FORD

Model "A" Car

and Model "AA" Truck

INDEX

Note: Index refers to Model "A" Ford passenger car unless otherwise mentioned.

SPECIFICATIONS OF FORD MODEL "A" CAR

Axle (Front)

Material: Chrome alloy forging.
Tensile strength: 125,000 to 145,000 lbs. per sq. in.
Tilt of axle: 5 degrees.
Type: "I" beam, knuckle reverse Elliott.
Bearings for wheels: Adjustable taper roller.

Axle (Rear)

Type: Three-quarter floating.
Material: Special Ford carbon manganese steel.
Make: Ford.
Gear ratio: 3.77 to 1 (Optional 4.111 to 1 for mountain country).
Differential make: Ford.
Gear type: Spiral bevel.
Pinion bearing: Double taper roller bearing.
Differential bearings: Single taper roller bearings, each side.
Shaft: 1⅛ in. diameter.
Ring gear: 8.4 in. pitch diameter.
Teeth: 1³⁄₁₆ in. wide.
Lubricant: Heavy semi-fluid oil.
Differential driven ring gear, number of teeth: 37.
Differential drive pinion, number of teeth: 10.

Battery

Capacity: 80 ampere hours.
No. of cells: 3.
No. of plates: 13 per cell.
Charging rate: 10-12 amperes.
Terminal grounded: Positive (+).

Brakes

Design: Ford.
Type: Mechanical, internal expanding shoe.
Foot pedal: Four wheels.
Linkage: Permanently set.
Adjustment: Stud on each brake plate, outside.
Percentage of braking power: Front wheels—40 per cent; rear wheels—60 per cent.
Diameter of drums: 11 in.
Drum width: 1¾ in.
Width of brake shoes: 1½ in.
Length of brake shoes: 14 in.
Brake shoe lining width: 1½ in.
Brake shoe lining material: Woven wire and asbestos composition.
Brake shoe lining thickness: ³⁄₁₆ in.
Brake shoes in each drum: 2.
Total brake shoes: 8.
Total braking surface: 168 sq. in.

Brakes (Emergency)

Hand lever: Rear wheels.
Type: Mechanical, self-energizing, internal expanding band.
Diameter of drum: 9⅝ in.
Width of brake shoe: 1 in.
Width of brake shoe lining: 1 in.
Thickness of brake shoe lining: ³⁄₁₆ in.
Length of brake shoe: 28¾ in.
Length of brake shoe lining: 28¾ in.
Brake shoe lining material: Asbestos and woven wire.
Total braking surface: 57½ sq. in.
Total braking surface of six-brake system: 225½ sq. in.

Camshaft

Diameter: ⅞ in.
Bearings: 3.
Bearing diameter: 1⁹⁄₁₆ in.
Bearings: Length, front—1¾ in.; center—2 in.; rear—1 in.
Lift of cam: .302.
Base of cam: .954.
Flange in which gear fastens: 2⁵⁄₁₆ in. in diameter, ⁵⁄₁₆ in. thick.
Material: Special Ford carbon manganese steel.
Camshaft gear: Bakelized material.
No. of camshaft gear teeth: 50.
Camshaft gear type: Spiral teeth.
Bearings: Steel in cast iron.
Location: In cylinder block.
Speed: ½ of crankshaft.

Capacities

Cooling system: 3 gal.; gasoline tank 11 gal.; engine oil pan 5 qts.; transmission 1 pint; rear axle 1½ pints; steering gear 7¾ ounces. When changing oil in engine pan, the new oil can be poured through the breather pipe more rapidly and will not bubble over if the oil level indicator is withdrawn.

Carburetor

Make: Zenith.
Model: Special.
Size: 1 in.
Control: Hand throttle and foot accelerator.

Clutch

No. of driven plates: 1.
Thickness: ⁵⁄₆₄ in.
Material: Spring steel.
Clutch facings attached to driven disc: 9 in. in diameter, ⁹⁄₆₄ in. thick.
Inside diameter: 5¾ in.
Material: Moulded asbestos composition.
No. used: 2.
Type: Single plate dry disc.
Clutch pressure: 1100 pounds.
Foot pressure: 30 lbs.
Weight clutch driving member: 15 lbs.
Weight—clutch disc: 2½ lbs.
Total acting surface of clutch facing: 75 sq. in.

Connecting Rod

Length: 7½ in.
Material: Steel forging, "I" beam section.
Weight: 1 lb. 6 oz.
Big end bearing: 1½ in. diameter by 1⅝ in. long.
Piston pin bearing: 1 in. diameter by 1⅝ in. long.

Cooling System

Water circulation type: Pump (and thermo-syphon).
Pump type: Centrifugal.
Make: Ford.
Make of radiator: Ford.
Core type: Tube and fin.
Core make: Ford.
Shell finish: Rustless steel.
Capacity of cooling system: 3 gals.
Fan make: Ford.
Fan belt type: "V".
Fan belt width: ⅝ in.
Radiator hose: Upper diameter—2 in.; upper length—8 in.; lower diameter—1¾ in.; lower length—2¾ in.

Crankshaft

Diameter: 1⅝ in. on main bearings; 1½ in. on crank pins.
Length of main bearings: Front and center, 2 in.; rear, 3 in.
Length of crank pin bearings: 1⅝ in.; connecting rods have a clearance of 5/1000 of an inch sideways.
Rear flange thickness: ⅜ in.
Total square inches of main bearing surface: 11½ sq. in.
Main bearing material: Babbitt, lower half backed in steel; upper half backed in iron.
Material: Special Ford carbon manganese steel.
Bearings: 3.
Weight: 28 lbs.
Gear: 25 spiral teeth, steel.

Drive

Torque tube.

Engine

Bore: 3⅞ in.
Stroke: 4¼ in.
Cylinders: 4, cast en bloc, integral with crankcase.
Type: 4 cycle, "L" head.
Cylinder head: Demountable.
Engine number: Stamped on left side of cylinder block just above the cylinder inlet connection. Engine number is also serial number of the car.
Engine suspension: 3 points.
Weight: Complete with clutch and transmission—473 lbs.
Firing order: 1, 2, 4, 3.
Flywheel weight: 62½ lbs.
Flywheel outside diameter over ring gear: 14.2 in.
Flywheel material: Cast iron.
Flywheel ring gear: 112 teeth.
Flywheel gear ratio to starter drive: 11.2 to 1.
Lubrication: Crankcase capacity—5 qts.
Torque: 128 ft. lbs. at 1000 R. P. M.
Valve arrangement: Right side, vertical; 1 intake, 1 exhaust per cylinder.
Offset of cylinders: ⅛ in.
Horsepower rating: S. A. E. or N. A. C. C.—24.03.
Horsepower brake: 40 at 2200 R. P. M.
Displacement: 200.5 cu. in.
Compression ratio: 4.22 to 1.
Compression pressure: 76 lbs. gauge at 1200 R. P. M.
Exhaust: pipe dia.: 2 in.
Manifold: Hot spot intake manifold.

The following table shows the horsepower developed by the Model "A" engine at various speeds from 600 r. p. m. to 2600 r. p. m.

R. P. M.	B. H. P.
600	14.1
800	19.9
1000	24.4
1200	29.1
1400	32.4
1600	36.2
1800	39.1
2000	40.5
2200	40.6
2400	40.8
2600	40.9

Here is a table giving the number of revolutions of the Model A engine at speeds ranging from 1 to 65 miles an hour.

M.P.H. of Car	High	Inter.	Low	Reverse
1	43	80	134	160
2	86	159	267	321
3	129	239	401	481
4	171	318	535	642
5	214	398	669	802
6	257	477	802	963
7	300	557	936	1123
8	343	636	1070	1284
9	386	716	1204	1445
10	429	796	1337	1605
15	643	1194	2006	2408
20	857	1592	2675	
25	1071	1989		
30	1285	2387		
35	1500	2785		
40	1714			
45	1928			
50	2142			
55	2357			
60	2571			
65	2785			

Fan

Type: Two blade.
Material: Steel, pressed into form in two strips and welded together.
Design: Airplane propeller type.
Belt: "V" Shape.
Belt material: Rubber and fabric.
Belt width: 5/8 in.
Shaft diameter: 5/8 in.
Bearing: Roller.
Speed: 1.50 to 1 of engine.
Diameter: 16 in.
Make: Ford.

Frame

Side members: Length—113 7/16 in. (overall); width—1 3/4 in. depth—4 in.
Cross members: Front—25 15/16 in.; center—30 7/16 in.; rear—42 3/4 in.
Thickness: 5/32 in.
Material: Pressed steel.
Length of frame (not including overhang): 102 31/32 in.

Gasoline Tank

Make: Ford.
Type: Cowl, gravity feed.
Capacity: 11 gallons.

Generator

Type: 2-pole.
Voltage regulation: Fixed control.
Cutout closes: About 9 MPH., car speed.
Cutout opens: About 8 MPH., car speed.
Cutout make: Ford.
Armature speed: 1 1/2 of engine.
Maximum normal charging rate: 12 amperes.
Armature speed: 1600 R. P. M.
Car speed: 25 M. P. H.
Armature shaft bearings: Ball-front, plain-rear.
Brushes: 3.

Hood

Length: 28 1/4 in.; louvres: 19.

Horn

Type: Motor.

Ignition

Battery, coil and distributor.
Coil units: 1.
Spark plugs: 7/8 in.; straight thread Champion No. 3; gap, recommended: .032 in.-.035 in.
Type: High tension, jump spark.
Breaker gap—.018 to .022 of an inch.
Distributor rotor revolves: Anti-clockwise.
Breaker cam revolves: Anti-clockwise.

Lights

Ammeter make: Ford.
Switch make: Ford.
Candlepower: Twolite-deflecting beam—21; cowl—3; parking—3; tail—3; stop—21; instrument panel—3.
No. headlights: 2; Make—Ford; 2 filament bulb.
Design of headlamp: Acorn.
Lens glasses: Flutes and prisms.
Headlight glass diameter: 8 1/2 in.
Tail-stop lights make: Ford.
Instrument light make: Ford.

Lock (Theft Proof)

Type: Ford type Electrolock, combination ignition switch and theft-proof.
Location: Instrument panel.

Lubrication (Engine)

Type: Pump, splash and gravity feed.
Crankshaft bearings: Gravity feed.
Connecting rods: Splash.
Camshaft bearings: Gravity feed.
Oil pump type: Gear.
Crankcase oil capacity: 5 qts.
Oil level indicator rod make: Ford.
Type of gage: Bayonet.

Lubrication (Chassis)

Type: Alemite pressure grease gun and set of fittings.

Pistons

Displacement: 200.5 cu. in.
Length: 3 29/32 in.
Material: Aluminum.
Weight: 1 lb. 1 7/8 oz. (less rings and pin).
Weight with rings: 1 lb. 4 1/4 oz.
Weight with rings and pin: 1 lb. 8 3/4 oz.
Ring groove width: upper two—1/8 in.; lower—5/32 in. oil control ring.
Ring groove depth: 7/32 in.
Pin material: Machined seamless steel tubing, full-floating type.
Compression ratio: 4.22 to 1.
Compression pressure: 76 lbs. ga.
Ring material: Cast iron.
Ring type: One piece, diagonal cut.
Pin diameter: 1 in.
No. of rings: 3.

Pump (Oil)

See LUBRICATION.

Pump (Water)

Make: Ford.
Location: Top of cylinder-head.
Shaft: 5/8 in. diameter.
Type: Centrifugal, 3 blade.
Size: 2 1/8 in. diameter.
Material: Gray iron casting.

Radiator

Make: Ford.
Type: Tube and fin.
Hose: Upper, inside diameter, 2 in.; length—8 in.; lower, inside diameter, 1 3/4 in.; length—2 3/4 in.
Cooling surface: 374 sq. in.
No. of fins: 120 long, 12 short.
No. of tubes: 102.
Capacity: 3 gallons.

Road Clearance

Road clearance: 9 in.

Rustless Steel

Rust-proof and tarnish-proof, for radiator shell, headlamps, tail lamp, cowl finish strip, hub caps, radiator and gasoline tank caps.

Shock Absorbers

Type: Houdaille, double acting, hydraulic.

Spark Plugs

See IGNITION.

Springs (Front)

Type: Transverse, Ford design.
No. of leaves: 10, two thicknesses of material.
Width: 1 3/4 in.
Free length: 30 13/16—30 15/16 in.
Material: Chrome steel.

Springs (Rear)

Type: Transverse, semi-elliptic.
Material: Chrome steel.
Width: 2¼ in.
For Tudor and Fordor sedans: No. of leaves—10, two sizes of material; free length—38⅞—39 in.
For Phaeton, Roadster and Coupes: No. of leaves—8, two sizes of material; free length—39⅜—39½ in.

Starting Motor

Terminal Grounded: Positive (+).
Normal armature speed: 1500.
Amperage, normal: 175.
Normal running torque: 3 lbs.
Type of drive: Bendix.

Steering Gear

Type: Worm and sector, three-quarters irreversible.
Steering ratio: 13 to 1.
Steering wheel diameter: 17 in.

Tires

Size: 4.75 x 19, balloon.
Recommended pressure: 35 lbs.
Station wagon tires: 5.00 x 19 and recommended pressure is 40 lbs.

Standard Equipment

Standard equipment: On all Ford cars includes five steel-spoke wheels, automatic windshield wiper, speedometer, gasoline gage on instrument panel, dash light, tilting beam headlamps, mirror, combination tail and stop light, oil indicator rod, complete tool equipment, and theft-proof ignition lock. Wide, substantial rumble seat is also standard equipment on the Ford Sport Coupe, De Luxe Roadster and Cabriolet. Triplex shatter-proof glass windshield wings are provided as standard equipment on the Roadsters and Phaetons.

Transmission

Type: Selective sliding gear, three speeds forward and one reverse. In unit with engine.
Make: Ford.
Gear and shaft material: Chrome alloy steel.
Gear ratio: High—100%; intermediate—53.8%; low—32.04%; reverse—26.7%.
Bearings: Pocket—roller; reverse idler—bronze; main shaft front—ball; main shaft rear—ball; counter shaft front—roller; counter shaft rear—roller.

Tread

Standard tread: 56 inches.

Turning Radius

Turning radius: 17 ft.
Turning circle: 34 ft.

Universal Joint

Front, make: Ford.

Valves

Arrangement: Right side, vertical; 1 intake, 1 exhaust per cylinder.
Lift: .287.
Material: Chrome silicon alloy.
Opening: 1⅜ in. in diameter.
Seat angles: 45°.
Spring pressure: 36 lbs.
Stem diameter: 5/16 in.
Tappet clearance: .010 minimum; .013 maximum with engine cold.
Style of stem end: Mushroom.
Stem guides: Removable.

Valve Timing

Intake opens 7½° before upper dead center.
Intake closes 48½° after lower dead center.
Exhaust opens 51½° before lower dead center.
Exhaust closes 4½° after upper dead center.

Wheels

Make: Ford.
Type: Steel spoke.
Material: Steel.
Rim: Drop center.

Wheelbase

Wheelbase: 103½ inches.

Wheel Carrier

Type: Tubular arm.
Material: Malleable casting.
Location: Bolted to rear sill and back of car body.

Weights

The weights with gasoline tank and radiator empty are approximately as shown below.

Roadster	2155 lbs.
Standard coupe	2257
Sport coupe	2283
Cabriolet	2273
Tudor sedan	2375
Fordor sedan (two-window)	2467
Fordor sedan (three-window)	2462
Town sedan	2475

OPERATION OF FORD MODEL "A" CAR

Illustration shows the driving compartment with the control levers, foot pedals and instruments on the instrument board, with each part named.

The gear-shift is the standard three-speeds forward and one reverse. The transmission is a selective sliding gear shift type.

Starting the Engine and Driving Pointers

1. Release the ignition lock cylinder by turning the switch key to the right.

2. See that the spark lever is retarded (at top of quadrant is retarded); the throttle lever (under steering wheel) advanced three or four notches down on the quadrant and the gear shift lever in neutral position.

Starting the engine with the spark advanced may cause the engine to kick back, and damage the starter parts. After the engine is started, advance the spark lever about half way down the quadrant.

3. If the engine is cold, turn the carburetor adjusting rod one full turn to the left to give it a richer mixture for starting. This rod serves both as a choke for starting and as an enriching adjustment. Next pull back the rod, at the same time pressing down on the starter button with foot. The instant the engine starts, withdraw foot from the starter button and release the choke rod, next advance the spark lever about half way down the quadrant. When the engine warms up, turn the adjusting rod back to the right. Never drive continuously with adjusting rod more than ¼ turn open. (See adjustment of carburetor.)

When starting a warm engine, do not pull back the choke unless the engine fails to start on the normal mixture as there is a possibility of flooding the engine with an over rich mixture of gas. If you should by accident flood the engine, open the throttle and with the choke rod in normal position, turn the engine over a few times to exhaust the rich gas.

When descending long grades, have the transmission in gear, the clutch engaged and the ignition switch on. This allows the engine to turn over against compression and act as a brake.

On steep grades the car should be in second speed gear before descent is started. On exceptionally steep grades the low speed should be used. This increases the braking action of the engine.

Always leave the **ignition switch on** when descending an incline. Shutting off the switch allows raw gas to be drawn into the cylinders which washes the lubrication off the cylinder walls. Also unexploded gas collects in the muffler and when the switch is again turned on there is a possibility of blowing out the muffler.

To stop the car: Disengage the clutch by pushing forward on the left pedal and apply the foot brake by pressing forward on the right pedal. Except when a quick stop is necessary, apply the brake gradually. When driving on wet or slippery pavement, the speed of the car should be reduced by applying the foot brake before releasing the clutch. This method of braking prolongs the life of the brake lining, and is a safety factor.

In bringing the car to a final stop, keep the clutch disengaged until the gear shift lever has been moved into neutral position.

To stop the engine, push in on the ignition electro-lock cylinder until it snaps into the lock position.

The spark control for average driving: The spark lever should be carried about half way down the quadrant. Only for high speeds should the spark lever be advanced all the way down the quadrant. When the engine is under a heavy load as in climbing steep hills, driving through heavy sand, etc., the spark lever should be retarded sufficiently to prevent a spark knock.

Driving the car: The different speeds required to meet road conditions are obtained by varying the pressure on the accelerator. Practically all the running speeds needed for ordinary travel are obtained in high gear; the low and second gear are used principally to give the car momentum in starting, and when the engine is subjected to a heavy load.

Do not make a practice of resting the foot on the clutch pedal while driving, as this may cause the clutch to slip and unnecessarily wear the facing on the discs.

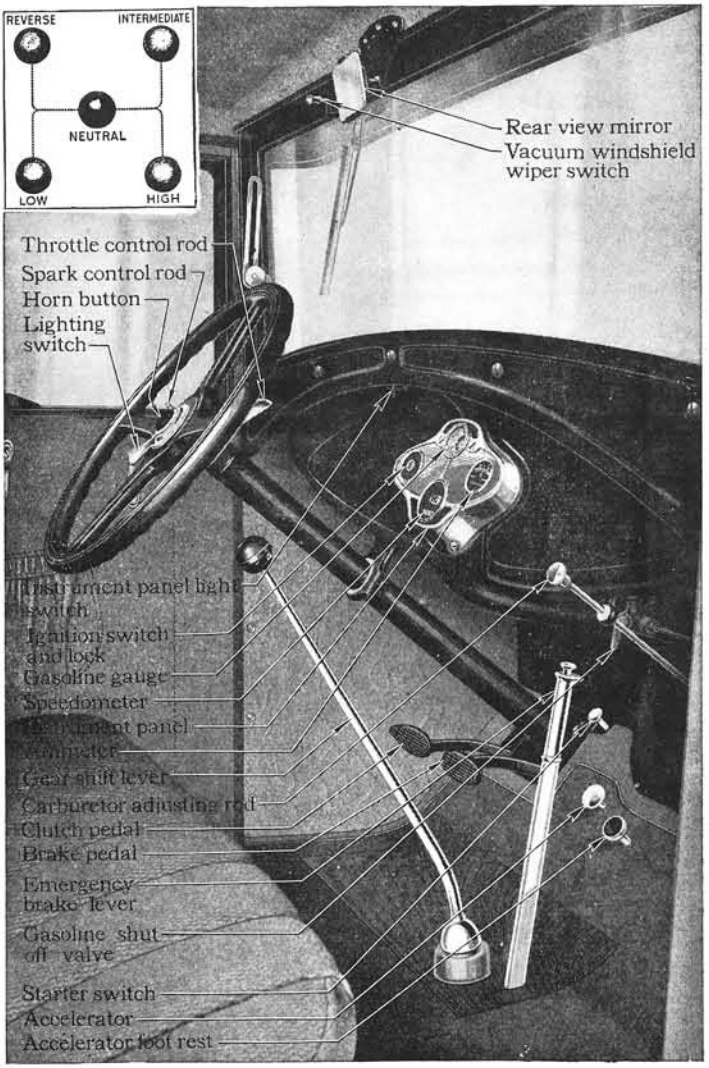

Fig. 1. **Instruments and control levers** of the model "A" Ford car. **The gear shift** is shown at the top, left corner.

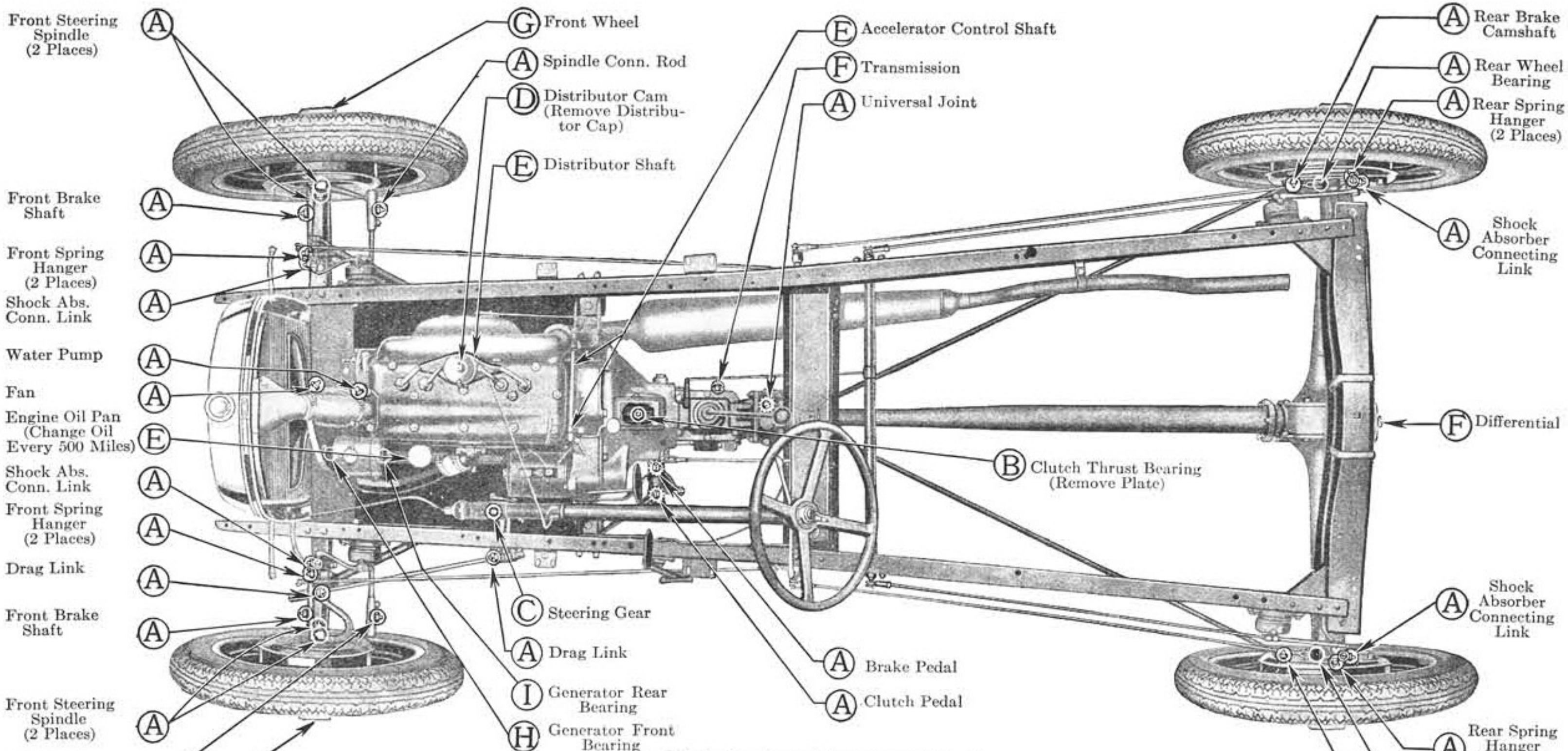

Fig. 2. **Lubrication chart** of the Model "A" Ford car.

