

#557

1912

Instruction Book

Operation and Care 1912 Thomas "Six Forty"

Instruction Book



Model M-C

E.R. THOMAS MOTOR CAR COMPANY
BUFFALO, N.Y.

OPERATION and CARE

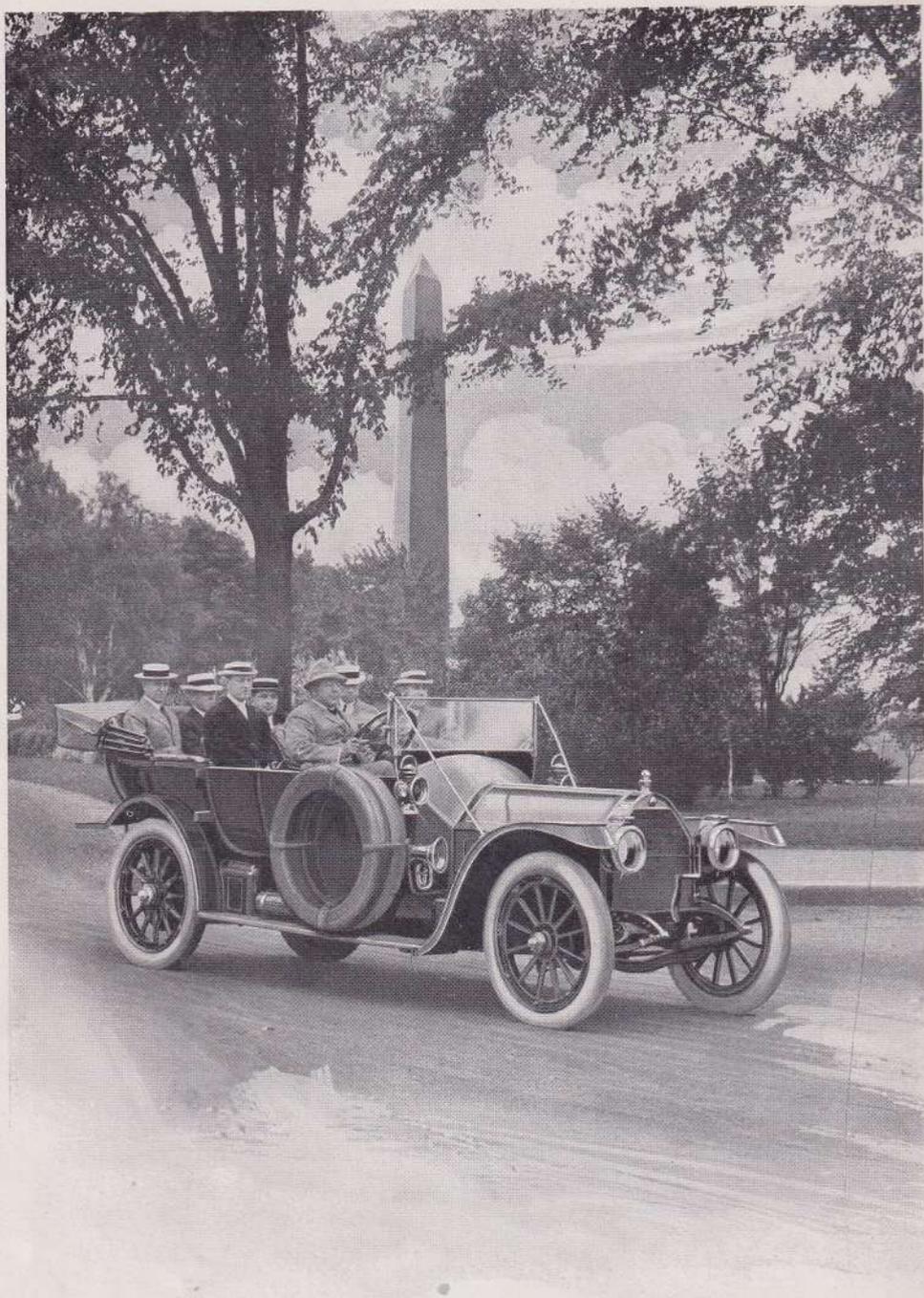
1912 Thomas "Six-Forty"



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E. R. Thomas Motor Car Company

BUFFALO, N. Y.



1912 THOMAS "SIX-FORTY" TOURING CAR AND MEN WHO MAKE IT

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Operating Instructions

It is presumed that all Thomas owners and operators are more or less familiar with the construction and operation of a motor car.

BEFORE ATTEMPTING TO START THE CAR, note the following :

- Fill the radiator with clean water,
- Fill the gasoline tank,
- Turn the gasoline valve just in front of the heel-board, to the position of "Supply."
- Be sure the motor is properly filled with cylinder oil. This can be determined by opening the indicator cock marked "Full"—when oil commences to drop from this cock the crank case level is correct.
- Fill the auxiliary oil tank in the chassis,
- Be sure that all parts of the car wherever necessary are properly lubricated (*See Diagram Page and "Lubrication"*),

BEFORE STARTING THE MOTOR, carefully note the following:

- Bring up air pressure on the gasoline gauge to at least one pound by means of the hand pump on the dash,
- Place the gear shift lever in the neutral position,
- Set the emergency brake,
- Advance the throttle or longer lever not to exceed two inches,
- Pull outward on the compression release lever underneath the radiator,

TO START THE MOTOR ON THE BATTERY

- Retard the spark by moving the shorter or spark lever to the extreme lower end of the sector.
- Push in on the button, of the battery switch, marked "on."
- Start the motor by engaging the starting crank and pulling up quickly with the left hand, when the motor starts push in the compression release lever switch on to the magneto by pushing the magneto button marked "on"; then immediately cut out the battery by pushing the battery button marked "off."
- Never permit the motor to continue to run on both battery and magneto.*

TO START THE MOTOR ON THE MAGNETO

- Advance the spark lever about two-thirds its full throw.
- Push in on the button, of the magneto switch, marked "on," being sure to cut off the battery by pressing the battery button marked "off." Then crank the motor as on the battery, if it fails to start readily, spin the motor rapidly. As soon as the motor starts, push in the com-

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pression release lever. Always pull "up" on the starting handle. Always drive on the magneto whenever possible to do so and then with the spark advanced as far as practicable without causing a knock in the motor. In cold or damp weather it is advisable before cranking to prime the carburetor by pulling the priming rod in front of the radiator, holding it out only a second or two.

