# Automatic Cross Feed

By R.G. Sparber

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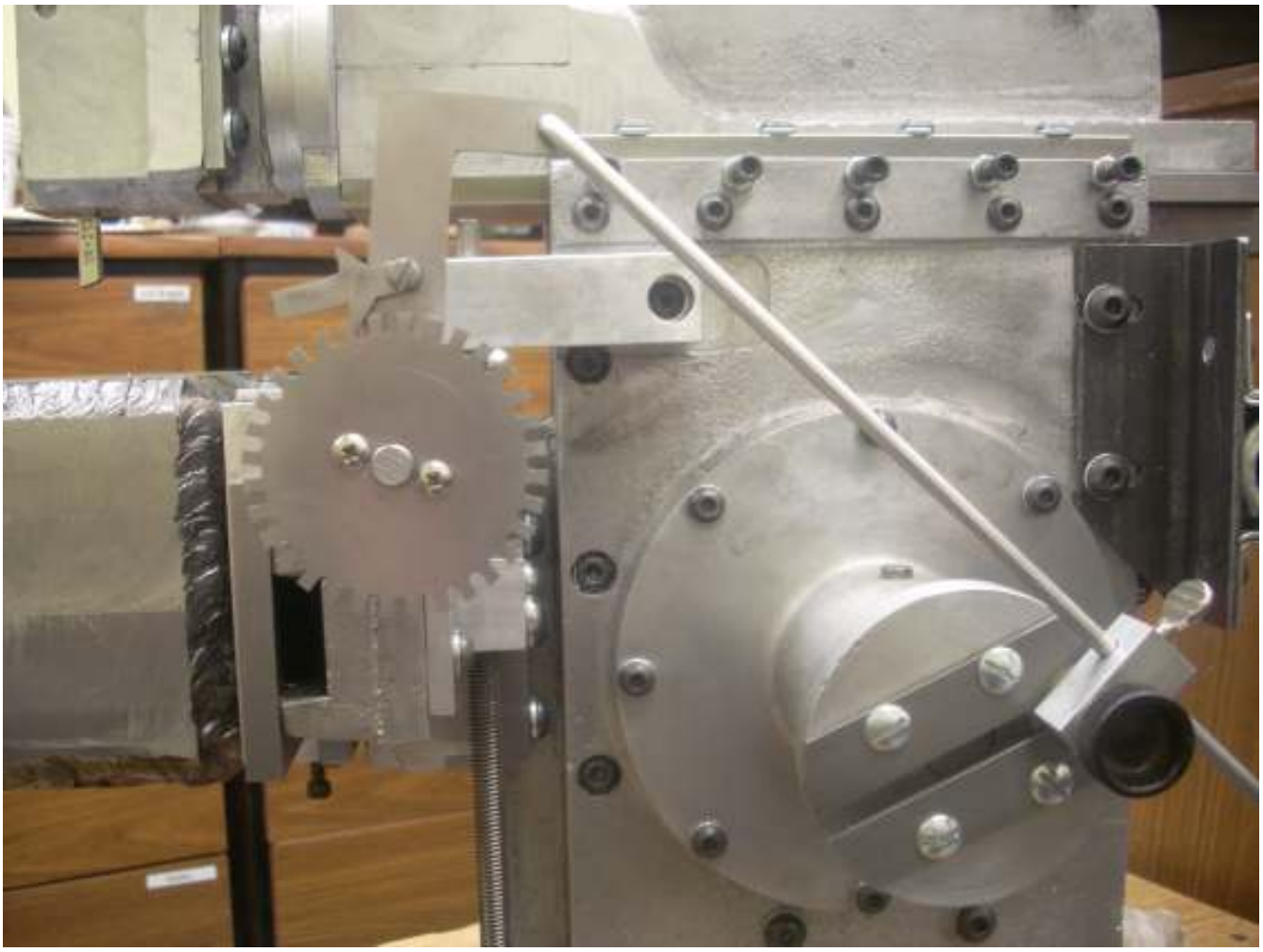
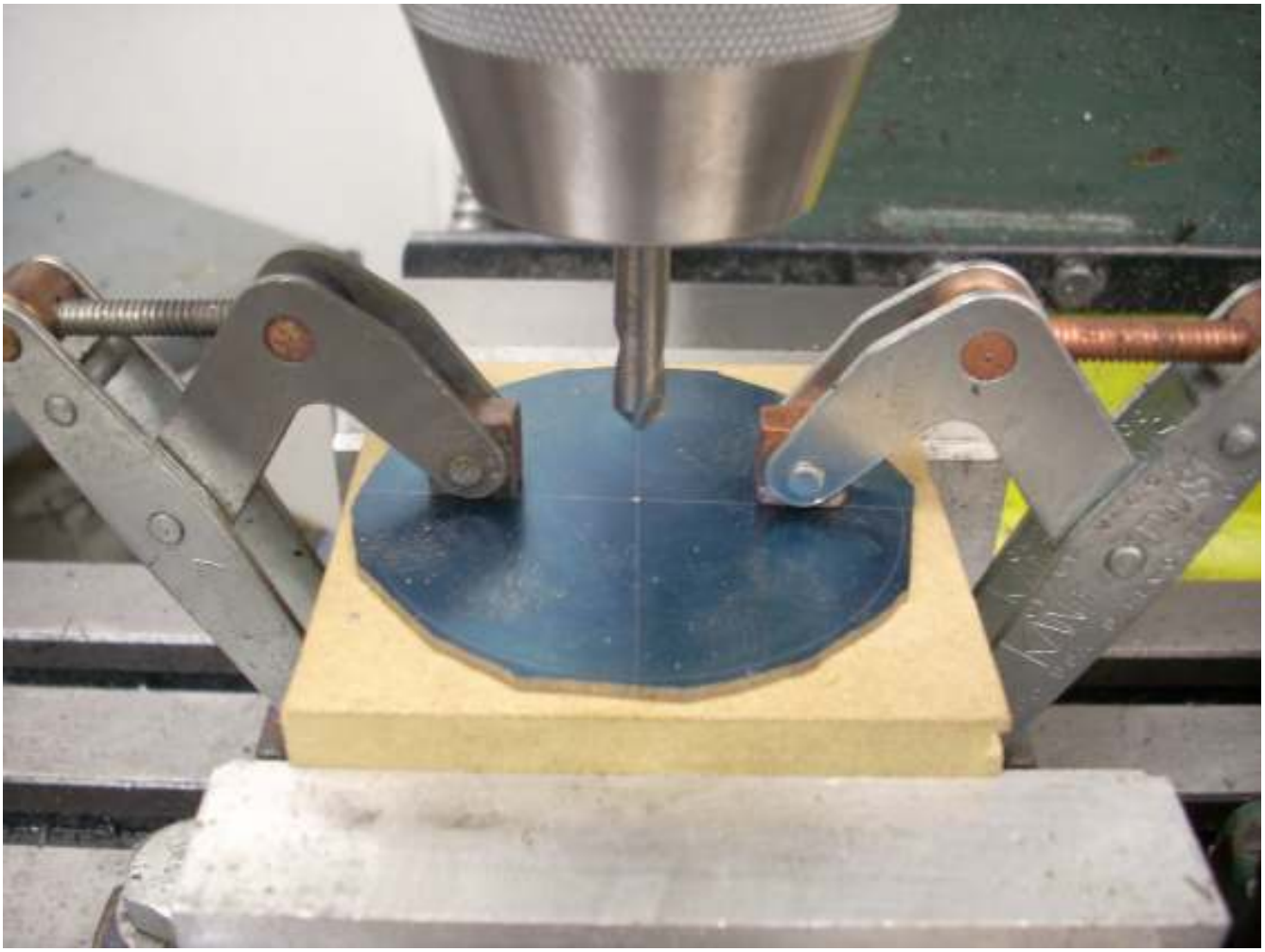