(A) Lubricate every 500 miles (pressure gun).
(B) Lubricate every 2000 miles (pressure gun).
(C) Gear lubricant every 2000 miles.
(D) Clean and apply light film of vaseline every 2000 miles.
(E) Oil every 500 miles.
(F) Gear lubricant every 5000 miles.
(G) Pack with lubricant—every 5000 miles.
(H) 2 or 3 drops of oil every 1000 miles.
(I) Fill oil cup every 2000 miles.

Use No. 2 high pressure lubricant in all high pressure lubricator fittings.
Use No. 4 cup grease in front wheel bearings.
Use good grade gear lubricant in the steering gear, also in the differential and transmission (see page 8).

Use oil on the distributor shaft and generator as specified above.
Place a little vaseline on the distributor cam as outlined above.
For engine oil recommendations see pages 8 and 9.

LUBRICATION

The lubrication chart shown on preceding page gives full information for lubricating the Ford model "A" car. Truck lubrication chart is shown farther on. Proper lubrication has a vital effect on the life of a car; consequently these instructions should be followed very carefully.

Engine lubrication: All parts of the engine are lubricated from the oil reservoir in the oil pan by the Ford pump, splash and gravity feed.

Only high grade engine oil should be used in the engine. Oil of this kind reaches the bearing surfaces with greater ease and cuts down frictional heat. It should have sufficient body so that the pressure between the two bearing surfaces will not force out the oil and allow the metal to come in actual contact.

Inferior oils have a tendency to carbonize quickly, also "gum up" the piston rings, valve stems and bearings. In cold weather a light grade of oil having a low cold test is absolutely essential for the proper lubrication of the car. In general an oil having the body of S. A. E. viscosity No. 40 will prove satisfactory for summer use. For winter use oil having the specifications of S. A. E. No. 20 should be used. It is essential, however, that this winter oil have a low cold test.

Proper oil level: Before starting the engine, make sure there is a sufficient supply of high-grade engine oil in the oil pan. If there is not enough oil, more should be added through the breather pipe located at the left side of the engine (a metal cap covers it). Five quarts of oil is the amount required in the oil pan.

To determine the correct oil level, use the indicator located on the left side of the engine just to the rear of the breather pipe (see Fig. 4), as follows: Pull out the indicator—wipe it off—re-insert the indicator and again remove it.

The mark made by the oil indicates its level. When the oil reaches the point marked "F" on the indicator, it is at the proper level. Under no circumstances should the oil level be permitted to get below the point marked "L" as any attempt to run the engine with too little oil may seriously damage the parts.

When replacing the oil level indicator, see that both the short and long ends of the indicator enter the opening in the crankcase then push the indicator all the way down. Failure to insert both ends into the opening permits oil to escape.

Draining the oil pan: It is advisable to clean out the oil pan by draining off the old oil when the new car has been driven five hundred miles, and thereafter to repeat this operation every 500 miles. The oil should be warm before draining.

Lubricating the differential: Every 5000 miles the lubricant in the differential should be drained and the housing flushed with kerosene. New lubricant should then be added until it reaches the level of the oil filler hole in the housing. In the truck the lubricant in the differential must be kept up to the level of the filler plug opening at all times.

Lubricating the transmission: About once every five thousand miles the gear lubricant should be drained from the transmission by removing the drain plug at bottom of transmission case. The interior of the transmission case should then be thoroughly flushed with kerosene and refilled with fresh gear lubricant.

The new lubricant is poured into the transmission through the filler hole, located at the right hand side of the transmission case. Pour sufficient lubricant in until it reaches the level of the filler hole.

Lubricating the steering gear: Every 2000 miles remove the plug on the steering gear housing and add gear lubricant until it reaches the level of the filler plug hole. Never use high pressure lubricant in the steering gear—use gear lubricant only.

Lubricating the clutch bearing: The clutch pilot bearing at the front end of the clutch is thoroughly packed with grease when the car is assembled, and it will not be necessary to lubricate this bearing until such time as the clutch may be disassembled. When the clutch is disassembled the bearing should be repacked with a good grade of cup grease.

Approximately every 2000 miles, lubricate the clutch release bearing. This is done by removing the hand hole cover and turning the bearing until the lubricator fitting is at the top. Lubricate the bearing by means of the compressor grease gun.

Note: The clutch is a dry disc clutch and under no circumstances should it be oiled.

Lubricating the car: In order to properly force lubricant to all parts equipped with the conical shaped fittings, a high pressure compressor gun, Fig. 3, is employed. With this gun the lubricant can be forced in under a pressure of 2000 pounds or more per square inch, thus assuring a more thorough and positive lubrication than can be accomplished any other way.

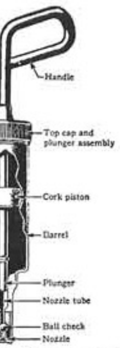

Fig. 3. Lubricating gun compressor.

Oiling the generator: The bearings in the generator are lubricated through a small oil hole located at both ends of the generator. The front oil hole is protected by a small cover. The rear oil hole by a small cap. Two or three drops of oil in the front oil hole every 1000 miles is sufficient to lubricate the front generator bearing. For the rear bearing fill the oil cup every 2000 miles. Do not put more than the recommended amount of oil in the oil holes as there is a possibility of oil getting on the brushes and affecting the operation of the generator.

The bearings in the starting motor are lubricated when they are installed in the car and require no further attention.

Oiling the distributor: The distributor should be kept clean and well oiled. Put oil in the oil cup at the side of the distributor every 500 miles. Add sufficient oil to reach the level of the oil cup. Every 2000 miles remove the distributor cap, clean the lobes of the cam and apply a light film of vaseline.

Engine Lubrication; Principle of Operation

The engine lubrication system is an exclusive Ford development. It is a combination of pump, gravity feed and splash system with oil reservoir in the valve chamber.[1]

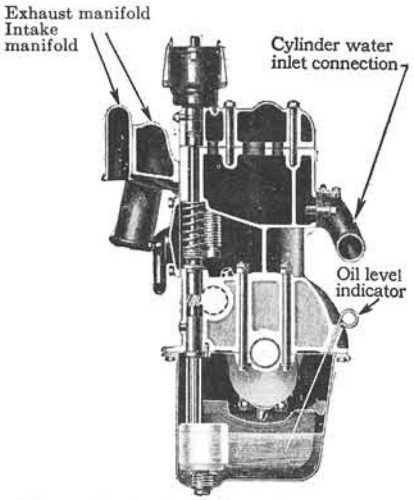

Fig. 4. **Sectional end view of engine** showing how the oil pump (also distributor) is driven by a gear on the camshaft. The oil level indicator is also shown.

[1]Classified according to the types of lubrication systems in *Dyke's Automobile and Gasoline Engine Encyclopedia,* this would be termed a "splash-circulating" type.

[2]Oil is carried to valve-chamber from the oil pump through the inside of housing surrounding the pump drive shaft, passing over the distributor gears to a point where it connects with a tube leading to the front compartment of the valve chamber.

The oil pump is the gear type and is located in the bottom of the oil pan. It is run by a gear on the camshaft as shown in Figs. 4 and 5. It is enclosed in a fine mesh wire screen through which the oil is filtered before it is pumped into the valve chamber[2]. The screen is surrounded by a shield so that the oil is pulled through it, rather than flowing in by gravity. The oil flows into the valve chamber in a continuous stream whenever the engine is running, but is in no sense a "forced" feed. It is rather the capacity of the pump being delivered in a smooth flowing stream.

The principal purpose of delivering the oil to the valve chamber is to provide direct gravity feed lubrication to the bearings of the crankshaft and camshaft. However, it also supplies exceptional lubrication for the valves, giving quieter action.

Small pipe openings lead down from the valve chamber to all the main crankshaft and camshaft bearings and oil flowing down these by gravity provides an abundance of lubrication. The bottom of the valve chamber is so arranged, through the use of small inbuilt dams, to provide reservoirs of oil for each main bearing pipe opening.

As the engine rests in the chassis on a 3-degree angle, sloping to the rear, the oil arriving in the valve chamber flows back, filling the first reservoir, then over the little dam, filling the second reservoir, and then over again to the third and last reservoir. From this point the overflow oil is carried by an external oil return pipe down to the front end of the tray in the oil pan where it flows back over the tray, filling the troughs through which the connecting rods are lubricated and from which all other moving parts are sprayed by the splash system. From the tray the oil flows to the bottom of the oil pan to be pumped back again.

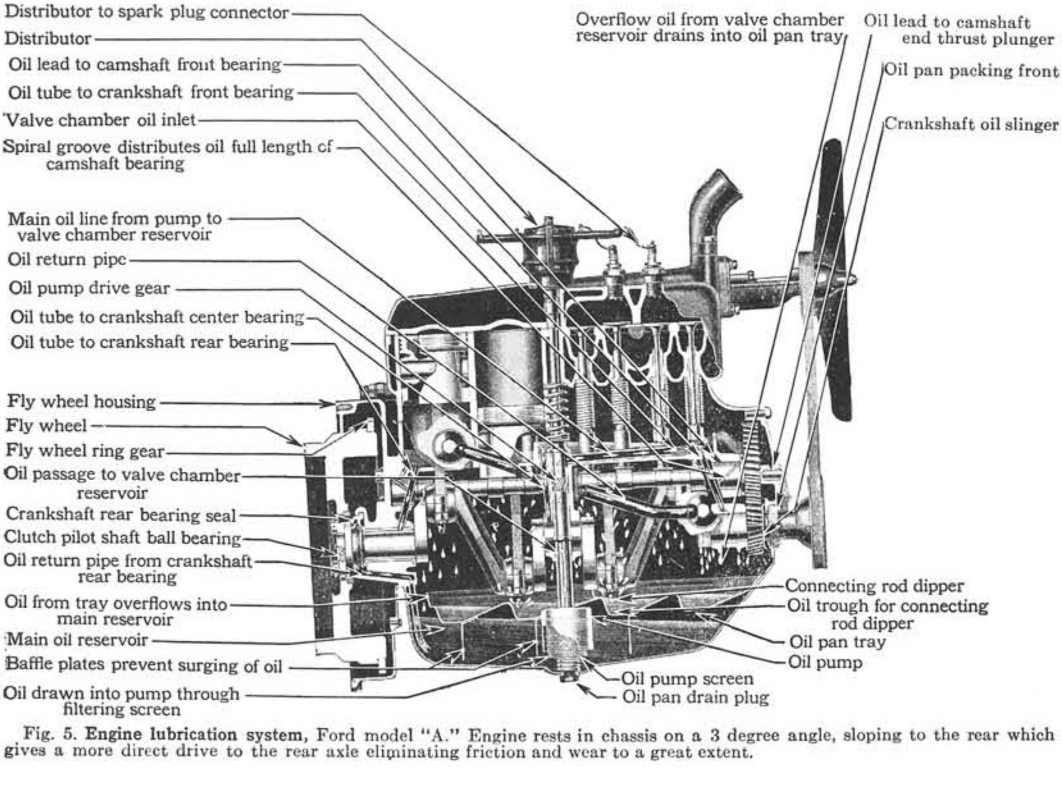

Fig. 5. **Engine lubrication system,** Ford model "A." Engine rests in chassis on a 3 degree angle, sloping to the rear which gives a more direct drive to the rear axle eliminating friction and wear to a great extent.

COOLING SYSTEM

Cooling the engine: The Ford engine is cooled by a circulation of water through the water jackets which surround the cylinders, combustion chamber and valve seats. The water is circulated by thermo-syphon action, the flow of water being accelerated by means of a centrifugal water pump located in the front of the cylinder head. This pump draws the heated water from the engine into the upper radiator tank where it is cooled by filtering through the radiator tubes to the lower tank. The radiator is cooled by means of the fan located just back of the radiator where it draws a current of air around the radiator tubes.

The radiator has a large cooling surface. The three rows of tubes run down between the fins in oblique position. Thus each tube receives a full blast of incoming cool air. Tubes and fins are joined with solder and heat from the tube is rapidly dissipated through the fins.

To prevent overheating keep the radiator well filled. The capacity of the cooling system is three gallons.

Adjusting the fan belt: The fan and water pump both operate from the same shaft. The shaft is driven by a "V" shaped rubber belt. The belt is adjusted to the proper tension when the car leaves the factory and **this adjustment should not be changed unless the belt slips.** The adjustment is easily made by loosening the generator support to engine screw and moving the generator toward you. Do not tighten the belt more than is actually necessary to keep it from slipping.

Water pump packing nut: Packing is used in forming a water tight connection around the water pump shaft. Should a leak develop, lubricate water pump shaft through water pump lubricator fitting then tighten the packing nut. A screw driver is used for this purpose as shown in Fig. 7. Do not tighten the nut more than is necessary to stop the leak. Metallic split ring packing (A-8524) is recommended.

When installing Ford metallic water pump packing, (Fig. 7), do not remove the old packing. Simply cut off the required amount of new packing, wrap it on shaft, and compress with packing nut. When installing packing, wrap it on shaft in direction in which nut is tightened. Do not tighten packing nut more than is necessary to stop the leak.

Cleaning the radiator: The entire circulating system should occasionally be flushed out. To do this open the petcock at the bottom of the radiator outlet connection pipe and insert a hose into the filler neck, allowing the water to flow through the system for about fifteen minutes or until the water comes out clear.

Care of the radiator in winter: In freezing weather it is necessary to use an anti-freeze solution in the circulating system to prevent freezing of the water, and bursting the tubes in the radiator.

Anti-Freeze Solutions For Cooling System

The following specifications are for Ford cars and trucks only. Below is given the proportions of **alcohol** and water and also, **ethylene glyco** for freezing temperatures. The lower table gives **specific gravity** of the alcohol and water solution as well as the proportions.

Before pouring the solution into the radiator be sure there are no water leaks. Tighten hose connections and inspect water pump packing. Drain off old water and flush radiator out thoroughly.

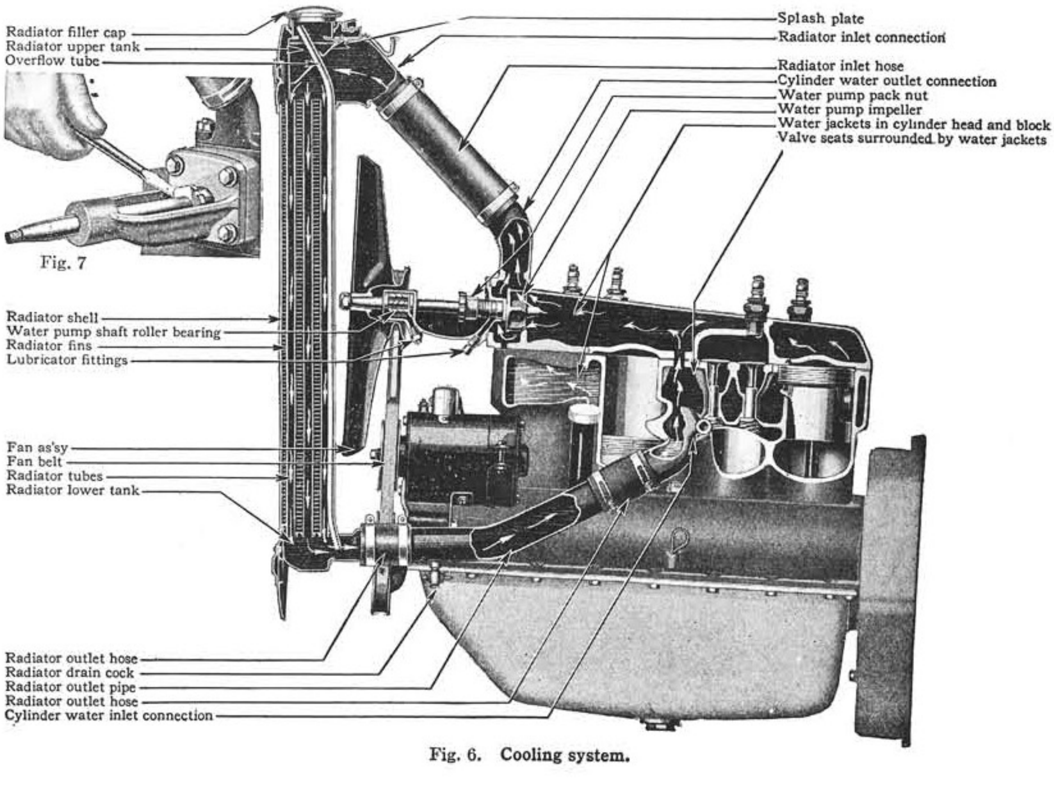

Fig. 6. Cooling system.

Where alcohol is used it must be borne in mind that losses through boiling or evaporation of the alcohol weakens the solution. Consequently to keep the solution at its proper strength, it will be necessary to occasionally add alcohol until the desired hydrometer reading of the specific gravity of the solution is obtained.

As alcohol is a solvent of pyroxylin, extreme care must be used not to spill any of the solution on the hood. **After filling the radiator,** be sure the radiator cap is tightly in place.

Ethylene Glyco

20° F. Above Zero		10° F. Above Zero		0° F Zero		10° F. Below Zero		20° F. Below Zero	
Pints Water	Pints Ethylene Glyco	Pints Water	Pints Ethylene Glyco	Pints Water	Pints Ethylene Glyco	Pints Water	Pints Ethylene Glyco	Pints Water	Pints Ethylene Glyco
20	4	18	6	16	8	14	10	12	12

Alcohol

Capacity Model A Cooling System	10° F. Above Zero		0° F Zero		10° F. Below Zero		20° F. Below Zero	
	Pints Water	Pints Alcohol	Pints Water	Pints Alcohol	Pints Water	Pints Alcohol	Pints Water	Pints Alcohol
3 Gals. (24 Pints)	17	7	15	9	14	10	12	12
Specific Gravity of Mixture	0.9691		0.9592		0.9486		0.9345	

FUEL SYSTEM

Cowl gasoline tank: The gasoline is carried in a 11-gallon tank welded integral with the cowl of the car. From this tank the gasoline flows by gravity to the carburetor, where it is mixed with air and drawn into the cylinders by piston suction.

A sediment bulb located on the engine side of the dash, is provided for draining off water or sediment that may have accumulated in the tank. Occasionally cleaning out the bulb prevents foreign material being drawn into the carburetor.

The carburetor: The quantity of gasoline entering into the carburetor is governed by the float. The volume of gas mixture entering the intake manifold is controlled by opening and closing the throttle,

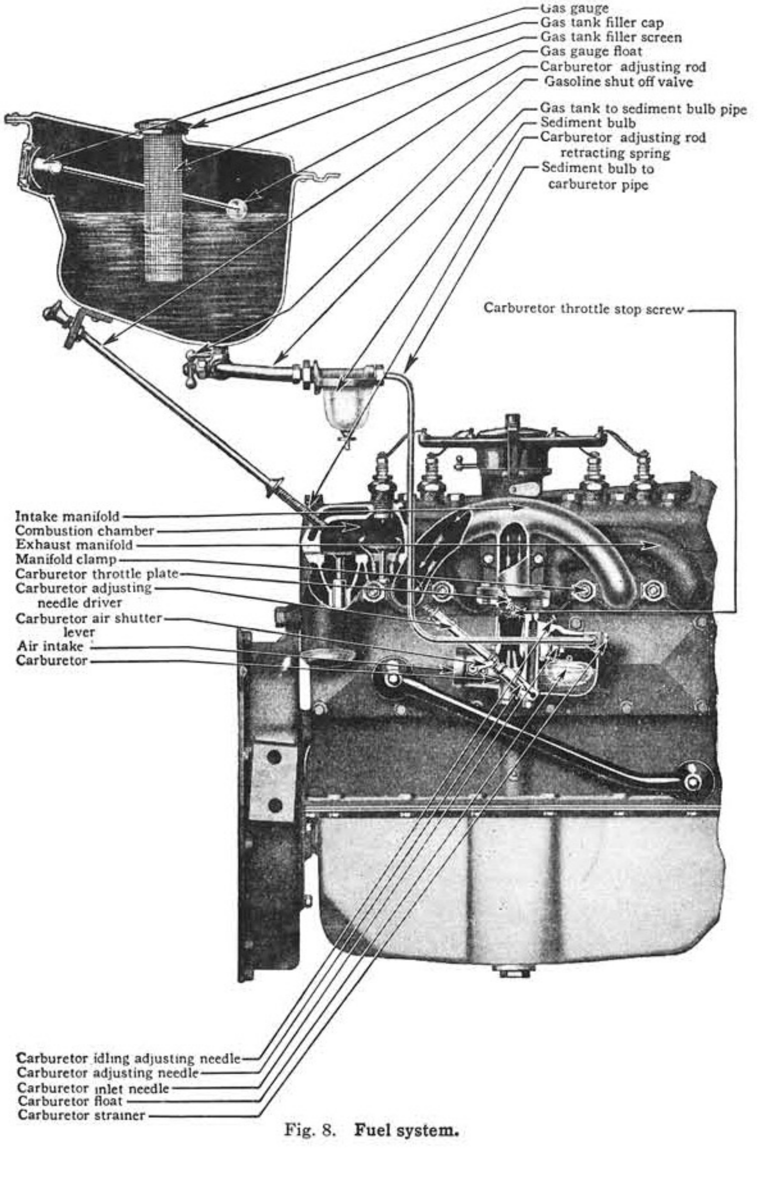

Fig. 8. **Fuel system.**

according to the speed desired by the driver. Since, with the exception of the needle valve and idle adjustment all of the carburetor adjustments are fixed, about the only thing that could affect the carburetor would be dirt or water getting into it. An occasional cleaning will insure uninterrupted service.

To clean the carburetor, remove the filter screen and thoroughly clean the screen by washing it in gasoline. The screen is easily removed by backing out the filter plug (see Fig. 9). It is also a good plan to occasionally remove the drain plug at the bottom of the carburetor and drain the carburetor for a few seconds.

Regulating gasoline mixture: For economical driving, reduce the quantity of gasoline in the mixture by turning the adjusting rod to the right as far as possible without affecting the operation of the engine. This is particularly true when taking long drives where conditions permit a fair rate of speed being maintained, and accounts for the excellent gasoline mileage obtained by good drivers.

Turning the carburetor adjustment too far to the left results in a "rich mixture." Such a mixture has too much gasoline and should be used for starting and warming up only. Running with too rich a mixture causes excessive carbon and overheating, likewise it wastes fuel.

Adjustment of Carburetor: The method of regulating the carburetor for ordinary driving conditions is to turn the carburetor adjusting rod to the right until the needle just seats, then turn the rod back approximately one-fourth of a turn. On long trips some drivers make a practice of driving with the adjusting rod turned all the way off.[1]

To set idle adjustment proceed as follows: With engine warmed up, fully retard spark and throttle levers. Unhook throttle rod at carburetor. Adjust throttle adjusting screw so that the engine will run sufficiently fast to keep from stalling. Next turn idling adjusting screw in or out until engine runs evenly without rolling or skipping. Then slowly screw in throttle plate adjusting screw until engine picks up slight additional speed. Connect throttle rod to carburetor.

Do not expect an engine that is too stiff to "rock" on compression when stopped, to idle well at low speed.

