

BUICK

REFERENCE BOOK



FOREWORD

In preparing this reference book, effort has been made to present only such information as will be of assistance in keeping the performance of the Buick car up to its normal high standard, having in mind as well, simplicity of language and convenience for ready reference. It deals with such adjustments and recommendations as to care which seasonal changes may require and minor operations which the owner might wish to perform himself or which emergencies might make necessary.

Keep this book in your car. It is dedicated to your convenience and satisfaction with your purchase, not so much with the idea of helping you out of trouble as to help you in keeping away from it.

BUICK MOTOR COMPANY

Division of General Motors Corporation

LOCK YOUR CAR

All Buick models are equipped with an effective anti-theft lock and the owner should take advantage of this protection by making a practice of **always** locking the car when parking.

IF YOUR CAR IS STOLEN—

1. It may be wrecked by a joy-rider.
2. You will have to notify the police and your insurance company.
3. Your theft insurance cost may be higher next year, because the rate will be based largely on how much it costs the insurance companies this year.
4. You will suffer inconvenience without your car until the insurance company settles.
5. You may have to go to court to identify your car if recovered.
6. You may aid the thief to carry out other and perhaps worse crimes by not locking your car.

SO—LOCK YOUR CAR

WARRANTY

It is expressly agreed that there are no warranties, express or implied, made by either the Seller or the Manufacturer of the Buick motor vehicles, chassis or parts furnished hereunder, except the Manufacturer's Warranty, being the standard warranty of the National Automobile Chamber of Commerce against defective materials only, as follows:

"The Manufacturer warrants each new motor vehicle, chassis or part manufactured by it to be free from defects in material and workmanship under normal use and service, its obligation under this warranty being limited to making good at its factory any part or parts thereof which shall within ninety (90) days after delivery of such vehicle to the original purchaser, be returned to it with transportation prepaid, and which its examination shall disclose to its satisfaction to have been thus defective; this warranty being expressly in lieu of all other warranties, express or implied, and all other obligations or liabilities on its part, and it neither assumes nor authorizes any other person to assume for it any other liability in connection with the sale of its vehicles. This warranty shall not apply to any vehicle which shall have been repaired or altered outside of its factory in any way so as, in its judgment, to affect its stability and reliability, nor which has been subject to misuse, negligence or accident. The Manufacturer makes no warranty whatever in respect to tires, rims, ignition apparatus, horns or other signalling devices, starting devices, generators, batteries, speedometers, or other trade accessories, inasmuch as they are usually warranted separately by their respective manufacturers."

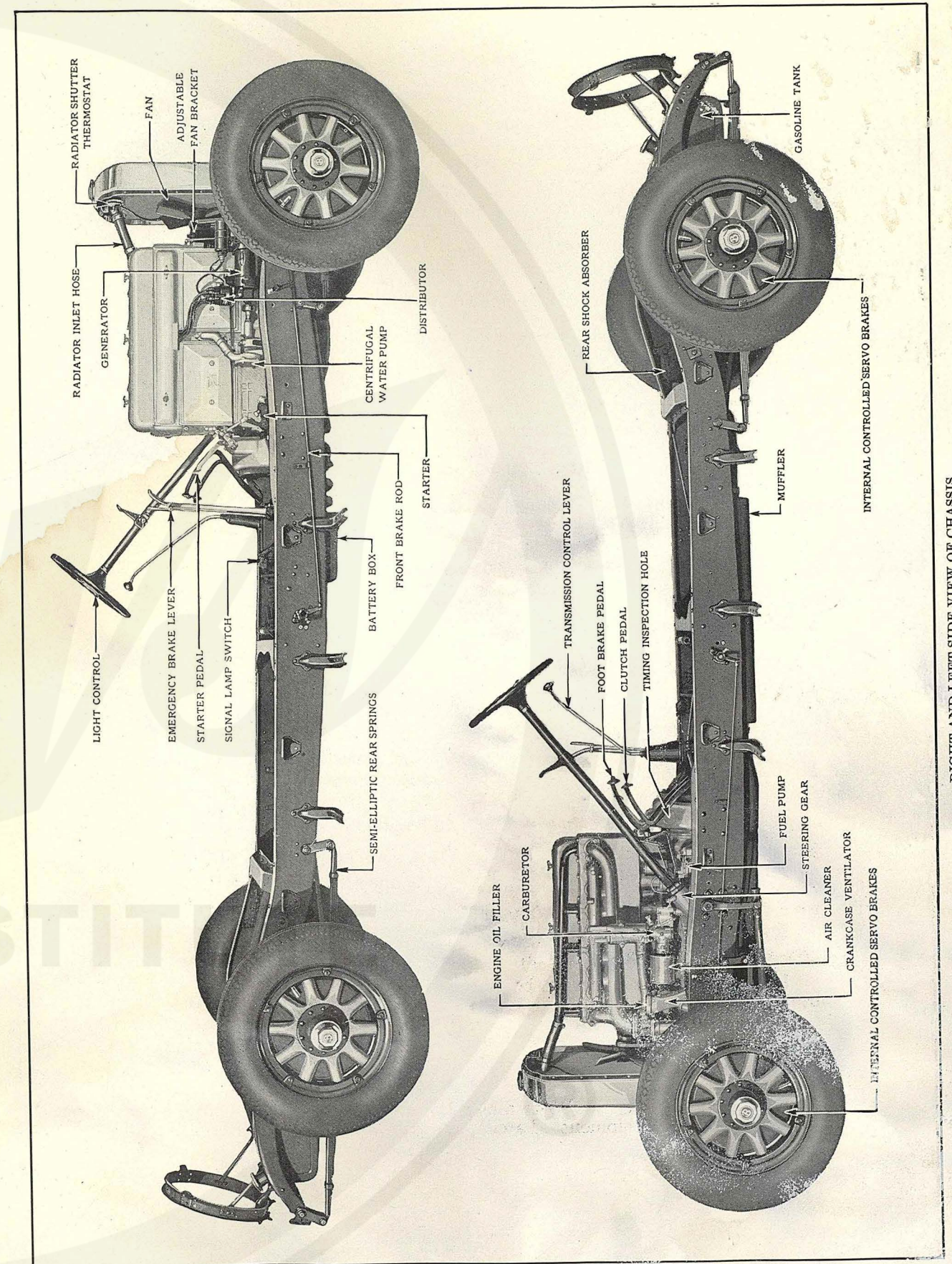
The Buick Motor Company reserves the right to make changes in design or add any improvement on Buick motor vehicles and chassis at any time without incurring any obligation to install same on motor vehicles and chassis previously purchased.

ORDERING BUICK PARTS

For the benefit and convenience of owners, Authorized Service Stations have been established throughout the country. These places carry a supply of genuine Buick parts, and all requests for parts should be placed with them. If some particular part is not available, the dealer can obtain it promptly from the factory branch or distributor.

When ordering parts from the dealer or Service Station, it is absolutely necessary that the following information be given:

1. The car serial number (to be found on plate on right side member under front fender).
2. Quantity.
3. Part name.
4. State year, model and style of car (i. e., touring, roadster, etc.).
5. Shipping directions. Write name and address *accurately*. Give city, state and method of shipment: Parcel post, express or freight.



RIGHT AND LEFT SIDE VIEW OF CHASSIS

SPECIFICATIONS

Weights—

Ask your Buick dealer for weights and license information.

H. P. Rating—

S. A. E. or N. A. C. C., Series 40—28.4; Series 50 and 60—33.75. Brake H. P. at 2800 R. P. M., Series 40—80.5; Series 50 and 60—98.

Bore—

Series 40— $3\frac{7}{16}$ "; Series 50 and 60— $3\frac{3}{4}$ ".

Stroke—

Series 40— $4\frac{5}{8}$ "; Series 50 and 60—5".

Cylinders—

Number of cylinders—6.

Firing Order—

1-4-2-6-3-5.

Displacement—

Series 40—257.5; Series 50 and 60—331.5.

Compression Corrected—

Series 40—84.5 lbs.; Series 50 and 60—82 lbs.

Compression Ratio—

Series 40—4.5 to 1; Series 50 and 60—4.35 to 1.

Serial No.—

On plate on right side of frame, beneath front fender.

Engine No.—

On right rear side of upper crankcase in rear of starting motor.

Wheel Base—

Series 40—118"; Series 50—124"; Series 60—132".

Tread—

Series 40—Front, $56\frac{3}{4}$ "; Rear, 58".
Series 50 and 60—Front, $56\frac{7}{8}$ "; Rear, 58".

Chassis Lubrication—

Zerk lubrication system.

Engine—

Six-cylinder, four stroke cycle.
Valve-in-head type.

Unit power plant suspended at three points rubber insulated from main frame.

Cylinders cast en bloc of special iron alloy. Cylinder block and crankcase are separate castings.

Crankshaft equipped with counterweights and a torsion balancer, supported by four large bearings.

Connecting rods and pistons properly balanced. Large valves mounted in detachable head readily accessible and operated by adjustable push rods.

Camshaft: Four bearings with cams forged integral with shaft.

Piston pins: Case hardened and ground.

Pistons: Cast iron, provided with three piston rings located above piston pin. The two upper being compression rings and the lower, oil seal type.

Cooling—

Water circulated by centrifugal pump, driven by spiral gears from camshaft, and temperature controlled by thermostatically operated radiator shutter. Fan driven by belt from pulley on camshaft. Capacity of cooling system, Series 40—4 gallons; Series 50 and 60—5 gallons, 2 quarts.

Lubrication—

Pressure feed system. Oil forced to all main and connecting rod bearings, also to rocker arms, push rods and timing gears. Cams, camshaft bearings, pistons and piston pins lubricated by oil mist thrown from connecting rod bearings.

Oil level gauge on crankcase and drain plug in bottom of crankcase.

Oil pressure gauge on instrument board.

Oil filter mounted on right side of dash.

Carburetor—

Automatic air valve, multiple nozzle type, supplied by fuel pump.

Automatic and manual heat control to insure proper vaporization at all engine speeds.

Air cleaner on carburetor intake.

Gasoline strainer on fuel pump.

Starting, Lighting and Ignition—

Complete Delco-Remy two unit system, built as integral parts of the engine. Generator thermostatically controlled and operating in conjunction with a large storage battery. Starting motor having an over-running clutch engagement device.

High tension jump-spark ignition system, with distributor and cutout relay mounted on the generator coil on timing gear housing. The distributor includes an automatic spark advance, with additional manual control mounted in center of steering wheel. The system also includes switch for controlling head lights, side lights, and tail light from the center of the steering wheel.

A current limit relay is provided to protect the electrical system from short circuits.

A combination stop, back-up, and tail lamp with stop and back-up features automatically controlled by operation of brakes and transmission when in reverse position.

Clutch—

Multiple disc, dry plate type, smooth and positive in action, with adjustment very accessible.

Clutch has ball bearing release which is lubricated by grease cup.

Transmission—

Selective sliding gear type, three speeds forward and one reverse.

Special heat-treated gears, positive interlocking hand control, integral with gearset.

Oil capacity: Series 40— $3\frac{1}{2}$ lbs. or pints; Series 50 and 60— $3\frac{3}{4}$ lbs. or pints.

Drive—

Through single, large, automatically lubricated universal joint and fully enclosed propeller shaft, through spiral bevel gears in rear axle.

Propeller shaft housing connected directly to rear end of transmission by large ball housing enclosing universal joint. Both torque and drive taken through ball joint.

Rear Axle—

Three-quarter floating type, with weight of car carried entirely on the housing.

Wheels are mounted on large Hyatt roller bearings.

Differential mounted on New Departure cup and cone type ball bearings and propeller shaft on

double and single row New Departure ball bearings.

Spiral bevel type driving gears, fully adjustable. Oil capacity: All models—6 lbs. or pints.

Front Axle—

Drop-forged and heat-treated I-beam section, reverse Elliott type.

New Departure cup and cone type front wheel bearings.

Ball thrust bearings on knuckles.

Brakes—

Service, or foot brakes, internal expanding on four wheels.

Emergency, or hand brakes, internal expanding on rear wheels.

Wheels—

Artillery type 19" diameter with large hub flanges, 10 spokes and 10 hub bolts each; demountable rims.

Tires—

Low pressure: Series 40—29 x 5.50; Series 50 and 60—31 x 6.50.

Steering Gear—

Semi-irreversible worm and roller type, with adjustment provided to take up wear. Horn button in center of, spark and throttle levers, headlight, sidelight and tail light switch on top of steering wheel.

Frame—

Strength and rigidity, combined with lightness provide a wide margin of safety and long life in the new double drop frame.

The side rails have a long, deep channel section and extra wide top and bottom flanges through the center where the strain is most severe. There is a gradual reduction in section toward each end with "kickup" over front and rear axles.

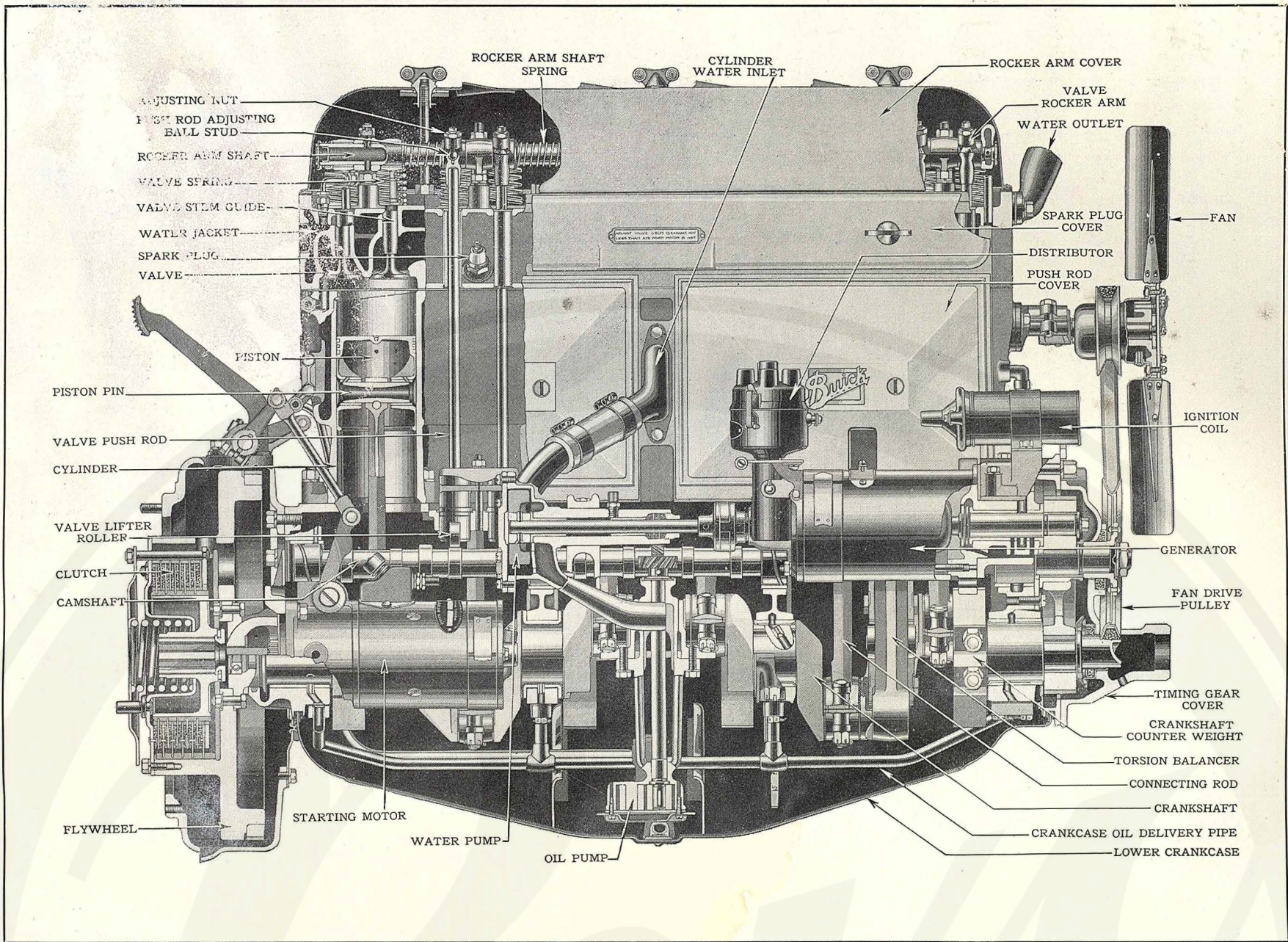
The side rails are rigidly tied together by cross members to prevent frame distortion.

Springs—

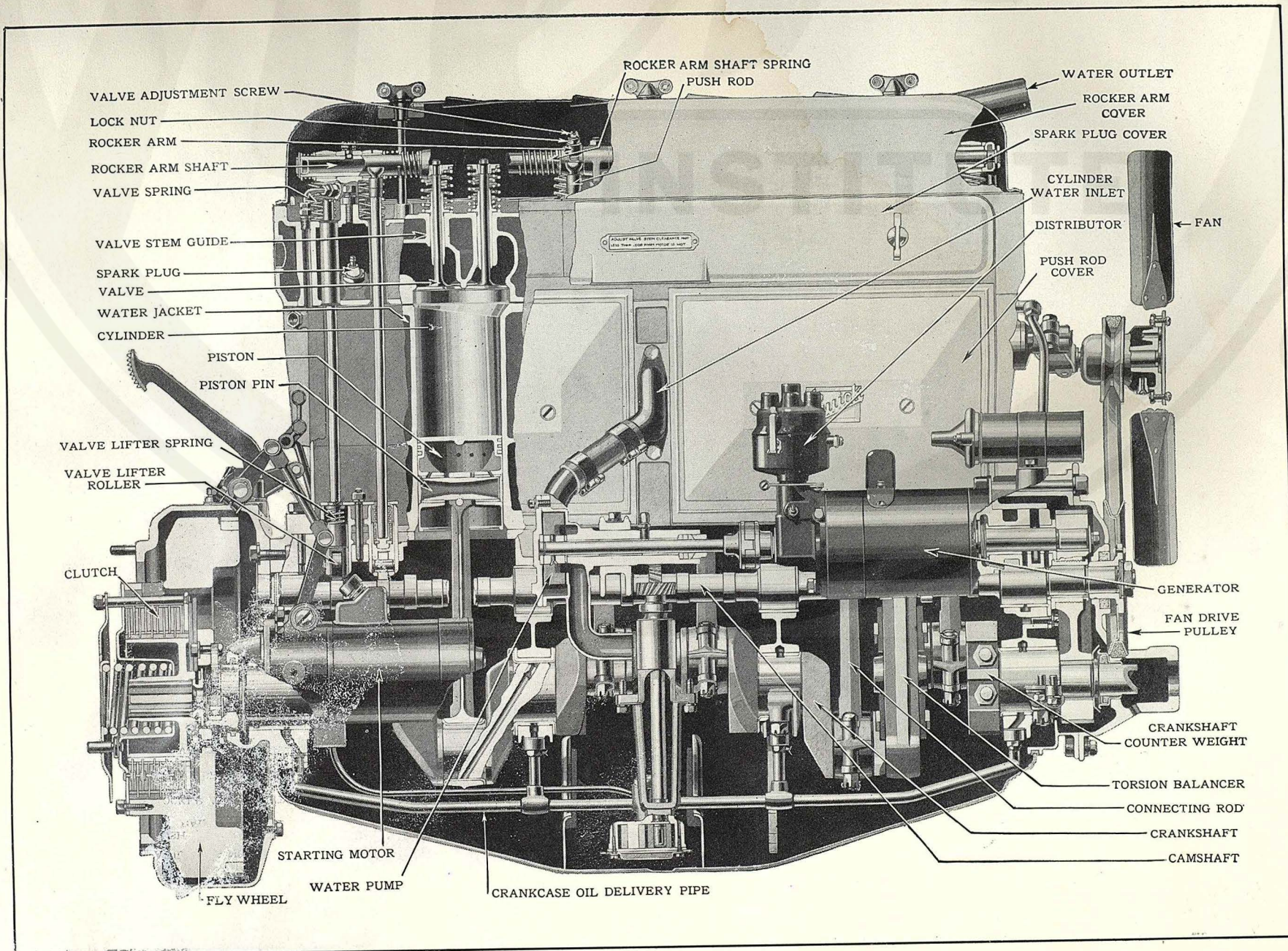
Semi-elliptic type front and rear.

Shock Absorbers—

Specially designed double acting hydraulic shock absorbers are used, both front and rear, on all models.



SECTIONAL VIEW OF SERIES 40 ENGINE



SECTIONAL VIEW OF SERIES 50-60 ENGINE

OPERATION AND CARE

The functions, care and adjustment of each unit of the car will be described in following chapters, but for convenient reference, the more essential features have been particularly emphasized in the following brief summary. At the head of the list are shown the capacities of various units, for convenience in taking care of lubrication, cooling and fueling:

Engine Crankcase—

Series 40—Dry, 7½ qts.—Refill, 5½ qts.

Series 50-60—Dry 8 qts.—Refill 6 qts.

Transmission—

Series 40—3½ pints or pounds.

Series 50-60—3¾ pints or pounds.

Rear Axle—

All Series—6 pints or pounds.

Cooling System—

Series 40—4 gallons.

Series 50-60—5½ gallons.

Gasoline Tank—

Series 40—19 gallons.

Series 50-60—22 gallons.

1. Lubrication—

Owing to the use of the oil filter, crankcase ventilator and radiator shutter, it is not necessary that the engine oil be changed oftener than four times yearly, but in the intervals between these changes, the oil level in the crankcase should be maintained to the "full mark" on the oil level gauge.

The crankcase ventilator and the radiator shutter require no attention, but the lubrication chart should be studied and its recommendations for the chassis in general observed systematically.

2. Cooling System—

The radiator should be kept filled within three inches of top with clear water in Summer and with anti-freeze mixture in Winter.

Inspect fan belt occasionally, especially in hot weather and tighten if necessary.

Keep water pump packing nut tight to prevent leakage.

3. Brakes—

Have the braking system inspected occasionally and adjusted if necessary. See that all pins and other connections are lubricated regularly. Do not use the brakes for "stunt" purposes.

4. Steering—

Keep steering mechanism properly adjusted and well lubricated. Have front wheel alignment inspected frequently and adjusted if necessary.

5. Clutch—

Do not "ride" clutch pedal or slip clutch.

6. Starting—

Release the starting pedal, immediately the engine begins to fire. Do not continue cranking engine with starter if ignition does not take place promptly. If necessary to use "choke" in starting, do not keep button out too long, as cylinders will be flooded with gasoline. Do not race the engine immediately upon starting or drive the car at high speed until thoroughly warmed up. Scoring of pistons and cylinders may follow if the precaution is not observed.

7. Fuel—

If necessary to use "choke" in starting, the button should be pushed in about three quarters of the way, immediately the engine starts to fire and all the way in as soon as engine is thoroughly warmed up.

8. Battery—

Keep battery plates covered with distilled water and all connections properly tightened. Register new car battery with authorized battery service station for systematic inspection.

9. Transmission—

Shift gears on a hard pull and relieve the engine of unnecessary strain. Depress clutch pedal fully when shifting gears. Do not shift into reverse when car is moving forward.

10. Springs—

Keep the spring clips tight and shackle bolts well lubricated and adjusted to prevent side play. Springs should be thoroughly lubricated between leaves.

11. Shock Absorbers—

No adjustments are necessary, and additional oil will only be needed in the event that leakage

may occur. Oil for this purpose may be obtained from authorized representatives of the United Motors Service, Inc.

12. Tires—

Test tire pressures frequently and maintain same in accordance with figures shown in table on page 53.

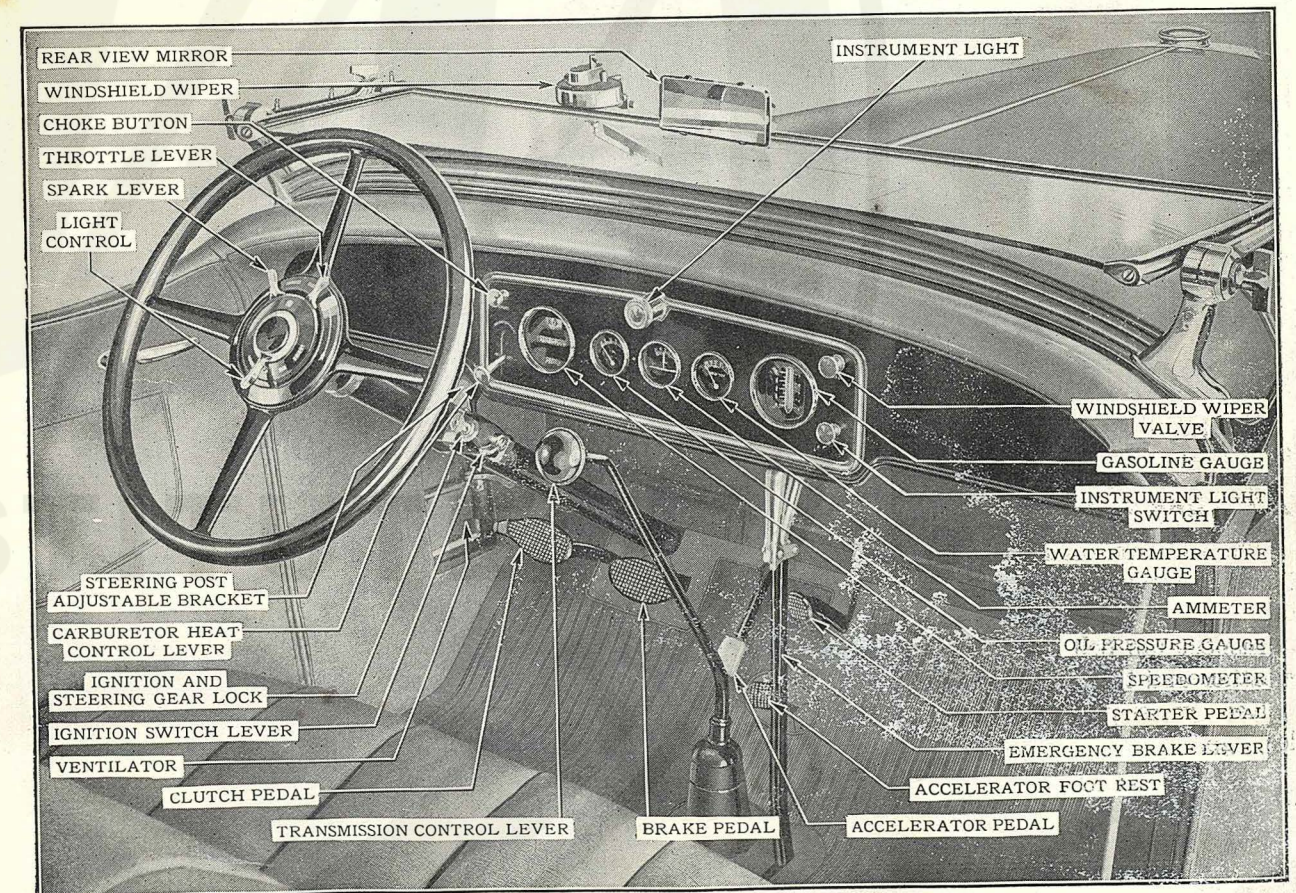
13. Care of Paint and Plated Surfaces.

