



# The NEMES Gazette

NEW ENGLAND MODEL ENGINEERING SOCIETY INC.

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## Editor's Desk

Frank Hills

Folks, there was far too much good stuff submitted this month for you to be reading my babble. So enjoy the offerings and maybe you'll see me next month! So, take it away Norm!!!

### Machining a Casting

By Norm Jones

An overstressing event which occurred during the development of the igniter design for my Mery Explosive Engine was more than likely the cause for "Sparking Lever" failure experienced at the NAMES show this past spring.

I had Gary Martin send me a replacement casting...very timely response by the way! The challenge was to not only "make it like the print", but also to match the original part exactly, as it performs a critical function in the operation of the igniters.

The rationale given here is applicable to machining any casting. As always, I recommend planning the entire sequence machining operations prior to cutting any metal. The first cut that you make is the most important in that there may be insufficient material available for a subsequent machining operation.

-Continued on page 2

## Next Meeting

Thursday, Dec. 3, 2008

7:00 PM. Meetings held at:  
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 Richard Koolish, see right) 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 mail or email to our publisher.

Addresses are in the left column.

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## Editor's Desk

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This particular casting has a generous "stub" located on one side of the pivoting point. There are a number of important factors to consider before proceeding. They include: (1) the location of the hole at the pivot point with respect to the profile of the casting, (2) Preserving maximum web thickness and co-planarity in the ears located on both sides of the pivot point (hopefully to prevent a reoccurrence of the initial failure), and (3) location of the hole in the boss at the end of the lever arm with respect to the center of the provided boss and distance from the pivot hole.

I located the approximate center of the pivot boss on the side opposite the machining stub with the aid of a circle template. This was to be my Reference location. The casting was then clamped to a parallel as shown in below:



The side ears were positioned parallel to the bar. The lever arm proved to be a good surface to locate the clamp. Note that the center location on the stub side is not necessarily in the center of the boss. My intent was to make sure that there was sufficient material in the stub to leave an outside diameter of .500.

The next picture shows the setup in the Mill Drill used to check the projected center on the stub side. As it turned out, the initial reference point proved to be acceptable. If it had not been so, I would have had to make a slight adjustment and repeat the procedure.



The pivot hole can now be drilled and reamed to size. The casting was then mounted on a

lathe mandrel. Note that the larger diameter of the mandrel is positioned on the headstock side (driven side). Be sure to apply some oil on the mandrel prior to mounting the casting to prevent possible galling if the part should spin. Tool pressure wants to be toward the headstock assuring that the part will remain in a fixed location during all machining operations.

The following picture shows the setup for machining the near side of each "ear edge", as well as turning the stub to the diameter of a suitable 5C collet (.500 in this case). It is important that the pivot hole and the stub diameter be concentric to assure proper functioning of the finished part.



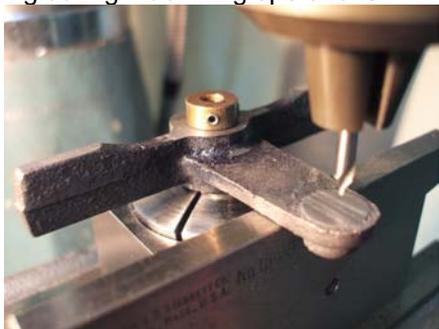
This next picture shows the casting mounted in a three jaw chuck on the lathe. This setup allows one to machine the remaining edge of each ear and the facing of the pivot hub.



A very useful setup is shown in the picture below. This is a square block that accepts a 5C Collet. The square block is usually sold along with a hex block as a set and makes a great addition to one's shop! The appropriate sized Collet holds the casting via the machined stub in the proper orientation, enabling one to machine the ears co-planer to one another. The small square is used to position the casting in the optimum orientation prior to tightening the Collet nut.



Below is a picture showing the Collet Block oriented in the milling vise for machining of the lower boss and drilling of the required hole. I inserted the mounting collar (used in final engine assembly) in the pivot hole. The smaller diameter will accept the pointed end of an Edge Finder which was used to establish my reference point. The adjustable parallel under the lever arm provides additional support for the casting during machining operations.



The next picture shows the Collet Block oriented in the milling vise to allow machining of the end of each ear. A drill blank was inserted in the pivot hole. The straight end of an edge finder was then positioned as close to the boss as possible to aid in determining the center of the reference point.