Carburetor Construction and Operation

The carburetor used on the Ford "A" cars and "AA" trucks is a Zenith special 1 inch size carburetor designed and developed especially for the Ford. A single fixed venturi supplies the right amount of air, fixed jet meters the fuel through the driving range, and a fixed idle jet measures the gasoline required for idle.

[1]The dash adjustment does not control the entire fuel supply. A minimum amount of fuel is constantly drawn from the float chamber through small fixed openings even when the dash adjustment is fully closed.

For best operation under usual driving conditions, the dash adjustment should be backed one-quarter turn off its seat. Running with the adjustment more than one-quarter turn off its seat may be necessary on new stiff engines, but otherwise this will result in poor economy, carbon and crankcase dilution.

The dash adjustment may be turned less than one-quarter turn off its seat to obtain a lean mixture suitable for high altitudes, high test fuels, or when driving at steady speeds on level roads. Under normal conditions, however, too lean a mixture causes uneven running at low speeds and slow pickup.

Do not force the adjusting needle down on its seat as this will score the needle.

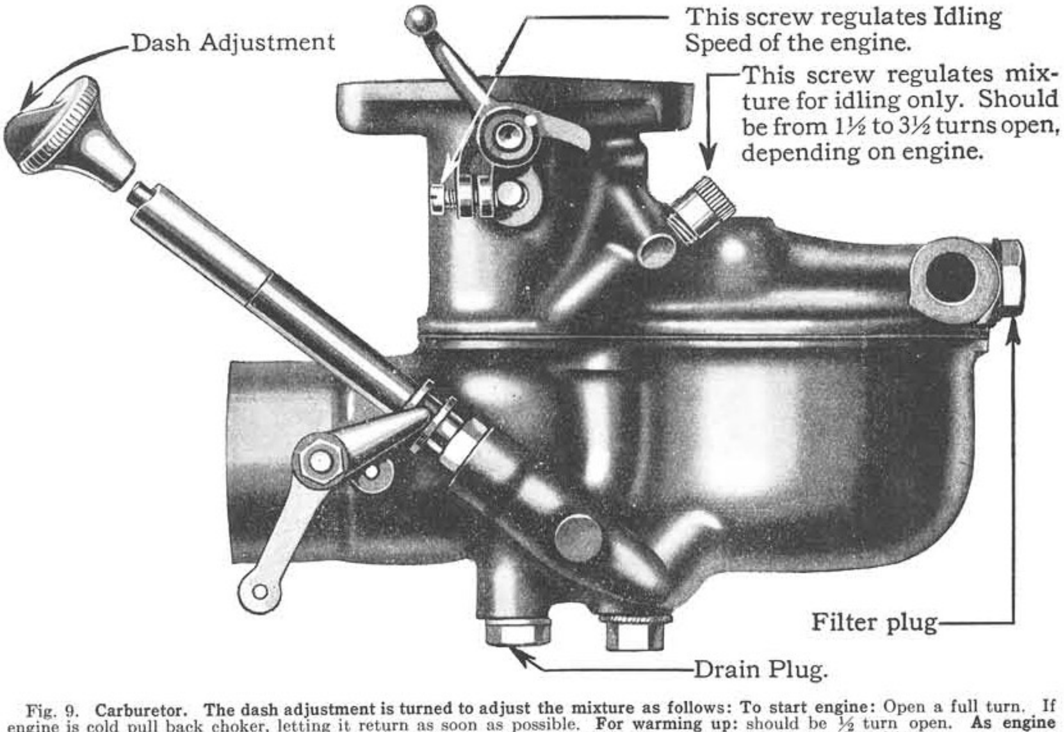

Fig. 9. **Carburetor. The dash adjustment is turned to adjust the mixture as follows: To start engine:** Open a full turn. If engine is cold pull back choker, letting it return as soon as possible. **For warming up:** should be ½ turn open. **As engine warms up:** close off adjustment to suit. Never drive continuously with dash adjustment opened more than ¼ turn.

The carburetor is in two parts, upper and lower halves, held together by a single bolt L, Fig. 10. This facilitates cleaning without fear of getting the carburetor out of order.

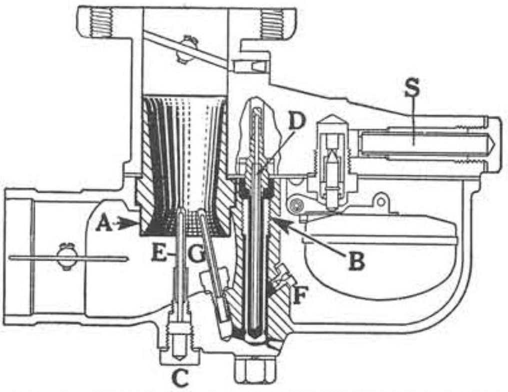

Fig. 10. **Cross sectional view of Ford model "A" carburetor. Names of parts: A,** single venturi; **B,** secondary well[1]; **C,** lower drain plug; **D,** idling jet; **E,** main jet; **F,** compensating jet; **G,** cap jet; **L,** main assembly bolt; **S,** filter screen.

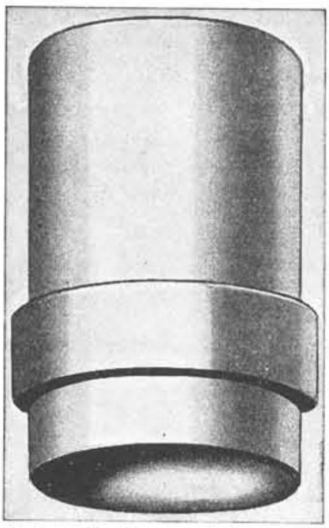

Fig. 11. **Venturi:** The function of the venturi (A, Fig. 10) is to measure the air through the carburetor and to keep it moving fast enough at low speed to completely atomize the fuel. Size 21.5.

Fig. 12. **Main jet:** This jet (E, Fig. 10), is directly connected with the fuel chamber, being subject to suction its flow of fuel will vary with the load or speed of the engine. Its effect is most noticeable at high speeds. Size No. 20.

Fig. 13. **Compensating jet:** This jet (F, Fig. 10), empties into the compensating well which is opened to the air, and therefore is not subject to suction. Its flow of fuel is constant, being determined by the fuel level in the bowl and the size of the jet. It is most effective at low speeds. Size No. 19.

Fig. 14. **Cap jet:** (G, Fig. 10). Controls the rate of discharge from the compensator well into the air stream. Size No. 20.

Fig. 15. **Idling jet:** Its function (D, Fig. 10), is to measure the fuel for closed throttle (idling) operation. When the throttle is opened, it is put out of action as the fuel then changes direction and goes through the cap jet. Size No. 11.

Servicing Carburetor

In cases of suspected carburetor trouble or complaints of poor fuel economy, first check spark plugs, breaker points, compression, etc., before removing carburetor. **Many so called carburetor troubles can be traced to one or more of the following causes:**

Dirty spark plugs; points incorrectly spaced—clean points and set gaps to .035".

Breaker contact points burned or pitted—dress points down with an oil stone and set gap between .018' and .022".

Leaky manifold or carburetor connections—with engine idling slowly, flow a little oil on each joint. If engine picks up speed there is a leak.

Poor compression—check compression in each cylinder by turning engine over slowly with hand crank (or as explained in *Dyke's Automobile Encyclopedia*).

Brakes dragging—jack up car and see that all wheels revolve freely.

Tires soft—inflate all tires to 35 lbs. pressure.

If the above points are ok and there is a free flow of fuel through the line, **check the carburetor.**

Cleaning the Carburetor

Remove filter screen. Blow out any dirt with air or rinse screen thoroughly in gasoline. The screen S, Fig. 10, is easily removed by backing out the filter plug. Usually cleaning the screen is sufficient to overcome the trouble.

For complete cleaning, remove carburetor and disassemble it by removing main assembly bolt L, Fig. 10. Separate the parts carefully to avoid damaging the gasket, float and idling jet tube.

Remove brass drain plug C beneath main jet, and rinse carburetor bowl in gasoline or use air to blow out any dirt which may have lodged in the bottom of the bowl or in the jets.

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[1]The **secondary** well is a sleeve screwed into carburetor casting into which the idling jet extends, and at the bottom of this sleeve or secondary well, are holes, which have the effect of metering the fuel that is within this well, during idling, to the cap jet, so as to have control over it, that is, to have it discharge over a longer period of time, or out quickly, and the holes in the bottom of the secondary well control the fuel held in reserve to cap jet. This fuel originally comes from the compensating jet F, which is in the fuel bowl. The **compensating well** is that part of the carburetor which this secondary well extends into, and is open to the atmosphere.

Trouble Shooting Hints (Fuel System)

Engine will not start: Make certain there is gasoline in the tank and a free flow of fuel through the line and at carburetor. Next, determine if there is a spark at the spark plugs.

Lack of speed: See that carburetor main jet E, Fig. 10, is free from dirt.

Poor idling: A plugged compensator, F, Fig. 10, will result in poor idling and low speed performance.

The idling jet D, Fig. 10, furnishes all the fuel for idling, consequently the tube and metering hole must be kept clear.

In case of leaks see that all connections and jets are tight. Examine carburetor float needle valve and float. If damaged, replace float or fuel valve assembly.

Poor fuel economy: make certain proper operation of dash adjustment is understood.

Water in the fuel line may freeze in cold weather and stop the flow of fuel—use hot clothes for thawing.

The carburetor should be handled carefully. Don't use strong-arm methods in taking it apart, reassembling or handling the various parts.

Cold Engine Starting

First: Open hand throttle lever two or three notches. Fully retard spark lever by pushing all the way up. Turn carburetor dash adjustment one full turn to left.

Second: Turn on ignition.[1] Pull back choke rod at the same time depress starter switch. The instant the engine starts, release choke.

Third: As engine warms up, gradually turn dash adjustment to the right until it is in its normal running position—one-quarter turn off seat when engine is warm, or to the right as far as possible without affecting the operation of the engine, as stated under "regulating the gasoline mixture."

Warm engine starting: It is usually unnecessary to use **choker** when the engine is warm.

ELECTRICAL SYSTEM

The electrical system includes the following: storage battery, starting motor, generator, ammeter, horn, timer-distributor, ignition coil, spark plugs, ignition switch and lamps.

Battery

Storage battery: Six volt, 80 ampere hour, 13 plate battery, designed and built to meet the requirements of the Ford car.

Adding water to battery: Every two weeks check the electrolyte in the battery to see that it is at the proper level. The solution (electrolyte) should be maintained at a level with the bottom of the filling tube. If below this point, add distilled water until the electrolyte reaches the proper level. Water for battery use should be kept in clean, covered vessels of glass, china, rubber or lead. In cold weather add water only immediately before running the engine so that the charging will mix the water and electrolyte and prevent freezing.

Access to the battery is easily made by removing a small plate located in the floor board in front of the driver's seat. To **remove** the battery from the car it will be necessary to take out the floor boards. When **replacing** the battery in the car be sure to install it with the **positive (+) terminal grounded** to the cross member as shown in Fig. 16.

When the electrolyte in a battery is allowed to fall below the level of the plates, the part of the plate that is exposed becomes dry and hard and the active material cannot be reconverted. As a result the battery deteriorates rapidly and its life is short. Keep distilled water above the level of the plates as mentioned above.

Hydrometer readings: Discharged completely at 1.150; discharged one-half at 1.220; charged fully at 1.280. Batteries reading 1.220 or less should be removed and charged. Batteries will freeze at zero when gravity is 1.170 and will freeze at 16 degrees below zero when gravity is at 1.200.

Use an accurate hydrometer: When checking batteries it is very important that the readings be accurately made—this applies to both temperature and specific gravity readings. Never use a cheap hydrometer. Cheap hydrometers often give incorrect readings, sometimes as much as 10 to 30 points off.

Keep the battery filling plugs and connections tight, and the top of the battery clean. Wiping the battery with a rag moistened with ammonia will counteract the effect of any of the solution which may be on the outside of the battery. A coating of vaseline will protect the terminals from corrosion.

It is of vital importance that the battery is firmly secured in its supporting brackets at all times. If clamps are loose, the battery will shift about in the compartment resulting in loose connections, broken cells and other trouble.

When repairs are necessary, or if the car is to be laid up for the winter, take the battery to a Ford dealer for proper attention and storage. Do not entrust your battery to inexperienced or unskilled hands.

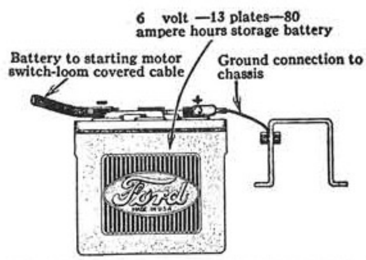


Fig. 16. **Storage Battery.** The positive (+) terminal is grounded to chassis frame, thus eliminating the possibility of grounding the battery through corrosion. Keep this connection tight and free from rust. Keep battery hold-down clamps tight to prevent battery shifting.

[1]**For starting at very low temperatures,** especially when battery efficiency is low and the engine does not turn over at starting speed: Open throttle lever two or three notches. Fully retard spark lever. Open dash adjustment one full turn and crank engine two or three times with ignition **off** and choke pulled all the way back. This will fill the cylinders with a rich mixture. Release choke and turn on ignition. Engine should start on second or third quarter turn of the crank.

It takes approximately 20 minutes running, with the generator set at average charging rate to replace in the battery the current taken out by one minutes use of the starting motor. At zero temperatures the starting ability of a battery is reduced to one-half its normal capacity, and its internal resistance proportionately increased. In other words, a battery that will crank the engine for five minutes at normal temperatures, will only crank it 2½ minutes at zero temperatures, and only about half as fast. Also due to congealed oil, the engine is stiff and requires considerably more power to turn it over. These conditions often result in a battery becoming partially, or fully discharged.

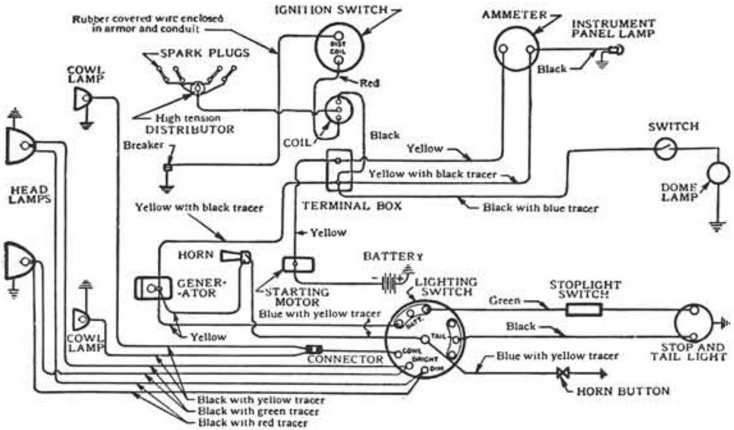


Fig. 17 (left). **Wiring diagram** showing the external circuits of the model "A" Ford cars equipped with cowl lamps with one bulb in each headlamp. The wiring is termed a single-wire, grounded return system. Colored wires are employed to distinguish the leads from one electrical unit to another.

The sizes of cables and wires leading to the different electrical units are as follows: From ignition distributor to high tension terminal of coil: high tension cable. From distributor terminals to spark plugs: bronze spring connectors. From contact breaker to ignition switch: No. 16 rubber covered wire enclosed in armored steel flexible conduit. From ignition switch to primary winding of coil: No. 12 rubber covered wire. From battery to starting motor switch: No. 1 B & S rubber covered battery cable. From battery to frame ground connection: flat strap. From generator to terminal box, on through ammeter back to terminal box, and to battery side of starting motor switch: No. 12 rubber covered wire. All other wires are No. 16 size rubber covered. The timer-distributor base is grounded to cylinder head. Condenser is in the base of the timer-distributor.

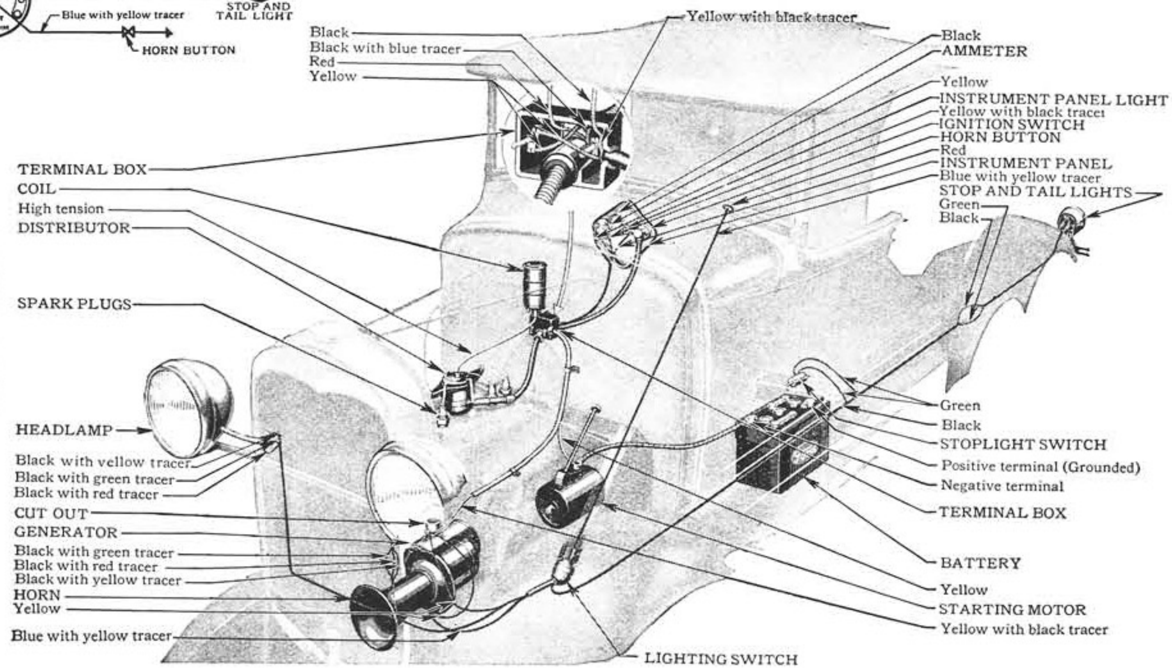


Fig. 18 (right). **Phantom view of the electrical system** showing the location of the different electrical units and wires. Note the lighting switch at the base of the steering column and the enlarged view of the terminal box. A study of this diagram will make the wiring system clear.

The ignition system cannot be miswired, even by a novice; the primary wire to ignition switch is enclosed in a steel cable with only one possible hook-up. The high-tension wire from the coil to the distributor has an independent fitting, and bronze spring connectors from distributor to spark plugs are so designed that they can be attached only one way.

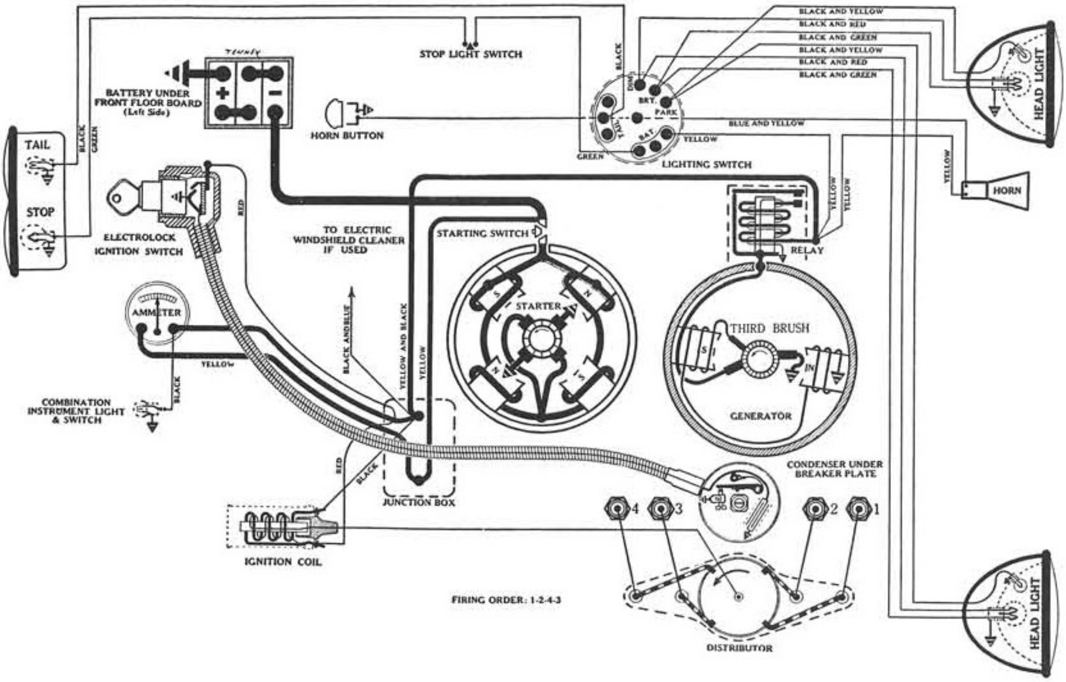


Fig. 18A. **Wiring diagram** showing the internal circuits of the model A Ford cars not equipped with cowl lamps, with two bulbs in each headlamp.

When starting to trace one of the several electrical circuits, begin with the positive (+) terminal of the battery or generator. The battery is the source of supply when the engine is not running, or generator is running very slowly. When the generator speed is increased to the point where its voltage becomes greater than the battery voltage, the relay points close and then the generator is the source of electrical current supply and also charges the battery. See *Dyke's Automobile Encyclopedia*, pages 332, 448 and 427 explaining the principle of operation of the cut-out (relay), how to trace circuits, etc.

Specifications and testing data follow:

Battery

Make and model: Ford, A-10655.
Voltage: 6 volts.
Terminal grounded: Positive (+).
Starting capacity: 98 amps. for 20 minutes.
Lighting capacity: 5 amps. for 17 hours.
Box: Length, 9⅜"; width, 7½"; height, 9½".

Starter

Make: Ford.
Rotation: Left hand, commutator end.
Connection to engine: Bendix drive.
Running free: 50 amps. at 6 volts, 4000 r.p.m.
Cranking engine: 145-165 amps. at 5.1 volts. Depends on temperature.
Lock torque: 15 pound-feet, 550 amps., 3.2 volts.
Brush spring tension: 35-40 oz. on each.
Starting switch: On starter, operated by foot plunger.

Ignition

Make: Ford.
Distributor rotation: Left hand, top view.
Breaker: Contact separation .018 to .022 inch.
Contact spring tension: 16 to 18 oz.
Timing: 1—Check contact separation. 2—Retard spark lever. 3—Screw out timing pin found in timing case cover, and insert rounded end in same hole. 4—Hand crank engine until pin is felt to drop in recess in camshaft gear. 5—Remove distributor cap and rotor button. 6—Loosen cam locking screw. 7—Replace rotor button and turn until the metal strip is opposite No. 1 contact. 8—Remove rotor button and turn cam slightly left hand (top view) until contacts just open. 9—Lock cam; assemble head; replace timing pin.
Spark plugs: ⅞" special; gap .035".
Firing order: 1-2-4-3.
Manual advance: 40 degrees (on flywheel).
Automatic advance: None.
Coil: AutoLite-Bosch.
Ignition switch: Special Electrolock.

Generator

Make and type: Ford, two pole (belt drive).
Rotation: Left hand, commutator end.
Performance data (generator cold):

Amps.	R.P.M.	Volts
0	625	6.5
2	680	6.6
5	815	7.1
10	1220	7.8
11	1500 (max.)	7.9

Motoring freely: 5 amps. at 6 volts.
Maximum current: 18 to 22 amps. at 6 volts.
Field test: 5.2 amps. at 6 volts.
Brush spring tension: 35-40 oz. on each.
Third-brush adjustment: Loosen cover band. Shift third-brush by hand. Mounting plate held in any position by friction clamp springs.

Relay (Cut-Out)

Make: Ford.
Closes: 7—7½ volts.
Opens: 0—2.5 amps. discharge.
Contact gap: .015—.020 inch.
Core gap: .010 inch, contacts closed.

