INSTRUCTIONS

for the Care and Operation of

AUBURN

4-44

MODELS

AUBURN AUTOMOBILE COMPANY

AUBURN, INDIANA, U. S. A.

The following is meant as a guide for the 1923-1925 Gardner four cylinder car.

The Auburn 4-44 was built in 1925-1926 and used the Lycoming CF engine. A four cylinder five bearing engine very similar to the Lycoming CE engine used by Gardner from 1923-1925.

Caution should be used with this guide as the two engines are not identical.

Use double sided printing and
trim bottom and side of print out.

General Description of Auburn 4-44 Engine

CYLINDERS: Special grade gray iron cast en bloc; integral water jacket; water circulation around barrels and large water passages around valves. All blocks are subjected to a high water presure to insure against leaks.

CYLINDER HEADS: Close grain gray iron; detachable, permitting easy access to valves and pistons; large water passages around spark plug bosses and over combustion chambers. Attached to cylinder by eighteen 1/2″ studs closely and equally spaced.

CRANKCASE: Upper half, close grain iron; thoroughly ribbed to give maximum strength and rigidity; upper half flywheel housing integral. Oil reservoir, or lower half, pressed steel with cork gaskets used to insure oil tight union.

PISTONS: Special design, lynite split skirt type; reinforced at open end and around piston pin bosses; very light in weight; accurately ground and fitted with four individually cast rings.

PISTON PINS: Made of case hardened steel, drilled hollow, hardened, accurately ground and held stationary in rod by a special locking device.

CONNECTING RODS: Drop forging, designed especially for light weight; 30-40 Carbon steel; "I" beam section; double heat-treated to insure strength, refinement, and toughness of material. Lower ends ground to guarantee perfect seat of bearing metal.

BEARINGS: Bronze back, babbitt lined, main and connecting rod bearings are used.

VALVES: All valves, whether intake or exhaust, are interchangeable.

VALVE TAPPETS: Mushroom type; fitted with hardened steel adjusting screws and lock nuts.

GEARS: The camshaft and generator are driven through composition gears with 1″ face.

CAMSHAFT: Drop forging; cams integral. All bearing surfaces and cams are hardened and ground accurately to size. Every cam is tested with a sceleroscope for hardness.

FLYWHEEL: Cast iron completely machined and perfectly balanced. Provided with teeth for starting motor.

IGNITION: As the engine is designed for battery ignition the distributor drive shaft is mounted in the gear case and driven from the camshaft through two spiral cut gears.

LUBRICATION: Full force feed. Entire lubricating system contained in upper half of crankcase. Pressure controlled by opening and closing of throttle and not by speed of motor, thereby insuring maximum pressure when motor is under load.

COOLING SYSTEM: Engine is equipped for Thermo-Syphon cool-

ing system. Fan is mounted on adjustable bracket and driven by a 1¼" flat belt from crankshaft.

OIL PUMP: Gear type, mounted in upper half of crankcase and extending into oil reservoir. The lower end of pump is always immersed in oil requires no priming. The construction permits oil reservoir to be removed without interfering with any part of lubricating system.

INTAKE MANIFOLD: Integral with exhaust; designed to completely vaporize gases and give equal distribution.

Instructions for Care and Operation of 4-44 Engine

PISTONS: The pistons are readily removable without removing cylinder head. Drain off the oil. It is not necessary to drain the water system unless you intend removing the cylinder head. Remove all cap screws attaching the oil pan to the crankcase and gear case.

With a hand crank, turn the crankshaft until either 1 and 4, or 2 and 3 pistons are on lower dead center. Remove the cotter pins, nuts, and take the caps off the two lowest rods first. With the starting crank, turn the crankshaft until the piston will slide by between the throws. Then reassemble the caps immediately to the respective rods from which they were removed.

CONNECTING RODS: The connecting rod caps must be replaced in exactly their original position. For example: No. 1 rod and cap have a figure "1" stamped on the side of the rod and also on the cap. This number must be on the same side.

