

Reference  
Book  
1928



# Reference Book



*Emblem of Satisfaction*

## 1928 MODELS

### 114½" WHEEL BASE

28-20	Two-Door Sedan	5 Passenger
28-24	Sport Roadster	4 Passenger
28-25	Sport Touring	5 Passenger
28-26	Coupe	2 Passenger
28-26-S	Country Club Coupe	4 Passenger
28-27	Four-Door Sedan	5 Passenger
28-29	Town Brougham	5 Passenger

### 120" WHEEL BASE

28-47	Four-Door Sedan	5 Passenger
28-47-S	DeLuxe Sedan	5 Passenger
28-48	Coupe	4 Passenger

### 128" WHEEL BASE

28-50	Sedan	7 Passenger
28-51	Brougham	5 Passenger
28-54	Sport Roadster	4 Passenger
28-54-C	Country Club Coupe	4 Passenger
28-55	Sport Touring	5 Passenger
28-58	Coupe	5 Passenger

## Buick Motor Company

*Division of General Motors Corporation*

Flint, Mich., U. S. A.

## **FOREWORD**

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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.

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**BUICK MOTOR COMPANY**



## WARRANTY

It is expressly agreed that there are no warranties, express or implied, made by either the Seller or the Manufacturer on 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 (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.



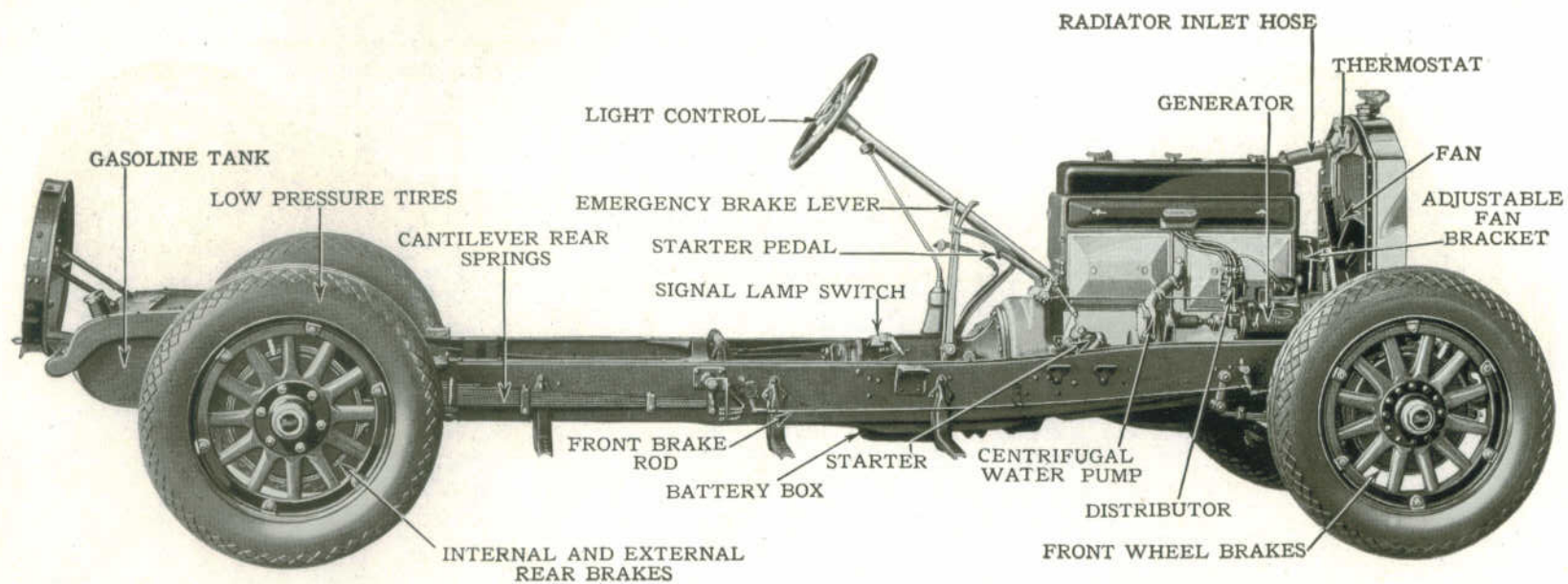
## ORDERING BUICK PARTS

For the benefit and convenience of owners, Buick 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:

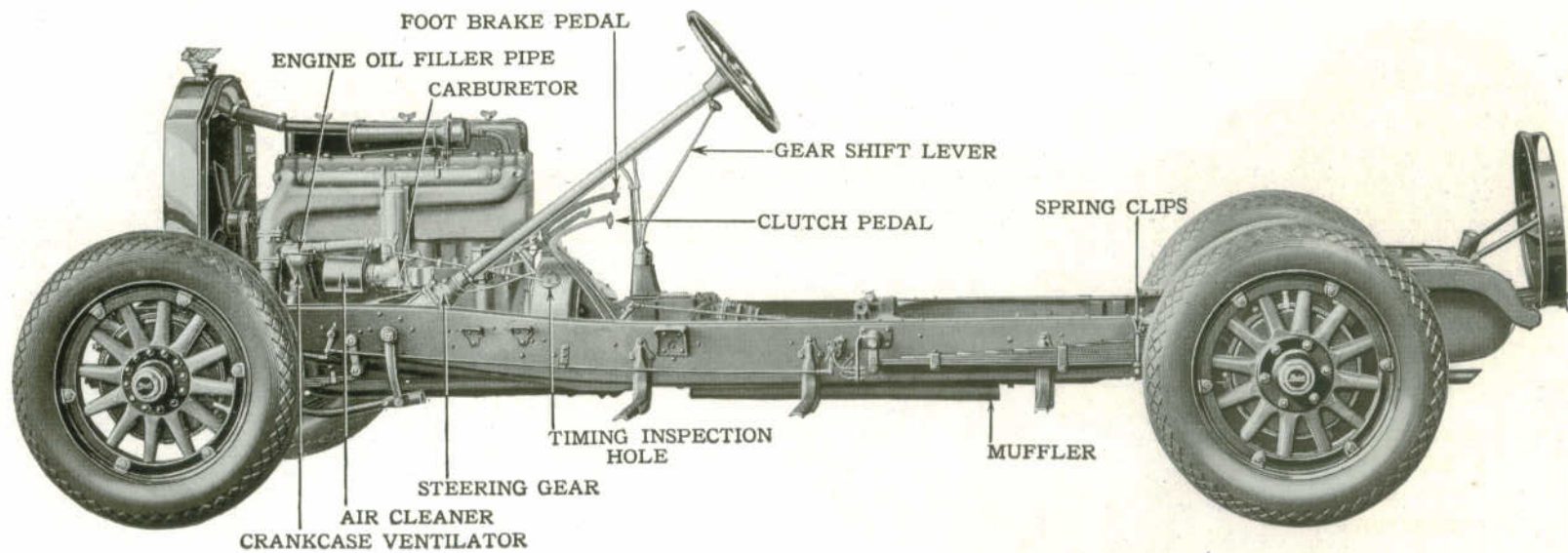
1. The car serial number (to be found on plate on right side member under front fender).
2. Quantity.
3. Part name.
4. State year, model and style of car (i. e., touring, roadster, etc.).
5. Shipping directions. Write name and address **accurately**. Give city, state and method of shipment: Parcel post,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





RIGHT SIDE VIEW OF CHASSIS





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.—114½" wheel base, 23.4; 120" and 128" wheel base, 29.4.

### **Bore—**

114½" wheel base, 3⅛"; 120" and 128" wheel base, 3½".

### **Stroke—**

114½" wheel base, 4½"; 120" and 128" wheel base, 4¾".

### **Cylinders—**

Number of cylinders, 6.

### **Model Plate—**

On the front side of the dash under the hood.

### **Serial No.—**

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

### **Engine No.—**

On plate on rear left side of upper crankcase in front of rear breather tube.

### **Wheel Base—**

Models 20, 24, 25, 26, 26-S, 27, 29, -114½"; Models 47, 47-S and 48, -120"; Models 50, 51, 54, 54-C, 55, 58, -128".

### **Tread—**

56 inches.

### **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: Three rings above piston pin.

### **Cooling—**

Water circulated by centrifugal pump, driven by spiral gears from camshaft, and temperature thermostatically controlled. Fan driven by belt from pulley on camshaft. Capacity of cooling system—114½" wheel base, 4 gallons—120" and 128" wheel base, 5 gallons.

### **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 float feed type supplied by vacuum system.

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

Air cleaner on carburetor intake.



**Starting, Lighting and Ignition—**

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

High tension jump-spark ignition system, with distributor, coil, and cutout relay mounted on the generator. 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 lights 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: 114½" wheel base, 3 lbs. 8 oz.; 120" and 128" wheel base, 3 lbs. 12.5 oz.

**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—**

The 114½" wheel base models have three-quarter and the 120" and 128" wheel base models full floating type, with weight of car in both types carried entirely on the housing.

In the three-quarter floating axle, wheels are mounted on large Hyatt roller bearings and in the full floating, on large New Departure ball 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: 114½" wheel base, 5 lbs. 4 oz.; 120" and 128" wheel base, 4 lbs. 12 oz.

**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, external contracting on four wheels.

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

**Wheels—**

Artillery type, with large hub flanges, 12 spokes and 12 hub bolts each; demountable rims.

**Steering Gear—**

Semi-irreversible split bronze nut and worm 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—**

Reinforced pressed steel channel section of the double drop type, with increased depth of side channel and reinforcements between upper and lower flanges at engine rear cross member and at rear spring trunnion.

Additional strength has been provided by extra large flanges on front engine cross member and brake shaft and rear kick up cross members.

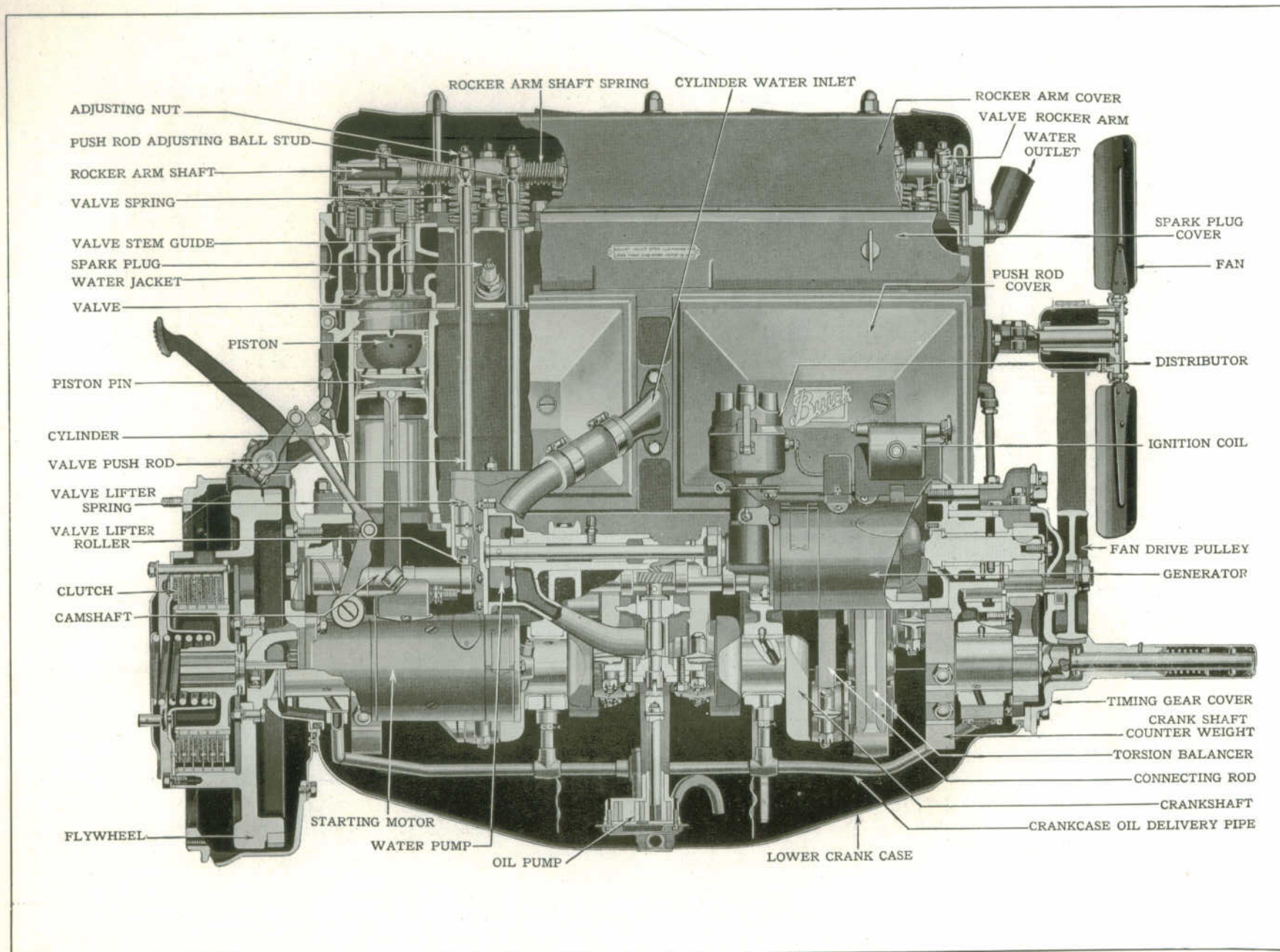
**Springs—**

Semi-elliptic type front; cantilever type rear.

**Shock Absorbers—**

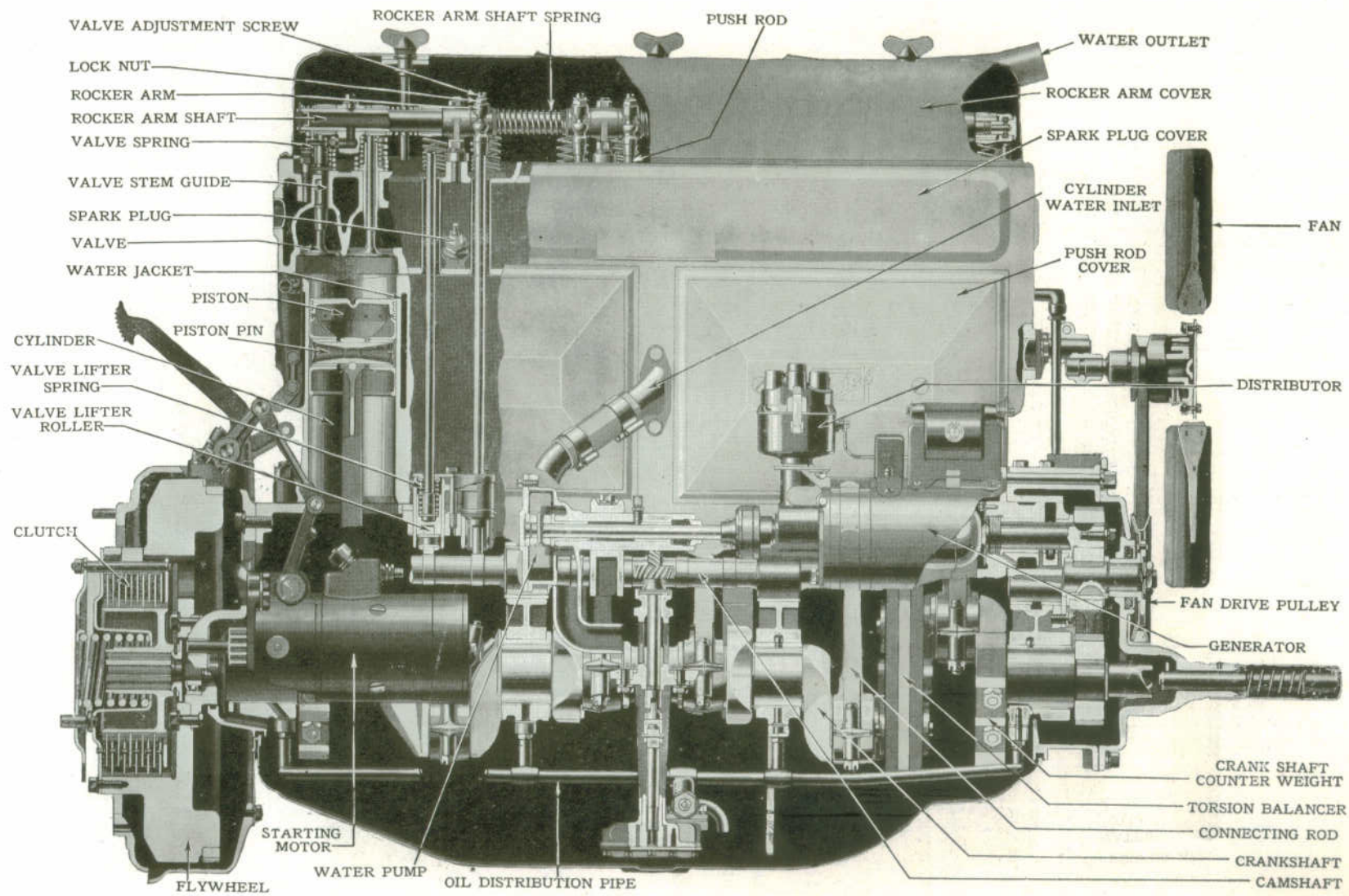
Specially designed hydraulic shock absorbers are used, both front and rear, on all models.





SIDE SECTIONAL VIEW OF 3 1/4" x 4 1/4" ENGINE





SIDE SECTIONAL VIEW 3 1/2"x4 1/4" ENGINE



## OPERATION AND CARE

In describing, in the chapters following, the several units of the Buick car, detailed consideration has been given to the functions, care and adjustment of each unit. The more essential features in connection therewith are particularly emphasized in the following brief summary:

### 1. *Lubrication*—

Maintain oil level in crankcase to "full" mark on oil level gauge. It is only necessary to change oil four times a year, due to the use of the oil filter, crankcase ventilator and thermostat. It is advisable to check the operation of the oil filter every 500 miles. The crankcase ventilator and the thermostat require no attention.

The lubrication chart should be studied and its recommendations covering the chassis in general observed systematically.

### 2. *Cooling System*—

Keep radiator filled within three inches of top with clear water in summer and an anti-freezing mixture in winter.

Keep fan belt tightened, particularly in hot weather.

Inspect water pump packing nut frequently and tighten if necessary.

Water thermostat is automatic and requires no attention.

### 3. *Brakes*—

Keep brakes in proper adjustment. Do not use for "stunt" performances.

### 4. *Steering*—

Keep steering mechanism properly adjusted and well lubricated.

Inspect front wheel alignment frequently and adjust if required.

### 5. *Clutch*—

Do not "ride" clutch pedal or slip clutch.

### 6. *Starting*—

Release starting pedal immediately the engine begins to fire.

Do not keep "choke" button out too long else flooding of cylinders with gasoline will result. Do not continue cranking engine with starter if ignition does not take place promptly.

Do not race the engine immediately upon starting nor drive the car at high speeds until engine has been thoroughly warmed up. Failure to observe this caution very often results in scoring of pistons and cylinders.

### 7. *Fuel*—

Do not attempt carburetor adjustments without thorough knowledge of method and necessity for adjustment.

Push "choke" button in about three-quarters of the way the moment engine starts to fire and all the way in as soon as engine has warmed up. Heat control lever should be set at top or "heat on" position in starting, and carried at such position between top and middle of slot as will be determined by weather conditions and the character of driving to be done.

Gasoline tank capacity: 114½" wheel base, 16 gallons; 120" and 128" wheel base, 19 gallons.

### 8. *Battery*—

Keep battery plates covered with distilled water and all connections properly tightened.

Register new car battery with Exide authorized service station for systematic inspection.



**9. Transmission—**

Shift gears on 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 the shackle bolts free and well oiled.