Lighting

Switch: Ford No. A-11654-B.
Location: Foot of steering column. Lights controlled by lever on steering wheel. Wires soldered to terminals.
Fuses: None.
Lamps: Head—1110 (bifocal); auxiliary—63; stop—1129; tail—63.

This diagram is from the *Standard Auto-Electrician's Manual* copyrighted.

Starting Motor

The starting motor is mounted on the left side of the engine. It is equipped with the Bendix drive[1]. It requires no attention beyond seeing that the cable connection is clean and tight. The bearings (made of graphite bronze) are lubricated when they are installed in the car and require no further attention.

In starting, the spark should always be retarded to prevent a back-kick occurring and the possibility of the pinion gear jamming with the flywheel ring gear should the engine back-kick. Should the engine fail to run at the first attempt to start, wait for a second before again depressing the starter button, thus assuring that both engine and starting motor have come to rest and thus avoiding pinion engagement while the engine might be back-rocking. Distorded Bendix springs and broken Bendix screws are usually the result of engaging of the pinion gear under such conditions.

Generator

The generator is mounted on the left hand side of the engine. During winter months in sections where low temperatures prevail, the charging rate should be adjusted to 10 amperes[2]; in the summer this rate should be cut down to 6 amperes. The rate can, of course, be increased or decreased to meet individual requirements. For example, the owner who takes long daylight trips could cut the charging rate down even less. On the other hand, the owner who makes numerous stops, should increase the normal rate if his battery runs down. See "Lubrication," for oiling the generator.

To increase or decrease the generator charging rate, remove generator cover and shift the third-brush. To **increase** the charging rate, shift the third-brush in the direction of rotation; to **reduce** the rate, shift the brush in the opposite direction. The output of the generator is indicated by the ammeter located on the instrument panel.

When increasing or decreasing the generator charging rate use a small fibre or wood stick to shift the third-brush. This prevents any possibility of sparks occuring.

[1]**Bendix drive information,** such as the principles of operation, failure of pinion gear to mesh, lubricating, care to use in re-starting, assembling the Bendix drive to armature shaft, etc. is given on pages 320 and 836 of *Dyke's Automobile and Gasoline Encyclopedia.*

[2]The 10 ampere setting given is for average driving conditions and in such cases as delivery cars and commercial cars, generally require a considerably lower charging rate (3-6 amperes) depending upon the service. An excessively high charging rate where cars are driven considerably during the day may buckle the plates and cause the battery to fail. Therefore, protect the battery by properly **regulating the rate of charge to suit the conditions under which the car is operated,** using a master ammeter.

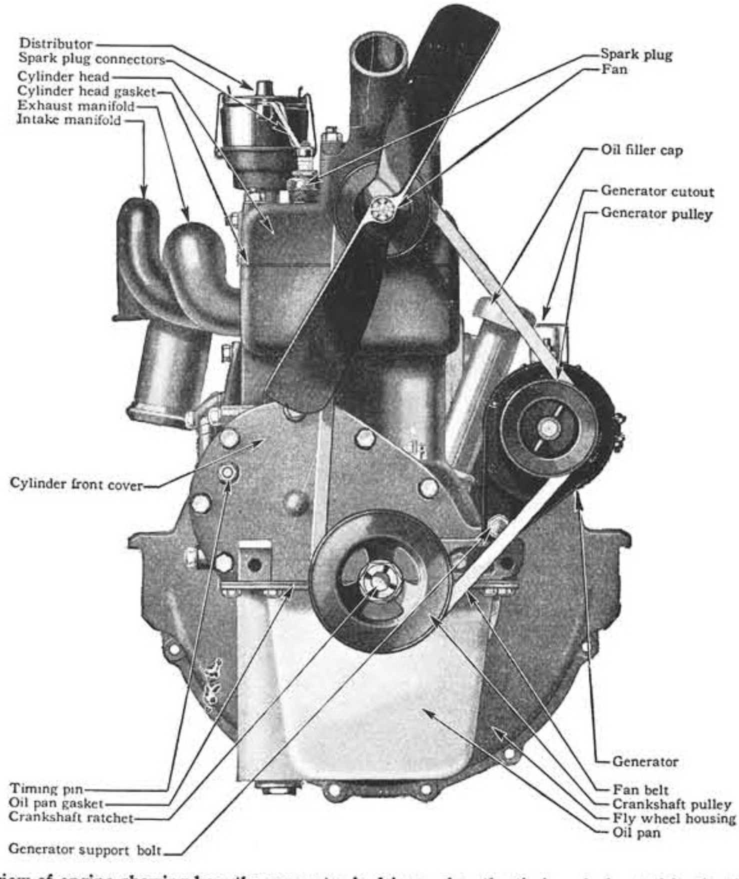


Fig. 19. **Front view of engine showing how the generator is driven, also, the timing pin located in the timing gear cover as explained under ignition timing.** The generator and fan drive and adjustment of the belt is also shown.

Cut-out: The cut-out, also termed the **relay**, is located on the generator. The battery supplies current for starting, ignition and lights below approximately 8 mph. car speed, and the generator supplies current for ignition and lights and charges the battery approximately, above 9 mph. car speed. This of course is approximate, as the speed which the cut-out cuts in is dependent largely upon the setting of the third-brush. Ordinarily, however, it cuts in at a car speed of approximately 7 or 8 mph.

The ammeter is located on the instrument panel. It registers "charge" when the generator is charging the battery, and "discharge" when the lights are burning and the engine running about 10 miles per hour or less. If the engine is running above 15 miles per hour and the ammeter does not register "charge," with the lights off, consult a Ford dealer.

In addition to registering the amount of current drawn by the lights, the ammeter also registers the amount of current drawn by the ignition when the circuit is closed. A short in the primary circuit of the ignition system would register on the ammeter.

Engine Ignition

The ignition coil mounted on the dash receives the low tension current from the battery, and transforms it into the high tension current necessary to produce the spark at spark plug. Occasionally inspect the wire connections at the coil, distributor and spark plugs to see that they are clean and tight.

The spark plugs are the medium through which the electric current ignites the gasoline charge in the cylinder. Hard starting or misfiring of the engine may be caused by dirty spark plugs or incorrect spark plug gap. Keep the plugs clean and the gap set to .035". This setting has been found to give better all-around performance. When an **engine does not idle properly** always check the spark plug gaps before attempting any repair work, often all that is necessary is to slightly **open** up the spark plug **gaps.**

Timer-Distributor

A novel feature of the Ford ignition distributor is the elimination of high tension cables from the distributor to the spark plugs. There is but one high tension cable and this connects the coil, placed on dash, with distributor which is on the right hand side top of the engine, and which is operated by a shaft extending up from a gear on the camshaft. The distributor, which is Ford designed, connects with the spark plugs by means of thin bronze springs.

Oiling the timer-distributor: See "Lubrication."

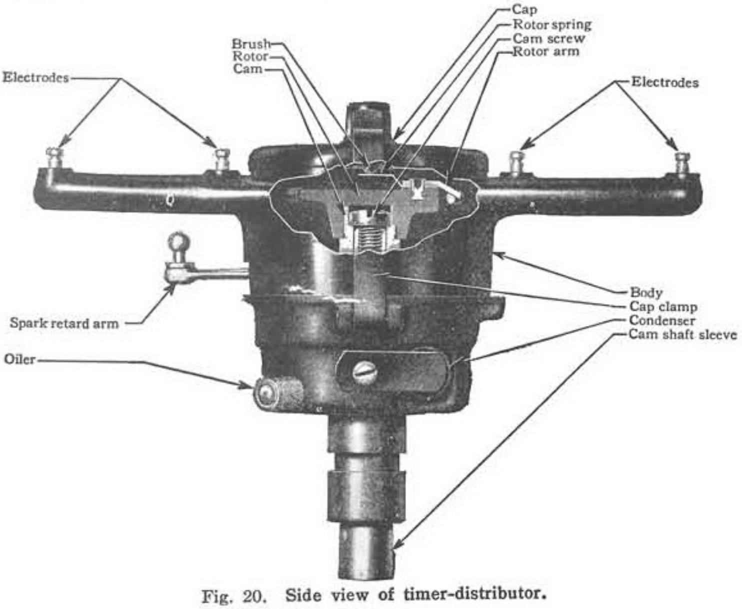


Fig. 20. **Side view of timer-distributor.**

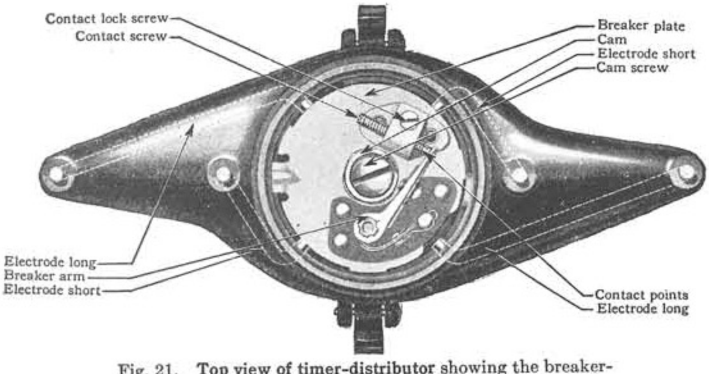


Fig. 21. **Top view of timer-distributor** showing the breaker-contact (interrupter) mechanism and distributor electrodes. The distributor cap and rotor are removed.

Adjusting ignition breaker-contact points: The gap between the breaker-contact points is set at .018" to .022". The gap should occasionally be checked to see that the points are clean and properly adjusted.

If the points are **burned or pitted** they should be dressed down with an oil stone. **Do not use a file.**

To adjust the breaker-contact points proceed as follows: Lift off distributor cap, rotor and body. Turn engine over slowly with starting crank until breaker-arm rests on one of the lobes of the cam with the breaker points fully opened.

Loosen lock screw and turn the contact screw until the gap is between .018" and .022". A standard thickness gauge (Fig. 21) is used to obtain this measurement.

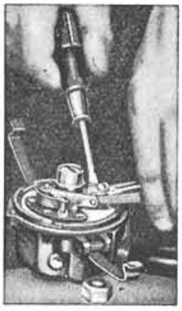


Fig. 21A. **Adjusting contact points.**

When correct adjustment is obtained, tighten the lock screw. After tightening the lock screw, again check the gap to make sure the adjustment was not altered when the lock screw was tightened. Replace distributor body, rotor and cap.

Ignition Timing

As the spark must occur at the end of the compression stroke, the timing must be checked from that point.

To find the compression stroke and time the spark proceed as follows:

1. Fully retard spark lever.
2. Check gap between breaker-contact points and if necessary adjust them.
3. Screw out timing-pin located in timing gear cover (see Fig. 19 showing location) and insert opposite end of pin into opening.
4. With the starting crank turn the engine over slowly, at the same time pressing in firmly on the timing-pin, see Fig. 22. When the piston reaches the end of the stroke, the timing-pin will slip into a small recess in the camshaft gear.
5. With pin in place remove distributor cover and lift off rotor and distributor body.
6. Loosen cam locking screw until cam can be turned, see Fig. 23.
7. Replace rotor and turn it until the rotor arm is opposite No. 1 high-tension contact point in distributor head, see Fig. 24.
8. Withdraw rotor from cam and slightly turn the cam in direction of rotation until points are slightly open so that when cam is tightened the points will become fully closed, or in other words, just ready to open. This method prevents any backlash in the distributor shaft from affecting the timing.

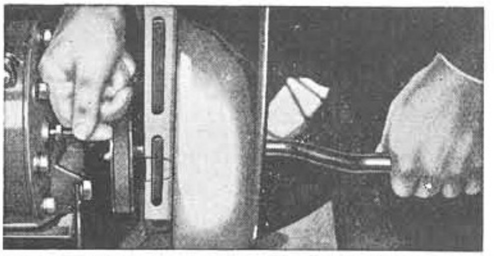


Fig. 22. **Setting No. 1 piston on top of compression stroke.** When piston reaches the end of the stroke, the **timing-pin** will slip into a small recess in the camshaft gear.

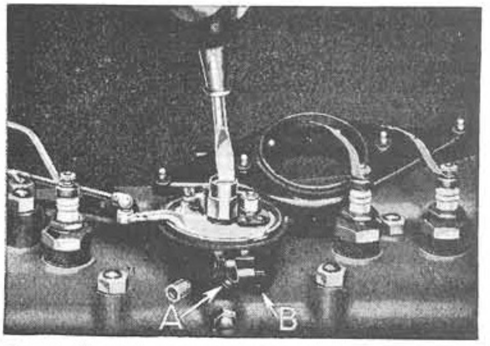
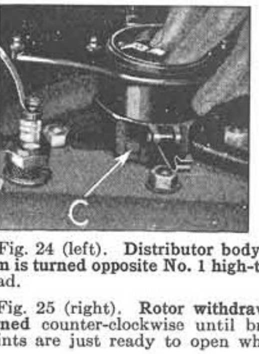


Fig. 23. **Loosening cam locking screw so cam can be turned.** The distributor cover, rotor and distributor body are removed.



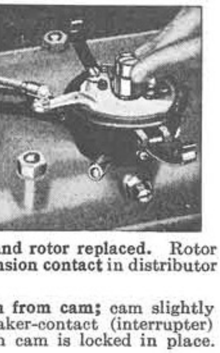


Fig. 24 (left). **Distributor body and rotor replaced. Rotor arm is turned opposite No. 1 high-tension contact** in distributor head.

Fig. 25 (right). **Rotor withdrawn from cam;** cam slightly **turned** counter-clockwise until breaker-contact (interrupter) points are just ready to open when cam is locked in place.

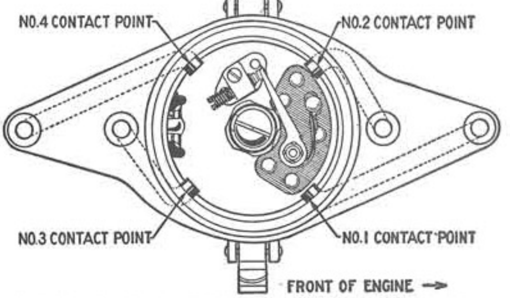


Fig. 26. **Distributor high-tension contact points in the timer-distributor** showing the numbering of electrodes leading to the spark plugs. The numbers refer to the engine cylinders; Number 1 cylinder is next to radiator and number 4 is next to cowl. **The firing order is: 1, 2, 4, 3.**

Before replacing the rotor and distributor cover, the timing should now be carefully checked. This can be done as follows:

Withdraw timing-pin from recess in timing gear. Turn on ignition switch. Again insert the timing-pin into opening in gear cover. While turning the engine over with crank, press in on timing-pin. If properly timed, just as the pin seats in the recess in the time gear, a spark should occur between the breaker points. If a spark does not occur, some error has been made and it will be necessary to re-check the work until the spark occurs between the breaker points as previously described.

When ignition is correctly timed, turn off ignition switch, replace rotor and distributor cover, **with-draw timing-pin from recess in timing gear and screw it back tightly into the timing gear cover.** Some mechanics replace the timing-pin after having located the piston on top of compression stroke, in order that it not be overlooked.

Before timing ignition always check the travel of the plate lever in distributor. The plate lever notch in distributor body is accurately machined to permit the lever to travel 20° from the fully re-tarded to fully advanced spark lever position. When the width of notch is increased it permits the lever to travel beyond the recommended 20° range and this of course affects the timing.

To check: Fully retard the spark lever on the steering gear quadrant and notice whether the plate lever is touching against the side of the notch. Next pull the spark lever all the way down on the quadrant to the fully advanced position and see if the plate lever is touching the opposite side of the notch. If the plate lever does not make the full 20° travel, disconnect the spark control rod and slightly bend the control rod lever until the plate lever touches one side of notch in distributor body when spark lever is fully advanced, and touches opposite side when lever is fully retarded. **Do not under any circumstances attempt to correct this condition by increasing the width of notch in distributor body.**

After checking travel of plate lever proceed with timing operation in usual way. When the timing operation is completed the travel of the lever should again be checked. When timing ignition do not remove distributor body.

The Ford Type Electrolock and Ignition Switch

The Ford type Electrolock used in the ignition switch is a combination switch and theft proof lock affording full protection for the car and meeting the exacting requirements of the underwriters as regards theft insurance.

To unlock the Electrolock, simply insert the switch key into the ignition switch and turn the key to the right. This releases the cylinder of the lock which snaps forward and closes the ignition circuit. When the cylinder is released the engine can be started in the usual manner, **and the switch key withdrawn from the lock.** To shut off the engine, push in on the cylinder of the lock until it snaps back in the lock position. Be sure that it stays in. This shuts off the ignition and locks the car.

The lock is placed in the ignition circuit. It not only replaces the regular ignition switch, but in the "off" position grounds the entire circuit. From the switch to the distributor an armored flexible steel conduit cable protects the primary current wire, this cable being grounded to the distributor casing, thereby making it impossible to wire around the device. The lock is nationally legal and complies with all ordinances. It is always possible to steer and push the car out of the way in case of fire or emergency even though the car is locked.

Should ignition trouble develop, check battery connections, also yellow wire from terminal box to starting motor and black wire from terminal box to coil, also red wire from coil to switch. **If these connections and wires are o.k. check switch as follows:**

Remove the four screws which hold the instrument panel in place and pull panel back. Disconnect wire at terminal on the lock case. The switch may then be **tested** in the following manner by using a six-volt circuit and test lamp.

First test: With breaker points in distributor open, place one test point on the primary terminal inside the distributor and the other test point on the switch terminal. With the switch **unlocked** the test lamp should light—with the switch **locked** the lamp should not light.

Second test: Place one test point on the primary terminal inside the distributor as in the first test and the other test point on the switch casing. With the switch **locked,** the lamp should burn. With the switch **unlocked,** the lamp should not burn.

If the lamp lights with the switch locked as described in the first test, or if the lamp lights with the switch unlocked as outlined in the second test there is either a ground in the switch, or the distributor condenser is shorted or grounded and it will be necessary to disconnect condenser from distributor to **determine whether the trouble is in the switch or condenser.**

Inspection of condenser: To remove the condenser from the distributor, remove the sealing wax covering screw head, C, Fig. 24 and back out the screw. Remove screw at A, Fig. 23 and remove condenser B.

For test purposes, insert a new condenser in place of the one removed and again try the second test as outlined above. Should the lamp still burn when the switch is in the **unlocked** position, the trouble lies in the switch and it should be checked as follows:

Inspection of switch (internal): Unlock the switch. Remove the three screws which hold the switch to the back of the instrument panel. The lock cylinder can then be removed by taking out the set screw at the side of the lock casing.

If the above tests fail to locate the trouble, it is no doubt due to a break in the wire in the cable and it will be necessary to replace the conduit assembly with the exception of the lock cylinder. The lock cylinder and keys in the old assembly can again be used.

When necessary to remove the switch or conduit assembly from the car, remove bolt which fastens cable to engine, remove distributor from cylinder head and unscrew distributor from switch cable.

Should the lock cylinder not work freely on account of dirt or foreign matter getting into the lock case, the cylinder should be removed and cleaned until it works freely.

Never grease or oil the lock cylinder. If the tumblers stick, place a little graphite in the keyhole.

Horn

The quality of tone and length of service received from Ford horns (motor type) depends entirely on the care they receive. To produce the most effective tone, it is necessary that the armature revolve at a high rate of speed. This speed is possible only when bearings are properly oiled, and the commutator and brushes are kept clean.

Lubrication: Once a month, remove motor cover located at rear of horn and place a few drops of oil in groove at each end of the armature shaft. **Use light fine oil.**

To clean the commutator, set the motor in motion by pressing the horn button. While motor is revolving, hold a piece of fine sandpaper against commutator until commutator is clean. Next, with a small piece of wood, clean the gaps between the commutator segments. Do not use metal when cleaning gaps. When turned with the fingers, the armature should revolve freely. Should it fail to operate, examine the battery, the wiring, and the horn button.

Adjustment: Turning the adjusting screw regulates the tone. Turning the screw to the right tightens the adjustment. Turning to the left loosens it. Regulate the adjustment until the desired tone is obtained.

Lighting System

Lamps used on the Ford cars are of rustless steel polished to a bright lustre.

Each lamp is held in a swivel socket which permits easy adjustment. The twolite headlamps are of the tilting beam type, with a special lens of flutes and prisms. There is a double filament 21-candlepower bulb[1], one filament throwing a beam down on the road, and the other throwing a beam of equal brilliancy straight ahead. In cars not having cowl lamps a special 3-candlepower bulb is provided in the headlamp for parking. The lights are controlled from a switch on the top of the steering wheel.

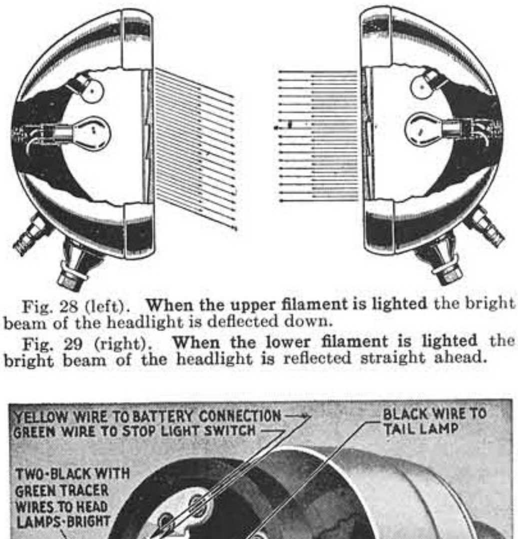


Fig. 28 (left). **When the upper filament is lighted** the bright beam of the headlight is deflected down.

Fig. 29 (right). **When the lower filament is lighted** the bright beam of the headlight is reflected straight ahead.

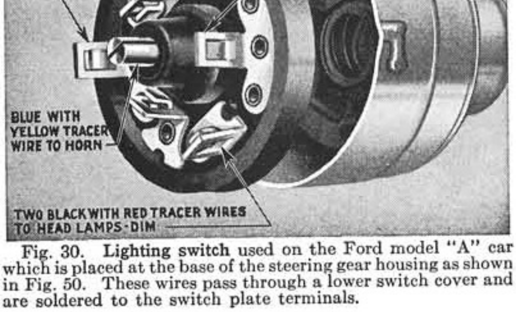


Fig. 30. **Lighting switch** used on the Ford model "A" car which is placed at the base of the steering gear housing as shown in Fig. 50. These wires pass through a lower switch cover and are soldered to the switch plate terminals.

Operation of the lights: The lighting system is operated by a switch handle located at the top of the steering wheel. When the lighting switch handle is pointed straight down, the lights are off. Turning handle first position to right from the "off" position gives a downward tilting beam for city driving. Turning handle to second position to right provides a beam which gives exceptionally brilliant road illumination for country driving. Turning handle all the way to the left turns on the parking lights.

When replacing burned out bulbs, make certain that you get genuine Ford bulbs, as satisfactory results cannot be obtained with the many inferior bulbs now on the market. Genuine Ford bulbs have the name FORD marked on the base. They insure headlights meeting the lighting requirements of the various states. When replacing headlamp bulbs the lights should be refocused.

Focusing and Aligning Headlamps

Align and focus headlamps with empty car standing on a level surface in front of a white wall or screen 25 feet from front of headlamps. This wall must be in semi-darkness or sufficiently shielded from direct light so that the light spots from the headlamps can be clearly seen. The wall must be marked off with black lines as shown in Figs. 31 and 32. Details for making the layout are shown in Fig. 33.

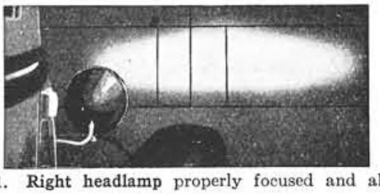


Fig. 31. **Right headlamp** properly focused and aligned.

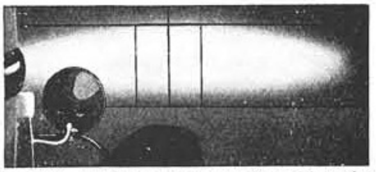


Fig. 32. **Both headlamps** properly focused and aligned.

