

applying the battery current to the shunt field. In this manner, the vehicle is retarded, but not stopped, and when the lever is pressed as far back as possible, the mechanical brake is applied to the wheel on the motor shaft and motion is arrested. The electric brake acts most powerfully when at high speed, and it is here that the mechanical brake would experience the most strain, so that by bringing the vehicle to a slow speed before applying the latter, wear and re-adjustment are avoided.

Reversing

To back the carriage, the handle must first be brought to the brake position on account of interlocking action, the foot piece may then be depressed, and on again throwing the handle forward, three reverse speeds are obtained. On reversing, the foot piece returns automatically to the forward running position.

Transmission

Power is transmitted from the motor directly to the rear axle by means of a propeller shaft fitted with a slip joint and two universals.

This construction assures perfect freedom of motion of the rear axle relative to the motor and adds materially to the life of all the parts by not subjecting those parts above the springs to the shocks which the rear axle must withstand.

In the axle and above the worm wheel is the worm, which is of the straight type and is carried on radial and thrust ball bearings, mounted in a unit construction with the worm wheel and differential which are fitted with the same bearing equipment. The whole unit is

designed to obviate adjustments subsequent to its being initially adjusted at the factory.

The torsion rod is swiveled on the axle housing and at its forward end it swings from the motor on a ball and socket hanger and it is so hung as to counteract only the tendency of the axle to turn on its own axis.

The six spline type of shaft end is used in the propeller and drive shafts, the latter being arranged so that they together with their hub flanges can be withdrawn without disturbing either wheels or the differential.

Brakes

A pair of powerful internal expansion brakes operate in drums on the rear wheel hubs, each brake consisting of a pair of shoes lined with asbestos and brass wire composition and connected through a suitable train of levers to a foot piece. The shoes are expanded by a cam which can adjust itself so as to equalize the pressure and can be adjusted from without by forcing down a screw which spreads them apart.

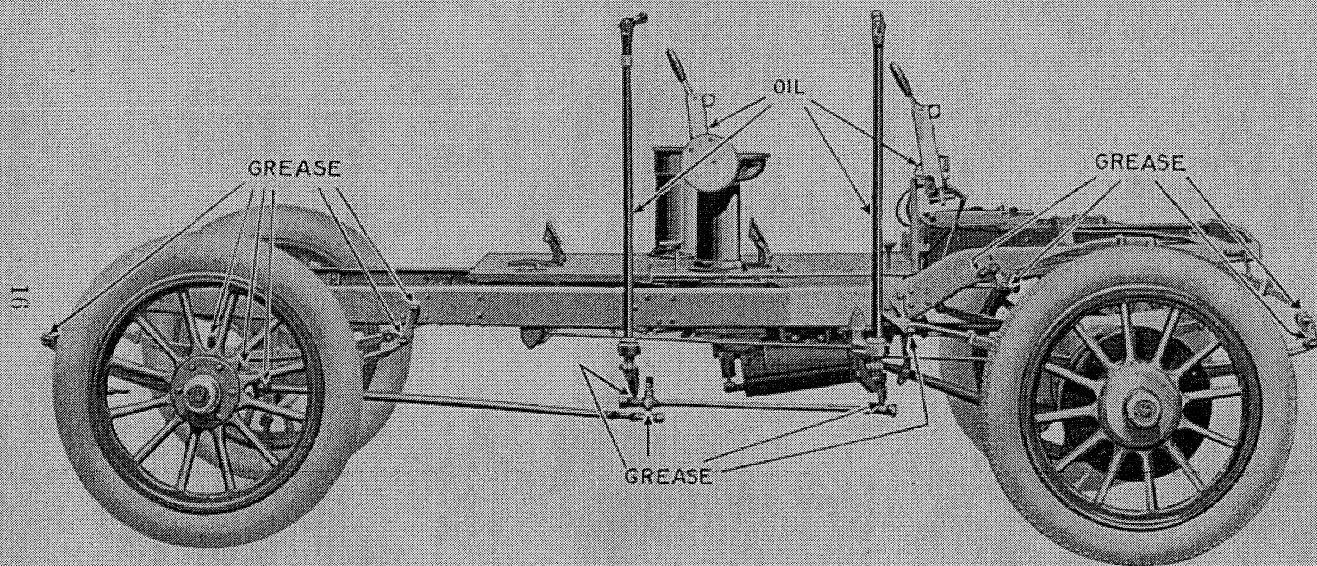
Steering

No pains have been spared to make the steering gear as simple as possible, and at the same time making the joints perfectly secure.

A ball thrust bearing is provided at each of the steering spindles to make the handling of the car as easy as possible.

The ball and socket joints are large and their adjustments are carefully locked.

A proper proportioning of the length of the various levers has resulted in a system that works freely, and at all times brings the carriage under ready control.



