

# The NEMES

NEW ENGLAND MODEL ENGINEERING SOCIETY INC.

# Gazette

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July 2013

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### Editor's Desk

George Gallant

The July 2013 meeting has been canceled!!

We are in dire need of an Events Coordinator. The basic requirements are ability to breathe air, talk to people, and schedule events. I, for one, really look forward to the presentations at the meetings. As I am not a machinist. Any presentations about tooling, techniques, and materials are interesting to me.

There individuals in the club who have unique skills and work experiences that would be of interest to the general group. As a help in getting started:

1. Form an ad-hoc group that gets together before each meeting to identify themes (materials, tools, engines, etc) to present.
2. Identify club members who have experience in said themes, and assign a meeting, or portion, to them.
3. Identify external entities (shops, educators, museums, etc) that could be recruited to give a presentation.

I think that having a theme, ie welding, that runs for a couple of meetings would allow a group of members to prepare shorter presentations that highlight their particular tools and techniques

Also, we have been very light on bringing toys/tools/projects to the meetings. Bob Neidorff has proposed instituting some kind of door prize or award.

### Next Meeting

Thursday, Aug 1<sup>st</sup>, 2013

Charles River Museum of Industry  
154 Moody Street  
Waltham, Massachusetts

### Membership Info

New members welcome! Annual dues are \$25 (mail applications and/or dues checks, made payable to "NEMES", to our Treasurer David Baker) Annual dues are for the calendar year and are due by December 31<sup>st</sup> of the prior year (or with application).

Missing a Gazette? Send a US mail or email to our publisher. Contact addresses are in the left column.

### Issue Contributions Due

AUGUST	JUL 18, 2013
SEPTEMBER	AUG 22, 2013
OCTOBER	SEPT 20, 2013

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# Pattern Making and Castings

by Rolly Evans

My latest project is building new frames and running parts for 20 HP Stanley engines. Stanley engines frame are flimsy to maintain lightness in overall weight. The early engines used ball bearing crossheads and the construction of the frame was designed to allow through bolts to be used to preload the balls in the crosshead. But this design also allowed the frame to twist under load. When Stanley went to wet engines and later changed the design of the crosshead to bronze guides, they did not upgrade the frame design to eliminate the twisting.

My new frame is more like a box beam with three square frames that the four rods pass through and are silver brazed, making the frame very rigid to prevent any twisting.

My quest this year is the building of the new crosshead guides. I built a pattern (see photos) and cast new bronze guides in Navy G SAE 620 aka CDA 903 bronze. It's a tin based bronze alloy used for gears and bearings. Running in oil they should last a long time.

Most of my work has been small quantities. I make a pattern know as a loose piece and the foundry would cut it into the cope and drag. But fewer and fewer foundries are training men to do this. I still sometimes make a loose piece but have to wait longer to get it cast as the foundry needs to bring in an old timer to do it correctly. I also pay more per piece.

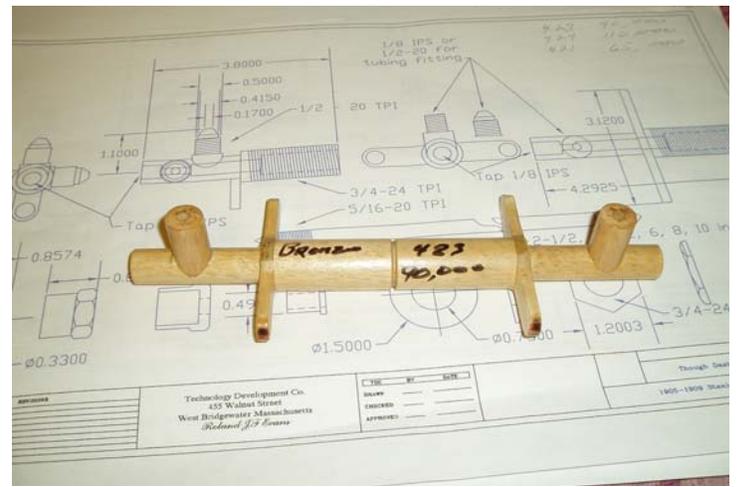
Now I try to make all my patterns on match plate, I also gate all my own parts on the pattern board. I request no grinding or cleaning up of the parts other than tumbling or bead blasting and cutting the spears off.

