BALL BEARING LATHE CENTER

BY A. C. SPAMPAN I

Improve your lathe with this precision type ball bearing dead center.

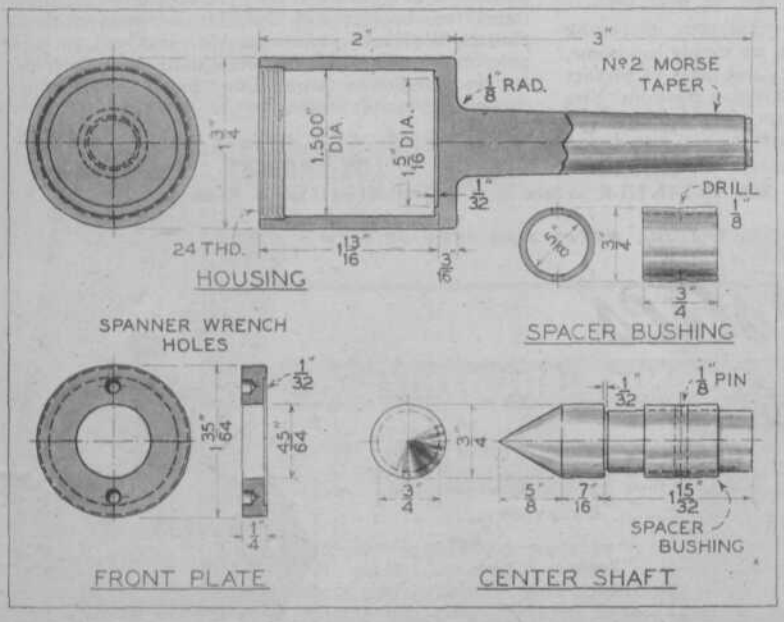
HERE is a ball bearing dead center which combines all the essentials of a worthwhile home workshop project, namely simplicity of design, usefulness and economy. All of the materials are to be found in most home workshops with the exception of the two ball bearings, which were purchased from an auto supply store at nominal cost. Needless to say, a properly machined dead center is a definite aid to anyone who does any kind of work on a metal or woodturning lathe. It can be used for a great variety of jobs ranging from heavy metal turning to high speed plastic turning and spinning jobs.

The bearings used were of the radial thrust type, but any similar precision ball or roller bearing can be Used by simply altering the bore of the bearing housing. The original was made in spare time. The drawings are self explanatory, and should not present any trouble to the amateur or professional.

The main body was made from 2" cold rolled steel. After the stock was cut to approximately the right size, both sides were faced and center drilled in a scroll or independent chuck. Care should be taken to true the rough shaft so that there is as little run-out as possible.

After the stock has been faced and centered, it is mounted between centers and the taper cutting is begun. Most home workshop lathes are equipped with No. 2 Morse tapers, but. the method outlined will duplicate practically any desired taper. There are many tricks used to cut tapers of this kind, and usually dial indicators and other expensive equipment are not available by the average home craftsman, so here is how to do the job easily:

Mount a piece of scrap in the chuck and center drill it, then mount one of the centers supplied with the lathe, between the center drilled piece in the chuck and the tailstock center. Offset the tailstock so that you get an even drag along the mounted center with a feeler gauge when the tool-bit is run across its length. This will give you an approximate taper setting. Rough turn to



Dimensions on drawing above must be followed closely, as parts must fit without play. Threads of the retainer ring must be snug lit but should not jam.

within 1/16" of the finished size, then make final adjustment to obtain the finished taper with the tailstock adjustment screws. Care should be taken to insure a good taper, as a slight error can make the center inaccurate.

When the taper is completed, the job is mounted in the headstock spindle. (Some lathes require an adapter for this mounting.) Clean all tapers and check to make certain that there is no run-out after the piece is set up in this manner.