See instructions under "General Care of Car," page 56.

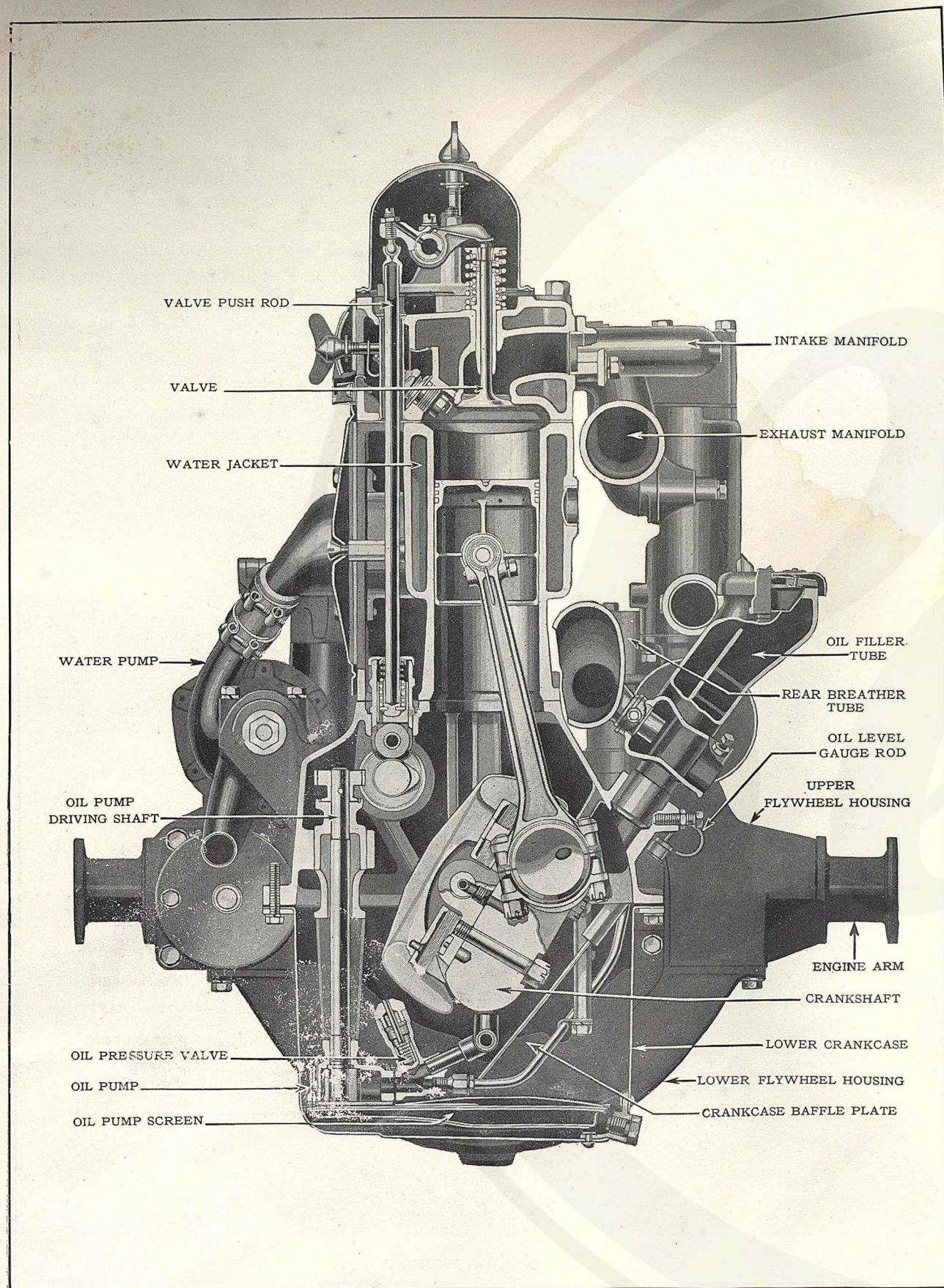
14. Inspection—

The following general inspections and adjustments are recommended in preparation of the car for winter and summer driving:

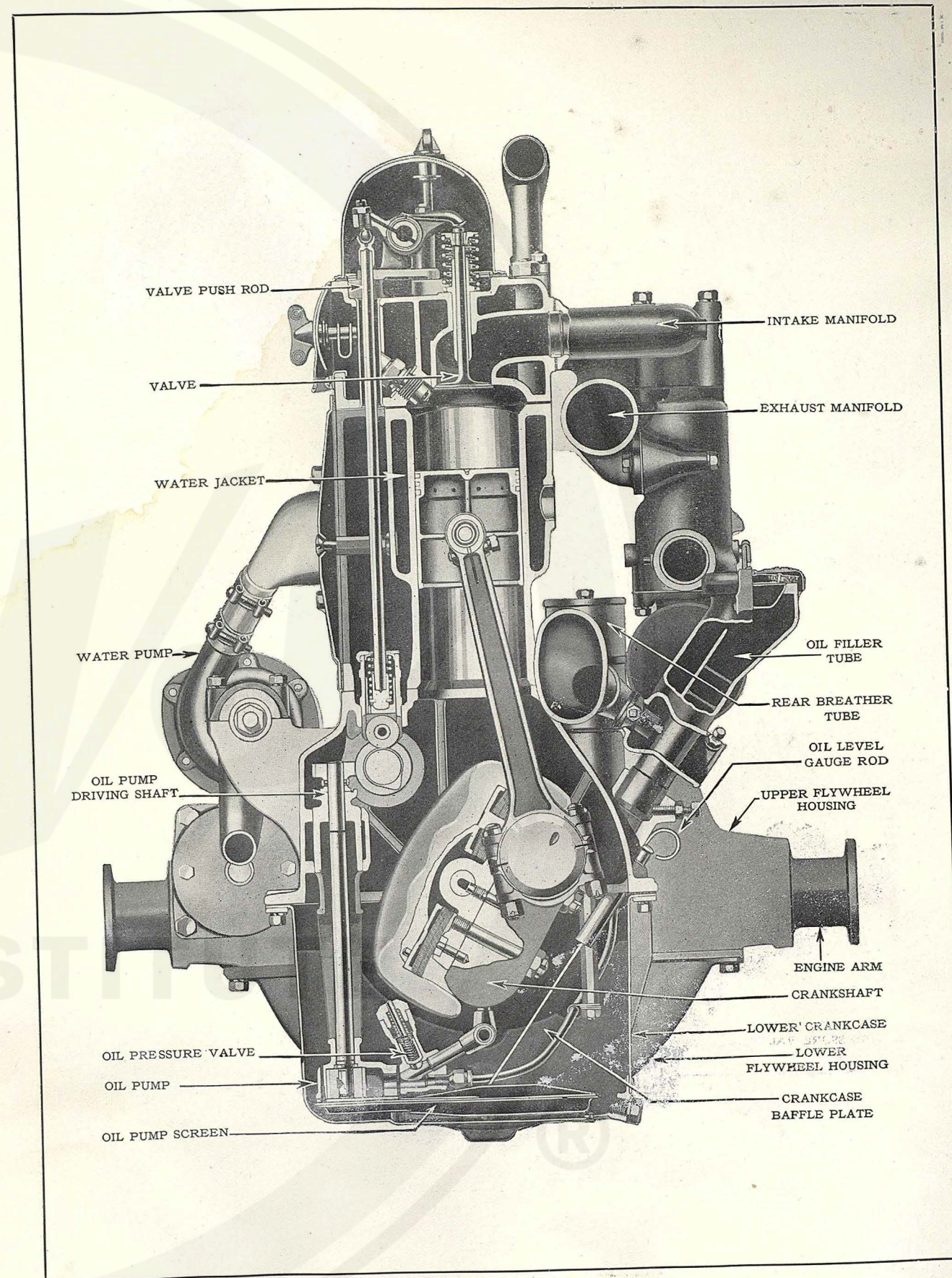
1. Adjust valves.
2. Time engine.
3. Clean and adjust spark plugs.
4. File and adjust distributor points.
5. Test, clean and fill battery.
6. Adjust generator charging rate.
7. Test oil filter.
8. Flush out and fill cooling system with anti-freeze mixture in Fall and water in Spring.
9. Inspect and tighten all wiring.
10. Oil and grease.
11. Change engine oil.
12. Change oil in transmission and rear axle.
13. Inspect and adjust horn.
14. Inspect tires for nails, and glass, and inflate to proper pressures.



DRIVING COMPARTMENT



END SECTIONAL VIEW OF SERIES 40 ENGINE



END SECTIONAL VIEW OF SERIES 50-60 ENGINE

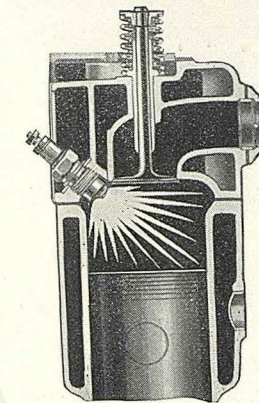
POWER SYSTEM ENGINE

Buick is the pioneer builder of valve-in-head engines for motor cars, which principle of design it has followed for more than twenty years. The present commanding position of Buick in the automotive industry is due in considerable measure to its consistent adherence to this type of construction. There are a number of very important advantages in the valve-in-head design and these will be readily apparent in a consideration of the following points:

1. The gasoline engine is that type of machine which derives its power from the heat developed in burning a mixture of fuel and air within its cylinders. The type of engine, therefore, that consumes in the highest degree the heat units in each charge of fuel and air, will show the greatest efficiency and economy in service, other things being equal. Of all internal combustion engines this condition is most closely met in the valve-in-head type which has the smallest area of combustion chamber surface and consequently less dissipation of the heat of combustion through the walls. The contrary obtains, however, in that type of engine with the valve pockets in the sides of the combustion chamber, thereby necessitating a greater area of combustion chamber surface and consequently a greater percentage of heat wastage. The thermal efficiency of the valve-in-head type is highest, which means that the largest possible amount of energy is developed from a given fuel consumption and, from the owners' point of view, this provides greater economy in operation.

2. In obtaining perfect combustion two conditions must be provided: The cylinders must be completely cleared of all burned gases before a fresh charge of fuel and air is admitted. Spark plugs must be so located that rapid ignition may be obtained, otherwise slow and therefore wasteful combustion will take place. The location of the valves in the cylinder head and directly over the pistons and the position of the spark plugs in the valve-in-head type of engine meet these two conditions.

3. Important from the standpoint of maintenance will be found the accessibility of the valves and the valve actuating mechanism, a feature which will commend itself to all owners who may desire personally to take care of minor maintenance operations.



COMBUSTION CHAMBER

The Four Strokes—

The Buick engine is a four-stroke cycle engine. It takes four strokes of the piston or two revolutions of the crank for each explosion or working stroke. The four strokes are as follows:

(a) **Suction Stroke.** The intake valve opens and the piston moving down draws a mixture of gas and air into the cylinder from the carburetor.

(b) **Compression Stroke.** Intake and exhaust valves closed, the piston moving up compresses the mixture of gas and air into a highly combustible condition.

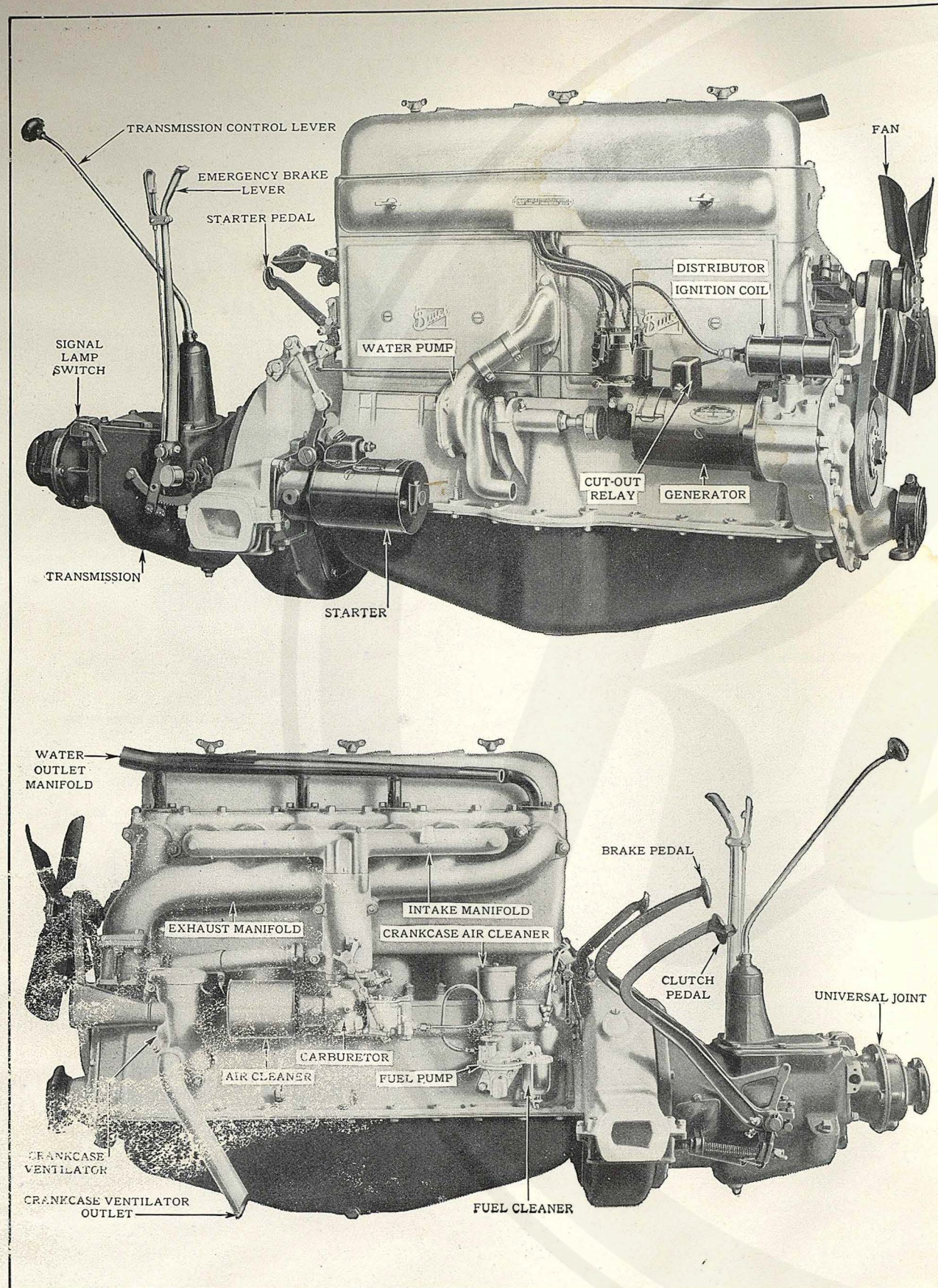
(c) **Power Stroke.** When the piston has reached the top of the stroke the spark plug fires and causes an explosion of the compressed gas mixture, forcing the piston down to supply the power.

(d) **Exhaust Stroke.** The intake valve remains closed and the exhaust valve now opens, allowing the dead gas to be forced out on the upward stroke of the piston and clearing the cylinder for the next charge.

There is but one power stroke out of four, the other three preparing for the power stroke. The engine has six cylinders but the crankshaft actually receives only three impulses every revolution.

Piston—

The piston is attached to the upper end of the connecting rod by means of a hardened and ground pin, the driving power being transmitted through the connecting rods to the crankshaft and from this point on through the clutch and transmission to the rear axle and wheels.



RIGHT AND LEFT SIDE VIEW OF SERIES 60 ENGINE

Connecting Rods—

Connecting rods are attached to the crankpins of the crankshaft. The natural wear of the crankpin and connecting rod bearings may be taken up by removing, as may be necessary, one or more of the thin shims provided between the rod and its cap. This work should be done by an experienced mechanic, as the rods and pistons must be maintained in proper alignment.

Crankshaft—

The crankshaft is made of high carbon steel, drop-forged and heat-treated, and having four bearings of large diameter. It is also equipped with counterweights and a torsion balancer.

The counterweights are attached to the crankshaft to counter-balance the crankpins and lower ends of the connecting rods. The torsion balancer absorbs the tendency of the crankshaft to twist under the power impulses of the pistons and delivers these impulses back to the shaft after the piston forces are spent. It is mounted on No. 2 crank throw and its bearings are lubricated under pressure from the crankshaft oiling system. As part of the crankshaft, it is completely enclosed in the crankcase and protected from dirt and atmospheric conditions.

Camshaft—

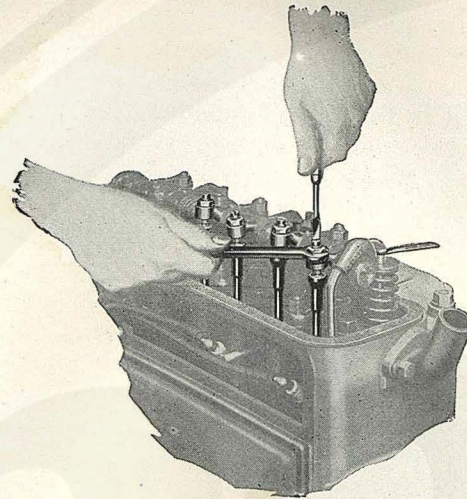
The camshaft is made of low carbon steel, drop-forged, case-hardened and is supported by four bearings. The cams are forged integral and shaft is driven through helical gears.

Valves—

The valves (inlet and exhaust) are operated off the cams by means of valve lifters, push rods and rocker arms, opening at the exact point in the cycle determined by the angular relation between the camshaft and crankshaft.

Adjusting Push Rods—

Push rods should be adjusted only when engine is normally hot, the usual method being by means of a feeler as illustrated in sketch, with the engine idling. However, if not practiced in this method, the owner may proceed as follows:—Remove spark plug. Turn engine with hand crank until intake valve closes in cylinder in which adjustment is to be made. Continue to crank until piston reaches



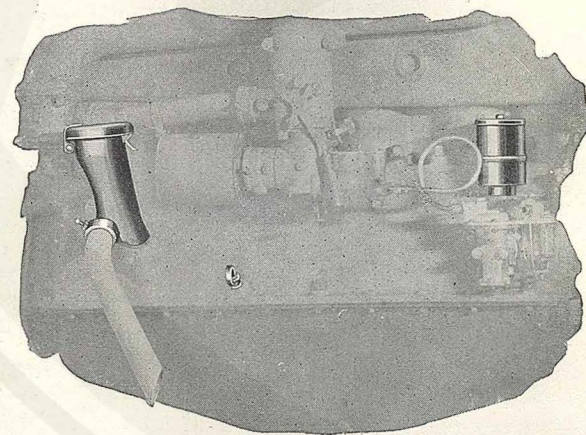
PUSH ROD ADJUSTMENT

top dead center. Both valves in that cylinder may then be adjusted by means of adjusting screw and locknut on end of rocker arm, and clearance between rocker arm and valve stem should be not less than .008 inch when engine is hot. Be sure that lock nuts are set up tight.

CAUTION: Closer adjustment than the above will cause trouble, such as loss of power, hard starting, poor gasoline economy, burning and warping of valves, necessity for their frequent grinding, and the blowing out of muffler. For the first 500 miles operation of the new car, the push rods should not be adjusted closer than .010 inch, in order that the valves may become properly seated.

Valve Timing—

The crankshaft gear is one-half the diameter of



OIL FILLER AND OIL LEVEL GAUGE

the camshaft gear, thus driving the camshaft at one-half the speed of the crankshaft. The camshaft gear, therefore, is meshed with the crankshaft gear in such manner that the valves open and close at exact points in the inlet and exhaust strokes. These gears are set in such relation to one another that the position of the pistons and the valves is correctly timed when the punch marks are in line with one another. The tooth and the space, each bearing a single punch mark, are meshed together. **This setting must be adhered to strictly.**

Engine Lubrication—

The oil is placed in the engine through the oil filler, which is located on the left side of the engine. The amount of oil in crankcase is accurately measured by an oil level gauge located on the left side of the engine on the upper crankcase and should be maintained to the "full" level as indicated by this gauge. Complete change of oil in crankcase is required only every three months.

Oil from the reservoir in lower half of the crank-

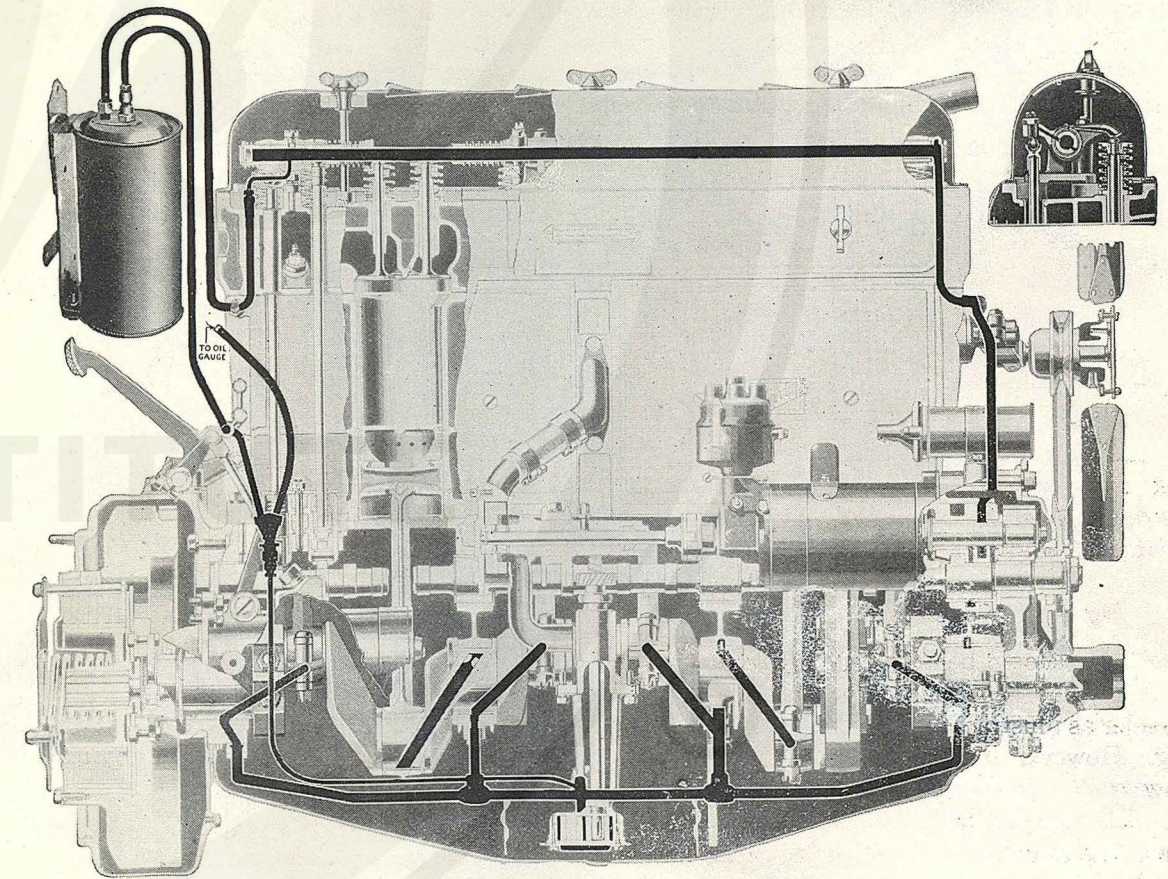
case is drawn through a strainer into the gear pump enclosed in the lower crankcase.

The oil pump forces the oil through distributing pipes to the four crankshaft bearings and through holes drilled in crankshaft to the six connecting rod bearings.

A second supply line from pump carries oil under pressure through the oil filter mounted on right side of dash, to the hollow rocker arm shaft from which it is distributed to the rocker arm bearings and ball ends of push rods. From the front end of rocker arm shaft, the oil is carried to the timing gear case, furnishing lubrication for the gears and also the front camshaft and generator shaft bearings.

Oil thrown off from the connecting rod bearings forms a heavy mist within the crankcase which lubricates the pistons, piston pins, cylinder walls, cams, valve lifters and the three camshaft bearings within the crankcase.

If indicator hand on pressure gauge should fall to zero while engine is running, the engine should be immediately stopped and



PRESSURE FEED OILING SYSTEM WITH OIL FILTER

an investigation made to determine the reason.

Oil Circulating Pump—

The oil pump consists of two small gears enclosed in a tight fitting housing and driven by a vertical shaft and spiral gear from the camshaft. As the gears turn, they take the oil between their teeth and the housing, carry it around to the outlet and force it to flow through the distributor pipe. The pump is automatic in action and requires no attention or adjustment, except the addition of fresh oil to the crankcase reservoir as often as necessary to keep the oil level up to the "full" mark on oil level gauge.