Each time the ram retracts, this automatic feed is able to move the taper sideways between 0.002” to 0.01”. Gingery certainly outdid himself this time! You can find a movie of the shaper cutting a block of paraffin wax on my web site. Be warned, it is a 60 MB file so takes a long time to download.

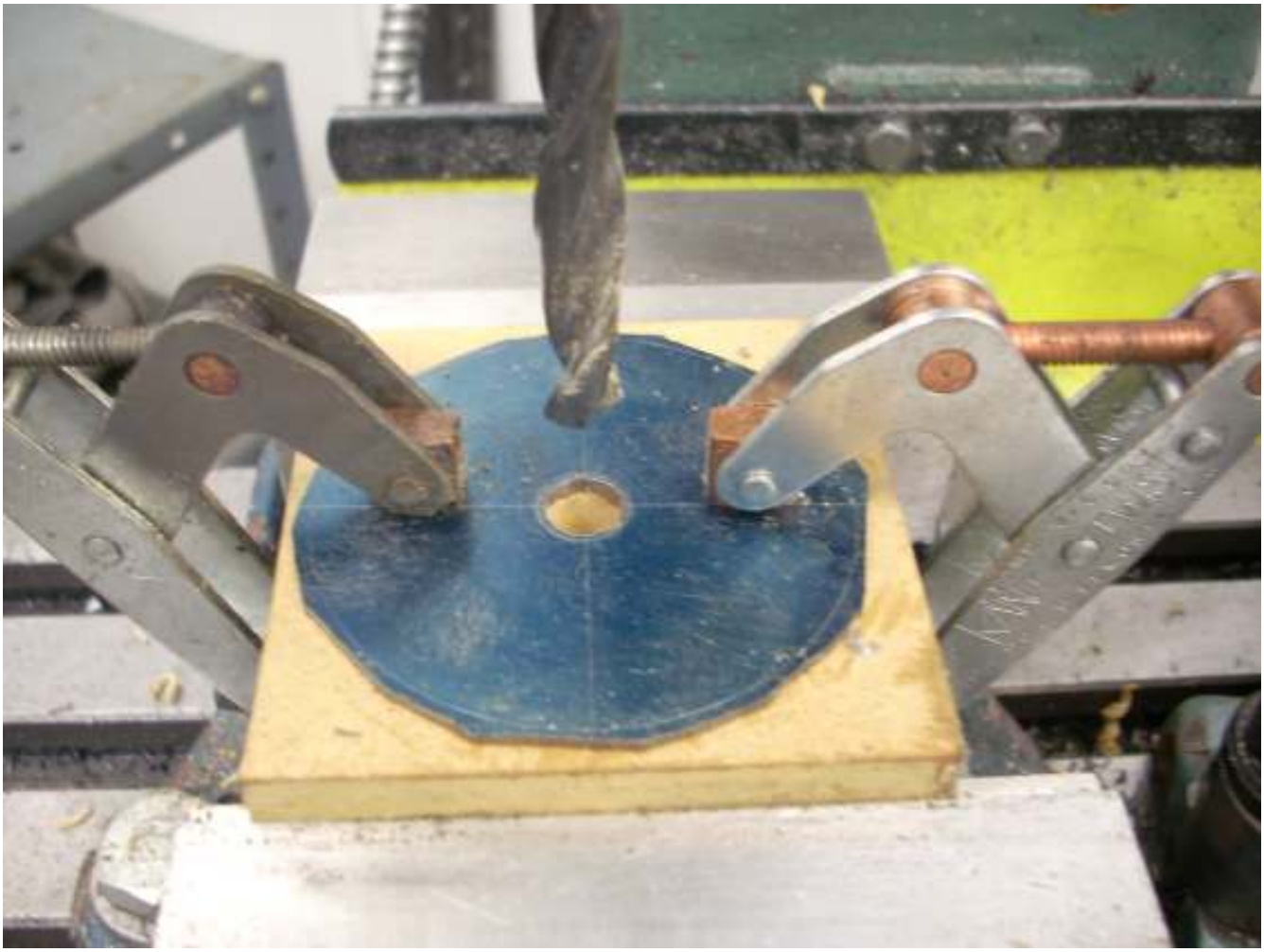
# *The Ratchet Wheel*

The adventure started by scribing the OD of the disk on a piece of 13 gage sheet metal.  I set my digital caliper to 2.625”, locked the slider, put one point into the dimple in the center of the disk, and ran the other point around in a circle. Sure makes an accurate and easily handled compass.

After marking the center, I trimmed much of the excess with my bandsaw.