TO START THE CAR

Release the hand emergency brake but do not do so until the driver is in his seat. Press down on the left foot pedal, which disengages the clutch. The clutch must always be disengaged when shifting gears.

FIRST SPEED—Move the hand gear shift lever laterally, toward the center of the car, and pull backward, which is the first speed ahead. Engage the clutch slowly and open the throttle either with the hand throttle or accelerator pedal, preferably the latter, until the car gains momentum.

SECOND SPEED—Disengage the clutch, close the throttle, move the gear shift lever forward, to the neutral position, laterally toward the outside of the car, and forward which is the second speed ahead. Engage the clutch easily and open the throttle until the car gains the correct momentum, which can be determined with practice.

THIRD SPEED—Disengage the clutch, close the throttle, move the gear shift lever backward past the neutral point, engage the clutch, and open the throttle to the desired speed of the car. The latter position of the gear is the third or high speed position.

REVERSE—Disengage the clutch, apply the foot brake, and allow the car to come to a stand still. Move the gear shift lever forward to the neutral position, laterally toward the center of the car, and forward, which is the reverse position of the gears. Engage the clutch easily until the desired position of the car is attained.

HIGH TO LOWER SPEED—There are times when the road conditions compel the shifting of the gear from high to lower speeds, such as bad hills, deep sand or mud causing the motor to labor. To do this, disengage the clutch, quickly shift the change gear lever to the next lower position, open the throttle and engage the clutch. This should all be done very quickly so as to take advantage of any momentum the car may have.

TO STOP THE MOTOR—Before stopping the motor place the gear shift lever in neutral position and set the hand or emergency brake. Push in the button marked "off" on either the battery or magneto switch, whichever is in operation, and while the motor is still turning from its own momentum, open the throttle about one inch. This supplies a charge of gas to the cylinders for starting the next time.

General Care

WASHING

In washing the car high grade castile soap is best for removing grease. Use plenty of water, luke warm, and rinse the body thoroughly. Do not allow mud, grease or water to remain on the car longer than necessary. Soak the dirt off with lots of water instead of rubbing it off. After the car is thoroughly washed, dry with a clean chamois skin. Remember that varnish requires some time to harden and when new is easily affected by injurious soaps or compounds. Don't use gasoline on the varnish. Remove heavy accumulations of dirt by washing, rather than by dusting. For light dusting use a woolen duster—not feathers. Do not allow water to remain in the air cells of the radiator, this does away to a large extent with the danger of the magneto getting wet and short circuiting.

BODIES

Bodies not in use should be stored in a dry place with a subdued light evenly distributed. Washing twice a month will preserve the color of the varnish. The varnish is apt to change its tint if a body is stored in a dark place, but generally resumes its natural shade after being in the light for a while. This is particularly true of varnish on a black ground which always has a slight greenish cast.

TOPS

Do not put the top down when wet—this will prevent mildew and rot. Do not pull the top straps too tight when the top is up—then the body doors will not bind.

Clean the outside of the rubber-covered Thomas tops by removing the dust with a dry cloth and using a moist cloth and soap if necessary to remove dirt. Thomas Mohair Tops should be cleaned by rubbing with a cloth dampened in a solution of $\frac{1}{2}$ -lb. of bicarbonate of soda to a quart of warm water. Do not use gasoline for cleaning tops.

The inside of the top should be gone over thoroughly with a whisk broom or stiff brush. For dirt and stains use suds made with clean water and castile or ivory soap. Use a stiff brush instead of a cloth. Dirty water, gasoline, carriage dressings and impure soap are apt to discolor and injure the top. Remove all traces of soap with water after cleaning.

SEAT CUSHIONS

If you carry a rubber apron or anything similar under the cushion see that it does not close up the air vent in the seat cushion. If it does the seat cushion may not afford the maximum amount of comfort.

SEAT COVERS

Thomas Standard Seat Covers may be cleaned the same way as the inside of the top. Do not have them dry cleaned, as the interlining gum prevents the cleaning vapors from doing their work.

CARE OF ENAMELED PARTS

The polish on the enameled parts of Thomas Cars can be maintained by the following preparation:

3 oz. oil citronella,
1½ oz. oil cedar,
1 pt. paraffine oil,
1 gal. turpentine.

Apply with a cotton cloth or waste and rub dry with a clean flannel cloth. The more rubbing the more brilliant the polish.

IN COLD WEATHER

Priming cocks are provided on each cylinder for use if the motor is extremely cold. Do not start with the throttle wide open. Do not allow the motor to run on the battery with a retarded spark.

ANTI-FREEZING MIXTURE

During the cold weather the following is a good mixture to use for a temperature not lower than five degrees below zero:

Alcohol, 15 per cent.,
Glycerine, 15 per cent.,
Water, 70 per cent.

For a temperature not lower than fifteen below zero increase the alcohol and glycerine two per cent., and decrease the water four per cent. Add a little alcohol occasionally to make up for evaporation. Use denatured alcohol in preference to wood alcohol as the boiling point is 10 degrees higher.

A solution of alcohol alone lowers the boiling point of water. Consequently on the warmer days the straight alcohol solution boils easily and evaporates.

Glycerine alone raises the boiling point, but it is more expensive than alcohol and is slightly injurious to rubber, so all in all the combination of the two is best.

Do not use salt or alkaline solutions as they are injurious to metal parts.

Lubrication

Lubrication is the most important point to remember in the care and operation of a motor car.

In the motor, for instance, an excessive amount of oil will cause a rapid deposit of carbon in the combustion chamber; the result being pre-ignition and loss of power.

It is very essential that all the oil used about a motor car should be clean and free from foreign substances.

The transmission and axles should be carefully lubricated from time to time to insure long life to these various parts.

It is also very essential that the correct oil be used in the different units, depending upon the work they have to perform.