Focus: 1. Lens must be intalled in door with the word "top" at top of door and with all lettering reading properly from front.

2. Turn on upper beam.

3. Focus by means of screw at back of lamps, first one lamp and then the other, adjusting the bulb filament at the focal center of the reflector to obtain an elongated elliptical spot of light on the wall, with its long axis horizontal (see Fig. 31). In focusing, adjust the bulb to obtain as good contrast and as well-defined cut-off across the top of the spot of light as possible.

With lamps thus focused for the upper beam the lower beam will be in satisfactory position. No adjustment is necessary for small bulb for parking light.

Alignment: 1. Headlamps are aligned by moving lamps after nut at bottom of bracket has been slightly loosened.

2. The tops of the bright spots on the 25-foot wall are to be set at a line 39½ inches (1928-9 models 37″)

[1]While the double filament 21-candlepower bulb is furnished as standard equipment, a double filament 21-32 candlepower bulb is available for those who desire a brighter beam of light straight ahead and who reside in those states where such lights are not prohibited by law.

above level of surface on which car stands. (See Fig. 33.) With tops of bright spots thus set for empty car, the headlamps comply, under all conditions of loading, with the requirements of the various states.

3. The beam of light from each headlamp is to extend straight forward; that is, the centers of the elliptical spots of light must be 30 inches apart.

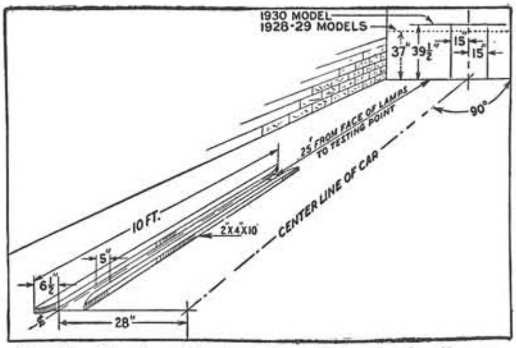


Fig. 33. **Shop layout for focusing and adjusting** headlamps.

Proper alignment of headlamps is readily **checked** by means of a horizontal line on the wall in front of the car, 39½ inches above the level surface on which car stands, and two vertical lines 30 inches apart, each one 15 inches from center line of car. Proper alignment of car relative to marks on the wall may be readily provided by use of wheel guide blocks for one side of the car, as shown in cut. If it is impossible to tie up the floor space required by these blocks, marks painted on the floor amy be used to show where one set of wheels should track and where the car should be stopped.

Stop and Tail Lamp

The stop or signal lamp switch is connected with the brake pedal so that when the brake pedal is depressed, the circuit is closed to the stop lamp. When the brake pedal is depressed, the switch plunger snaps forward, closing the contacts in the switch and putting on the stop light. The switch plunger is under constant spring tension at all times, except when the brake is applied.

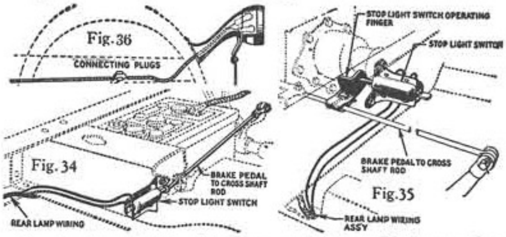


Fig. 34 (lower left). **Stop lamp switch installation used on** car.

Fig. 35 (right). **Stop lamp switch** installation used on the truck.

Fig. 36 (upper left). **The tail lamps A-13407-A (rustless steel) and A-13407-C (black enamel) are equipped with stop and tail light wires extending from the lamp approximately 22". One end of the extensions is attached to the tail and stop light sockets in the lamp—the opposite ends are connected to the tail lamp wire by means of a connecting plug A-14487,** located 22" ahead of the tail lamp.

ELECTRICAL TROUBLES AND REMEDIES

Connections; Keep Clean and Tight

In cold weather the generator voltage is considerably higher than normal. This is sometimes noticeable by the bluish white color of the light from the bulbs. The increased voltage is caused by the low temperature of the electrolyte which increases the internal resistance in the battery, and in order to maintain a constant charging rate, the generator voltage correspondingly increases.

When the bulbs burn out prematurely, it is because they are operating at too high a voltage as a result of poor or loose connections in the battery-generator circuit or due to the charging-rate being set too high. The bulbs are designed to burn 100 hours at 6½ volts. If the voltage goes up to, say, 7½ volts, the bulbs will last less than 25 hours.

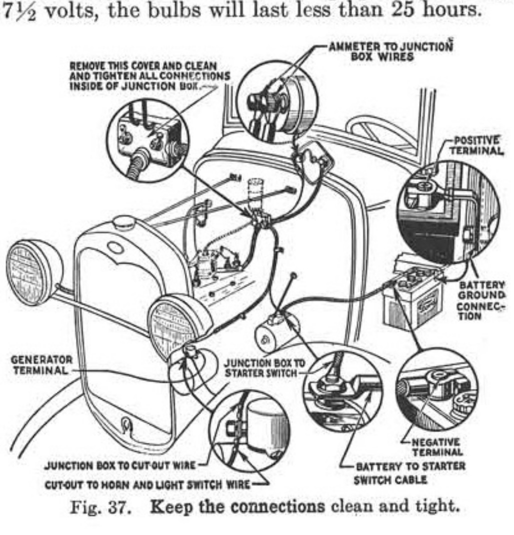


Fig. 37. **Keep the connections** clean and tight.

The remedy in such cases is to first make certain that all connections in the battery-generator circuit are clean and tight, especially at the battery terminals, ground connections, and cut-out (see Fig. 37). Any loose connections build up resistance and cause high generator voltage. Any connections found loose should be taken apart, cleaned, and securely tightened. Nuts and screws should have washers under them. Special attention should be given the battery terminals, as these are especially subject to corrosion. Take battery terminals off, clean thoroughly with ammonia, coat with vaseline and reassemble, tightening securely. If this is done two or three times a year, no trouble from corroded terminals should be experienced.

If the connections are all o.k. but the bulbs continue to burn out, it will be necessary to cut down the generator charging-rate approximately 2 to 4 amperes. Care should be taken, however, not to cut the generator charging-rate too much or the battery will become undercharged. If it is necessary to reduce the charging-rate to prevent lamps burning out, the gravity of the battery should be recorded at that time and an inspection made after the car has been driven 500 to 800 miles to note whether or not the gravity is falling off. If the gravity is rapidly falling off, it will be necessary either to slightly increase the rate or give the battery a bench charge. Otherwise, the battery may fail to turn the engine over if the weather is extremely cold.

If starting motor, electric windshield wiper or horn fails to operate, or generator fails to charge: In cold weather lubricating oil sometimes congeals and hardens on the commutators in the above parts, causing a coating of insulation between the commutator bars and the brushes. Under these conditions the 6-volt current supply is of too low tension to force current through this coating of insulation and consequently the part fails to operate. If cleaning off the congealed oil and grease does not remedy the condition, the source of trouble can be traced to loose or poor contacts or connections.

In addition to a dirty commutator, the generator should also be checked for worn brushes. If the brushes are badly worn, they should be replaced. If the commutator is dirty or slightly rough, polish it with 00 sandpaper. Be sure to blow out any sand or particles after polishing.

Check Electrical Equipment

After several months of winter driving, it is an excellent plan to check over all electrical equipment on the car. This not only adds to the performance of the car, but it may prevent unnecessary trouble later on. **Here are some points which should be thoroughly gone over, especially at that season of the year.**

Generator: Remove dust cover and clean commutator with a cloth. Use a small piece of wood to clean gaps between segments. Examine the brushes; if badly worn, they should be replaced. Adjust charging rate for summer driving—6 to 8 amperes at 25 miles per hour should be sufficient. This rate can, of course, be increased or decreased, depending upon the conditions under which the car is operated. The charging rate should be adjusted with a master ammeter.

Starter motor: Remove dust cover and clean the commutator the same as on the generator. See that all electrical connections are clean and tight.

Battery: Remove floor boards; this will give free access to all parts of the battery and its connections. Clean the top of the battery and the terminal connections with a mild solution of sal soda or with a cloth moistened with ammonia. The top of the battery should then be flushed with water, wiped dry and the terminals cleaned and coated with a light grease or vaseline. Add distilled water to the battery until the tops of the plates in each cell are covered.

Lamps: Headlights should be checked for focus and alignment. All lamps should be checked to see that none of the bulbs are burnt out and that all connections are clean and tight.

Horn: Remove cover at rear of horn and thoroughly clean commutator. Use a small piece of wood to clean the gaps between the commutator segments. Do not use wire or metal of any kind. Place a few drops of oil in the groove at each end of the armature shaft. Check tone of horn, if necessary regulate by means of adjusting screw.

Distributor: Contacts on the distributor body and on the rotor should be cleaned with very fine sandpaper. This will remove any corrosion on the contacts. Corrosion sets up a high resistance in the secondary circuit.

Check the breaker point gap. The gap should measure between .018″ and .022″.

Windshield wiper: Being exposed to the weather, the ground connections on the electric windshield wiper should be thoroughly cleaned. The commutator wiped with a cloth or fine sandpaper. Oil on the commutator, rust on the windshield frame at point of ground contact and poor connections cause most windshield wiper trouble.

All electrical connections on the car should be carefully gone over. Poor connections often cause trouble on the road and are difficult to locate.

Lighting switch: Remove the lower section of lighting switch and wipe out any oil or grease that may have leaked down from the steering gear. This grease has a high resistance and will lower the candle power of headlights.

Spark plugs: Remove spark plugs, thoroughly clean and adjust the points until the gap measures between .032″ and .035″. In some cases, where engine does not idle satisfactorily, the gaps can be set slightly larger. Engineers state that best results are obtained by replacing spark plugs every 10,000 miles.

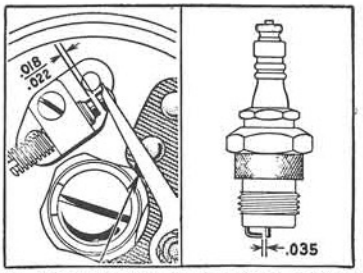


Fig. 37A. **Breaker point gap and fibre block and spark plug gap.**

Check breaker point gaps after the first few hundred miles a new car is driven. During this period the contact point on the fiber block on the breaker arm assembly slightly wears until a hard glaze forms on the block. This glaze forms practically a permanent bearing. During the wearing-in process, the gap between the breaker points becomes slightly less. This is why it is important to check the gap.

Once the fiber block has obtained its permanent bearing, there should be no occasion for further adjustment for some time. A little vaseline, however, should be placed on the distributor cam every 2000 miles. The gap between the breaker points should measure between .018″ and .022″.

Coil trouble is often due to allowing dust and moisture to accumulate on the bakelite insulator end of coil where the high tension cable leads from. This dust and moisture may set up a carbon path resembling a crack in the insulator for the secondary current to ground on the metal case on the coil. Keep the coil insulator, also the spark plug porcelains, and the top of the distributor clean.

Another common cause of coil troubles is the failure to push in on the cylinder of the Electrolock sufficiently far to permit it to snap back into the locked position when shutting off the engine. If the breaker-contact points are closed when the lock is not all the way in, it permits the current to flow through the coil, causing overheating and consequent damage to the coil.

When connecting the high tension wire to the coil, extreme care must be taken to make certain that the wire goes all the way into the coil until it makes good contact. If wire does not make good contact in the coil the high tension voltage may break down the insulation and crack through the bakelite neck of coil.

Flickering headlamps: Occasionally after a car has been in service for long periods, the headlights will flicker. This may be due to slight corrosion forming on the brass contact points on the headlamp plug and in the headlamp. The condition can be easily remedied by withdrawing the socket plug from the headlamp and sandpapering the contact points on the plug and in the headlamp. These contact points are now made of lead which is non-corrosive.

TRANSMISSION AND CLUTCH

The transmission is a standard selective sliding gear shift type with three speeds forward and one reverse. (See Fig. 1 showing gear-shift).

The countershaft is carried on roller bearings, these bearings being selected because of their extreme efficiency in carrying radial loads such as are exerted on these gears. For the same reason a roller bearing is used in the connection where the drive shaft joins the spline shaft, as the load there also is radial in nature.

Ball bearings are used for the bearings in which the drive and spline shafts rotate, because of their effectiveness in carrying radial loads to which there is a certain amount of end thrust, as is the case with these shafts. The reverse idler is carried in bronze bushings. See "Lubrication," for transmission.

The clutch is a single plate dry disc type. The clutch may be described as having a cover plate assembly which consists of a cast iron outer driving plate and a stamped cover plate in which are mounted twelve pressure springs and six release levers. The springs are in direct action against the pressure plate and automatically compensate for all wear of the friction facings. This is a feature that eliminates any necessity of adjusting the release levers.

The driven member or clutch disc assembly is composed of a slightly dished steel disc and two friction facings of the moulded type, used because of their long wearing and high temperature resisting qualities. The facings are riveted to both sides of the driven disc. With this construction the outer and inner edges of the clutch disc facing start to engage first. As the clutch engages when the pedal is released, the spring pressure in the clutch flattens out the "dish" in the clutch disc and the entire lining surface picks up the load evenly. This feature insures exceptionally smooth clutch engagement.

Clutch pedal clearance and adjustment: Do not make a practice of resting your foot on the clutch pedal while driving, as this may cause the clutch to slip and unnecessarily wear the facings on the discs. The correct **clutch pedal clearance,** or play for the clutch pedal is approximately 1". That is when the clutch is depressed there should be about 1" movement in the pedal before it starts to disengage the clutch. As the clutch facings wear this clearance or movement gradually grows less. Consequently it should occasionally be checked. Under no circumstances should the car be driven without clearance or play in the clutch pedal. See Fig. 39.

Care: Oil or grease must not be used in the clutch which is a dry disc type. Lubrication of the clutch bearings however is important; see "Lubrication."

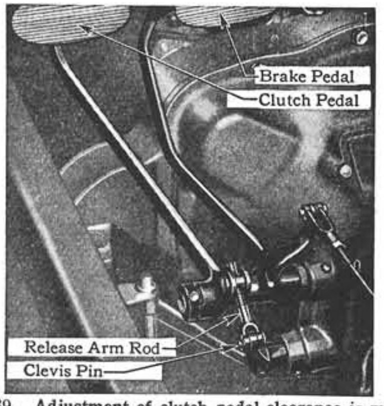


Fig. 39. **Adjustment of clutch pedal clearance** is made by removing the clevis pin and turning the release arm rod. Screwing the rod in decreases the clutch pedal play. Screwing the rod out increases the play. After making adjustment, be sure to replace clevis pin and cotter key.

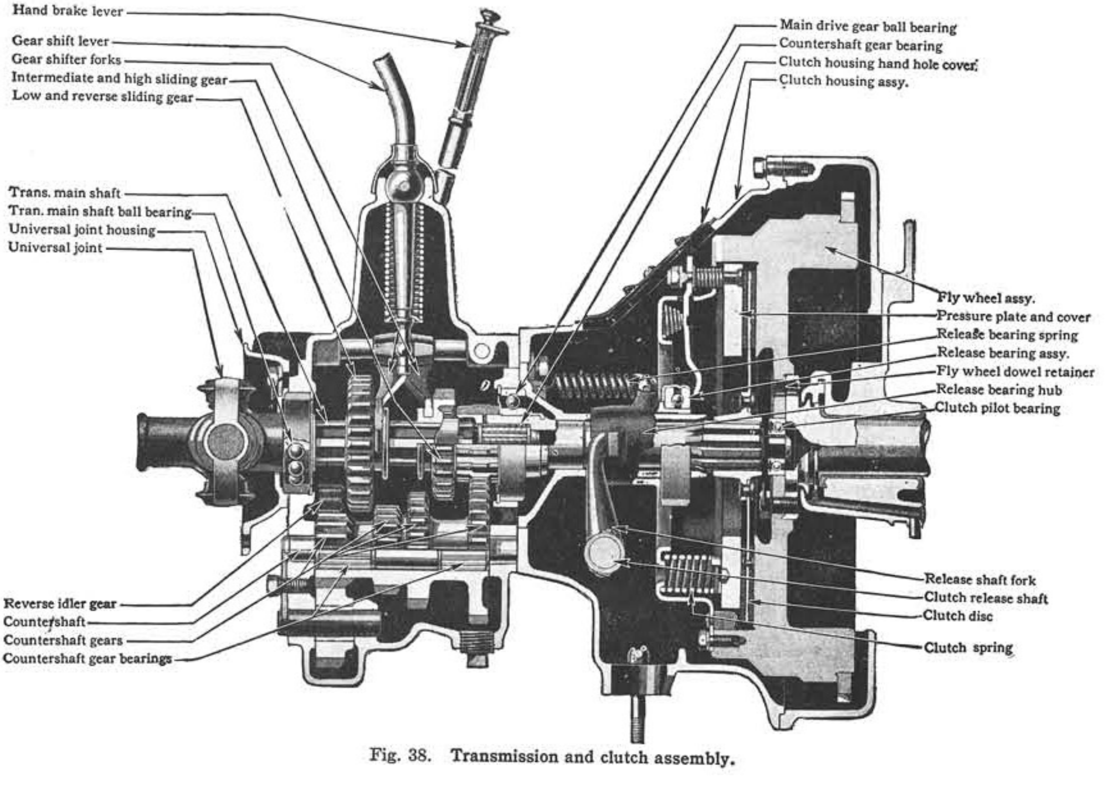


Fig. 38. **Transmission and clutch assembly.**

To replace gears it is necessary to remove rear axle from under car by disconnecting spring shackles and the universal joint ball cap coupling from rear end of transmission. Then remove rear axle from underneath car and disassemble.

To disassemble rear axle, first remove wheels and pull rear hubs from the taper ends of axle shafts. Next, remove left rear axle housing and torque tube by unbolting it from the differential housing. Then with a special puller the drive shaft double taper roller bearings can be removed from the differential housing. Then install the ring gear and pinion and replace and adjust drive pinion taper roller bearing.

Adjustment of the double taper roller bearing on the drive pinion shaft can be made by taking up on the driving pinion adjusting nut and locking in position with lock nut. This adjustment should be made by taking out all the play, but caution however must be used to not adjust the bearing too tight, but leaving bearing to revolve freely.

When replacing driving gear (ring gear) **and driving pinion** care should be taken to see that these gears have been kept in sets, which can be determined by observing if the same number on the pinion is on the ring gear.

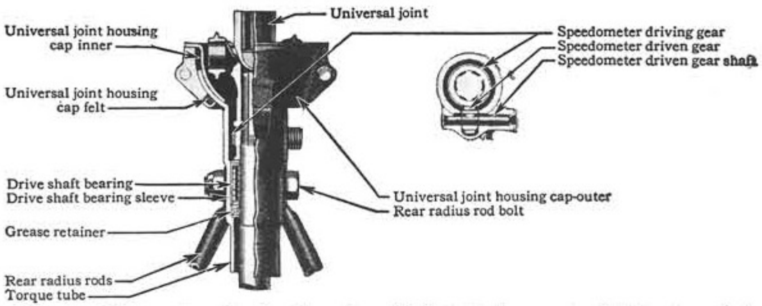


Fig. 41. **Drive system** showing the universal joint which connects with the transmission main drive shaft (see also transmission illustration and top view of chassis illustration), drive shaft bearing and sleeve, grease retainer, rear radius rods and bolt, torque tube and drive shaft which extends to rear axle but shown cut here. The speedometer drive is also shown.

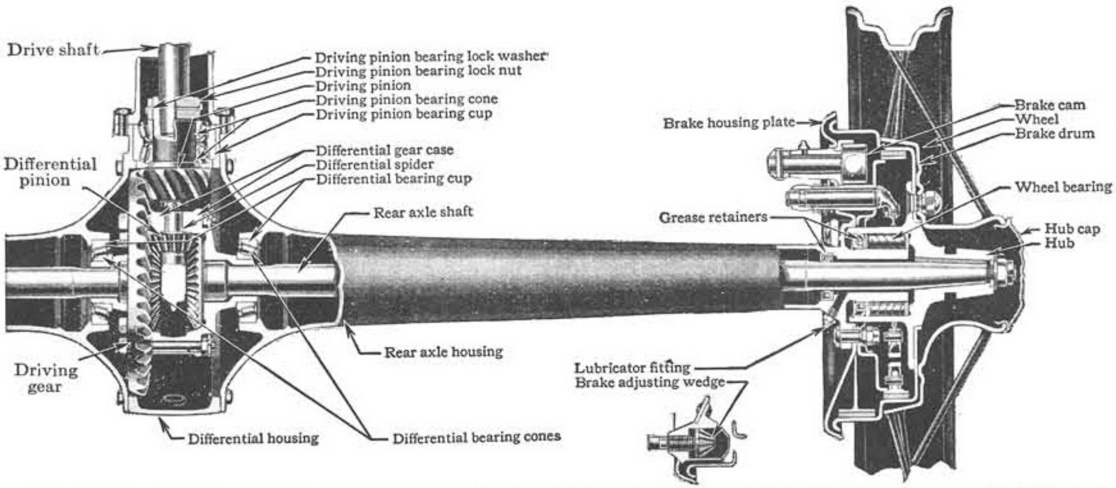


Fig. 40. **Rear axle assembly** showing the drive shaft, driving pinion, driving gear (ring-gear), differential, rear axle shafts, rear axle housing, grease retainers, rear wheel bearings, wheel hub and cap, two-in-one brake drum, brake operating cam, wheel spokes and rim.

REAR AXLE

The rear axle is a three-quarter floating type. Torque tube drive is employed. By this principle of drive, all the driving stress or thrust is taken up by the tube surrounding the drive shaft, leaving the springs free to perform their normal function.

Bell forgings welded to steel tubing make up the axle shaft housing which is bolted to the differential housing.

The driving pinion hub is exceptionally heavy and as the pinion is carried on double taper roller bearings alignment of the gear is always assured.

The driving pinion and ring gear (driving gear) are made up in sets and carefully matched, each set being lapped to eliminate the possibility of noise in operation. The driving pinion and driving gear have spiral bevel teeth.

The differential side gear is forged integral on the rear axle shaft and the teeth then cut. See specifications, "Axle, rear" for further data on construction, gear-ratio, etc.

The front and rear axle assemblies should occasionally be gone over to see that all **nuts and connections are tight,** with cotter pins in place. The **spring clips** should also be inspected to see that they are tight.

Lubrication of rear axle. See lubricating chart Fig. 2, and differential lubrication, under "Lubrication."

WHEELS AND TIRES

Front Wheel Alignment[1]

To correct premature excessive tire wear: Adjust front wheel toe-in to 1/16" plus or minus 1/32". The best way to check toe-in measurements is with a wheel aligning gage.

If adjustment is required: Remove cotter pins and loosen the two spindle connecting rod end clamp bolt nuts; then turn the spindle connecting rod either in or out until the correct adjustment is obtained. The rod has a right-hand thread on one end and a left-hand thread on the other which simplifies adjustments. When the correct toe-in is obtained, tighten the two connecting rod clamp bolt nuts, making sure to replace cotter keys.

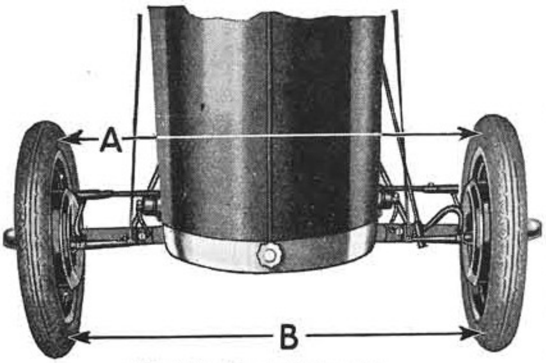


Fig. 41A. **Front wheel toe-in.**

Check front wheel alignment after tightening ball plugs. After adjusting the ball plugs on the ends of the spindle connecting rods always re-align the front wheels. This is necessary as tightening the ball plugs shortens the distance between the spindles, causing the wheels to toe out slightly. As a result it is necessary to realign the front wheels in order to insure proper steering and prevent excessive tire wear.