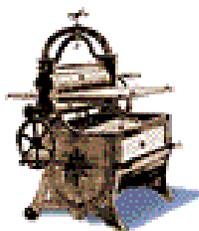
The following picture shows the Collet Block in yet another orientation. This configuration is used to drill and tap a series of holes in each ear which will be used to mount the igniter actuating mechanisms. Drilling and tapping in the same setup will yield the best possible alignment of the tap with a drilled hole. My method of tapping in the mill is to insert the tap in the drill chuck and rotate it by hand while applying slight down pressure to get the tap started. I then remove the tap from the chuck and finish the job using a straight tap wrench. Fellow NEMES member Les Russell suggested a better way to tap in the mill. One needs to fabricate a "tap handle" by taking a piece of 1/8" thick aluminum, approximately 1 1/2" long and 1/2" wide. Drill a hole in the center of the handle to the approximate size of the square feature on the end of the tap. A bit of filing is required to match the "driving end" of the tap!

I used a center drill in the drill chuck that matched the hole diameter in the end of the tap as a guide to maintain alignment while tapping. A spring

loaded guide would work even better. This "lightweight" short handle gives better control while tapping and greatly reduces the chance of breaking a tap. By the way, this size handle was used with a 2-56 tap. A longer handle might be more appropriate for a larger tap.



The last picture shows the finished part installed on my Mery Explosive Engine. This little project describes just one approach to machining this particular part. I am sure that there are lots of other methods that could be used. The utilization of tooling such as: a Collet Block, Lathe Mandrel, Adjustable Parallel and that neat little Tap Handle certainly contributed to the success of this project.



## ***NEMES Gazette Editorial Schedule***

<u>Issue</u>	<u>closing date for contributions</u>
Jan. '09	Dec. 21, 2009
Feb. '09	Jan. 25, 2010
Mar. '09	Feb. 23, 2010

## ***Big Note to All!!!***

**2010 membership dues are due!!!** See **Membership Info** above and send them in! Sorry, there was no room for the form this month! I thought you'd like the pictures better. But that doesn't get you out of paying!



## ***President's Corner***

Dick Boucher

### **The Meeting**

Our speaker this month is Roger Wiegand. Roger is a molecular biologist currently working on malaria at the Broad Institute of Harvard and MIT. He moved to Wayland MA 10 years ago to lead a startup company in agricultural biotechnology. But fear not, this is not the subject of his talk. He has had a long interest in mechanical music devices, beginning in the early '70s with Edison phonographs, progressing through player pianos and orchestrions, to his current love, fairground organs.

He is currently the owner and operator of the Diamond Jubilee, an 89-key Gavioli organ that he acquired three years ago in England. Those who attended the museum's Innovations exhibition this fall will remember this magnificent instrument. The organ, built in ~1897 in Paris, spent its first century in England, working first in traveling shows and then in the center of a steam-driven gallopers (our flying horses) at an amusement park in Cleethorpes England. This organ, which was found disassembled in boxes and baskets, has been extensively refurbished and expanded. An avid woodworker, Roger has done much of the restoration, with help from expert organ technicians in the UK and carousel restoration artists in the US. The Jubilee is the largest known traveling antique fairground organ in the Americas.

### **Miscellaneous Ramblings**

No ramblings this past month I didn't go to the final show of the year at the Precision Museum in Vermont but the word I have is that the show is getting better every year.

My thanks to Dave Stickler for his great talk last month. At this time, Norm Jones and I are getting things together for the annual bus trip to Cabin Fever in York Pennsylvania. For those of you who have sent in checks already, thanks. If you are planning on going please make you room reservations and get a check for the bus to Dick Koolish as soon as possible as this makes it much easier on me if I can get the bus paid for quickly.

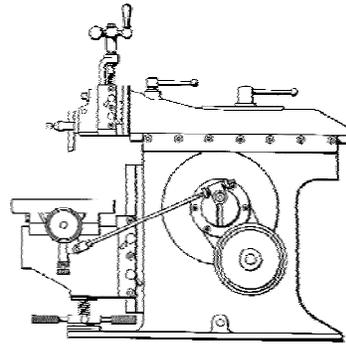
For those of you who aren't up on this trip basically the trip is not sponsored by the society so it has to be totally financed by attendees. The cost of the bus this year remained the same as last year so we have set the price of \$150.00 based on a group of 28 riders. As in years past, if we have more than

28 attendees we will have a cash reimbursement for the riders on the bus. It is always nice to have more money on hand at the show.

