



Ford Service And Repairs



Reboring and Reaming Main Bearings of Cylinder Block After Rebabbiting

While rebabbiting is a "foundry" operation, which does not require much mechanical skill, or great accuracy, the reboring and finishing of these rebabbitted bearings is a "machine job," which requires great care and accuracy in order that the three main bearings may not only be in alignment with each other, but at the proper center-to-center distance from the Ford cam shaft as well.

If the crank shaft is not accurately aligned, with regard to the cam shaft, then the timing gears will be noisy, and the valve timing may not be quite as accurate as it should be, when the timing gears are installed.

In shops doing a great amount of reboring of the main bearings of the Ford cylinder block, the most accurate and economical results can be obtained from the use of expensive power driven, or specially built machine.

There are now on the market a great number of excellent types of the hand and power-driven reboring fixtures, which are readily and easily attached to the Ford cylinder block. These, if properly attached and adjusted, will produce a job of the same qual-

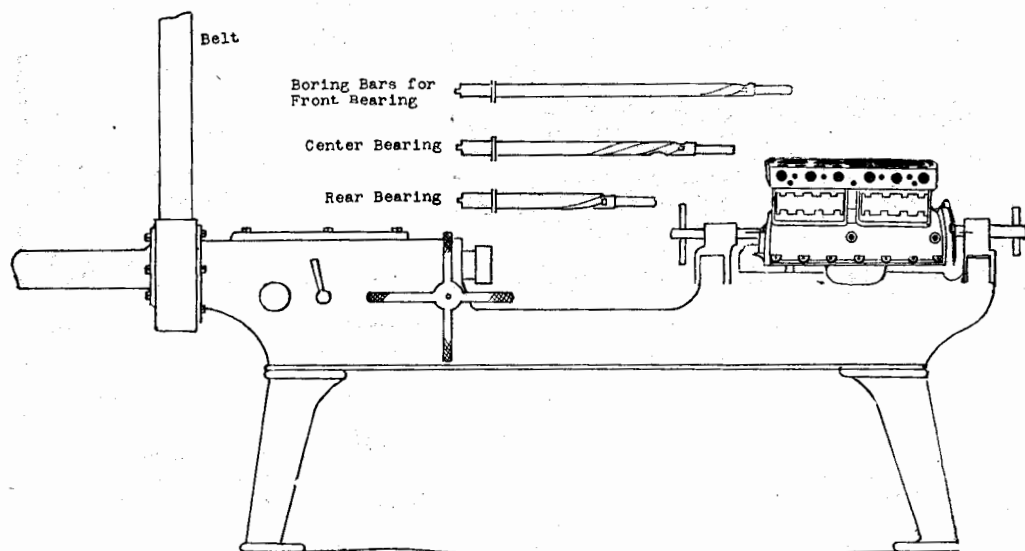
ity and accuracy as that obtainable through the use of the most elaborate and expensive machines.

For those shops, in which reboring main bearings is only an occasional repair, the hand-operated type of reboring fixture is preferable, and will give excellent results.

Whenever the old crank shaft is to be replaced in new bearings then the cutting bar should be set to cut the bearings the correct size to fit that particular worn crank shaft. While all new Ford crank shafts are of practically the same size or diameter, this does not apply after the crank shaft has been in service for any length of time.

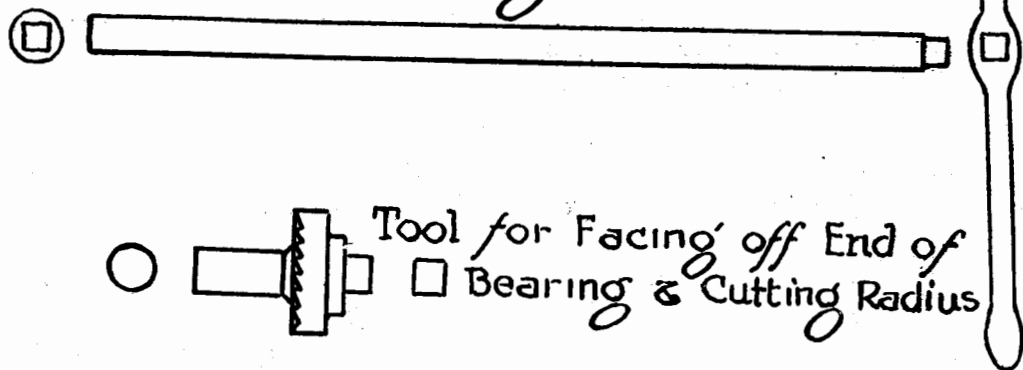
As a rule, the conditions which caused the cutting and wear of the babbitt bearings, are apt to have caused some wear of the steel of the crank shaft also. We have seen cases where the crank shaft had been reduced in diameter as much as .010 to .020 inch.

And if the cutting tool for reboring the bearings is set to the size for a new crank shaft the bearings will certainly be too large and too loose for a correct fit. This is one of the refinements of shop practice that makes for good work and prevents "come-backs."