**11. Shock Absorbers—**

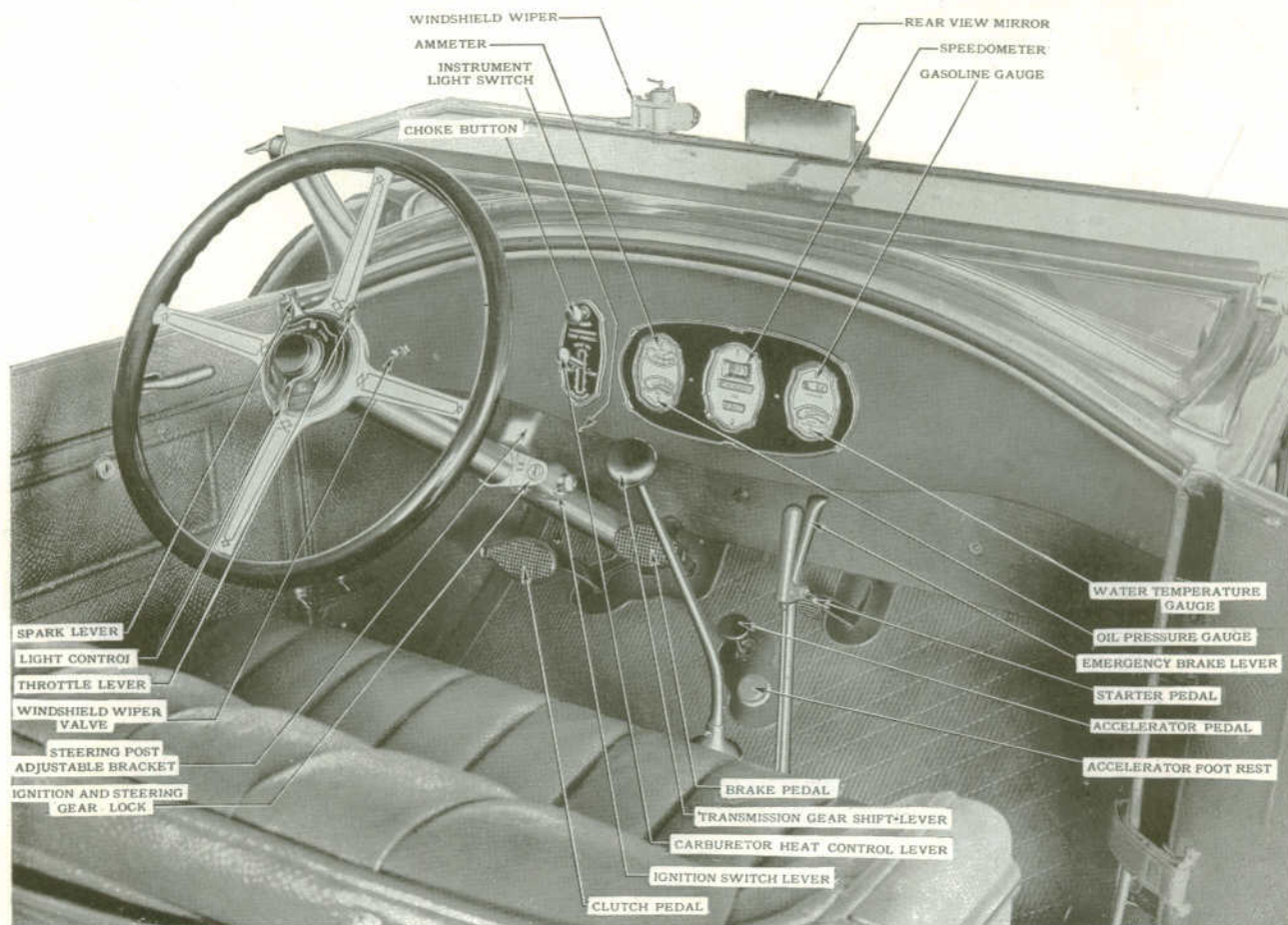
No adjustments are necessary, and additional oil will only be needed in the event that leakage may occur. Oil for this purpose may be obtained from authorized representatives of United Motors Service, Inc.

**12. Tires—**

Test tire pressure frequently and maintain same in accordance with figures shown in table on model plate on front side of dash.

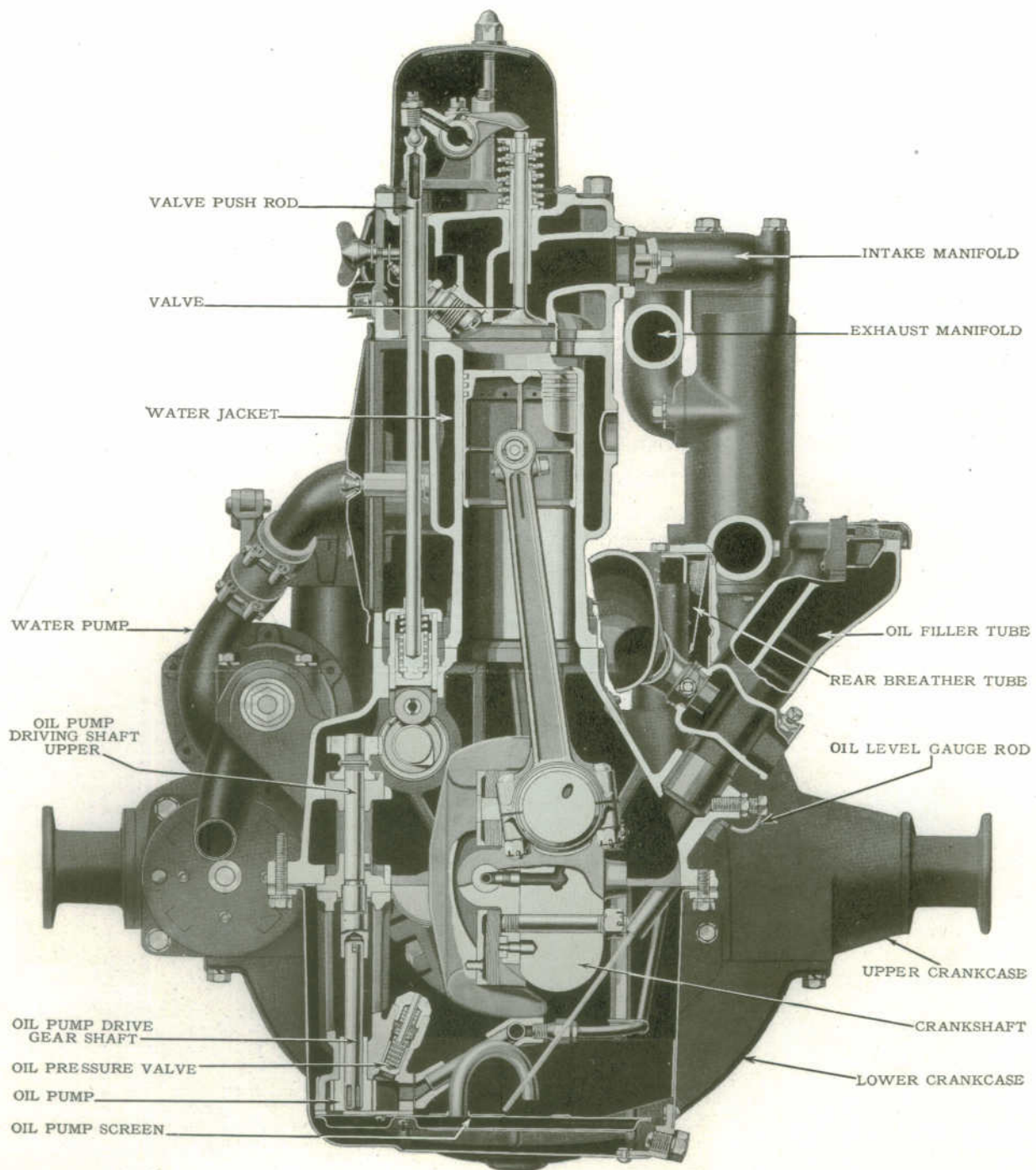
**13. Care of Paint—**

See instructions under "General Care of Car," page 62.



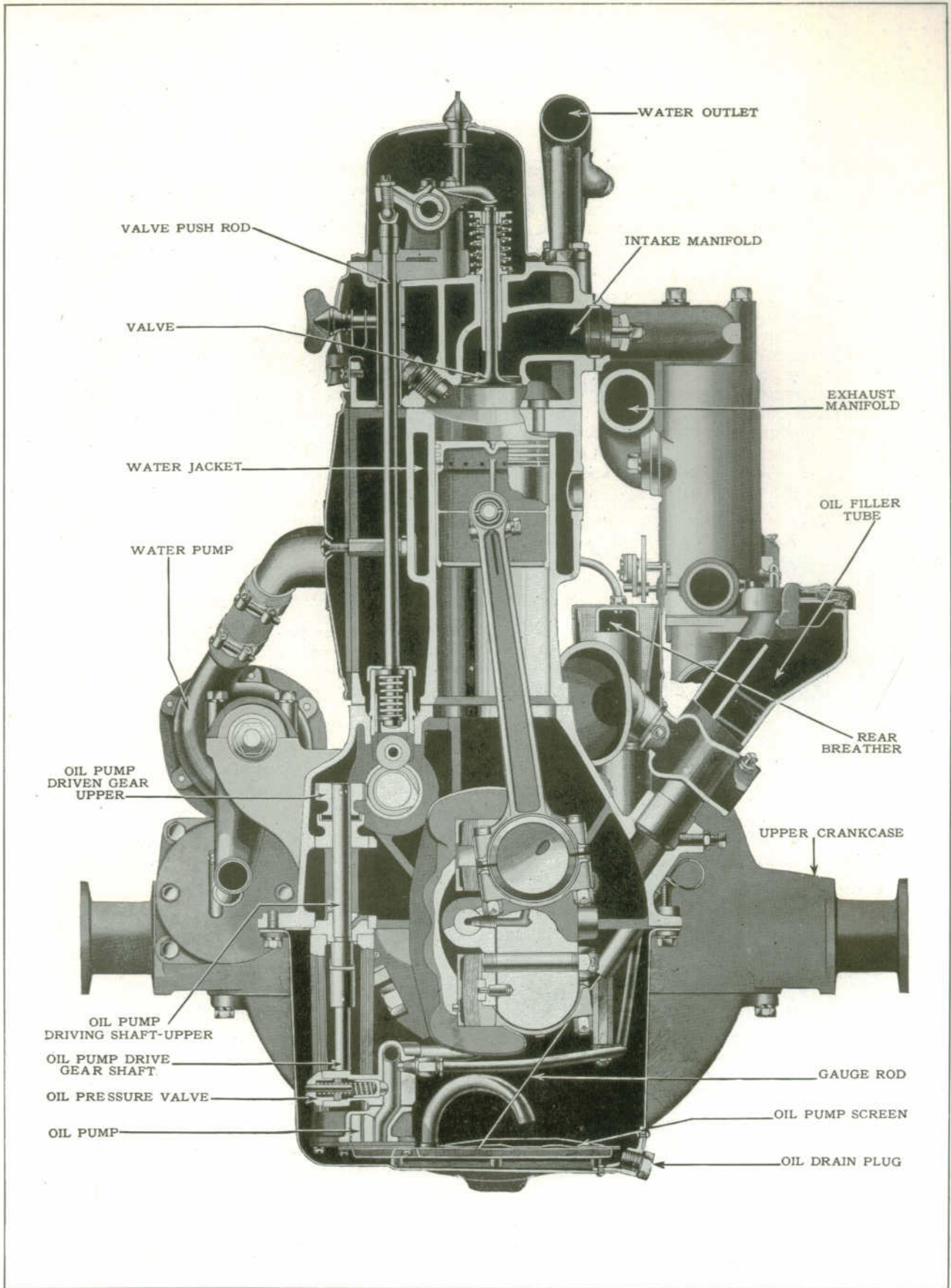
DRIVING COMPARTMENT





END SECTIONAL VIEW OF 3 1/4"x4 1/2" ENGINE





END SECTIONAL VIEW OF 3 1/2"x4 1/4" ENGINE

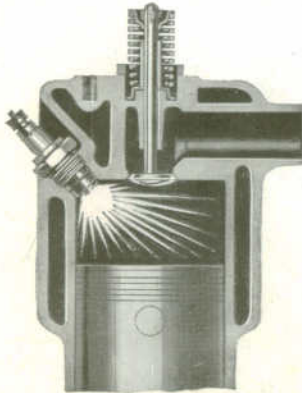


## POWER SYSTEM

### 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.



COMBUSTION  
CHAMBER

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.

#### **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.

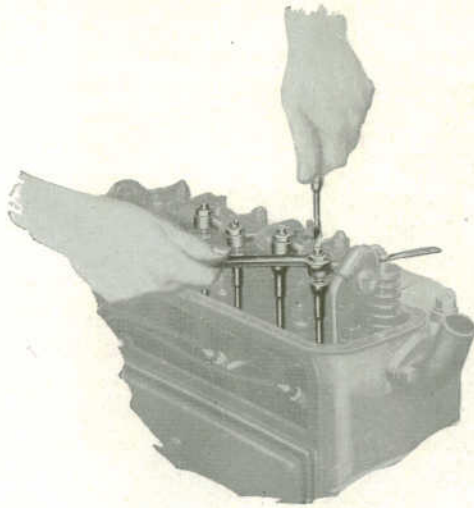
#### **Connecting Rods—**

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.



PUSH ROD ADJUSTMENT

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 top dead center. Both valves in that cylinder may then be adjusted by means of adjusting screw and lock nut 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.

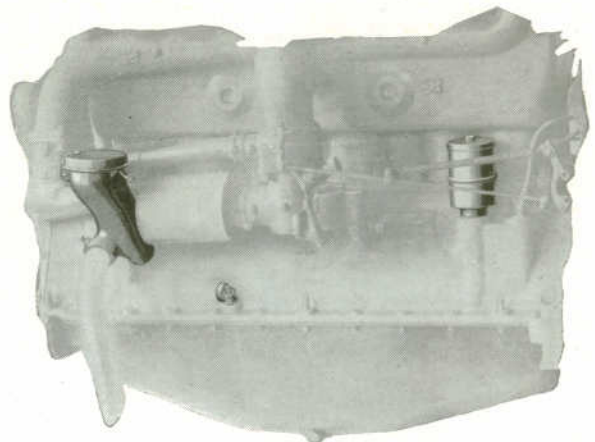
**Valve Timing—**

The crankshaft gear is one-half the diameter of 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—**

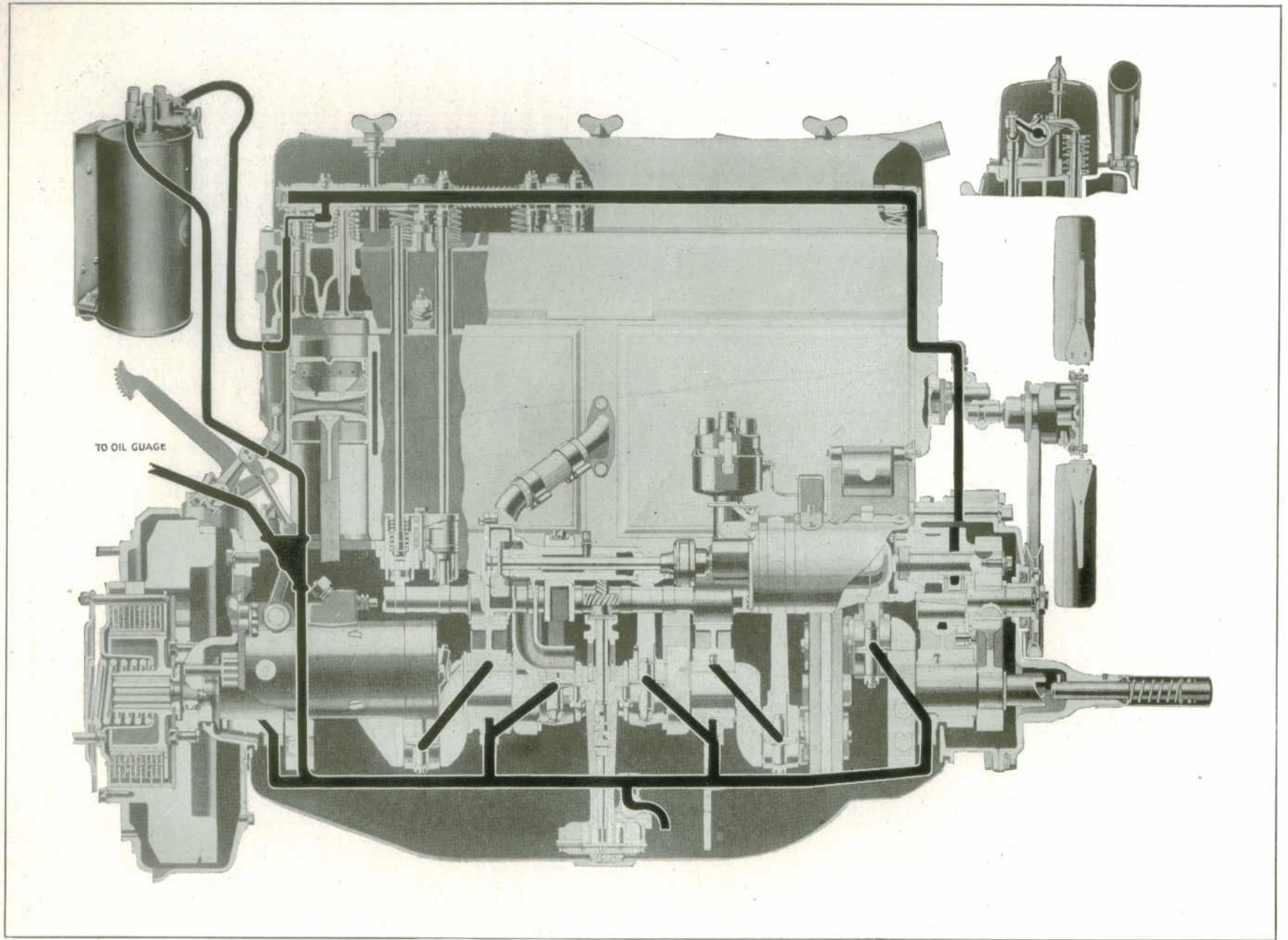
The oil is placed in the engine through the oil filler, which is located on the left side of the engine. The amount of oil in crankcase is accurately measured by an oil level gauge located on the left side of the engine on the upper crankcase and should be maintained to the "full" level as indicated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

Oil from the reservoir in lower half of the crankcase is drawn through a strainer into the gear pump enclosed in the lower crankcase.



OIL FILLER AND OIL LEVEL GAUGE





PRESSURE FEED OILING SYSTEM WITH OIL FILTER



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 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 circulation 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 function, due to clogging, and when this occurs it is necessary to replace the filter cartridge.

The filter is provided with a by-pass valve which, in case of clogged filter, allows oil to flow directly from oil pump to rocker arm shaft. To determine if oil is passing through filter, open test valve on top of filter and if oil flows through valve, the filter is operating.

**CAUTION: When testing operation of filter, engine must be warmed up and running. Be sure that valve is closed tightly after making this test.**

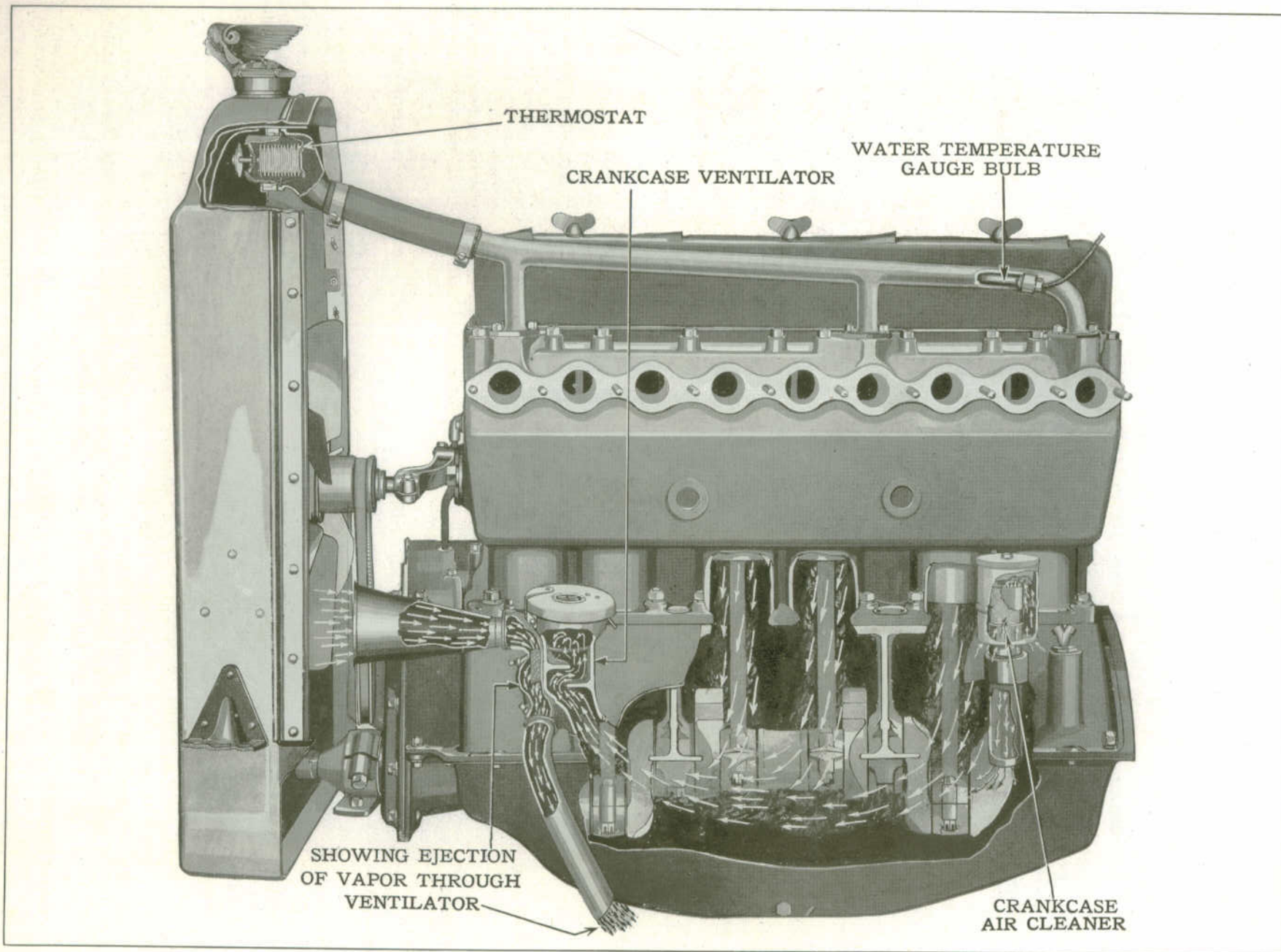
#### *Crankcase Ventilator—*

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.