We will be using the Motel 6 in York. This is a very reasonably priced motel in the block where a great 24-hour restaurant is located for gathering over a coffee or full meal but most especially breakfast. The phone number there is 717-846-6260. When calling for a reservation, be sure to mention that you are from the New England Model Engineer bus trip to get the special rate of \$35.95 for the room. We only have 25 rooms reserved, so be sure to get your reservation in early. If you are traveling with someone else, you can double up on the room and save some money.

If you have any questions about the trip, give me a call at 978-352-6724 or e-mail at [rluciernb@juno.com](mailto:rluciernb@juno.com) or call Norm at 978-256-9268. If you contact me by e-mail I will send you a full itinerary of the trip.

Dick B.



## ***Metal Shapers***

By Kay R. Fisher

### ***Ron Shimon's***

#### ***Lewis Shaper***

This month's acquisition and rebuild story is from Ron Shimon in Iowa.



#### **Lewis 10" Shaper**

**Photo by Ron Shimon**

"In a July, 1974 issue of the Davenport, Iowa newspaper there appeared a classified ad for a "partially completed metal shaper". I had always thought it would be nice to have a metal shaper, so I had to check this out. Also, I recalled that, many years ago, there was a company that advertised in Popular Mechanics magazine "build your own machine tools". I wondered if this could

be one of those machines. It turned out that this "partially completed metal shaper" was one of those machines, a Lewis; and it was being sold out of Harold's estate.



**Shaper with Milling Vise Photo by Ron Shimom**

Harold was a machinist by vocation and avocation. He was a machinist for one of the local farm equipment manufacturers; and he had three lathes in his basement, plus other machine tools. In one corner were patterns that he had made for castings for an engine. Harold was a bachelor, which explains how he could be so involved with his hobby.

Harold's brother was handling the estate; and had collected all of the cast iron parts for the shaper that he could find. I examined the parts and the work that had been done on them; and decided that I could finish the shaper with the equipment that I had available. So, for \$65, I became the owner of the cast iron parts, drawings, bills of material, and even the packing slips. Little did I realize that I was starting a project that would take me nearly half a lifetime to finish.



**Shaper Left Side Photo by Ron Shimom**

The packing list showed that Harold had ordered the No. 106 10" Metal Shaper, the No. 112 Swivel Base Vise, and the "Nuts & Screws" and "Steel and Bronze, Etc" packages for both. Harold's brother was able to find all of the castings listed on the packing list for the shaper except for the ratchet gear blank; but could only find the movable jaw for the vise. None of the "Nuts & Screws" and "Steel and Bronze, Etc" were with the shaper parts. I suspect

these got mixed in with other similar materials in Harold's shop.



**Shaper Right Side Photo by Ron Shimom**

In addition to the prints (actual blue prints) for the shaper and vise, there were prints for the No. 109 Mill, the No. 114 Drill Vise, and the No. 107 6" Jointer. Unfortunately, no date was shown on the packing slip, and I can't read the post mark on the envelope in which all the paperwork was sent; but it was mailed for a cent and a half. The Lewis Machine Tool Company's address on the envelope and packing list was 3217 Union Pacific Ave., Los Angeles 23, California. In other literature, I have seen the company address as 3017 North Main Street, Los Angeles 31.



**Shaper Cabinet Photo by Ron Shimom**

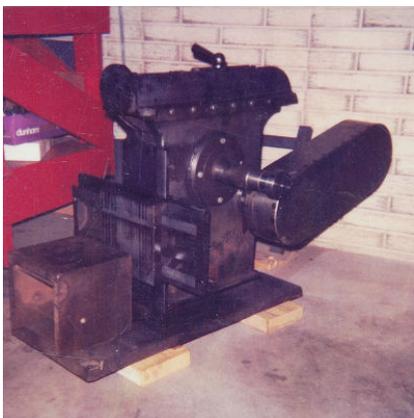
The Lewis drawings left a lot of details up to the builder; and I didn't care for some of the details they did provide (like using set-screw collars), so I did a lot of re-design and drawing. Also I had to come up with a drive system.