Camber of front wheels should be approximately 1 13/16". The camber is not adjustable, as it is provided for in the forging of the spindle. The only possibility of the camber being changed would be due to a bent axle or spindle or badly worn spindle body bushing.

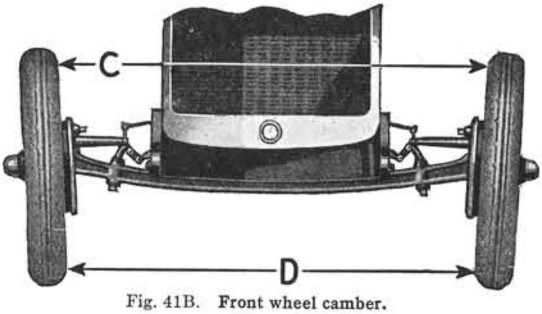


Fig. 41B. **Front wheel camber.**

Caster effect is given to the steering knucklet at the factory which is 5°.

If front axle is bent it should be straightened cold.

If rear axle shaft is bent, caused by striking wheel against curb or otherwise, replace it.

Wheels

Wheels are of the steel spoke type, with 1/4" diameter spokes electrically welded integral with the hub shell and rim. The hub shell carrying the weight of the wheel, fits over the brake drum, to which it is bolted, and it may be removed as a unit without disturbing the brake adjustment.

The front wheels should be jacked up periodically and tested for smoothness of running and excessive side play. To determine if there is excessive side play, grasp the sides of the tire and shake the wheel. Do not mistake loose spindle bushings for loose bearings. Insert a cold chisel between spindle and axle when making this test to take up any spindle bushing play.

Adjusting front wheel bearing: If there is excessive play in the bearing it can be adjusted as follows: Remove wheel. Withdraw cotter key and tighten adjusting nut until the hub just starts to bind. Then back off the adjusting nut one or two notches until the hub can be freely revolved. Before replacing the wheel, **be sure to insert cotter key in adjusting nut.**

[1]See pages 906-907 of *Dyke's Auto Encyclopedia* for explanation of camber, toe-in, caster, etc. and page 897 for additional pointers on the subject of wheel alignment in general.

Removing Wheels and Tires

To remove Ford steel spoke wheels: Jack up the side of the car from which the wheel is to be withdrawn and screw off the five hub bolt nuts. The wheel can then be removed. When replacing a wheel, tighten each hub bolt nut a few turns at a time. Then follow around hub, tightening each nut firmly. If nuts are not drawn up evenly, the wheel will not run true.

Removing tires from Ford steel spoke wheels (drop center rims): Remove valve cap and lock nut and place wheel so that valve is at the top. Let all air out of tube. Push valve stem up into tire. Working both ways from the valve stem, press the tire together and down in to the rim well, approximately one foot each side of the valve stem. Insert tire iron under both beads at point opposite valve and force tire over rim. The tire can then be removed from the wheel with the hands.

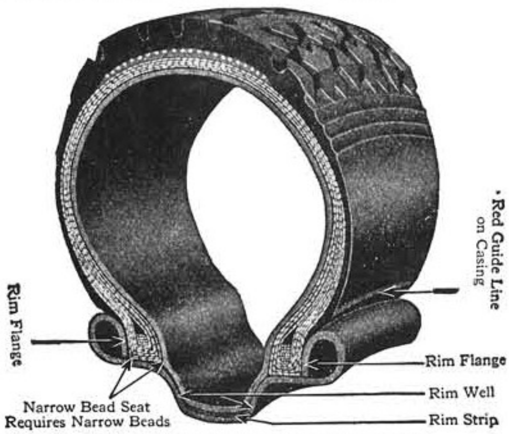


Fig. 42. Sectional view of tire and rim.

Mounting Tires

Mounting tire on Ford steel spoke wheels (drop center rims): Inflate tube until it is barely rounded out, and insert tube in casing. If tires are marked with a red dot on red guide line, the tube must be placed in the tire with the valve stem at point marked with the red dot. (Caution: Never use a tire flap when mounting tires on Ford steel spoke wheels.) With wheel placed so that valve stem hole is at top, place casing and tube on wheel with valve in valve stem hole. (See Fig. 43). Working

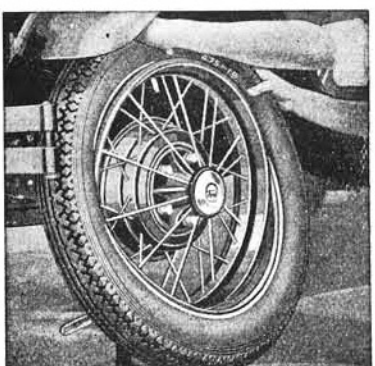


Fig. 43. Mounting tire on rim.

both ways from the valve stem, press the casing together and down into the rim well, until lower part of casing can be forced over rim flange at bottom. A tire iron may be used if necessary. (See Fig. 44.) Raise tire up, (see Fig. 45), until it is perfectly centered on rim and beads are seated on bead seats. Inflate tube to not more than two pounds pressure and work casing back and forth to insure proper setting of tire, indicated by red line on tire being equally spaced from rim all way around. (See Fig. 46.)

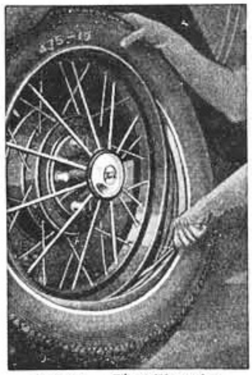


Fig. 44. Installing tire.

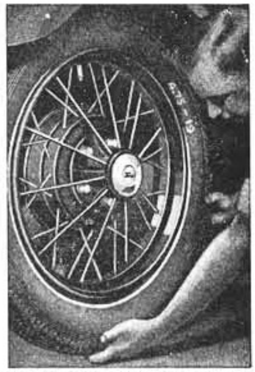


Fig. 45. Centering tire on rim.

Caution: With Ford steel spoke wheels (drop center rims) use only casing with red centering line just above rim flange, and tubes marked "for drop center rims." It is particularly important that the **red line** show an even distance from the rim all around on both sides before fully inflating tire. Put valve nut on valve, inflate tire to 35 pounds and screw valve cap down tightly. (See Fig. 46.) With Ford steel spoke wheels, tires can be more easily changed with wheel mounted on axle or tire carrier than by laying the wheel on ground.

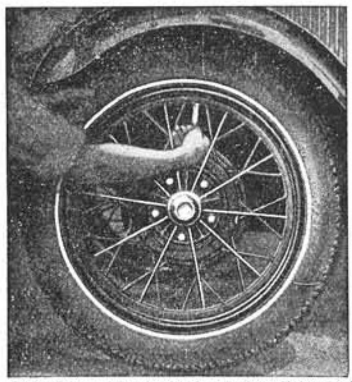


Fig. 46. Red line on tire must show even distance from rim all the way around the tire.

Keep tires inflated to 35 pounds*: Tires should never be run partially inflated, as the side walls are unduly bent and the fabric is subjected to stresses which cause what is known as rim cutting. Keep both front and rear tires inflated to 35 lbs. and check the pressure once a week.

Never run on a flat tire, even for a short distance. Skidding also shortens the life of tires. Avoid locking the wheels with the brakes—no tire will stand the strain of being dragged over the pavement. Avoid running in street car tracks, or bumping the sides of the tire against the curbing.

To get the most service at least expense, tires should be inspected frequently and all small cuts or holes properly sealed or repaired, thus preventing dirt and water working in between the rubber tread and the fabric, causing blisters or sand holes.

Care of tires when car is stored: When a car is idle for any appreciable length of time, it should be jacked up to take the load off the tires. If the car is laid up for several months, it is best to remove the tires. Wrap up the outer casings and inner tubes separately, and store them in a dark room not exposed to extreme temperatures. Remove oil or grease from the tires with gasoline.

*On the station wagon, keep the tires inflated to 40 lbs.

SPRINGS AND SHOCK ABSORBERS

Springs

Springs: The transverse, Ford design springs on the Ford model "A" car have been built to give exceptionally easy riding qualities to the cars. The outstanding advantage of this type of spring is that it rests on its flexible ends with the heavy center part uppermost. Therefore all road shocks are imparted to the most sensitive part of the spring instead of the middle. Thus the very weight of the spring receives the benefit of spring action instead of hanging below as dead weight and increasing the hammer-like blows of road impacts.

Care of springs: The springs should be lubricated occasionally with oil or graphite. This will restore the original flexibility of the springs and improve the riding quality of the car.

Unsprung weight: The remarkably easy riding qualities of the model "A" Ford were obtained chiefly by increasing the ratio of the sprung weight over the unsprung weight of the car and this has been attained to a degree considered exceptional in light car construction. It is attributed largely to the use of the **transverse principle** of spring suspension.

Riding quality of any car depends to a great extent upon the ratio of the **sprung weight,** that which is carried **above the spring shackle,** to the **unsprung** weight, that which is **carried below the spring shackle.** The less the unsprung weight in ratio to the sprung weight, the easier riding the car will be. If the weight below the spring is unusually heavy or out of proportion to that above, it imparts road shocks with greater force, thus lessening riding comfort.

Shock Absorbers

Ford hydraulic double acting shock absorbers operate entirely on the principle of hydraulic resistance. Shock absorber fluid is forced from one chamber to another by the movement of the lever arm. The working chamber is automatically kept full by the shock absorber fluid in the reservoir.

The shock absorbers regulate the flexing of the springs just as a door check does the closing of a door, only it works both ways.

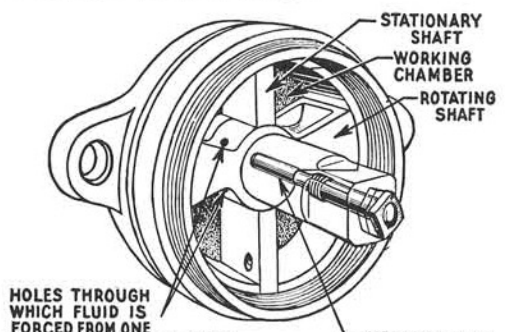


Fig. 47. **Inside view of the double acting hydraulic shock absorber showing the principle of operation.** The working chamber which is filled with fluid, which provides the shock absorbing action, consists of a forged steel chamber divided into two equal sections by the stationary shaft.

The rotating or wing shaft which operates integrally with the shock absorber arm is rotated by any movement of the arm. The rotation of the shaft forces the fluid from one compartment into the other.

The resistance in the shock absorber depends upon the rapidity with which the fluid is forced from one compartment to another. The rate of flow is controlled by the size of the opening between the compartments and this opening is enlarged or restricted by adjustment of the needle valve. This is why correct needle valve adjustment is so important.

On the downward stroke of the arm where greater shock absorber resistance is required to cushion the recoil of the springs, the fluid is forced only through the by-pass around the bottom of the needle valve seat. The resistance at this point is controlled by the adjustment of the needle valve. The by-pass in the stationary wing shaft is completely closed by a ball check valve which is forced down on its seat by the pressure of the fluid.

Adjustment: Turning the square end of the needle valve (see Figs. 48, 49) changes the adjustment. Resistance is increased when the needle is screwed in, and decreased when the valve is backed out.

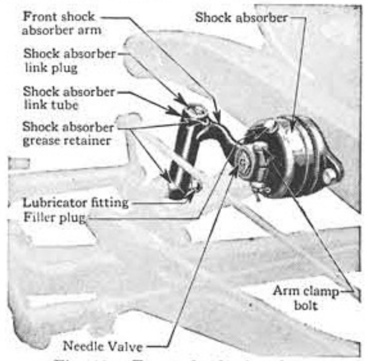


Fig. 48. **Front shock absorber.**

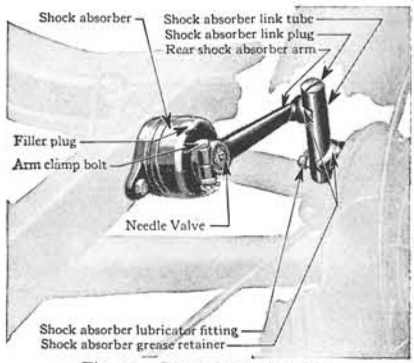


Fig. 49. **Rear shock absorber.**

The average adjustment for rear shock absorbers during warm weather is made as follows: Screw needle valve in until it seats, then back valve off ¼ turn. **For front shock absorbers,** back valve off ⅜ of a turn.

For cold weather adjustment the needle valve in the rear shock absorbers should be screwed in until it seats, then backed off ½ to ⅝ of a turn. For front shock absorbers the needle valve should be backed off ⅝ to ¾ of a turn. A slight movement of the needle valve either way makes a big difference in the action of the instruments.

These **settings** are of course only **approximate** and can be easily changed to suit the individual preference of the owner and the conditions under which the car is operated. For example, the owner who drives at high speed over rough roads would require greater shock absorber resistance than the owner who drives at moderate speed over paved highways.

Care: The only care the shock absorbers require is replenishing the shock absorber fluid in the reservoir and the lubrication of the connections. The filler plug in the reservoir should be removed at intervals of 5,000 to 10,000 miles, and the reservoir filled with shock absorber fluid. Ford dealers are equipped to render this service.

Lubricating shock absorber connections: The ball joints are made in unit with the instrument arm and spring perches. They are hardened and ground. The ball joint seats are enclosed in the shock absorber connecting links, which should be lubricated every 500 miles with the compressor gun.

In order to secure maximum riding comfort, it is important that the spring hangers be free in the bushings and kept well lubricated.

Servicing Shock Absorbers

If adjustment cannot be obtained by turning the needle valve proceed as follows:

1. **Check level of fluid in reservoir,** bringing it up to level of filler plug opening. Before putting in the new fluid check the old fluid in the reservoir to see if it has been excessively thinned out. If it is too thin, remove and replace with new fluid. While it is not necessary to correct shock absorber action, that the fluid in the reservoir be right up to the level of the filler plug opening, from a service standpoint it is a good plan to check this every 5,000 to 10,000 miles and add more fluid if the reservoir is not at least half full.

If bringing up the level of the fluid in the reservoir does not correct the trouble, then check the resistance in each unit, as follows:

2. **Disconnect shock absorber from link assembly;** next pull the shock absorber arm all the way down, then push the arm up fast, repeating the operation two or three times. If little or no resistance is encountered on the down stroke, screw the needle valve all the way in and again check for resistance. All four units should be checked in this manner. If there is lack of resistance in any one of the units, it should be replaced with a new unit. When making the check you will observe that the resistance on the up stroke is considerably less than the resistance on the down stroke, as the shock absorber is designed to give this type of action. It is therefore important when checking for resistance to make the check on the down stroke.

When instruments are OK adjust them to give the type of ride the owner prefers as previously described.

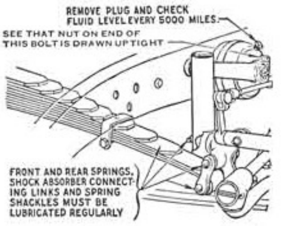


Fig. 49A. **To obtain proper shock absorber action** these points must be checked regularly. If neglected hard riding and noise is likely to develop.

Important: It is impossible to secure 100% shock absorber action unless the shock absorber connecting links are lubricated regularly and both the front and rear springs are properly lubricated. Spring covers should be installed on cars, as these covers regulate the amount of lubricant supplied to the springs and feeds that supply constantly.

STEERING GEAR

The steering gear is known as the hour glass worm and two tooth sector type, three-quarter irreversible.

The worm is mounted on two taper roller bearings which take the end thrust as well as the radial loads. The steering worm is splined to the steering worm shaft, and the steering worm sector is forged and machined integral with its shaft.

The worm is so cut that the sector teeth have no play or lash in the center (the straight ahead driving position) but with gradually increasing lash toward ends. This provides against binding at extremes after adjustment for normal wear. The steering column is clamped to the bearing adjusting sleeve, which permits reservicing in part and gives ample strength and proper alignment.

The steering wheel is made of a composition over a steel frame, and is black polished to a bright lustre. It is 17″ in diameter.

Care: Lubricate every 2,000 miles with steering gear lubricant only. Never use grease in the steering gear assembly as in a short time the grease is forced from between the worm and sector and as a result these parts become dry and cause excessively hard steering. In fact most steering gear troubles can be directly traced to the use of improper lubricant.

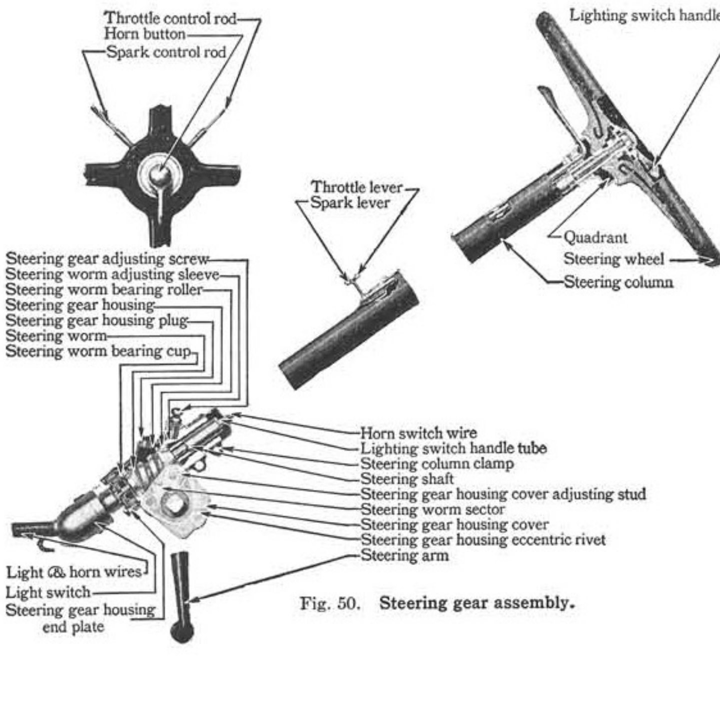


Fig. 50. **Steering gear assembly.**

A fluid lubricant of the consistency of 600-W must always be used in the steering gear. In other words use the same lubricant in the steering gear that is used in the axle and transmission.

Adjustment: Little attention is required from a repair standpoint, but in time, of course, it will require adjustments to compensate for natural wear. Adjustments are provided to compensate for wear on all parts of the mechanism, the adjustable upper bearing taking up both end and radial play.

When making adjustments, the front wheels of the car should be jacked up and the drag link disconnected from steering arm in order to effect a satisfactory adjustment.

There are three adjustments which can be made with the steering gear assembled in the car, namely: end play in worm sector; end play in steering shaft; proper mesh of sector teeth in worm. When it is necessary to make any one of these adjustments, the other two adjustments should also be checked.

Adjustment of end play in worm sector: First see that housing cover nuts are securely tightened. Next turn steering wheel to either extreme, then back one-eighth of a turn. Gripping steering arm at hub, the shaft should move freely when turned back and forth, without a particle of end play. Adjust as required by means of sector thrust screw at side of housing next to engine. A special offset screw driver is required for this purpose. After making adjustment, be sure to tighten lock nut, then reinspect for end play and freedom.

Adjustment for end play in steering shaft: To adjust for end play in steering shaft or between worm and roller bearing thrusts, turn steering wheel to either end stop, then back up one-eighth of a turn, or to a point where there is lash of steering arm. This leaves the steering shaft bearings free of side thrust. Next loosen housing clamp bolt and lock nut on worm adjusting screw. Turn down adjustment screw tightly with a six-inch wrench, then back off one-sixth of a turn. Next tighten lock nut and housing clamp bolt securely. Turn steering wheel from extreme to extreme positions and test for stiffness.

Adjustment for proper mesh of sector teeth in worm: First loosen steering column to frame bolts to free the nuts. Turn steering wheel to the mid-position of its complete travel or turning limits. (Drag link previously disconnected.) Shake steering arm to determine amount of lost motion. Next loosen the three housing cover stud nuts exactly one-quarter turn, then loosen housing cover adjusting stud nut one-half turn. Turn the eccentric adjusting sleeve clockwise, very gradually, checking at each movement the amount of lost motion still existing at the steering arm. Adjust only sufficiently tight to eliminate all lash of steering arm (no more), being sure to finish movement of eccentric adjustment sleeve in clockwise direction. Turn steering wheel throughout full travel to test for free operation. If too tight, turn eccentric adjusting sleeve counter-clockwise to free and readjust, as above, more carefully. Next securely tighten housing cover adjusting stud nut and follow by tightening housing cover nuts. It is important that the adjusting stud nut be tightened before tightening housing cover nuts.

The foregoing adjustments will suffice in practically every instance. Occasionally, however, even after all three of these adjustments have been carefully made and checked, there may still be an unequal amount of lash between sector teeth and worm at points equi-distant from central position of worm. To compensate for any unequalities in lash, an eccentric rivet adjustment is provided. By means of this adjustment, the sector shaft can be shifted to either side of the worm centerline. To make this adjustment, however, it is necessary to remove the steering gear assembly from the car.

BRAKES

The braking system includes four internal-expanding service brakes, one on each wheel, and an emergency or parking brake on each rear wheel which is also an internal expanding brake. This design is made possible by specially developed **two-in-one brake drums** on the rear wheels.

The four-wheel **service brakes** are operated by the foot-brake pedal. The **emergency brakes** are operated by the emergency brake-lever and are entirely separate and distinct from the four-wheel service brakes.

Both sets of brakes are of the mechanically operated design, of simple construction insuring positive action and highest efficiency at all times.

The four-wheel brakes, as stated, are of the **expanding shoe type and are self-centering,** an exclusive Ford development, which means that under all circumstances the entire surface of the shoes contacts with the brake drum whenever pressure is exerted to bring them into action. This prevents howling and screeching and makes the brakes silent at all times. The brake on each of the four wheels has two shoes, a total of eight shoes in all, and these expand to come in contact with the brake drum. Plates upon which the braking mechanism is mounted are of cold spun steel and all working parts are cadmium plated to prevent rusting.

A two-in-one brake drum is provided for the rear wheels, Fig. 51. The larger braking surface accommodates the brake shoes of the four-wheel system, and a separate braking surface, slightly offset from the first, accommodates the parking or emergency brake, which is of the band or full flexible shoe type and self energizing.

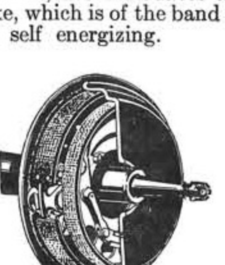


Fig. 51. **Rear wheel brake showing the two-in-one brake drums.**

The Ford brakes are made possible through the Ford steel spoke wheels to which drums can be fitted of such design as to readily accommodate two sets of internal brakes on the rear wheels.