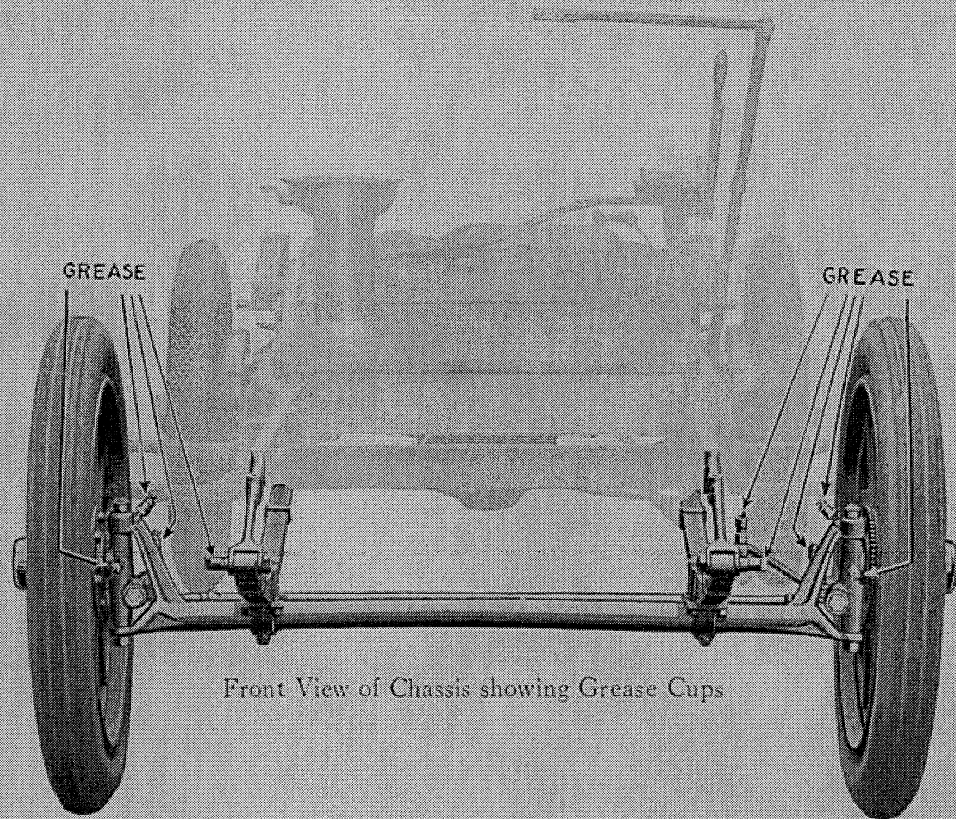
Side View of Chassis showing Oil and Grease Cups

General Care

Oil cups and grease cups have been provided at all points wherever wear is possible and free use of lubricants is necessary.

In oil cups use a good grade of engine oil.

In grease cups use cup grease.



Front View of Chassis showing Grease Cups

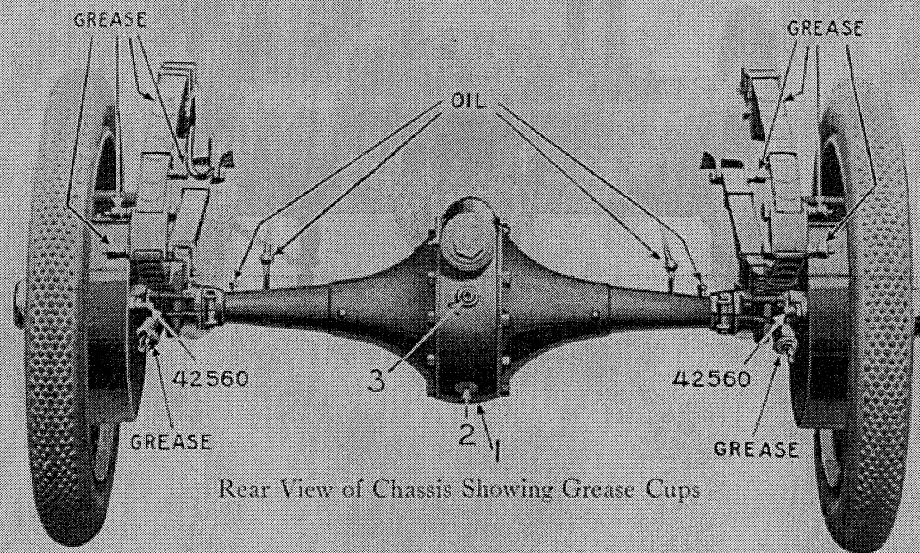
General Care of Steering Gear

In spring bolts use cup grease.

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In the oil cups use good grade engine oil.

All points of wear have been provided with adjustments and take-up devices. Any radical adjustments should be undertaken only by some one familiar with mechanics.



