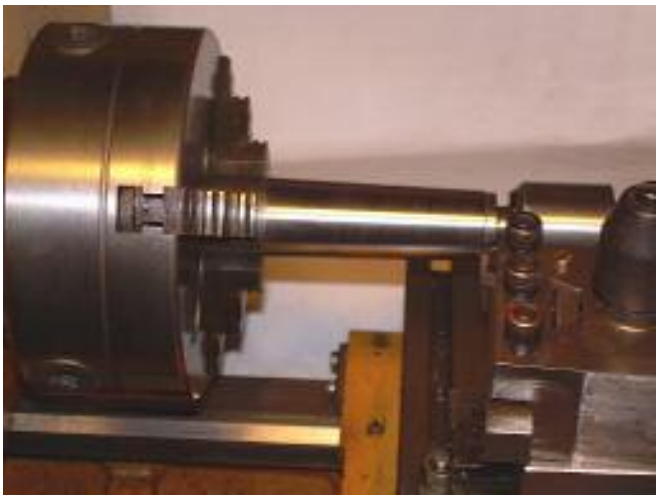
Emco Compact 8 Chuck Back-Stop

Chris Heapy had "Construction Notes for a Chuck Back-Stop" on his website. The Chuck Back-Stop will allow you to face thin washers and to act as a depth stop for machining to length. Chris' attachment was inspired by a design described by J. A. Radford ("Stop Bars and Bushes for Lathe Mandrels", Model Engineer 5 February 1971) and G. H. Thomas ("The Model Engineers Workshop Manual"). His attachment was made for a Myford lathe with MT 2 taper in the mandrel so I changed a few dimensions to suit the MT 3 taper on my Emco lathe.

Materials

I started with a 25-mm diameter rod of CRS for the MT 3 shank. The draw tube was made from a piece of 20 mm diameter steel tube and the push rod from a piece of 12-mm diameter CRS. I also used pieces from my scrap box.

MT 3 shank



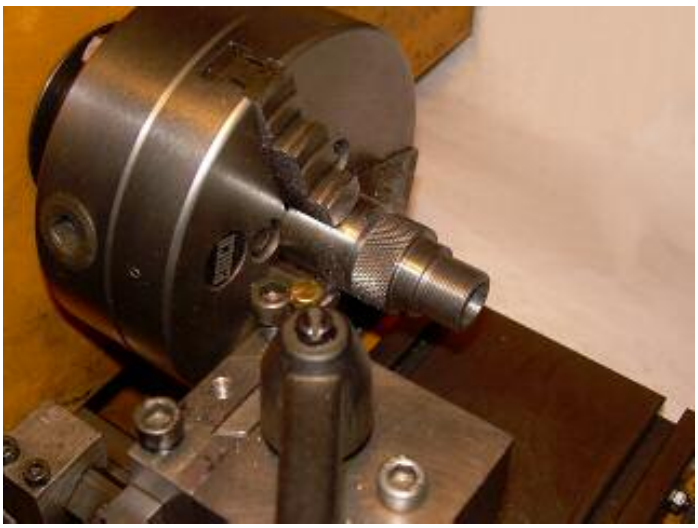
First I mounted a MT 3 centre in the lathe and used it to adjust the top slide to the right angle using a test indicator. The MT 3 shank was made from a piece of 25-mm diameter mild steel rod. I mounted the bar in the 3-jaw, centre drilled and turned the taper (right picture).

At the "thin end" a short part was turned to 20-mm diameter. This part was supported by a fixed steady and a 3-mm pilot hole was drilled to a depth of a little over 20-mm. The hole was opened up to 15-mm diameter with a twist drill and the hole bored to a diameter of 16.05-mm. In the innermost part a relief was turned for the threading tool to run into. Then the M17 x 1 thread was cut. The through hole was drilled later with the shank mounted in the lathe mandrel. I just have to finish the draw tube and nut first.

Draw Tube

The draw tube was made from a piece of 20-mm diameter steel tube with an inner diameter of 16-mm. Since it would not be possible to thread the draw tube M17 x 1 a short piece of 20-mm mild steel rod was turned down for a length of 15-mm so it would just pass into the draw tube. An 11-mm diameter hole was drilled through and one end of the hole tapered. The two parts was then silver soldered together, mounted in the 4-jaw chuck and centred. The 11-mm hole was bored to a close sliding fit with the push rod. The outermost part of the silver soldered end was turned down to 17-mm diameter and threaded M17 x 1. The rear end was threaded M17 x 1 (female). The length of the drawtube was adjusted so it was 7-mm short of reaching the rear end of the lathe mandrel.

Draw Tube Nut



The draw tube nut was turned from a piece of 25-mm diameter steel rod. A small pilot hole was drilled to a depth of a little over 25-mm, the hole was then opened up to 11-mm with a twist drill and bored for a sliding fit with the push rod.