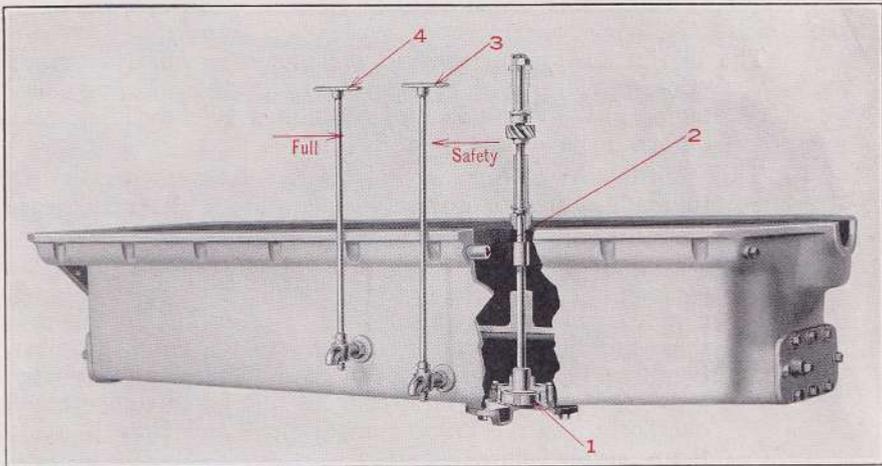


Fig. A

We have found, by costly experiment, which oils give the best result in the various parts of our 1912 car and recommend their use to all Thomas owners. These oils and greases are compounded for us under our own brand. Other lubricants may do the work but we recommend what we know to be right.

If Thomas lubricants are not handled by your garage or dealer—you can order them direct from the ENTERPRISE OIL COMPANY, Buffalo, N. Y.

We are in no way interested in the lubricants specified below or in the house that manufactures them and recommend them only for the mutual benefit of the user of our cars and ourselves and when used according to instructions, lubrication troubles will be avoided.

THOMAS MOTOR OIL—For use in Thomas Motors and oil cups which are shown on oiling diagram.

THOMAS REAR AXLE OIL—For use only in the differential in the rear axle.

THOMAS REAR AXLE GREASE—For packing rear axle housings on each side of the differential Gear Case. This housing holds five and a half pounds on each side of the differential. This grease is so compounded that it does not mix readily with oil and acts as a washer, holding the rear axle oil in place. The housing needs repacking only when the oil shows at end of axle.

THOMAS GEAR GREASE—For use in axle hub and various grease cups wherever found on the car (described as "Cup Grease" on oiling diagram).

Thomas Transmission Gear Case Grease is made by mixing two parts of Thomas Gear Grease with one part of Thomas Motor Oil.

MOTOR

The lubrication system used in the motor is what is termed "Constant level splash system;" a constant level being maintained in the crank case of the motor by the sliding vane oil pump shown at 1, Fig. A.

This maintaining of a constant level is entirely automatic due to the generous overflow openings from the crank case proper to the reservoir below.

The oil pump shown at 1, Fig. A, forces oil through a lead opening in the crank case to the longitudinal pipe 2, Fig. A, cast integral with the lower half of the case. In this pipe there are three openings leading into the crank chamber, two into the crank compartment and one into the front gear compartment. The oil from this latter compartment overflows into the crank compartment and from there to the reservoir below.

From the main oil lead to the crank case is a branch opening leading to the sight feed 1, Fig. B, located on the dash switchboard, from which it returns to the rear bearing of the motor 2, Fig. B.

To determine when it is necessary to fill the motor, try petcock marked "Safe," 3, Fig. A, and when a flow of oil is not obtained, it is then time to replenish the supply.

The main cylinder oil supply is carried in the oil tank, 1, Fig. C, in the chassis frame and filled at 2, Fig. C, through the tonneau floor. This tank carries six gallons of oil and constitutes a reserve supply.

Oil is transferred from this reserve tank to the crankcase of the motor by creating an air pressure of 3 lbs. or 4 lbs. with a few strokes of the hand pump shown at 3, Fig. B, and opening the valve 1, Fig. D, until the oil drops from the petcock marked "Full," 4, Fig. A, as explained above; both valves should then be closed and the motor is ready for another run.

It is advisable to draw off the oil from the motor base once in every thousand miles. The base should then be washed out with kerosene before being refilled with Thomas Motor Oil.

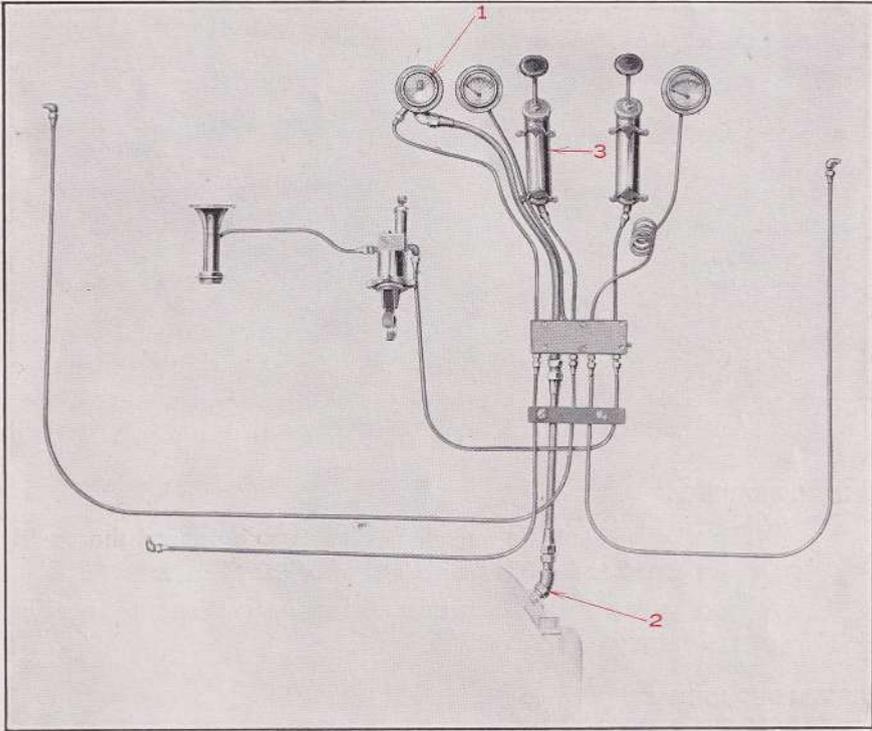


Fig. B

TRANSMISSION

The transmission should be replenished at least once in every 500 miles with "Thomas transmission grease," and the transmission case should be cleaned thoroughly every 1500 to 2000 miles, and refilled with new grease.

In filling the transmission case, the grease should be kept at such a level that the sliding gears will dip about one inch into it. Thomas Transmission Gear Case Grease is made by mixing two parts of Thomas Gear Grease and one part of Thomas Motor Oil.