It's been a learning process as different metals shrink faster than others when poured and depending on the shape may need to be gated in more than one spot. Maybe I've been lucky or the foundry has made corrections to my work that I do not know about, but my parts have always come out very well, or as I had planed.

Most of the foundries have cores of standard diameters for round cores and some also have square cores. It's best to check first with the foundry. For odd shaped cores, you need to build a core box. This is a mold box opposite the shape of the core. I make the core from wood or metal and then make the box of fiberglass that sometimes is in two parts as required to get the core removed. Sometimes I just use Bondo body plastic to make the box. The pattern will also require hubs or supports to hold the core firmly in place as the metal is being pored. If the core is two small the foundry will insert steel rod in the core when they make it so the weight of the metal will not break the core.

More complicated patterns need special core boxes and large loose patterns need a good foundry man to cut them in.

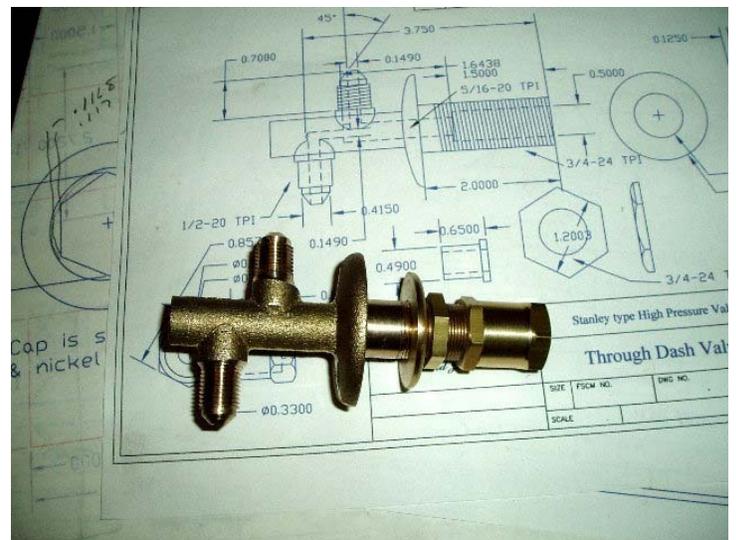
Photos attached are a small sample of some of the ways uncomplicated patterns are made.



Loose pattern



Castings from loose pattern



Finished machined part



Match plate pattern with standard cores - Un-gated



Finished castings



Finished part



Match plate pattern gated



Match plate pattern gated



Finished castings



Match plate un-gated with cores



Core boxes required



Finished castings

Ed Note: Rolly supplied additional photos but we are out of room. Will include next month.



## Shop Tips

Bob Neidorff

### Expanding Arbor Set

When I saw this Expanding Arbor Set offered for sale, I thought that it would come in very handy, so I bought it and put it in my tool cabinet. It sat there for many years because I never quite found the right use for it...until this weekend.



The set looks very versatile. You get 8 different arbors, sizes:  $\frac{1}{4}$ ",  $\frac{3}{8}$ ",  $\frac{1}{2}$ ",  $\frac{5}{8}$ ",  $\frac{3}{4}$ ",  $\frac{7}{8}$ ", 1", and  $1\frac{1}{4}$ ". You can put the arbors in a three-jaw chuck or in a collet, and then slide the work over the arbor to hold it precisely on center. The only drawback is that the work must have a through-hole. Until now, every time that I needed this tool, my work had a stopped hole, so I couldn't get an Allen wrench in to tighten the arbor.