The outer part was turned down to a diameter of 17-mm for a length of 13-mm. A small recess was turned for the threading tool to run into. This part was threaded M17 x 1. From the M17 part the rod was turned down to 20.2-mm diameter for a length of 6-mm, this part will just fit into the rear of my lathe mandrel. The remaining 25-mm diameter part was knurled and the nut parted off (right pic.). In the knurled part I drilled three 4.2-mm holes 120 deg. apart. One hole was tapped M5 for the locking screw, the other holes may be used for a tommy

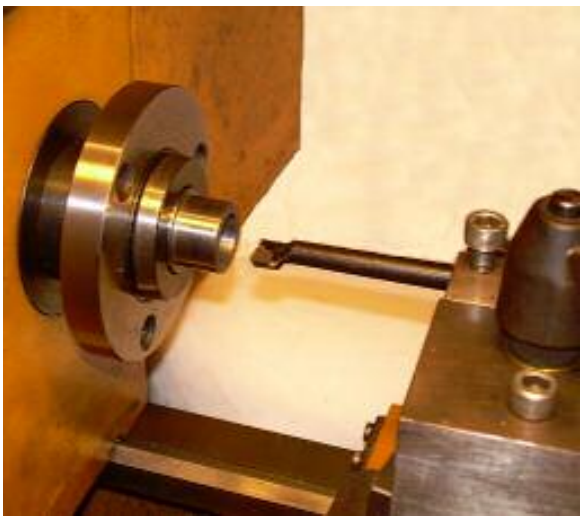
bar. I also turned a small 2-mm thick washer that just will pass over the threaded part of the nut. I insert this washer and tighten the nut before knocking the shank out of the lathe mandrel, this way the thread should not be damaged.

Locking screw

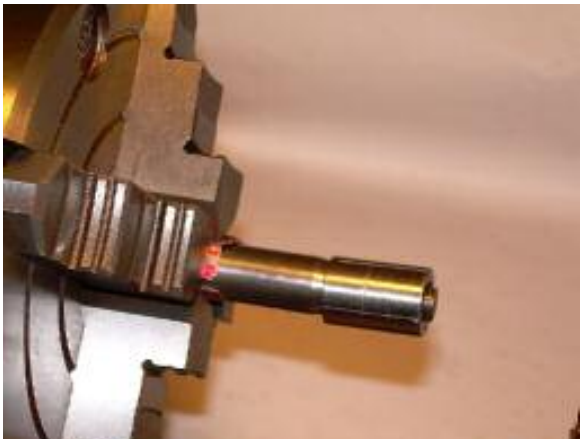
I just used a M5 Allen screw for now, turned down to 4-mm at the tip.

Boring the MT 3 shank

After finishing the draw tube and draw nut I mounted the MT 3 shank in the lathe mandrel and clamped it in place with the draw tube and nut. First I drilled a 5-mm diameter pilot hole through the shank and then used larger drills to open up the hole to 13-mm diameter. The hole was then bored to just under 14-mm diameter.



To finish the hole I made a lapping device to lap the hole to the correct dimension. First I turned a small split bush with a tapered hole and then turned the end of a 12-mm rod down to 8-mm diameter and threaded it M8. Then a corresponding taper was turned from the threaded part. The picture to the right shows the split bush partly mounted on the tapered end. I just need to make a small nut. Tightening the nut on the lapping device will push the lapping bush up the taper so the diameter increases.



The 12-mm rod was mounted in the drill chuck in the tailstock and the hole in the shank lapped to 14-mm diameter (bottom right picture).

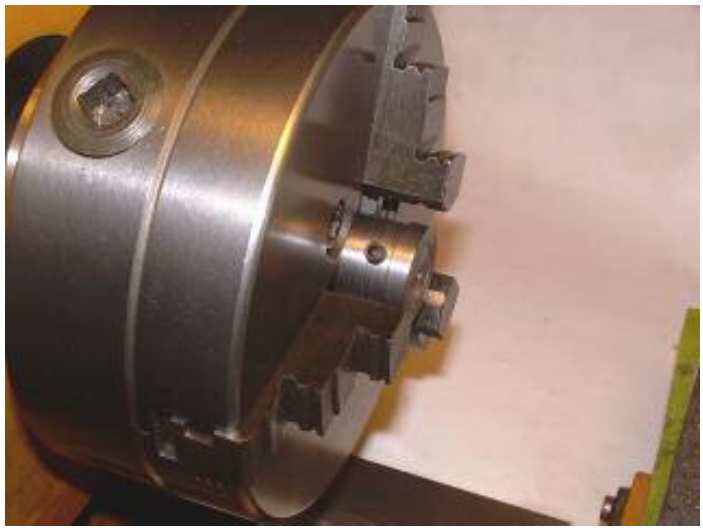
Push Rod

The push rod was made from a piece of 12-mm diameter mild steel that was lapped for a short time using the same tool as described for the disk carrier. I just used a smaller bush. One end was turned down to 8-mm and screw-cut M8 for a length of 12-mm. In the other end a 4-mm wide slot was milled with a slot drill (left picture). The length of the push rod was adjusted so it protrudes a few cm from the rear end of the lathe mandrel.

