

The NEMES Gazette

NEW ENGLAND MODEL ENGINEERING SOCIETY INC.

No. 121

May 2006

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Editor's Desk

Victor Kozakevich

In a former life, I designed the HVAC controls and their enclosure for a Philadelphia trolley, intended for mounting on the roof. It's the long box with sloping top and three latches in this photo.



I happened to mention my story to someone recently. Out of curiosity, I checked the Internet and found pictures not only of the actual trolley, plus an HO model as well.



What more delightful form of flattery could a modeler receive, than to have his creation imitated in plastic!

Next Meeting

Thursday, May 4, 2006

7:00 PM. Meetings are held at:
Charles River Museum of Industry
154 Moody Street
Waltham, Massachusetts

Membership Info

Annual dues of \$25 (via checks made payable to "NEMES" and mailed to our membership secretary) for the calendar year are due by December 31st of the prior year.

Missing a Gazette? Send mail or email to our publisher.

Addresses are in the left column.

Contents

Editor's Desk.....	1
President's Corner	2
The Meeting	3
Treasurer's Report	5
NEMES Gazette Editorial Schedule	5
Shaper Column	6
Shop Tips.....	8
Web Sites of Interest	10
For Sale	10
NEMES clothing	11
Upcoming Events	12



President's Corner

Norm Jones

The Meeting

Our speaker for the May meeting will be Stan Grayson. Stan's presentation was originally scheduled for the March meeting, but has been rescheduled due to the forecast for a severe snowstorm on that evening.

In a presentation entitled "Engines Afloat, from early days to D-Day", writer Stan Grayson will discuss some of the key breakthroughs in the development of the internal combustion engine and the men behind them. Stan's focus is marine engines and includes many slides.

After receiving his master's degree in English from Penn State, Stan was drafted and served in Vietnam. Subsequently, he pursued a career in writing. He is the author of four books on internal combustion engine history with an approach that combines the personal stories of key inventors and executives with technical background. Stan has also written several books on boats and sailing as well as many magazine articles. Stan started his own publishing company, Devereux Books, in 1994 but continues to contribute articles to such magazines as *WoodenBoat*. He is also a longtime model railroader (HO scale) and recently completed a radio controlled tugboat.

Why didn't I do this Long Ago!

Those of you who have a lathe in your shop have to deal with the task of setting the toolbit to the correct height.

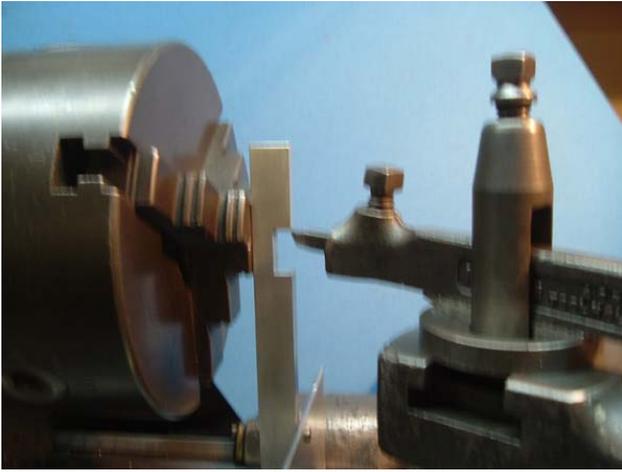
Over the years I have employed various means of accomplishing this operation. The first method that I usually go for is to "eyeball" it. You will find out on the first pass, when facing off a piece of stock whether you were successful or not. If not, you get to make a minor adjustment and try again. When "turning" a piece of stock, sometimes you can get away with being a bit low, however if you are not "right on", the dial on the crossfeed will not give

a correct reading as to how much material is being removed. Another method that I have used is to place a center in the tailstock and use the point as a reference. This method is somewhat risky, especially when using the lantern style toolpost on my 9" Southbend as I have to swing the entire assembly around as much as 180 degrees to get it to the correct cutting position. On occasion, I have experienced a slight change in the vertical placement while repositioning the assembly, giving a false sense of assurance that the setting is correct. Probably the most unforgiving setup is that of a cutoff tool. The larger the stock diameter the less critical tool height seems to be. However, when you get under 0.2" diameter, the toolbit will not be "happy" unless you are dead on.

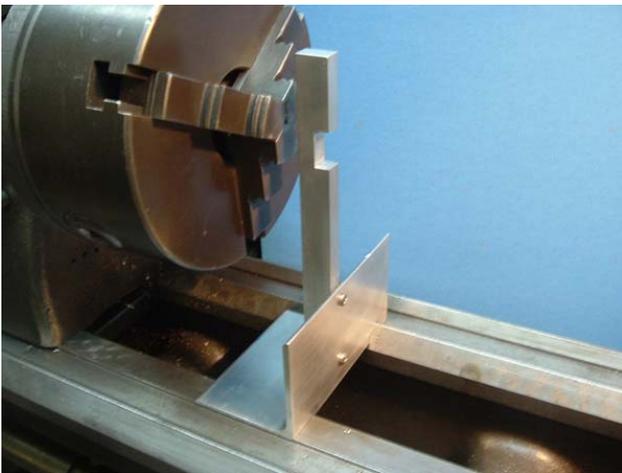
I have come up with a fixture that is made from a piece of 2" right angle aluminum that I have keyed to the bed of my 9" Southbend lathe. It has an upright attached with a couple of screws and a notch cut at the proper height. The correct height for the notch was determined by bringing a live center, mounted in the tailstock, in contact with the upright. That mark will become the top of the notch. The first picture shows this positioning. The overall length of the vertical notch is determined by the various types of tools that will be used. I used a notch of 0.6" to provide relief for cutoff tools. The second picture shows a toolbit in the proper position (the tip of the tool at the top of the notch), assuring its location to be "on center". The last picture shows the fixture itself.