Oil Pressure Gauge—

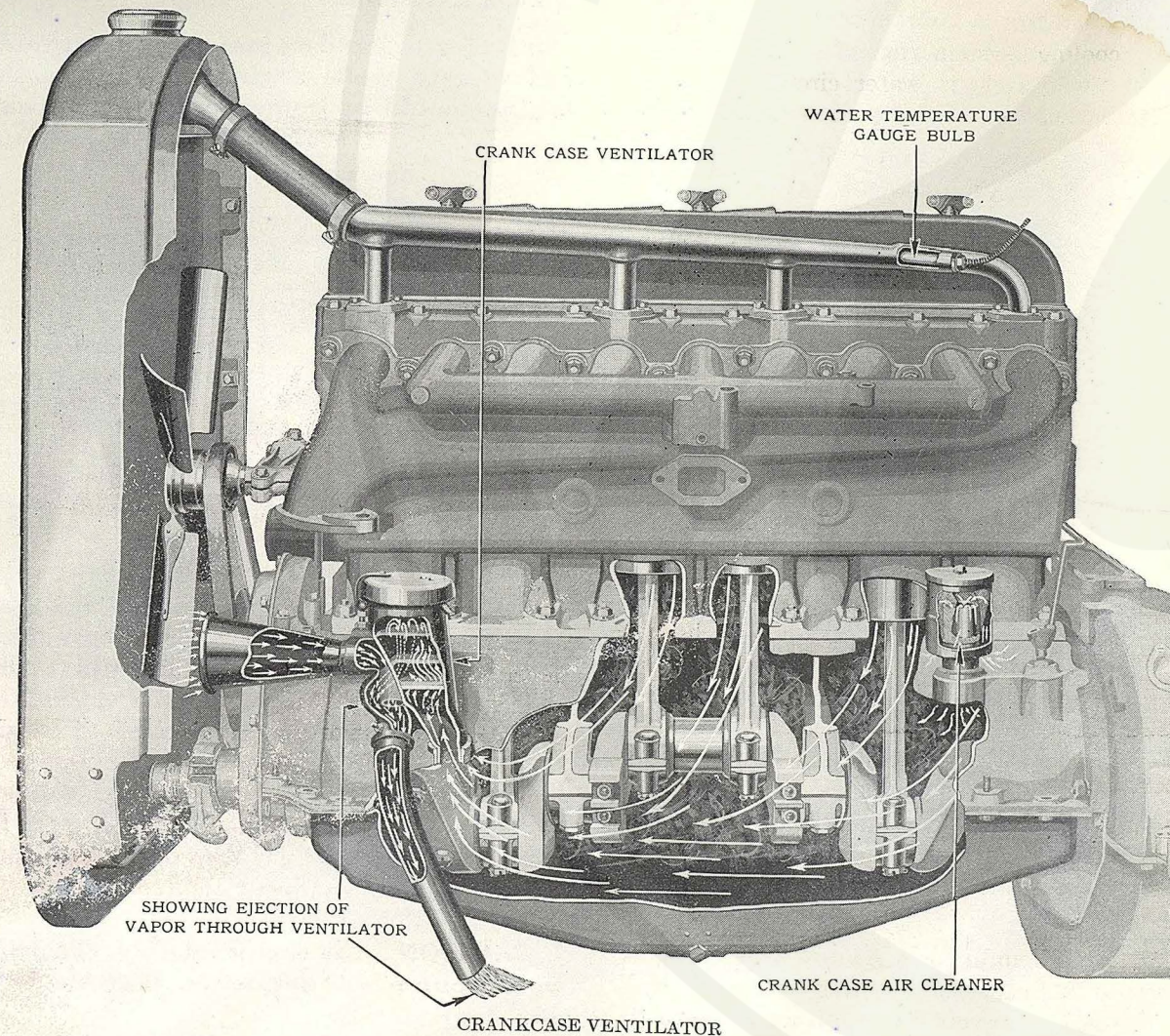
The oil pressure gauge merely indicates circula-

tion of the oil and does not show when the supply in the crankcase reservoir is running low. Watch and test the oil level in the crankcase by reading oil level gauge.

CAUTION: Do not attempt to determine oil level while engine is running. Wipe oil level gauge clean before taking reading.

Oil Filter—

The function of the oil filter is to remove from the crankcase oil, all particles of dirt and carbon not already eliminated from circulation by the oil pump screen. When the filter is entirely free of dirt, its capacity is such that the quantity of oil in crankcase will pass through the filter approximately every five minutes, at a car speed of 25 miles per hour. This rate of flow will gradually decrease until such time as filter ceases to func-



tion, due to clogging, and while there is no definite limit to the life of the filtering unit, it is advisable to replace this unit after approximately 10,000 miles use.

Owing to improved construction of the filter the replacement can easily be made and at a reasonable cost.

Crankcase Ventilator—

The crankcase is provided with a ventilator to remove excessive dilution. Water and fuel are the two elements which cause dilution. The water is a by-product of combustion and is the most harmful of the two diluents. A small amount of fuel is not harmful and is really necessary in cold weather. The ventilator will remove all water from the

crankcase and hold the fuel content to a minimum. The car owner should observe the following suggestions:

1. Avoid use of "choke" longer than necessary.
2. Do not idle engine or drive at extremely slow speeds for long periods of time.
3. Do not flush crankcase with kerosene.
4. Keep the engine in good mechanical condition. See that the compression is good; that the ignition system functions properly and that the carburetor is correctly adjusted.
5. An engine in good condition and in proper adjustment should show some appreciable amount of oil consumption. Check the amount of oil in crankcase at regular intervals and maintain level to "full" mark on oil level gauge.

COOLING SYSTEM

The cooling system includes the radiator, cylinder water jackets, water circulating pump, thermostatically controlled radiator shutter, and fan.

Radiator—

The radiator consists of an upper and lower tank connected by many narrow passages in the core. The hot water from the engine enters the upper tank and gradually flows through the passages in the core to the lower tank while a current of air is circulated through the openings in the core by the fan. An outer shell encloses the radiator and supports it on the frame of the car. Water capacity of cooling system is 4 gallons for Series 40 and 5 gallons, 2 quarts for Series 50 and 60.

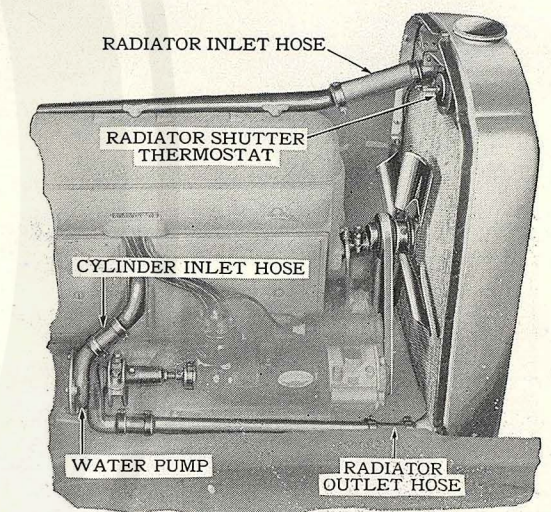
Fan—

The fan is mounted on a bracket attached to the cylinder block and is driven by a belt from a pulley on the camshaft. A V-type belt is used on all models.

Adjustment of the fan is made by loosening the clamp bolt at upper end of fan bracket, pushing the fan to the left until proper tension of the belt is obtained, and tightening the clamp bolt.

Lubrication—

The fan is mounted on a plain bearing which is lubricated under pressure by a gear pump, drawing oil from a reservoir in the fan hub. A stand-



COOLING SYSTEM

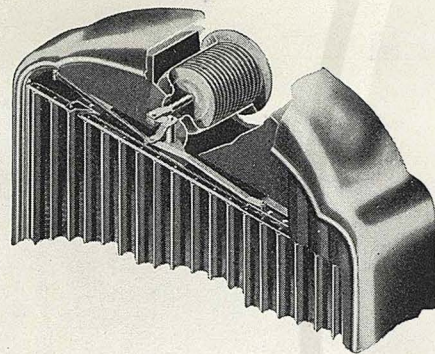
pipe inside the hub is provided to control the oil level. A filler screw is provided and with the filler hole at top, insert sufficient quantity of oil so that when fan is rotated and filler hole is at bottom, the excess oil will drain off. When oil ceases to run out, quantity remaining in fan hub is sufficient for lubrication of bearing for approximately 5000 miles and filler screw may then be replaced, making sure that it is properly tightened.

CAUTION: Use engine oil only, not grease as the pump will not deliver it to the bearing.

Water Pump—

The water pump is of the centrifugal type and consists of an impeller with straight blades fastened to the shaft, and a water-tight housing with inlet and outlet connections. The gravity pressure of the water carried in the radiator, forces it to the pump which throws it off at the outer ends of the blades and out of the housing to the cylinder jackets.

In order to keep the housing water-tight, the pump shaft is packed with ring packing impregnated with graphite lubricant. Whenever the packing nut shows evidence of leakage, it should be tightened with engine running slowly, but only enough to stop the leak as further tightening will cause binding and cutting of the shaft.



THERMOSTAT AND RADIATOR SHUTTER

Thermostatic Control—

Thermostatic control of engine temperature is obtained by a thermostat placed in the upper tank of radiator which automatically operates the radiator shutter.

When the engine is cold, the shutter is closed, cutting off the passage of air through the radiator. When the temperature of the water reaches a pre-determined point, the thermostat opens the shutter to the degree necessary to maintain the correct operating temperature.

In addition to controlling the water temperature, the shutter also controls the temperature of the air under the hood, thus assisting in carburetion and greatly reducing the "warm up" period.

Water Temperature Gauge—

An indicator is mounted on the instrument board of all models, which registers the temperature of the water in the cooling system.

Draining—

To drain cooling system, open drain cock in bottom of radiator and do not store car without draining cooling system thoroughly.

Anti-Freezing Mixture—

Alcohol	Specific Gravity	Series 40	Series 50 & 60	Freezing Point
20%	.978	3.2 qts.	4.4 qts.	19°F. above zero
30%	.968	4.8 qts.	6.6 qts.	10°F. above zero
40%	.957	6.4 qts.	8.8 qts.	2°F. below zero
50%	.943	8.0 qts.	11.0 qts.	18°F. below zero
60%	.927	9.6 qts.	13.2 qts.	35°F. below zero

As alcohol tends to evaporate more rapidly than water, thus raising the freezing point of the solution, it is necessary to add alcohol at frequent intervals. With the aid of an hydrometer the specific gravity of the solution can be determined and the corresponding freezing point obtained from the foregoing table. In making specific gravity determinations, care should be taken to have the temperature of the solution being tested between 55° and 65°F. or serious error will result.

Solutions containing calcium chloride and similar compounds tend to corrode the metal parts of the cooling system and are not recommended. Solutions composed of distilled glycerine or ethylene glycol should be used only if the instructions furnished by the manufacturers are carefully followed.

Cleaning—

Once or twice a year, particularly in the spring after the use of alcohol or other anti-freezing mixtures it is advisable to clean the cooling system. In performing this operation, the following suggestions may be found of assistance:

First drain the system thoroughly and after dissolving a pound of sal soda or a half pound of lye in five gallons of water, pour mixture in the radiator after straining through a cloth. Run the engine slowly for five minutes and then drain the cleansing mixture. Again fill the system with clear water, running the engine as before; and after draining this thoroughly, the radiator may be refilled for use. Thorough flushing of the system after using the cleansing mixture is essential in view of the detrimental action of such mixtures on the hose connections.

It is further suggested that contact of the cleansing mixture with the enameled or painted surfaces will injure the finish.

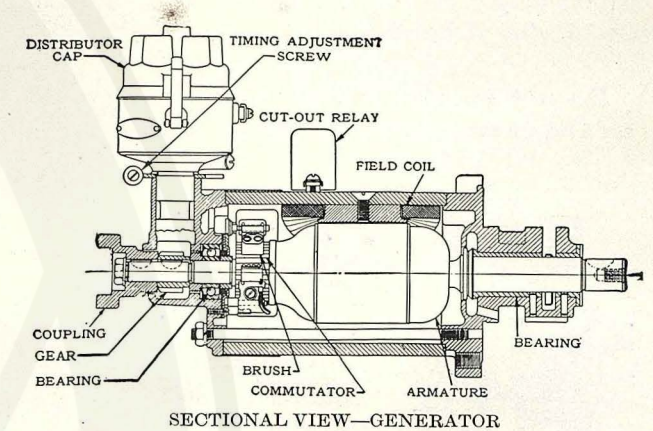
CAUTION: Never pour cold water in the radiator when its water content is extremely low and the engine very hot as cracking of

the water jacket may follow. Give the engine an opportunity to cool off before adding cold water.

STARTING, LIGHTING AND IGNITION

The Delco-Remy system of starting, lighting and ignition is used on all models. This system consists of starting motor, generator, distributor, ignition coil, cut-out relay, and lighting control on the steering wheel. It is of the six-volt, single wire or grounded type, the engine and frame of the car forming the return side of the electrical circuit.

Ignition switch in combination with lock on steering column is used, but this is not part of the Delco-Remy system.

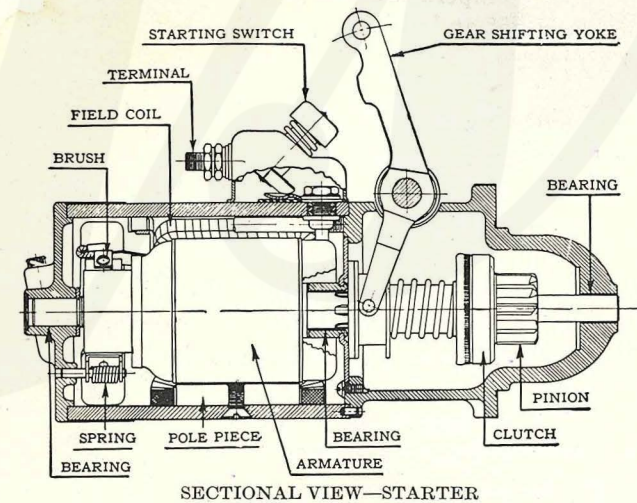


sufficient amount to keep the storage battery in a properly charged condition. Current for lighting and ignition is supplied by the storage battery when the engine is stopped and during car speeds under approximately eight miles per hour.

Charging Rate Regulation—

Different conditions of driving require varying charging rates to obtain the best results from the system as a whole. For example: A physician's car operated for short distances and requiring frequent starting and considerable use of lights, needs a higher charging rate than a car which is driven long distances, with little use of lights. A thermostat is provided in the generator, for automatic regulation of the charging rate to meet these varying requirements.

The adjustment of the thermostat should never be changed. If unusual driving conditions should make adjustment of the charging rate necessary, this may be done by adjustment of the "third brush," but the operation should be attempted only by some one thoroughly familiar with the proper procedure. When the car leaves the manufacturer, the charging rate is adjusted to meet the requirements of the average driver.

**Starting Motor—**

This unit serves the purpose of cranking the engine for starting. The initial movement of the starter pedal causes the starting pinion to engage with the teeth on the flywheel and further movement of pedal closes the switch on top of starting motor. This completes the electrical circuit and cranks the engine. The starter pedal should be released as soon as the engine begins to fire.

Generator—

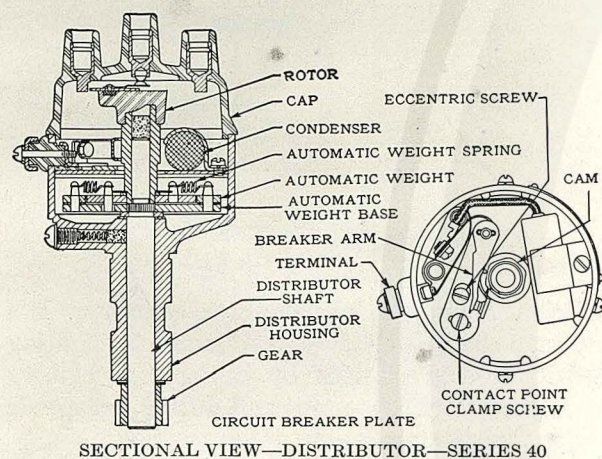
The purpose of the generator is to provide current for lighting and ignition and in addition, a

Generator Lubrication—

An oiler is located at the rear end of the generator and a few drops of engine oil are required each 500 miles to lubricate the generator bearing. Zerk connection is provided on the distributor housing and should receive attention every 500 miles.

The distributor rotor should be removed every 2000 miles and a few drops of oil placed on the felt wicking in the top of the cam. This lubricates the bearing and surface of the cam.

Do not for any reason place oil or grease on the commutators of the generator.

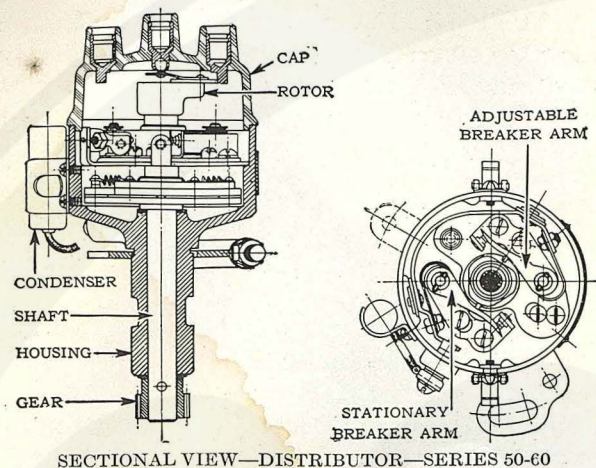
**Distributor—**

The distributor is mounted on the rear end of the generator and its purpose is to bring about the proper timing and distribution of the ignition current.

At normal engine speeds the spark advance is automatically regulated within the distributor but under certain conditions of driving, the spark lever on the steering wheel should be used to retard or advance the spark.

The spark should be retarded during the starting operation and at slow idling speeds, or when engine labors under heavy pull. Under all other conditions it should be fully advanced.

The distributor used on the 40 Series is a single breaker arm type. The 50 and 60 Series is a double breaker arm type, breaking alternately, thus sharing the work which would otherwise be done by one.

**Breaker Points—**

The breaker points are carried in the distributor housing below the rotor, and their function is to interrupt the low tension (or battery) current at the proper time to produce the spark. The points should be so adjusted that the clearance between them when the contact arm is directly on top of cam, is .018 inch.

Timing the Ignition—Series 40—

1. Check Breaker Point Gap:
 - (a) Remove distributor cap and rotor, Fig. 1.
 - (b) Loosen distributor head clamp screw (A).
 - (c) Rotate distributor head until breaker points open as wide as possible.
 - (d) Check the gap with .018" feeler gauge.
 - (e) If the gap is incorrect, loosen clamp screw (B) and turn eccentric screw (C) until the gap is just .018".
 - (f) Tighten clamp screw (B).
2. Remove valve rocker arm cover, Fig. 2.
3. Uncover timing hole at the left of flywheel housing, Fig. 3.
4. Set spark lever on "advance" position, Fig. 4. Note that screw (E) is at the front end of slot.
5. With ignition off crank engine by hand until No. 6 cylinder exhaust valve (D), Fig. 2, opens and starts to close. Then crank over very slowly and watch the timing hole, Fig. 3, until the 15° mark is directly opposite the index line. This is the position to fire No. 1 cylinder.
6. With screw (A) loose, (Fig. 5), turn the distributor head so that terminal (F) is toward the front of car. The six high tension terminals will then be in positions as shown in Fig. 5.

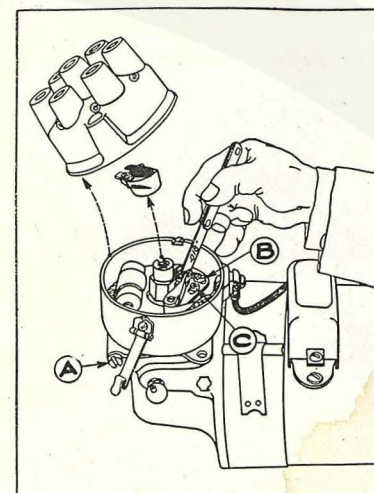


Fig. 1

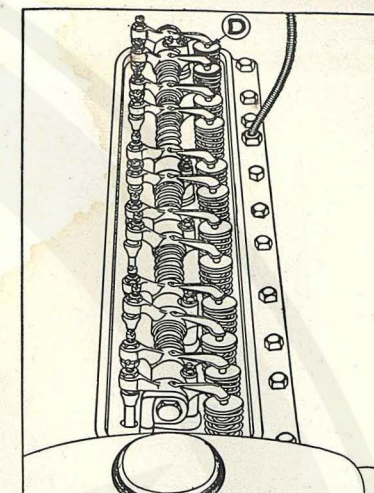


Fig. 2

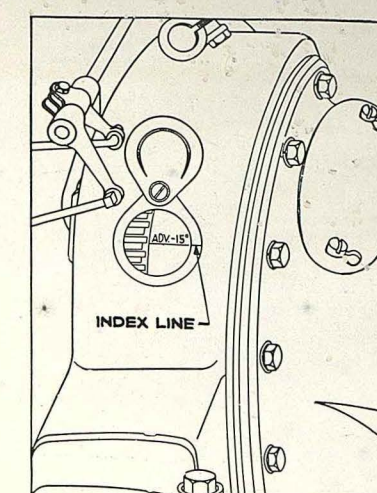


Fig. 3

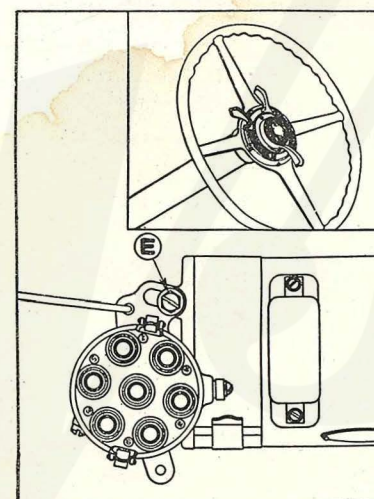


Fig. 4

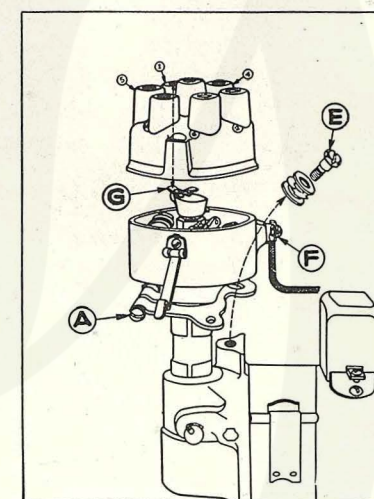


Fig. 5

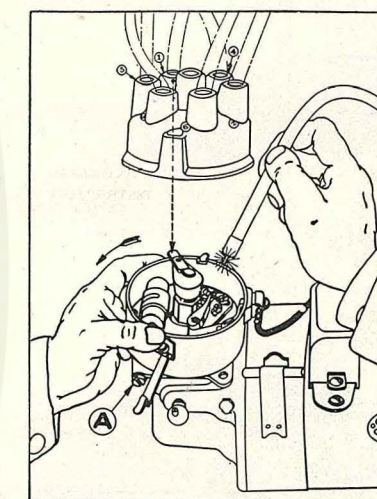


Fig. 6

TIMING IGNITION DIAGRAM—SERIES 40

7. Important—**Rotor point (G) must be directly under No. 1 high tension terminal.** If it is not—remove cap screw (E) at back of distributor head; lift up the whole assembly; turn the rotor so that point (G), Fig. 5, is directly under No. 1 H. T. terminal; let the assembly down again and replace screw (E). The distributor head and rotor should now be in positions as shown in Fig. 6.

8. To make the final adjustment, turn the distributor head very carefully in a counter clockwise direction until the breaker points **just barely** open. This can be determined by turning on the ignition and holding the center H. T. wire to form a gap with distributor head (See Fig. 6)

when the points open. There will be a spark across the gap. Lock the distributor head in this position by tightening screw (A).

9. To check the above timing operation—replace the distributor cap and center H. T. wire; disconnect all spark plug wires except No. 1; take No. 1 spark plug out from cylinder and lay it on some metal surface of engine with its thread grounded and spark points clear; then with ignition on, turn engine over slowly for two complete revolutions, tapping the crank lightly as the 15° mark approaches the index line (Fig. 3). The spark will occur in the plug when 15° mark lines up with index line if the timing is correct.

10. Assemble removed parts.

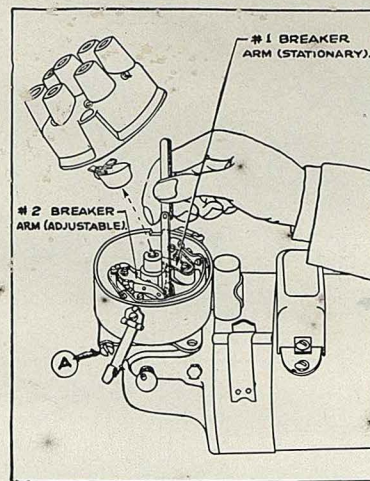


Fig. 7



Fig. 8

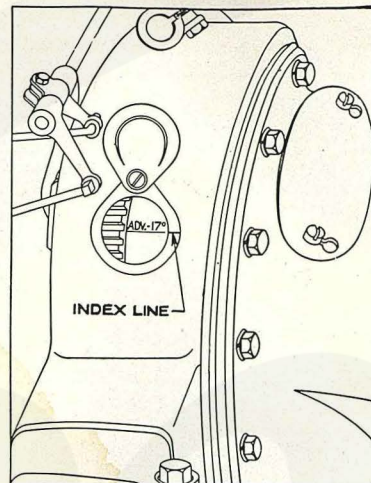


Fig. 9

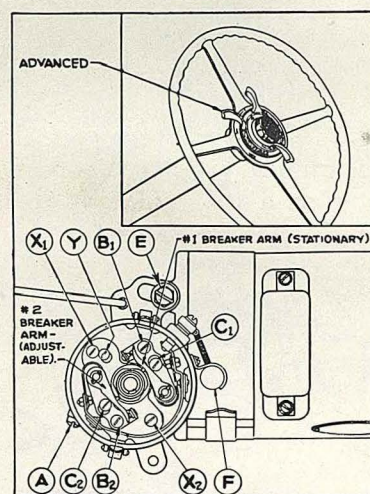


Fig. 10

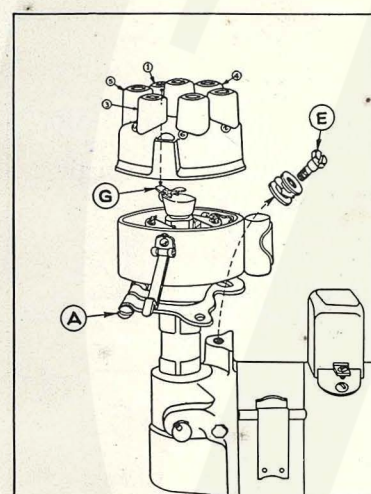


Fig. 11

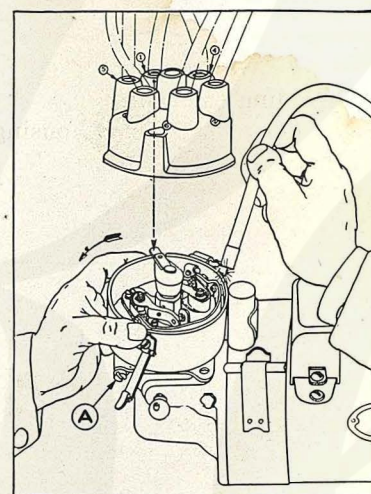


Fig. 12

TIMING IGNITION DIAGRAM—SERIES 50-60

Timing the Ignition—Series 50 and 60—

1. Check Breaker Point Gaps:

- Remove distributor cap and rotor, Fig. 7 and Fig. 10.
- Loosen distributor head clamp screw (A).
- Rotate distributor head until breaker points on No. 1 (stationary) breaker arm open wide as possible.
- Check the gap with .018" feeler gauge.
- If the gap is incorrect, loosen clamp screw (B1) and turn eccentric screw (C1) until gap is just .018". Repeat this operation on No. 2 (adjustable) breaker arm.

- Make certain that both clamp screws (B1) and (B2) are tight after adjusting the gaps.