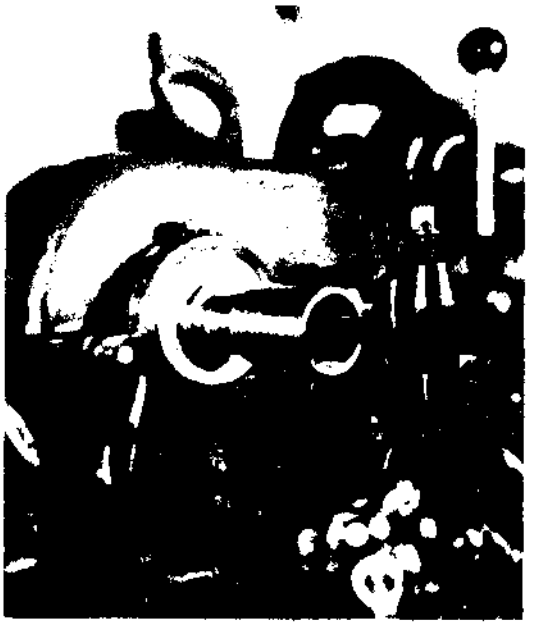
Drill the housing with the largest drill available. In the original case, it was 3/4". From this point on, you can rough bore, leaving 1/16" on the back face for turning the rear shoulder for the ball bearing. Extreme care should be taken in boring this hole. The final cut should be smooth, and using one of the bearings as a plug gauge, the housing should be bored so that the bearing is a snug sliding fit in the hole. The back face is then undercut so that only the outer race rests against the back shoulder. These two points are important as any play between the bearing housing and the bearing would result in chatter, inaccuracy and run-out of the center shaft. The finished unit is then threaded as specified on the drawings and the outside diameter is cut to size and polished.

Now we can start on the front locking plate. A piece of 1 3/4" cold rolled steel was used. Turn the outside diameter being careful that the center hole runs concentric with the outside diameter. Thread the plate, using the housing as a ring gauge to test the thread. This thread should be a snug fit as it will be used to pre-load the two bearings. After it is threaded, it is undercut so that the outside race of the front ball bearing rests against the locking plate. The plate is then cut off to size and laid aside until final assembly when the two spanner wrench holes are drilled.

The center shaft must be made with great care so as to assure concentricity. This shaft was made from drill rod. Mount the shaft in the chuck and turn to the proper outside diameter. Offset the compound rest to 60° and turn the point. Turn the shaft so as to allow the bearings to be a light press fit over shaft. (A small gauge may be turned so as to make sure what the correct size for the shaft has to be. This gauge is tried in the bearing hole for size.) Cut off shaft to proper length.

You are now to a point where the job takes on a resemblance to the finished job. All you have to do *[Continued on page* 138]

Turning No. 2 Morse taper on shank. Check frequently during job as this part calls for accuracy.



Shank on housing is inserted in headstock spindle lor boring bar job on Inside. Cut end recess now.

Turn standard center angle on center shaft end as shown below. Turn shaft for close fit bearings.

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now is to make the spacer bushing. A piece of stock is mounted in the chuck and is drilled and reamed to the shaft size. This spacer should also be a press fit on the center shaft. The outer diameter is turned and the bushing is then cut off.

Care must be taken in assembly. All chips and dirt must be removed from the various parts. The bearings should be packed with a good grade of grease to insure trouble-free service. The front bearing is then pressed on the center shaft. The spacer collar should be pressed over the shaft and pressed against the front bearing. The spacer and shaft should be drilled in this position and the 1/8" pin inserted being sure that there is no play between the spacer and the bearing race. The rear bearing is then pressed over the shaft and forced against the spacer. Now your troubles are over. The assembled unit is inserted into the housing. Now we can lay out the two wrench holes in the front plate and drill the two 1/8" holes, being careful not to drill through, as this would enable dust to enter the housing and cause trouble in your bearings. This plate is screwed into the housing. Screw the plate until it rests up against the front ball bearing race. Advance the front plate 1/16" more, and you will notice that the bearing will now be pre-loaded. A slight drag will be noticed in the shaft, but this is further proof that the bearings are properly pre-loaded. If the front plate thread does not hold its adjustment an 8-32" set screw can be inserted in the housing so that it locks the front plate in position.

The job is now ready for use and can be used many months without lubrication. Every six months the bearings should be cleaned and repacked. The original bearings were Fafnir No. **16** which are used in magneto shafts. Now we know you are impatient to try the center on your next lathe job, so good luck to you.