REAR AXLE

The differential should be filled with "Thomas Rear Axle Oil" once in every 1000 miles and should be thoroughly cleaned and refilled at least once in every season.

The rear axle housings on each side of the differential gear case should be kept packed with Thomas Gear Grease.

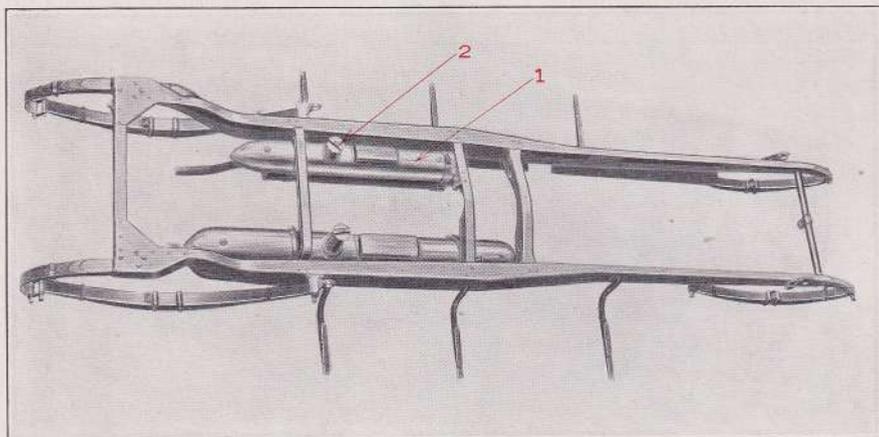


Fig. C

WHEEL BEARINGS

The wheels should be removed every 2,000 miles and thoroughly cleaned and refilled with Thomas Gear Grease.

See Page 17 under adjustments for instructions to readjust bearings.

UNIVERSAL JOINTS

The universal joints are packed when leaving the factory with Thomas Gear Grease and should be carefully examined at least once every 500 miles.

GREASE CUPS

All grease cups on the car should be kept filled with "Thomas Gear Grease," and given a full turn every day. There are 31 cups located as follows: 6 on front springs, 6 on rear springs, 2 on rear axle brake shafts, 2 on rear spring seats, 1 on pinion shaft forward bearing, 1 on torque tube rear upper connection, 1 on torque spring housing, 1 on torque tube block, 1 on clutch trunnion, 2 on water pump case, 1 on timer drive shaft, 4 on steering knuckle pins top and side, 2 on steering arm pins, 1 on speedometer drive, 1 oiler in fan hub.

The above is very important, see schedule of Lubrication Diagram.

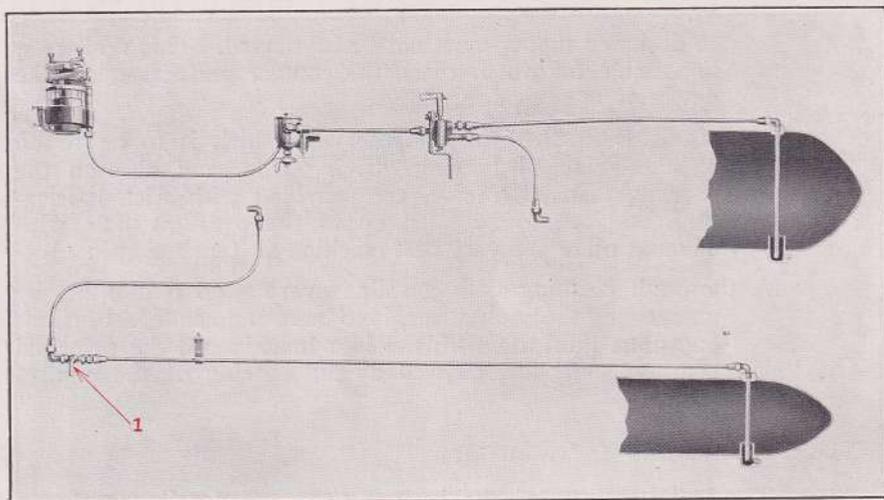


Fig. D

CLUTCH

About once a month all the oil should be drawn from the clutch by taking out the oil plug, 1, Fig. E, and turning the fly wheel over until hole is at the bottom. After the oil has run out, turn the clutch half way around and inject four or five guns of gasoline. Then turn the opening down again and allow the gasoline to run out, carrying any dirt or sediment with it. After thoroughly cleaning the clutch in this manner refill with about $\frac{1}{4}$ pint of Thomas or extremely light cylinder oil. Medium or heavy oils positively must not be used.

MAGNETO

BOSCH MAGNETO—The armature shaft is fitted with ball bearings at both ends, while the shaft carrying the distributor brush is fitted with plain bearings. The front bearing of the magneto should be lubricated once every two months with Thomas or a very light oil; this can be done by injecting a drop or two of oil in the reservoir marked "Oil." On the rear end plate, two lubricating apertures are provided, one connected by a small tube to the ball bearings on the rear end of the armature shaft, and the other connected to the plain bearings of the distributor spindle. The common receptacle for these two bearings should be frequently filled with Thomas or light machine oil in order that the oil reservoir for the plain bearings may not run dry.

No other part of the apparatus requires lubrication; and it may be especially pointed out that the contact breaker is

so designed that it must not be lubricated. This renders it impossible for oil to reach the contact surfaces while the device is in operation.

EISEMAN MAGNETO—The oil reservoir which is to be found on the principal bearing, driving side, and also on the bearing, distributor side, are provided with wick lubricators, and are to be filled up to the overflow hole with Thomas oil or the very best machine oil (such as 3 in 1).

