

The gear case is made of cast iron, and fastened to the pump base and motor base by means of ten cap screws, a leather gasket being inserted to make the joint air tight. Two holes, tapped and fitted with plugs, serve to drain away any superfluous oil, leaving only the proper quantity to lubricate the machine.

The brush holder yoke is of cast iron, and is fastened to the front bearing cap by a quarter-inch screw through a slot, which is for the purpose of giving the proper backward lead to the brushes.

The two brush holders are made of brass throughout. The main body is bolted to the yoke through a vulcanite bushing, and carries a lever arm. A small tension block is attached to this arm, bearing on the brush, which is of carbon, the necessary tension being supplied by the spiral spring. The leads are sweated into the lugs, one on each holder.

The shaft of the armature is made of machine steel, one end tapered to receive the pinion, which is held in place by a cotter key, washer nut, and split key. The part of the shaft adjoining the pinion fits into the rear bearing; next is placed an oil guard of cast iron; and next to that the two end plates, between which are the laminations, 239 in number, all held together by a wrought iron nut. Adjoining the nut is the commutator sleeve and commutator wedge holding the commutator segments, 105 in number. The segments are insulated from the sleeve and wedge and each other by mica. The wedge goes on to the sleeve, which is threaded to receive a disc screwed tightly upon the wedge and secured to it by four $\frac{1}{4}$ " machine screws to obviate any possibility of its unscrewing. An oil thrower is firmly fastened to the shaft by means of a taper and forced fit. The remainder of the shaft fits into the front bearing. The bearings are made of brass, and each is equipped with an oil ring.

The laminations are of soft sheet iron .015" thick, and punched out on a machine. The armature shaft is furnished with a longitudinal slot, and the laminations key into this slot. The slots are 53 in number, $\frac{1}{16}$ " deep and .17" wide. Each lamination is of 7" outside diameter, and is varnished for insulation purposes to reduce eddy current losses as much as possible.

In the armature winding there are 53 slots and 106 coils. There being but 105 commutator bars, 105 coils are connected up, the remaining coil being idle and put in to complete the winding. Each coil is form wound and taped, consisting of 10 coils of No. 21 B. & S. gauge, double cotton-covered wire. There are 4 composite conductors in each slot, and as each one contains 10 wires, the total number of conductors in each slot is 40, making 2120 in the whole winding, or 2100 leaving out the idle conductors,