This weekend, I made a bull live-center on the lathe starting from  $3\frac{1}{2}$ " diameter steel. I turned the nose to a precise  $60^\circ$  taper, drilled and bored it through  $\frac{3}{4}$ " and then parted off so that I could precisely bore into the other end for bearings. That was a big mistake. Once it was parted off, I tried to put it into my three-jaw chuck, but the chuck bore was too small and jaws were too short, so it couldn't reach beyond the taper. Then I grabbed my massive 10" four-jaw chuck and tried the same thing. Unfortunately, that didn't work either.

The classic solution to this problem is to mount the work between centers and drive it with a dog, but I'd need a very large dog to drive this piece, and even with that, it would be impossible to bore the end because of the center.

My first thought was that this expanding arbor was not likely to work, because the arbor was so small and the part so large. I slid one end of the work over the arbor, tightened the Allen wrench through the other end, and then mounted it in a  $\frac{3}{4}$ " 5C collet. I made a few light cuts and convinced myself that it was turning true, so I started to bore out the body.

Immediately, I was frustrated because the arbor didn't hold tightly enough and the work slipped. I stopped, retightened the Allen wrench as tightly as I could using an extension for leverage, and tried again.

This time, success! I was able to take deep cuts and the part stayed true. This little arbor held tightly and made the job easy. After finishing the boring operation, I dismantled the work, tested the bearings for fit, said something that I won't repeat, and decided to try mounting it again to take a slightly deeper cut on the inner portion of the bore. Sure enough, the work slid on the arbor and I tightened the Allen wrench with all my might, and it was true again! I was able to bore slightly deeper and get a perfect fit for the bearings.



In retrospect, it would have been smarter for me to start the job by boring into the work for the bearings, then turn the taper pointed towards the headstock, and parted off after the job was complete. I live and I learn.

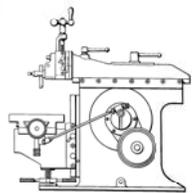
Now that I found a chance to use this arbor set, I can highly recommend it – assuming that you have the right job for it. But it works well, is easy to use, and handles a problem that was otherwise intractable. You could probably make an arbor like this yourself, too, but these are convenient and not expensive.

If you're interested in a set, you can get it from a number of suppliers, including Shars, CDCO Tool, and many people on ebay. The lowest price that I saw recently was \$40 including shipping from a dealer on ebay, but ebay listings come and go. CDCO Tool sells the set for \$38 plus shipping. Mine says Made in Taiwan but you can also find a USA version of this tool for more money.

[www.shars.com/products/view/313/Expanding\\_Arbor\\_Set](http://www.shars.com/products/view/313/Expanding_Arbor_Set)

[www.cdco.com/item.php?itemid=194](http://www.cdco.com/item.php?itemid=194)

[www.ebay.com/sch/i.html?\\_nkw=expanding+arbor+set](http://www.ebay.com/sch/i.html?_nkw=expanding+arbor+set)