Special Babbitt Boring Lathe.

Bar for Facing Tool.



There are now on the market various types of aligning reamers, or reamers made with inserted, adjustable blades. These blades can be readily adjusted to any desired diameter of cut.

Generally speaking, it is more important to have a clean, smooth surface on the cast babbitt metal, when a reamer is used, as the reamer has a wider cutting surface, and is not usually designed to take out as much metal as is the shorter blade of the cutting bar.

It is suggested that in any shop attempting to do much rebabbiting of main bearings that both the reboring bar and the aligning reamer be used. The reboring bar should be used to remove the stock, while the finished surface is obtained with the reamer.

Another advantage in the use of a reamer is that it is often desirable to overhaul a motor, when it is not really necessary to rebabbit the main bearings, as the bearings are sometimes somewhat out of shape. Also, in many cases, it is desired to install a new crank shaft, which, being larger in diameter than the old worn crank shaft, leaves enough metal for refinishing the main bearings, without the necessity of rebabbiting.

SETTING REBORING TOOLS.

Every manufacturer, making a portable babbitt boring fixture, furnishes directions applying to his own particular make of machine, but there are certain other directions which apply to all makes of machines.

With every reboring machine is furnished a small block, or gauge. These gauges vary in design, but all are intended to perform the function of adjusting the cutting tool to the proper diameter for making the bearing fit a standard, new crank shaft.

When one desires to set the cutter, to cut a diameter of say .008 inch diameter smaller than the standard, one can use a thickness or

"feeler" gauge that is one-half the desired change in the diameter; in this case being .004 inch.

In setting the tools for reboring, one should remember that a "running" fit requires about .002 inch clearance, to give room for the oil. Now, the Ford crank shaft is just $1\frac{1}{4}$ inches in diameter and, if we cut the babbitt about .001 inch smaller, or even of the same diameter, this will leave .002 or .003 inch of the babbitt metal, for the "burning-in" of the bearings.

In cutting such a soft material as babbitt metal, the cutters should have considerable "lip," or a sharp edge, like a plane, in order that the soft metal may not "crowd up" around the cutting edge and be pulled off, instead of being cut off, as it should be.

SEQUENCE OF OPERATIONS.

Assuming that the bearings have been properly babbitted, the face of the cylinder block should be trued up with a file, so as to eliminate any burrs, fins, gaskets, or other irregularities which are sometimes encountered.

It is suggested that three .002 inch shims be placed on each side of the front, center, and rear main bearings—between the cylinder block and the caps. Now the caps should be bolted down as securely, as if the crank shaft were permanently installed.

If the work is to be done on a specially designed machine, or if the work is to be done on one of the hand-operated fixtures, the fixture should be properly aligned with the cam shaft bearing holes, and properly clamped to the cylinder block, using the bolts provided for this purpose.

Care should be taken that the abutting faces, of the fixture and of the cylinder block, are free from grit and dirt, which might otherwise tend to cause inaccuracies in the alignment.

Special pins are provided to slip into the holes in the cylinder block, where the cam shaft bushings are placed. Then the fixture is aligned, with these pins, in order to get the correct center-to-center distance between the crank shaft and the cam shaft.

After clamping the fixture in place the bearings of the fixture itself should be well oiled so that no undue friction or excessive wear will occur in the reboring tool.

Assuming that all cutters have been set, to cut to the same diameter, the boring operation can now proceed.

In most of the reboring machines the main bearing caps have to be removed when the fixture is taken off.

FACING BEARINGS.

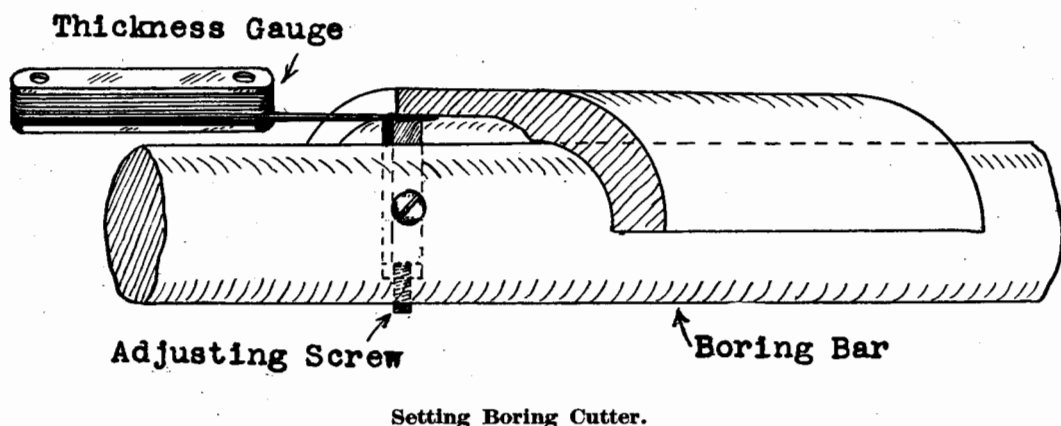
This being the case, the caps should be replaced on the cylinder block, and securely bolted down, as previously done for rebor-

of each side for a depth of $\frac{1}{8}$ to $\frac{1}{4}$ inch, and to a width of $\frac{1}{2}$ inch. The purpose of this relieving being to afford room for the metal to flow into, when the bearings are burned-in, and also to relieve the bearings of side friction, which is very prevalent when burning-in.

