Overview

This stand alone grinding head **(photo 1)** can be used with various different designs of cutter grinders.

It is ideal for use with the Worden Cutter grinder, the Stent or the Kennet. It can also be bolted to a lathe cross slide for use as a toolpost grinder although you may have to adjust the spindle centre height. It is suitable for internal and external grinding. As the spindle has a Myford standard nose thread and takes Morse taper collets, it can also be used for milling and drilling in the lathe. This would need a separate motor with speed control fitted. Construction is fabricated and no castings are required.

Photo. 1. The finished grinding head

HOW TO MAKE A FULLY ADJUSTABLE GRINDING HEAD

David Haythornthwaite builds a useful tool grinding head

Carbide lapping machine

A few years ago I purchased a Tiplap tool lapping machine by Boremasters for a reasonable price at a machinery auction **Photo. 2.** The machine had many of the features of a Quorn tool and cutter grinder, but the motor was fixed height and had a fixed grinding wheel, limiting the versatility of the machine. I set about making a bolt on column with an adjustable grinding head, capable of using interchangeable grinding wheels and I also added some other Quorn features to make it equal in every respect to the Quorn. The finished unit is illustrated in **Photo. 3**

Recently, several readers of MEW have expressed a wish to add an adjustable grinding head behind a Worden tool and cutter grinder and also to build a Stent type without castings. This unit can be attached to any kind of tool grinder or even be clamped to a lathe cross slide, so I thought it may have a wider appeal to many readers.

The design

The general Layout is shown in **Fig 1**. A base plate (Part E in Fig.2) supports a Column (Part G) via a steel mounting bush (Part F). The baseplate is clamped to the cutter grinder itself via two slide rails (Part I) which when the mounting setscrews are loosened, allows the baseplate to be slid from side to side varying the position of the column. You will see from **Photo. 3** that in the case of the Tiplap machine, I found it best to mount the rails on an intermediate plate in order to set the unit back a little and allow more working space for the workhead to move. If you create long rails, it will allow you to rotate the head through 90 Deg., to use the circumference of the grindstone and then slide the whole unit to the left to leave the grindstone still presented to the work.

Moving Head

On the column is fixed a central pivot block (Part A) and this is clamped to the

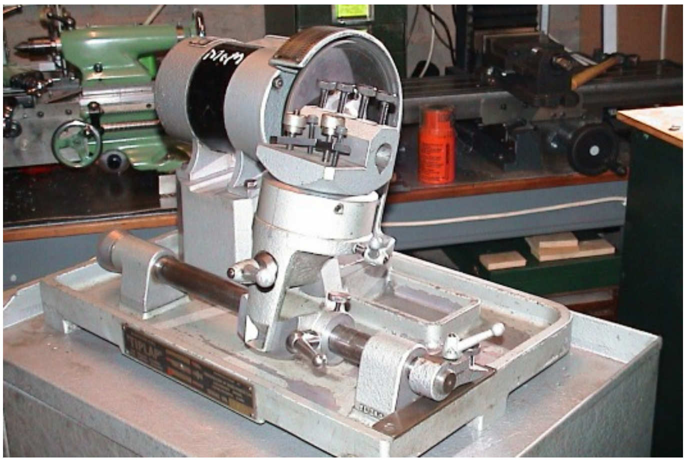


Photo.2 The original Tiplap cutter grinder

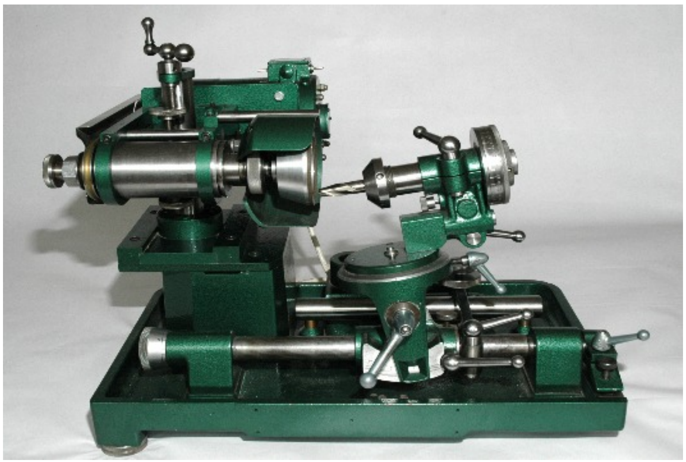
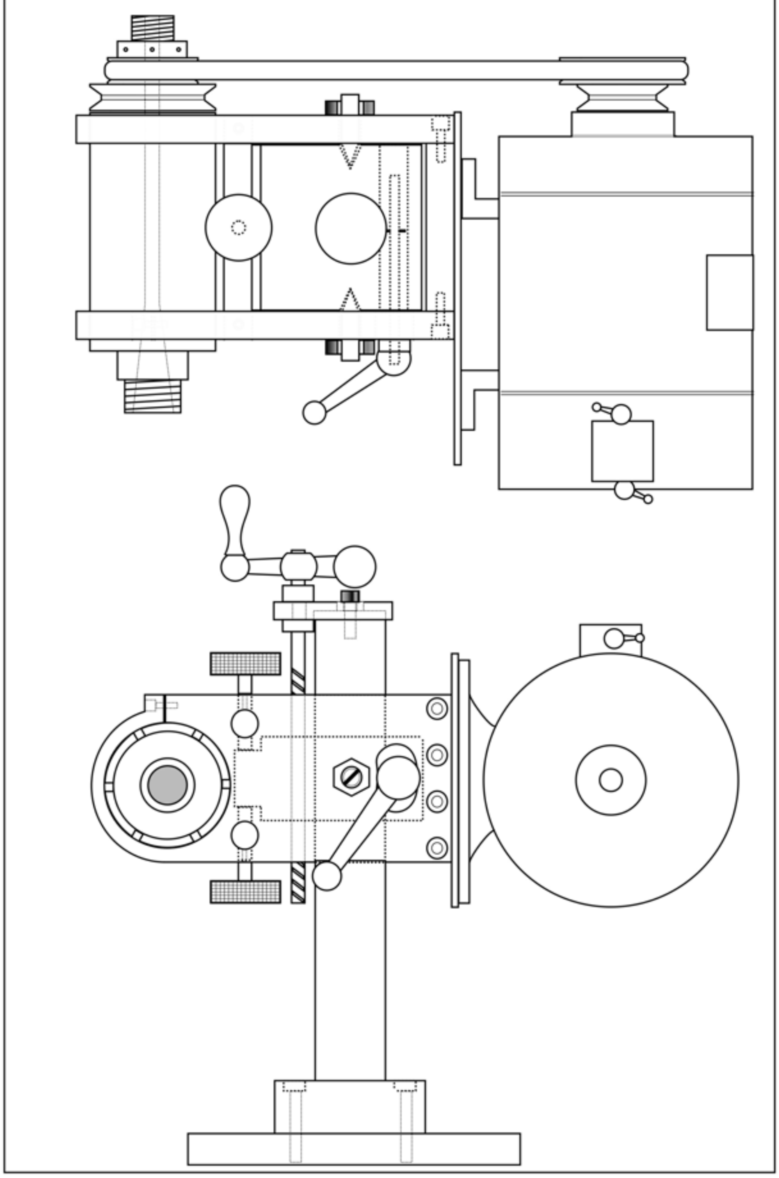