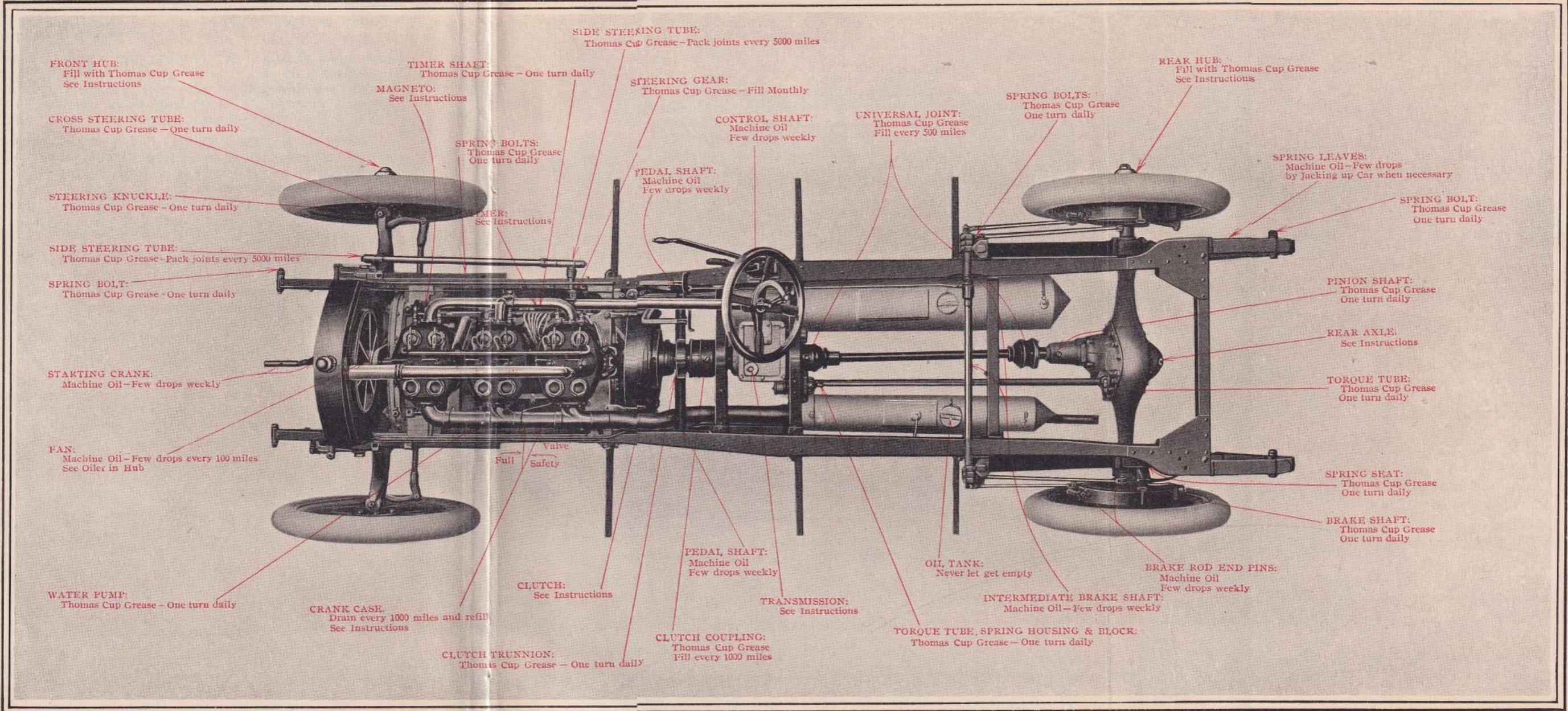
A thorough cleaning with gasoline every 4 to 6 months, by unscrewing the wick screw, is to be recommended. Further, one must lubricate with the best machine oil the principal bearing, cam side, as well as the bearing of the contact lever.

BATTERY TIMER AND DISTRIBUTER

The ball bearings of the battery timer or distributor should receive a few drops of Thomas or fine machine oil once a week. This can be very readily accomplished by removing the distributor cover and shaft and lifting the breaker box proper from its bearing seat, leaving the bearings open for lubrication and inspection.

SPRING LEAVES

About every thousand miles or when necessary the frame should be jacked up so that Thomas Motor Oil can be forced between the leaves. For complete oiling schedule see following diagram.



Adjustments

CLUTCH

The clutch is provided with two separate means of adjustment. If the clutch slips or does not engage properly, ordinarily the trouble can be overcome by washing out with gasoline as described under "clutch lubrication." If this does not answer, remove the *lock nut* (2, Fig. E) on the clutch cover, allowing the *lug washers* (3, Fig. E) to slip over the *lock screw* (4, Fig. E). Turn the clutch finger *adjusting screw* (5, Fig. E) clockwise until the lock screw (4, Fig. E) will enter the next space in the lug washer (3, Fig. E). Make the same adjustment on the other three clutch finger adjusting screws (5, Fig. E), care-

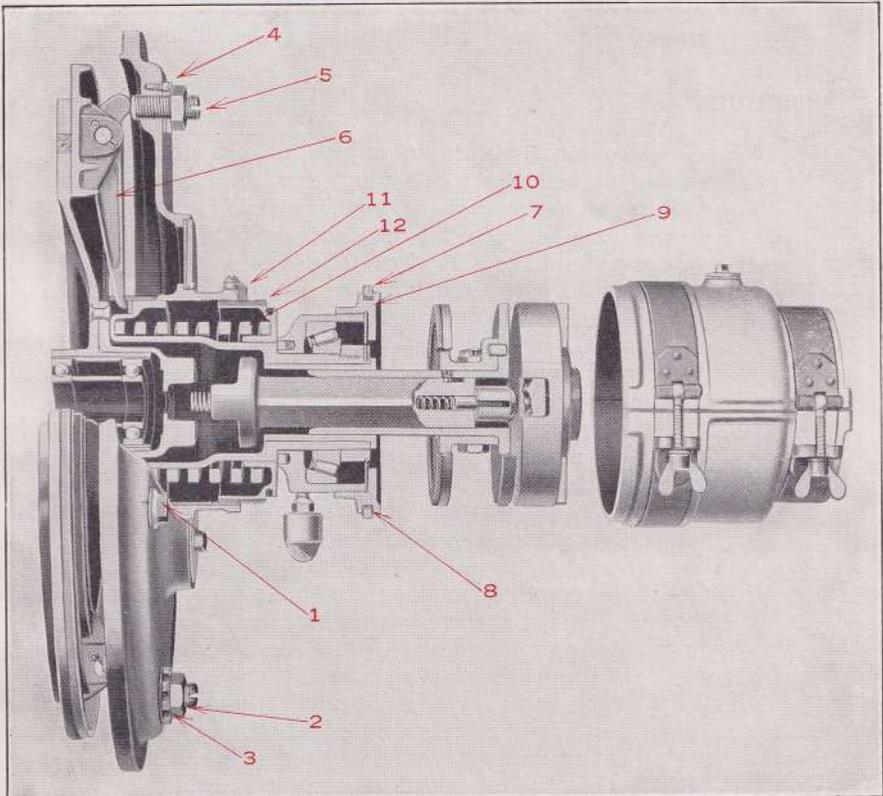


Fig. E

fully noting the tension on each screw and bringing each one to the same tension by turning the clutch finger adjusting screw (5, Fig. E) one or possibly two notches on the lug washer (3, Fig. E). This adjustment is very sensitive and extreme care should be taken to get the same amount of tension on each finger adjusting screw so that the clutch fingers (6, Fig. E) carry the same load.