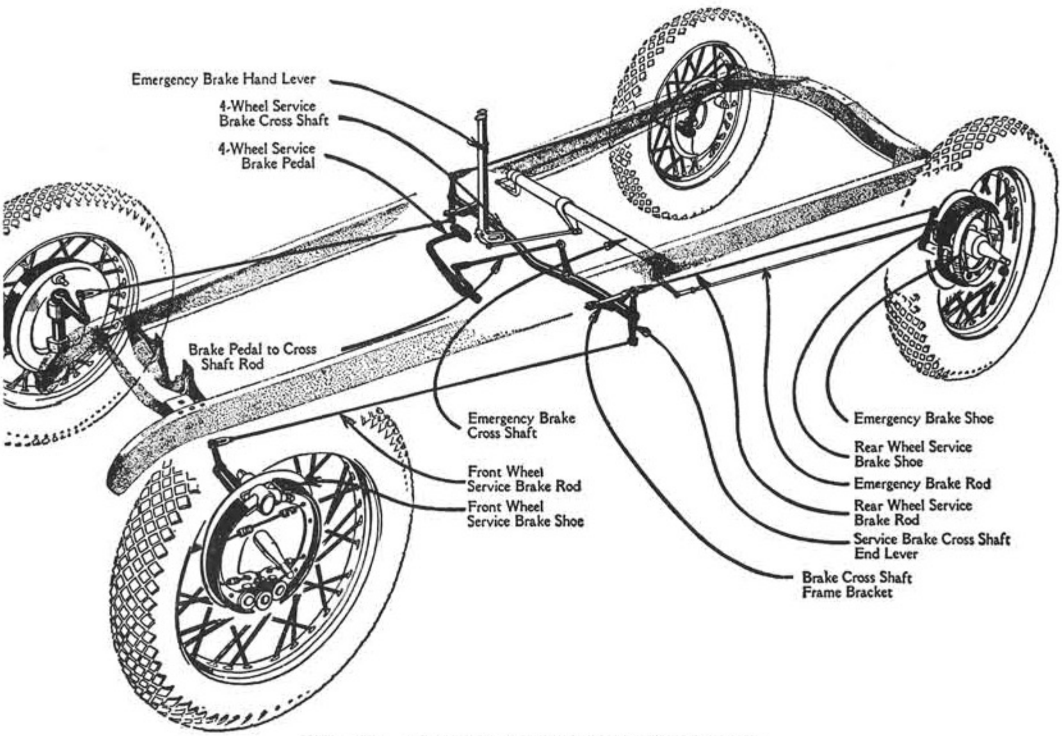


Fig. 51A. **Brake system of the model "A" Ford car.**

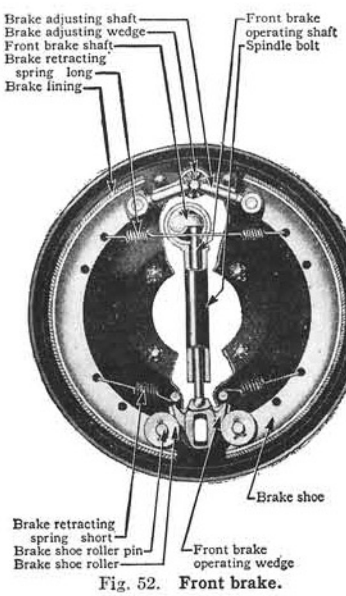


Fig. 52. **Front brake.**

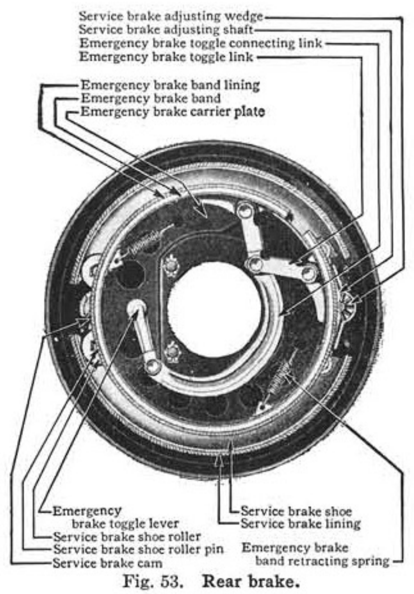


Fig. 53. **Rear brake.**

Adjusting Four-Wheel Service Brakes

Make all adjustments with brakes cold. Fully release emergency brake lever.

Raise rear end of car sufficiently to allow wheels to spin free from floor.

Turn adjusting wedge at both rear brakes until the brake drags, then back off the wedge two or three notches or just enough to allow the wheels to revolve without drag.

To insure correct equalization, the same person should check the brake pressure by rotating the wheel.

After adjusting rear brakes, adjust the front brakes in the same manner.

If adjustments are correctly made the brakes should operate as follows:

1. Rear brakes should just start to hold when brake pedal is depressed approximately 1 inch.

2. Depressing pedal about ½ inch farther should tighten but not lock rear brakes and cause front brakes to just start to hold.

3. Depressing pedal approximately another ½ inch should lock rear wheels and hold the fronts very tightly. With properly adjusted brakes this should not exceed one-half of the total possible pedal movement.

4. When brake pedal is applied with full pressure rear wheels should slide and fronts should make a heavy impression or road print, which condition is obtained just before sliding.

When all of the adjustment on the adjusting wedges is used up, it will be necessary to reline the brakes. When this becomes necessary we suggest you take your car to an authorized Ford dealer. They are provided with special relining equipment.

Emergency brakes: The emergency brake requires little attention from an adjustment or service standpoint, and with ordinary care will last indefinitely.

Lubrication of brakes: See lubrication chart, Fig. 2.

Ground side of brake lining must come next to drum: When riveting "A" or "AA" brake shoe linings to brake shoes it is very important that the side of the lining which carries the trade mark be placed next to the shoe so as to insure the ground side of the lining being next to the drum.

All linings should be **ground** after assembling to shoe so as to secure a uniform braking surface.

SERVICING ENGINE

Grinding Valves

The valves used on the model "A" engine are accurately ground at the factory. They form an ideal seat in the cast iron block consequently they should require no further attention for some time.

When necessary to grind the valves, proceed as follows:

1. **Drain water;** loosen radiator stay rods at radiator; pull radiator slightly forward and lift off hood.
2. **Unhook spark and throttle rods, "A", Fig. 53A.** These rods are connected with ball and socket joints and are disconnected by holding the rod stationary, and pulling back on the cap.
3. **Disconnect carburetor adjusting rod, "B"** at carburetor and pull rod back into front compartment. Do not misplace locking sleeve spring and washer which will drop off when adjusting rod is pulled back.
4. **Shut off gas and disconnect fuel line** at sediment bulb; **remove carburetor** by screwing out the two carburetor intake manifold bolts "D."
5. **Remove fan belt** by loosening the generator bracket bolt and pulling generator toward engine as far as it will go. Fan belt can then be removed from fan.
6. **Disconnect spark plug connectors** and lift off distributor cap and body.
7. **Screw off all cylinder head nuts.** Loosen distributor set screw nut "C" and back out set screw until distributor base can be lifted off.
8. **Pull radiator slightly forward and lift off cylinder-head** complete with water pump and fan assembly. Cylinder-head gasket can then be slipped off over ends of studs.
9. **Screw out oil return pipe bolt upper,** "E," and loosen the lower bolt. Push pipe out of way so that valve chamber cover can be removed.

As a **quantity of oil is always standing in the valve compartment** it is a good plan to place a **drain pan** under the rear end of the right hand engine pan before removing valve chamber cover.

10. **Screw out the 10 valve chamber cover bolts** and lift off cover "F." With a valve lifter compress the valve springs until the **valve spring seat retainers** can be withdrawn.

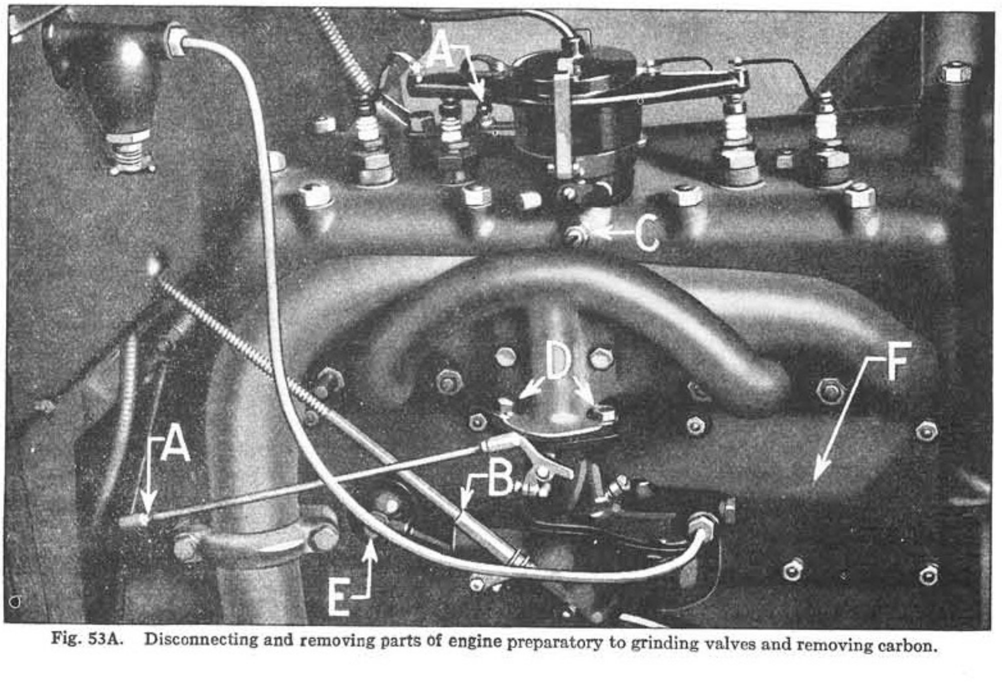


Fig. 53A. Disconnecting and removing parts of engine preparatory to grinding valves and removing carbon.

It is not necessary to remove the valve springs. When compressing the springs the valve-lifter is inserted between the lower coils of the spring.

11. **Next lift up the valves** as far as they will go and carefully examine both the valve seats and the beveled face of the valves. If the valves and seats do not require refacing or reseating, the valves can be ground in without removing the valve guide bushings.

12. **Grinding:** As the tops of the valves are machined smooth, it is necessary to use a vacuum cup type valve grinder. The grinder holds the valve by suction.

Extreme care must be used to prevent any carbon or grinding compound getting into the valve guide bushings; also make sure that all compound is removed from valves and valve-seats when the grinding operation is completed.

13. **Refacing and reseating:** Should the valve require refacing or the valve seats need reseating, it will be necessary to remove the valve-guide bushings in order to withdraw the valves.

To remove the bushings lift out the valve springs; the bushings can then be withdrawn through the valve chamber. If the guides bind in the cylinder block they can be removed by tapping them out with a brass rod inserted through the valve opening in the face of the block.

14. **After the refacing or reseating operation is completed, replace the valves and insert the valve guides** into the cylinder block. The valves should then be lightly ground in to insure a perfect seat.

15. **After grinding, always check the clearance between valves and push rods;** a thickness gauge is used for this purpose. The clearance should not be less than .010″ or more than .013″ with engine cold. The gap must be measured with the push rod on the heel of the cam.

16. **Next replace the valve springs,** valve chamber cover, cylinder head, etc., making sure to close drain cock and refill radiator.

Removing Carbon

Carbon must be removed from piston heads with a carbon scraper. Never use a wire brush, as particles of carbon or a strand of wire from the brush are liable to be forced between piston and cylinder wall with possibilities of scoring.

Before replacing cylinder head, pour at least a tablespoonful of engine oil around the edge of each piston to insure sufficient lubrication when engine is started. After the engine is thoroughly warmed up, tighten all cylinder head nuts and retighten after a few days driving. Attention to this detail lessens any possibility of gasket blowing out, also, to prevent any possibility of a water leak developing between cylinder head and block, particularly the cylinder head nut which holds down the ignition lock conduit. **In tightening the cylinder head bolts** start with the center bolt and work through the center and zig zag back and forth across the head.

Checking Clearance Between Valves and Push Rods

To check the clearance between the ends of the valve stems and push rods (tappets) a thickness gauge is used. The clearance should be not less than .010″ minimum or more than .013″ maximum with engine cold. The gap must be measured with the push rod on the heel of the cam. If the tappet clearance is less than .010″ grind off the end of valve-stem.

To insure a uniform power stroke in each cylinder, it is absolutely necessary that the correct clearance be maintained between valves and push rods, and that the clearance be checked with the **push rod resting on the heel of the cam** (the lowest point of the cam).

When checking this clearance, an easy way to determine that the push rods are on the heel of their respective cams is explained under Figures 54 to 57.

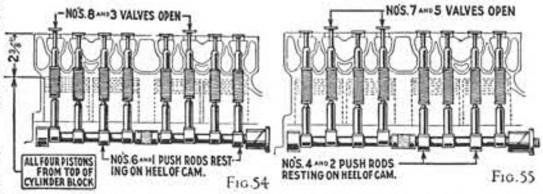


Fig. 54 (left). **First turn the engine over until numbers eight and three valves are fully opened**[1]. At this point, all four pistons will be 2⅜″ from the top of the cylinder and numbers 6 and 1 push rods will be resting squarely on the heel of their respective cams and the clearance can be easily checked.

Fig. 55 (right). **After adjusting the clearance between numbers 6 and 1 valves and push rods,** turn the engine over exactly **one-half turn.** Numbers 7 and 5 valves will now be open, and numbers 4 and 2 push rods will be resting on the heel of their cams.

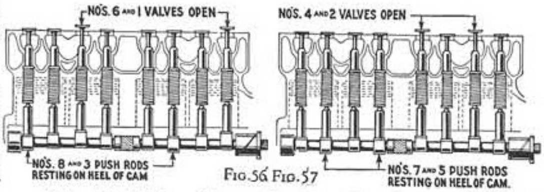


Fig. 56 (left). **After adjusting the clearance between numbers 4 and 2 valves and push rods,** again turn the engine over exactly **one-half turn.** Numbers 6 and 1 valves will now be open, and numbers 8 and 3 push rods will be resting on the heel of their respective cams.

Fig. 57 (right). **After checking the clearance between numbers 8 and 3 valves and push rods,** once more turn the engine over **one-half turn.** Numbers 4 and 2 valves will now be open, and numbers 7 and 5 push rods will be resting on the heel of their cams and their clearance can be checked.

Valve Timing

Meshing timing gears: When installing timing gears always make sure that the tooth marked "o" on the small time gear (crankshaft gear) meshes with the timing-pin recess on the large time gear (camshaft gear). (See Fig. 58.) See "Specifications" for **valve timing in degrees.**

Timing gears are fitted with a back-lash of not less than .003″ or more than .005″.

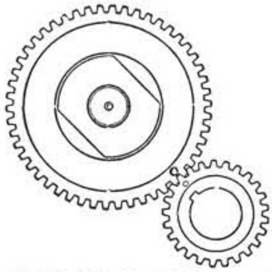


Fig. 58. **Meshing timing gears.**

[1]**The valves are numbered** consecutively from the front end of the engine (next to the radiator) to the rear of engine. Nos. 1, 4, 5 and 8 are exhaust valves; Nos. 2, 3, 6 and 7 are inlet valves.

Loose timing gear: Here is a quick way to check for a loose timing gear that is causing a knock. With the engine running slowly, screw out timing pin, located in timing gear cover, and insert opposite end of pin into opening. Care must be used not to let hand come in contact with the fan. Press in firmly on pin; if the knock stops, the trouble is undoubtedly due to the gear nut being loose on the camshaft.

Pistons

Pistons are made of aluminum. See "Specifications" for weights, etc.

Fitting pistons: Pistons are fitted to the cylinder walls by reboring the cylinders to fit the pistons[1], at a clearance of .002″. If pistons are otherwise o.k. they should not be replaced until there is at least .006″ clearance between piston and cylinder wall.

When fitting pistons, use a long feeler (thickness gauge) that extends the full length of the piston. Insert the feeler between piston and cylinder wall on the opposite side of the piston from the slot in the skirt.

When properly fitted to a .002″ clearance there will be a slight drag when a .001″ feeler gauge is inserted between the piston and cylinder wall when piston is moved up and down, and a heavy drag when a .003″ feeler gauge is used.

Standard oversize pistons are: .005″, .010″, .020″ and .030″.

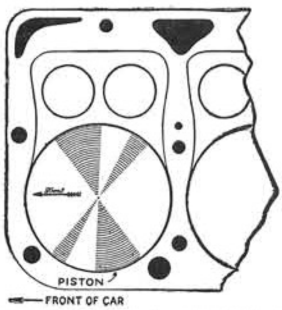


Fig. 58A. **Markings on pistons.** To eliminate any possibility of pistons being incorrectly assembled in an engine, the word "front" is placed beside the arrow, that is, stamped on top of the piston. When the piston is correctly assembled in the engine, the arrow will point toward the front of the car and the split in the skirt will be toward the left side of the engine (left and right side is always determined from driver's seat).

Piston Pins

When removing or installing a piston pin (also termed wrist-pin), always immerse the piston in boiling water for approximately a minute or so. This will expand the piston pin hole sufficiently so that the pin can be pushed either in or out with your fingers. It also eliminates any possibility of distorting the piston when removing or installing a pin.

When fitting a piston-pin, which is a full floating type, in piston, select a pin which cannot be pressed into the piston by hand at room temperature.

Next submerge the piston in boiling water, allowing the piston to remain in the water from one to two minutes, then withdraw piston, wipe out piston pin holes with a clean cloth and insert pin.

If properly selected the pin can then be pushed into the piston with a slight pressure of the hand. Taking the chill out of the pin by holding it in your hand for a few seconds and then applying a light film of oil on the pin will make it easy to install.

Piston-pins are selected to give a clearance of .0005″ in connecting rod. The correct fitting of new piston pins is very important.

When piston-pin has been assembled in place the lock ring between the two bronze bushings at the upper end of the connecting rod drops into the piston-pin groove, locking it in place.

Piston Rings

Piston rings are fitted in piston ring grooves with a clearance of from .0015″ to .002″.

The ring gap clearance is .011″ to .013″ for the top ring, .009″ to .011″ for the middle ring and .007″ to .009″ for the bottom ring. The bottom ring is an oil control ring 5/32″ in width while the middle and top rings are 1/8″ wide.

The middle and top rings are designed with a .001″ to .0015″ taper to more quickly form a seat. When fitting, the script word "Ford" should be installed toward the top.

Oversize piston rings: The following oversize piston rings are available: .005″, .010″, .020″ and .030″ which are 1/8″ wide. Oil control rings come in the same sizes but are 5/32″ wide.

Connecting Rods

The connecting rod is a steel forging, I-beam section with its upper end bronze bushed and floats on the piston-pin. The lower end is babbitted as is also the connecting rod cap.

The importance of accurately aligning connecting rods cannot be over-emphasized. Rods that are distorted or bent even to a slight extent will cause a knock or piston slap, and excessive wear on piston and rings.

Before installing a rod always check it for alignment. Many pistons are replaced unnecessarily, due to out of line rods.

There are three possible misalignments in a connecting rod:

(a) Twist in the rod; (b) piston pin boss not parallel with lower bearing; (c) piston pin boss not central with lower bearing.

The lower end of the connecting rod has .008″ to .012″ end play on the crankshaft. The upper end has .040″ total side play between the wrist pin bosses in the piston.

Connecting rod upper end is fitted to piston pin with .0005″ clearance. When properly fitted rod should drop gradually when piston is held in both hands and given a quick shake.

Connecting rod lower ends are babbitted, and on service rods they are reamed to a diameter of 1.499″ and then shimmed to suit the individual crankshaft crankpin bearing so that the clearance is approximately .002″. It is necessary to first ream the rod bearings to size before installing a new rod.

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[1]**The operation of reboring the cylinders to fit the pistons** is similar to the procedure for the Ford model "T" engine as explained on pages 823 and 824 of *Dyke's Automobile Encyclopedia*, except the clearances, and also the adjustment of the model "T" special micrometer for setting the boring bar. In setting the boring bar for the model "A," the setting on this special micrometer referred to, should be adjusted at .0625″ as zero. Then, one-half of the actual oversize of piston, which is being installed, should be added to the .0625″; this will give the actual setting of the boring bar.

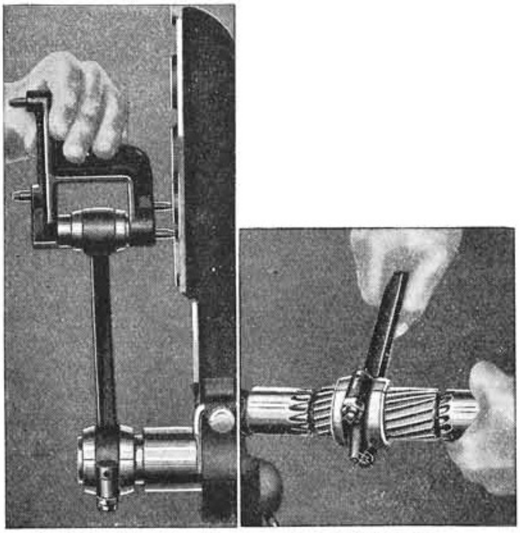
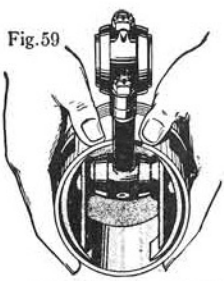


Fig. 58B. **Checking the connecting rod for twist.**
Fig. 58C. **Reaming connecting rod bearing.**

This is done by securely gripping the square end of a connecting rod bearing reamer in a vise (Fig. 58C) and revolving the rod on the reamer. The lower end of the connecting rod has .008″ to .012″ end play on the crankshaft.

Fig.59



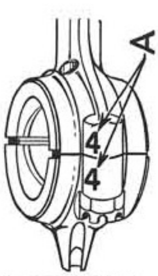


Fig. 59 (left). **Connecting rod properly fitted.**
Fig. 59A (right). **Connecting rod and cap marked.**

When connecting rods and bearing caps are assembled in new engines both the cap and the rod are marked with a number which corresponds with the number of the cylinder into which they are fitted (Fig. 59A).

After taking up a connecting rod bearing be sure to replace the cap in its original position; that is, so that the number on the cap lines up with the number stamped on the upper half of the rod.

Main Bearings

The crankshaft main bearings are babbitted into the cylinder block casting and crankshaft bearing caps.

Fitting engine main bearings: This process consists of rebabbitting main bearings in the cylinder block, then rough-boring the rebabbitted bearings[1], to which are fitted rough-babbitted main bearing caps, then align reaming them to 1.625″ (reamer size) which is approximately .001″ to .002″ larger than the diameter of the crankshaft journals, after which the crankshaft is placed in the main bearings and the proper amount of shims either added or removed to give it .002″ clearance.

To insure a satisfactory job when overhauling an engine, it is always advisable to rebabbitt the main bearings in the cylinder blocks. Attempting to recondition old bearings by hand scraping is an extremely slow process and is not as satisfactory as when new bearings are installed and properly fitted.

Crankshafts are fitted with an end clearance of .004″ to .007″. This is checked by using an inside micrometer between the flanges on the rear bearing of the crankshaft and then checking the overall length of the rear main bearing cap with an outside micrometer.

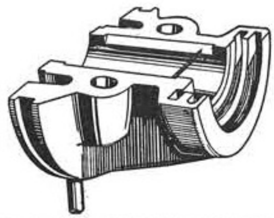


Fig. 59B. **Crankshaft rear bearing caps** for replacement on crankshafts on which the rear bearing surface has become worn. It has a $\frac{1.618}{1.620}$ bore and is $\frac{3.013}{3.018}$ between the thrust faces as compared with the standard cap which has a $\frac{1.623}{1.624}$ bore and is $\frac{2.993}{2.995}$ between the thrust faces.

Engine Support

The model "A" Ford car is equipped with a flexible front end vibration absorbing support for the engine Fig. 59C, which greatly reduces the transfer of engine vibration to the chassis. It is simple in design and operation, and frees the car from unpleasant vibration periods.

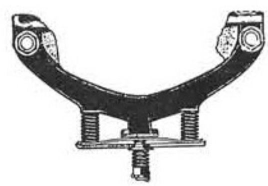


Fig. 59C. **Engine support.**

The support bracket is bolted to the front engine cover and rests on two flexible coil springs which support the front engine weight. The stud at the lower part of the bracket has a large foot. This foot comes almost in contact with the top of a stiff, flat, horizontal spring which rests on the frame cross member. This arrangement gives the front end of the engine a very free range of vertical motion, yet holding it within definite limits. It thus permits the engine mass to move in response to the unbalanced inertia forces, yet the vibrations are absorbed or dissipated before they are transmitted to the chassis.

The flat spring and a lower coil spring used where the bracket stud passes through the frame, serve to cushion the engine action against downward and upward road shocks.

Adjustment: Clearance between the coils of all three springs and between the auxiliary flat spring and leather washer should not be less than 1/64″ or more than 1/32″. This adjustment can be made by an adjusting nut at the lower end of the bracket stud.