Photo.3 Finished grinder with adjustable head

Fig. 1 General Arrangement



column by means a split cotter (Part J) which grips the column when a ball handle is tightened. The central pivot column can be raised or lowered by a threaded lead screw (Part L) fixed to the top of the column (At Part H) and passing through a suitably threaded hole in the pivot block. Two conical holes on either side of the pivot block are formed directly in line with the central column as it passes through the pivot block.

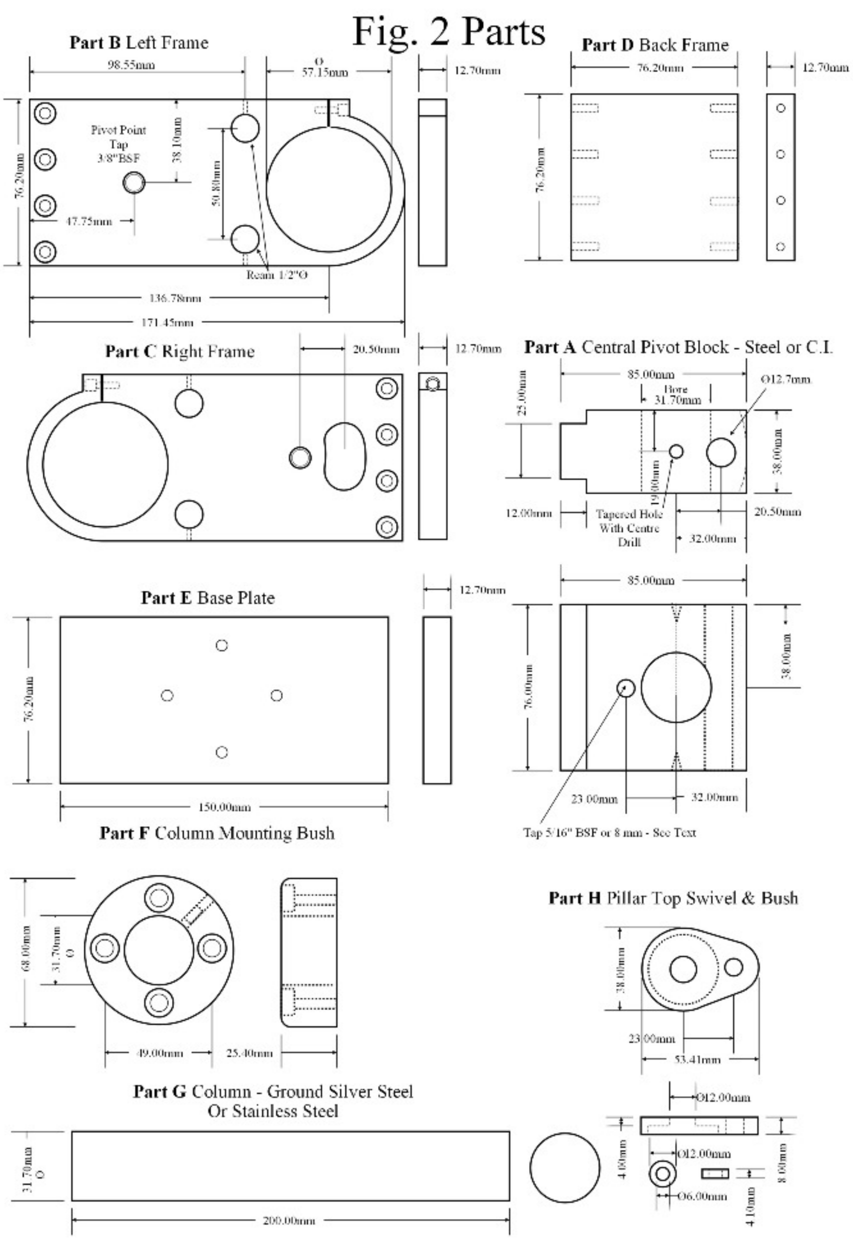
An outer casing carrying the motor at one end and the grinding spindle at the other end is formed by the cheeks (Parts B& C) and the back (Part D). This outer casing pivots on the central pivot block by means of two hardened headless steel bolts (Parts S) which screw through the pivot points in parts B & C. Pivot points are provided on these bolts to run in the conical holes in the central pivot block. This arrangement allows the height of the spindle to be finely adjusted, without unclamping the central block from the column. Thus it is possible to finely adjust grinding height without losing register around the column. The fine adjustment is controlled by two adjusting screws (Parts M) which screw through horizontal adjustment bars between the two cheeks and bear upon a recessed area at the front of the central pivot block. The whole arrangement is very similar to that achieved by the Quorn castings.

Grinding Spindle

Any grinding spindle of a suitable size may be used. I made a spindle from the “Spindles” book – no. 27 in the Nexus special interest series. The spindle that I made was the Basic spindle from chapter 3 and I selected this for several reasons. Although quite large at 2.25” Diameter, it carries a hollow shaft allowing the use of a drawbar and it has a no. 2 Morse Taper (MT) in the nose. It also has a threaded nose identical to my Myford Super ML7B and therefore will take all my Myford accessories. This spindle also finds use as a drilling / milling spindle on my Myford lathe where a clamping arrangement has been made complete with motor to attach it to the cross slide or vertical slide. Making tools for the workshop which have multiple uses in this way has a lot to commend it.
You may use an existing spindle or design a different spindle but the 2.25” holes in the frame cheeks will need to be adjusted to suit. When I made the spindle I used a double angular bearing instead of two separate bearings at the front. I also recommend that you make a round “pulley nut” on the rear of the shaft with tommy bar holes for tightening. The standard 3/4 “ BSF nut that the instructions suggest for the pulley nut

Photo.4 The parts of the spindle

Photo.5 Finished spindle ready for use



looks totally inappropriate when spinning around at 5,000 RPM.
I cannot duplicate the drawings for the spindle which will be copyright, but to give readers some idea of the construction, I show **Photos 4 & 5** to illustrate both the finished spindle and the work involved in making the parts. It proved no problem to make this in free cutting mild steel. I suggest that if you intend to use the spindle for multiple uses, the rear pulley should be made no larger than the body of the spindle to facilitate extracting the spindle from the various clamping arrangements.