2. Remove valve rocker arm cover, Fig. 8.

3. Uncover timing hole at left of flywheel housing, Fig. 9.

4. Set spark lever to "advanced" position, Fig. 10. Note that screw (E) is at extreme front end of slot.

5. With ignition off, crank engine by hand until No. 6 cylinder exhaust valve (D), Fig. 8, opens and starts to close. Then crank over slowly and watch the timing hole, Fig. 9, until the 17° mark

is directly opposite the index line. This is the position to fire No. 1 cylinder.

6. With screw (A) loose, Fig. 11 turn distributor head so that condenser (F) is toward the front of car, Fig. 10. The six high tension terminals will then be in position as shown in Fig. 11.

7. IMPORTANT—Rotor point (G), Fig. 11, must be directly under No. 1 high tension terminal. If it is not, remove cap screw (E) at back of distributor, lift up the whole assembly and turn the rotor so that point (G) is directly under No. 1 high tension terminal. Let the assembly down again and replace screw (E). The distributor head and rotor should now be in positions as shown in Fig. 12.

8. No. 1 (stationary) breaker arm should now be timed in the following manner: Turn the distributor head carefully in a counter-clockwise direction until the breaker points just barely open. This can be determined by turning on the ignition and holding the center high tension wire to form a gap with distributor housing, Fig. 12. When the points open, there will be a spark across the gap. Lock the distributor in this position by tightening screw (A).

9. No. 2 (adjustable) breaker arm should now be timed as follows:

Turn flywheel over **one complete revolution** until 17° mark is again directly opposite the index line. This is the position to fire No. 6 cylinder.

10. Loosen the two breaker arm plate locking screws (X1) and (X2), Fig. 10. Turn the eccentric screw (Y) so that breaker arm advances in counter-clockwise direction, until points just separate, as described under No. 8.

11. Tighten screws (X1) and (X2) so as to lock breaker arm in this position. Both breaker arms should now be properly synchronized.

12. To check timing of No. 1 (stationary) breaker arm:

To check the accuracy of the timing operation, replace rotor and cap but disconnect all high tension wires from spark plugs. Hold No. 1 spark plug wire in such a way as to form a gap with metal part of engine. Turn flywheel over slowly until spark occurs. **This should require one complete revolution.** Next observe position of timing mark on flywheel relative to index line on flywheel housing. Marks should line up as shown in Fig. 9.

13. To check timing of No. 2 (adjustable) breaker arm:

Hold No. 6 spark plug high tension wire in such a way as to form a gap with metal part of engine. Turn engine over with crank until spark occurs. **This should require one revolution.** If No. 2 (adjustable) breaker arm has been properly timed, the 17° mark on flywheel will line up with the index line on the housing.

This timing operation must be accurate in order to synchronize both breaker arms.

14. Re-assemble all removed or disconnected parts.

Spark Plugs—

Pay particular attention to the condition of the spark plugs and their gaps. The plugs both inside and outside, should at all times be kept free from accumulation of oil and carbon. The gaps should be adjusted to provide an opening of approximately .025 inch. If these gaps are too large, it is quite probable that difficulty will be experienced in starting the engine. Misfiring almost certainly will result, particularly on a hard pull, and the general operation of the engine will be poor.

The firing order of the cylinders, or the sequence in which ignition occurs, is 1, 4, 2, 6, 3, 5.

Lighting Switches—

The switch for headlights, side lights and tail light is located at the lower end of the steering column and is controlled by a lever on top of the steering wheel.

Dome, pillar and tonneau lights are controlled by separate switches.

Instrument light switch is located on the instrument board and provides either indirect illumination of the instruments or direct lighting of the front compartment. The center position of the lever indicates light "off."

Ignition Switch—

The ignition switch operates in conjunction with the steering gear lock, and is automatically locked when the steering gear is locked. Before locking the steering gear, the ignition switch must be turned to the "off" position.

Windshield Wiper—

The double blade vacuum type windshield wiper

is used on all of the 40, 50 and 60 Series, except on open models which have the single blade type. The wiper is operated by button on instrument board.

Signal Lights—

A combination stop, back-up and tail light provides warning when the brakes are applied and light for backing up when transmission control lever is in reverse position. Tail light is controlled by lighting switch lever on steering wheel and is on when either head lamps or side lamps are lighted. This arrangement requires but one switch and one bulb to provide both the stop and back-up lights.

NOTE: Proper adjustment of the stop light switch is such that the light should not show on until the brake pedal is depressed 2". If the light shows at a shorter pedal travel, the car should be taken to an Authorized Service Station for adjustment.

Horn—

A vibrator horn of the Klaxon type is used on all models. This equipment should require little attention but any needed adjustments should be made only by a competent mechanic.

Current Limit Relay—

A current limit relay is provided to protect the electrical system against damage from short circuits. It is mounted on the inside of the dash, and a short circuit is indicated by a buzzing sound from the relay.

Ammeter—

The ammeter indicates the net amount of current that the generator is supplying to the storage battery when the engine is running or the amount of current the battery is furnishing for lights when the engine is not operating.

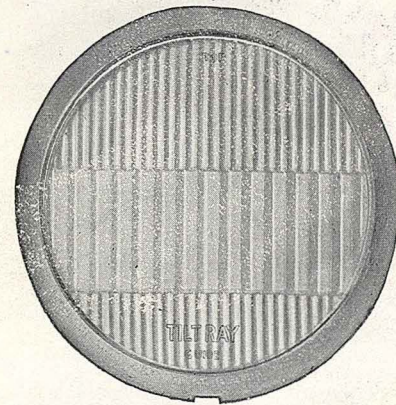
Should the ammeter indicate "discharge" with the car running more than ten miles per hour without lights, the electrical equipment and wiring should be checked by a mechanic familiar with the system.

CAUTION: Do not attempt to operate the system with the storage battery disconnected, as serious damage to the apparatus may result from such action.

Do not remove the generator or attempt to change any connections on switches, current limit relay or ammeter without first disconnecting the lead from one of the storage battery terminals.

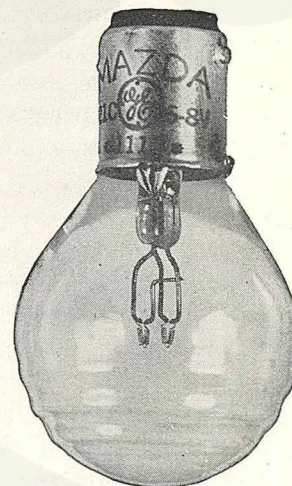
LAMPS

The lamp bulbs used in the lighting system have a voltage rating of 6 to 8, with candle power as follows:

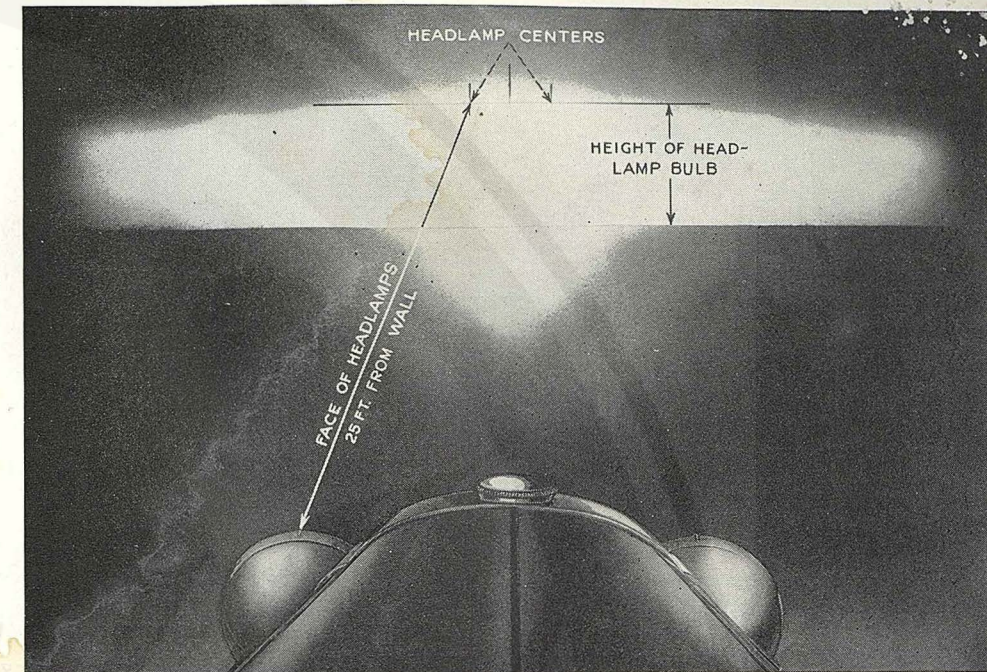


HEAD LAMP LENS

Head lamps:	21 c. p., two filaments, double contact base.
Stop and Back-up lamp:	15 c. p., single contact.
Parking lamps	} 3 c. p., single contact.
Tail lamp	
Tonneau lamp	
Instrument lamp	Direct light 3 c. p., single contact.
	Indirect light 3 c. p., single contact.
Dome lamp:	6 c. p., single contact.
Pillar lamp:	6 c. p., single contact.



DOUBLE FILAMENT BULB



APPEARANCE OF BEAMS FROM BOTH LAMPS WHEN CORRECTLY ADJUSTED

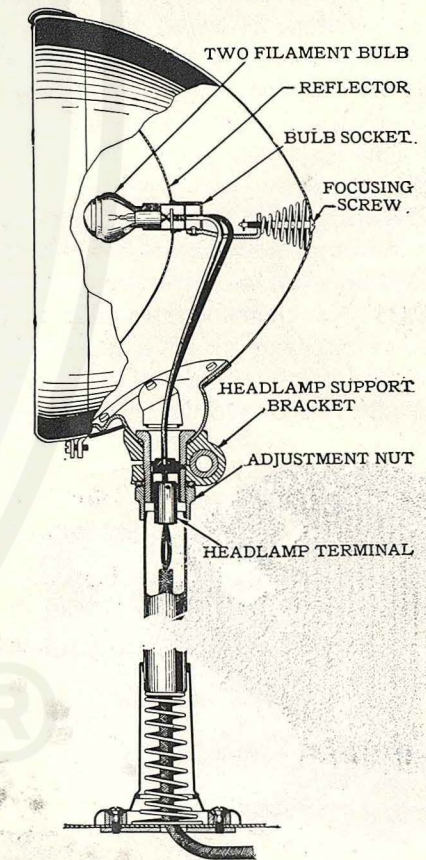
Head Lamp Adjustment—

Head lamps should be adjusted to comply with state or local requirements. Reference to the illustration will show the pattern of beams from both lamps when correctly adjusted. This adjustment will be obtained by observing the following procedure:

1. Place the car on a level floor with a garage door or other light colored vertical surface 25 feet ahead. Draw a horizontal line on this vertical surface at a level 4" below the height of the lamp centers, this allowance being made to compensate for the position of head lamps when car is fully loaded. Sight through the center of the rear window over the radiator cap, and so determine a point on the horizontal line midway between the lamps. Locate points on both sides of this center point, directly ahead of the center of each head lamp.

2. Switch head lamps on, place lighting control switch on steering wheel in position marked Brt. (Bright).

3. Cover one head lamp to obscure the light beam, while adjusting the other. Turn the focus adjustment screw on the back of the uncovered lamp until a beam is obtained having highest intensity at the top and a sharp upper outline and



HEADLAMP MOUNTING

as narrow as possible, measured from top to bottom. Loosen the mounting nut, aim the lamp so that the top of the beam coincides with the horizontal line on the vertical surface and is equally divided by the vertical line directly ahead of the head lamp center. Tighten the head lamp adjusting nut securely and check the position of

the beam to see that it has not changed.

When installing new bulbs always check the head lamp focus to insure against glaring and illegal lights and to provide proper road illumination.

In replacing parts always use genuine parts such as furnished with original equipment.

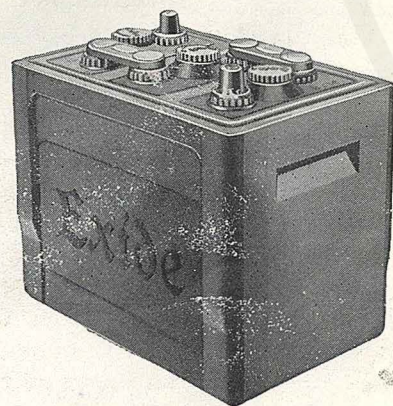
BATTERY

Series 40 model is equipped with a 6-volt, 13 plate Exide battery, type 3-MXV-13-1, while Series 50 and 60 are equipped with a 6-volt, 15-plate Exide battery, 3-MXV-15-1.

Warranty—

The Exide batteries are guaranteed by the manufacturers (The Electric Storage Battery Company, Philadelphia) to be free from defects in material and workmanship.

At any time within three months from date of delivery of car to the purchaser, any battery which may prove to be defective or incapable, when fully charged, of giving its rated capacity, will be repaired or replaced free of expense on receipt, transportation charges prepaid at any Exide battery depot or authorized Exide battery service station. This guarantee does not cover the free charging of batteries, nor the making good of damages resulting from continued lack of charge, nor from failure to keep the plates covered with solution by filling the cells from time to time with pure water. No claims on account of alleged defects can be allowed unless made within three months of date of delivery of battery to purchaser, and the right is reserved to refuse to consider



STORAGE BATTERY

claims in the case of batteries opened by other than authorized battery service stations.

Registration—

Purchasers of cars are earnestly urged to cooperate with the battery manufacturers by taking their cars, as promptly as possible after receipt, to the nearest Exide battery service station in order that the battery may be registered and its condition and installation checked. No charge is made for this first inspection. Such stations are maintained in the principal cities and towns of the country.

Care—

The battery requires very little attention, but that little is absolutely necessary. Negligence in this respect is the principal cause of battery failure or short life.

Distilled water should be added to the battery at such intervals as will ensure the plates being covered at all times. Usually, water should be added once a week in summer and twice monthly in winter, and in freezing weather it should be added just before using the car.

To prevent corrosion of battery terminals and connections apply a coating of vaseline jelly over the battery posts and strap terminals, making sure that connections are properly tightened. If corrosion occurs, clean posts and terminals with a strong soda solution before applying vaseline jelly.

See that the filler plugs are tight and the top of the battery kept dry.

An occasional inspection should be made of the ground strap connection between the battery and the frame as looseness in this connection is a frequent cause of burning out of head lamp bulbs.

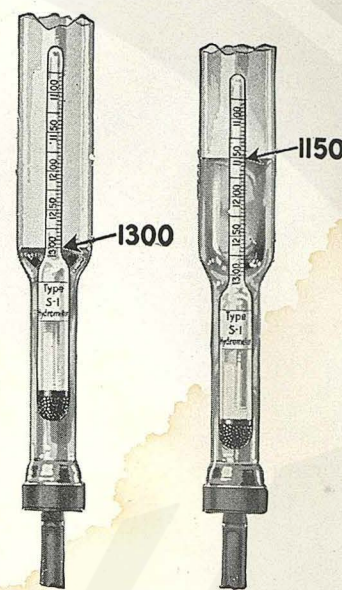
Periodical hydrometer readings are advisable and this inspection should be made by Buick or Exide authorized service stations.

A battery in good condition should register an hydrometer reading of not less than 1.250 in climates where freezing of water occurs, or 1.180 in climates where this does not occur. If the reading falls below 1.150 or 1.080 in such climates, it indicates complete discharge and the battery should be taken to an Exide station for charge. If the car is to be laid up for the winter, take the battery to an authorized battery station for proper storage.

It is not necessary to add acid to the battery. Except in cases of broken jar or deterioration of the sealing compound, loss of acid does not occur. It is inadvisable for car owners to experiment with so-called quick electrolytes for the purpose of keeping the battery fully charged.

Circuit Diagram—

The wiring circuits of the electrical equipment are shown in the circuit diagram on page 30. With the aid of this diagram, each circuit through the several units can be traced.



HYDROMETER READINGS

ELECTRICAL ADJUSTMENTS

The electrical system provides practically continuous service and satisfactory operation, because of the excellence of design and manufacture of its component units. However, minor difficulties may arise and the following suggestions may be found of practical benefit to the owner in the care and operation of the car.

Starting motor fails to crank engine when starter pedal is fully depressed.

(a) Switch on head lamps and note that they are lighted normally.

(b) Depress starter pedal as usual, and note the intensity of the light in the head lamps. If dimmed considerably or lights go out, the trouble may be located as follows:

(c) Battery low or completely discharged. Check specific gravity with hydrometer—see instructions for care of battery on page 28.

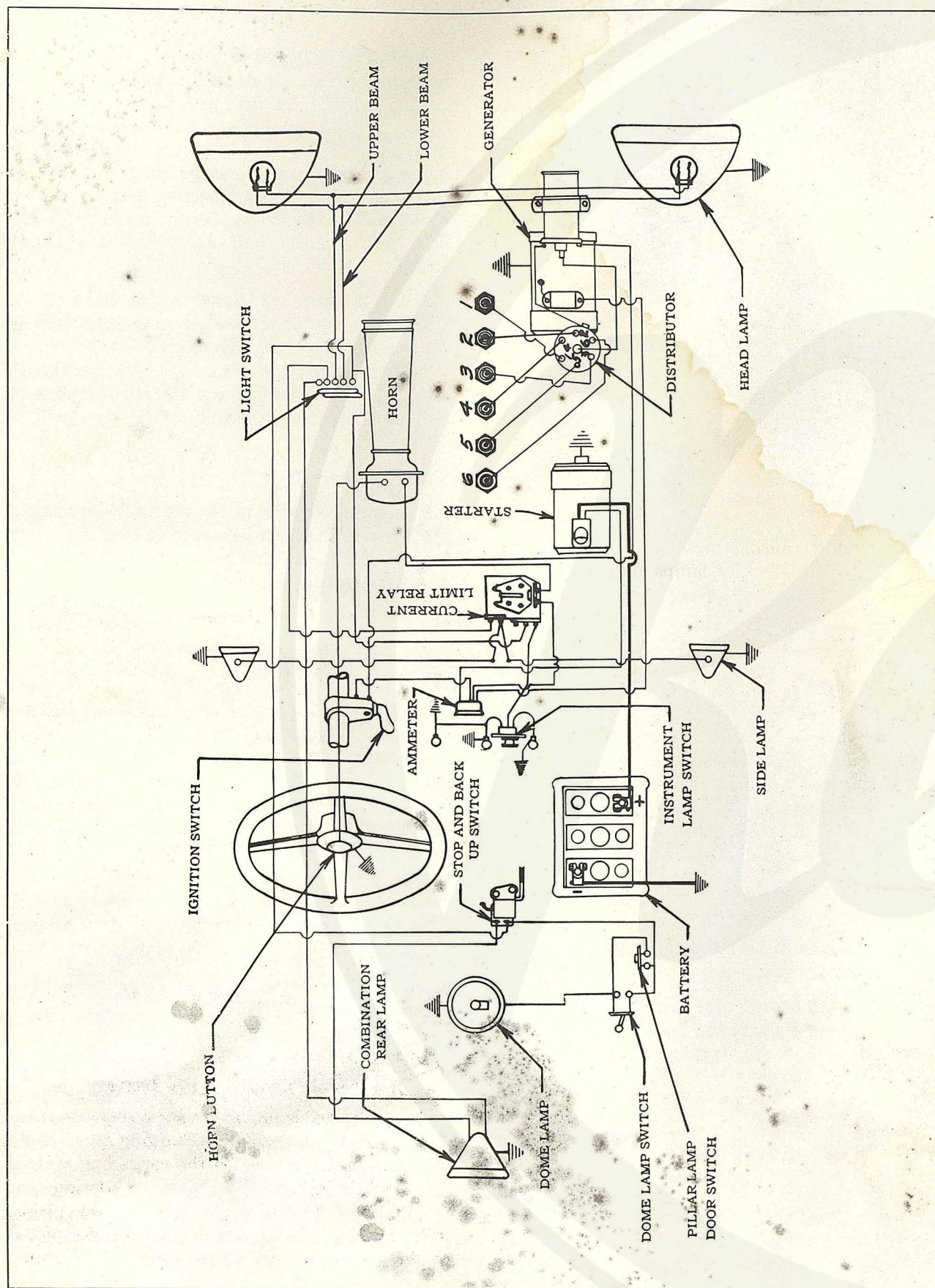
(d) Crank engine by hand with ignition off, and determine if there is any mechanical condition which would prevent engine being cranked by starter.

(e) Terminals of wire connections to battery posts may be loose or corroded. Remove terminal from post by loosening clamp bolt, and scrape the inside of the terminal and outside of the post with a knife blade so that it is clean. Place a small amount of vaseline jelly on the battery post and tighten terminal securely in place.

(f) See that ground wire connecting battery to frame, is securely fastened at both ends.

If lights burn and do not dim or go out when starter pedal is fully depressed, proceed as follows:

(a) Raise hood and press the nickel plated button on top of starter switch. The starter is now out of gear and if nothing is wrong with starter, it will run freely and produce a humming sound. This indicates that the switch is not properly adjusted, and such adjustment can be obtained by rotating the nickel plated button in a counter-clockwise direction from one-half to one full turn. After this is done, press the starter pedal in the usual way for starting the engine.



WIRING CIRCUIT DIAGRAM

Lights—

Lights will not burn when light switch is turned on.

The lights are controlled by a switch operating from the center of steering post. The parking position of lever, to left of center, lights the side lamps and tail lamp. Center position indicates all lights off, and dim and bright positions are to right of center. If lights do not burn in any of the switch positions, but the starter cranks, check as follows:

(a) All connections between the battery and the current limit relay should be checked to see that they are tight. The current limit relay is located on the dash, and if the trouble is due to dirty contact points on the relay, a slight pressure of the finger, producing a sliding movement of the contact, will usually correct the trouble.

(b) Examine bulbs and if all are burned out, trouble may be due to loose connection in generator circuit, causing high voltage. This will usually be indicated by lamps flaring up when engine speed is increased and should be taken care of only by an Authorized Service Station.

Current limit relay vibrates when lights are on.

This indicates a short in one of the lighting circuits and may be traced as follows:

(a) Turn switch successively to each lighting position, and if the relay vibrates in all positions except "Off," the trouble should be found in the tail light circuit, current limit relay to lighting switch, or lighting switch to stop light switch.

Lights flare up as engine is speeded up.

This indicates a loose connection in the circuit from generator to battery and the following connections should be checked:

- Current limit relay.
- Ammeter.
- Starting motor and battery terminals.
- Battery ground connection to frame.
- Generator relay connections.

Lamps have short life and must be replaced frequently.

Examine lamp bulbs for proper voltage (6-8 volts) and make sure that good quality bulbs are used only. Check wires for loose connections as outlined under previous paragraph.

Ignition—

The ignition switch is located on the steering post bracket, operating in connection with the steering gear lock. "Off" and "On" positions of the switch are indicated on the top of the steering gear lock.

Engine fails to fire when switch is on and when cranked by starting motor.

(a) See that battery connections are tight and that battery is in properly charged condition.

(b) Remove high tension wire from one of the spark plugs, and hold terminal approximately $\frac{1}{4}$ " from metal base of plug while engine is being turned over with starting motor. The spark should jump the gap readily. If it does not and ammeter flickers to discharge while engine is being cranked, the trouble should be traced as follows:

- Breaker points pitted or out of adjustment (fail to open properly).
- Defective condenser.
- Broken down ignition coil.
- Ignition out of time.

Engine Fires Irregularly—

(a) Examine spark plugs and see that they are not short circuited by oil or carbon, and that gaps are proper, .025 inch.

(b) Inspect breaker points for proper clearance and cleanliness.

(c) Check high tension wires to spark plugs for poor insulation.

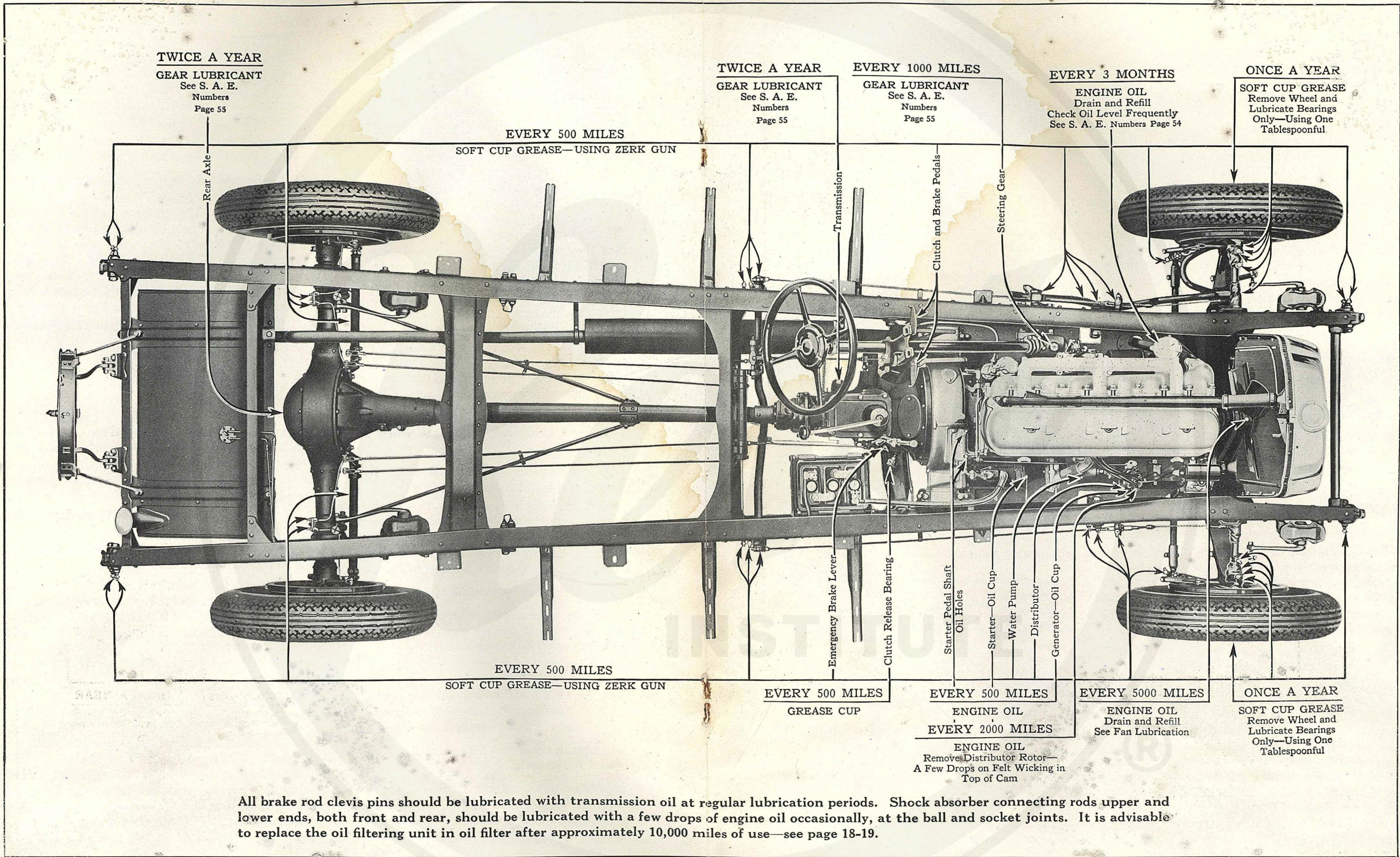
Ammeter shows discharge when ignition and light switches are "OFF."