When the tension on the clutch fingers is increased it correspondingly decreases the throw of the clutch pedal and it may be necessary to compensate by increasing the throw. To do this remove the brake disc key locks and keys (7 and 8, Fig. E) and turn the clutch brake disc (9, Fig. E) one turn clockwise.

When the tension on the clutch fingers (6, Fig. E) is correct and further adjustment is necessary, provision has been made for increasing the clutch spring (10, Fig. E) tension. This is done by removing the lock (11, Fig. E) and screwing the clutch spring adjusting nut (12, Fig. E) one turn clockwise with the spanner provided.

The clutch is adjusted perfectly when it leaves the factory and if properly lubricated adjustments will be unnecessary.

CARBURETOR

No. 1.—Before attempting to adjust the carburetor it is advisable to test the spark plugs for soot, short circuiting due to the formation of small metallic beads, and the proper gap between the electrodes. The magneto spark plug gap should be 4 M M or $1/64$ of an inch.

No. 2.—It is also wise to turn the motor over by hand to determine if each cylinder has its proper compression.

No. 3.—We will suppose that the carburetor has received the proper adjustment at the factory for the altitude in which the car has been tested.

No. 4.—In starting the motor, be sure to advance the throttle lever only a very small part of its entire throw, about one and a half to two inches.

No. 5.—After the motor has been running a few moments examine the gasoline level to see if the fluid has risen to a line marked on the carburetor at point 1, Fig. F.

No. 6.—If the gasoline has not risen to the level or a very little above it, or if it is considerably above the line, screw up or down on the cap marked 2, Fig. F, as the case may require, until the proper level is obtained.

Allow the motor to warm up a little before making any further adjustments and be sure to note just exactly how and where the adjusting screws are set so that you can always come back to the original setting if necessary.

No. 7.—If the motor does not run smoothly at moderately low speeds adjust the low speed screw marked 3, Fig. F, in

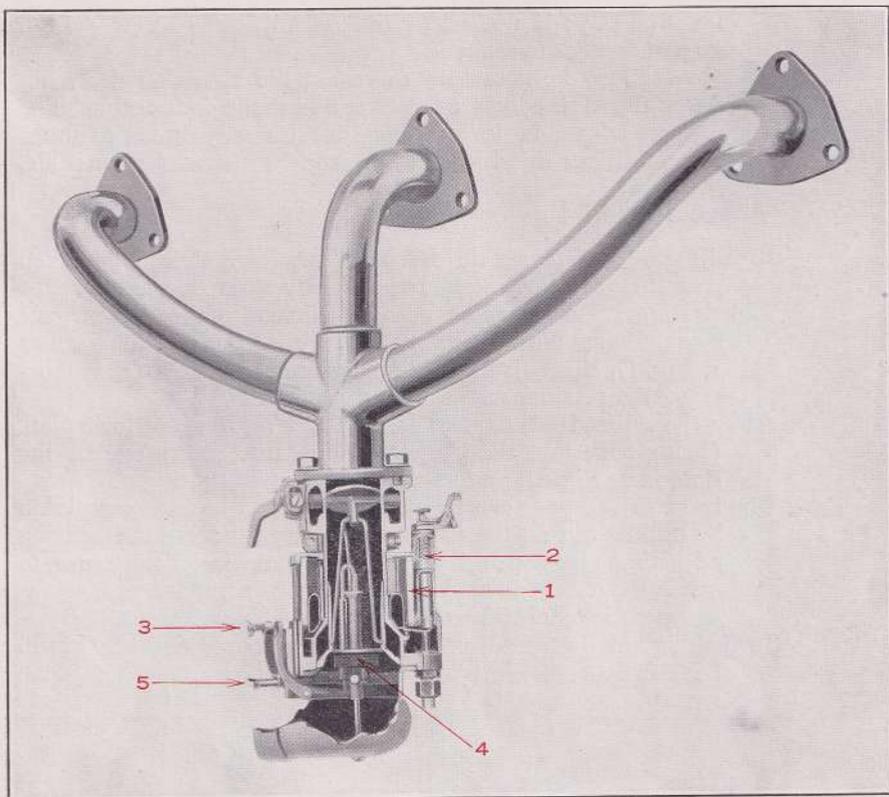


Fig. F

or out a notch or two at a time until the proper smoothness of operation is obtained.

- No. 8.—It may be possible that the motor will now be getting too much or too little air for this low speed adjustment. This can be determined by screwing up or down on the normal air collar shown at 4, Fig. F. Do not move this collar more than one notch at a time in either direction and always pause between changes of adjustment to note the result. *Caution*—Always bear in mind that the car ran satisfactorily at the factory with the original adjustments so that the adjustments needed will be very slight.
- No. 9.—If the moving of the normal air collar improves the first condition obtained, start again as in paragraph seven and see if the last result cannot be improved.
- No. 10.—Work back and forth as per the above until the highest speed of the motor is obtained for that position of the throttle.
- No. 11.—After adjusting as per the above paragraph, open the throttle half way quickly and note if the motor picks

up promptly; if not screw out on adjusting screw 5, Fig. F, just enough to make it.

No. 12.—It may be necessary to repeat the above on the road, especially if the first adjustment is made indoors, as it is always advisable to make carburetor adjustments under the conditions in which the car is to be operated if possible.

AXLE, GEARS AND WHEEL BEARINGS

In adjusting the rear axle driving gears care should be taken that they are not meshed too tightly with one another.

The driving pinion may be adjusted closer to the driven gear by removing the lock plate and turning the retaining collar 1, Fig. G, clockwise the desired number of slots (first loosening the retainer nuts, 2 and 3, Fig. G).

After the desired adjustment is obtained replace the lock plate (being sure that the projection on same enters one of the slots in 1, Fig. G, and re-adjust nuts 2 and 3, Fig. G).