Another purpose of this relieving at the sides of the bearings is to provide oil channels for the circulation of the oil.

Several years ago it was customary to cut a spiral oil-groove, from one corner of the bearing diagonally across, and passing over the oil hole, to the opposite corner of the bearing. This practice has been discontinued, as being unnecessary. It is now believed that these oil grooves curtailed the available bearing area, and allowed the oil to get "out," as well as to get "in."

In some cases, where a new crank shaft is provided, and a main bearing burning-in machine is not available, it is suggested that the



ing. The facing tool should now be used to cut the radius in the ends of the bearings. This rounds off the inside of the ends of the babbitt, so that the babbitt fits properly against the fillets, or corners, of the crank shaft.

As there is no end thrust on the front and the center main bearings and, as all the end thrust of the crank shaft is taken up in the rear main bearing; it is necessary that the facing off of the rear main bearing be attended to with particular care.

As the rear main bearing caps are now made $\frac{1}{8}$ inch longer, it may be necessary to dress down the ends of these main bearing caps with a file, if a new crank shaft is used. Ordinarily, with a used crank shaft, which is a little worn, the wear of the crank shaft will make it unnecessary to remove much metal from the ends of the rear main bearing cap.

Now the main bearing caps should be removed, and the edges, or sides, of the babbitt of both the cylinder block and the bearing cap, should be "relieved" or cut away,

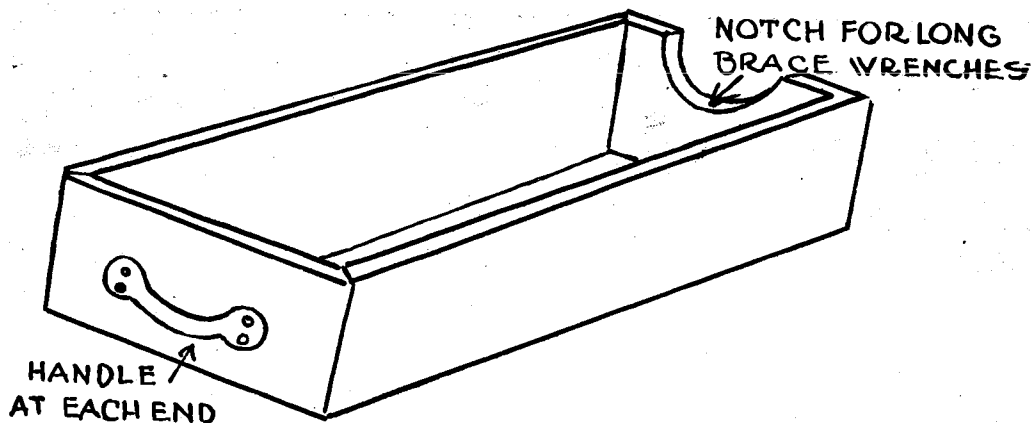
main bearing aligning reamer be used for the purpose of getting an accurate diameter and a smooth bearing surface.

If the bearings are to be burned in, it is advisable that a .002 inch shim be removed from each side of each main bearing cap. Then the caps can be bolted down tightly again, and the bearings burned in.

INDIVIDUAL TOOL KITS.

Most mechanics like to have some tools of their "very own," and the average mechanic will take better care of his tools, and keep them sharp and in better condition, if he knows that these tools are to be kept for his own, individual use. That is why it pays to have individual tool kits, in shops where more than one or two mechanics are employed.

In order that the tools may be readily accessible, wide, flat tool boxes are the best; as then less time is wasted digging through the several layers of tools to obtain the one tool needed—which is always at the bottom.



Individual Tool Kits.

As some of the brace wrenches, or speed wrenches, used in Ford car repairing are rather long, a notch should be cut in one end of the box for the shanks of these speed wrenches to extend through. If each mechanic has a number, this number, or the name of the mechanic, can be painted on each end of the box.

The ends of the box should be provided with handles, for easier handling and carrying. Some repairmen prefer a heavy strap, extending over the top of the box, and serving as a carrying handle.

When the whistle rings at "quitting time," these tool boxes can be piled up on each other very nicely, with the notched ends of the boxes outward, so that the boxes can be shoved clear back on a shelf.

Such boxes should be made of about $\frac{3}{4}$ inch planed lumber and should be about 24 inches long, 12 inches wide, and 6 inches deep.

Small compartments, or a little tray, can be placed across the un-notched end of the box, to carry the 6 sizes of cotter pins used on the Ford car.