Disconnect the red wire from ammeter terminal. If ammeter hand does not return to zero, ammeter is incorrect, and there is no fault in other parts of the electrical system. If ammeter hand returns to zero, it indicates fault is in switch or wiring and car should be taken to service station for inspection.

Generator—

Generator does not charge battery.

The generator is provided with a thermostat for automatically regulating the charging rate. Should the generator charge when the car is first started but fail to charge after running a short time, the trouble may be due to burned out thermostat resistance unit. This trouble is caused by loose or dirty connections in the generator charging



All brake rod clevis pins should be lubricated with transmission oil at regular lubrication periods. Shock absorber connecting rods upper and lower ends, both front and rear, should be lubricated with a few drops of engine oil occasionally, at the ball and socket joints. It is advisable to replace the oil filtering unit in oil filter after approximately 10,000 miles of use—see page 18-19.

LUBRICATION CHART

circuit, and electrical system should be inspected as follows:

(a) Test all wires and connections from battery through starting motor terminal, ammeter, switch, and generator for open circuits, and check operation of cut-out relay.

(b) Examine all generator brushes for good seats and spring tension.

(c) Turn on lights to see if ammeter is in working order.

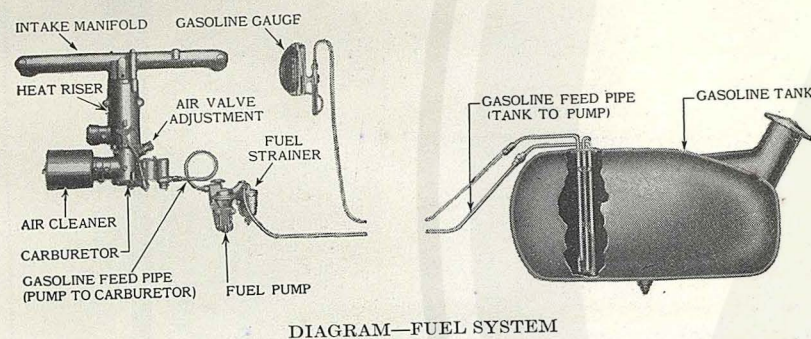
Ammeter readings are reversed.

(a) Examine battery to see if negative terminal is grounded, if not, reverse the battery terminals.

(b) Reverse wires on ammeter.

FUEL SYSTEM

The fuel system consists of gasoline tank, instrument board gasoline gauge, gas lines, fuel pump, gasoline cleaner, air cleaner, intake manifold and carburetor. The capacity of the gasoline tank on Series 40 models is 19 gallons, Series 50 and 60, 22 gallons.



DIAGRAM—FUEL SYSTEM

Fuel Pump—

The AC variable stroke diaphragm type fuel pump is attached to the left rear side of the crankcase and is driven by an eccentric on the camshaft. The gasoline cleaner is an integral part of the pump. Operation and functioning of the pump is described in the following, reference being made to the accompanying illustrations:

Rotation of eccentric (H) on the camshaft (G) actuates the operating rod (I) and in turn a rocker arm (D), pivoted at (E), which pulls link (F) and in turn diaphragm (A), downward. This downward movement of the diaphragm creates a vacuum in chamber (M) which draws fuel through section valve (L) in the outlet of the gasoline cleaner. On the return stroke of the rocker arm, spring (C) moves the diaphragm upward, forcing the fuel from chamber

(M) through pressure valve (N) and opening (O) to the carburetor.

When the carburetor bowl is filled, the float closes the inlet needle valve which creates a pressure in chamber (M). As the pressure above the diaphragm increases, its stroke lessens to a point

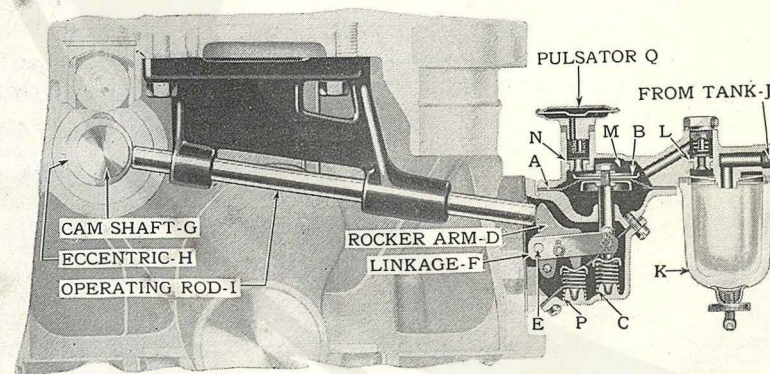
where the pressure in chamber (M) overcomes that of spring (P) and the movement of the diaphragm ceases until the lowering of the fuel in the carburetor opens the inlet valve needle.

Spring (P) is not a part of the operating mechanism, but is used for the purpose of keeping rocker arm (D) in contact with eccentric (H), to prevent noise. A diaphragm type pulsator (Q) serves to keep the

flow of the fuel constant at all times.

Gasoline Cleaner—

This cleaner is an integral part of the fuel pump, and consists of a glass bowl with a double screen of fine mesh. Dirt and water settle in the bowl which may be easily removed for cleaning.

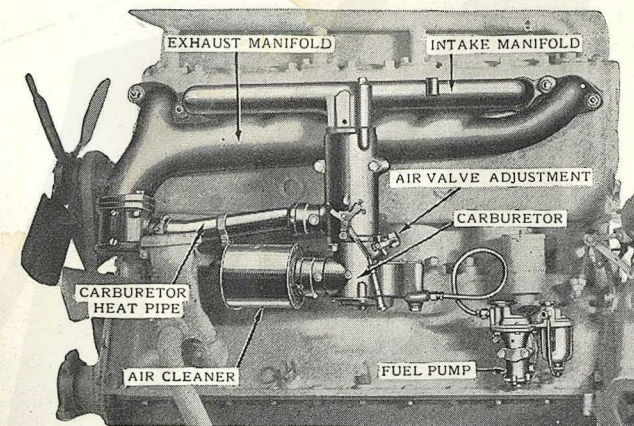


DIAGRAM—FUEL PUMP OPERATION

CARBURETOR

The carburetor is the instrument which measures the fuel charges for the engine and automatically mixes them with the proper amount of air to form a highly combustible gas. The Marvel carburetor is used, model "T-3-S" on Series 40 and model "T-4-S" on Series 50 and 60, this being the automatic air valve, heat controlled type. Its outstanding advantages are:

1. Simplicity of construction and operation.
2. Quick starting in any weather.
3. Automatic and manually controlled heat application to ensure complete vaporization of fuels.
4. Economy in fuel consumption.
5. Ease of adjustment.



CARBURETOR AND MANIFOLDS

Construction—

The carburetor consists of a main body or mixing chamber to which is attached a float chamber bowl, a double walled heat riser, in which the throttle is carried, heated by gases from the exhaust manifold under automatic control of a damper valve therein, and an exhaust outlet pipe.

Within the mixing chamber are three non-adjustable nozzles which proportion the gasoline for a proper mixture. One of the nozzles called the "low speed," is located in the center of the venturi which is a fixed air opening. The other two nozzles called "high speed" and "intermediate high speed" are located just under the air valve and controlled by it. An air adjustment screw is provided for regulating the pressure of the air valve spring enclosed therein and is the only mixture adjustment required. Within this screw is

also enclosed a plunger connected by a link to the air valve. The function of this plunger is to provide a resistance in addition to that of air valve spring to richen the mixture for acceleration. This arrangement of plunger, spring and hollow screw is termed the dash pot.

A further control of the high speed jet is provided by the fuel metering valve operated by the carburetor throttle. This valve provides the maximum fuel feed to the "high speed" nozzle when the throttle is fully opened for high speeds and for quick "pick-up." During the ordinary driving ranges this valve controls the amount of fuel being used, thus providing all the economy possible. This valve is entirely automatic and requires no adjustment.

A choke button is provided on the instrument board to assist in starting. Pulling out this button closes a butterfly valve in the air intake passage of carburetor which restricts the air opening of the carburetor and consequently produces a richer mixture.

A control lever is also placed on the instrument board to provide for manual regulation in addition to the automatic heat control mechanism of the carburetor.

Heat Control—

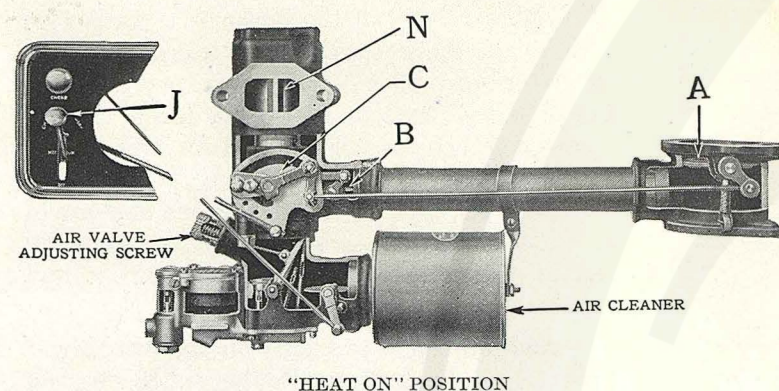
The carburetor and manifolds have been designed to utilize the exhaust gases of the engine to ensure complete vaporization and a consequent minimum consumption of fuel. This is accomplished by the use of a double walled riser between the carburetor and intake manifold. The riser is connected to the exhaust manifold in such a manner that the exhaust gases pass between the walls of the riser and through an outlet tube back to the exhaust pipe. The amount of heat thus furnished to the riser and carburetor is controlled by two valves; one in the exhaust pipe and one in the outlet tube of riser heat jacket.

The valve in the exhaust pipe is connected to the throttle lever of carburetor in such a manner that the greatest amount of heat is had in the riser when the throttle is only partly open, as in idling and at slow speeds, and a decreasing amount as the throttle is opened further for higher speeds. By means of the heat control lever on instrument

board, this automatic action of the heat valve may be varied to suit weather and driving conditions.

The control lever also operates the valve in the

outlet of the carburetor riser simultaneously with the valve in exhaust pipe, and adjustment may be had to the point where no exhaust gases pass through the riser.

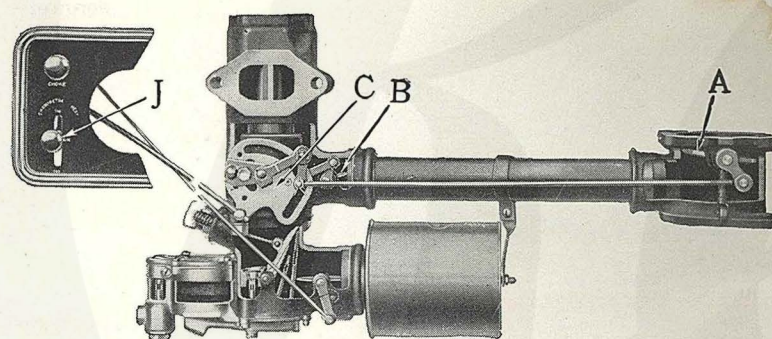


"HEAT ON" POSITION

Control lever "J" on instrument board in center of slot at "medium" or normal driving position.

Valve "A" nearly closed and valve "B" partly closed, restricting flow of hot gases through riser jacket. As throttle is opened, valve "A" will also open quickly.

This setting of control lever may be used when engine is thoroughly warmed up and lower position should not be used except in extremely hot weather.



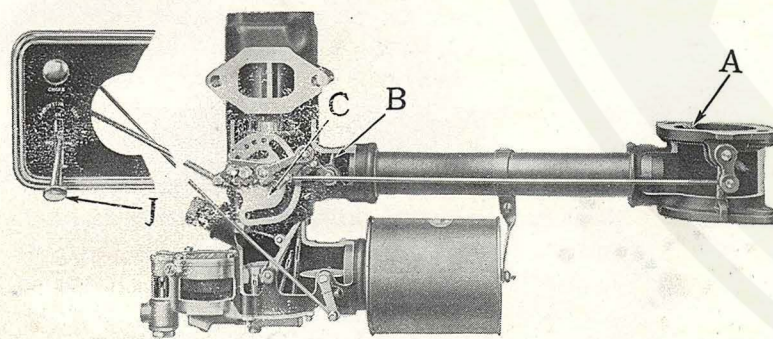
"MEDIUM" POSITION

Heat control lever "J" on instrument board at bottom of slot or "heat off" position.

Valve "A" half open and valve "B" fully closed.

In this setting no exhaust gases pass through riser jacket. As throttle is opened, valve "A" will also open further.

This is the setting used during extremely hot weather or under certain heavy road conditions when engine appears to lose power because of too much heat.



"HEAT OFF" POSITION

Starting—

To start engine, pull out choke button all the way, set heat control lever at top or "heat on" position. Advance spark lever about half way, throttle lever about one-quarter way, turn ignition "on," and depress starter pedal.

The moment engine fires, the choke button should be pushed in about three-quarters of the way and allowed to remain in that position until engine is running smoothly. After engine has warmed up, the choker should be pushed in all the way and the heat control lever set in any position between top and middle of slot, depending upon weather conditions and the character of driving to be done.

It should be remembered that the position of the heat lever largely controls the "pick up" and acceleration of the car. Therefore, if driving in traffic where quick acceleration is desired, drive with the heat control lever between "heat on" and "medium," never below "medium" in town driving, for best all around performance. On straight-away driving, the heat lever may be set to "medium" and only in extreme cases of very hot weather should it ever be set at the bottom or "heat off" position.

Adjustment—

No change should be made in the carburetor adjustment until after an inspection has been made to determine if the trouble is not in some other unit. It should be made sure that the gasoline lines are clear; that there is gasoline in the gas supply line; that there are no leaks at connections between carburetor and engine, and fuel pump, that the ignition system is in proper condition and that there is even compression in all cylinders.

If it is necessary to test adjustment or to make a readjustment, proceed as follows:

1. Set air screw so that the end is flush with the end of ratchet set spring.
2. Set heat control lever on dash at "heat on" position and leave in this position while making adjustment. Start engine in the usual manner, using the choke as described above.
3. When engine has warmed up slightly, set air screw for good idling by turning to the right for a richer mixture or to the left for a leaner mixture, as the needs of the engine require.

If the air screw is turned too tight, the engine will roll. If the air screw is not tight enough, the engine will hesitate and perhaps stop entirely. To test the idling adjustment, turn air screw in a quarter of a turn at a time until engine does roll; then turn back to the left until engine hesitates, indicating that mixture has too much air; next turn air screw in to the right three or four notches at a time until engine runs smoothly. This accomplished, proper adjustment for power and economy throughout the entire range of the engine will have been obtained.

If the engine idles too fast with throttle closed, the latter may be adjusted by means of the throttle lever adjusting screw.

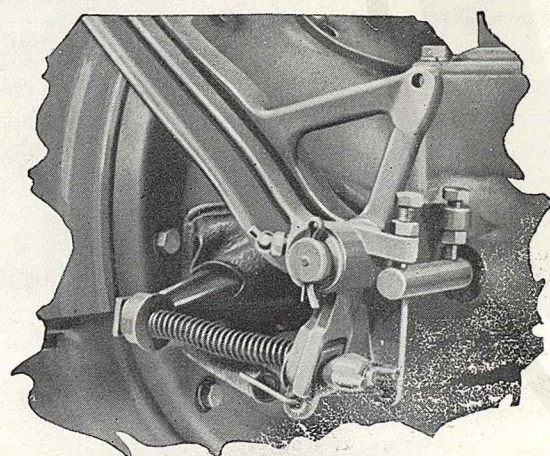
Air Cleaner—

There is no question but that much of the wear occurring in the various parts of an automobile engine has been due to the presence of dirt and carbon in the lubricating oil. Most of the dirt finds its way into the engine through the carburetor air intake and recognizing the desirability of eliminating this source of wear, all 1930 models are equipped with an air cleaner, attached to the carburetor air intake.

THE DRIVING SYSTEM CLUTCH

In setting a motor car in motion, it is first necessary to start the engine and then, with the engine running, to start the car. This necessity is met by introducing between the engine and transmission a coupling device which, at the will of the operator and by means of a pedal, establishes a rigid connection between the engine and transmission or breaks this connection as may be required in operating the car. In the Buick design, the device by which this is accomplished is known as a multiple disc clutch. The ease of operation of the Buick clutch constitutes one of the many important advantages of the Buick product, a point which has commended itself to all owners, particularly women drivers, for several years.

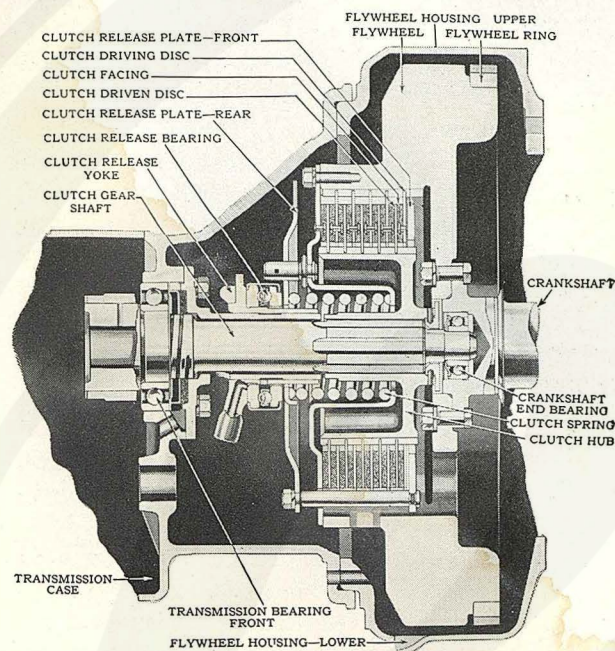
This type of clutch consists of a number of plates, the alternate ones being lined on both sides with friction facing. When the pedal is depressed, the clutch plates separate, and as a consequence there is no driving connection between the crankshaft and the rear axle. When the pedal is released, the plates are brought together by the clutch spring and the resulting friction causes the clutch to revolve as a unit and thereby establishes a direct driving connection between the engine and the rear axle, when the transmission control lever is in other than neutral position.



CLUTCH PEDAL ADJUSTMENT

Adjustment of Clutch Pedal—

Correct functioning of the clutch depends upon



SECTIONAL VIEW—CLUTCH ASSEMBLY

the proper adjustment of the clutch pedal movement. If in releasing, the pedal strikes the toe-board before the clutch is fully engaged, adjustment should be made by means of the screw provided on the rear side of the clutch pedal hub. This screw regulates the distance between the clutch pedal and the under side of toe-board, and in correct adjustment, this distance should be approximately $\frac{3}{16}$ inch.

When correctly adjusted, it should be possible to depress the clutch pedal approximately 1 inch before pressure of the clutch spring is felt. To obtain this adjustment, an adjusting nut is provided on the rear end of the clutch release rod at the lower end of the pedal, this nut regulating the clearance between the release bearing and the clutch.

Lubrication—

Lubrication of the clutch release bearing is provided by means of a grease cup, conveniently placed and which should receive attention every 500 miles. **Do not oil or grease the clutch plates.**

Riding the Clutch—

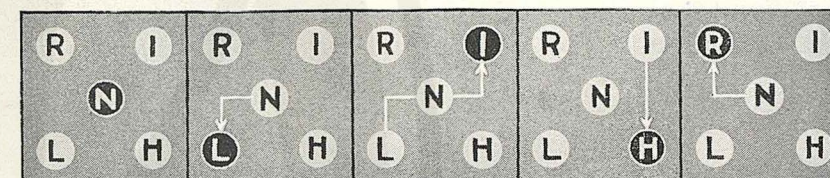
Driving with the foot continuously on the clutch pedal is commonly described as "riding" the clutch.

This habit will result in excessive wear of the clutch plate facings and a slipping clutch, as well as a noisy release bearing.

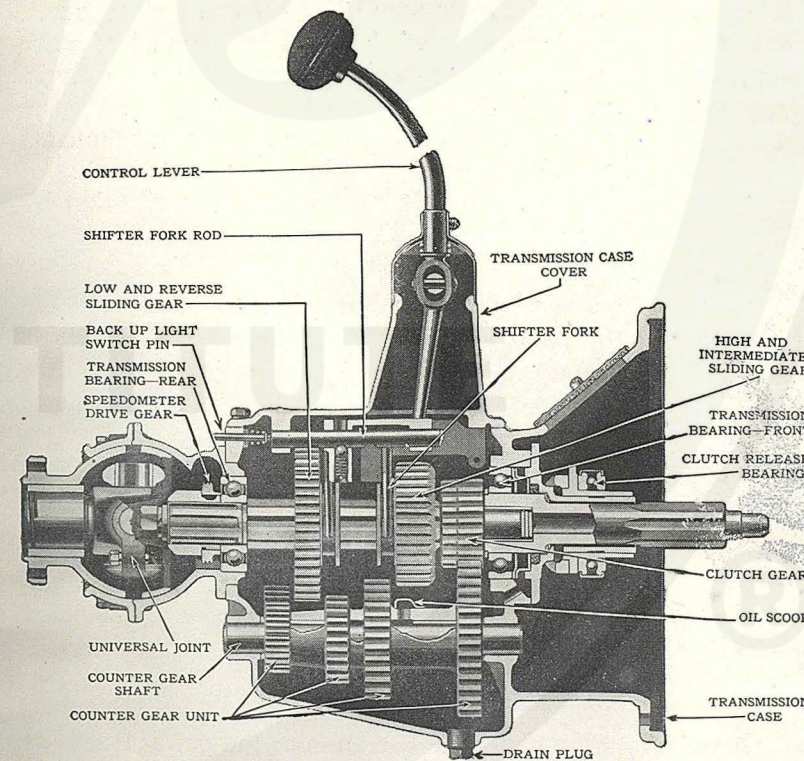
TRANSMISSION

The transmission system includes all those parts which transmit power from the engine to the rear wheels, but generally the transmission gearset alone is understood by this term.

The gearset, or change speed gear, is necessary because a gasoline engine develops power in proportion to its speed; the higher the speed, the greater the power output. On the other hand, the car frequently requires more power at low speeds and at such times the gearset is used to change the ratio between the speed of the engine and the speed of the rear wheels.



GEAR-SHIFT DIAGRAM



SECTIONAL VIEW—TRANSMISSION

Control Lever—

The transmission gearset is operated by a control lever located in the driving compartment of the car. In addition to neutral the control lever can be shifted to four positions: Low speed, intermediate, high and reverse. The illustration below, lettered "N" neutral, "L" low, "I" intermediate, "H" high and "R" reverse, indicates the several positions of the lever in making gear shifts.

Gearset—

The change speed gears are carried on two shafts, the lower of which is known as the countershaft and carries the counter-gears, while the upper or main shaft carries the sliding gears. The main shaft is mounted in a ball bearing at its rear end and runs in a bronze bearing in the clutch gear at its forward end.

The countershaft is stationary and the counter-gears revolve on it. The reverse idler gear is mounted on a separate shaft to one side of countershaft and is in constant mesh with one of the counter-gears. The sliding gears are mounted on the main shaft in such a manner that they can be moved along to engage with one or the other of the counter-gears.

The high and intermediate sliding gear is provided with internal teeth on its forward side so that it can be moved over the clutch gear to lock the main shaft and clutch gear together.

Neutral Position—"N"—

The clutch gear is directly connected to the engine when clutch is engaged and consequently turns in the same direction, but the counter-gear, being in constant mesh with

the clutch gear revolves in the opposite direction. When the control lever is in neutral position, neither of the sliding gears is in mesh with any other gear and therefore the main shaft does not turn.

First Speed Position—"L"—

When the control lever is moved to the first speed position, the low and reverse sliding gear is moved into mesh with the low speed counter-gear and the car moves forward.

Second Speed Position—"I"—

When the control lever is moved to second speed position, the low and reverse sliding gear is drawn out of mesh with the counter-gear and the high and intermediate sliding gear is moved back into mesh with the intermediate speed counter-gear. In this position the main shaft also turns in the same direction as the engine.

High Speed Position—"H"—

When the control lever is moved to third or high speed position, the high and intermediate sliding gear is disengaged from the intermediate speed counter-gear and moved forward on the main shaft until the internal teeth slip over and engage the teeth of the clutch gear, locking the main shaft and the clutch gear together, thus giving the engine a "direct drive" to the rear axle.

Reverse Position—"R"—

When the control lever is moved to the reverse speed position, the low and reverse gear is moved into mesh with reverse idler gear and the main shaft then revolves in a reverse direction from that

of crankshaft and when clutch is engaged, car is driven backward.

High to Lower Speed—

When it is necessary in traffic, heavy roads, or on hills to change from a higher to a lower speed, release the clutch and move the gear shifting lever into the desired position. Reduce the speed of the car and increase the engine speed slightly when making the change. **Never change to a lower speed when the car is running fast.** Always bring the car to a complete stop before reversing.

Lubrication—

All the transmission gears run in a constant bath of oil which also lubricates the bearings of the main shaft, clutch gear and universal joint. An oil filler hole is provided on the side of the transmission case for introduction of new oil, and a drain plug at the bottom allows emptying and cleaning. It is recommended that the oil be changed after the first 2000 miles of driving and thereafter twice a year.

Universal Joint—

The transmission is fastened solidly to the engine which in turn is fastened to the car frame, but the rear axle is hung on springs and must be free to follow the uneven surface of the road. In order to allow continuous transmission of power from the gearset to the rear wheels, the universal joint is interposed between them. It consists of two yokes held at right angles to each other by means of two universal joint rings and four cap screws. It is encased in a ball-shaped housing, which prevents the entry of road dirt, etc., and is automatically lubricated by the oil from the transmission.