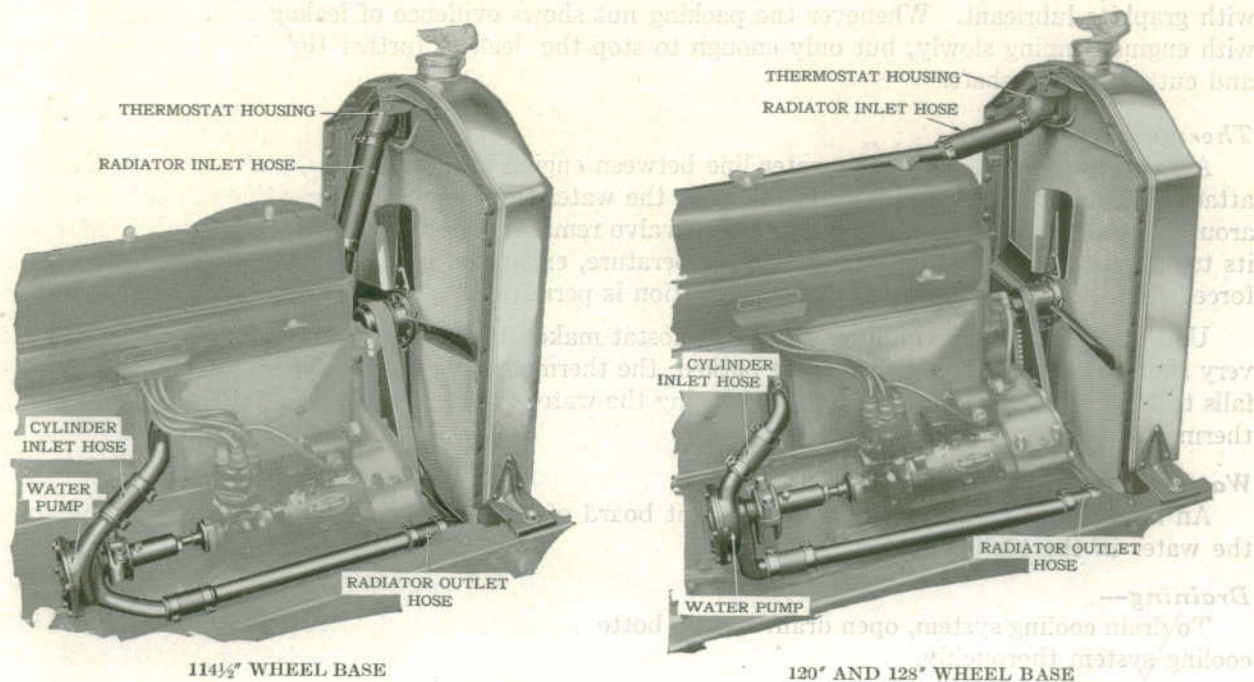


CRANKCASE VENTILATOR AND THERMOSTAT



## COOLING SYSTEM

The cooling system includes the radiator, cylinder water jackets, water circulating pump, thermostat 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 114½" wheel base models and 5 gallons for 120" and 128" wheel base models.

### 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 flat belt is used on those models of 114½" wheel base, and a "V" type belt on all other 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-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.**

If the belt is greasy, wash with a clean cloth or stiff bristle brush and gasoline. If adjustment will not taken up looseness in belt, it should be replaced.



**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—**

A thermostat is placed in the water line between engine head and radiator. It is held in a housing attached to the upper water tank of radiator, the water from engine passing through this housing and around the thermostat unit. The thermostat valve remains closed and prevents water circulation until its temperature reaches 120° but at this temperature, expansion in the thermostat occurs, the valve is forced from its seat and normal water circulation is permitted.

Under severe weather conditions, the thermostat makes it possible to heat up the engine to 120° in a very short time, and should the car be parked, the thermostat valve will close when water temperature falls to 120°, preventing circulation and keeping the water in cylinder jacket warm for some time. The thermostat requires no adjustment.

**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—**

In cold weather, the cooling system should be drained and filled with a solution that will not freeze when car is allowed to stand. The best anti-freezing mixtures are composed of denatured alcohol and water as follows:

Alcohol	Water	Specific Gravity	Freezing Point
20%	80%	.9780	19° F. above zero
30%	70%	.9680	10° F. above zero
40%	60%	.9570	2° F. below zero
50%	50%	.9430	18° 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.

**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 this 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,



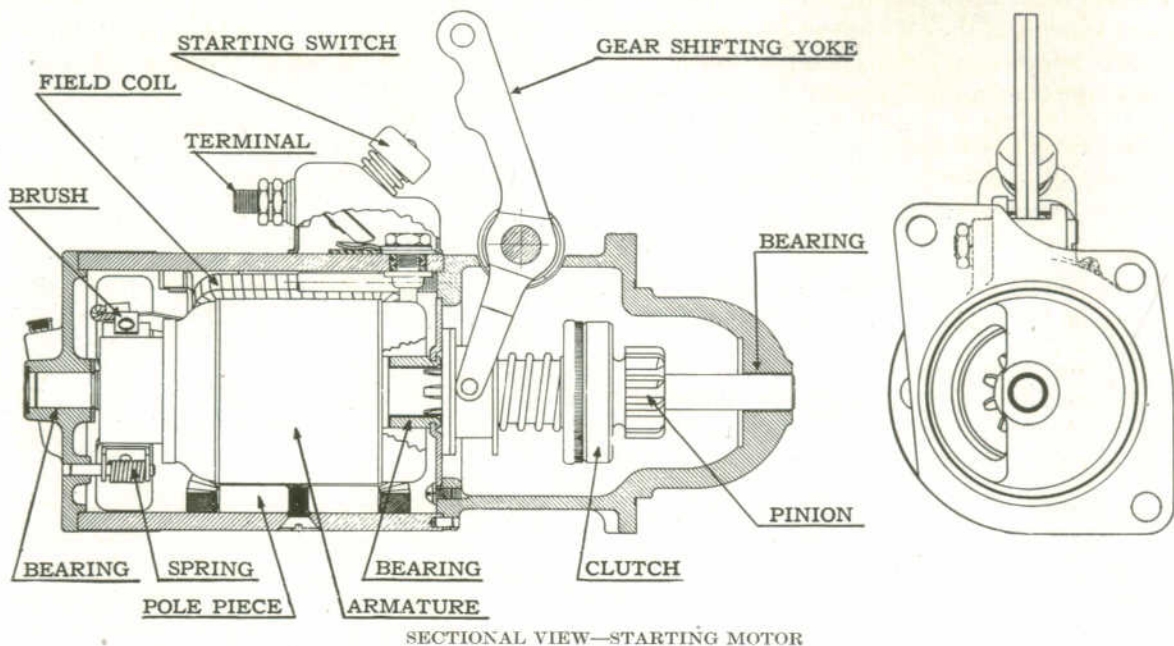
running the engine as before; and after draining this thoroughly, the radiator may be refilled for use. Thorough flushing of the system after using the cleansing mixture is essential in view of the detrimental action of such mixtures on the hose connections.

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, ignition switch in combination with lock on the steering column, 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.



### 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—

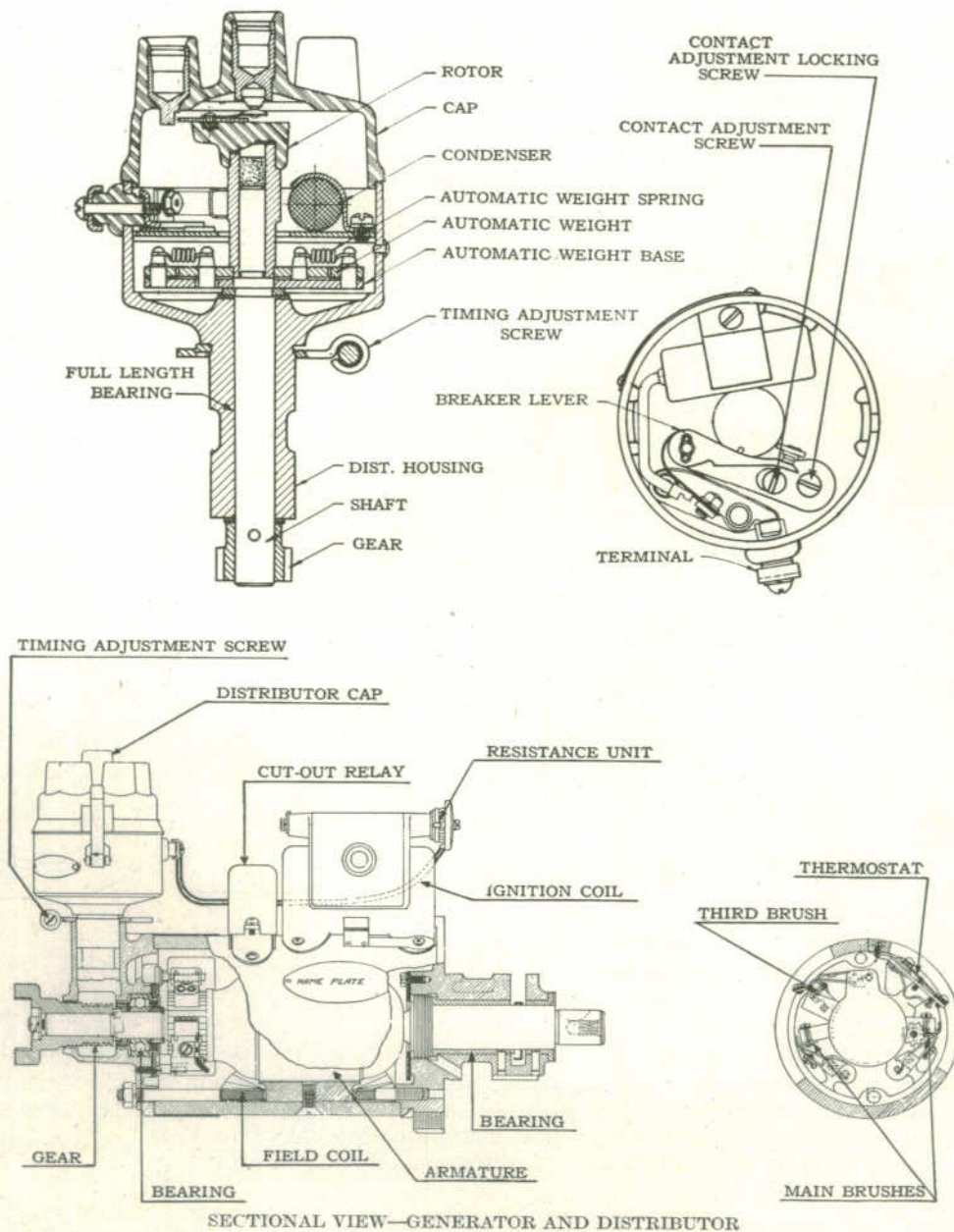
The purpose of the generator is to provide current for lighting and ignition and in addition, a sufficient amount to keep the storage battery in a properly charged condition. Current for lighting and ignition is supplied by the storage battery when the engine is stopped and during car speeds under approximately 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.



### 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.



**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—**

The ignition is correctly timed when the car leaves the factory. If, however, re-timing may be found necessary, the proper procedure is as follows:

1. Fully advance spark lever on steering wheel.
2. Remove cover from top of engine so that valve action may be noted.



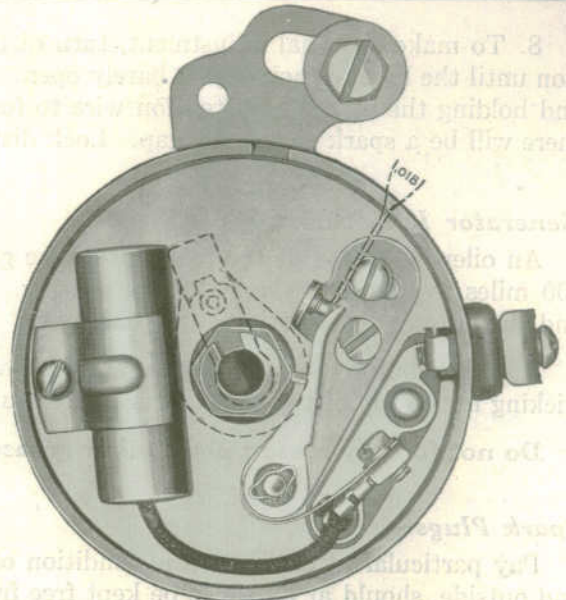
FLYWHEEL MARKING

location, loosen distributor head clamp screw (at bottom of distributor head) and turn head to proper location. Be sure to tighten clamp screw again when properly located.

5. Check breaker point gap. After removing distributor cap and rotor, loosen distributor head clamp screw and rotate distributor head until breaker points open to their maximum opening. Check this opening, using an .018" feeler gauge and if incorrect, loosen contact point adjustment clamp screw (inside of head) and turn eccentric screw until gap is .018". Then tighten adjustment clamp screw.

6. With ignition off, crank engine by hand until No. 6 cylinder exhaust valve opens and starts to close. Continue to crank very slowly and watch the flywheel through the timing inspection hole in housing until the 17° mark is directly opposite the index line. This is the position for firing No. 1 cylinder.

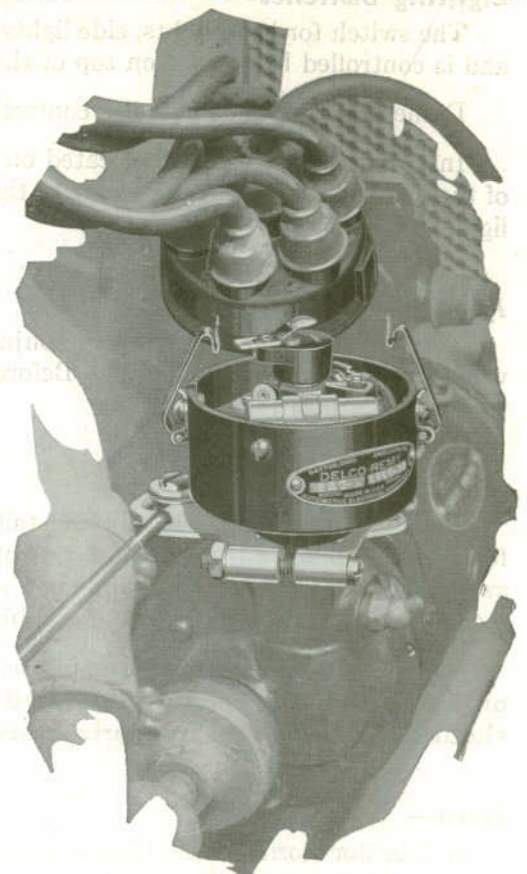
7. **Important—Rotor contact segment must be directly under No. 1 high tension terminal.** If rotor is not in this position, remove manual advance stop cap screw, lift up the whole assembly, turn rotor to desired position directly under No. 1 high tension terminal, let assembly down again and replace manual advance stop cap screw.



BREAKER POINT ADJUSTMENT

3. Uncover timing inspection hole on left side of flywheel housing.

4. See that coil to distributor primary terminal is toward front of car. The six high tension terminals in distributor cap will then be in proper position when cap is held in place with spring clamps. To secure this



TIMING ADJUSTING SCREW



8. To make the final adjustment, turn distributor head very carefully in a counter-clockwise direction until the breaker points just barely open. This action can be determined by turning on the ignition and holding the center high tension wire to form a gap with distributor head. When the points open, there will be a spark across the gap. Lock distributor head in this position by tightening clamp screw.

#### ***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.**

#### ***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 head lights, 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 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.

#### ***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  $3\frac{1}{4}$ " 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 lamps: 21 c. p., two filaments, double contact base.

Stop and Back-up  
lamp: 15 c. p., single contact.

Parking lamps }  
Tail lamp } 3 c. p., single contact.  
Tonneau lamp }

Instrument lamp } Direct light 3 c. p., single contact.  
} Indirect light 6 c. p., single contact.

Dome lamp: 6 c. p., single contact.

**Head Lamp Adjustment—**

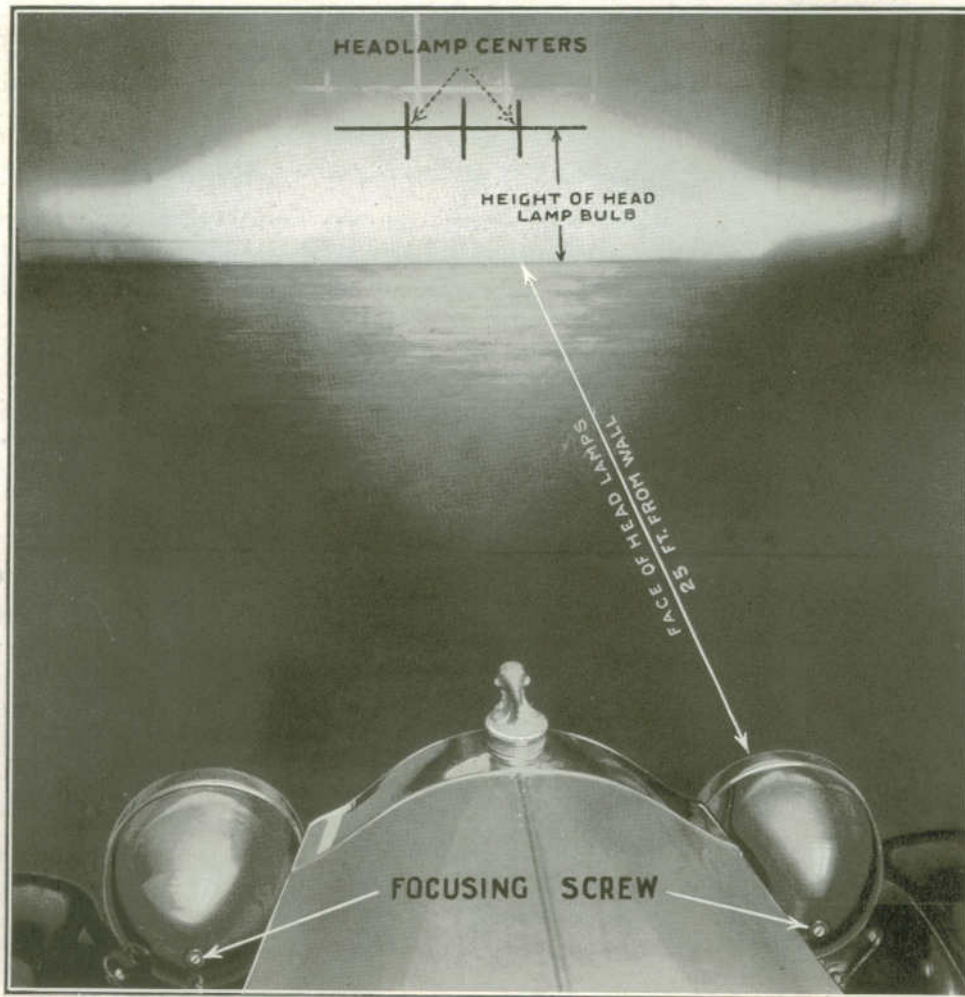
Head lamps should be adjusted to comply with state or local requirements. Reference to the illustration will show the pattern of beams from both lamps when correctly adjusted. This adjustment will be obtained by observing the following procedure:

1. Place the car with the **rear seat fully loaded** 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 the level of



the lamp centers. 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 at the right and left 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.)



APPEARANCE OF BEAMS FROM BOTH LAMPS WHEN CORRECTLY ADJUSTED

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 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 mounting nut securely and check the position of the beam to see that it has not changed.

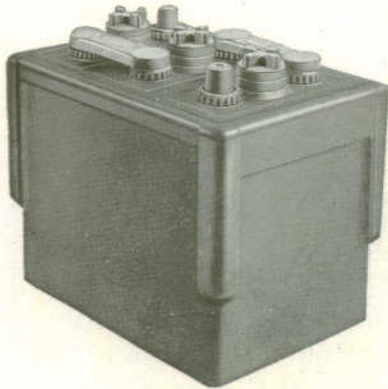
When installing new bulbs always check the head lamp focus to insure against glaring and illegal lights and to provide proper road illumination.

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



## BATTERY

All 114½" wheel base models are equipped with a 6-volt, 13 plate Exide battery, type 3-XC-13-1 G, while all 120" and 128" wheel base models are equipped with a 6-volt, 15-plate Exide battery, type 3-XC-15-1 G.



STORAGE BATTERY

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

### Registration—

Purchasers of cars are earnestly urged to co-operate 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.