Harold had rough machined the 3/4 in. dovetails on the column, ram, cross rail, and cross rail slide. He had completed the base, column, sweep, and bull gear; and had slabbed off the knee and cross rail slide. He had also completed the spindle housings; however, I redid these with bronze bushings. He machined the face of the movable vise jaw; but, since I didn't have the rest of the vise, I used this piece for a lap. Not having a large mill

with which to finish machine the large dovetails, I filed, lapped, and scraped these surfaces to fit.

At the time I bought the shaper, I supervised an engineering lab and model shop. I took advantage of this to do the milling work on the head, clapper box slide, clapper box, and clapper; and the sheet metal work on the belt guards. The pinion gear was obtained from Boston Gear. The remainder of the work was done with my 10 inch Atlas lathe, a home-made drill press, and a lot of tools, jigs and fixtures made especially for the project.

Early in the project, I made a set of 1/2" and 5/8", 10 pitch left-hand ACME taps; and had a local shop heat treat them. This shop was also running a cyanide bath for some other parts that they were producing. The clapper was done at this time, so I had them case harden it in the cyanide bath. This shop was no longer in business when I made the feed ratchet gear from cold-rolled steel, so I pack case hardened it with charred leather using a charcoal fire in the Weber kettle.



**Early days** **Photo by Ron Shimon**

The above photo was taken in 1984. At this point, the shafts were done, gears mounted, ball-crank handles done, clapper and clapper box done, tool slide and head partially done, the bench done, and the ram would go back and forth when the input shaft was turned. In 1985 I changed jobs and worked away from home, so the shaper stayed in this condition until 2002 after I retired.

In retirement, I got back to making parts and more redesigning. This time, however, my redesign was done on a simple little CAD program on my computer. This was a big help. I also acquired an acetylene torch. Having some welding capability gave me a few more options.



**Dividing Ram Scale** **Photo by Ron Shimon**

Photo above shows my method for indexing to put the degree scale on the business end of the ram. That is a CAD drawn protractor taped to the sheet metal backing.



**Machining Ram** **Photo by Ron Shimon**

The face of the ram had a hole and a recess in it. Before putting the ram in the lathe for final machining, the face was drilled and tapped so that the flanged extension could be attached. This extension sat out of the way on the lathe tailstock while the shaper ram was being machined on the lathe center. Then the extension was attached, a truing cut made on the extension, and the shaper ram supported in the steady rest. for boring the hole and recess.



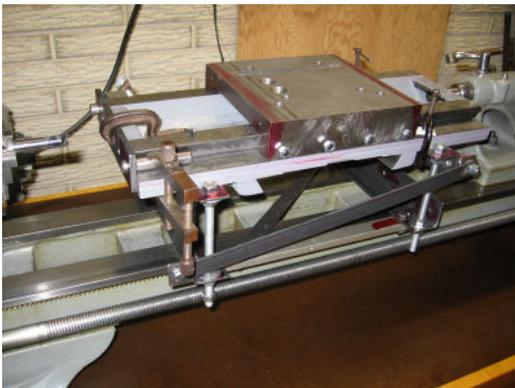
**First Chips** **Photo by Ron Shimon**

September 2006, 32 years after I had bought the parts, the first chips were produced.



**Lathe Carriage Hand Shaper Photo by Ron Shimon**

In machining the knee, I discovered that there was a twist in the cross rail ways. When I lapped and scraped these ways, I had assumed they were cut in the same set up; so I didn't check for a twist. The error was such that the right front corner of the top of the knee was 0.005" above the plane containing the left and rear top edges. It was too much of an error to ignore. I wanted to produce flatter surfaces than that. After a lot of head scratching and procrastination, I came up with the way to fix it as shown above. Hand cranking the carriage to make it work like a shaper ram was slow; but it got the job done. What is shown is the last surface to be done. The other surfaces had already been cut and fitted to the cross rail slide by scraping.