REAR AXLE

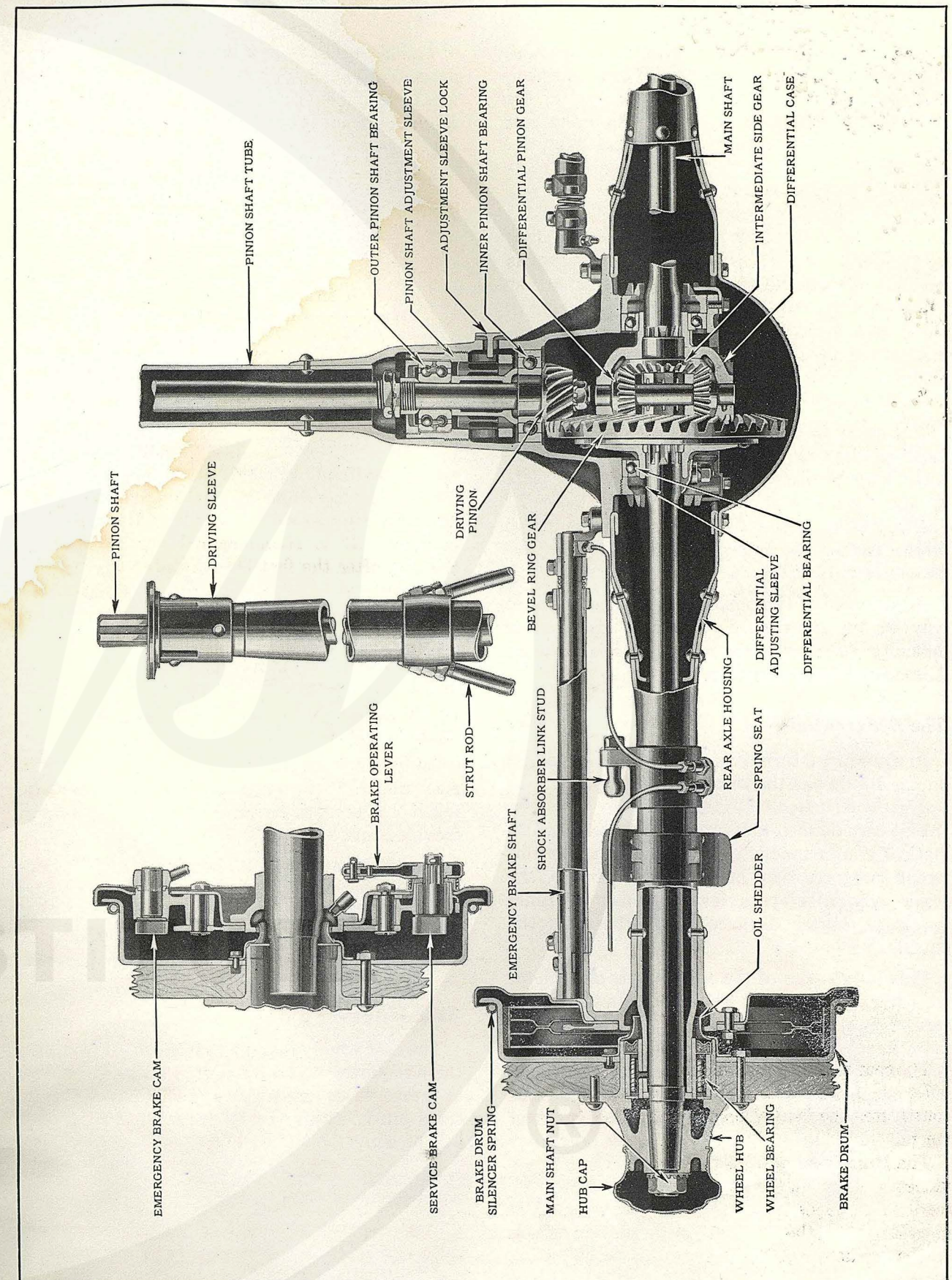
The rear axle assembly includes the pinion shaft, differential, axle shafts, brakes and wheels and constitutes the final element in the driving mechanism.

The Buick rear axle design, embodying a single universal joint and a long torque tube, presents many advantages in a consideration of the method of transmitting the driving effort of the rear wheels to the frame of the car. With this construction,

it is possible to operate the car under its own power even though one or both rear springs may have been broken, which cannot be done in the design in which the driving effort is transmitted through the springs.

Pinion Shaft—

The pinion shaft transmits the power from the universal joint to the driving gears of the differ-



SECTIONAL VIEW—REAR AXLE

ential. It is enclosed for its entire length in a steel tube which carries the driving flange attached to the universal joint housing on the rear of the transmission. The driving effort from the rear wheels is transmitted by this tube through the ball joint to the transmission case and the frame of car. The tube protects the propeller shaft and its bearings against the entrance of foreign matter. In addition, it compensates torque reaction, that is, prevents the tendency of the axle housing to revolve around the shafts when power or the brakes are applied—as when the car is driven or the brakes used. At its rear end the pinion shaft is mounted on ball bearings and carries the driving pinion which meshes with the large ring gear on the differential.

The depth to which the pinion meshes with the teeth of the ring gear is adjustable, and adjustment may be made by removing the cover plate on the right side of pinion flange and loosening the adjusting sleeve clamp screw. The sleeve which carries the outer bearing can then be turned to adjust the position of the pinion.

Adjustment of the pinion shaft should be made only by an experienced mechanic. In case of difficulty, take car to the nearest Buick dealer or Authorized Service Station.

The Differential—

In rounding a turn, it is obvious that the wheel on the inside has the shorter path to follow. In wagon construction for example, all the wheels are free to turn on their axles and they therefore automatically accommodate themselves to the different distances they have to cover; hence, the inside wheels rotate a fewer number of times (cover a shorter distance) than those on the outside.

This is not true of the rear wheels of a motor car, although it is of the front ones. In the former case they are keyed fast to the axle shafts and must turn with them. As a result, in rounding a turn, one wheel would slide or scrape around, were not some device employed to eliminate this action by automatically decreasing the speed of the inside wheel.

This requisite is met by the use of the differential, which allows one rear wheel to rotate a greater number of times than the other. Thus, when a car is running along a straight stretch of road, both rear wheels roll at the same rate of speed—or approximately so—and cover the same distance, but when turning a corner the inside wheel rotates at a slower rate and therefore covers a shorter distance. It is this device, also, that permits of one of the rear wheels, when it is jacked up, being driven while the other remains at rest.

Briefly, the differential enables the rear wheels to turn simultaneously at different rates of speed whenever this may be necessary.

Adjustment—

The position of the differential and driving gear with respect to the driving pinion, may be adjusted by removing the cover plate on the rear of the housing and moving the lock keys entirely out of the slots in the adjusting nuts at either side of differential case. Loosen nuts on studs which hold the bearing cap. Adjusting nuts may now be turned but they should be turned a like amount. By means of these adjusting nuts differential can be moved toward or away from the pinion. When proper adjustment is secured, replace locks, tighten nuts on studs and replace cover plate.

Adjustment should be made by an experienced mechanic and in case of trouble, car should be taken to nearest Buick dealer or Authorized Service Station.

The differential and its bearings run in a continual oil bath introduced through the filler plug in the axle housing. The old oil should be drained off, differential washed out with gasoline or kerosene and fresh oil introduced twice a season.

Rear Wheels—

The rear wheels rotate on Hyatt roller bearings, these requiring no adjustment. They are packed in grease when assembled and are further lubricated automatically by oil from within the rear axle housing.

FRONT AXLE

The front wheels are mounted on steering knuckles pivoted to the front axle, so that they may be turned by the steering gear. Steering arms attached to the knuckles are connected by an adjustable tie rod, and the left steering arm has a third arm which connects to the steering gear by means of the steering connecting rod.

Front Wheels—

The front wheels rotate on adjustable ball bearings of which there are two in each hub. In mounting the wheels, care should be exercised to thoroughly fill the bearings with grease. Do not fill hub cap or space between bearings with grease.

Bearing Adjustment—

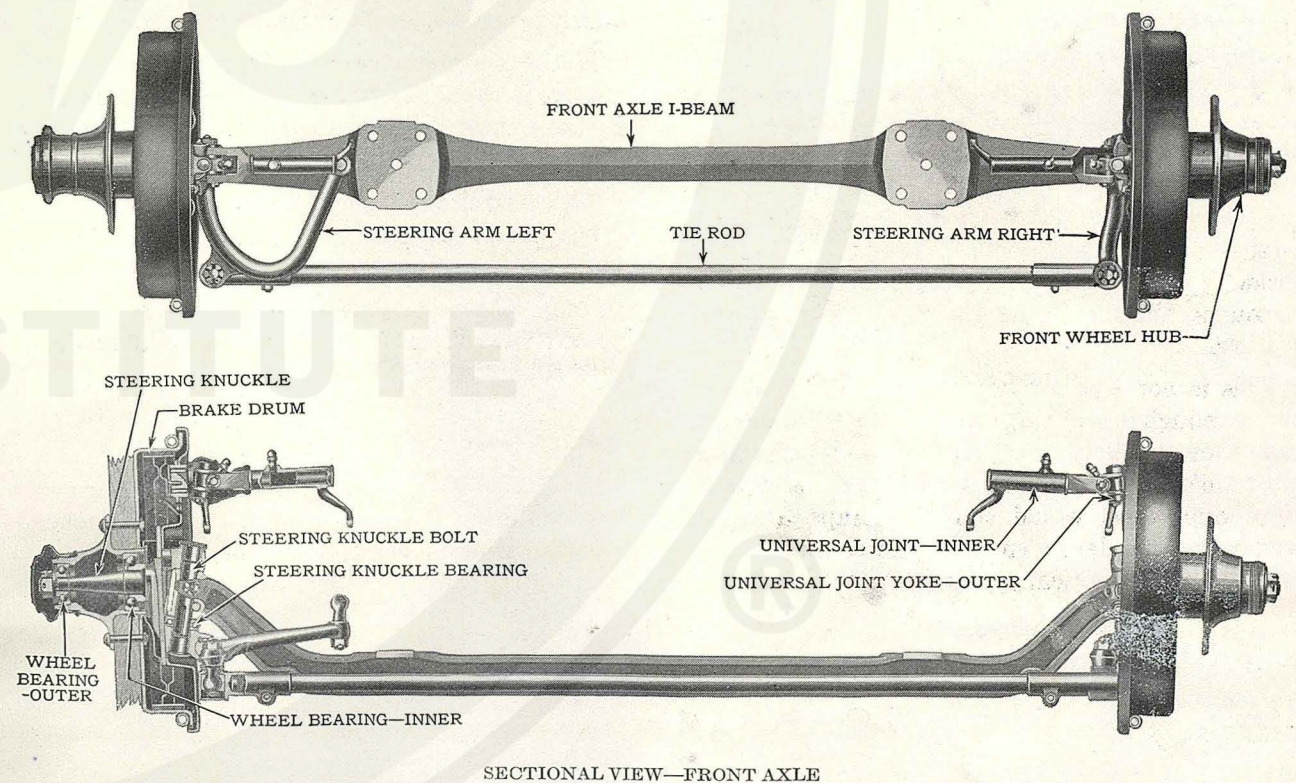
The front wheel bearings require adjustment from time to time, as well as periodical inspection, cleaning and repacking with fresh grease. When adjustment appears necessary, remove the hub cap, jack up the wheel, extract the split from the bearing nut, and tighten the latter sufficiently to

eliminate all looseness. Take care not to make the adjustment too tight or the bearings will be damaged. In determining if the adjustment has been properly made, the wheel should revolve freely and without perceptible shake. This shake, however, should not be confused with that resulting from play in the kingbolt bushings. The latter may be determined by inserting a chisel or other small tool between the steering knuckle and the axle.

Front Wheel Camber and Toe In—

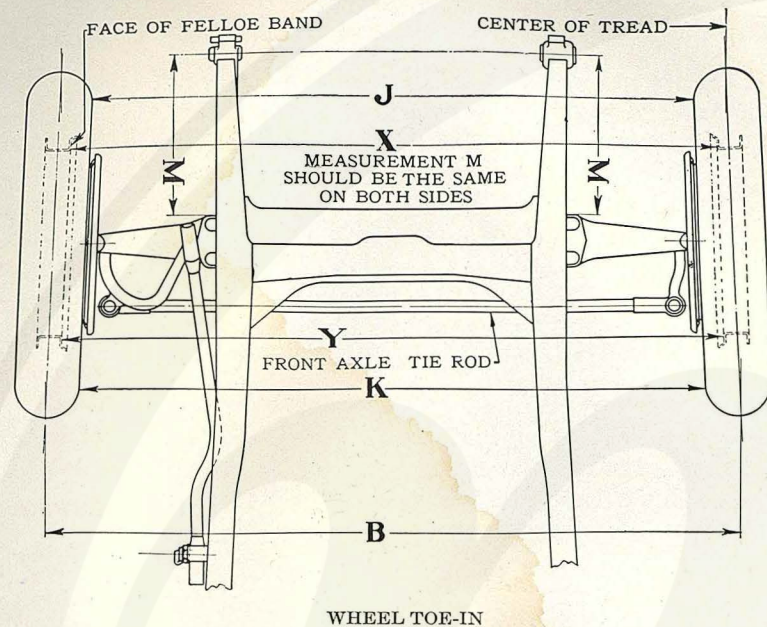
The front wheels do not stand exactly parallel but are set at an angle, and kingbolts are also set at an angle. These angles have been carefully figured to provide easy handling of the car. Reference to the illustrations will indicate the proper alignment of the front wheels.

Measuring at the inside corner of the rim base, the distance between the wheels at front side should be from $\frac{3}{8}$ to $\frac{1}{8}$ inch less than at the rear. If this measurement is made between tire centers, the difference should be from $\frac{5}{8}$ to $\frac{7}{8}$ inch, or if between inside faces of tires, it should be from $\frac{1}{8}$



to $\frac{3}{16}$ inch less. This setting is called "toe-in." The wheels are correctly set at the factory, but should realignment be necessary, due to accident, the "toe-in" may be adjusted by loosening the tie rod clamp bolts. The tie rod, having right and left hand threads at its ends, can then be turned the proper amount for setting the correct toe-in, after which the clamp bolts should be tightened.

The front wheels are also set with a "camber," or, referring to the illustration below, the measurement "D" is from $\frac{3}{8}$ inch to $\frac{5}{8}$ inch greater than "E" or in other words, the wheels are from $\frac{3}{4}$ inch to $1\frac{1}{4}$ inches closer at the bottom than at the top. If accident or collision changes this camber, it is necessary to straighten the axle or spindles to restore the original setting.



WHEEL TOE-IN

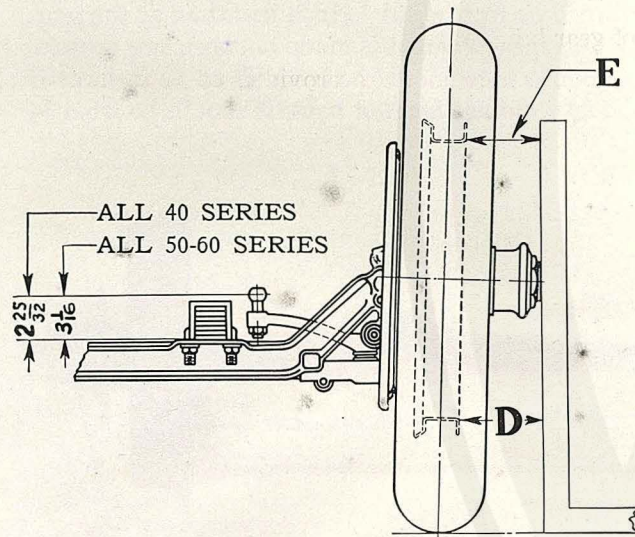
SPEEDOMETER

The speedometer registers the speed at which the car is traveling, the total number of miles traveled, and the trip mileage. The total cannot be reset, but the trip mileage can be reset to zero by pulling out and turning the knurled finger nut which protrudes below the face for that purpose.

If the speedometer head is removed for any reason, it should be handled with great care as it is made up of delicate parts which may be easily damaged.

Under no circumstances oil the instrument head.

The drive is taken from a worm gear which is attached to the main shaft of the transmission through the transmission end plate, being supported with suitable bearings and held in place by a set screw.



WHEEL CAMBER

STEERING GEAR

The steering gear used on the Series 40, 50 and 60, is of the worm and roller type. It consists of a worm on the steering tube which engages with a single roller mounted on the roller shaft.

The worm is mounted between two tapered roller bearings while the roller is mounted on a pin in the forked end of the roller shaft and provided with roller thrust bearings. The roller shaft is carried in two bronze bearings in the housing cover.

Adjustment—

The worm is adjustable for end play by means of a nut at the top of the steering gear housing

while an adjusting screw is provided on the inner side of housing to regulate end play of the roller shaft.

Back lash between the worm and roller is adjusted by means of an eccentric which shifts the housing cover. When properly adjusted the steering gear will have no lost motion or back lash, with the front wheels in straight ahead position.

NOTE: To obtain full advantage of this type of steering gear, adjustment should be made only at Authorized Buick Service Stations.

Lubrication—

Periodical lubrication of the steering gear and its connections is essential; for, in addition to minimizing wear, this lubrication will make for easy steering.

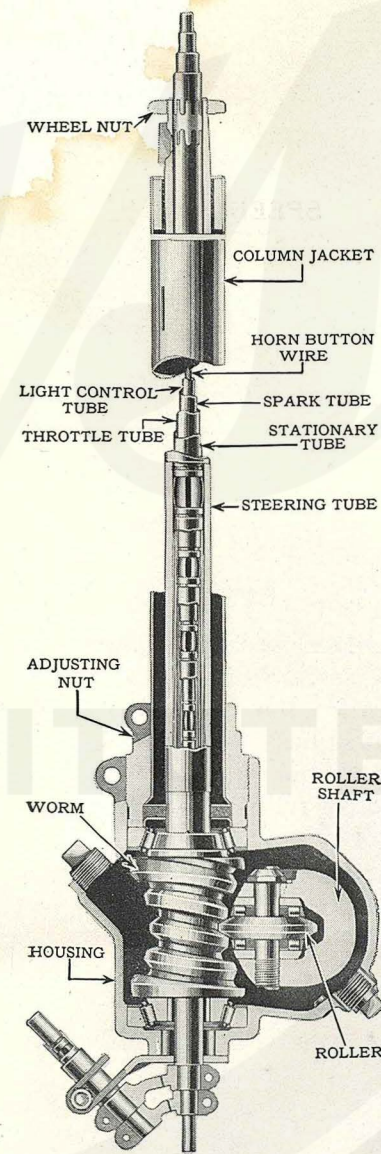
An oil plug is provided in the steering gear housing and this should be kept filled with a good grade of gear lubricant.

Zerk connections are provided at both ends of the steering connecting rod and on each of the tie rod ends and kingbolts and these should be filled with soft cup grease every 500 miles.

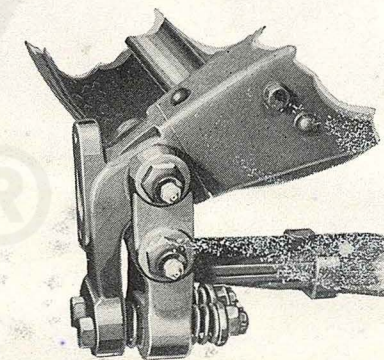
The spark and throttle bevel gears at the bottom of the steering gear should receive a little engine oil from time to time.

Road Shock Eliminator—

A steering road shock eliminator is mounted at front end of left front spring and this is designed to prevent transmission of road shock to the steering wheel.



SECTIONAL VIEW—STEERING GEAR



ROAD SHOCK ELIMINATOR

Steering Gear Lock—

A lock is provided for locking the steering gear in conjunction with the ignition. It is mounted on the steering column and bolted to the back of the instrument board. In one operation, it locks both steering and ignition and provides the most effective theft protection yet devised for the motor car.

To Lock the Car—

After stopping the car, turn the ignition lever to "off" position. Turn the lock key to the left, counter-clockwise, until it can be removed, and both steering and ignition are then locked.

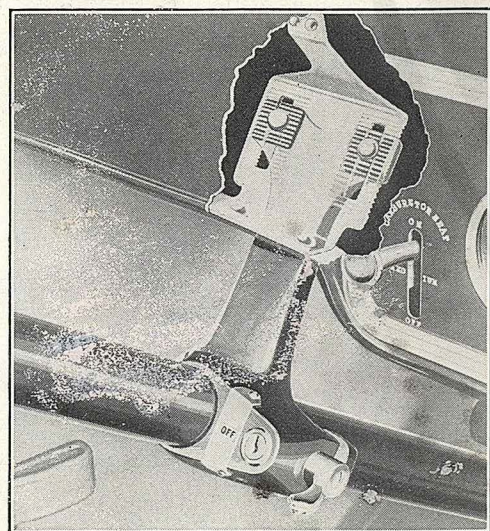
To Unlock Car—

Turn the key to the right, clockwise, until it can be withdrawn from the lock. This unlocks the steering post and the ignition lever can then be turned to the "on" position for starting the engine in the usual way. If key turns hard, move steering wheel slightly to remove strain on locking pin.

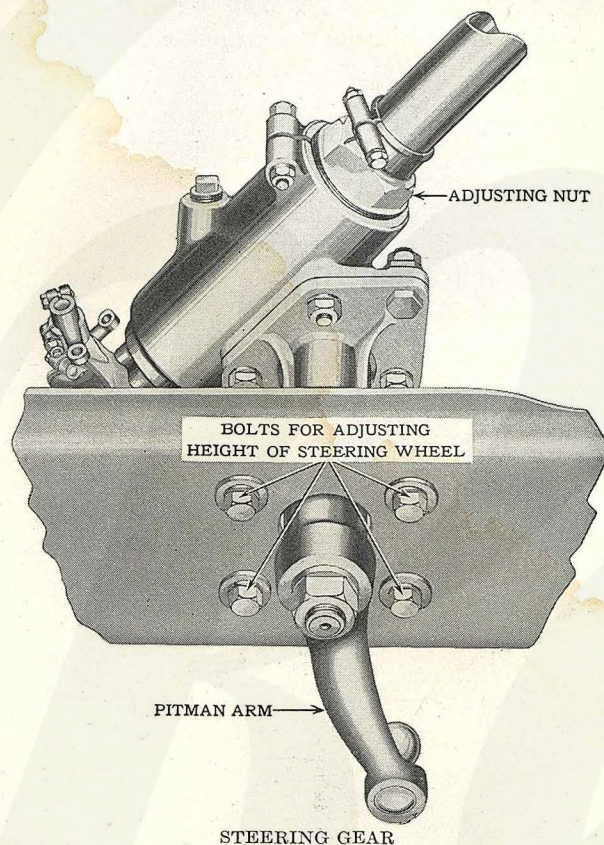
CAUTION: Immediately upon receipt of the car, the owner should make a record of the key numbers for future reference, as without these numbers, it will be impossible to duplicate lost or broken keys.

Steering Wheel Position—

The steering column bracket on all models is provided with an adjustment for placing the steering wheel in the most convenient position. This



adjustment consists of loosening two nuts on the steering column bracket back of the instrument board, also four screws which clamp the steering gear housing in the bracket, raising or lowering the steering wheel to the position desired and then tightening the screws and nuts.

**SPRINGS**

Front and rear springs are semi-elliptic type, unusually long and flexible. The front springs are overslung while the rear are underslung, thus giving a lower body level. Springs of different carrying capacities are used for various body models, in order that the maximum ease of riding may be secured in all cases.

The rear ends of front springs and the front end of left front spring (steering road shock eliminator) are provided with shackles, while the front end of right front spring is attached to frame by the conventional eye bolt.

The rear springs transmit no driving forces so are shackled at both ends.

Spring eye and shackle bolts are subject to natural wear, and must occasionally be adjusted, or rattles will develop.

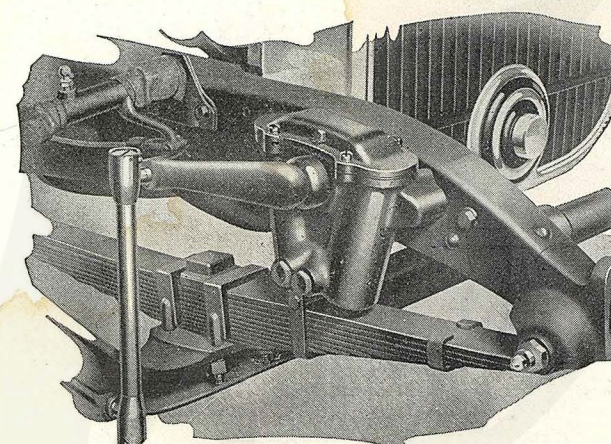
Lubrication—

Spring eye and shackle bolts are lubricated by means of Zerk fittings.

In order to obtain the best riding qualities, springs should be thoroughly lubricated. This should be done by raising weight of car off springs, in order that oil will run between spring leaves.

Shock Absorbers—

New type hydraulic shock absorbers are included as standard equipment, both front and rear. These are of the double acting piston type, which gives a dampening action both up and down, adding materially to the easy riding qualities of the car.

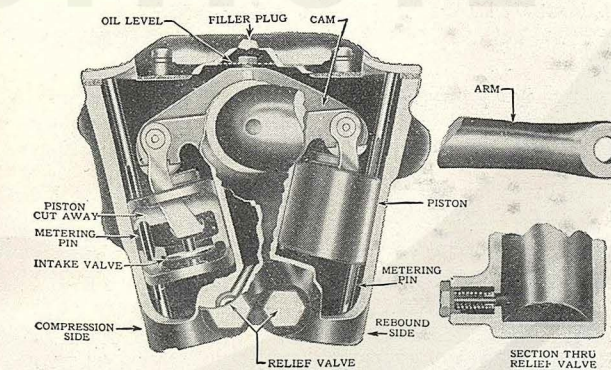


FRONT SHOCK ABSORBER

These absorbers require no adjustment but should be inspected at least twice yearly and oil added through the plug hole in cover, if needed.

Oil for this purpose should be a high grade non-freezing oil and may be obtained through any United Motors Service Station.

CAUTION: Do not use any other oil than that specified above.

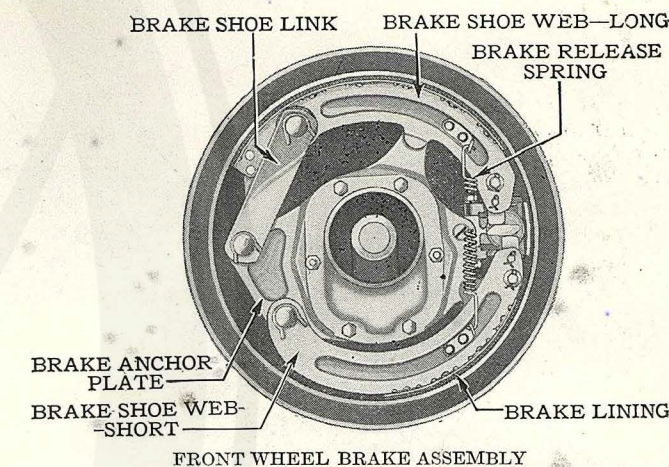


SECTIONAL VIEW—SHOCK ABSORBER

BRAKES

Buick Controlled Servo Internal Expanding Shoe Type, mechanically operated four wheel brakes are used on all models. Series 40 has 14-inch diameter and Series 50 and 60, 15-inch diameter drums.