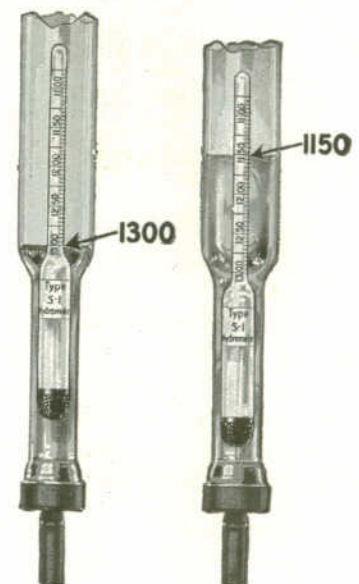
Periodical hydrometer readings are advisable and this inspection should be made by Buick or Exide authorized service stations.

A battery in good condition should register a 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.

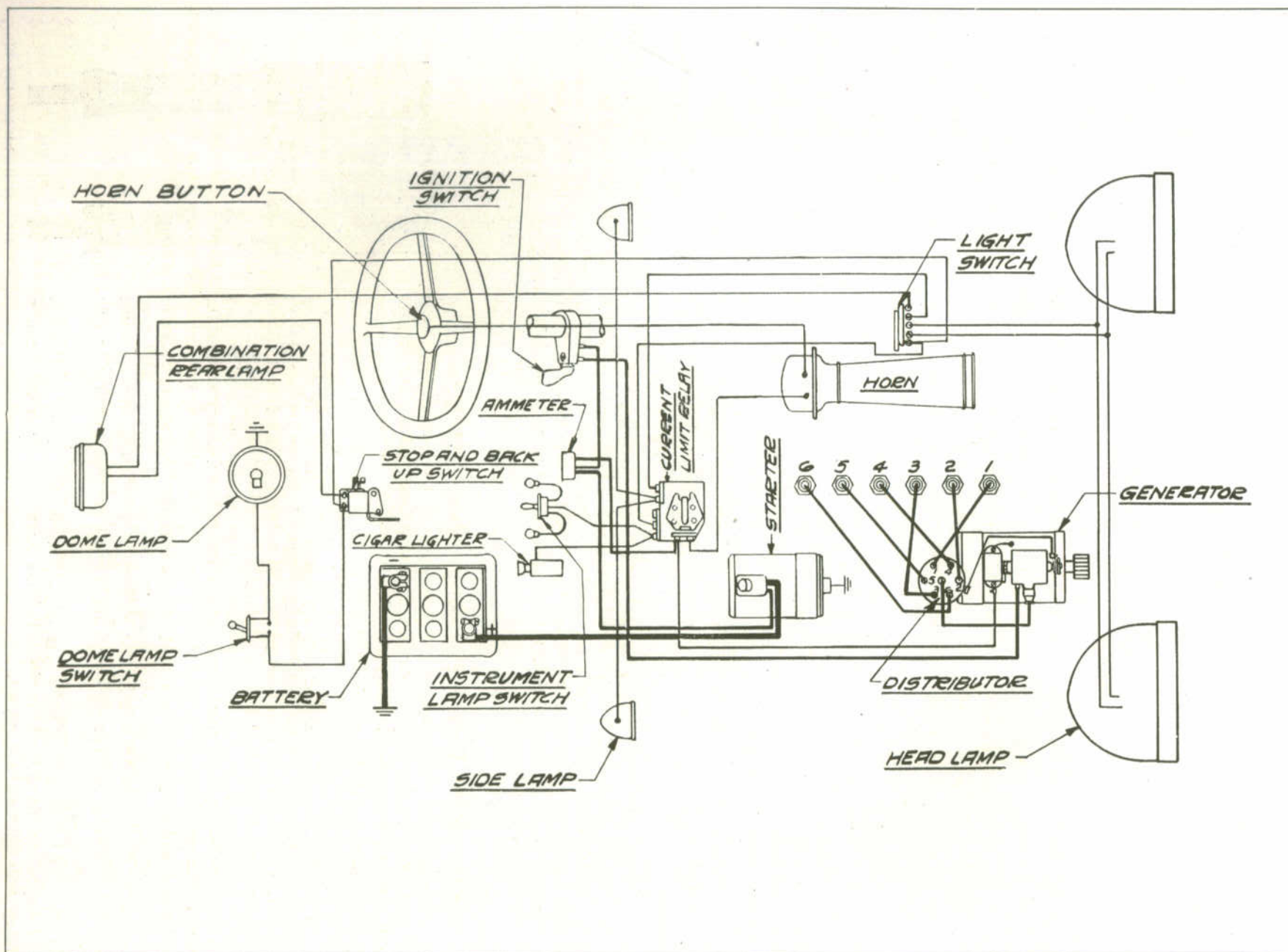
### Circuit Diagram—

The wiring circuits of the electrical equipment are shown in the circuit diagram on page 28. With the aid of this diagram, each circuit through the several units can be traced.



HYDROMETER READINGS





WIRING CIRCUIT DIAGRAM



## 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 27.
  - (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.

### **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 lamps. 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:

- (a) Current limit relay.
- (b) Ammeter.
- (c) Starting motor and battery terminals.
- (d) Battery ground connection to frame.
- (e) 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:

1. Breaker points pitted or out of adjustment (fail to open properly).
2. Defective condenser.
3. Broken down ignition coil.
4. 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 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.

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## FUEL

The fuel system consists of gasoline tank, instrument board gasoline gauge, gas lines, vacuum tank, gasoline cleaner, intake manifold and carburetor. The capacity of the gasoline tank on 114½" wheel base models is 16 gallons, the 120" and 128" wheel base models, 19 gallons.

### *Vacuum—*

Gasoline supplied from the tank at the rear is drawn to the vacuum tank by the vacuum created by the suction strokes of the pistons. The gasoline flows by gravity from the vacuum tank to the carburetor.

### *Vacuum Tank—*

The vacuum tank has four connections, three at the top and one at the bottom. The lower connection leads to the carburetor through the cleaner; one of the top connections leads to the intake manifold of the engine; one to the main gasoline tank and the third is a vent.

The tank consists of two chambers, and between the upper filling chamber and the lower emptying chamber there is a partition in which is placed a flapper valve. This valve is kept closed by a vacuum in the upper chamber. As gasoline is drawn into the upper chamber it gradually lifts the float until it has risen enough to operate a set of levers which shut off the suction valve and at the same time open the air valve. When this occurs, the admission of air into the upper chamber allows the flapper valve leading to the lower chamber to open, thus replenishing the gasoline supply in this chamber.

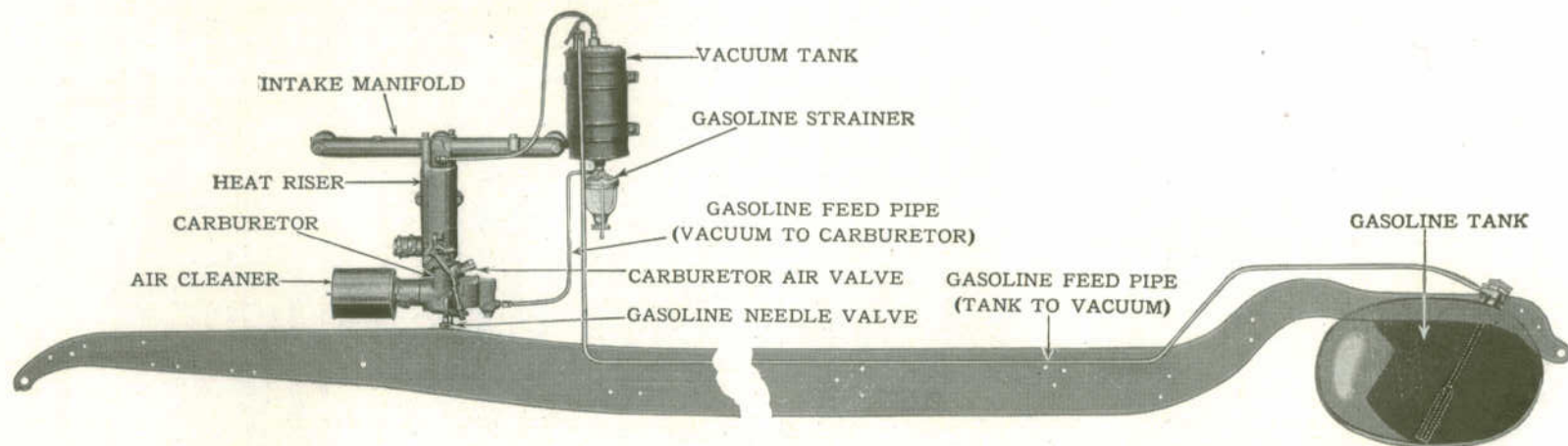
The lower chamber is always under atmospheric pressure due to its connection with the air vent tube at the top of the vacuum tank. As soon as the gasoline in the upper chamber allows the float to drop below a certain level, the levers connected to the float close the air valve and open the suction valve automatically, and the process of filling the upper chamber is repeated.

There is a small strainer where the tube from the gasoline tank enters the vacuum tank, and this strainer should be removed and cleaned once every 1000 miles to prevent clogging.

At the bottom of the vacuum tank there is a small drain plug which should be removed periodically and a small amount of gasoline drained to remove any sediment.

Should it be necessary to refill the vacuum tank, remove the plug at the top of the tank and pour in about one pint of gasoline.



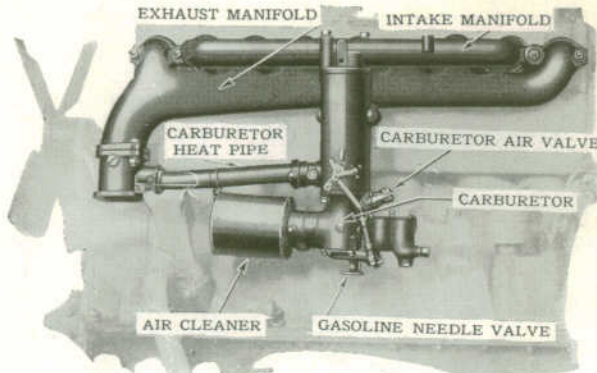


GASOLINE SYSTEM



## 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" on 114½" wheel base and model "T-4" on 120" and 128" wheel base models, this being the automatic air valve, heat controlled type. Its outstanding advantages are:



CARBURETOR AND MANIFOLD

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.

### Construction—

The construction embodies a main body or mixing chamber and a conventional float chamber bowl with fuel strainer attached at point of entrance of fuel to bowl. Within the mixing chamber are two nozzles which proportion the amount of gasoline used in the mixture. One of these nozzles, called the "low speed," is regulated by the gasoline adjustment needle at the bottom of carburetor and the other, called the "high speed," is controlled by the automatic air valve. An air adjustment screw is provided which regulates the pressure of the air valve spring enclosed therein. 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 the air valve spring to assist in acceleration. This arrangement of plunger and air valve 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.