The large driven gear can be adjusted toward the driving pinion by pulling out on the two lock pins and turning the bearing adjusting rings 4 and 5, Fig. G, clockwise, being sure to insert the lock pins in their proper slots after the proper adjustment is obtained.

In making this latter adjustment, the rear cover 6, Fig. G, will have to be removed by taking off the nuts 7, Fig. G.

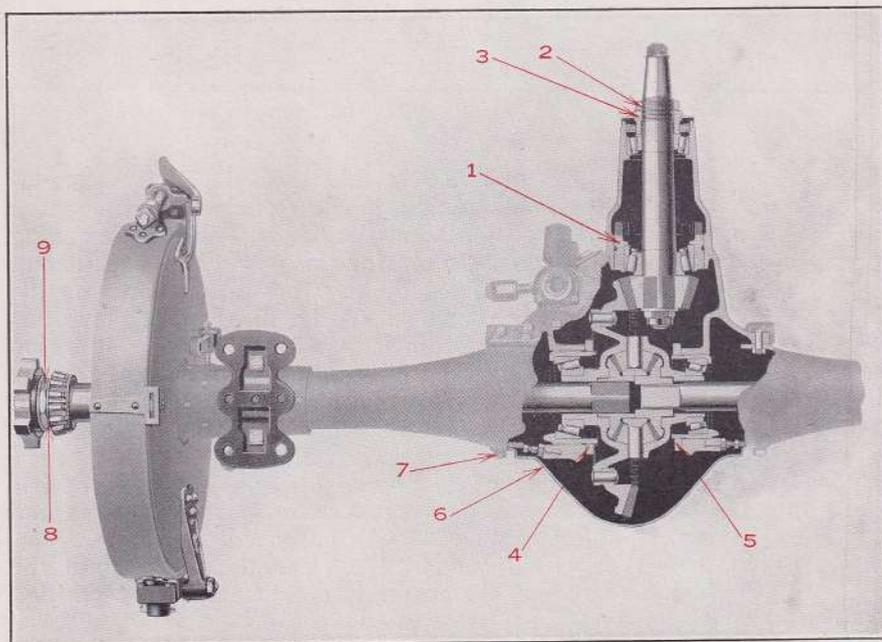


Fig. G

The wheel bearings may be adjusted by means of the adjusting collars 8, Fig. G, and lock nuts 9, Fig. G, for that purpose. Care should be taken that the bearings are not set up too tight and that all lock nuts and cotter pins are properly set afterwards. In adjusting the wheel bearings, one will have to determine by feeling when the adjustment is correct. There should be no perceptible end play and still the wheel should turn freely or oscillate from its own weight.

MOTOR

Air pressure of from $1\frac{3}{4}$ to $2\frac{1}{4}$ pounds should be maintained on the gasoline tank. To increase the pressure carried, screw down on the adjusting screw on top of the mechanical air pump on the motor. To decrease the pressure, raise this same screw, being sure to securely lock same in place after the proper adjustment is obtained.

Valve push rods should be properly adjusted for clearance under the valve stems while the motor is running. The inlet should have about two-thousandths and the exhaust about four-thousandths inch clearance.

MAGNETO—BOSCH

It might not be necessary to adjust the contacts of the make and break mechanism more than once or twice during a season.

The break between the contacts should never be more than 4 M M or $\frac{1}{64}$ of an inch. This can be gauged correctly by using the feeler on the magneto wrench furnished with the tool kit. The adjustment may be accomplished with the screw No. 5 with the contact arm No. 7 in contact with the roller No. 19 on its center line. See Bosch magneto book, page 7, for these numbers. After making the adjustment be sure to lock the adjusting screw in place with the nut provided for the purpose.

MAGNETO—EISEMAN

The gap between the contact points of the Eiseman magneto should be maintained the same as the Bosch, 4 M M or $\frac{1}{64}$ of an inch. This may be accomplished with the adjusting screw No. 3798.

After making the adjustment the screw No. 3798 should be locked firmly by the lock nut No. 4191 provided for that purpose. See Eiseman magneto book, page 10, for these numbers.

If it should become necessary to dress the contact points due to their becoming pitted, care should be used to file them (with a very fine swiss file) so that the contact faces are perfectly square in their relation to each other.

TIMER DISTRIBUTER

It may be necessary to adjust the contact points of the timer interrupter due to slight disintegration caused by the electric current. The gap should be kept the same as on the magneto, 4 M M or $1/64$ of an inch. This is accomplished in practically the same manner as in the magneto except that the distributor body should be removed and the gap adjusting plug (furnished with the instrument) inserted. This plug gives the same action to the breaker arm as the cam in its action.

A small file (which serves as a gauge as well as to dress the contact points) is furnished with each instrument. A circular band, which serves as a cover to the working parts, when moved to the proper position, exposes a small slot through which the file and gauges may be inserted.

Inspection

GENERAL

The value of a careful inspection cannot be too strongly emphasized. Every part of the car should be examined at least twice a month to see that it is in proper condition and that every nut is properly tightened and all cotter pins in place, in fact, there are a great many things, little in their individuality but great in the aggregate, that might cause annoyance to the owner if not given the proper attention.

MOTOR

The motor should be carefully inspected periodically for loose wire connections, proper valve push rod adjustment, leaks in valve caps and spark plugs, compression, magneto and pump couplings, fan bearings, water leaks, see that motor has a sufficient amount of lubricating oil, and in fact numerous small things that will take only a few moments time each day, but may save many hours delay caused by neglect.

CLUTCH

Examine the clutch operating mechanism from time to time to be certain that everything is in proper condition and that there are no oil leaks from clutch cover, or clutch coupling cover.

TRANSMISSION

The transmission should be kept free from oil leaks as far as possible; cover screws should be kept tight and bearing retainers firmly locked in place at all times.

BRAKES

Brakes and brake operating mechanism are very important items to be remembered in the inspection of a car, for in the continued efficiency of the brakes may rest not only the life of yourself but the lives of your family and friends.

In the inspection of brakes see that all brake rods and clevises are in proper condition to stand the strain of continued service and that all rock shafts and levers are working freely.

See that brake bands do not grip the drums when in released position and that they securely lock the wheels when the proper pressure is applied.

GEAR SHIFT

It is also wise to examine the gear shift mechanism occasionally to see that there is a minimum of lost motion and that gears are properly meshed when shifted to the driving position. This can be accomplished very easily by removing the inspection plug in the top of the transmission case.