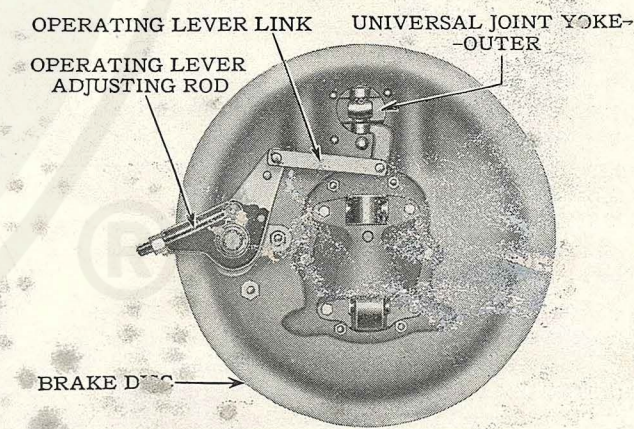
Briefly, these brakes have the following advantages: (1) Operate with low pedal pressure. (2) Require infrequent adjustment and when necessary is accomplished easily and quickly. (3) Fully enclosed and not affected by weather conditions. (4) Long life of brake linings, and brakes remain at their maximum efficiency during life of linings.



FRONT WHEEL BRAKE ASSEMBLY

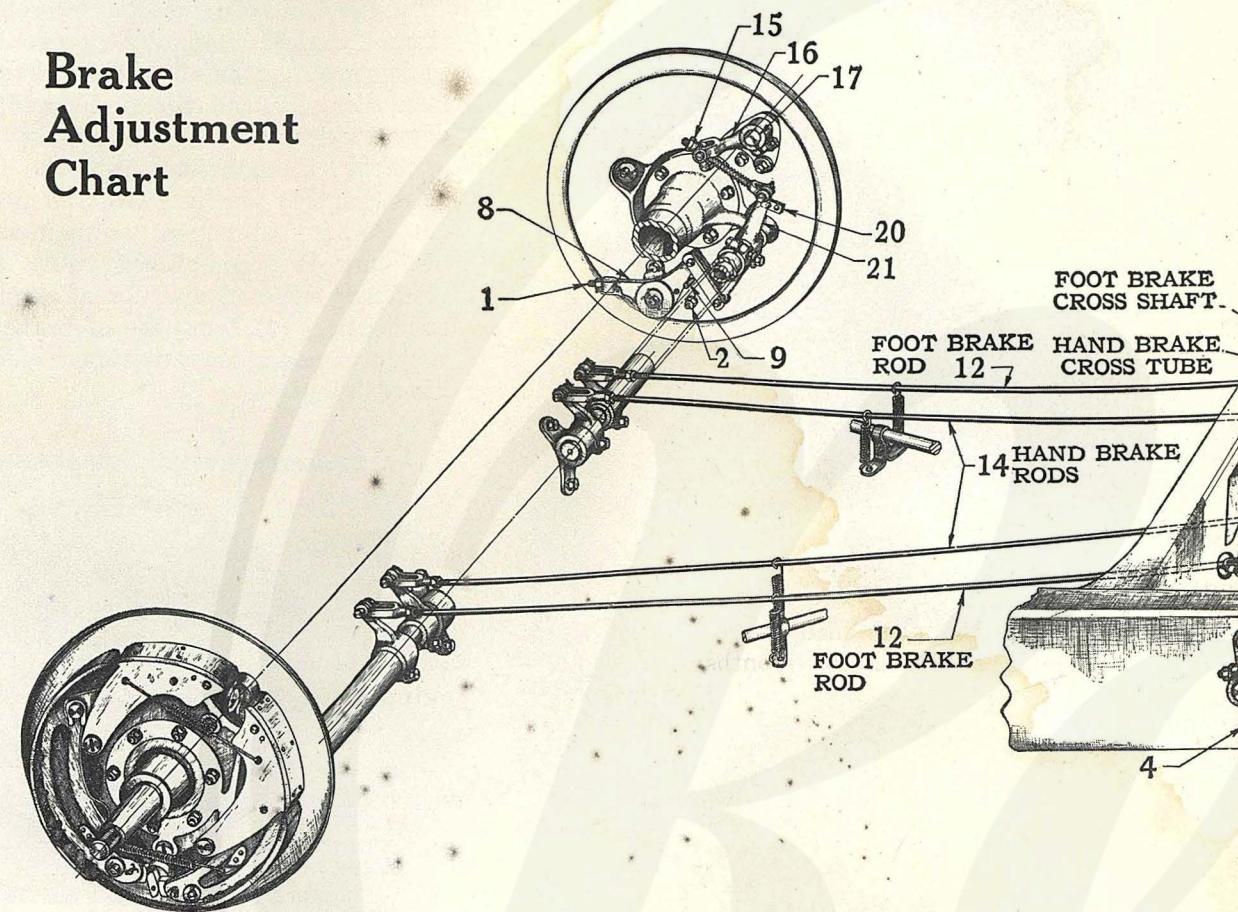
Service Brakes—

The service brakes applied by the brake pedal and operating two shoes in each drum act upon all four wheels simultaneously and in the proper ratio, assuring maximum braking efficiency with minimum effort.



FRONT WHEEL BRAKE CONTROL

Brake Adjustment Chart



FOOT BRAKE ADJUSTMENT

For maximum efficiency and smoothness in operation follow in order the instructions listed below:

NOTE: Do not adjust when brakes are warm. Brake drums must be at room temperature. Brakes must be adjusted when pedal travels to within 2" of toe board with brakes applied.

1. LUBRICATE ALL BRAKE CONNECTIONS.

Pedal must have live feel.

NOTE: Do not over grease wheel bearings. A tablespoonful of grease on each bearing is sufficient. Do not fill hub caps or hubs with grease.

2. LEVERS 4, 8 AND 8a SHOULD BE AGAINST STOPS 9 AND 18 IN RELEASED POSITION:

NOTE: Adjusting screw 3 is used at factory to set equalizer 5 parallel to cross shaft, and it should not be necessary to change.

3. REMOVE ALL SLACK IN PEDAL MOVEMENT.

(a) Pedal should be set $\frac{3}{16}$ " from toe board by adjusting screw 23 with rod 7 disconnected.

(b) Set front wheels straight and adjust rods 10 so that levers 19 set approximately $1\frac{1}{4}$ " forward of a perpendicular center line.

(c) Adjust cables 11—(Do not allow any slack).

(d) Adjust rods 12.

(e) Adjust rod 7.

NOTE: When adjusting rods 7, 10 and 12 and cables 11, care should be taken not to pull levers from their stops.

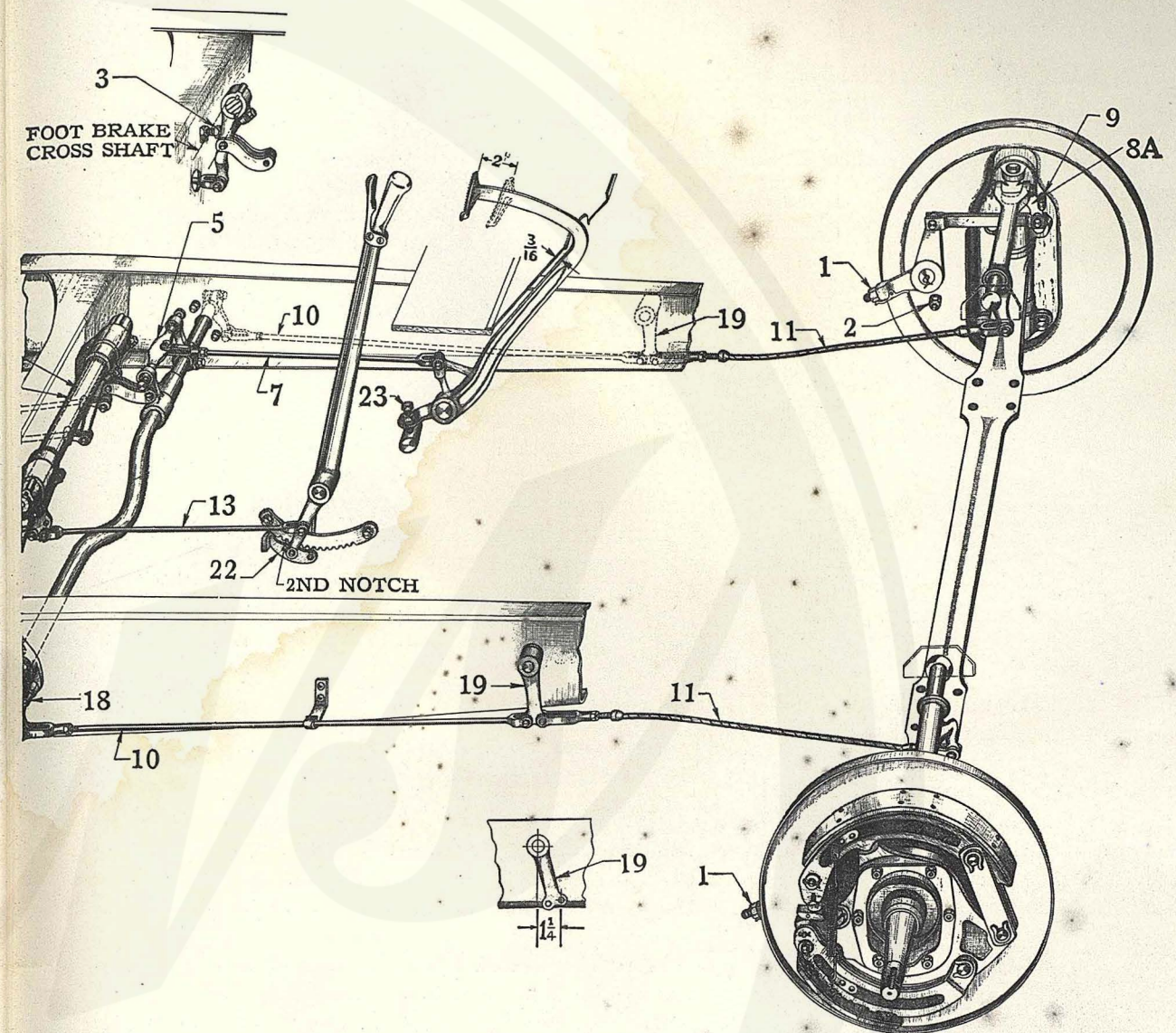
4. JACK UP ALL FOUR WHEELS.

5. LOOSEN NUTS 2 UNTIL LOCKWASHERS ARE FREE TO ALLOW CENTRALIZER TO CENTER CAM.

6. TAKE UP NUTS 1 UNTIL WHEELS DRAG HARD, OR UNTIL IT IS JUST POSSIBLE TO ROTATE WHEELS A COMPLETE REVOLUTION BY HAND.

7. TIGHTEN NUTS 2 TO LOCK CENTRALIZER IN CORRECT POSITION.

8. BACK OFF NUTS 1 FOURTEEN (14) FLATS (THIS SHOULD GIVE SUFFICIENT CLEARANCE TO FREE THE WHEEL, AND IS EQUIVALENT TO APPROXIMATELY 2" PEDAL TRAVEL), A SLIGHT DRAG IS PERMISSIBLE WITH NEW LINING. AFTER BACKING OFF NUTS 1, IT WILL BE NECESSARY TO



APPLY BRAKES FIRMLY TO PROPERLY SEAT NUTS 1 AGAINST LEVERS 8.

NOTE: Check spring lock to make sure it will hold nut 1 from rattling off.

9. BEFORE REMOVING JACKS, APPLY BRAKES LIGHTLY WITH PEDAL JACK TO DETERMINE

HAND BRAKE ADJUSTMENT

Adjustment is provided on hand brake to get maximum mileage out of lining and give both rear wheels same braking efficiency.

1. CHECK LEVERS 21 MAKING SURE THEY SET AGAINST STOPS 20, AND THERE IS NO SLACK IN RODS 13 AND 14.

NOTE: Rod 13 is set in lower hole of cross shaft lever to give maximum ease of operation.

2. SET HAND BRAKE LEVER PAWL 22 IN SECOND NOTCH OF RATCHET WITH REAR WHEELS OFF

WHETHER RIGHT AND LEFT WHEELS HAVE SAME DRAG. IF NOT, SLACK OFF ADJUSTING NUT 1 ON TIGHT WHEEL TO BALANCE.

IMPORTANT NOTE: The brake linkage is arranged to give proper distribution of braking effort between front and rear wheels. This relation can not be changed by varying adjustments of nuts 1.

GROUND—WHICH IS EQUIVALENT TO FOURTH NOTCH WHEN BRAKES ARE APPLIED WITH CAR MOVING.

3. ADJUST NUTS 15 UNTIL BOTH REAR WHEELS HAVE A HEAVY DRAG.

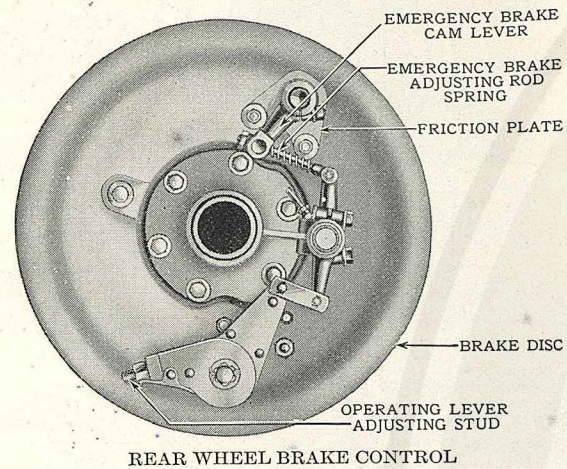
NOTE: If there is not enough thread to do this, move lever 16 one or two notches forward on serrated shaft 1

4. RELEASE HAND BRAKE—(WHEELS SHOULD BE FREE FROM DRAG).

Parking Brakes—

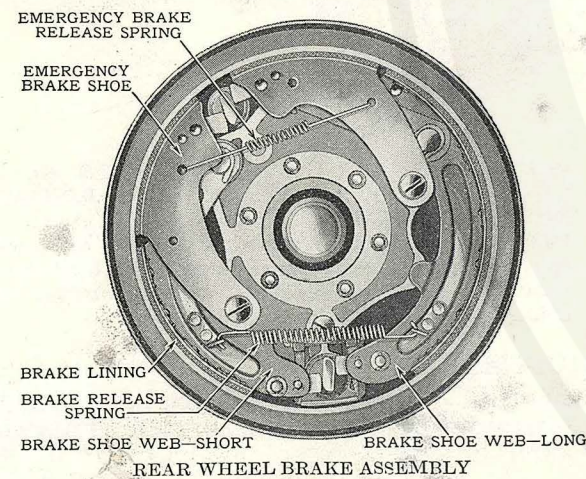
The parking brakes, applied by the hand brake lever, operate two shoes in each rear wheel drum only.

The shoes and operating mechanism are separate and independent of the service brakes.

**Adjustment—**

Service brakes should require little adjustment (only such as will follow the natural wear of the brake lining).

Whenever adjustment may be required, a Buick Authorized Service Station should be consulted, and the procedure as outlined in the instructions included with the brake chart, will provide the most satisfactory brakes.

**Lubrication—**

The brake mechanism is lubricated by Zerk connections and should have attention every 500 miles. All brake clevis pins should be kept well lubricated with engine oil.

FRAME

The frame requires no attention other than to see that the body bolts are tightened as may be necessary.

WHEELS

The wheels are of the standard artillery type with large diameter spokes and large hub flanges.

The demountable rims are of the bolted-on type and may be removed from the wheels with the tire by the following operations:

Remove the dust cap and nut from air valve stem. With the rim wrench remove all of the nuts from the wedge bolts. Insert screwdriver end of the demountable rim wrench between the felloe and wedge to pry loose and remove wedges. The tire rim may then easily be removed.

In replacing the rim and tire, the foregoing operations will, of course, be reversed. Be sure that the wedges are drawn up evenly until all are tight, and after driving several miles, tighten again, as this will help to avoid worn wedges.

To Remove Tire From Rim—

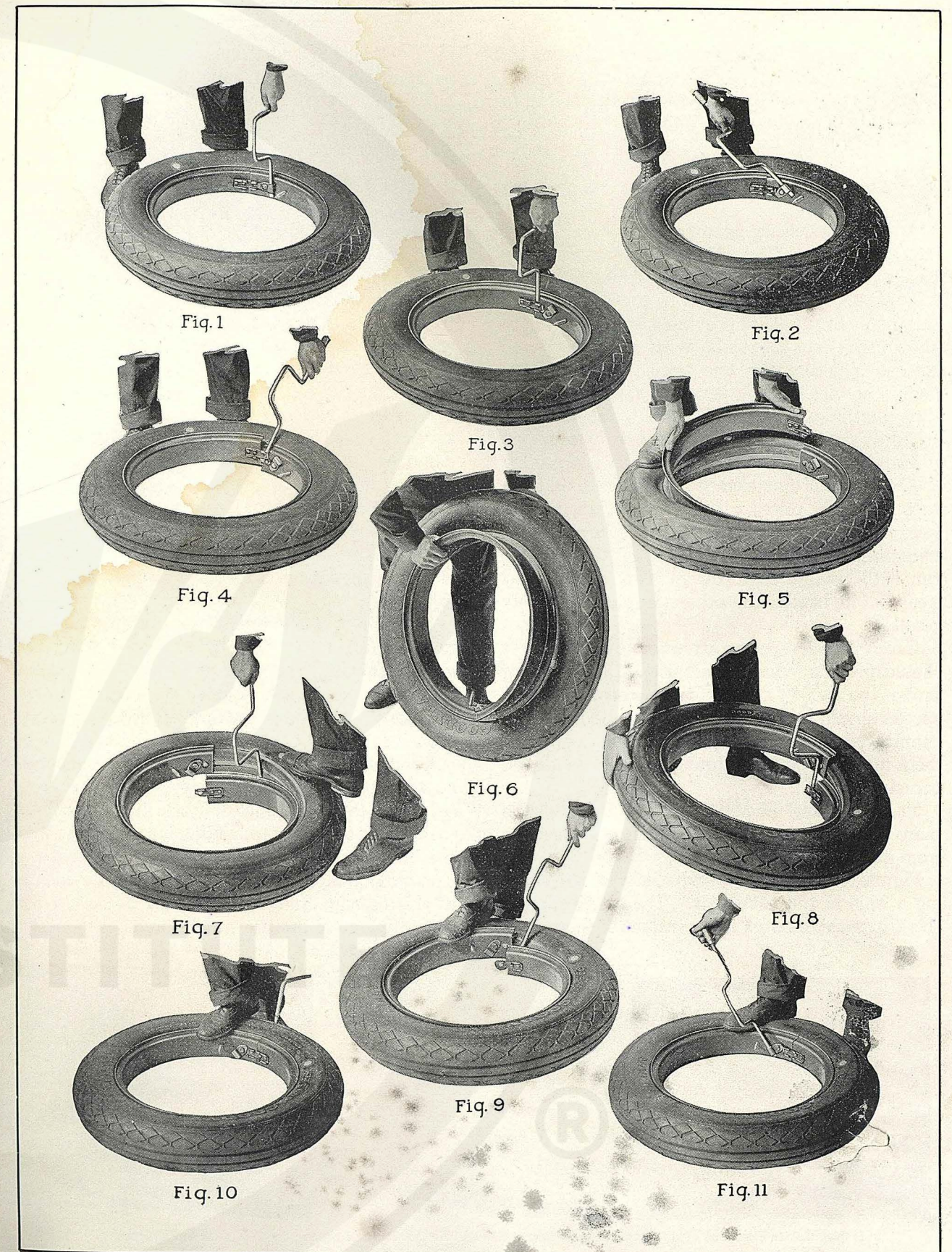
First, see that the tire is fully deflated before attempting the operation.

To take the rim out of the tire, lay rim and tire flat with notched side of driving plate up. Reference to the illustrations, and close observance of the following should make the operation an easy one.

Figure 1—Unlock rim by inserting screwdriver end of rim wrench into locking plate, and turn until locking plate is clear of driving plate, as in Figure 2. Insert screwdriver end of rim wrench in the notch in driving plate as in Figure 3, and pry the plate clear of the hole, as in Figure 4. Continue this operation until the end of the rim which carries the driving plate is free from the tire and rests on the side of the other end. With screwdriver end of rim wrench or as in Figure 5, pry the rim from the tire for the full circumference, holding the tire down firmly with the foot.

To Replace Tire on Rim—

Turn the rim over so that end with the valve stem hole is on top. Insert valve stem in hole in the rim and work both tire beads into the rim for a distance to within approximately ten inches of the other end, as in Figure 6. Turn tire and rim over, prying in on rim and forcing it into position



TAKING OUT AND REPLACING RIM IN TIRE

with the foot. With screwdriver end of rim wrench, pry the rim into place, so that the ends butt together, following the operations as shown in

Figures 7, 8, 9 and 10. The rim can then be locked as shown in Figure 11, and the tire is ready for inflation.

TIRES

All 1930 models are equipped with low pressure, straight side cord tires, size 29 x 5.50 on Series 40 and size 31 x 6.50 on Series 50 and 60.

The purpose of the tire is to protect the tube that holds the air, thus providing an air cushion to absorb shocks of the road. With normal load and correct inflation, the tire should deliver satisfactory service but if it is run at a lower air pressure than is recommended, rapid tread wear will certainly occur and very often fabric breaks.

Maintenance of the proper pressure is therefore the most important element of tire care and the tires should be tested with a reliable gauge every week, making sure that they are inflated to the minimum pressure recommended. If the tires are run with lower pressures than these, rapid tread wear, fabric breaks and other troubles will surely result.

Careful use and proper attention to air pressures should provide maximum service. Application of brakes too quickly and turning of corners at high speeds should be avoided, as well as skidding and running of tires in car tracks. Front wheel alignment and adjustment of brakes should be checked occasionally.

The following illustrations will indicate the more common forms of tire damage resulting from under inflation.

Figure No. 1 shows an under inflated tire striking a hole in the pavement. The gauge showed this tire under inflated to the extent of more than

ten pounds, so that the tire was too soft to absorb the force of the blow and was crushed flat.

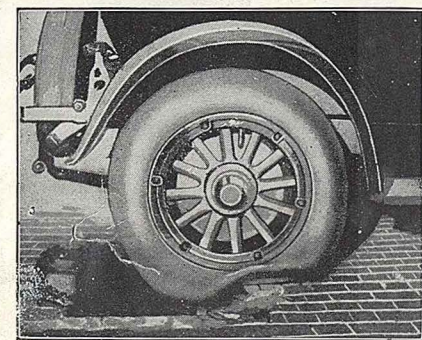
Figure No. 2 shows a cross sectional view of the tire at the moment of impact. This will illustrate the manner in which tire is damaged by being crushed between the rim and the pavement.

Figure No. 3 shows the effect of the blow. The fabric has been ruptured, although the tough rubber tread showed no marks of the blow. The tube, of tough elastic rubber, probably was not damaged at the time, but constant flexing or bending of the tire enlarged the break and the tube, forced into the crack by the air pressure within, was pinched and cut. A leak thus developed and eventually the tire became flat, although perhaps not for several days after the injury.

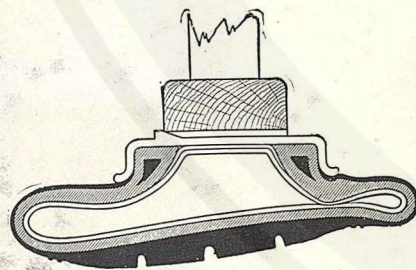
Figure No. 4 shows the manner in which an under inflated tire may be bruised against the curb while parking or turning around. Bruises or breaks caused in this manner are very common.

Figure No. 5 shows the appearance (on outside of casing) of a bruise made by the rim on an under inflated tire. Rim bruises are not always evident on the outside of casing, however, even though several of the inside plies of fabric may be broken.

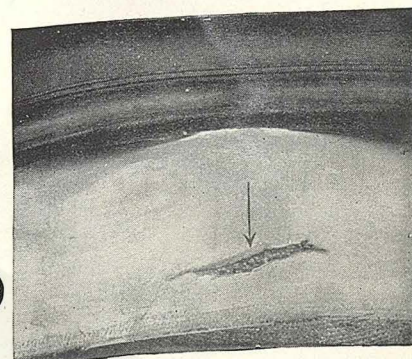
Figure No. 6 shows a similar injury except that the break is worse, being of a compound nature. The outside of the casing may show no evidence of this damage and blow-out may not occur for some time after the tire was injured.



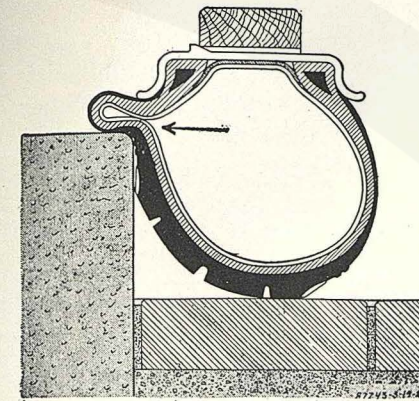
Tire Hitting Hole in Pavement
FIGURE No. 1



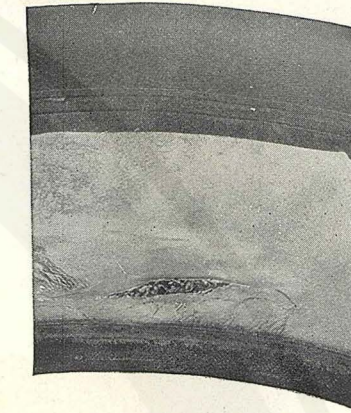
Cross-sectional View of Balloon Tire Crushed by Impact
FIGURE No. 2



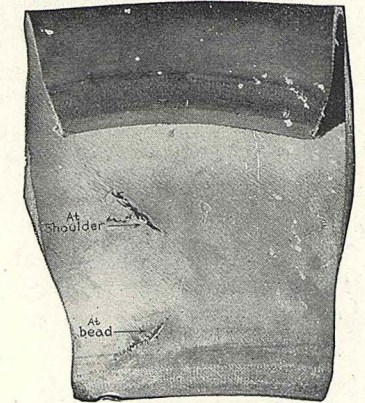
Single Break
FIGURE No. 3



Manner in Which Rim Bruise Occurs
FIGURE No. 4



Bruise Parallel to Bead
FIGURE No. 5



Compound Break
FIGURE No. 6

Figure No. 7 shows a crack or break in the fabric on the inside of a casing, caused by excessive flexing of the sidewall as a result of under inflation.

Figure No. 8 shows the effect of under inflation in relation to tread wear on low pressure casings. Tests have proven conclusively that under inflation is responsible for unnatural, spotty or rapid tread wear. This is particularly true of low pressure casings because of the greater area of contact and the constant wiping action against the road surface.