# CARBURETOR

STEAM CYLINDER OIL

Twice a year

CUP GREASE

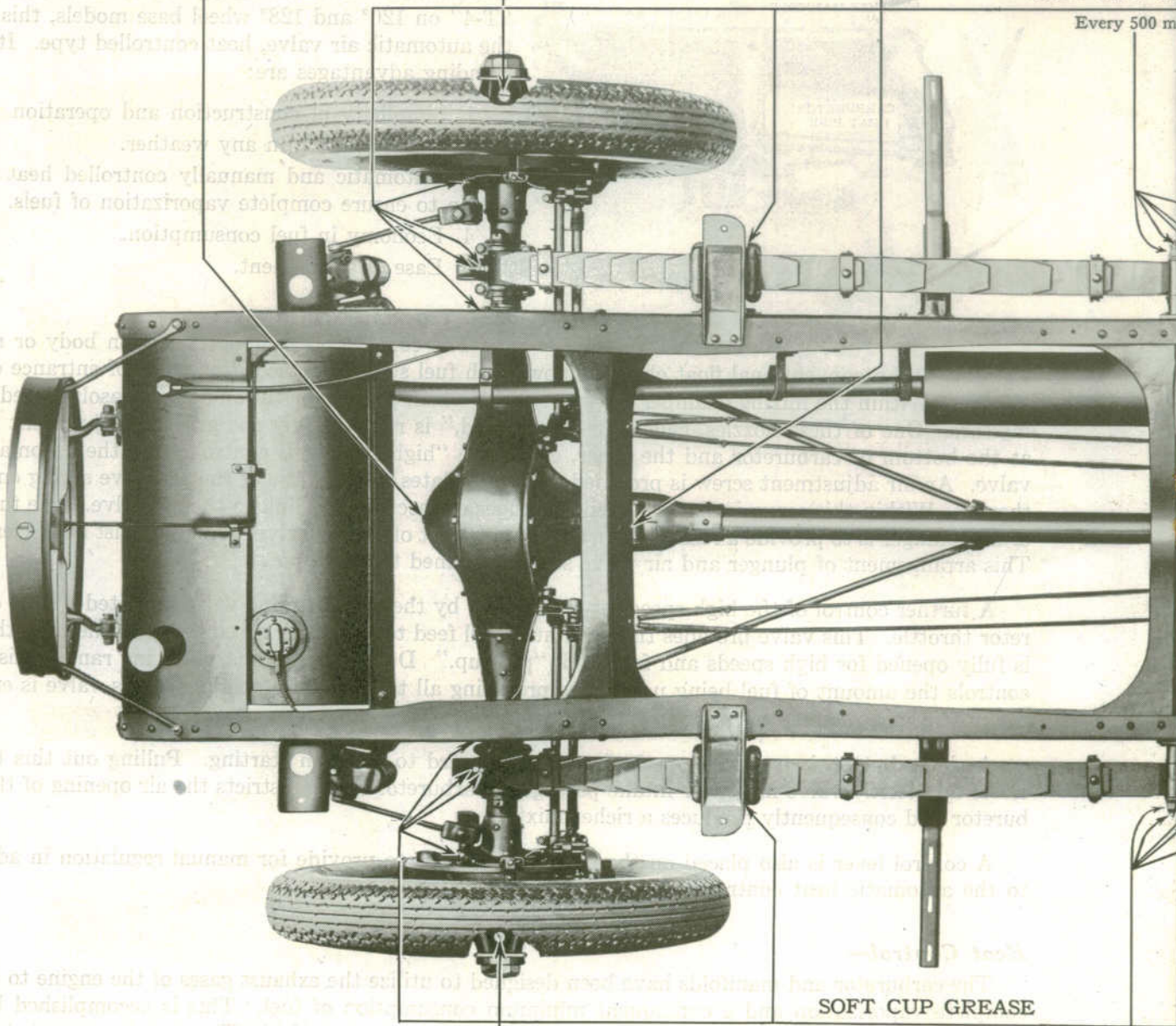
1000 miles

CUP GREASE

Twice a year

SOFT CUP GREASE

Every 500 m



CUP GREASE

1000 miles

SOFT CUP GREASE

Every 500 miles



STEAM CYLINDER OIL

Twice a year

STEAM CYLINDER OIL

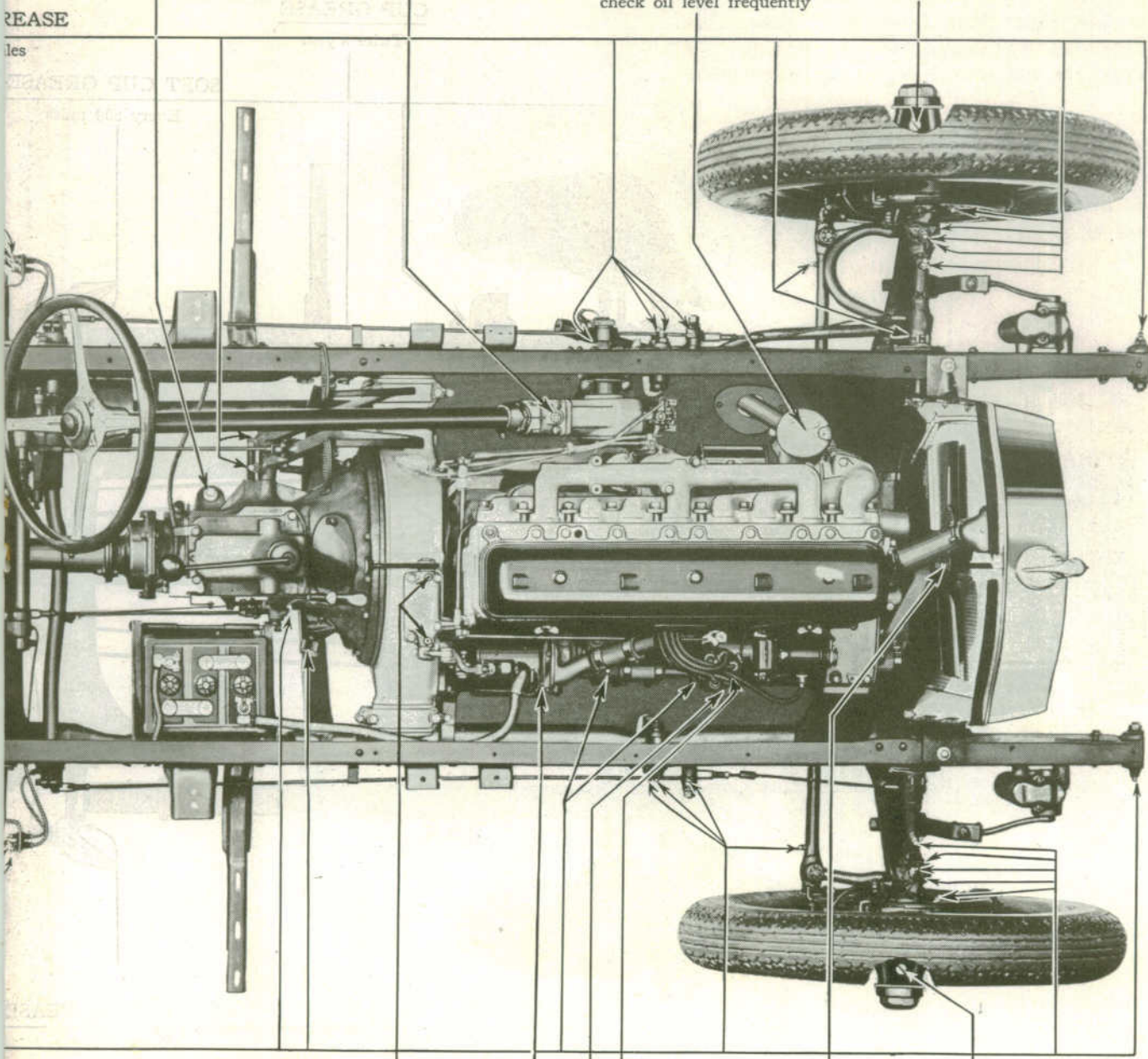
1000 miles

ENGINE OIL

Change every three months  
check oil level frequently

CUP GREASE

1000 miles



REASE

les

ENGINE OIL

Every 500 miles

ENGINE OIL

Every 2000 miles  
Distributor Rotor  
See Page 24

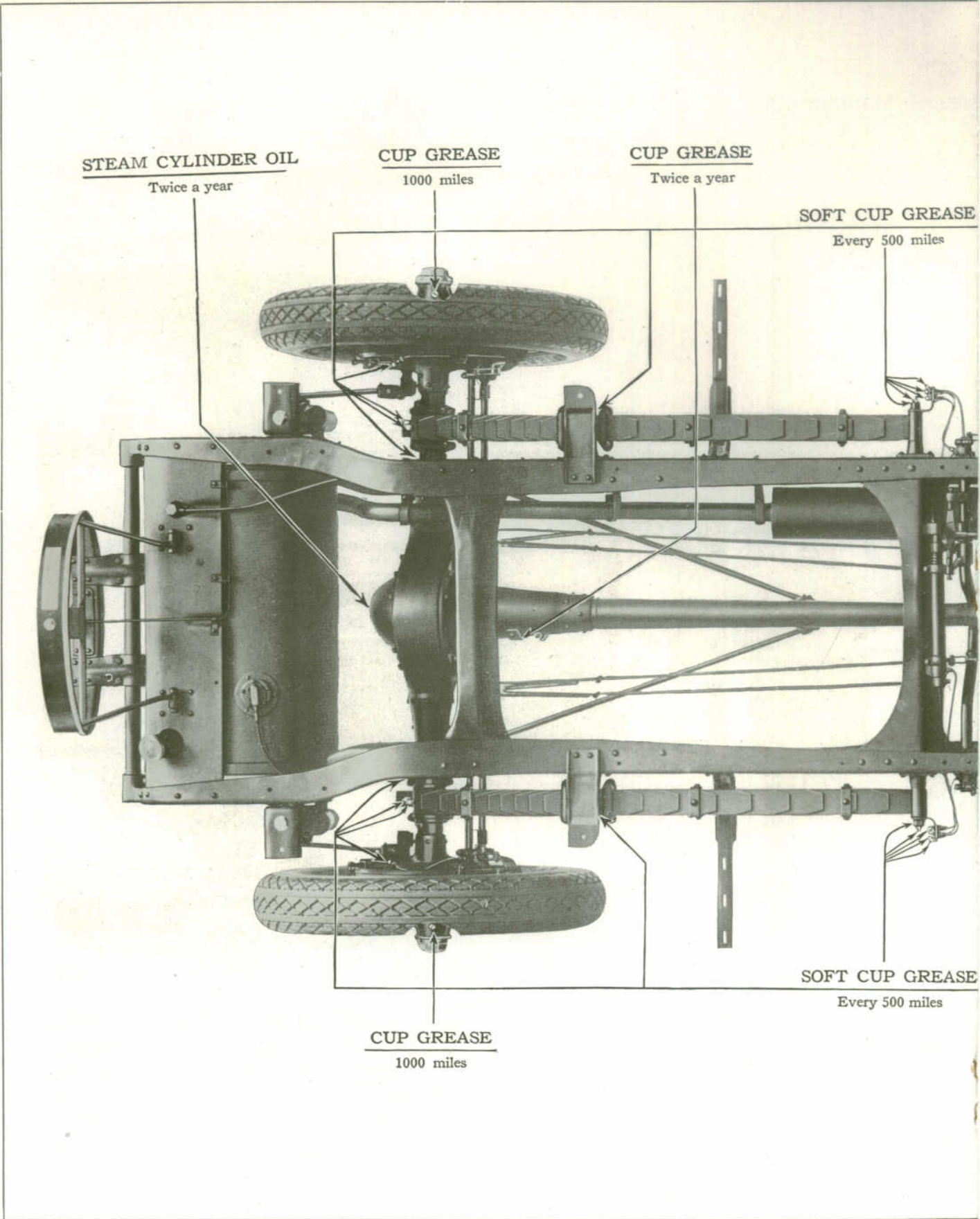
ENGINE OIL

5000 miles  
Fan—See Page 19

CUP GREASE

1000 miles







STEAM CYLINDER OIL

Twice a year

STEAM CYLINDER OIL

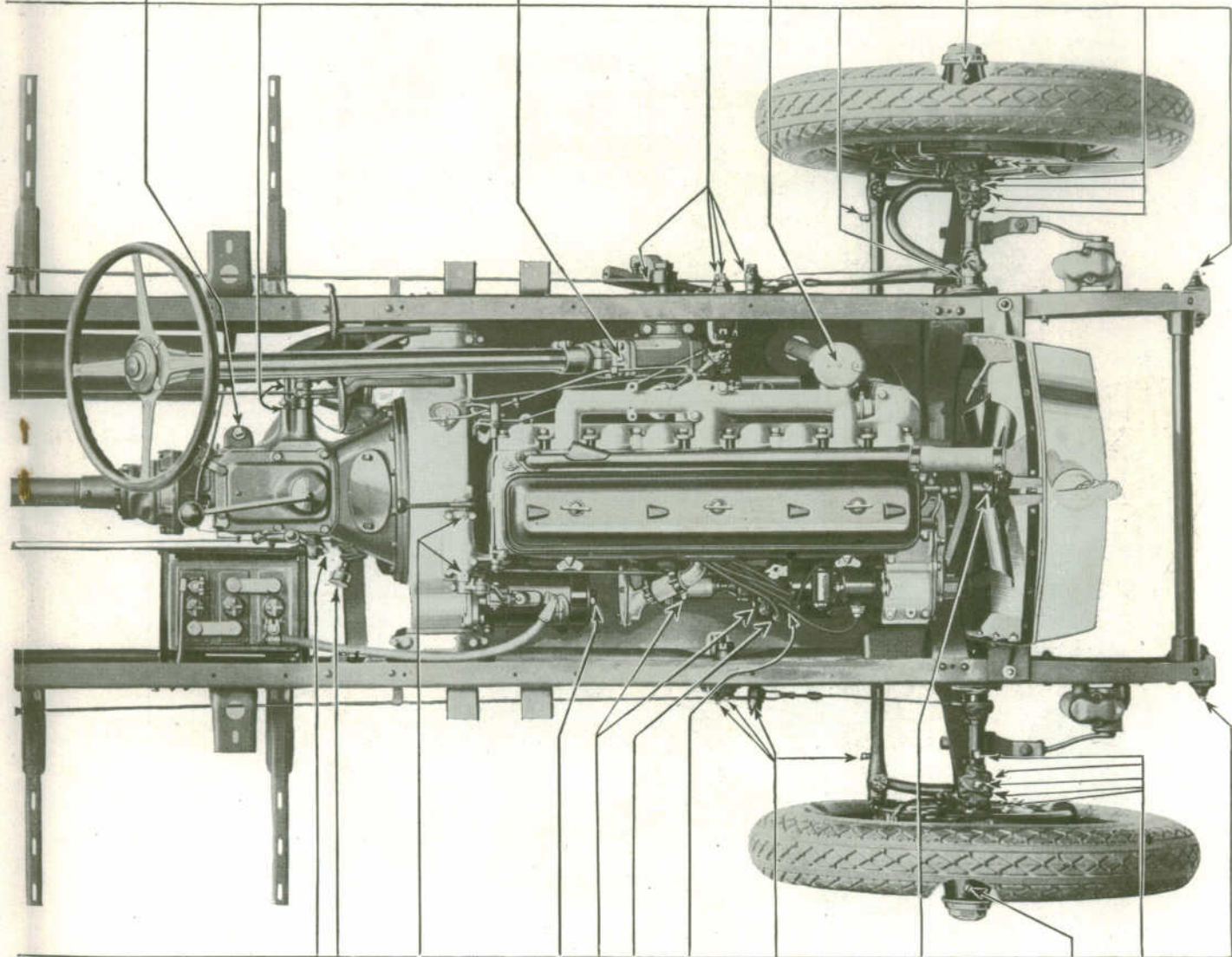
1000 miles

ENGINE OIL

Change every three months  
check oil level frequently

CUP GREASE

1000 miles



ENGINE OIL

Every 500 miles

ENGINE OIL

Every 2000 miles  
Distributor Rotor  
See Page 24

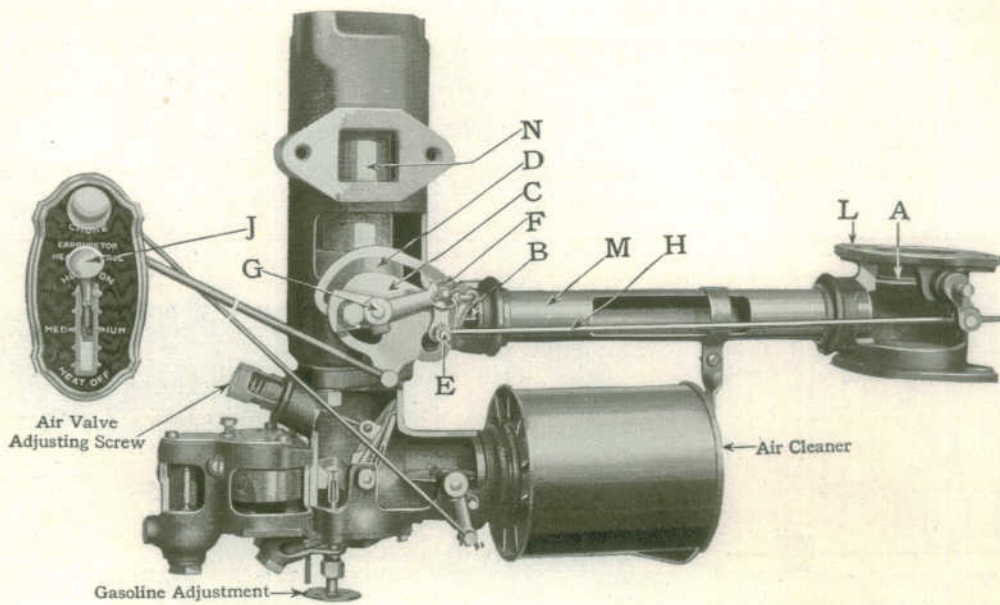
ENGINE OIL

5000 miles  
Fan—See Page 19

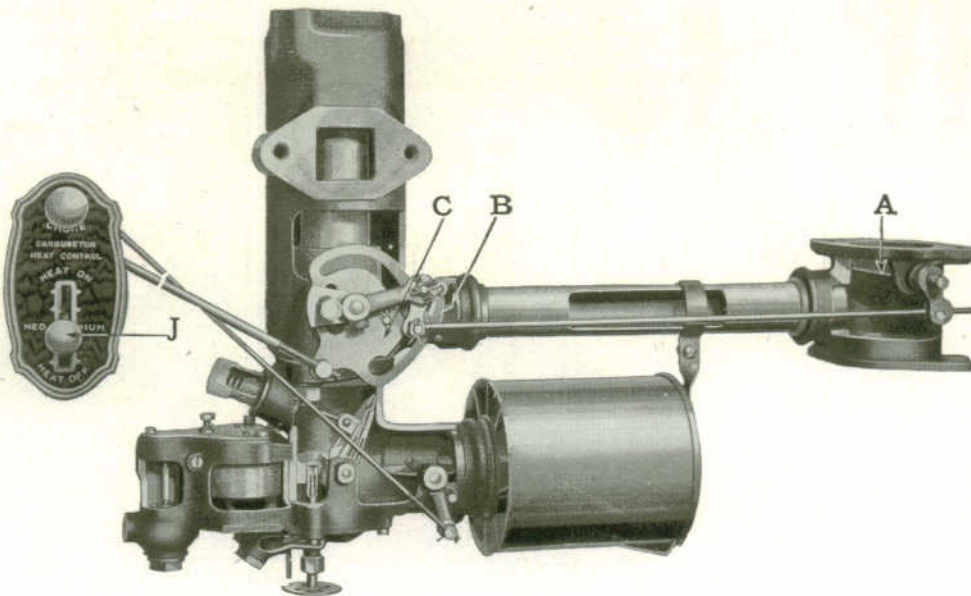
CUP GREASE

1000 miles





Heat control lever "J" on instrument board at No. 1 or "heat on" position.  
 Valve "A" in main exhaust pipe closed and valve "B" in outlet of carburetor body wide open.  
 Gases from exhaust manifold enter at opening "N" and pass through riser jacket, returning to exhaust pipe below valve "A."  
 As throttle is opened, valve "A" remains closed up to approximately 40 miles per hour then opens with wide open position of throttle.



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.



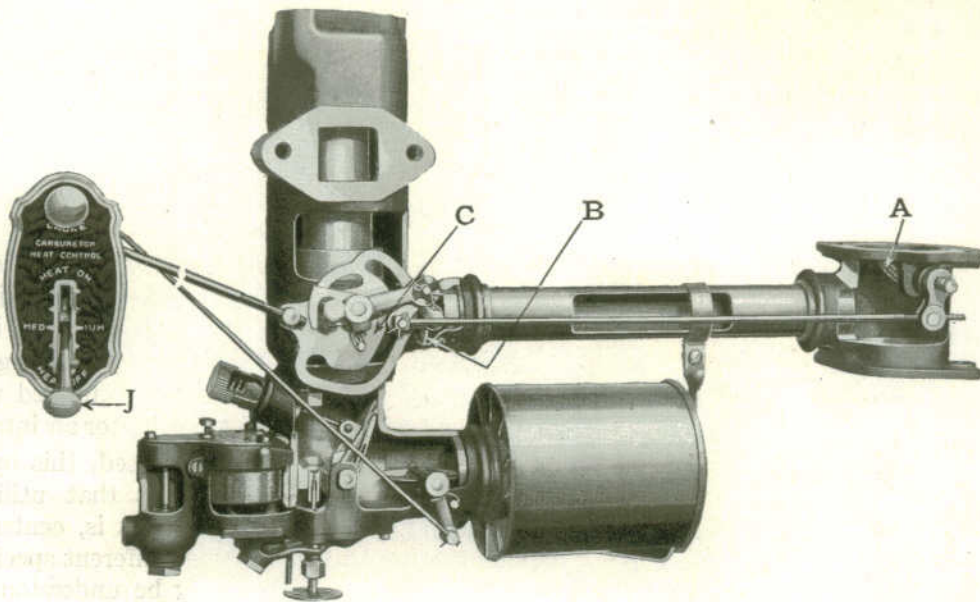
The control lever also operates the valve in the outlet of the carburetor riser simultaneously with the valve in exhaust pipe, and adjustment may be had to the point where no exhaust gases pass through the riser.

### Starting—

To start engine, pull 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.



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.

### 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 noted that the vent hole is open in filler cap of main tank; 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; 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:

Set air screw so that end is flush with the end of ratchet set spring above it. Turn gasoline adjustment to the right very carefully so as not to injure the needlepoint, until the valve is closed gently against its seat. Then turn to the left approximately one complete turn, which will bring the notch in the disc handle directly below the guide post above it. This notch is placed in disc at the factory and indicates the setting for the best power and economy.

Start the engine in the usual manner and place heat control lever on No. 2. After engine has thoroughly warmed up, push choker button in all the way and set the air screw for good idling. It may be necessary to turn to left for more air or to right for less air to obtain smooth even running.

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

#### **Rich Mixture—**

An over-rich mixture will cause the engine speed to fluctuate and "roll" at an idle speed, and "lope" at intermediate speeds.

To remedy this condition, cut down the fuel or increase the air, or both, and keep the heat control lever at center mark in slot and lower only if weather is extremely hot.

#### **Lean Mixture—**

Generally, the best adjustment is obtained with the fuel and air valves set as previously described. It must be remembered that too lean a mixture (as well as over-rich mixture) causes over-heating and loss of power and is not as economical as an adjustment which provides just the proper proportion of gasoline and air.

#### **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 1928 models are equipped with an air cleaner, attached to the carburetor air intake.

The AC Air Cleaner is used, this operating on much the same principle as that utilized in the ordinary cream separator, that is, centrifugal force separating two elements of different specific gravity. The operation will readily be understood from the following description:

1. The suction stroke of the engine draws the air through the directing vanes of the cleaner, which give it a rapid, rotating motion, spirally.

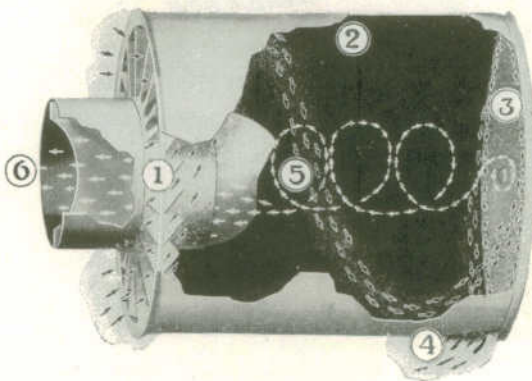
2. Centrifugal force separates the dust particles from the air, throwing them against the inside wall of the cleaner.

3. The spiral motion of the dust along the inside surface of the cleaner wall brings it to the rear circular end.

4. The dust is then forced through a small outlet at front end.

5. The clear air moves spirally through the center portion of the cleaner until it strikes the directing plate and leaves the cleaner.

6. The current of clear air leaves the cleaner in a straight line and enters the carburetor.



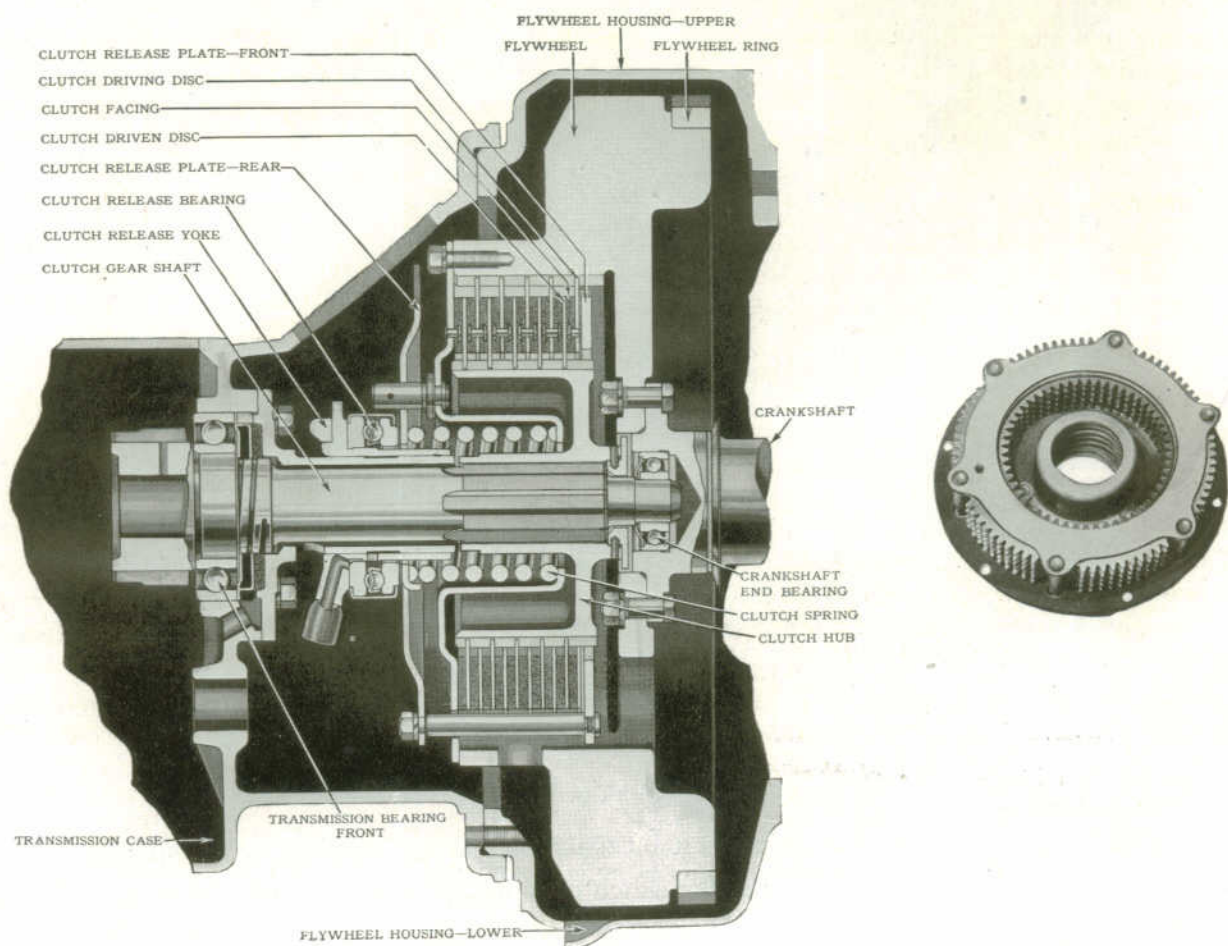
AIR CLEANER



## 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.



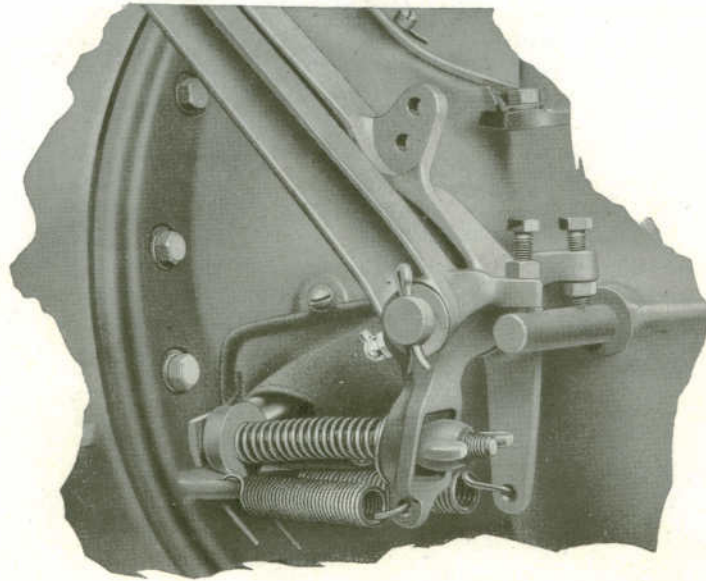
SECTIONAL VIEW—CLUTCH ASSEMBLY

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.



**Adjustment of Clutch Pedal—**

Correct functioning of the clutch depends upon 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.



CLUTCH PEDAL ADJUSTMENT

**Lubrication—**

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 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.