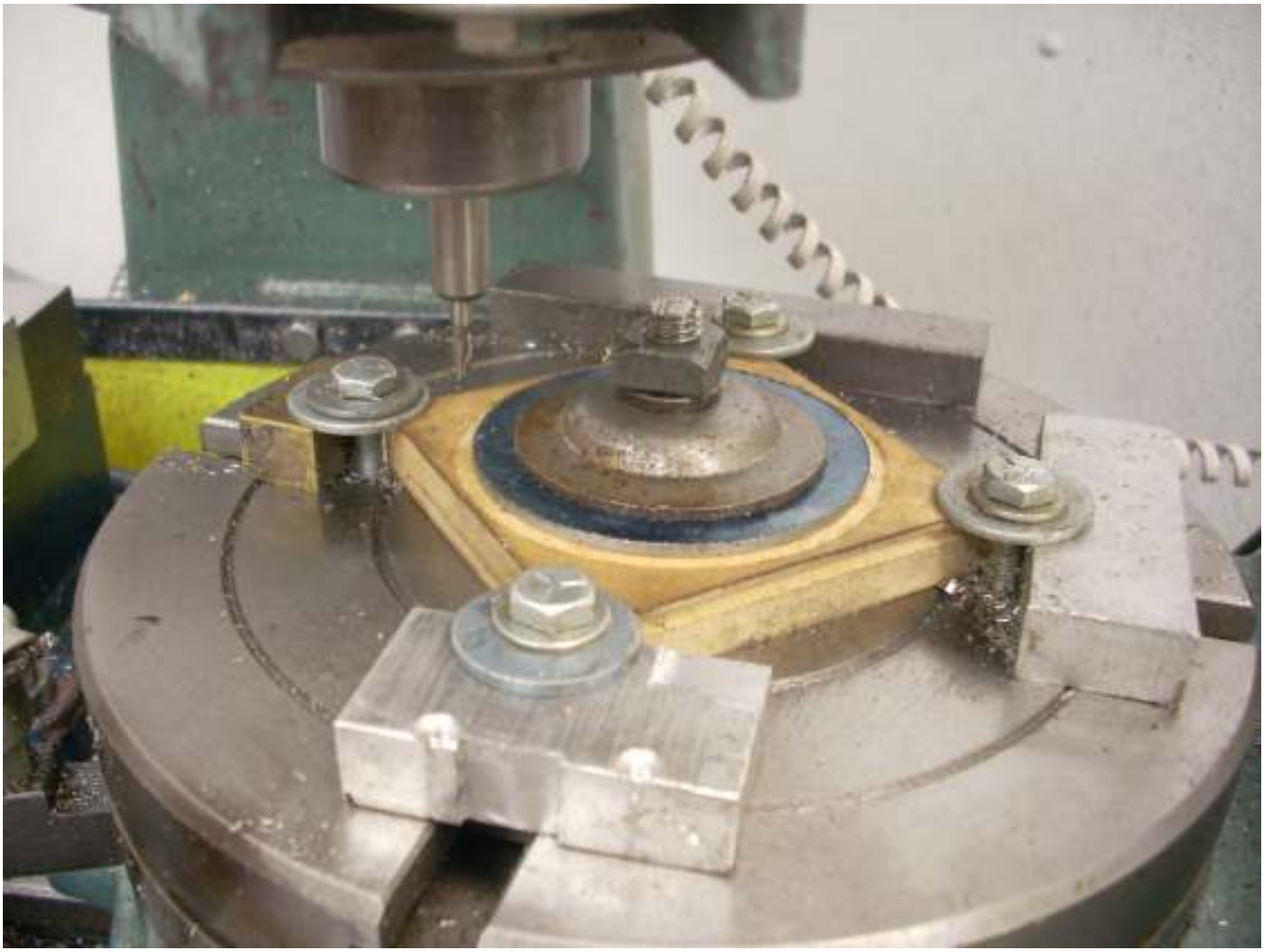
A piece of 1/2” thick MDF is used to support the disk. Here I have clamped the disk to the MDF in preparation for drilling a 3/8” center hole.