**Boring Lead Screw Hole Photo by Ron Shimon**

Correcting the ways moved them relative to the holes for the cross feed lead screw and cross feed nut. I enlarged and relocated the left-hand lead screw hole on the set-up shown in photo above. This is just an adjustable height frame that slides along the lathe ways to hold longer parts for drilling. I used this for putting in the original lead screw holes and also for center drilling the ram face. The plate on the left end contains a small hole (behind the C clamp) in the proper location for the new lead screw hole. I indicated on this hole to center the whole thing, then bored and reamed the new hole for a bushing. While in the same set-up, I drilled the lead screw hole in the new cross feed nut.



**Cutting V groove Photo by Ron Shimon**

With the cross rail ways corrected, it was back to machining the knee. The knee casting had a boss for a V groove on the side.

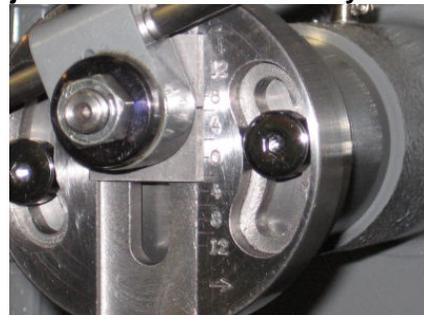


**Final Cut of Knee Photo by Ron Shimon**

April 2008, (34 years after I bought the parts) the final cut on the knee takes place. Now all that remained was to install the rest of the wipers which had already been made.



**Length Adjustment Photo by Ron Shimon**



**Pawl Adjustment Photo by Ron Shimon**

I don't know how many hours I put on this project; but they were all fun hours. The biggest challenge was to figure out a way to make stuff using the tools available. I'm pleased with the way the shaper turned out. And I think Harold would be too."

Thanks Ron for that great acquisition and rebuild story.

Keep sending me email with questions and interesting shaper stories.

My email address is:  
[KayPatFisher@gmail.com](mailto:KayPatFisher@gmail.com)

Kay



From Dick Wells

I'd like to give my 1912(?) 10 1/2" x 24" Prentice lathe to a budding machinist who would enjoy it. The lathe was acquired by me in 1944, and has been in regular - if limited - hobby use ever since. It has all change gears, two chucks, faceplate, steady and follower rests. It is old-fashioned but operable from line shaft/countershaft drive. Single phase 220/110 motor. See photos at:

<http://s174.photobucket.com/albums/w86/Steamer102/>  
 Call Dick Wells for more information: 978-448-5157

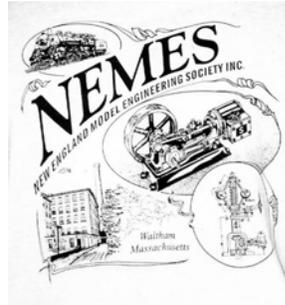
**NEMES Shop Apron**



Look your best in the shop! The NEMES shop apron keeps clothes clean while holding essential measuring tools in the front pockets. The custom strap design keeps weight off your neck and easily

ties at the side. The apron is washable blue denim with an embroidered NEMES logo on top pocket.

Contact Rollie Gaucher 508-885-2277

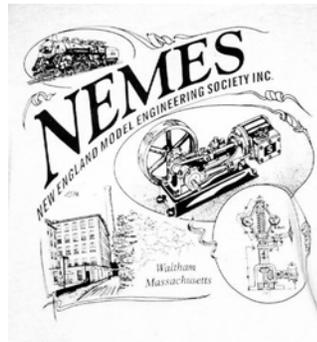


**NEMES clothing**

**NEMES Tee Shirts**

NEMES tee shirts and sweat shirts are available in sizes from S to XXXL. The tee shirts are gray, short sleeve shirt, Hanes 50-50. You won't shrink this shirt! The sweat shirts are the same color, but long sleeve and a crew neck. Also 50-50, but these are by Lee. The sweat shirts are very comfortable!

Artwork by Richard Sabol, printed on front and back:



Rear



Front

Prices:

	Tee Shirts	Sweat Shirts
S - L	\$12.00	\$22.00
XXL	\$14.00	\$24.00
XXXL	\$15.00	\$25.00

Add \$5 shipping and handling for the first tee shirt, \$1 for each additional shirt shipped to the same address. Sweat shirts are \$7 for shipping the first, and \$1.50 for each additional sweat shirt.

Profits go to the club treasury.

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