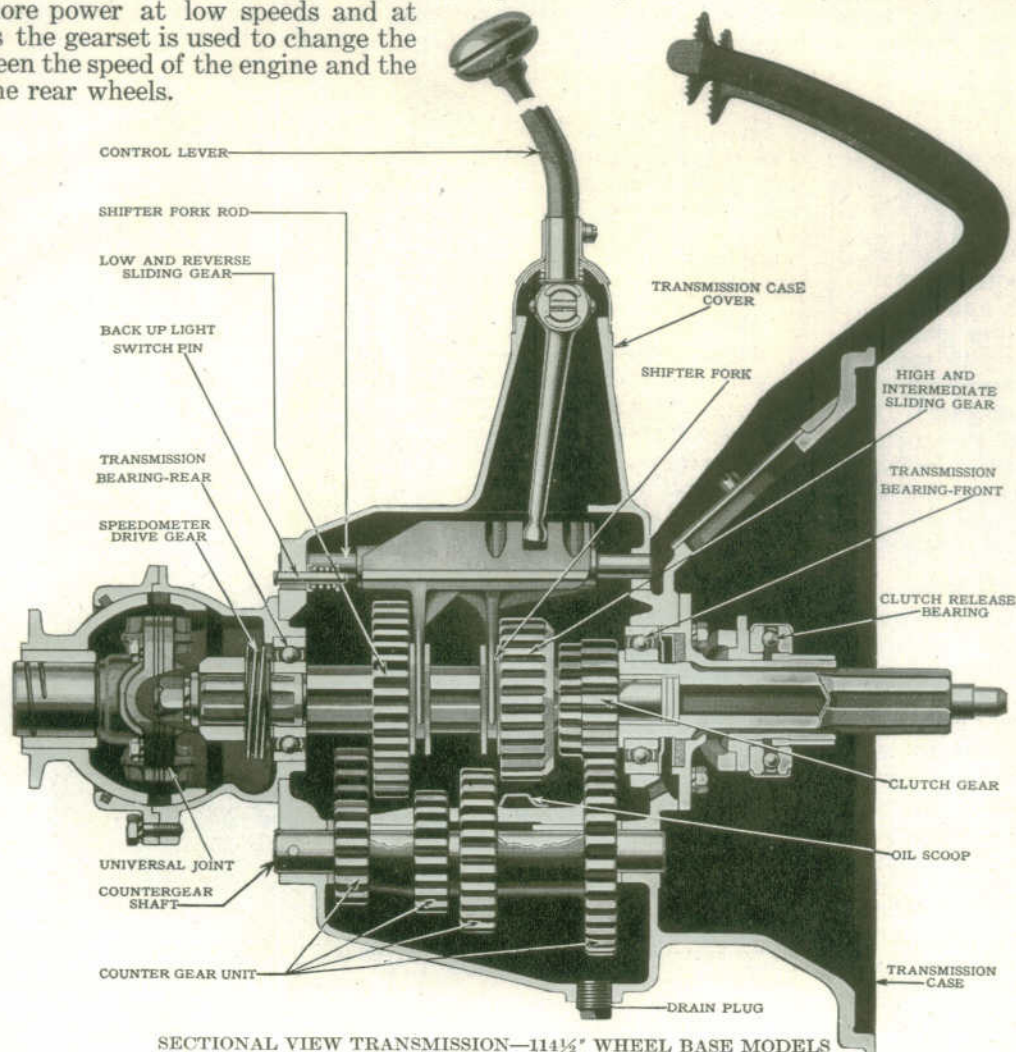
This habit will result in excessive wear of the clutch plate facings and a slipping clutch, as well as a noisy release bearing.



## 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.



SECTIONAL VIEW TRANSMISSION—114½" WHEEL BASE MODELS

### 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 on page 44, 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"**

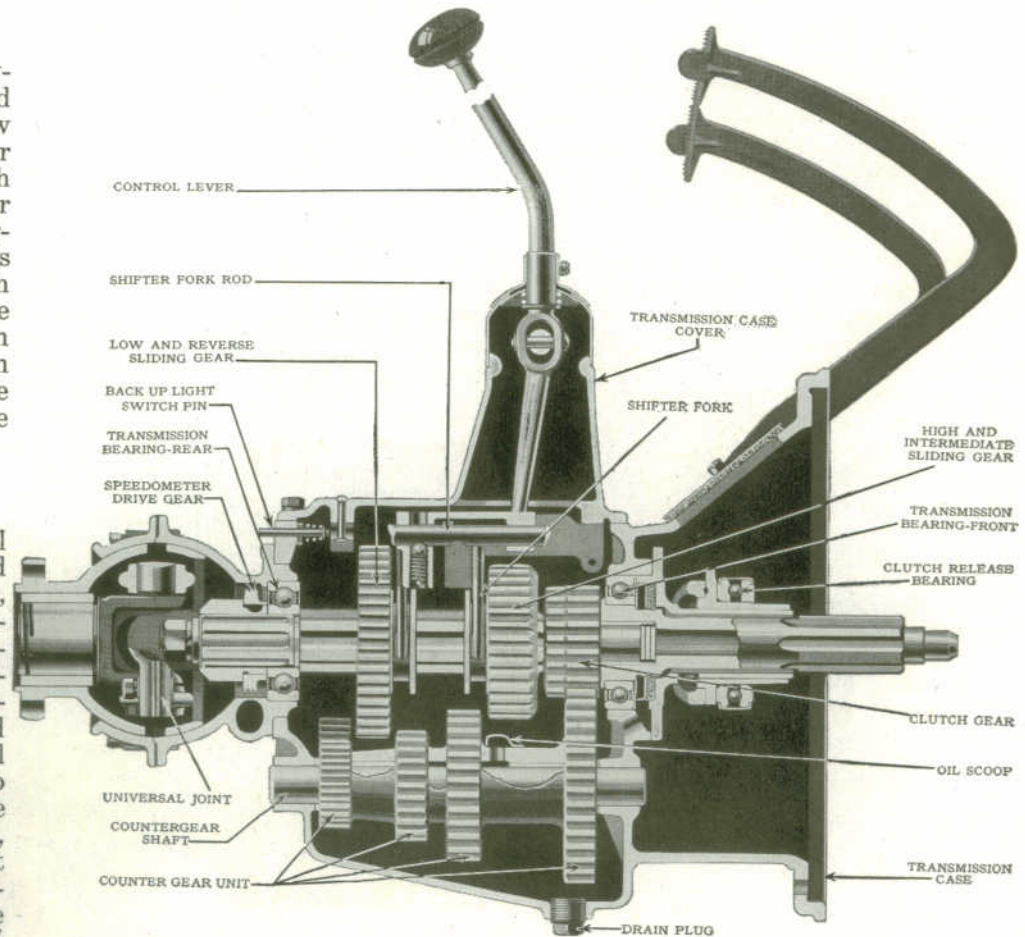
When the control lever is moved to the first speed position, the low and reverse sliding gear is moved into mesh with the low speed counter-gear and the car moves forward.

**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"—**

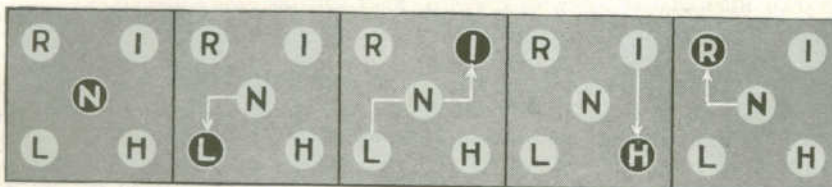
When the control lever is moved to third or high speed position, the high and intermediate sliding gear is disengaged from the intermediate speed counter-gear and moved forward until the internal teeth slip over and engage the teeth of the clutch gear, locking the main shaft and the clutch gear together,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



SECTIONAL VIEW TRANSMISSION—120" AND 128" WHEEL BASE MODELS

**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.



GEAR-SHIFT DIAGRAM

**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. A good grade of steam cylinder oil should be used, but at the beginning of the winter season it is advisable to thin the lubricant by adding a quantity of engine oil. Usually, a half and half mixture will meet winter driving conditions.

**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.

**Pinion Shaft—**

The pinion shaft transmits the power from the universal joint to the driving gears of the differential. 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.

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## 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.

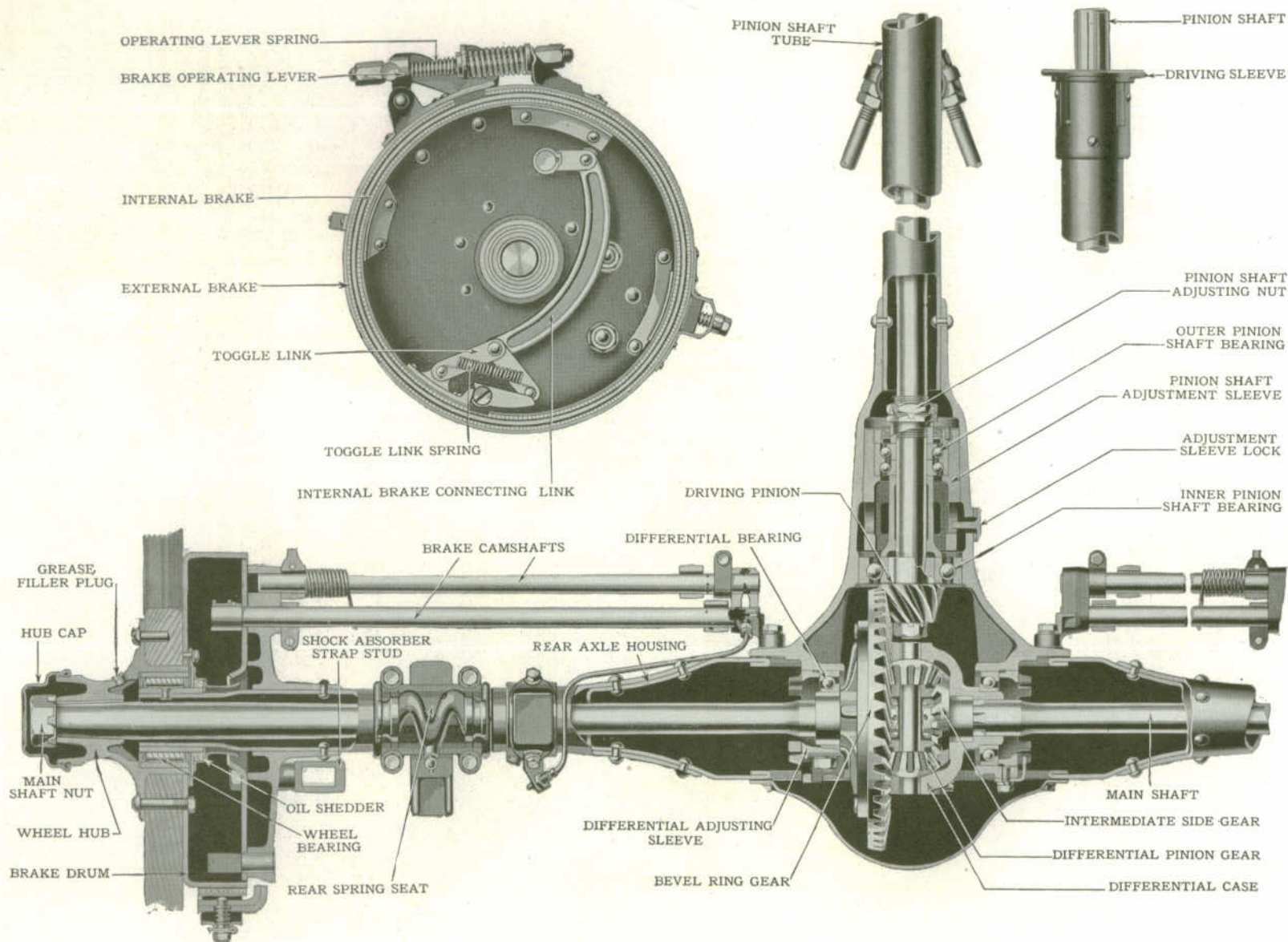
The Buick rear axle design, embodying a single universal joint and a long torque tube, presents many advantages in a consideration of the method of transmitting the driving effort of the rear wheels to the frame of the car. With this construction, it is possible to operate the car under its own power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

**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.

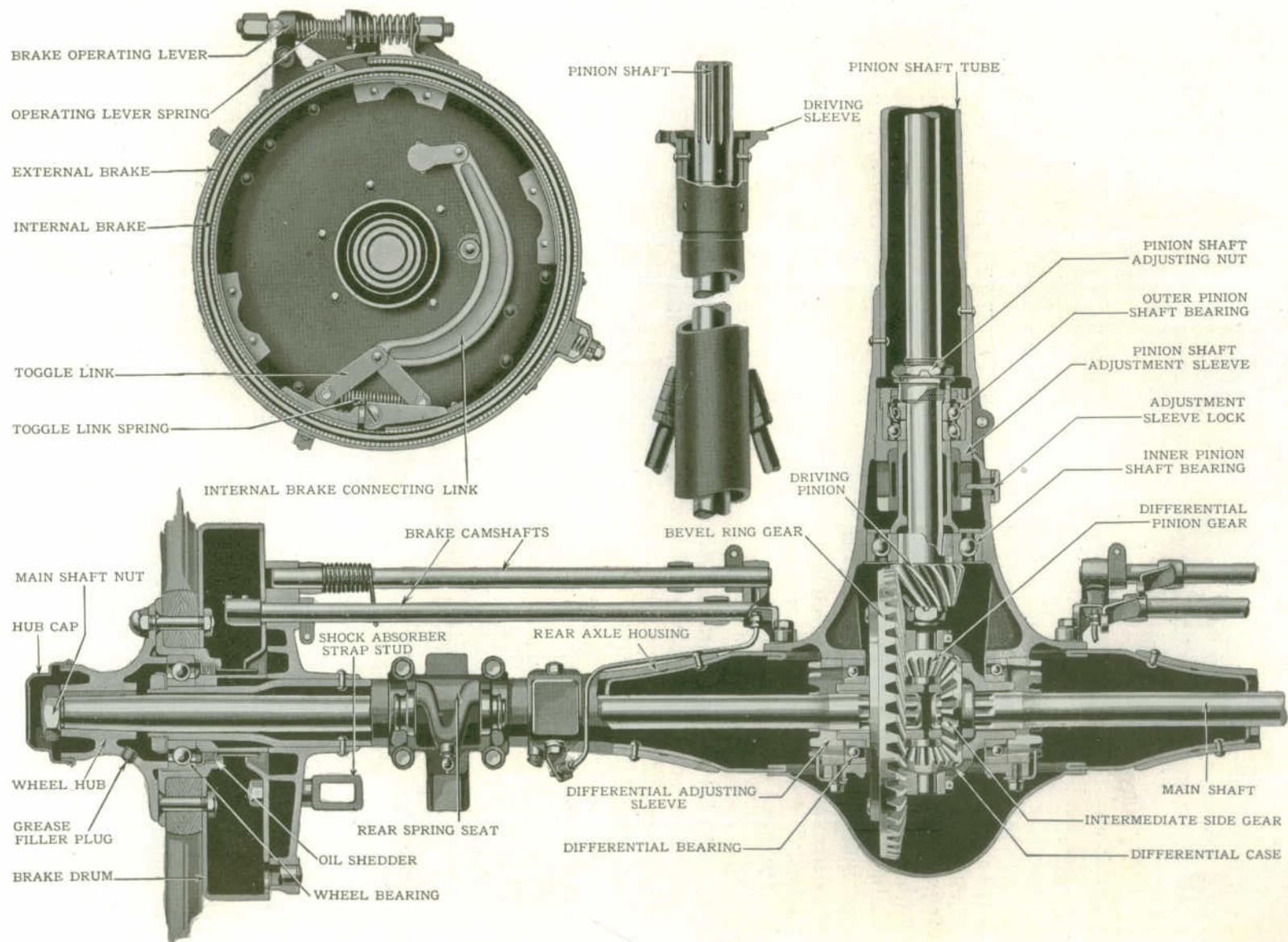
This is not true of the rear wheels of a motor car, although it is of the front ones. In the former case they are keyed fast to the axle shafts and must turn with them. As a result, in rounding a turn, one wheel would slide or scrape around, were not some device employed to eliminate this action by automatically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





SECTIONAL VIEW—REAR AXLE—114 $\frac{1}{2}$ " WHEEL BASE MODELS





SECTIONAL VIEW—REAR AXLE—120" AND 128" WHEEL BASE MODELS



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 in 114½" wheel base models rotate on Hyatt roller bearings, and in 120" and 128" wheel base models, on New Departure ball bearings, these requiring no adjustment. The bearings are lubricated through a grease plug in the hub flange and should receive this attention every 1000 miles.

In 114½" wheel base models, the wheels are attached to the tapered ends of axle shafts and driven by keys in shafts and hubs. In 120" and 128" wheel base models, the wheels are held on ends of axle housing by means of large hex nuts and locked with special lock washers.

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## 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.

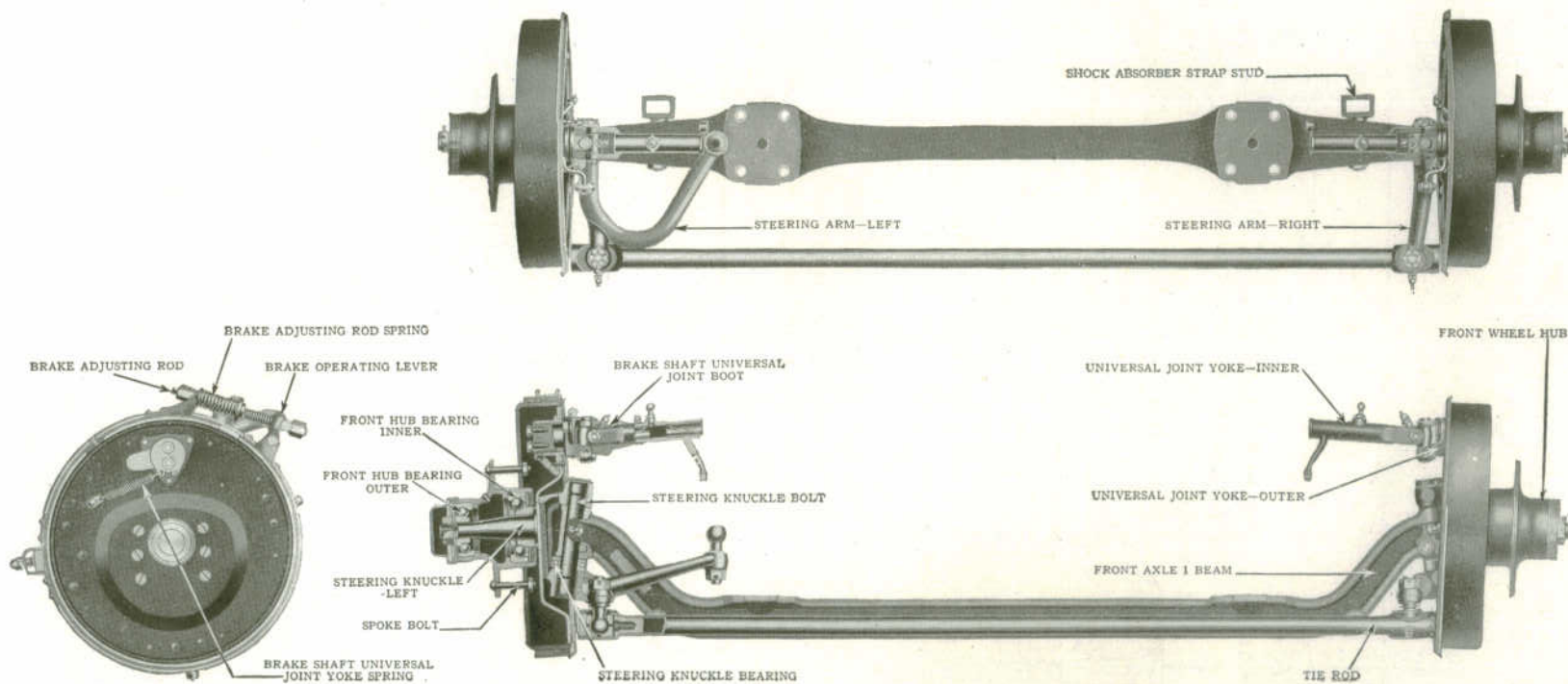
#### **Tie Rod Adjustment—**

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  $\frac{3}{16}$  inch less than at the rear. If this measurement is made between tire centers, the difference should be  $\frac{5}{16}$  inch, or if between inside faces of tires, it should be  $\frac{1}{4}$  inch. This setting is called "toe-in." The wheels are correctly set at the factory, but should realignment be necessary, due to accident, slight adjustment may be made by shifting shims in the tie rod ball stud sockets and greater adjustment by resetting the steering arms.