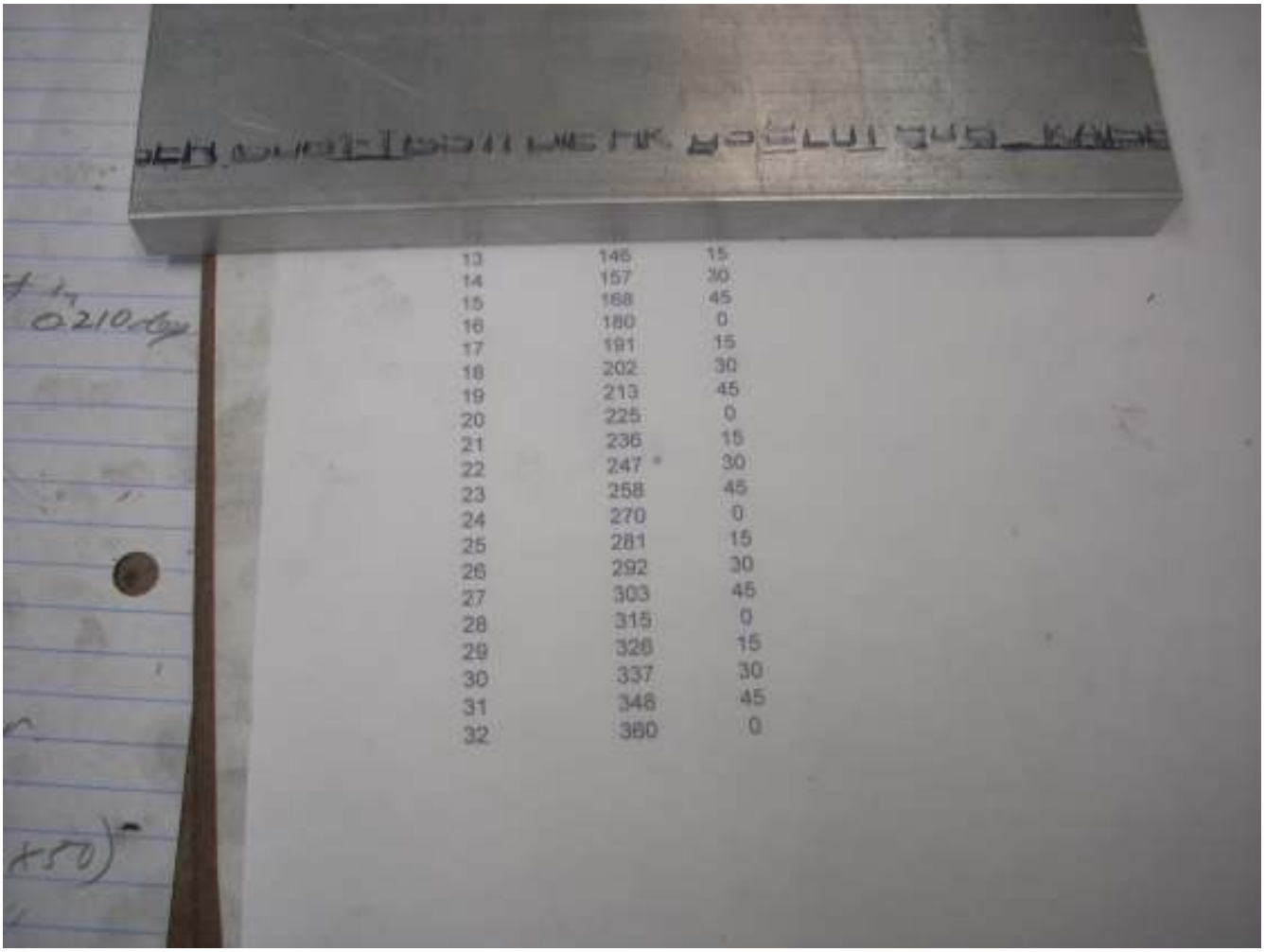
The drill goes through both the disk and the MDF.

I am doing a rough alignment of my rotary table with the spindle center. I followed it up with a DTI to get them within 0.001” of each other.  The bits of packing are part of my clamping system.

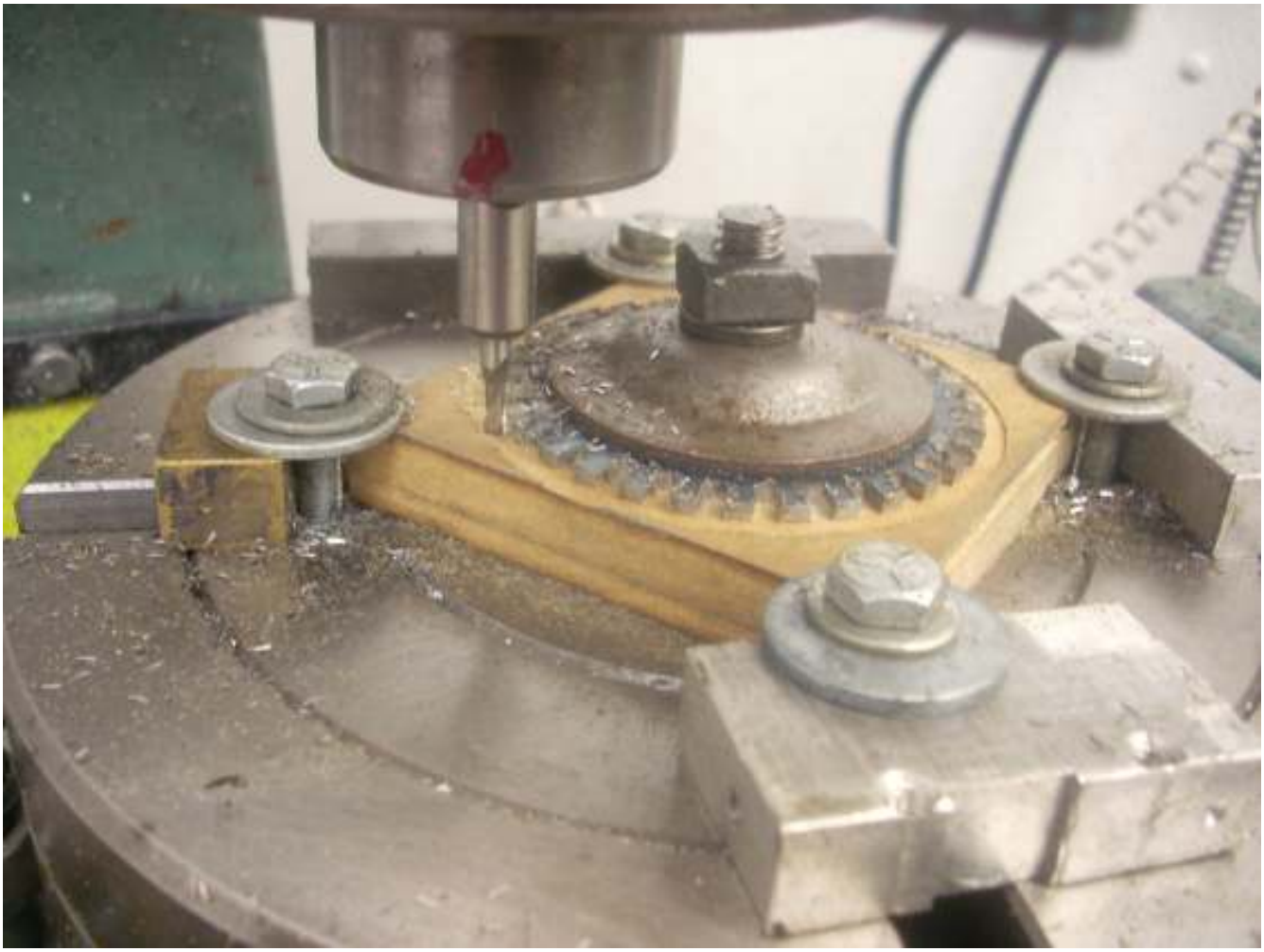
A length of threaded rod with a nut on the bottom was fed up through the hole in the MDF. A heavy washer went on next and was followed by a split washer and a second nut. The disk is now securely held on the MDF. I then used washers and hold down bolts to secure the MDF to the rotary table. The assembly was centered on the RT by eye. I then used a sleeve with an ID of 3/8”. It fit over the threaded rod and accepted the body of the end mill. I suspect I'm within 0.005” of true.