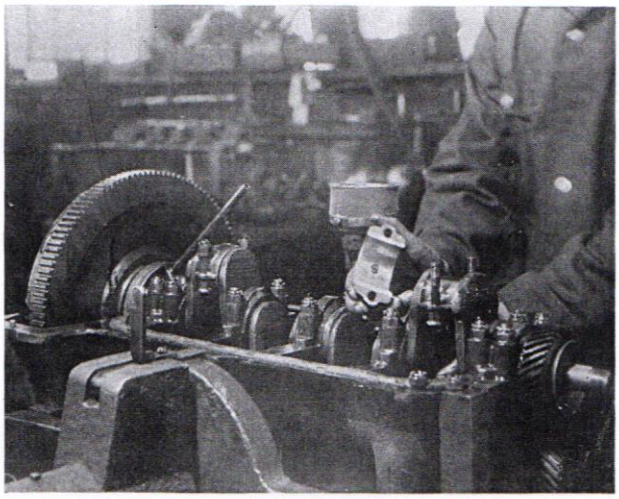

Fig. 1.—Removing Connecting Rods. Hold rod in position when backing off nuts and removing cap.

The connecting rod bearings, both upper and lower halves, are anchored in the rods and caps by two No. 12-28 x 7/16″ flat head brass machine screws. No shims are used. The clearance between the bearing and the shaft is set at the factory .0015. This clearance is checked by using a piece of paper .0015″ thick and 1-1/8″ square. The paper is assembled between the shaft and bearing, and the nuts are drawn up tightly. The rod with the paper in place should support its own weight on the shaft, but it should be possible to move it with very little pressure.

The connecting rod bearing total side clearance is from .004″ to .006″. Never exceed this clearance or the danger of over oiling will result.

Adjustment should be made when wear of .004″ or more has taken place. The work of adjusting the connecting rod bearings should be undertaken only by an expert mechanic in a properly equipped Service Station. Adjustment can be made by filing off the face of the cap. Care must be taken in filing to see that the surface is kept straight.

A loose connecting rod bearing is usually most noticeable on a hard pull, and an experienced mechanic can usually determine which bearing is giving the difficulty by listening closely or by removing the oil pan and noting any looseness in the cap. Pressing against the cap and rocking the crankshaft at the same time will usually enable the mechanic to determine which bearing is in need of adjustment.

GRINDING VALVES: It is necessary to regrind the valves in their seats whenever they become sufficiently pitted or scored to cause loss of compression. To remove the valves, drain the water and remove the cylinder head as described in the paragraph relating to the cylinder head and gasket.

Remove the valve cover plate from the side of the engine, and with a suitable valve lifter raise the valve springs and take out the valve spring seat supports. Be careful that the supports do not drop through the oil holes in the cylinder into the crank case. Remove the valve spring seats and springs, then lift out the valves.

When grinding, it is advisable to place under the head of the valve a spring of sufficient tension to hold the valve away from its seat when not under pressure from the grinding tool.

Valve grinding compound may be purchased from any accessory store and is usually sold in combination tins containing both fine and coarse grades. A little of the coarse grade should be placed on the valve and with an oscillating movement of the valve it should be worked into the seat. Always bear lightly on the valve and be careful not to make more than 1/8 to 1/2 a revolution of the valve before reversing its direction of motion, otherwise grooves in the valve face will result.

When all pits and black spots have disappeared and the valve presents a dull, silvery appearance, finish the grinding with a fine compound. The valve face should have a uniform surface, free from grooves and pits, but should not necessarily have a polish. The valve acquires a glassy polish while in use. Each valve should be ground and returned to the seat from which it was removed.

An excellent test to determine whether a perfect seat has been ground is as follows: With a soft lead pencil mark lines across face of valve head,

spacing them approximately 1/8″ apart around the entire face. Then replace the valve and make a quarter rotation backward and forward. All lead pencil marks should be broken. If any are not, continue grinding until such time as all pencil lines are broken, which indicates that the valve is seating perfectly on its entire surface.

Remember that all of the pencil lines are not to be completely erased but should be broken at one point on the seat where the valve comes in contact with the seat in the cylinder block.

After regrinding, make certain that every trace of grinding compound is removed as well as cloth or other material used to prevent the grinding compound from reaching the cylinder bores.

CYLINDER BLOCK: The cylinder block is made detachable to promote accessibility and to facilitate repair work.