Dimensions

A word of apology is due here for the quality of the drawings. I am not a draughtsman and I am sure that the projections are all wrong to someone who is trained as such. However I do think that they are sufficient to construct this item and many will adapt them to their own needs. In accordance with the preference of our editor, all (most !) dimensions are given in mm but it will be obvious that the machine was actually made from imperial materials. I.e. 3”x ½ “ flat plate was used for the outer casing. The spindle was 2 ¼” Diameter and the main column was made from 1 ¼” Diameter stainless steel bar. Also most of my stock of reamers is imperial, so the machine is a mixture of both systems. Metric cap head set screws were used throughout.

Making a Start on Construction

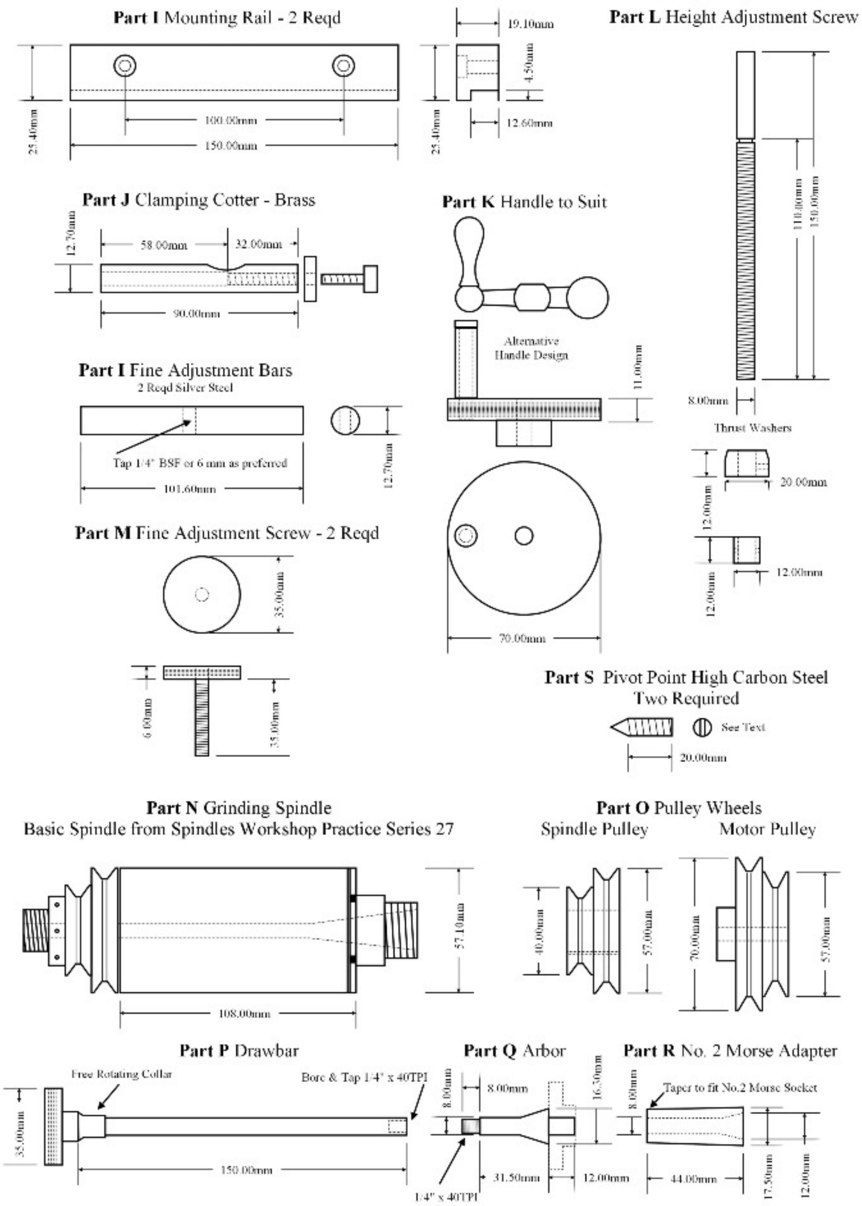
It is some time since I made this machine so my photography skills during construction were limited. I did however take many photographs at the time and I am a great believer that one or two photographs are often better than a thousand words.

Base Plate and Column

Cut a piece of 76.2 mm x 12.7 mm flat steel bar to just over 150 mm long and trim square and parallel on the milling machine if necessary. It is important that the long sides are parallel if you intend to run them in slides as I did to give a horizontal adjustment. Mark the centre of the plate.
Cut the column to length from stock material. I had been given some ground stainless steel bar, so I used that, but if purchasing, I would probably have used ground silver steel for this part. Put the cut length into the lathe 3 jaw and support the end with a fixed steady. Face and slightly chamfer the end then centre drill, following up with a 5.2mm drill. Then tap 6 mm ready for the setscrew holding the top swivel (Part H). Reverse in the lathe and chamfer the bottom end.
The column mounting bush is a straight turning job with 4 countersunk holes to take 4 recessed 8 mm cap head set screws at 49 mm p.c.d. Drill these Ø6.9 mm at this stage and spot through the positions onto the baseplate. Drill the 4 holes in the baseplate Ø6.9 mm and tap 8 mm. Open the fixing holes in the bush to Ø8.00 mm and countersink to a depth of 7 mm. The size of countersink required for 8mm setscrews is actually 13mm. If you have a 13mm drill, then your workshop is better equipped than mine. I drilled ½” and reduced the heads of the setscrews slightly on the lathe. It is important that the bush is bored to a nice close fit on the column to ensure a rigid structure. The drawing shows a grub screw to hold the column captive, but I actually Araldited the bush onto the end of the shaft, once the drilling of the mounting holes was finished.
The two fixing rails were actually made from 1”x ¾” flat bar and were grooved out on the milling machine to fit the base plate. Make the rebate slightly tight on the thickness of the baseplate so that when the setscrews are tightened, the baseplate is held captive. I used 6mm cap head setscrews to hold these down. Now you have a rigid column on which to mount the grinding head, you can move onto the head itself.