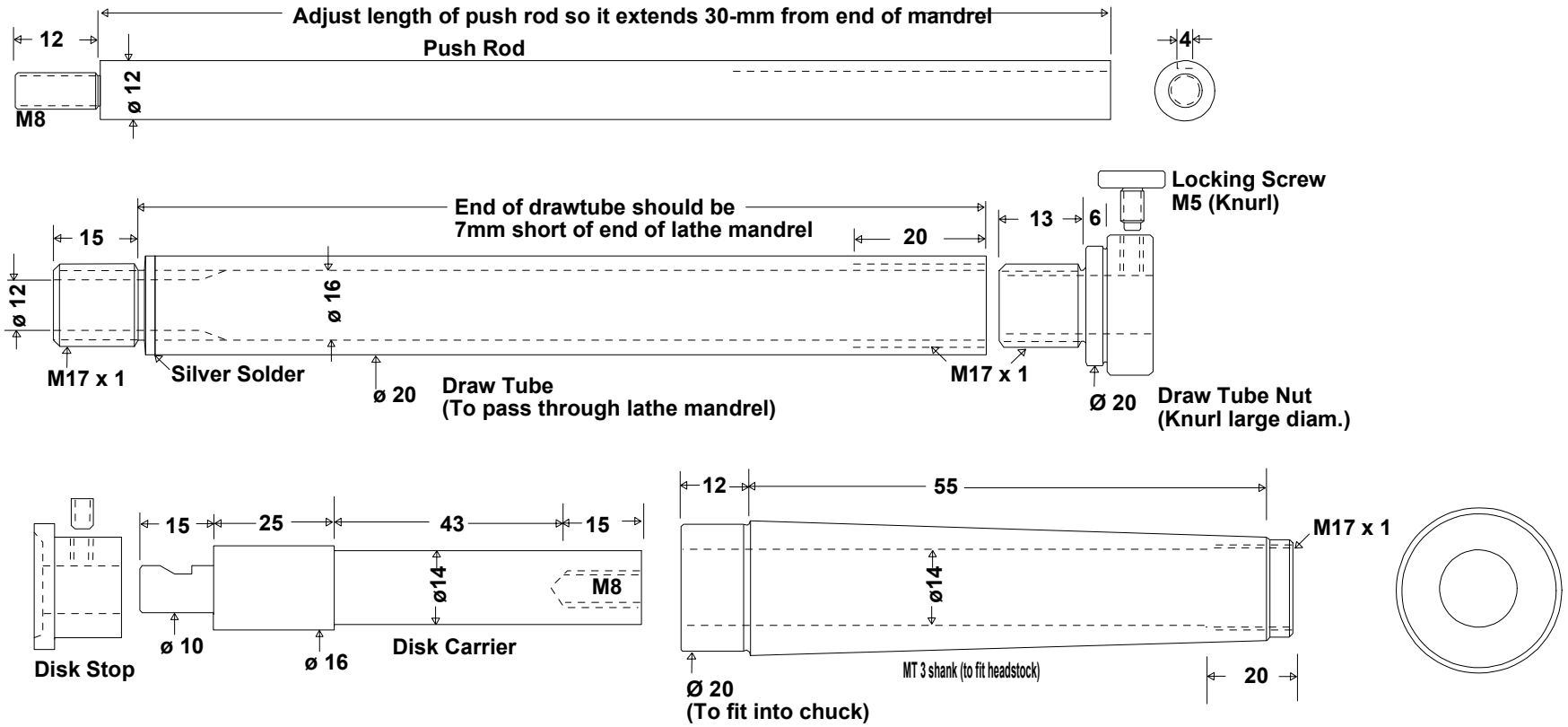
Disk Carrier

The disk carrier was made from a piece of 15-mm diameter mild steel since I didn't have any 16-mm stock at hand. The work was faced and centre drilled at both ends and turned between centres. I made an external lap after an article by "Duplex" that I found on Ron Chernich's web site (modelenginenews.org). The picture to the right shows the lap in use to lap the disc carrier to fit the hole in the MT3 shank. The disk carrier was then mounted in the 4-jaw and centred so I could drill a 6.8-mm hole in the rear end and tap it M8. After I had made two disk stops the carrier was mounted in the MT 3 shank and clamped with the push rod. The outer end was then turned to a close fit in the disk stops and a small flat for a set screw was milled. The total length of the carrier was adjusted so it almost reaches the front end of my smallest 80-mm 3-jaw chuck.

Disk Stops



The disk stops was made from a piece of 25-mm diameter mild steel. I made two stops for now, one just under 25-mm in diameter and one just under 20-mm in diameter. A 25-mm bar long enough to make several stops was mounted in the 4-jaw and centred. The bar was faced and turned down to 20-mm for a length of 14-mm. A centre hole was drilled and a 5-mm pilot hole drilled to a depth of around 20-mm. The hole was opened to 9.5-mm with a twist drill and the hole bored to just under 10-mm with a small boring tool. I used a 10-mm machine reamer to bring the hole to its final dimension. The remaining part of the bar was then turned to just under 25-mm diameter and parted off for a total length of just over 16-mm. The next stop was made the same way, except that the large diameter was turned just under 20-mm. The stops was mounted the other way around in the 4-jaw, the jaws clamping on the small diameter of the disk stops. A small recess was turned on the front end and the hole for the set screw was drilled and tapped.



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2008	T.H.	Steel	

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