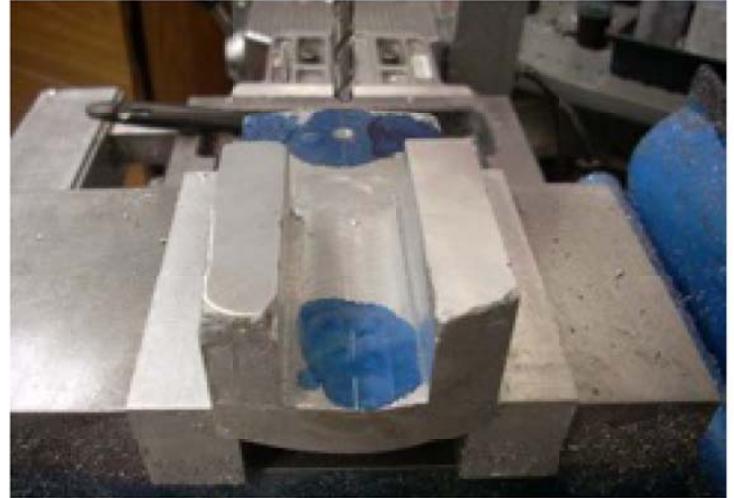
## Metal Shapers

Kay Fisher

## R. G. Sparber's Gingery Shaper - Part 38

### Machining and Fitting the Clapper Box (part 4 of 5)

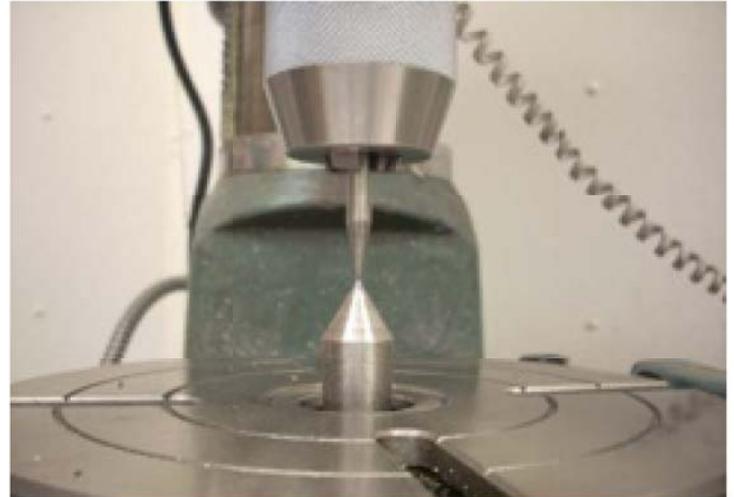
The next task is drilling the mounting holes. In the foreground is the location of the pivot hole. I have just drilled a hole that will line up with the curved slot to be machined later.



Drilling Slot Photo by R. G. Sparber

Gingery specifies that these holes should each be  $\frac{3}{4}$ " from the ends but later says they should be 4" apart. Be careful with this over constraint of the hole locations. I did place the center of the holes  $\frac{3}{4}$ " from the edges but the center to center distance was 3.888" and not 4". This dimension is not critical but it is essential that the holes in the clapper box perfectly match the holes in the down feed casting. This is not a problem if you match drill.

The holes were drilled and then the casting put aside so I could set up my rotary table. I will later match drill these holes into the down feed casting.



Rotary Table Alignment Photo by R. G. Sparber

For the rotary table, the first step is to roughly align the center of the spindle to the center of the rotary table. I used a dead center in the rotary table and a spud in my drill chuck. This will get me close enough that I can next use my DTI.



Table Alignment 2 Photo by R. G. Sparber

With the Z axis locked, I zeroed the DTI at the front position. There is some risk that indicating on this steep taper causes me to pick up additional error from an out of tram head. It might have been better to put the DTI on the less steep taper or better yet, used another rod that has no taper. The spindle is then rotated so the DTI is at the back position. The reading is noted and I adjust the Y axis until the DTI now reads half of its previous reading. I then move back to the front to verify that there is no difference between front and back reading. The process is repeated between left and right.



Table Alignment 3 Photo by R. G. Sparber

When the center of the spindle is aligned with the center of the rotary table, I can swing the DTI all the way around and the needle does not move. The X and Y DRO displays are then zeroed.

This is far more accuracy than needed for the next operation but I was a bit rusty using my rotary table so this was good exercise for my aging brain.



Chain Drilling Begins Photo by R. G. Sparber

I adjust the X axis position until my 1/4" drill enters the center hole without bending. The X and Y axis are now locked. I found that a rotation of  $\pm 14^\circ$  relative to the center hole looked about right. First the slot will be chain drilled and then cleaned up with a 3/8" four flute end mill. Here you see the first hole being drilled at about  $13^\circ$ . That leaves some metal for my clean-up cut with the end mill.



Chain Drilling Continues Photo by R. G. Sparber

I chain drilled from that first hole towards the center hole. Then I drilled a second series of holes starting at  $+13^\circ$  from the other end of the arc.



Milling Slot Photo by R. G. Sparber

The drill and drill chuck have been replaced by the  $\frac{3}{8}$ " four-flute end mill in a collet. This type of end mill cannot drill like a two flute. Instead I have centered it over a hole which provides relief for the center of the end mill which cannot cut. Note that the hole is only part way through. I ran out of quill travel.