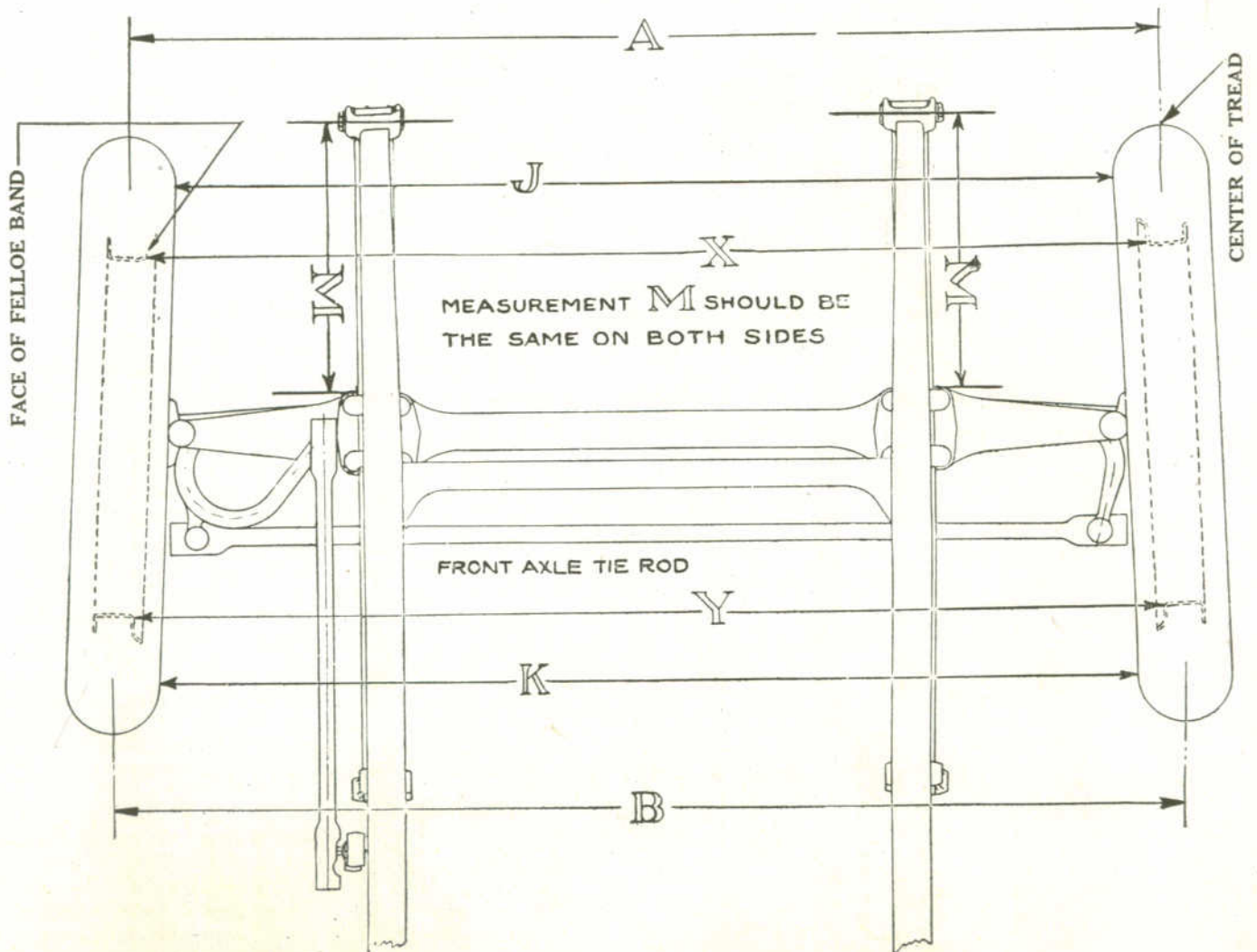
The front wheels are also set with a "camber," or, referring to the illustration on page 50, the measurement "D" is from  $\frac{11}{16}$  inch to  $\frac{15}{16}$  inch greater than "E" or in other words, the wheels are from  $1\frac{3}{8}$  inches to  $1\frac{7}{8}$  inches closer at the bottom than at the top. If accident or collision changes this camber, it is necessary to straighten the axle or spindles to restore the original setting.





FRONT AXLE ASSEMBLY



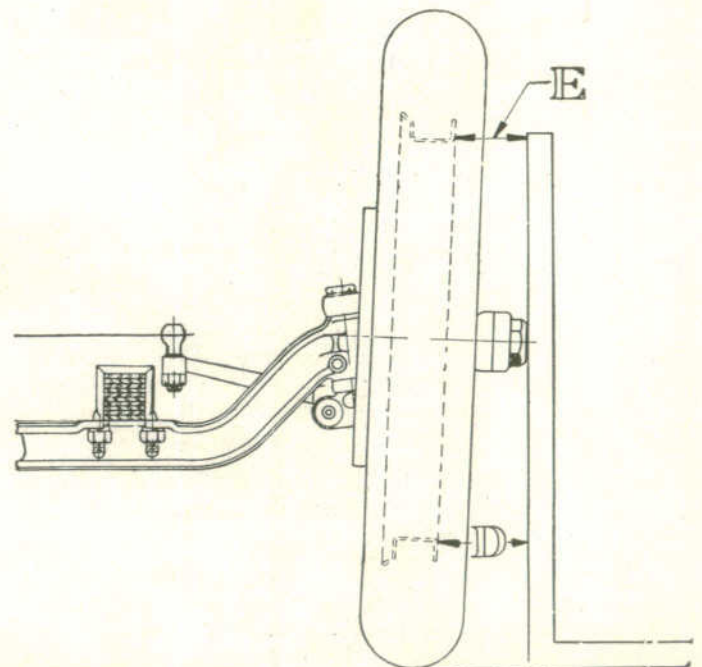


### Front Wheels—

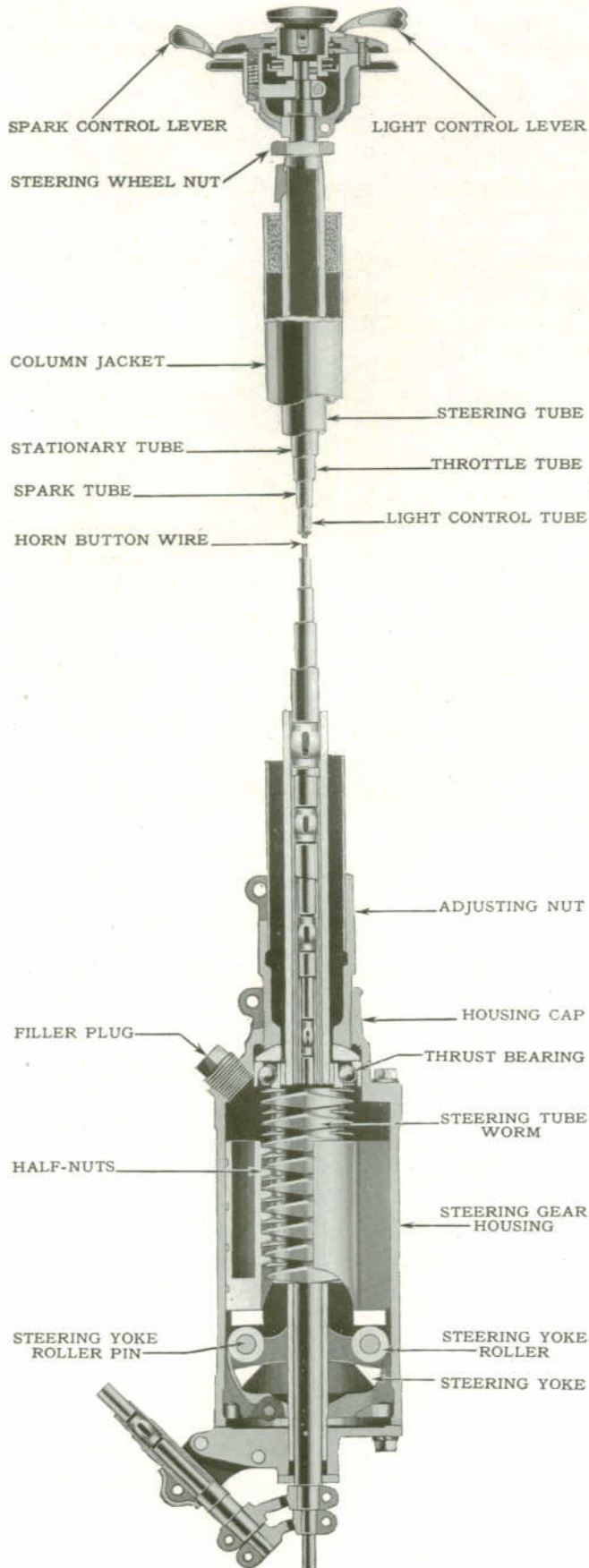
The front wheels rotate on ball bearings, of which there are two in each hub. The bearings are lubricated through a grease plug in the hub flange, and by filling the hub caps with soft cup grease. In mounting the wheels, care should be exercised to thoroughly fill the bearings with grease, and also the space between the bearings.

### 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 pin from the bearing nut,







SECTIONAL VIEW STEERING GEAR

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.

**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.

**Steering Gear—**

The type of steering gear used is of the worm and split nut form of construction, and is both simple and reliable. Briefly, it consists of a double threaded tube engaging with two half-nuts, the whole being enclosed in a casing mounted on the frame.

A steering gear of this type is both positive and free in action and is designed to prevent transmission of road shocks to the steering wheel. The worm has ample threads to ensure long life, and frequent adjustment to compensate wear is therefore unnecessary. In addition, the half-nuts have hardened steel thrust blocks at their lower end which still further ensures against wear.

**Adjustment—**

The steering wheel tube is provided with a large ball thrust bearing, mounted in the adjusting nut, the latter being screwed into the upper part of the steering gear case. To compensate lost motion or looseness in the steering gear, loosen the clamp bolts and screw the adjusting nut down, securing tightly the clamp bolts when adjustment is completed. There should not be more than one-half inch lost motion at the steering wheel rim.



Do not screw the adjusting nut down so far that stiff steering results. When making the adjustment, it is advisable to jack up both front wheels, frequently turning the steering wheel to note whether steering is becoming stiffer than desirable.

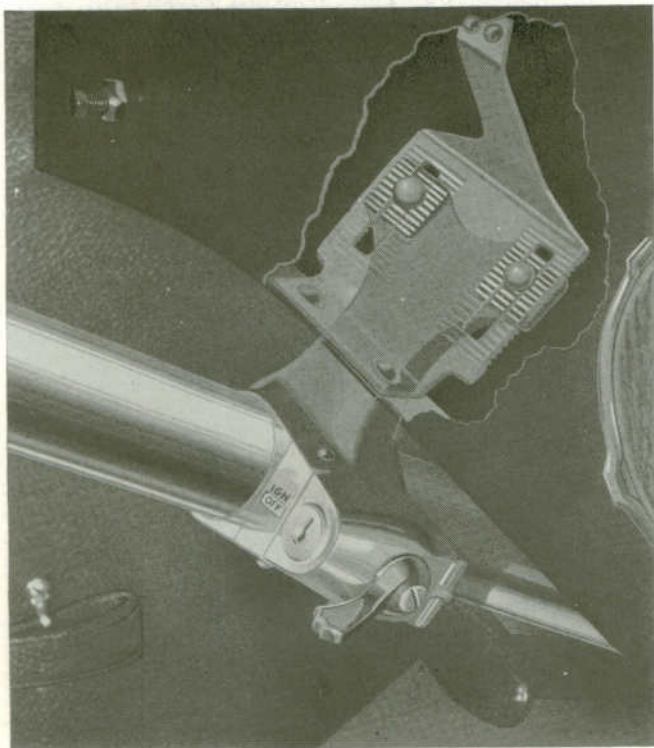
#### **Lubrication—**

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 oiling plug is provided in the steering gear housing and this should be kept filled with steam cylinder oil.

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.



#### **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 two 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

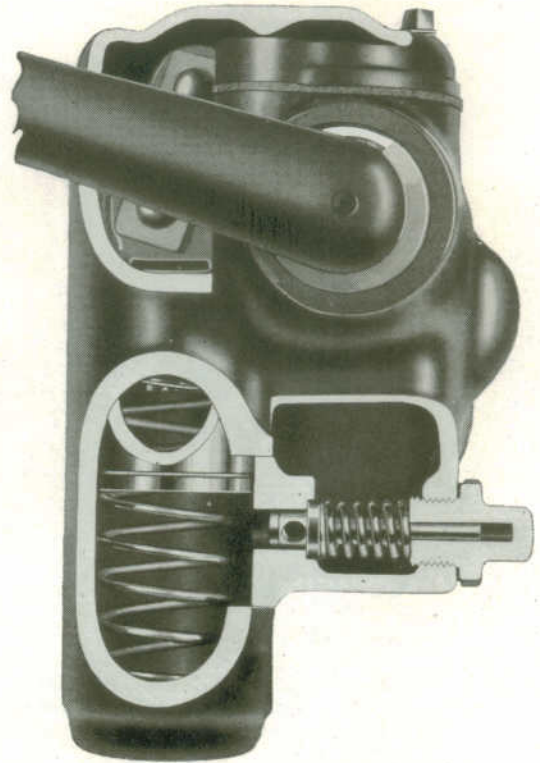
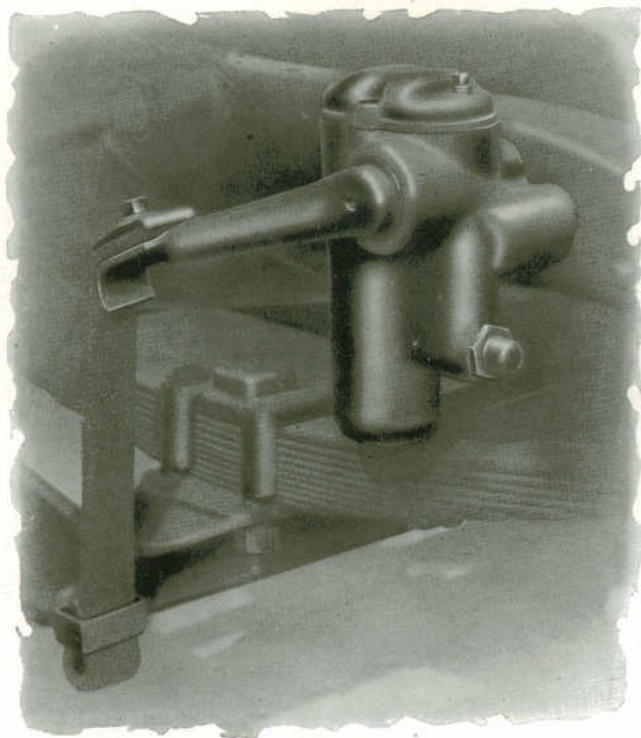
Broken springs are almost invariably caused by loose spring clips or tight shackle bolts, or subjection to some unusual strain in careless driving.

**Keep the spring clip nuts tight at all times.**

Spring eyes and shackles are subject to wear which will cause a rattle. To correct, loosen the shackle bolt nut and tighten bolt until the threaded shackle takes up the play, then tighten nut.

### *Lubrication—*

The shackle bolts are lubricated by the Zerk system and in case of squeaks a mixture of oil and graphite may be applied to the spring leaves by means of a brush.



### *Shock Absorbers—*

Specially designed, hydraulic type shock absorbers are included as standard equipment, both front and rear, on all 1928 models. These absorbers should require no adjustment and no lubrication, but it may be necessary in case of leakage to add oil to the cylinders, a pipe plug in the cover being provided for this purpose.

This oil is 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.**

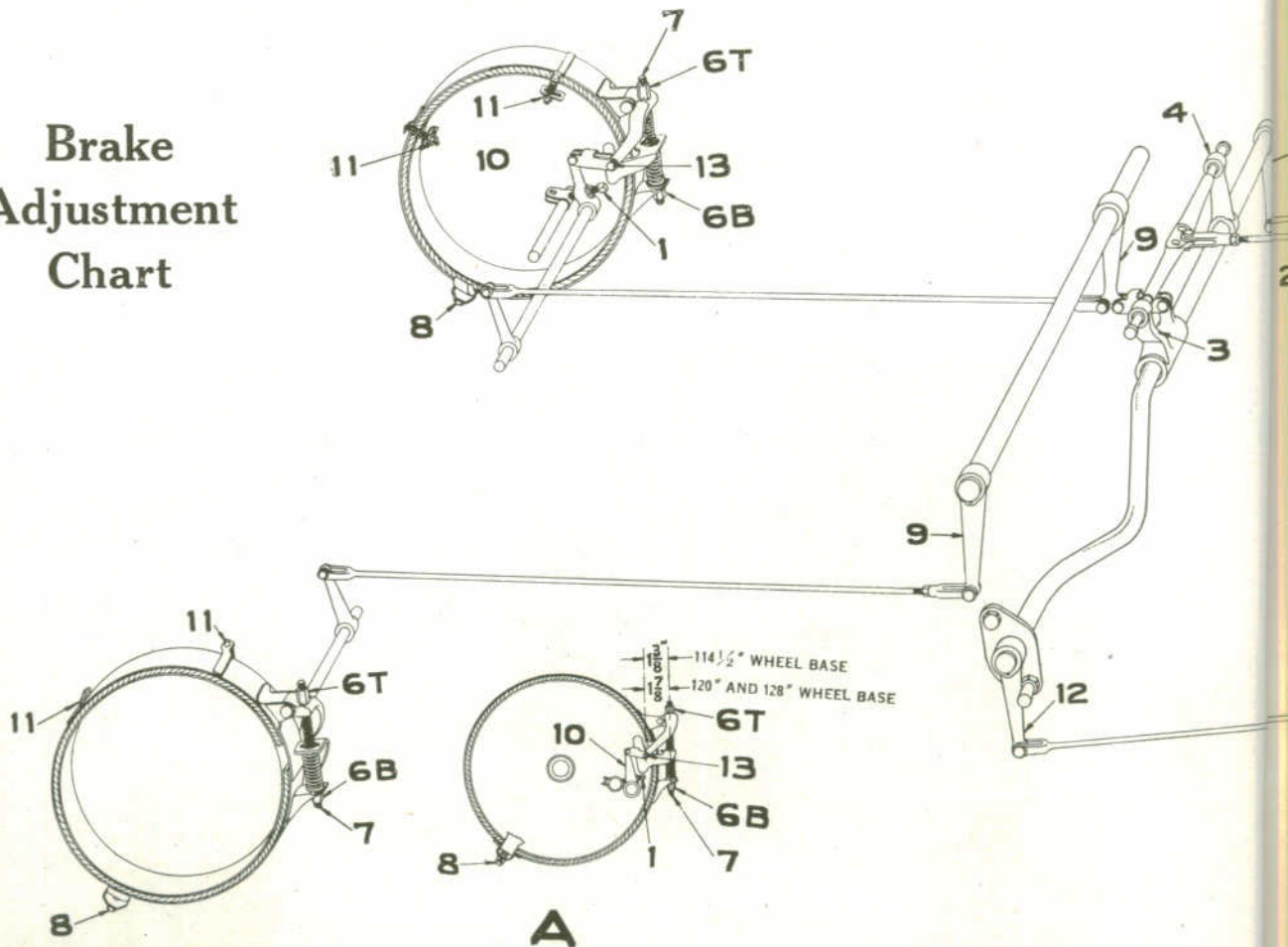
## BRAKES

The four-wheel brake system supplied on all Buick cars for 1928 is of the same general design and construction as used on all Buick Cars for several years, its efficiency and satisfactory performance having been demonstrated under all driving conditions.

In addition to greater safety in general driving and the reduction of skidding to a minimum, these brakes provide a means in emergencies for stopping in much shorter distances than with rear brakes only. **It is not expected, nor intended, that this brake installation shall be used for "stunt" purposes, or contrary to the established principles of safe and sane driving.**



## Brake Adjustment Chart



Maximum braking effect and smoothness of operation, as provided in the design of the four-wheel braking system, are obtained when the following four conditions exist:

**Pedal Travel**—Pedal should travel five inches, and this travel will be had if band clearances and lever positions are correct.

**Equalizer Action**—When brakes are in release position, equalizer bar should be parallel to the long cross brakshaft. When brakes are applied, equalizer bar should be parallel to the shaft.

**Band Clearance**—A clearance of approximately 1-32 inch between lining and drum should be had for entire circumference.

**Lever Positions**—When brakes are in release position, levers should return to stops provided.

### ADJUSTING BRAKES AND CHECKING RODS AND LEVERS

1. Jack up the four wheels.
2. Lubricate all working parts of the brake system. Care must be exercised in keeping all lubricant away from linings.
3. Try all working parts to determine if each shaft and connection is free. When brakes are released, foot pedal must come to within  $\frac{1}{16}$  inch of toeboard and levers should snap back against their stops as follows:

Rear brake lever stop screw No. 1 should return against clamp on hand brake camshaft. Correct setting of this stop screw will bring pin No. 13 in a position  $1\frac{3}{8}$  inches from center line of adjusting rod No. 7 for  $114\frac{1}{2}$ " wheel base and  $1\frac{1}{8}$  inches for 120" and 128" wheel base models, this pin being located toward the axle. See view A.