With the 1/8” end mill set to the correct distance from the center of the RT, I cut the OD of the ratchet wheel. Note that some of the MDF was removed too. This insures that I have gone all the way through the sheet metal.

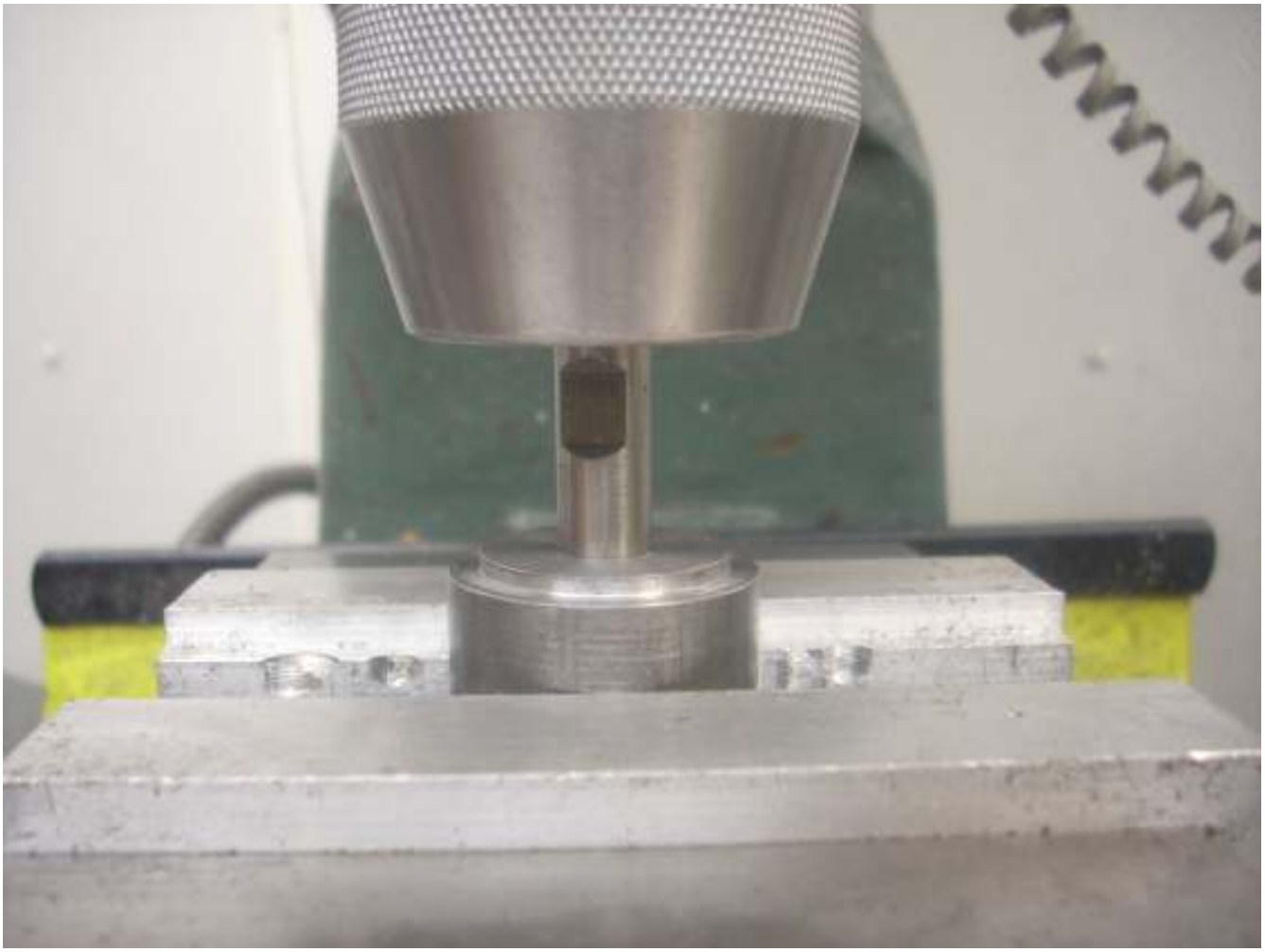



In order to cut 32 teeth, I needed to advance 11° 15' after each tooth. It took a few minutes to set up an Excel® spreadsheet to guide the work. The first column is the tooth number, the second and third columns are the angle in degrees and minutes.



It took me about 20 minutes to cut the teeth. The challenge was to not let my mind wander since it would be easy to mill off a tooth.

The ratchet wheel came out surprisingly well. I'd never done one before.



A few minutes on my lathe and the hub was turned. I'm using 12L14. Here you see the hub being aligned with the mill's spindle. I then drilled and tapped two 6-32 holes.

A 6-32 hole was cross drilled and tapped for the set screw. If anything binds, I don't want the hub locked too tightly to the cross feed rod. This small set screw should yield easier than a ¼”-20 set screw.

With the hub holes drilled and tapped, I ran the tap drill through the hub to match drill the ratchet wheel. It would have been better to do all of the drilling first and then run the tap. I got lucky and did not tear up the threads during the match drill process.

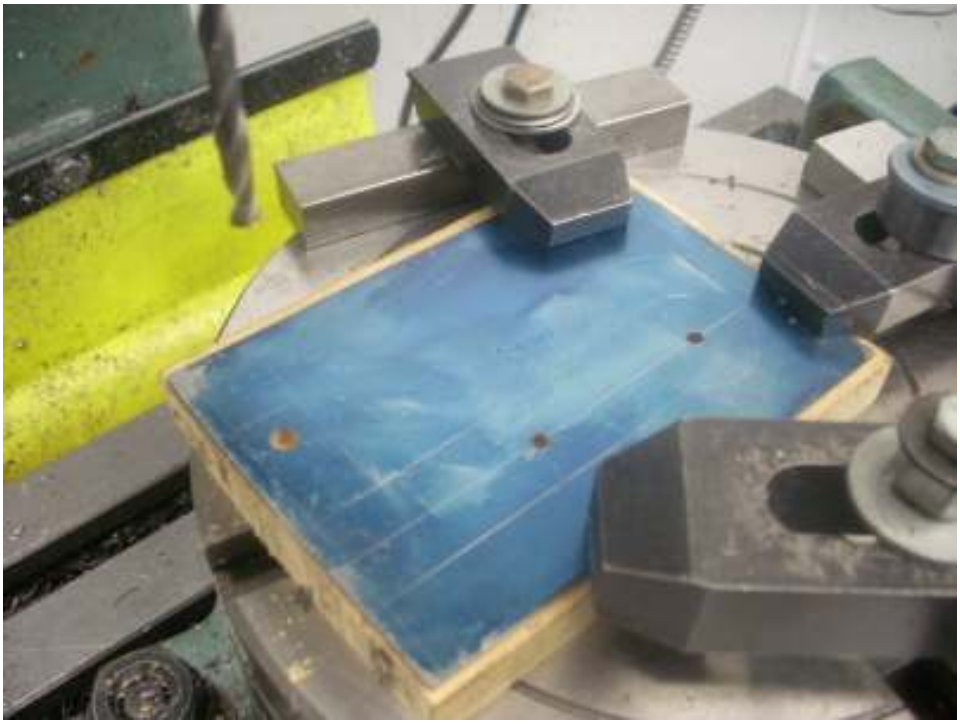
Not shown here is that I had that close fitting 3/8” rod through both the hub and ratchet wheel before match drilling.