Clamping Cotter

Before making the central pivot block you will need to prepare the clamping cotter. The sequence of machining is that the cotter is made and bolted rigidly into the hole in the pivot block. The column hole is then bored in the pivot block, and this boring process also cuts the curve in the clamping cotter at the same time, thus ensuring that the cotter clamp fits the column exactly. After boring the column hole, the cotter is split into two parts along the centre line of the curved section, to make two matching cotter clamps.
Cut a length of 12.7mm (½”) brass bar to just over 90 mm long and face in the lathe at each end to finish 90mm. This length is so that the cotter will pass through the pivot block (76 mm) plus the thickness of one side cheek (Part C - 12.7mm) with clearance to spare. If you change the thickness of part C or the width of Part A then adjust accordingly. With the brass piece accurately centred in the lathe chuck or collet, Drill 5.2mm (Tapping size for 6mm) down the centre to a depth of 32mm. Reverse in the lathe and drill 5 mm from the other end until it breaks into the original hole. Follow up



by drilling or reaming 6mm from this end to a depth of 58mm to give clearance for a 6mm bolt. Fit a large, strong, washer to the threaded end by means of a 6mm set screw which effectively puts a temporary "head" onto the brass cotter. Put on one side until it can be inserted into the pivot block.

Central Pivot Block

I made the pivot block from steel and also the cotter from steel although ideally I would make the pivot block from cast iron and the clamping cotter from brass.
Start off with a block of cast iron – or steel 76.2mm x 85 mm x 38mm thick. The thickness is not critical, I cut mine from a piece of 3" x 1 ½" flat steel bar. Ensure that the block is absolutely square in all directions and mark out the positions of the pivot centres, the column hole and the hole for the cotter clamp. It is absolutely essential to the accuracy of the machine that this pivot block is dead square. It is also essential that the pivot centres and the central column hole lie exactly in line with each other and that this line is at right angles to the side of the block. It is worth taking time over this marking out. Check the position of the cotter clamping hole and ensure that it is 32 mm exactly from the pivot line. If the hole were closer than 32 mm then the column hole would impinge upon the clamping bolt, and if further away, there is a danger that the clamping cotter would not clamp the column correctly.
Drill the two pivot centres using a no.4 centre drill and then mount the block on its side on parallels in order to put the 12.7mm hole through for the clamping cotter. This is a VERY deep hole (76mm) and in order to drill a smaller pilot hole, you would need a long series drill or alternatively only pilot to halfway and for the bottom half, go straight through with the smallest drill that is long enough. Withdraw the drill regularly and lubricate well whilst drilling. Take the hole up to (say) 12 mm diameter or 31/64" by drilling and then follow up with a ½" machine reamer or D bit at very slow speed. Keep the reamer moving until you have withdrawn it.
Place the clamping cotter through the hole, and from the side with the 6mm clearance hole in it, insert a 6mm bolt and washer with a short bush round the outside of the cotter in such a way that the cotter is firmly held in the hole. This is illustrated in **Photo 6**.