[1]See pages 790 and 790A of *Dyke's Auto Encyclopedia* which gives the procedure for fitting the crankshaft bearings in the model "T" engine and which is a similar method and equipment for the model "A" engine, except for clearances, and the gauging of the front end of the babbitt in the cylinder block.

ENGINE TROUBLES AND REMEDIES

Engine Fails to Start

If starter turns engine over freely, check the following:

Ignition switch off.

Gasoline tank empty or supply shut off.

If engine is cold, mixture may not be rich enough —choke button not pulled back. See starting instructions.

Warm engine—over choking.

Breaker points too close. The correct adjustment is .018 to .022".

Spark plug gaps too wide. Correct gap .035".

Water in sediment bulb or carburetor.

Starter Fails to Turn Engine Over

Battery run down. A quick way to check this is to turn on the lights, and depress the starter switch. If the battery is weak the lights will go out or grow quite dim. If the battery is run down, have it recharged.

Loose or dirty battery connections—See that both the negative and positive battery terminal connections are clean and tight. These connections should be checked regularly.

Missing at Low Speed

Gas mixture too rich or too lean. See "carburetor adjustment."

Too close a gap between spark plug points. The correct gap is .035".

Breaker points improperly adjusted, badly burnt or pitted. See "adjusting breaker contact points."

Fouled spark plug. Plugs should occasionally be cleaned and the gaps checked.

Water in gasoline. See instructions on "cleaning sediment bulb and carburetor."

Missing at High Speed

Insufficient gasoline flowing to carburetor due to gasoline line or filter screen being partly clogged.

Gas mixture too rich or too lean. See "carburetor adjustment."

Water in gasoline, drain sediment bulb and carburetor.

Engine Stops Suddenly

Gasoline tank empty.

Dirt in fuel line or carburetor.

Gas mixture too lean. See "adjustment of carburetor."

Engine Overheats

Lack of water—radiator should be kept well filled.

Lack of oil—check oil level.

Fan belt loose or slipping. See "fan-belt adjustment."

Excessive carbon deposit on piston heads and in combustion chamber. This can be corrected by taking off the cylinder head and removing the carbon. (Ford dealers are equipped for this work.)

Incorrect spark timing. See "ignition timing."

Gas mixture too rich. See "adjustment of carburetor."

Water circulation retarded by sediment in radiator. See "cleaning the radiator."

Engine Knocks

Carbon knock—caused by a deposit of carbon in combustion chamber and on piston heads. Take off cylinder head and remove carbon.

Ignition knocks—usually occur when the car is suddenly accelerated or when ascending steep grades or traveling through heavy sand with the spark lever fully advanced. Slightly retarding the spark lever eliminates the knock. The spark should be advanced as soon as normal road conditions are encountered. For normal driving the spark lever should be carried about half way down the quadrant.

Loose bearing. If a bearing has become loose it should be adjusted.

FORD LIGHT DELIVERY CARS

For light delivery purposes, there is a selection of commercial bodies available on the model "A" chassis.

The chassis used on these is exactly similar to that of the passenger car, except that the radiator shell is finished in black enamel, and headlamps in black enamel with rustless steel rims. However, such body types as the deluxe delivery, the special delivery in natural wood and the town car delivery, the radiator, headlamps, etc., are in bright rustless steel as on the passenger car.

The tires on the station wagon are 5.00x19. Tire pressure on the station wagon is 40 pounds.

FORD MODEL "AA" 1½ TON TRUCK

In addition to several standard bodies. Ford trucks are available with many other types of bodies adapted to almost every line of business. These bodies are mounted on either 131½" or 157" wheelbase **chassis** with single or dual rear wheels, open or closed cabs and high or low rear-axle gear-ratios, optional.

Specifications Ford Truck Chassis

Engine: 4-cylinder; develops 40 horsepower at a moderate speed of 2,200 r.p.m. The only difference between the model "A" and "AA" engine is the clutch. The model "AA" has stronger springs in the pressure plate and a larger diameter clutch disc.

Brakes: Service brakes on all four wheels. Emergency brakes operate independently on rear wheels. All are internal expanding and fully enclosed. Enlarged service brake-drums on the front wheels give increased braking power. Total braking surface is 474⅞ sq. in.

Clutch: Clutch facing attached to driven disc is 9¾" outside diameter; inside diameter is 5½" and thickness 9/64". Clutch pressure is 1350 pounds and foot pressure is 36 pounds. Weight of clutch disc is 3 pounds and the total acting surface of clutch facing is 102 sq. in.

Springs and torque tube: Cantilever rear springs reduce unsprung weight and lessen rebound. Torque-tube drive relieves the springs of any but their natural function of absorbing shocks.

Wheels and tires: Steel disc wheels. Tires, front, 6.00 x 20, heavy duty balloons (six-ply); rear single wheel, 32 x 6, high pressure (eight-ply); dual rear wheels, 6.00 x 20 heavy duty balloons (six-ply).

Cooling: Centrifugal water pump; tubular radiator; two-blade airplane propeller type fan 16 inches in diameter, driven by adjustable "V" belt. Capacity, 3 gallons.

Chassis dimensions: Standard 131½ inch chassis—over-all width across single rear hubs, 69½ in. Over-all width across dual wheel tires, 76 7/16 in. Over-all length, 183½ in. Long 157 in. chassis—over-all length, 223 3/16 in.

Rear axle: spiral bevel gear, three-quarter floating. Gear-ratios, 6.6 to 1 and 5.14 to 1.

Fuel: Gravity feed. Capacity of tank, 10 gallons.

Turning circle: Standard 131½ in. chassis—46 ft.; long 157 in. chassis—57 ft. 2 in.

Wheelbase: 131½ in.; 157 in.

Front construction: The front spring is a special Ford design transverse type. The front axle is a chrome-alloy steel forging "I" beam construction. Adjustable taper roller bearings for wheels.

Frame: Standard 131½ in. chassis—thickness ⅛ in. Side members 6 in. deep and 2¾ in. wide. Frame is tapered and has five unusually heavy cross-members. May be shortened 27 inches to accommodate dump bodies. Length from back of cab, 81½ in.; from back of cab to center-line of rear axle, 51¾ in.

Long 157 in. chassis—same thickness and width as standard. Depth 7 in. Length from back of cab, 120 25/32 in.; from back of cab to centerline of rear axle, 77 9/32 in.

Transmission Ford "AA" Truck

The four-speed transmission, Fig. 60, used in the truck is of exceptionally rugged construction—large size gears and bearings are used throughout. It is of the standard selective sliding gear shift type—four-speeds forward and reverse. All gears and shafts are made from special heat treated chrome alloy steel. The countershaft is carried on roller bearings. A roller bearing is also used at the front of the main shaft. Because of their effectiveness in carrying radial loads, the main drive gear and spline shaft are carried on ball bearings.

With this increase in the number of speed ratios the truck operator has at his command all the pulling power in low, necessary to bring the truck out of bad places, and also in high to maintain a good speed on the highway, even with the truck loaded to its rated capacity, whether traveling on level roads or up grade.

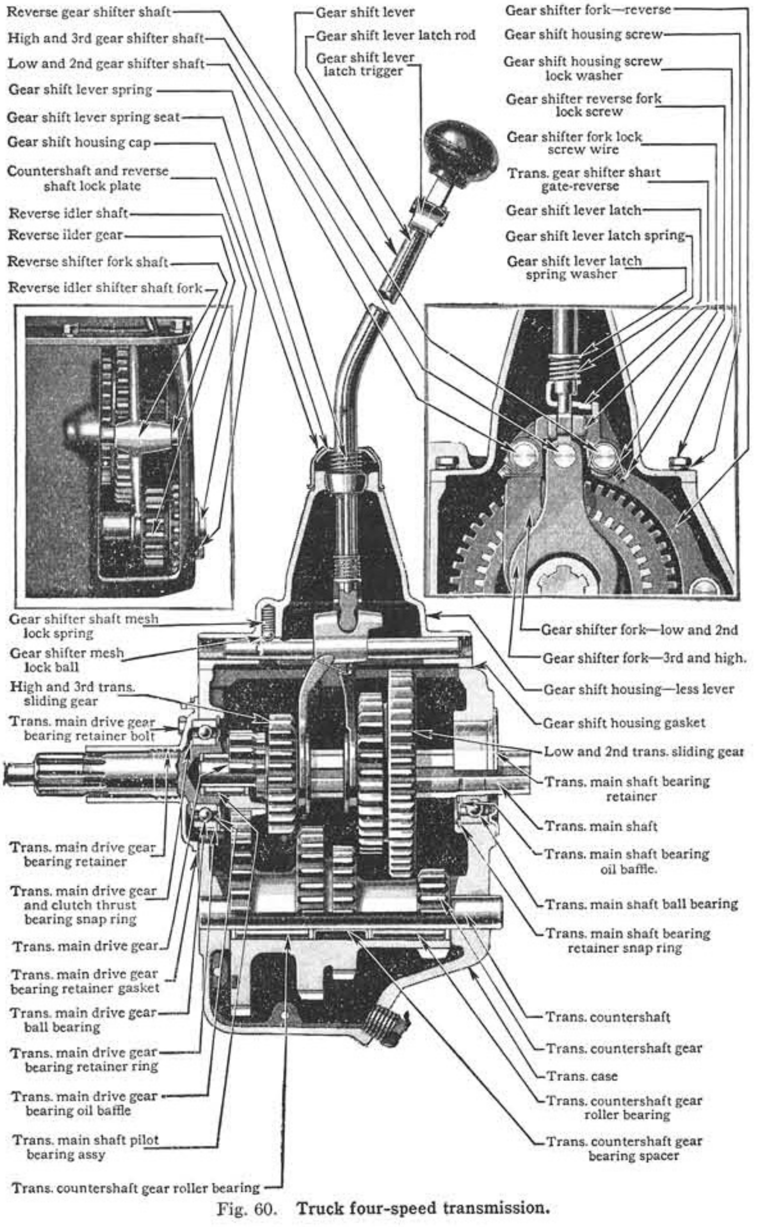


Fig. 60. **Truck four-speed transmission.**

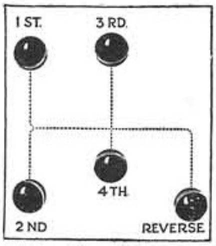


Fig. 61. **Gear shifting:** To shift into first or low speed with the gears in neutral, move the gear shift lever to the left and forward. To shift into second from low speed, move the lever straight back through neutral into second speed. To shift into third from second, move the gear shift lever forward into neutral, then to the right and forward into third speed. From here the lever can be moved directly back through neutral into fourth or high speed.

To shift into reverse from neutral press the release catch on the side of the lever, located just below the gear shift lever ball, and move the lever to the extreme right out of range of the forward speeds, then directly back into reverse gear. The release catch is easily operated by the driver's thumb, making it possible to go into reverse gear with one movement.

Power take-off: An opening is provided on the right side of the transmission housing for a power take-off, the power being taken from one of the gears on the cluster gear unit. The opening has a steel cover plate which may easily be removed for installation of the take-off.

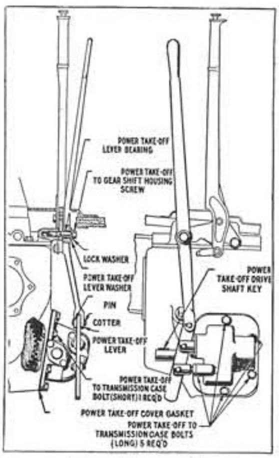


Fig. 61A. **Power take-off** assembly shown attached to transmission of the "AA" truck. In addition to its hauling ability, the "AA" truck equipped with the power take-off, provides a stationary power-plant. It has proved its efficiency in the operation of cement mixers, feed mills, electric generators, air compressors, orchard sprayers, hoists, winches, water pumps, bean shellers, portable arc welders, wood saws, floor sanding machines, lighting plants and many other uses.

Rear Axle Ford "AA" Truck

The rear axle used on the Ford model "AA" 1½ ton truck is shown in Fig. 62 with each part named.

Rear axle gear ratios: The spiral bevel gear rear axle for the "AA" truck is available in two ratios. The original ratio of 6.6 to 1 is for trucks used for transporting heavy loads and where power is the chief requisite. The 5.14 to 1 ratio is for trucks used in more speedy delivery work where loads are light.

The construction of the truck rear axle is exactly the same with either gear ratio, the only difference being in the size of the driving pinion and the number of teeth in the driving pinion and driving gear.

When changing over a 6.6 to 1 ratio axle to a 5.14 to 1 axle, the high speed axle should not be used for heavy duty work. In making the change over, it will be necessary to replace the driving pinion and driving pinion pilot bearing race assembly and the differential case and driving gear assembly. The speedometer driving and driven gears should also be changed.

The number of teeth in the 6.6 to 1 ratio **driving pinion** is 5 teeth, and 33 teeth in the **driving gear;** the 5.14 to 1 ratio is 7 teeth in the driving pinion and 36 teeth in the driving gear.

Mounting Truck Wheels

It is very important that truck wheels be correctly mounted.

Right and left-hand threads: In mounting hubs, or in replacing studs or nuts, right-hand studs must be used on right side of chassis and left-hand on left side. **Right** and **left** sides are seen from the driver's seat facing forward. All studs and nuts are plainly marked "R" and "L" and must be so used. Right- and left-hand threads are used on all assemblies to insure wheel nuts staying tight.

Wheels must be clean. Always examine wheels before mounting on hub to be sure that (a) countersunk holes, where ball face of wheel nut seats, are free from dirt, and (b) face of disc and hub flange, where they bear together, must be clean and free from dirt or grease. The same applies to the surfaces of both rear duals where the two come together. Presence of foreign matter will prevent proper bearing and create high spots which are likely to cause loose fits, play and wear. Watch this point, particularly in mounting spare wheels, which may have picked up road dirt. The countersunk holes should be carefully cleaned.

Dual wheels are of the double cap nut type. The inner dual wheel is individually held by the sleeve-shaped inner wheel nut to insure positive drive and tire alignment. The inner wheel must be mounted and tightened before the outer wheel is put on. The outer wheel slips over the inner wheel nuts and is independently held by the outer nuts. The front, or single wheel is held by a single set of nuts.

Tightening nuts should be done with the truck jacked up. Outer wheel nuts must be backed off at least two full turns to tighten inner nuts. **These nuts must not be neglected.** In mounting wheels or tightening nuts, proceed in a criss-cross fashion and not around the circle.

Do not use an extension on the regular wrench handle as supplied. Ordinary pressure as exerted in tightening cap nuts with the handle is sufficient to drive wheel nuts home, without use of an extension.

Tighten all wheel nuts at the end of the first fifty to one hundred miles on a new truck. Thereafter, only an occasional check of nuts for tightness is necessary, but this should especially be done soon after a spare tire and wheel change. Nuts properly installed and given the subsequent tightening will remain tight indefinitely.

Clearance of stud holes in wheels with the ball-faced nuts filling the opening permits of easy mounting and eliminates wear. **Wheels do not pilot on hub at center,** the entire load being carried through the cap nuts and studs.

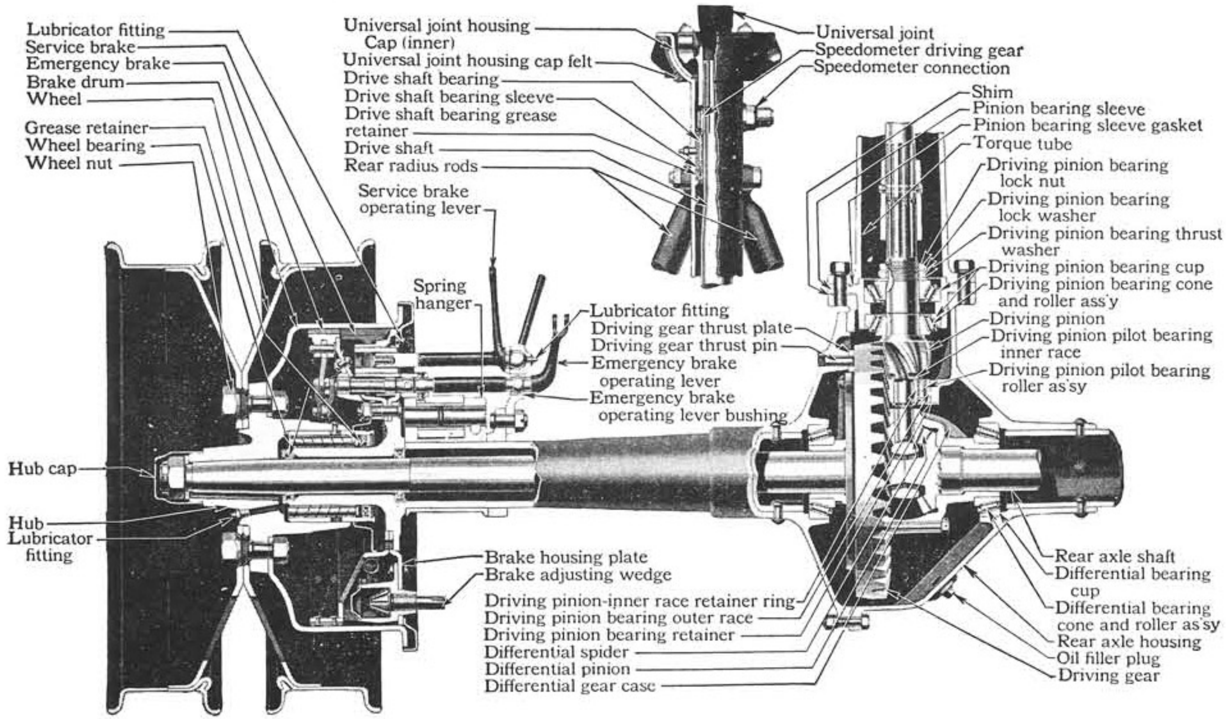


Fig. 62. **Model "AA" truck rear axle with dual wheels.** Brief specifications are as follows:

Drive: Spiral bevel gear.
Type: Three-quarter floating.
Ratio: 5.14 to 1 and 6.6. to 1.
Axle shaft diameter: 1 15/16".

Coupling type, front: Universal joint (enclosed) rear: splined sleeve.
Rear wheel bearings: Spiral roller type, 3 1/2" long x 2 7/8" inside diameter x 4" outside diameter, 18 rollers, 9/16" diameter.
Springs, front: Transverse type, Ford design, rear: cantilever type.

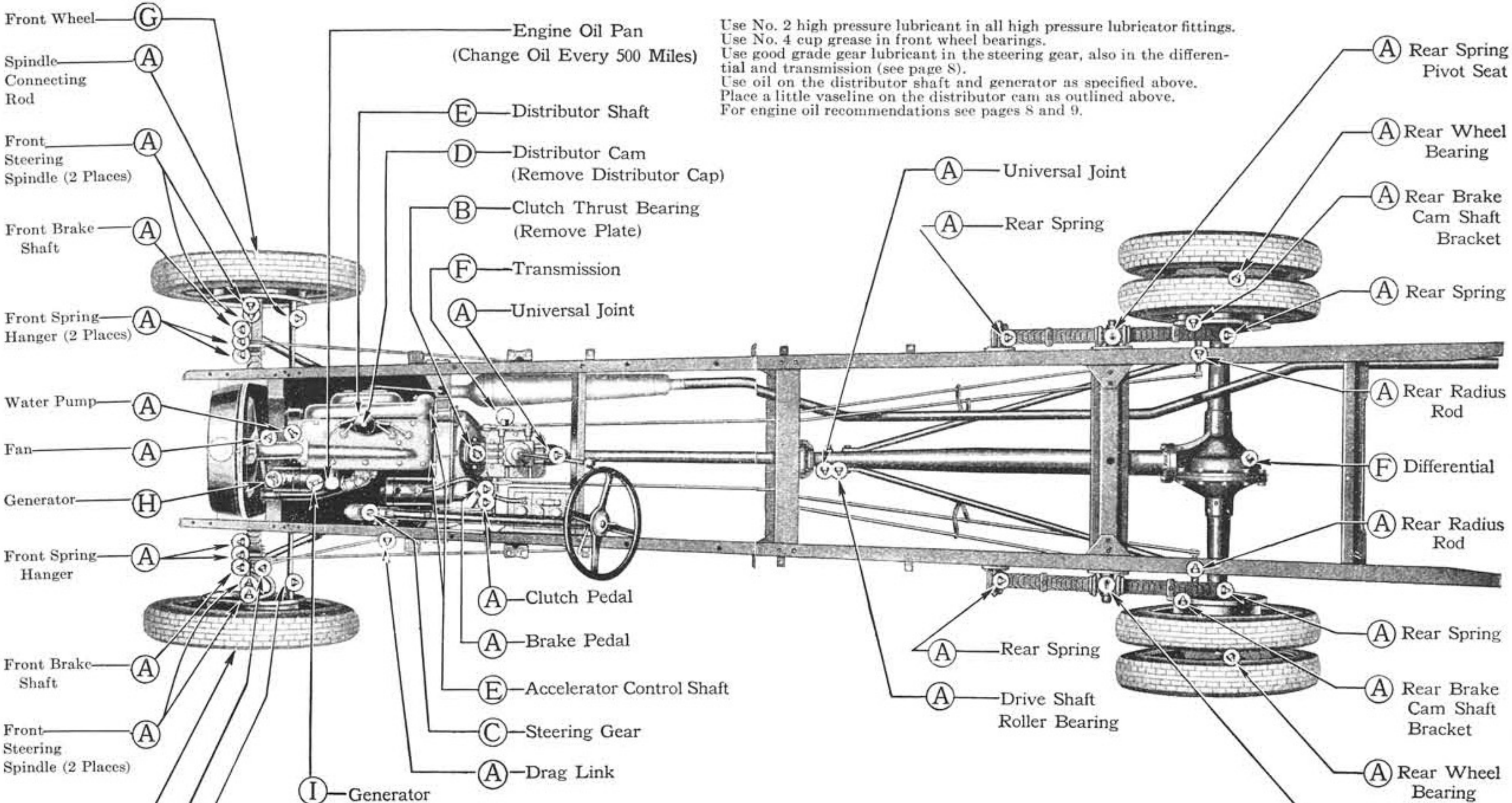
The total gear reduction ratio between the engine and the rear wheels with the 5.14 to 1 and 6.6 to 1 ratios is as follows:

Ratio	*5.14 to 1*	*6.6 to 1*
High	5.14 to 1	6.6 to 1
Third	8.67 to 1	11.15 to 1
Second	15.89 to 1	20.39 to 1
Low	32.89 to 1	42.24 to 1
Reverse	40.19 to 1	51.61 to 1

The increase in speed of the truck, at the same number of engine revolutions, with the 5.14 to 1 gear over the 6.6 to 1 gear is slightly more than 28 per cent.

The miles per hour of the truck with the 5.14 to 1 and 6.6 to 1 **rear axle at various engine speeds** is as follows:

Engine RPM	*Truck MPH: 5.14 to 1*	*Truck MPH: 6.6 to 1*
600	10.7	8.5
1000	17.8	14.
1400	25.	19.5
1800	32.2	25.
2200	39.3	30.5
2600	46.5	36.
3000	53.6	41.5



Use No. 2 high pressure lubricant in all high pressure lubricator fittings.
Use No. 4 cup grease in front wheel bearings.
Use good grade gear lubricant in the steering gear, also in the differential and transmission (see page 8).
Use oil on the distributor shaft and generator as specified above.
Place a little vaseline on the distributor cam as outlined above.
For engine oil recommendations see pages 8 and 9.

Fig. 63. **Model "AA" truck lubrication chart.**

(**A**) Lubricate every 500 miles (pressure gun).
(**B**) Lubricate every 2000 miles (pressure gun).
(**C**) Gear lubricant every 2000 miles.
(**D**) Clean and apply light film of vaseline every 2000 miles.
(**E**) Oil every 500 miles.
(**F**) Gear lubricant every 5000 miles.
(**G**) Pack with lubricant—every 5000 miles.
(**H**) 2 or 3 drops of oil every 1000 miles.
(**I**) Fill oil cup every 2000 miles.