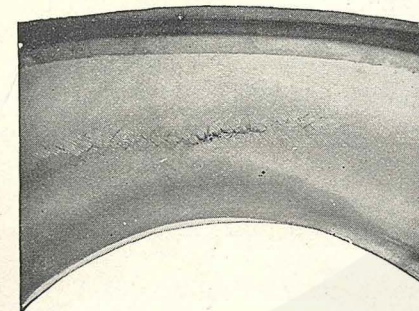
Figure No. 9 shows a casing which was run flat on the rim for a short distance and so badly injured that it cannot be repaired. The same condition will result if a casing is run for a considerable distance at an extremely low pressure. This will show the need of changing the tire or repairing the leak immediately, so that the fabric may not become torn and separated.

Table of Recommended Tire Pressures—

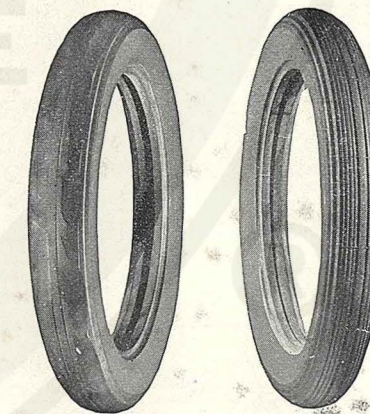
Model	Front	Rear
30-40	35	36
30-44	35	32
30-45	35	35
30-46	35	34
30-46S	35	34
30-47	35	40
30-57	35	36
30-58	35	34
30-60	35	42
30-60L	35	42
30-61	35	36
30-64C	35	32
30-68	35	36
30-69	35	35

NOTE: For High Speed Driving.

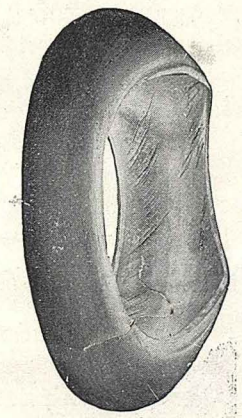
Inflate **front** tires on all models to forty pounds air pressure.



Shoulder Break
FIGURE No. 7



Tire Run 4 Lbs. Under-inflated
Tire Run at Correct Pressure
FIGURE No. 8



Casing Run Flat
FIGURE No. 9

GENERAL LUBRICATION

Systematic lubrication is essential to economical and satisfactory motor car operation and too much emphasis cannot be placed upon its importance. Buick owners are provided with a product of mechanical excellence, but it must be realized that like any other piece of good machinery, it performs at its best only when it is properly lubricated. Every effort has been made to make Buick lubrication as simple and as automatic as possible as well as to make the lubrication points unusually accessible and convenient.

ENGINE

To ensure the proper lubrication of the engine, it is advisable to check daily, the amount of oil in the crankcase, using for this purpose the oil level gauge in the upper crankcase on left side of engine. The level should be maintained at the "full" mark on this gauge, and should it be necessary to add any oil, fill through the oil filler tube on left side of engine. For detailed information on "Engine Lubrication," see page 17.

The capacity of oiling system in the Series 40 engine is $7\frac{1}{2}$ quarts, including oil pan, cleaner, and all oil lines and pockets through the system, and in the Series 50 and 60 engine, the capacity is $8\frac{1}{2}$ quarts. When draining and refilling the crankcase, however, the amount of oil necessary to show "full" on oil level gauge is $5\frac{1}{2}$ quarts in the Series 40 and 6 quarts in the Series 50 and 60 engine.

Engine Oil Viscosity Specifications—

For proper engine lubrication a high grade well refined oil is essential. As a guide to the selection of a proper body or viscosity for summer and winter conditions, an oil having a body or viscosity conforming with S. A. E. No. 30 is recommended for summer use, except in the case of prolonged high speed driving where a heavier oil such as those conforming in viscosity with No. 40 or No. 50 should be used.

For winter use an oil having a body or viscosity of S. A. E. No. 20 and with a zero pour test is recommended. Such an oil should be satisfactory for temperatures down to ten (10) degrees above zero, below which temperature an oil of viscosity conforming with S. A. E. No. 10 and with a zero or sub-zero pour test should be used.

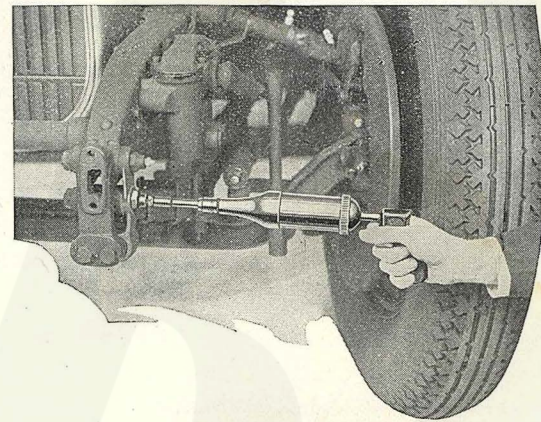
The S. A. E. numbers have been adopted by a

large number of the oil companies and no difficulty should be experienced in obtaining the proper grade when adding to or making a complete change of oil in the crankcase.

Zerk Lubricating System—

All models are equipped with the Zerk high pressure lubricating system, which is clean in handling and both efficient and easy in operation.

It consists of a compressor, and ball-check valve fittings located at the various points requiring lubrication and these fittings are so designed as to provide maximum convenience in lubricating the car.



ZERK COMPRESSOR

Operating the Compressor—

Before using the compressor, fittings should be wiped free of dust or dirt, to make sure that they will not be clogged or dirt forced into the bearings.

To force grease to the bearings, it is necessary only to place end of compressor on the fitting and push the handle, which may be accomplished very readily with one hand.

When pressure contact is made the rim of the nipple seats in the cup of the nozzle and effects a leak-proof seal at any angle within 25 degrees of the axis of the nipple.

During the forward stroke of the handle, the piston ejects the lubricant in the hollow stem through the nozzle, containing ball check, directly into the nipple.

The hollow stem is automatically refilled by vacuum suction, through an inlet which is opened by the piston at the end of the return stroke. To

ensure full opening of the inlet, it is important that a complete return stroke be made.

Filling the Compressor—

Remove the cap, pull out plunger and fill barrel with a good grade of soft cup grease, not too full but packed solidly to avoid trapping of air. After compressor is filled, it is necessary to prime the high-pressure unit. This is accomplished by placing nozzle against some solid object and pushing forward several quick and complete strokes until lubricant is worked through the high-pressure nozzle unit.

Lubricating Points—

The charts shown on pages 32 and 33 will indicate the points requiring lubrication, the recommended intervals and the kind of lubricant to be used. It should be realized that oily surfaces quickly collect dirt which if reaching the various working parts, will cause premature wear. It is advisable, therefore, to keep all points of lubrication as free from dirt as possible.

For your convenience and ready reference, the following table will call attention to the various lubricating points, the frequency of attention and the proper lubricant.

EVERY 500 MILES

Soft Cup Grease

Using Zerk Compressor—

- Front end of front spring, 3.
- Front spring shackle bolt, upper, 2.
- Front spring shackle bolt, lower, 2.
- Universal joint yoke block, 2.
- Universal joint yoke lever, inner, 2.
- King bolt, upper, 2.
- King bolt, lower, 2.
- Front axle tie rod, 2.
- Drag link, front end, 1.
- Drag link, rear end, 1.
- Front brake idler lever, 2.
- Distributor, 1.
- Brake pedal, 1.
- Clutch pedal, 1.
- Clutch release bearing, 1. Hand grease cup only
- Brake shaft, outer bearing, 2.
- Brake shaft, inner bearing, 2.
- Rear spring shackle, front, 2.

- Rear spring shackle, rear, 4.
- Water pump, 1.
- Hand brake lever, 1.
- Brake camshaft bracket, inner, 2.
- Brake camshaft in brake spider, 2.
- Rear service brake tube, 2.

Engine Oil—

- Spark control gears and shaft, a few drops.
- Hand brake lever pins, a few drops.
- Brake clevis pins.
- Generator housing, rear, a few drops in oil cup.
- Starter pedal shaft (through holes in cover), a few drops.
- Starter housing, front end, a few drops in oil cup.
- Front and rear shock absorber connecting rod ball and socket joints, a few drops at both upper and lower ends.

EVERY 1000 MILES

Steering gear. Fill through plug hole with gear lubricant conforming with S. A. E. specifications, No. 160 for summer and No. 90 for winter use.

AFTER FIRST 2000 MILES AND TWICE A YEAR THEREAFTER

Remove filler cap on the left side of transmission case and fill to level of opening with gear lubricant conforming with S. A. E. specifications, No. 160 for summer and No. 90 for winter use. Inspect frequently.

Remove plug in rear of rear axle housing and fill to level of opening with gear lubricant conforming with S. A. E. specifications, No. 160 for summer and No. 90 for winter use. Inspect frequently.

Fan hub. Remove screw, drain old oil and refill as directed on page 19 with engine oil every 5000 miles.

Remove distributor rotor and place a few drops of oil on the felt wicking in top of cam.

FOUR TIMES A YEAR

Crankcase should be completely drained and refilled four times a year. However, the oil level must be kept up to full mark on measuring stick at all times.

ONCE A YEAR

Remove both front wheels and lubricate bear-

ings by applying soft cup grease directly to the bearing cups and ball assemblies. Do not fill hub cap or center portion of hub with grease.

Before fresh lubricant is packed into bearings, it is advisable to clean both the bearings and inside

of the hubs with kerosene.

Crankcase Capacity for Refilling—

Series 40, 5½ quarts.

Series 50 and 60, 6 quarts.

GENERAL CARE OF THE CAR

Care of the Finish—

The bodies of all models are finished in Duco, and the outstanding advantage of this finish to the car owner is the ease with which it may be kept clean and new looking. Duco is the hardest, toughest and most durable automobile finish ever developed, but if the owner desires to keep his car looking as it did when delivered to him, the finish must not be abused, and the following cautions should be observed by the purchaser of a Duco-finished car:

The car should be cleaned at reasonable intervals, and while possible in some cases to clean with a dry cloth, it is usually best to wash the finish if the car is very dirty, particularly if grit or small sand particles may be present in the dirt. Should the finish, after washing, appear gray or white, thorough polishing is required and Duco Polish No. 7 is recommended for this purpose.

Care should be taken that no alcohol or anti-freezing mixture containing alcohol is spilled on the Duco finish, but if this does occur, it should be immediately wiped off.

The Duco finish will usually resist the action of dilute acids such as are present in battery solutions, but it is advisable to exercise care in keeping any acid, dilute or full strength, from the finish.

Duco Polish No. 7 may be used both as cleaner and polisher. If the car is only dusty, the dust may be removed with a dry cloth, and the polish then applied. If the car is dirty, it should be washed and dried, before applying the polish. Use a dry, clean cloth in rubbing off the polish and with thorough rubbing a fine lustre will be obtained. If in cleaning and rubbing the finish traces of the color remain on the cloth, the owner need not be alarmed, as this represents a weathering or wearing action and does not appreciably affect the life of the finish.

All chromium and nickel plated parts of the car should be kept clean and free from dirt or foreign matter, and for cleaning the chromium plated

parts at least, nothing but clear water and a clean rag should be used. Dirt containing black soot, clay, iron oxide, or calcium chloride, if allowed to remain on the plated surfaces, may cause tarnishing and even corrosion.

For repairing scratches and worn spots on the fenders, duPont No. 7 touch-up black is recommended. This may also be used to prevent rusting of bolts and nuts, such as those used for mounting bumpers, license plates, etc.

Closed Car Upholstery—

The upholstery material in closed cars is exposed to dirt and weather conditions which will cause wear and deterioration unless the proper care is given the upholstery. It is desirable at least once a month or more frequently if necessary, to clean the upholstery with a vacuum cleaner and a whisk broom.

If the material becomes spotted, a cleaning fluid should be used for removing the spots, and when this has thoroughly evaporated, apply a hot flat iron wrapped in a wet cloth. Steaming the fabric and rubbing lightly against the nap will raise the nap to its normal position.

Floor carpets may be cleaned by rubbing with a sponge soaked in gasoline.

Open Car Upholstery—

Leather upholstery may be washed with pure soap and water, rinsing off the soap and drying with a moist chamoise. Never use gasoline on leather upholstery.

Squeaks and Rattles—

The body is attached to the chassis by hold-down or "body" bolts and between the body sill and chassis frame is placed an "anti-squeak" material. As the car is driven and the body weight compresses the anti-squeak and the body bolts seat themselves in the wood sills, these bolts may become loose. When this condition exists,

the body will move on the chassis and squeaks and rattles will result. It is advisable to inspect the body bolts once a month, at least for the first few thousand miles of driving, and tighten them when necessary.

Door hinges should be examined occasionally and hinge screws tightened if necessary.

A small amount of grease or oil applied once a month to door locks, striker plates, hinges, door check pins and dove tail bumpers will be found helpful in preventing squeaks and rattles.

Tops and Curtains—

Dust or dirt on the outside of the top should be removed with a sponge and soap suds, rinsing with clear water and then drying with chamois. Do not use gasoline or oil of any kind as these will injure the fabric and dull its lustre.

Exposure to all kinds of weather, may in time dull the lustre of the top material, and small cracks may develop. Should this occur, the top may be refinished with duPont No. 7 auto top finish, which will restore the lustre, protect the fabric and keep it from leaking.

The above can be used only for black tops and should be applied with a flat varnish brush, drying over night, the top having been washed and thoroughly dried.

The inside of closed model tops may be cleaned by brushing briskly with the nap, using a vacuum cleaner if available. Do not brush the windows in the storm curtains of open models; they should be wiped with soft cloth or sponge dampened in alcohol. The curtains should not be folded and laid away when wet.

Storing the Car—

If the car is to be laid up for any length of time and especially in the winter, the following suggestions should be observed: Drain the water from the cooling system, then run the motor not over

one minute to dry out the cylinder water jackets.

Drain the crankcase. Flush out the old oil, then refill with fresh oil. It is also well to pour a little oil into each cylinder through the spark plug hole to prevent the interior from rusting. Clean the spark plugs and dip the ends into oil to prevent rusting and replace them.

Crank the engine for about 20 seconds with the ignition switch off and the throttle closed. This ensures a distribution of the oil over cylinder walls and valve mechanism.

Disconnect the wires from the storage battery and remove battery to some dry place. It is best to take the battery to a battery service station, where it may receive a freshening charge at least once a month. It is well worth while to take care of the battery.

Go over the nickeled parts with a light coating of vaseline jelly or grease to prevent rusting. This should be removed with gasoline before putting the car back into service.

Jack up the front and rear axles and remove the tires.

If the tires are to be out of service for any length of time, they should be removed from the rims. The inner tubes should be put in the casing with a small amount of air pressure and the tires stored in some cool, dark place, preferably where there is a slight amount of moisture, since if they become too dry the rubber will harden and lose its elasticity. It is a good idea to wrap tires with cloth to protect them from heat.

Remove all dust from top and upholstery, wash body clean, put the top and side curtains up and cover the car with heavy sheetings or a paper cover especially made for the purpose.

When putting the engine back into service again, remove the spark plugs, inject a small quantity of oil into each cylinder, crank the engine by hand for a few seconds, replace the plugs, turn the ignition "on" and after the engine has been started on its own power, run slowly for a few minutes.

FIRST AID SUGGESTIONS

In the operation of an automobile it is recognized that there may arise certain conditions causing poor performance or failure of the engine or power system to function properly and frequently the owner is not able to locate the cause from the symptoms in evidence. When this occurs and an Authorized Service Station cannot be consulted conveniently, it is also realized that the owner should have at hand some simple suggestions which will enable him to drive the car to the service station for advice, should this be needed.

It has, therefore, been thought advisable to list in this book a limited number of suggestions which may be found of benefit to the owner in locating and correcting the minor difficulties encountered in the operation of the car. No attempt has been made, however, to include any instructions relative to the method of performing repair operations. Authorized service stations should be consulted whenever such repairs may be found necessary.

If the engine fails to start when cranked.

(a) Cylinders flooded with fuel by keeping choke button out too long. To correct, push choke button in completely and continue cranking with throttle closed until excess gasoline has been expelled from cylinders when ignition should occur. Not more than 20 seconds cranking should be required to clear the cylinders.

(b) No fuel in gas tank.

(c) Weak or no spark at spark plugs. The probable causes are discharged battery, loose or corroded battery terminals, burned or improperly adjusted breaker points in the distributor, loose or broken wires or connections, or spark plug points set incorrectly or fouled. The strength of the spark may be determined by disconnecting one of the spark plug connections and holding it about $\frac{1}{4}$ -inch from the plug base while the engine is being cranked.

In case of a discharged battery it may still be possible to hand crank the engine and obtain sufficient spark to start. If loose or corroded terminals are found they should be tightened and cleaned. In case of burned breaker points, the metal adhering to the face of the point may be scraped off to provide temporary relief, and points adjusted to .018". If the spark plugs are fouled, they should be cleaned and adjusted to proper gap (.025").

If the engine stops or misses at high speeds or under heavy load.

(a) Make sure that there is gas in the main tank and if this is established, it is then necessary to determine if fuel is reaching the carburetor.

Examine all connections, particularly into and out of the fuel pump to make sure that these connections are tight. It is necessary that these connections be kept tight as any looseness will interfere with the proper functioning of the pump. If all connections are tight and the condition is still not corrected, disconnect the pump connection of pipe leading from pump to carburetor. Then crank engine and if gasoline flows from the pump connection it may be assumed that fuel is reaching the carburetor and the cause of the trouble will have to be sought elsewhere.

If, in cranking the engine with pump connection loose or disconnected, fuel does not flow from the pump, then it may be assumed that there is an air leakage or stoppage in the main fuel line from the tank to the pump and it would be advisable to take the car to an Authorized Service Station for a determination of the trouble.

(b) Test for spark at spark plugs. The method for making this test is described in a preceding paragraph under the heading "Weak or No Spark at Spark Plugs." If a good spark is obtained regularly, the trouble does not lie in the ignition system. If no spark occurs or the spark is weak, it indicates a discharged battery or loose connections. An examination should be made of wire connections at switch, ammeter, coil and distributor. If these are found tight and in good condition, it is well to examine the battery terminals and ground wire.

If the engine misses regularly on one or more cylinders.

(a) The most probable cause is dirty spark plug or plugs. To locate, first idle engine slowly with retarded spark, then hold screwdriver against plug terminal and top of engine, thus short-circuiting the plug. Be careful to hold screwdriver by wooden handle, else a shock will result. Short-circuiting a plug which is not working will not change the engine speed. On the other hand it will cause the engine to slow down or stop if the short-circuit is established with a working plug.

After the dead plugs have been thus located, they should be cleaned and adjusted, or replaced by new ones.

If the engine misses irregularly.

(a) Sticky valves or improper adjustment of push rods.

Engine oil, or kerosene if available, introduced around the valve stems, will help to free sticky valves. If push rods require adjustment see under "Adjusting Push Rods," page 16.

(b) Burned or improperly adjusted breaker points.

(c) Loose connections in low tension (or battery) circuit. Examine connections at ammeter and switch, and at side of distributor housing.

(d) Short-circuit in high tension wires due to broken down insulation. Inspect spark plug wires and heavy wire from coil to distributor head.

(e) Defective spark plug, or spark plug terminal gaps are more or less than .025 inch.

(f) Incorrect carburetor adjustment.

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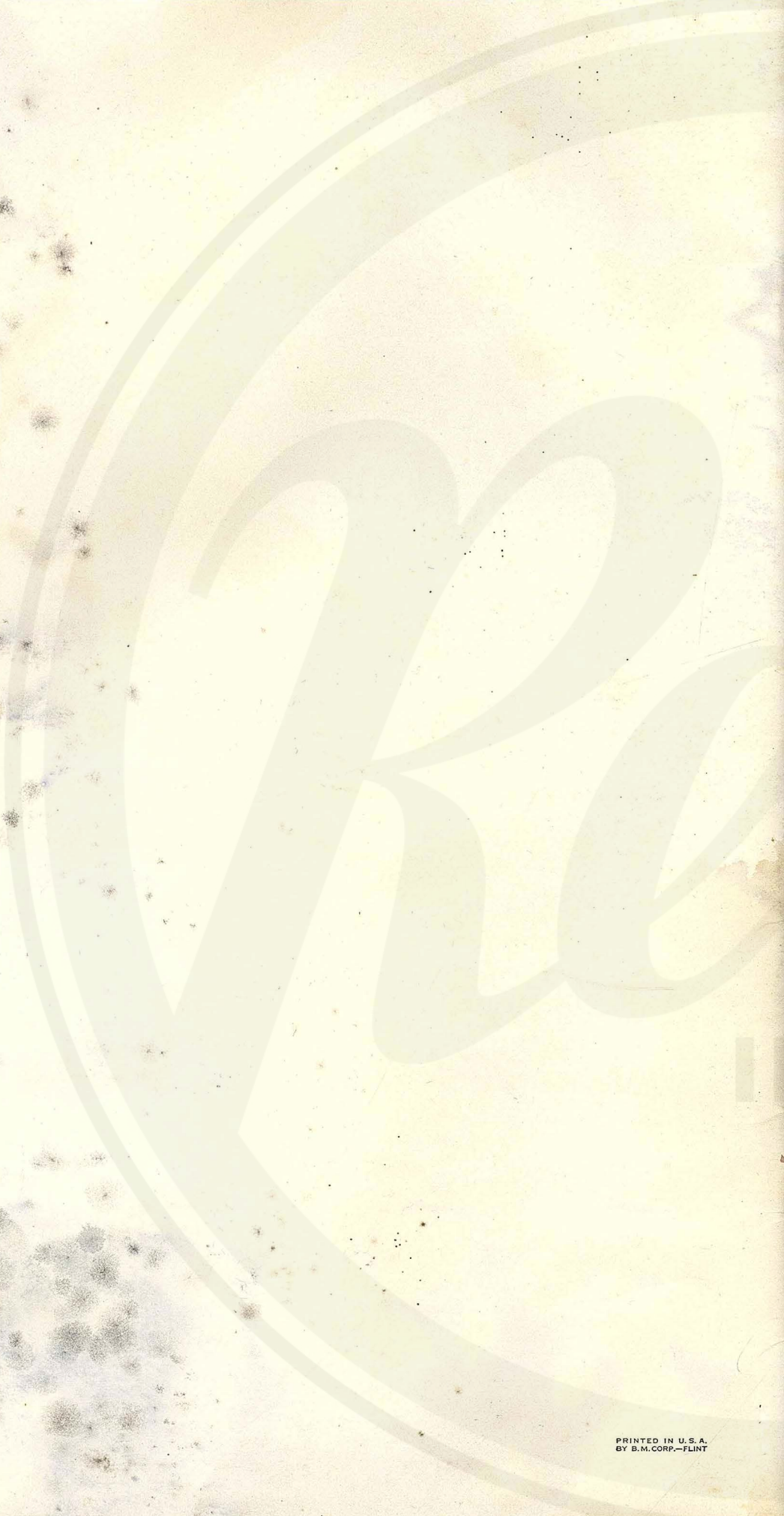
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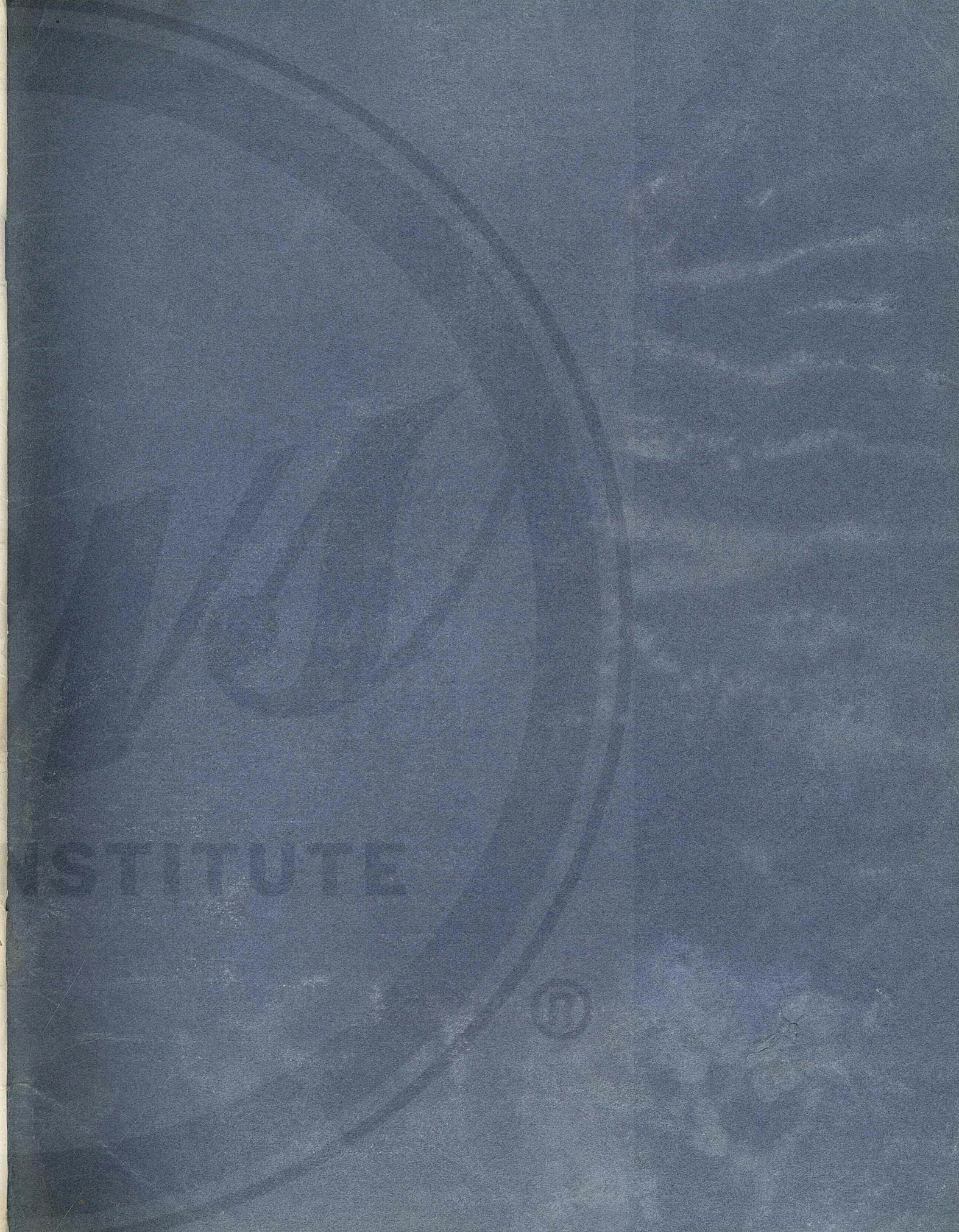
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