STEERING GEAR

One of the most important parts of motor car assembly is the steering mechanism.

The steering arms should be looked after frequently to see that they are properly tightened into their sockets on the spindles. The steering balls and sockets should also be examined carefully to see that they are not only properly lubricated but that they are always in a proper state of adjustment.

SPRINGS

Last but not least of all the items to be inspected are the springs and spring clips; the springs looked after so that no rust is allowed to accumulate between the leaves and the spring clips all properly tightened to hold the springs in place under any severe usage.

General Construction

MOTOR

The motor is of T head construction with plain crankshaft and camshaft bearings. Valves extra large and operated by cams through roller push rods of large diameter.

The intake manifold is of the "Y" pipe design and of such size as to give the proper speed of the gases coming from the carburetor.

The carburetor is entirely mechanical in its action, having no adjusting springs to weaken and change the setting; when once properly adjusted will remain so indefinitely for any reasonable changes in altitude.

The cooling system includes centrifugal water pump, cup and ball bearing fan, and water spreader in radiator. This latter gives perfectly uniform radiation of heat throughout the entire surface of the radiator. The fan belt is held tight by automatic spring tension.

The oiling system comprises the crank case oil reservoir, sliding vane oil pump, reserve oil tank with capacity of six gallons, lead pipe to and from sight feed on switchboard, supply pipes from reserve tank to crank case and from hand air pump on switchboard to the tank. The connections on the oil lines as well as on the gasoline and air lines are all of long sleeve solderless design, such as will reduce to a minimum the possibility of their vibrating loose and causing a leak.

The gasoline system takes in all the lines leading from the main gasoline tank in the chassis as well as those from the reserve tank under the front seat of the car. This system also includes the mechanical air pump on the motor and the hand air pump on the switchboard.

The timing gears are all helical cut, mounted on hardened and ground shafts, with thrust absorbed by hardened and ground steel thrust collars. These gears are carried in a perfectly oil tight compartment.

FUEL SUPPLY SYSTEM

All pipe lines from the chassis are led into a junction box on the body dash where they are branched to their several places (gauges and pumps, located on the switchboard). This allows for the ready removal of the body in case of change to limousine or vice versa, without disturbing any of the chassis piping. The chassis pipe lines are all carried in a clamping bracket to maintain them always in their relative position to each other.

COOLING SYSTEM

Water is the cooling medium; being delivered to the cylinders by a centrifugal pump of large capacity; from the cylinders it is forced through the upper manifold to a specially constructed radiator where it comes in contact with cell walls. Air is drawn by the fan through the spaces around the cells, carrying with it any excess heat transmitted from the water in its circulation. From the radiator the water flows by gravity to the pump when the same operation is repeated.

IGNITION SYSTEM

The 1912 Thomas is provided with two separate and independent systems of ignition, each controlled by a switch on the switchboard of the car. The wiring of each system is mounted in a separate housing, the better to protect it from injury and for better insulation. The current supply for one being high tension magneto (Bosch or Eiseman optional) and for the other 6 volt 40 ampere hour storage battery. The battery current is transformed to high tension by a single vibrator coil and distributed to the several cylinders by a high tension distributor driven off the camshaft by bevel gears.

The terminals of the magneto and distributor wires are marked with rings to correspond with the number on the proper socket.

The magneto current is transmitted to the spark plug through individual knife switches to aid in locating any trouble that may arise through incorrect carburetion, injury to the ignition system, or any other cause whatsoever.

CLUTCH

The clutch is of three plate cork insert type, a Thomas patent; the friction surfaces being, one on the steel flywheel, the other on the thrust plate, the manganese bronze driving disc between the two being mounted on imported annular ball bearings. The contact is maintained by a large, square wire, coil spring carried in an oil and dust tight housing. The spring tension is released by foot pedal through yoke and large "Timken" roller bearing, mounted in oil and dust tight cover. The drive from clutch to transmission is through an alignment joint protected by non-rotating dust-tight cover. The clutch is provided with "Raybestos" faced brake collar to prevent spinning when in released position.

TRANSMISSION

The transmission is of the three speed and reverse selective type with special nickel-steel gears and shafts mounted on imported annular ball bearings. The operation of the gears is

through shifting forks mounted on sliding shafts provided with ample guide locks to maintain the sliding gears in correct relation with their mating gears on the jack-shaft.

The main drive pinion is provided with imported thrust bearing to absorb any possible thrust that may be applied to it through the action of the clutch or any other cause.

The transmission as a whole is carried between cross members of the frame by three-point suspension, the driving torque being absorbed by two very generous studs in the transmission case proper.

STEERING

The steering is accomplished by a large 18-inch wheel to worm and sector gear and steering arm through ball and socket fore and aft rod to steering arms on the front axle. The worm and sector gears are mounted on "Timken" roller bearings which tends to make very easy control. The fore and aft rod is provided with springs each side the steering ball to prevent road shock being transmitted to the hand wheel. The hand wheel is provided with three hand grips on the lower vertical and two horizontal spokes; these for ease of driving on long continuous trips. Adjustments are provided for stopping the wheels from taking excessive angularity when making turns.

AXLES

The rear axle is known as full floating type with wheels and differentials mounted on "Timken" bearings and the whole mechanism carried in pressed steel housing. The driving and differential gear carrier may be removed as a unit from the main housing in case of repairs, or for more careful inspection than is possible through the rear cover plate. The construction throughout is of nickel-steel best suited to the purpose for which it is used.

The front axle is I beam construction with steering spindles as well as the wheels mounted on "Timken" bearings. The steering arms and cross tie-rod are of very generous proportions, making for the greatest safety of the occupants of the car.

As in the rear axle, the materials are of nickel-steel best suited to the purpose.

SPRINGS

Front springs vanadium steel semi-elliptic of generous length, provided with nickel-steel clips, and combined with seats that form the lower shock absorber connection; the upper shock absorber connection being a large shoulder stud through the side channel of the frame.

Rear springs vanadium-steel three-quarter elliptic combined with auxiliary springs to absorb the extreme downward action; the recoil being taken care of by extra heavy recoil straps from the frame to the rear axle housing.

Shock absorbers are also used on the rear as on the front to absorb as much as possible of the road shocks. The whole spring suspension is designed to give the easiest riding qualities possible for any car at any price to have.