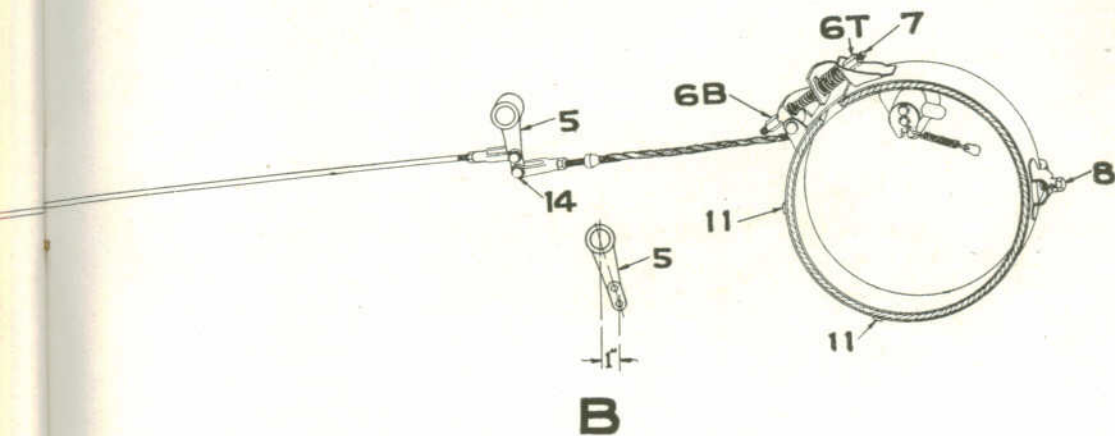
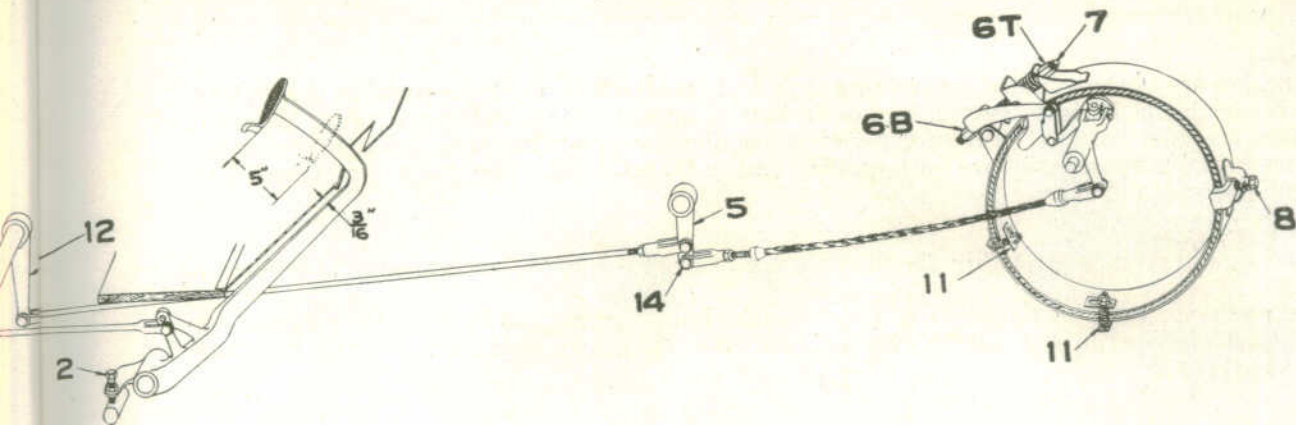
Stops for front brakes are located inside the brake drum and are not adjustable. To determine if front brakes return to full release, disconnect pin No. 14 and work brakes by hand, allowing them to snap into release position. Lever No. 12 should return against stop.

4. **Adjustment of Brakes**—The brake pedal should travel approximately five inches and the equalizer must set parallel to the supporting shaft when the brakes are released or locked. To obtain this, proceed as follows:

(a) Release right front and rear brakes by turning adjusting nuts No. 6T and 6B and adjust left front and rear brakes as follows:

(b) Adjust at the brake anchor by turning adjusting screw No. 8 so that when the wheel is revolved the lining clears the drum at this point by  $\frac{1}{16}$  inch, then adjust brake band guides No. 11 on the lower side of front brakes and upper side of rear brakes to get approximately  $\frac{1}{32}$  inch clearance.





(c) The brakes should be rounded to get uniform clearance between the lining and the drum. If flat spots are found in the bands, use a brake rounding tool between the lining and the drum but do not use a screwdriver or chisel.

(d) Obtain correct pedal travel (approximately 5 inches) and square pulling movement of equalizer by turning adjusting nuts Nos. 6T and 6B at the left front and rear brakes.

(e) **Note:** The clearance between the lining and the drum is governed by **two nuts**, No. 6T for the longer portion of the brake and No. 6B for the shorter portion. **Both long and short ends of brakes must have same clearance.**

(f) Adjust right front and rear brakes same as mentioned in paragraphs (b), (c) and (e) so that the right and left brakes in each set hold alike.

Lock nuts must be locked with proper wrenches. Do not use pliers.

5. If, in an exceptional case, the correct brake band clearance is not obtained by the foregoing adjustments, brake rods and cables should be checked for length. Proceed as follows:

Lever No. 12 must set against stop when brakes are released.

**Brake Pedal Rod**—to get the proper position for the brake pedal, remove pin from yoke at rear end of rod and adjust the pedal by means of screw No. 2 for clearance of  $\frac{1}{16}$  inch between the toeboard and the pedal.

**To Check Rear Rods and Levers**—Lever No. 3 must set parallel to lever No. 4. If not, remove pins from adjusting yoke ends at levers No. 9 and with levers Nos. 10 and 12 against the stops, turn the yoke ends so that the holes in levers and yoke ends are in alignment. This will cause the equalizer to set parallel to the supporting cross shaft.

**Brake Pedal Rod**—With lever No. 12 setting against stop and lever No. 3 in line with lever No. 4, with equalizer parallel to supporting shaft, turn adjusting yoke so that holes in yoke end and the center hole in equalizer are in alignment, and replace pin. This rod should be just short enough to take up any looseness between the equalizer and levers Nos. 3 and 4.

**To Check Front Rods and Levers**—With lever No. 12 setting against stop, the front pull rod should be of such length that the center of lower pin No. 14 in lever No. 5 is one inch ahead of a vertical line through the center of the lever retaining bolt. See view B.

**To Check Cables**—With the front rods of the proper length as mentioned above, turn the wheels to the extreme right and adjust the right cable so that pin No. 14 can be replaced with the fingers, this is to be done, of course, with the brakes released and lever No. 12 and the front brakes setting against their respective stops. Adjust the left cable in like manner with the wheels turned to the extreme left.

**Note:** All lock nuts on rods and cables should be tightened after making necessary adjustments.



**Service Brakes—**

The service brakes are of the external contracting type and operate from the right pedal in the driving compartment. When this pedal is depressed, brakes on both front and rear wheels are applied. External contracting brakes are used because years of experience has demonstrated that they are the most satisfactory for service brake purposes, and are both quickly and easily adjusted. The brake band assemblies are interchangeable, front and rear.

**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.

**Emergency Brakes—**

The emergency brake in the Buick braking system is the usual internal expanding type which years of experience have demonstrated as the most satisfactory for emergency purposes. The brake is operated through the hand lever in the driving compartment, and is applied only at the rear wheels.

The emergency brakes should require little attention, the adjustment necessary in compensating for natural wear of the linings. By disconnecting the end of the emergency brake pull rod, and turning the yoke in proper direction, this wear may readily be taken up.

---

## 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 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.





Fig. 1



Fig. 2



Fig. 3



Fig. 4



Fig. 5



Fig. 6



Fig. 7



Fig. 8



Fig. 10



Fig. 9



Fig. 11



## TIRES

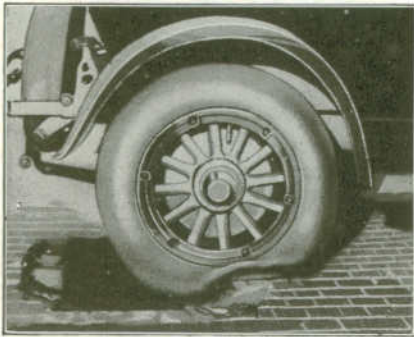
All 1928 models are equipped with low pressure, straight side cord tires, size 31 x 5.25 on 114½" wheel base models, and size 33 x 6 on 120" and 128" wheel base models.

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.

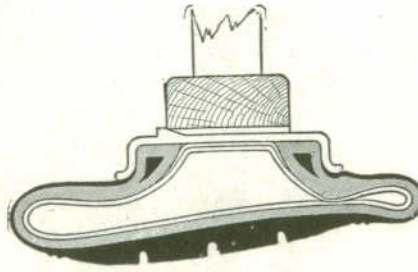
Maintenance of the proper pressure is therefore the most important element of tire care and the tires should be tested with a reliable gauge every week, making sure that they are inflated to the minimum pressure recommended. If the tires are run with lower pressures than these, rapid tread wear, fabric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

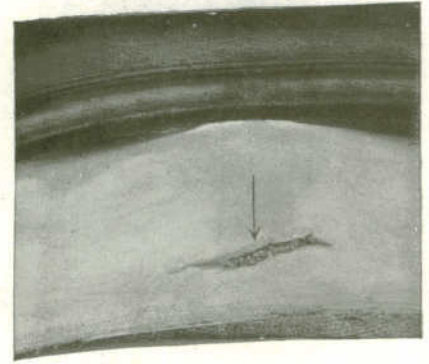
The following illustrations will indicate the more common forms of tire damage resulting from under inflation.



Tire Hitting Hole in Pavement  
FIGURE No. 1



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

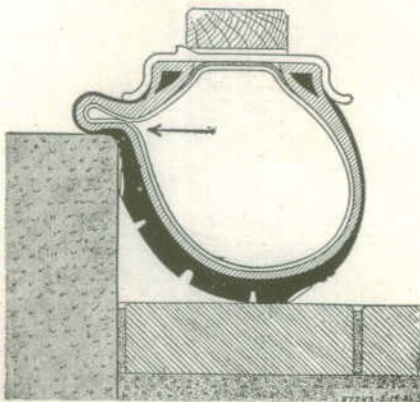


Single Break  
FIGURE No. 3

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.

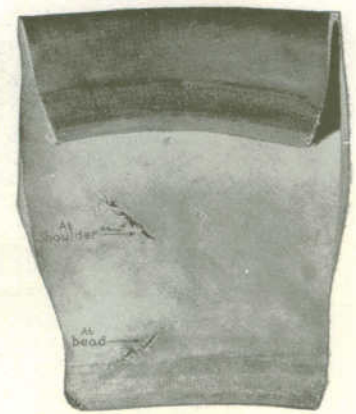
Figure No. 3 shows the effect of the blow. The fabric has been ruptured, although the tough rubber tread showed no marks of the blow. The tube, of tough elastic rubber, probably was not damaged at the time, but constant flexing or bending of the tire enlarged the break and the tube, forced into the crack 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.



Manner in Which Rim Bruise Occurs  
FIGURE No. 4



Bruise Parallel to Bead  
FIGURE No. 5



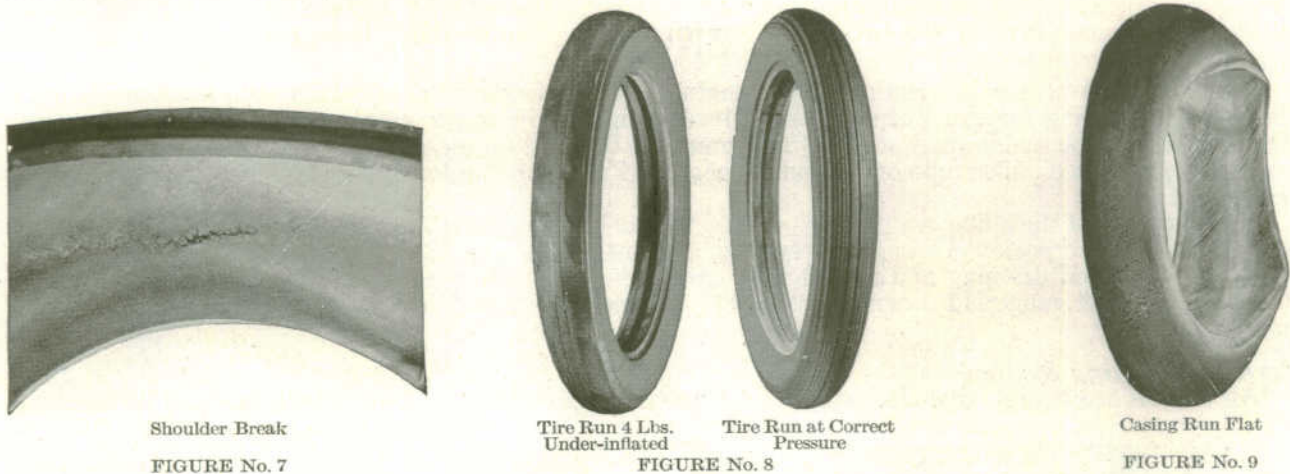
Compound Break  
FIGURE No. 6



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.



Shoulder Break

FIGURE No. 7

Tire Run 4 Lbs.  
Under-inflatedTire Run at Correct  
Pressure

FIGURE No. 8

Casing Run Flat

FIGURE No. 9

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	Model	Front	Rear
28-20	32	34	28-47-S	34	36
28-24	30	30	28-48	34	34
28-25	32	32	28-50	34	42
28-26	30	30	28-51	34	36
28-26-S	30	32	28-54	30	30
28-27	34	40	28-54-C	30	32
28-29	34	40	28-55	34	36
28-47	34	36	28-58	34	36

**NOTE: For High Speed Driving.**

Inflate **front** tires five pounds higher than figures in above chart.



## 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.

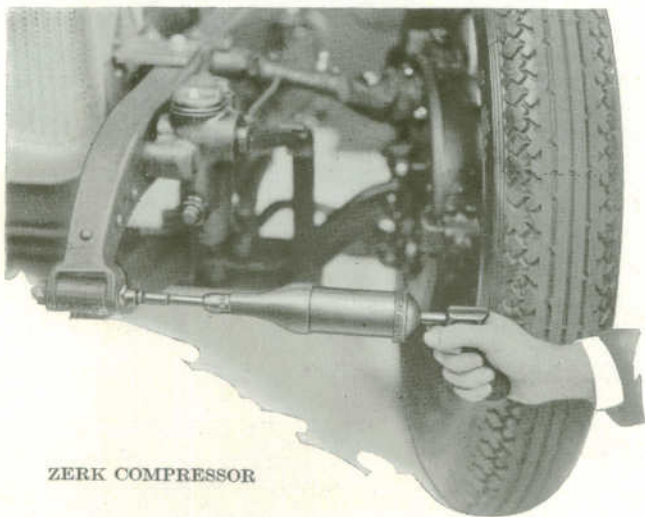
### ENGINE

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 15.

The capacity of the oiling system in the 114½" wheel base engine is 7 quarts, including oil pan, cleaner, and all oil lines and pockets through the system, and in the 120" and 128" wheel base engine, the capacity is 8 quarts. When draining and refilling the crankcase, however, the amount of oil necessary to show "full" on oil level gauge is 5 quarts in the 114½" wheel base and 6 quarts in the 120" and 128" wheel base engine.

#### 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.



ZERK COMPRESSOR

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.

#### 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 bearing, 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 34 to 37 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 springs, 2.  
 Front spring shackle bolt, upper, 2.  
 Front spring shackle bolt, lower, 2.  
 Front brake universal joint yoke block, 2.  
 Front brake universal joint yoke lever, inner, 2.  
 Kingbolts, 4.  
 Front brake disc brackets, 2.  
 Front axle tie rod, 2.  
 Drag link, front end, 1.  
 Drag link, rear end, 1.  
 Front brake pull rod idler lever, 2.  
 Distributor, 1.  
 Brake pedal, 1.  
 Clutch pedal, 1.  
 Clutch release bearing, 1. Hand grease cup only.  
 Cross shaft lubrication bracket, 6.  
 Rear spring shackle, 2.  
 Rear spring front end, 2.  
 Rear spring block, 2.  
 Rear spring, rear end, 2.  
 Rear spring seat to axle, 2.  
 Rear brake camshaft bracket, inner, 2.  
 Rear brake camshaft in brake spider, 2.  
 Hand brake lever, 1.  
 Water pump, 1.

### *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.

## EVERY 1000 MILES

Wheel hubs, 4, soft cup grease. (Zerk connections may be placed in threads of hubs and Zerk compressor used to fill hubs.)

Steering gear. Fill through plug hole with steam cylinder oil.

## EVERY 2000 MILES, OR AT LEAST TWICE A YEAR

Remove filler cap on the left side of transmission case and fill to level of opening with steam cylinder oil. Inspect frequently.

Remove plug in rear of rear axle housing and fill to level of opening with steam cylinder oil. Inspect frequently.

Pinion shaft bearings, remove plate and insert soft cup grease.

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.

### *Crankcase Capacity for Refilling—*

114½" wheel base, 5 quarts.

120" and 128" wheel base, 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 luster 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.

Should the finish be damaged in any way, the owner should insist that repairs are made only by a Duco re-finishing station.

### *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 chamois. 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.

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



(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.**

(a) Examine the gas tank supply, and make sure that the small vent hole in filler cap is open. If there is gas in the main tank, then test at the carburetor by depressing plunger on top of the float chamber, and if gasoline rises through the plunger hole, there is fuel in the carburetor and the system is functioning.

If no gasoline shows at carburetor, then test at vacuum tank by removing pipe plug from bottom of tank. If gasoline flows, replace pipe plug and close shut-off valve in the top of gasoline cleaner. Remove plug at bottom of strainer trap on carburetor and clean the strainer.

If no fuel flows from the vacuum tank when the plug in the bottom is removed, there is indicated either a stoppage or air leak in the line between the main and vacuum tanks, a sticking valve in the vacuum tank or dirt in the strainer at the top of the latter. To determine if fuel pipe between main and vacuum tanks is clear, disconnect at both ends and blow through pipe. The suction tube strainer in main tank should be examined when withdrawn. The strainer within top of vacuum tank may be removed by unscrewing the fitting to which main fuel pipe is attached to the tank.

(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 15.

(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 gaps more or less than .025 inch.

(f) Incorrect carburetor adjustment.



## BUICK BRANCHES AND DISTRIBUTORS

Atlanta	Buick Motor Company, 512-516 Spring St., N. W.
Boston	The Noyes-Buick Company, 857 Commonwealth Ave.
Buffalo	Buick Motor Company, 1094-1100 Main Street
Charlotte, N. C.	C. C. Coddington, Inc., 500 West Trade Street
Chicago	Buick Motor Company, 2031 Calumet Ave.
Cleveland	The Ohio Buick Co., 1900 East Twenty-fourth Street
Cincinnati	Leyman-Buick Company, 630 Walnut Street
Dallas	Buick Motor Company, 1420-24 Young Street
Denver	Buick Motor Company, 690 Lincoln Street
Detroit	Buick Motor Co., 460 West Canfield Ave.
El Paso, Texas	Buick Motor Co., 415 West San Antonio Ave.
Flint	Buick Motor Company, 605 N. Saginaw Street
Grand Rapids, Mich.	Buick Motor Company, 60-66 Sheldon Ave.
Indianapolis	Buick Motor Company, 13th and Meridian Streets
Jacksonville, Fla.	Buick Motor Company, Monroe and Julia Streets
Kansas City, Mo.	Buick Motor Co., Admiral Boulevard and McGee Street
Lincoln, Nebr.	Nebraska-Buick Auto Co., 1300 Q. Street
Los Angeles, Cal.	Howard Automobile Co., 1367 S. Figueroa Street
Memphis, Tenn.	Buick Motor Company, 739 Union Ave.
Milwaukee	Buick Motor Company, 156-160 E. Wisconsin Ave.
Minneapolis	Pence Automobile Co., Hennepin Ave. and 8th Street
New York City	Buick Motor Company, Broadway at 55th Street
New York City	General Motors Export Company, 224 West 57th Street
Oklahoma City	Buick Motor Company, 10th and Broadway
Philadelphia	Buick Motor Company, 2917 North 16th Street
Pittsburgh	Buick Motor Company, Baum Boulevard and Rebecca St.
Portland, Ore.	Howard Automobile Co., Burnside at 13th
Rochester, N. Y.	C. L. Whiting, 342 East Ave.
Saginaw	Garber-Buick Company, 204-206 N. Washington Ave.
St. Louis, Mo.	Vesper-Buick Auto Co., Grand Ave., at Lindell Blvd.
Salt Lake City	Randall-Dodd Auto Co., 47-53 South Second St. East
San Antonio, Texas	Buick Motor Company, 300 Broadway
San Francisco	Howard Auto Company, 1601 Van Ness Avenue
Seattle, Wash.	Eldridge-Buick Co., Eleventh Ave. and East Union
Washington, D. C.	Buick Motor Company, 1021 Fourteenth St., N. W.

## UNITED MOTORS SERVICE BRANCHES

Atlanta	94-96 W. Peachtree Street
Boston	32 Brighton Ave.
Buffalo	1127-33 Main Street
Chicago	2521-27 S. Wabash Ave.
*Cincinnati	309 E. Eighth Street
Cleveland	4019-4109 Prospect Ave.
Dallas	2820-26 Commerce Street
Denver	9th Ave. and Acoma Street
Detroit	417 Willis Ave., W.
Indianapolis	1133 N. Meridian Street
Kansas City	2701-07 Warwick Trafficway
Los Angeles	1225 South Grand Ave.
*Milwaukee	159 E. Park Street
Minneapolis	Tenth St. at Harmon Place
New Orleans	1003-11 St. Charles Street
New York	239-41 W. Fifty-sixth Street
Omaha	2512 Farnam Street
Philadelphia	342-44 N. Broad Street
*Pittsburgh	5114 Liberty Street
St. Louis	Locust at Jefferson
San Francisco	Van Ness at Clay
Seattle	1708-10 Broadway
Toronto, Canada	490 Yonge Street

\*Note:—No service department, parts stores only



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