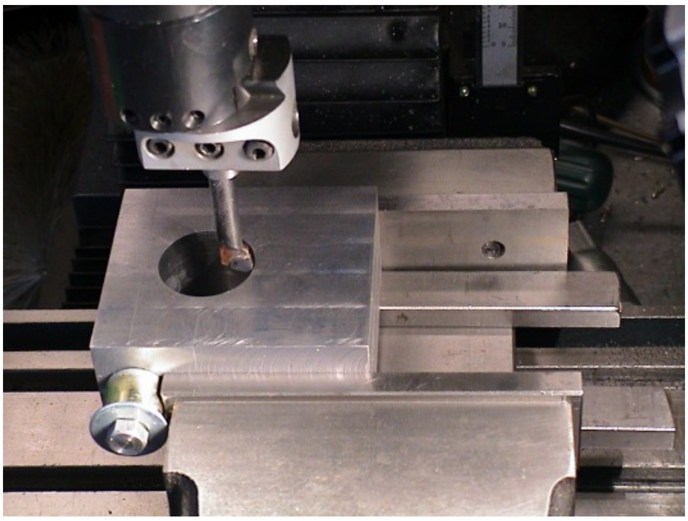


Photo. 6 Boring the column hole

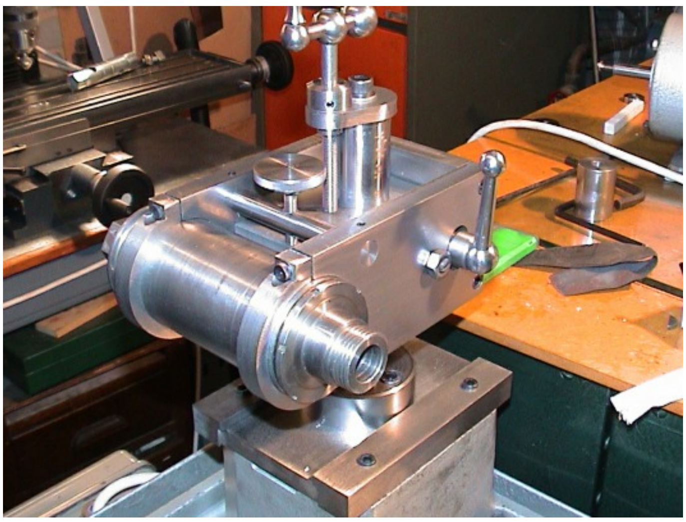


Photo. 7 The basic grinding head

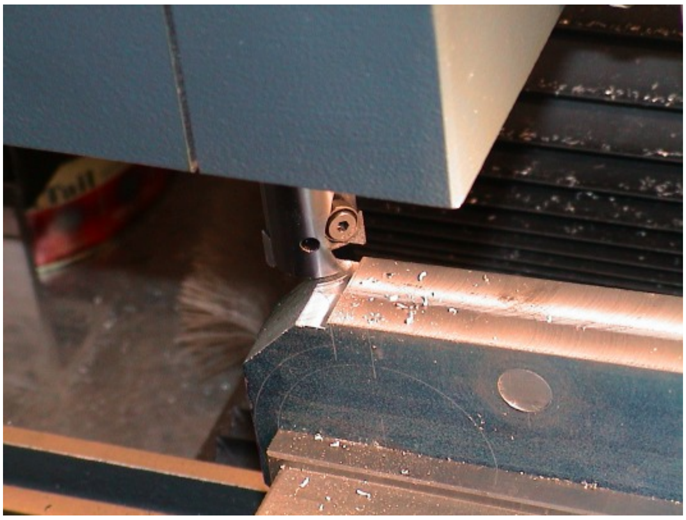


Photo. 8 Milling the step

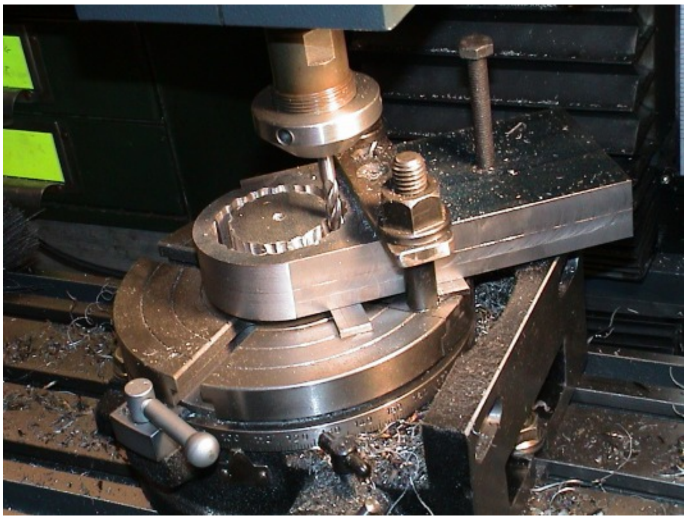


Photo. 9 Chain drilling the spindle hole

Place the block in the machine vice – or clamp to the milling machine table – tapping securely down on parallels as in **Photo 6**. Start by drilling the column hole through the block, using first a centre drill and then successively larger drills until you have reached either your largest drill or the capacity of your milling machine. Bore out until the hole is a nice CLOSE fit on the column. As you approach the finished size, do take several passes at the same setting to ensure that all the spring in the tool has been eliminated. As the work progresses, you will be able to see, and indeed hear the change in note as the boring operation cuts into the brass cotter. You can just see this in the photo, although my cotter was steel. If the boring operation breaks into the central hole in the cotter and touches the bolt, then you have got your measurements wrong or one of the holes is not at right angles.
Once you have finished this hole, you may, at this point, also drill and tap the hole through the block which will act as a nut on the main head raising lead screw (Part L). Move the table 23mm (to the left in the photo) and drill through the block at the tapping size for the thread of the head raising screw. I used 5/16 " BSF for this and drilled 6.9 mm, but fully metric engineers will probably prefer to use an 8 mm x 1.25 thread and drill 6.9 mm. The thread is unimportant, but a fairly fine thread gives a nice slow adjustment of the head on the column.
Finally mill the rebate on the block, turn over and mill the rebate on the other side. The dimensions of these are not particularly critical, so long as the fine adjustment screws can eventually bear on the central portion. To see the basic layout, see **Photo.12.** In this photo you can see the two fine adjustment bars with the rebated part of the block visible between them.
In use, there is not much clearance between the back of this block and the back of the outer casing pivoting round it (Part D). This can mean that the back of the block can foul the back of the pivoting casing when substantially raising or lowering the grinding head using the fine adjustment screws. I have shown a curve on the drawing and I suggest that you may like to curve the back of the block in a vertical curve to increase this movement. I simply milled an angled chamfer on the top and bottom edges.

Constructing the Pivoting Casing

This consists of a steel cage made up of parts B, C & D which holds both the motor and grinding spindle and pivots about two hardened steel points in the centre.
First cut two lengths of 76.2mm x 12.7mm flat steel bar to finish full 171.45mm long. These will make parts B&C. Also cut a length to finish 76.2mm to make the back Part D. Parts B and C are almost identical in layout, except they are "handed" by the countersinks on the setscrews holding the sides to the back. Additionally, the kidney shaped hole in part C is only required in part C as the clamping cotter protrudes through this to allow tightening of the cotter using a ball handle. Mark out the required holes on one piece only and clamp the two side pieces together. Drill and ream the two ½" holes which will hold the fine adjustment beams and insert two silver steel dowels 20mm long into the holes. This ensures that from now on the two sides will stay in alignment whilst being machined together. Drill the pivot holes at tapping size for 3/8" BSF – 8.4mm. Pilot drill the centre of the large hole, for the grinding spindle, right through, and drill the setscrew holes to fasten the sides to the back piece, but only drill at tapping size for 6mm i.e. 5.2mm drill. These will be opened up to 6mm after spotting through onto the back part D and will be countersunk on opposing sides when the two sides are separated. What we are aiming at eventually is illustrated in **Photo 7** showing the head unpainted before fitting the guards and motor. I always feel that a photo is often clearer than drawings.
If you wish, you can, at this stage, Tap 3/8" BSF through both pivot holes whilst clamped together and insert a 3/8 BSF bolt to ensure that everything stays in register. The next task is to shape the sides and I started by creating the step where the clamp screws will clamp the spindle in place. As seen in **Photo 8** I sawed the corners off the two sides and then milled down to the outside of the clamping circle whilst the parts were held together in the vice. One of the short silver steel dowels can be seen holding everything in register. Once this is completed, the parts B & C should be mounted flat onto a rotary table to cut the curved ends of the pieces. In order to do this, fit a spigot into the centre of the rotary table of such a diameter that it will locate the pilot hole in the centre of the large hole in parts B&C. Finally bolt the stack onto the rotary table as shown in **Photo 9.** You can clearly see the 3/8" bolt holding the stack together.
Using a large end mill, mill the curve on the outer end of the stack, being particularly careful to rotate the rotary table against the cutter rotation to eliminate climb milling. You will have to be careful or set stops when approaching the step which has already been formed.
Once the outer contour is completed the next task is to bore the large hole for the grinding spindle itself. This can be done by drilling and then gradually increasing the size with a boring head, but in order to save time I chose to chain drill the circle and then join the holes using a slot drill as in **Photo 9.** This proved to be quite a vicious operation, when breaking through the drilled holes, and I wished that I had chosen to slot drill all the way through, instead of chain drilling.
Once the majority of the circle has been removed by chain drilling in this way, line up the milling machine with the marked out circle using the boring head as an alignment tool and then finish off the hole using a boring head. Of course if your lathe is big enough you can bore this out on the faceplate, but I did not fancy swinging all that weight around.
While you still have the rotary table on the milling table, and the milling head is lined up with the centre of the rotary table, separate the two sides and identify which is the part C. Mount that part (C) on the rotary table, lining up the centre of the table with the 3/8" BSF pivot point hole, as shown in **Photo 11.** Rotate the rotary