Rear View of Chassis Showing Grease Cups

Hub Brake Adjustment

To adjust hub brake shoes for wear: Raise both wheels from the floor by means of jacks. Then turn adjustment screw No. 42560 until satisfactory braking effect is obtained. (This can best be judged by running the motor with the rear wheels jacked from the floor and operating foot brake from the seat.) Adjust so that wheels have about equal speed when brake is applied. A locknut is provided for maintaining the adjustment of the screw No. 42560. This adjustment should be made only in case shoes become worn. After making any of these adjustments, be sure that the wheels turn freely when foot brake is in off position. (Do not run motor on the two highest speed positions.)

General Care

21 Three openings into the rear axle are provided. These openings are fitted with generous-sized pipe plugs. The axle may be drained completely of old or dirty oil through No. 1 and when it is drained to refill or replenish the supply of oil in the axle, take out No. 2 and No. 3 plugs and pour oil in No. 3 until it overflows out of No. 2.

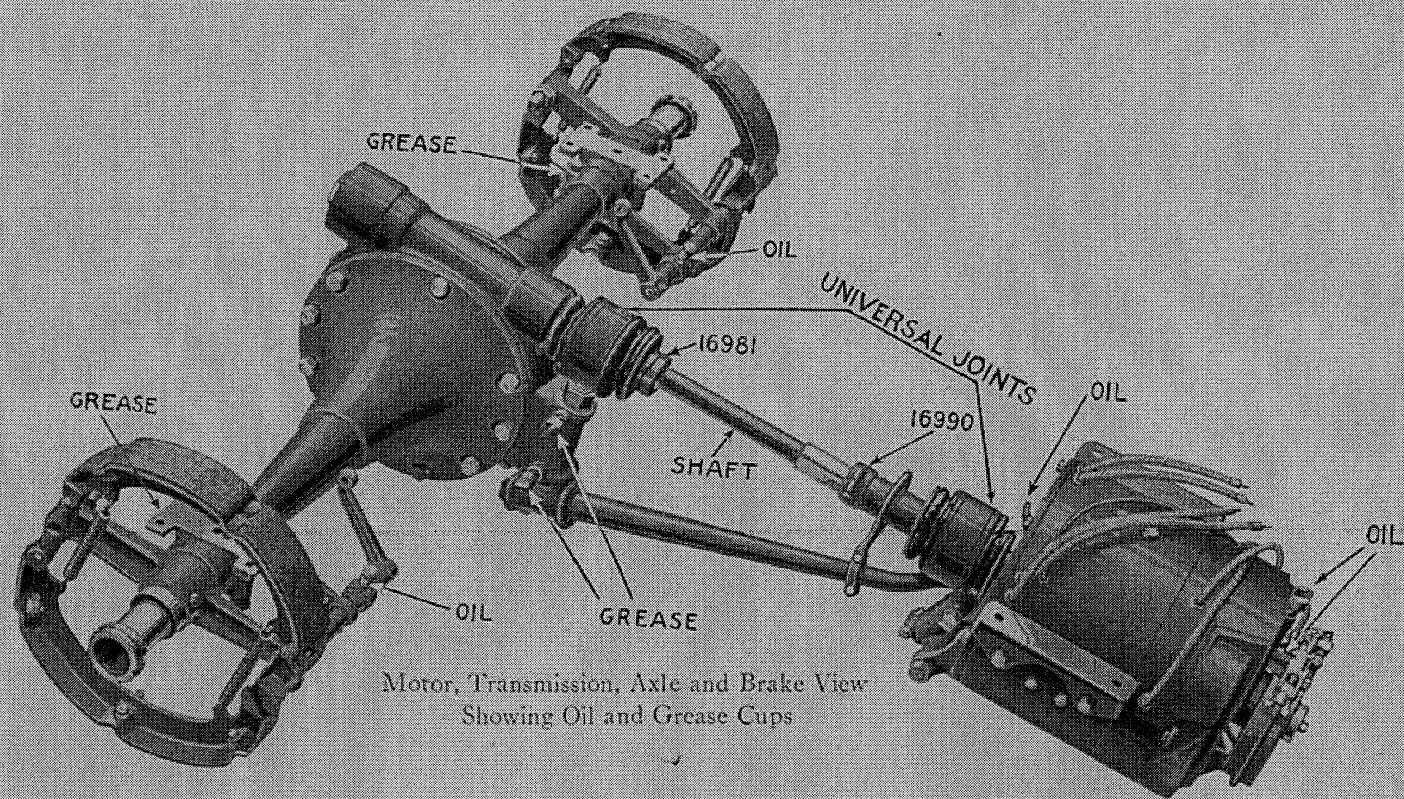
A pure castor oil (unadulterated with mineral or animal oil) should be used in the rear axle worm housing, under ordinary conditions of temperature. During extremely cold weather a good mineral oil should be used. A change in spring and fall is recommended. At all other places on the rear axle cup grease and suitable bearing oils may be used.