Really Milling Slot Photo by R. G. Sparber

I raised the quill all the way up and then unlocked the mill head. After lowering the head down, the quill was extended until the end mill was near the surface. The head was then slowly rotated until the end mill lined up with the hole. As a final check, the quill was lowered to verify that the end mill cleanly entered the hole. Then the head bolts were tightened.

Here is the root of the problem. The  $\frac{1}{4}$ " drill plus chuck are much longer than the  $\frac{3}{8}$ " end mill and collet. Fortunately, this is not a critical. For better alignment I could have run my DTI around the inside of the hole milled by the end mill.



Side Milling Slot Photo by R. G. Sparber

The slot is then side milled. I moved the rotary table from  $-14^\circ$  to  $+14^\circ$  and got a nice looking arc.



Slot Done Photo by R. G. Sparber

It looks good to me but the top surface is a bit ratty. Gingery notes that I can optionally clean up the surface. I offset the X axis  $+0.200$ " and  $-0.200$ " to clear an area around the slot.



Slot Cleanup Photo by R. G. Sparber

I'm not real happy with the look, especially at the ends of the arc.



After More Surface Milling Photo by R. G. Sparber

The part was put back in my vise and the surface milled.



To add an event, please send a brief description, time, place and a contact person to call for further information to Bill Brackett at:

[thebracketts@verizon.net](mailto:thebracketts@verizon.net) or 508-393-6290.

## July 4th NO MEETING THIS MONTH

NEMES Monthly Club Meeting Canceled!

## NO MEETING THIS MONTH

<http://www.neme-s.org>

July 6th Antique Engine Meet & Tractor Meet

Boothbay Railway Village

Rt 27 Boothbay ME

[www.railayvillage.org](http://www.railayvillage.org)

July 7th Pepperell Engine and Tractor Show

RT 111 Pepperell, MA Ken Spalding 978-433-5540

July 21 9AM The Flea at MIT

Albany Street Garage at the corner of Albany and Main Streets in Cambridge

<http://www.mitflea.com>

July 21st Antique Car and Motorcycle Club

Waushakum Live Steamers

Holliston MA

[www.waushakumlivesteamers.org](http://www.waushakumlivesteamers.org)

July 27th 28th 8:30- 4:30 Race of the Century

The Collings Foundation

137 Barton Road in Stow, MA Cost at gate: \$15 Adults

[www.collingsfoundation.org/cf\\_OpenHouseEvents12.htm](http://www.collingsfoundation.org/cf_OpenHouseEvents12.htm)

July 26th -28th Eliot Antique Tractor & Engine Show

Raitt Homestead Farm, Rt 103

Eliot ME. Lisa Raitt 207-748-3303

[raittfarmmuseum.org/EliotAntiqueTractorandEngineShow.html](http://raittfarmmuseum.org/EliotAntiqueTractorandEngineShow.html)

Aug 1st Thursday 7PM

NEMES Monthly club meeting

Charles River Museum of Industry Waltham, MA

781-893-5410

<http://www.neme-s.org>

Aug 4th Belltown Antique Car Club

47th annual summer show

off of Rt. 151 East Hampton Ct

<http://www.belltownantiquecarclub.org/index.htm>

Aug 3-4th Scribner's Mill Show

Sebago Lake Region near Harrison ME

207-583-6455

Aug 10th -11th Straw Hollow Engine Show

Boylston, MA

J. A. Resseguie 508-869-2089

Aug 18th 9:00am The Flea at MIT

Albany Street Garage at the corner of Albany and Main Streets in Cambridge

<http://www.mitflea.com>

Aug 23-25th 42nd Annual Meet

Waushakum Live Steamers

Holliston MA

[www.waushakumlivesteamers.org](http://www.waushakumlivesteamers.org)

Aug 30th -31st Vermont Gas & Steam Engine Assoc show

Intersection Rte 100 and Rte 107 Stockbridge VT

Gail Norman 802-485-8224