Photo. 10 Finishing the spindle hole

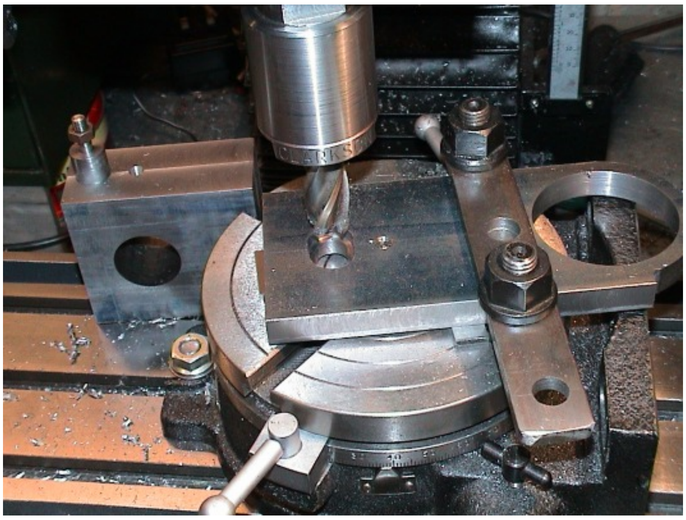


Photo. 11 Finishing the kidney shaped hole

table so that the long side of the part C is parallel to the X direction of the milling table and move the table in the x direction by 20.5mm. This point will be the centre of the kidney shaped hole clearing the cotter clamp. Mill the kidney shaped hole with a slot drill by rotating the rotary table. The amount of angular rotation is not critical providing it gives enough angular movement for the final fine adjustment of the grinding height to work. The slot drill used should give easy clearance on the clamping cotter and I appear to have used a 5/8" cutter.

You will see from the **Photo 11** that I finished the hole to size using an end mill as I did not have a suitable slot drill. In the picture the rotary table is positioned at the end of the kidney shaped hole i.e. not with part C in line with the X travel. Also in **Photo,11** you can see the semi finished clamping block in the background complete with fitted clamping cotter and showing one of the pivot points.

Ensure that the central clamping block is finished in order to use it during assembly of the whole unit.

Assembly of the Pivot Casing

Assembling the unit is a bit fiddly, but it is important to get everything right and square if the final unit is to be accurate in use. I would suggest that you follow my procedure as follows:-

First I made the two pivots (Part S) which will screw through the sides and upon which the whole casing will pivot, motor, spindle and all. These could be made from silver steel, threaded $^3/_8$" BSF turned to a 60° point and then hardened and tempered. I cheated and cut sections from $^3/_8$" BSF high tensile steel setscrews, first removing the heads. I then formed the pivot points by turning the setscrews in the lathe, holding them in a collet and using a tungsten carbide tool to turn the point. Finally I cut a screwdriver slot in the end and provided locking nuts by thinning down commercial nuts..

Secondly I made the two fine adjustment bars (Parts I) and fitted 3mm grub screws into parts B&C to hold the adjustment bars securely. These can be clearly seen in **Photo 12.** I have shown these to be made of silver steel. They do not need to be hardened, but silver steel is a good way of getting accurately ground bar that is a good fit in a reamed hole.

I then clamped both sides of the casing,, parts B&C, to the central block, with the pivot points loosely fitted into the sides. I clamped the sandwich of Side / Central block / Side together with the whole lot resting upon a surface plate and screwed in the pivot points tightly. It is one of those occasions where you do not know how tightly to clamp things. If the clamps are too tight, then the pivot points will not align the three items correctly. Once I was sure that everything was in alignment, I fitted the two adjustment bars and secured with the grub screws.

Finally, I inserted the back, (Part D) and this needs to be a tight fit so that inserting the back just, ever so slightly, spreads the two sides apart. Once I was happy with that, I clamped the sandwich tightly and used the 5.2mm holes in the sides as a template to drill the tapping holes into the back (Part D). Once this was done the assembly was taken apart, the holes in the back tapped 6mm and the holes in the sides opened out to 6mm diameter and countersunk for 6mm, cap head, set screws. Before re-assembling the pivot casing, I drilled and tapped the two fine adjustment bars for the fine adjustment screws. It is advantageous for this thread to be a fine one and I used ¼ " BSF for mine as I had the necessary taps. However, I would state that it is better to use a left hand thread here, if you can get hold of a LH tap – and also a LH die if you don't fancy screwcutting left hand threads (away from the chuck). My threads are all RH and I have learned to live with that, but the fine adjustment is not really intuitive in use and if I did it again, I would try to use a LH thread. With a RH thread, screwing the top adjusting screw DOWN, RAISES the grinding head which to my mind just feels strange. The purpose of the lower adjusting screw is to lock the whole pivoting head action rigid, once the correct position has been found with the top screw.

Clamping The Spindle

With the assembly set up as in **Photo 12** clamp the back plate down to the milling table, with the assembly set in line with the table. Mark where the clamping screws for the spindle should go and using a 4.4mm drill, drill a hole 25 mm deep, - tapping size for a 5mm set screw. When you have done the first one, keep the table in the same position and open up the top of the hole with an 8 mm slot drill for the cap head. Take this down into the flat area for say 3 mm in order to partially countersink the setscrew. You will see from Photo 12 why we must use a slot drill or end mill for this as it cuts into the outer curve of the clamping hoop. Treat the second screw in the same way.

Measuring from the table, work out the centre line of the spindle hole and split the clamping strap along the centre line on both sides with a slitting saw as illustrated in **Photo 12**. Use a reasonably thick saw to give space for the arrangement to clamp the spindle and ensure that the table is moving from right to left if set up as in the photo to ensure that you do not "climb mill" i.e. the table should move in the opposing direction to the saw movement. When both sides have been slit, open up both holes with a 5mm drill down to the level of the split and tap the lower part of the hole 5mm.

Head Raising Screw and Pillar Top Swivel

How you make the outer shape of the pillar top swivel (Part H) is up to you. It can be shaped by sawing and filing, or done on a rotary table as in **Photo 13.** Start with a piece of mild steel 55mm x 40mm x 8mm thick and mark out the centres of the holes. Drill these to a nominal size such that the piece can be mounted, by each hole in turn, on a mandrel held in the centre of the rotary table. Clamp the piece and then mill the curves, taking care to ensure that the rotary table rotation is always feeding the cut on – i.e. not climb milling. Once this has been done, move to the lathe and