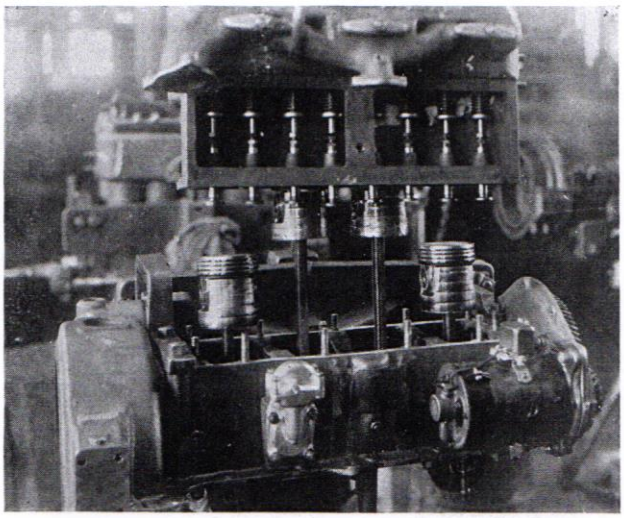

Fig. 2—Removing Cylinder Block. Rods Nos. 2 and 3 in uppermost position to avoid possibility of beading.

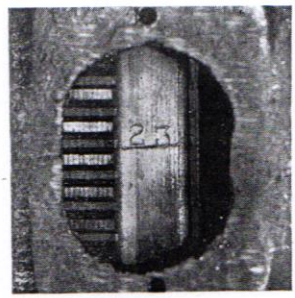

Fig. No. 3-A

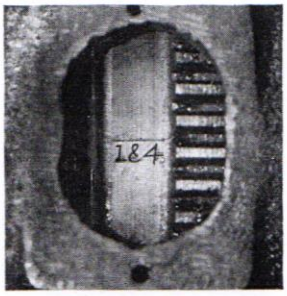

Fig. No. 3-B

Flywheel Timing Marks: A, used when removing and replacing Cylinder Block; B, used when timing engine.

When removing, turn the crankshaft until marks 2-3 D. C. on the flywheel align with the center mark on the housing. This operation will bring pistons 2 and 3 on top dead center, largely avoiding the possibility of bending the rods when the block is lifted off.

When replacing the cylinder, it is very important that all cylinder base stud nuts be drawn down as tightly as possible. A loose cylinder will cause a dull heavy knock or pound very similar to a knock caused by a loose main bearing. When attempting to locate a motor knock it is well to see that these nuts, especially the ones at the extreme front and rear ends of the cylinder block, are drawn down tightly.

PISTON PIN: After removing the connecting rod and piston as directed above, test the pin for looseness in the piston bosses. The pin is held in the connecting rod by means of a bolt which passes through the sawed end of the rod and engages in a notch in the piston pin, clamping the pin tightly and preventing it from turning in the rod. A loose pin will cause a knock, in which case replacement is necessary.

It is very important when reaming the bearings in the piston pin bosses to see that the holes are reamed smoothly and are in perfect alignment so that the pin will fit properly.

When fitting new pin to piston, first place the piston in hot water for several minutes. The heat will expand the piston pin hole, after which the pin should be inserted. When a new pin is assembled and the rod is held by the piston, its free end will, with a slight push, fall of its own weight.

Before installing in engine the rod assembly should be checked for squareness.

PISTON RINGS: When the piston rings become worn to any extent, immediate replacement should be made. In fitting new rings to pistons, they should have about .0015″ side clearance between the ring and the piston groove. The gaps between the ends should be from .006″ to .010″.

MAIN BEARINGS: The main crankshaft bearings are of the bronze back babbitt lined type. No shims are used and adjustment is secured by filing off the faces of the caps the same as described under connecting rods.

The proper clearance between the crankshaft bearing surfaces and the bearings is from .0015″ to .002″. This clearance can be checked in the same manner as described in the paragraph on connecting rods. A side clearance of from .0015″ to .0025″ is allowed between the bearing flange and the fillet on the crankshaft. Use a feeler gauge to check this clearance when installing new bearings.

Never fit main bearings so tightly that the crankshaft cannot be turned freely by hand with the piece of paper .0015″ assembled between the bearing and shaft. This insures the proper amount of oil film. Adjustment should be made after wear of .003″ or more has taken place or only at comparatively long intervals.

However, overheating or overloading a new engine, due to operation without a sufficient quantity of oil or with an inferior oil, is sure to cause loosening of the bearings by the melting of a small portion of the facing.

A loose bearing always causes in an engine a knock of a magnitude depending upon the degree of looseness. It is readily discernible to