The joints at the ends of the brake rods should be oiled frequently.

Use cup grease in all grease cups.

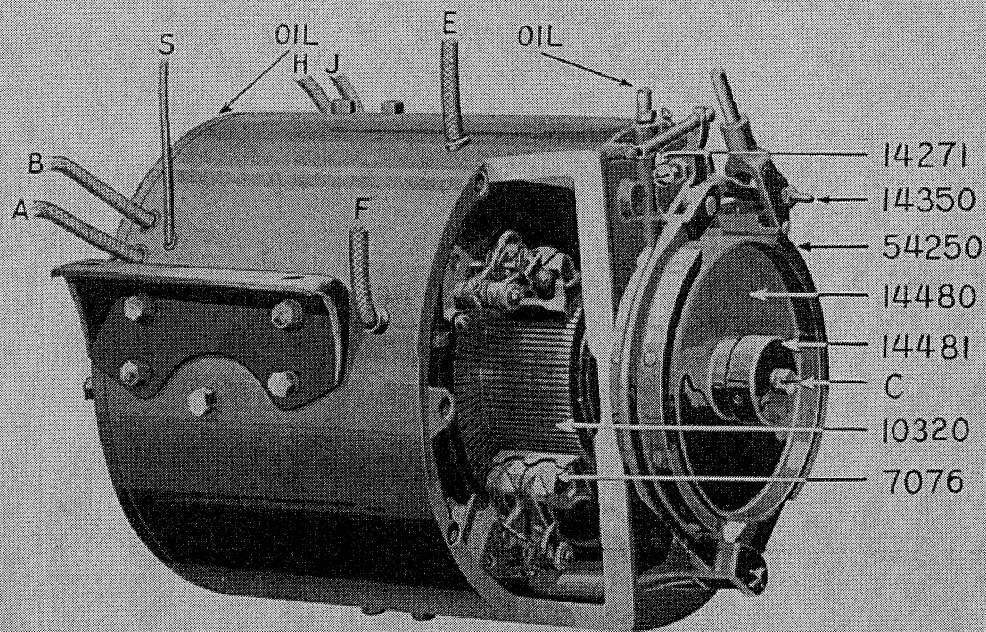
Use good grade of engine oil in all oilers.

To oil rear wheel bearings remove pipe plug in end of hubs inside of hub caps.

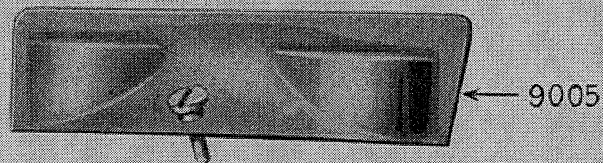


Motor, Transmission, Axle and Brake View
Showing Oil and Grease Cups

23 An extra supply of grease should be put in the universal joints, each 90 days. This may be done by removing the nuts Nos. 16981 and 16990 and pushing the shaft forward into the joints at rear of motor until the rear end of shaft is free of the rear joint. The shaft may then be pulled out of the front joint. Both joints may then be filled with grease and the shaft replaced, nuts put in place and securely locked. All oil and grease cups should be supplied with lubricant at least once every week or two.



View of Motor showing
Oiling Places



General Care of Motor

The two oil covers lead to the ball bearings in the motor yokes. A good grade of light cylinder oil is recommended for these bearings.

25 The commutator No. 10320 should be at all times kept clean, free from any gummy or gritty substance. The carbon brushes No. 7076 should make perfect contact with the surface of the commutator and should be replaced with new ones when worn out. These brushes are originally $1\frac{5}{8}$ inches long and should be replaced with new ones as soon as the measurement is reduced to $1\frac{1}{4}$ inches. It is safer to replace these brushes often, rather than allow them to become too short. Very serious damage may result from using brushes that are too short or ones that make poor contact with the commutator. Brushes that are too short or that are making poor contact will pit, burn and blacken the surface of the commutator. Replacement of brushes should be made only by an experienced person.

The motor leads are lead out of motor through insulated holes. These holes, lettered J, H, B, A, S, E and F correspond to the letter contacts on the controller into which they are connected.

The motor brake may be adjusted for wear by means of the winged nut No. 14350. Clearance between brake jaws and wheel may be adjusted by means of the screw No. 14271.

To remove brake wheel from armature shaft, take the $\frac{5}{8}$ screw C out of the cap 14481. A $\frac{1}{2}$ -inch, 12-pitch bolt, 3 inches or longer, or a cap screw may then be screwed through the threads in the cap and up against the end of the armature shaft. Continue to turn this screw and the pulley will be drawn off the shaft.