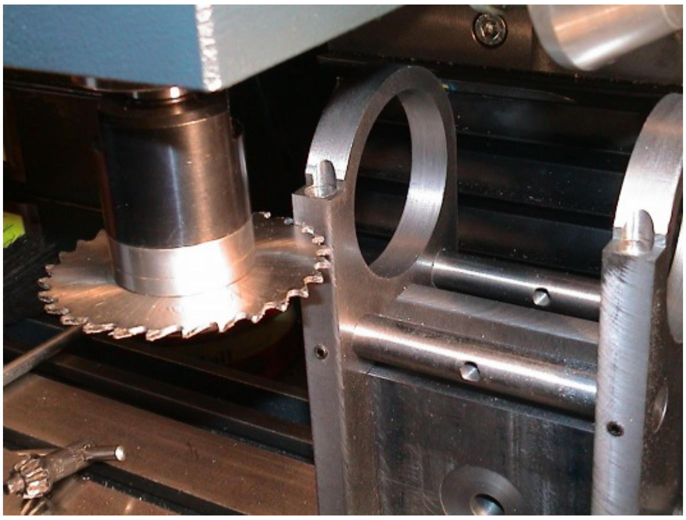


Photo. 12 Splitting the clamping hole

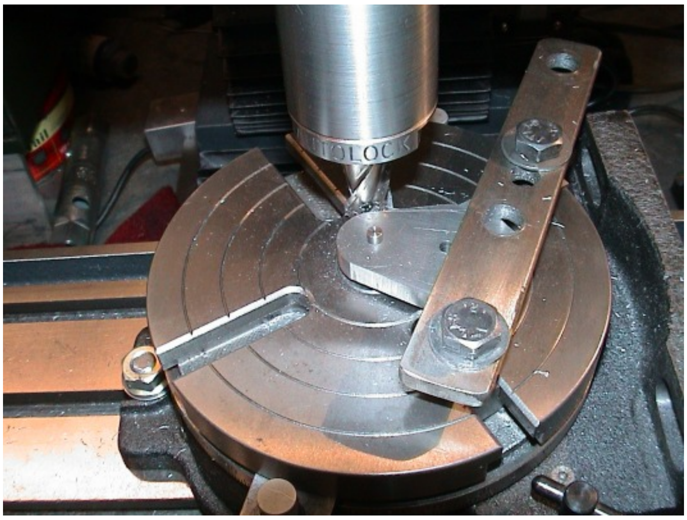


Photo.13 Shaping the pillar top swivel

clamp to the lathe faceplate, centring the hole on the large end. Simply pushing the tailstock into the hole is probably good enough. Open up the hole to nearly 12mm and then finish with a 12mm reamer. Then, using a boring tool, bore a recess of a diameter to be a nice fit on the end of your column and to a depth of 4mm.

The 12mm diameter bush with a 6mm hole should be just a fraction thicker than the swivel plate so that when a setscrew with a large washer clamps the two parts to the column, the bush is captive and the swivel plate can still swivel around but with no play whatsoever.

The purpose of the head raising leadscrew is to raise the whole head up or down the column. It is a straight turning job in mild steel. However you should bear in mind that the clamping block into which this will screw is in effect an enormously thick nut and therefore the thread on the screw must be accurate. I screwcut the thread on the lathe to almost full depth and then finished it off by running a die down it. This guides the die and eliminates any chance of a drunken thread. Any misfits may be helped if necessary by opening up the hole in the block to clearance diameter for part of the way thus effectively “thinning the nut”. I made two bushes to fit on the screw either side of the swivel plate in order to take the thrust in either direction. The lower one is very short of room being close to the main column, and is pinned to the adjusting screw. The top one is held by a 5BA grub screw. I used a handle from an old scrap cross slide which was a push fit on the shaft, but I show an alternative design (Part K) on the plan.

Fine Adjustment Screws

The purpose of these items is to swivel the motor and spindle about the pivot points, thus giving a fine height adjustment without losing register by unclamping the head from the column. I used ¼” BSF but I suspect that most people will use 6mm for these. As previously mentioned there is an advantage to using a left hand thread for a more intuitive feel. I made these in two pieces. I turned the heads with a blind hole in the centre and knurled the edges to create a good gripping surface. I then turned the threaded part leaving the last 6mm plain, which was then fixed into the blind hole in the head using two part epoxy resin.

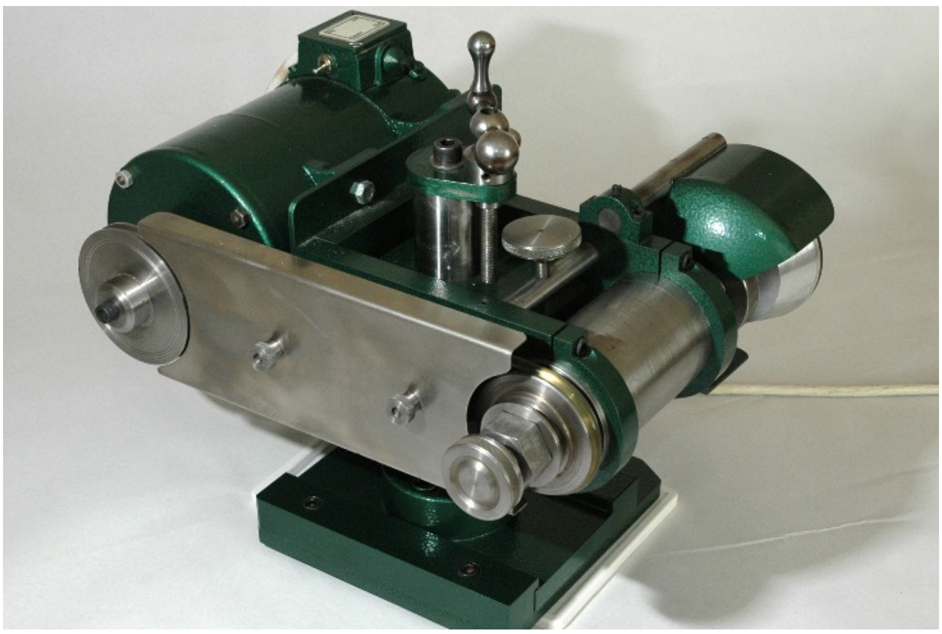
Motor Drive, Pulleys and Guards

My Tip Lap grinder came with an Induction split phase motor by Carter Electrical and the plate reads G8/212 1/8 HP 2800 RPM. so I used that for the grinding head. I cannot find any up to date reference on this motor. I also have a Parvalux motor ref M3 1/6 HP 2800 RPM with an external capacitor which gives a better starting torque. Both are similar size and both are reversible which is important. A motor plate was cut from 3mm steel plate 120mm x 160mm and the motor was attached to this using setscrews and nuts through the plate. The plate was then attached to the back plate (part D) using cap head set-screws into holes tapped into part D. These cap head set screws need to be carefully placed so that the setscrew positions are not covered by the motor feet. The bolts holding the motor to the plate came above and below Part D as the feet mounting points were 95mm apart as can be seen in **Photo 14** and **Photo 1.**

The two step pulleys detailed on the plan give spindle speeds of 2800RPM and roughly 5700RPM respectively and the drive is through bond-a-band round belting which can be made to any length in the workshop. Unless driving grinding points, I almost always use the slower speed setting. If I need the higher speed, the motor struggles a little on startup but runs effectively after that. I think that the Parvalux motor with the higher starting torque is an advantage there.