I put a close fitting 3/8” rod into the hole and then secured the two screws. Thanks to match drilling, it all has to fit together precisely.

You can see the 1” diameter 0.076” wide slot that will take the ratchet plate.

# The Ratchet Plate

Using the same 13 gage sheet metal, I marked out the ratchet plate. I needed practice using my RT so decided to cut this on my mill rather than using a saw and file.



The center of the round part of the ratchet plate was centered on the RT. All three holes were drilled next.

I then used my 1/8” end mill to cut the 1” hole, the 2” outline, and the straight parts. Initially I planned to use just my RT dial and DRO but in the end just followed the layout lines. This is not a precision part. The work went very fast.

The ratchet plate before cleaning up the edges. You can see that my eye was a bit off on the lower edge. The 3/16” hole is not centered.

After a bit of filing, it doesn't look half bad.

I removed the two screws, dropped in the ratchet plate, and put the ratchet wheel back on the hub.

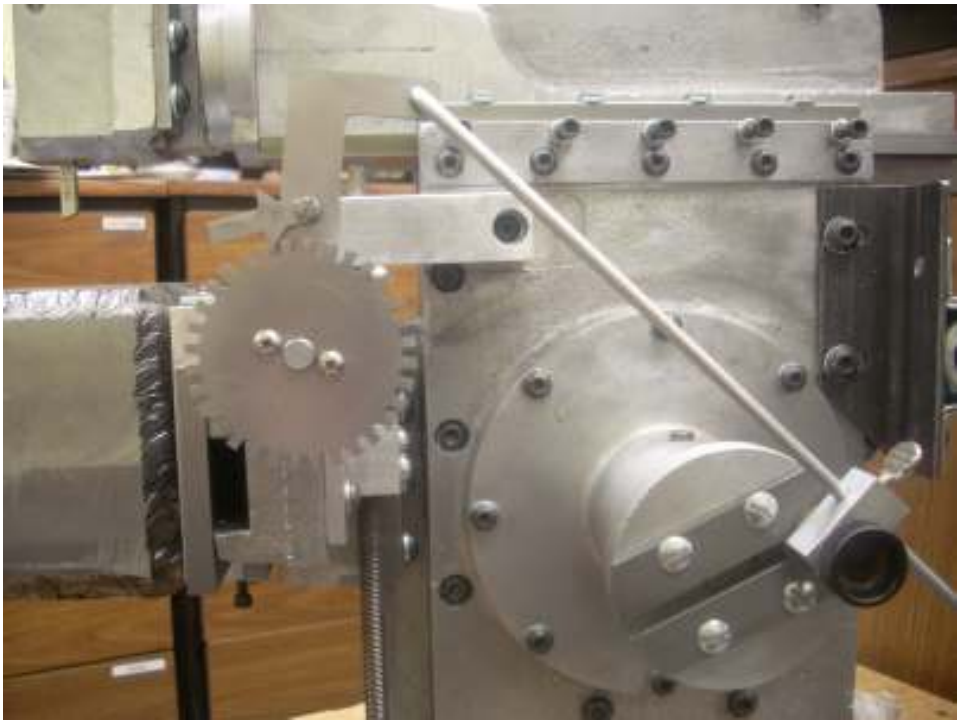
The ratchet plate is a smooth sliding fit on the hub.

The ratchet pawl was cut from a piece of 1/8” x 3/4” CRS. All features were cut and filed before it was cut free of the bar. This makes it a lot easier to clamp and handle.

Gingery suggests using a rivet but I chose to drill and tap the hole, use a screw, and have a locking nut on the back. It makes adjusting the clearance between pawl and plate easier.

The connecting link is supposed to be steel or brass. I didn't have any 3/16” steel rod and could not see wasting my precious brass rod on this part. So in the end I used 3/16” aluminum rod. If it does not hold up, I'll make a new one from steel.

The crank block and feed crank pin were not worth documenting. I did find a nice plastic handled ¼”-20 screw for the crank pin.



I had to slide the ratchet assembly almost to the end of the cross feed rod in order to align it with the crank block. There is no room for a second crank. It would not be hard to make a new, longer rod but at this time I think I can live with just a single crank on the other end of the cross feed.

The next step is to finish the table. I plan to bolt on T slots on the top and mill a V slot on the right vertical face of the table.

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