Guarding the drive will depend upon your arrangement, but I made a stainless steel channel which is supported on two posts screwed into the side of the swivel head. The guard is fixed with two knurled finger nuts for easy removal and fixing without tools. This is illustrated in **Photo 14.**

For a guard for the grinding wheels, I used an old redundant small dry powder



The motor drive and guards

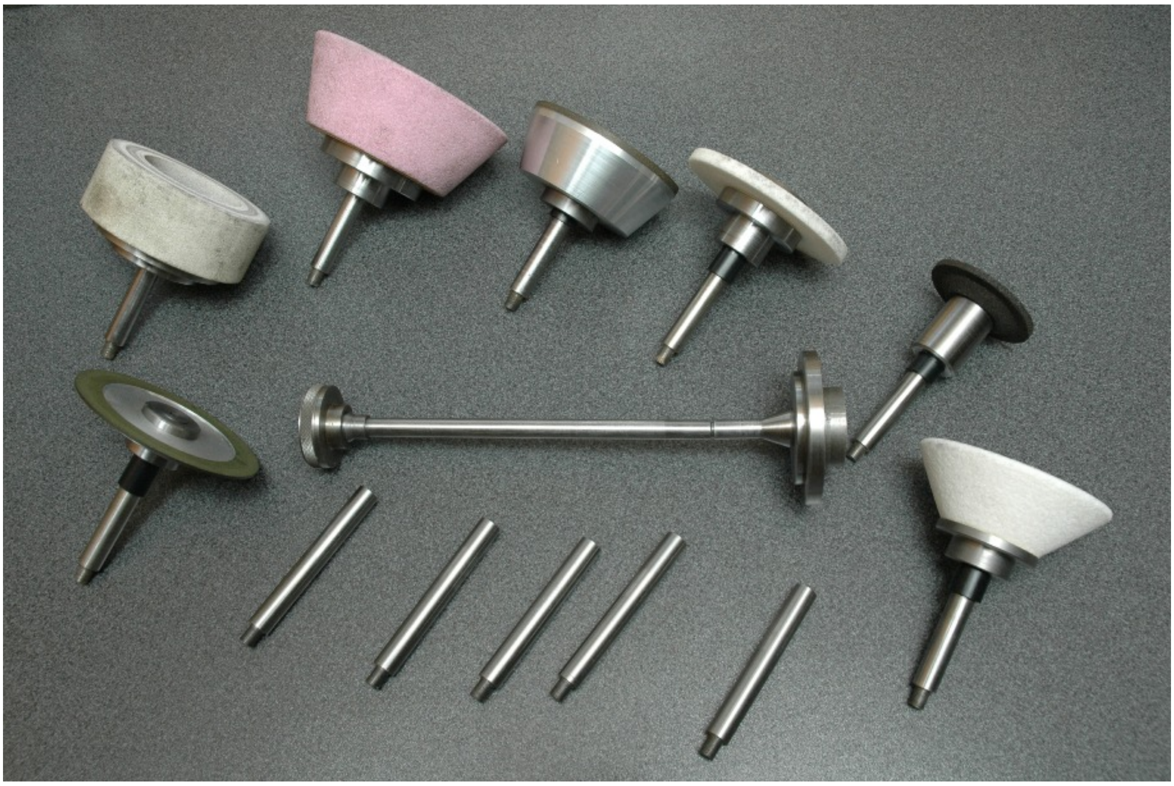


Photo 15 Grinding wheels and arbors

fire extinguisher 112 mm diameter. I sawed the top off the fire extinguisher and cut away an access segment. I then mounted it on an arm supported by a small plummer block type of fixture made from steel and mounted on the top of the swivel head. This can be seen in Photo 1 and Photo 14. Using a fire extinguisher in this way makes a very neat, fully adjustable guard which would be difficult to fabricate. If you do this, it is obviously very important that you release all pressure from the extinguisher before cutting it open and wear a mask whilst emptying it of powder.

Mounting the Grinding Wheels

The advantage of using the basic spindle from the spindles book as the grinding spindle is that it is very adaptable. It carries a nose that is identical to the Myford ML7 and it has an internal 2 MT fitting with a through bore. This means that you can mount your grinding wheels using 2 MT collets, Myford collets or a variety of other methods. I started off by using Professor Chaddock's method of mounting the Quorn wheels. This involves a 5/16" arbor that widens out into a 40 Deg. taper to locate into the grinding spindle and is secured by a drawbar with a ¼" x 40 TPI thread. I made an adapter to go into my 2MT socket and bored it to fit the Quorn arbor (Part R). However as I needed quite a few grinding wheels, I did not fancy making a lot of arbors with a 40 Deg. taper and I eventually settled on mounting my grinding wheels on a 5/16" plain arbor with a 40TPI drawbar end and using a Myford 5/16" collet on the nose of the spindle to locate the arbor. This means that I only need to prepare 5/16" plain arbors and when I wish to mount a new grinding wheel, I fix a flange onto the arbour with 2 part epoxy. When dry, I run the arbour in a collet in the lathe to finally true up the flange face and mount the wheel.

However I realise that most readers will not have Myford collets (although plain 2MT collets would work) so I have drawn on the plan, my original method using parts P - Drawbar, Q - Quorn type arbour and R – Adapter for 2 MT socket. I have drawn it using an 8mm arbour rather than my imperial system. Note the drawbar has a loose locating collar on the bar which locates in the chamfered end of the bore in the spindle. The measurements of the MT adapter (Part R) show the larger end at 17.5mm and, with a 2MT taper, this should cause it to pull in flush with the end of the 2MT socket in the spindle. You should fit this first with an arbor and if necessary adjust the length of the loose collar on the drawbar to ensure that the arbor is held firm.

Where size permits, I prefer to clamp the grinding wheels using 3 setscrews on the flange in order to eliminate any possibility of anything unscrewing when running the spindle counter clockwise. However I have many grinding wheels held by only a single set-screw and I have never had a wheel come loose.

Photo 15 shows the drawbar with a Quorn type arbour and flange. Note that the arbor is partly unscrewed to show the join, as otherwise the drawbar and arbor appear to be one piece. The photo also shows a selection of wheels mounted on plain arbors and some pre-made silver steel arbors ready for future use.

In use the head can be removed from the column and fitted inverted to more easily present the edge of a disk wheel to the work, as can be done with the Quorn. Actually I have never used it in this way.

I hope that this article will give some inspiration to those readers who would like to make a tool and cutter grinder of their own design and are hesitant to spend the substantial amounts of money required for some of the casting kits. The making of this unit gave me much pleasure and it is simply a dream to use.

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