Norm's Tool Height Fixture - Calibration to perfect height with a live center



Norm's Tool Height Fixture – In use



Norm's Tool Height Fixture

I don't know why I took so long to get around to making the tool, but I sure am happy to have it now. The basic concept can be used to design a similar fixture for any lathe. I think you will find this fixture to be quite handy. My next task really should be to mount my "new" three jaw chuck to its backing plate that I bought five years ago!

I am off to the NAMES show with Ron Ginger and company tomorrow. Time will tell what kind of treasures we will bring home this year.

See you on May 4th.

Norm



The Meeting

Max ben-Aaron

March meeting

The April meeting of NEMES came to order in the Jackson Room at the Charles River Museum of Industry on the usual first Thursday of the month.

Show & Tell

Rollie Gaucher told about tools for removing seals from impossible places (don't ask!) and passed around a seal remover that he made and a commercial remover for the seal on the output shaft of a Volvo transmission.



The guest speakers for this meeting were Alan Earls and Robert Edwards who co-authored the book "Raytheon Company: The First Sixty Years".

The Raytheon Company

One could almost write the "Raytheon story" as the story of the Spencer brothers. Al Spencer was originally hired by Vannevar Bush when Bush was running the initial company, AMRAD. When Bush left AMRAD in 1921 to start another company, Spencer Thermostat, Bush took Al, who had invented the bimetallic thermostat, with him.

Laurence Marshall, who later, as General Manager, played a pivotal role in Raytheon, turned the bimetallic disk into a thermostatic switch, which was a commercial success.

The venture morphed into the American Appliance Company because Dr. Smith, who had originally worked for AMRAD, had invented a home refrigerator that had no moving parts. This refrigerator worked as a pilot model, but could never be made to work when scaled up, so Marshall changed the focus of the company to electron tubes, finding a promising market for rectifier tubes to replace batteries in the then-new radio sets that were becoming popular.

Just when the American Appliance Company looked like it was a going concern, a firm in Indiana announced that they had a prior claim to the name. Miles Pennypacker came up with the name 'Raytheon' and the rest is history.

To manufacture the radio tubes, Raytheon bought an existing company, Champion Lamp Works, in Peabody MA. Al Spencer had an older brother, Percy, whom he introduced to Marshall. Percy Spencer only had a formal grade-school education, but, after working in a machine shop, was introduced to electrical matters by a contractor who hired him as a hand while electrifying a pulp and paper mill. After a spell in the Navy, he became superintendent for the Wireless Specialty Apparatus Company. Marshall added him to Raytheon's three-man staff and sent him to Champion to supervise production of the tube.

At this point, RCA threw a spanner in the works. They switched from the 112A tube whose plate only required 135 volts to a 171A tube whose plate required 180 volts, making the Raytheon rectifier obsolete. Percy, experimenting on his own, produced a variation of the Raytheon tube that could handle 180 volts and saved the company.

Radar had been crucial in the Battle of Britain and the British, pushing the envelope, had invented the magnetron. They were dismayed to find that even if every machinist in the country were to spend all his time only making magnetrons, they could still only produce 10,000 a year, so they were obliged to seek

help in the US. They wanted Bell Labs and Western Electric to solve their production problem. Because of Dr Edward Bowles' insistence they also brought the magnetron to Waltham to show to Raytheon.

Popular legend is that Percy took one look at the magnetron and solved the problem instantaneously, with production following immediately. Actually, Percy asked J.D. Cockcroft (who later won a Nobel Prize with Walton for being the first to transmute an element by 'knocking the H out of nitrogen'): "I wonder if I could take this home with me over the weekend". Surprisingly, Cockcroft allowed it and on Monday morning Percy suggested some improvements. The British were impressed and gave Raytheon a contract to make the magnetron.

Spencer had figured out how to build a magnetron by stamping out laminations, stacking them in sequence and silver soldering the laminations together in a continuous hydrogen oven. Costs of production were estimated and samples and a production plan were submitted to the government, only to be met with skepticism because experts in the industry declared Raytheon's plan to be impractical.



This enraged Marshall who declared that Raytheon would buy and install the equipment at its own expense to prove its point. Raytheon's resources were stretched thin and at that time it was not possible to borrow money against orders, when no orders existed. The treasurer, Dave Schultz was instructed to forget the rules and to raise money from every possible – and even impossible — source, to stall creditors and suppliers and to cut corners, but without sacrificing quality. When Schultz protested, Marshall pointed to his copy of "The Little Engine Who Could". . .

When Captain Henry Bernstein, as officer in charge of radar design at BuShips, was given a tour of Raytheon's facilities in 1942, he was thunderstruck to see "magnetron lathes had been built by Raytheon out of parts, including bicycle chains, purchased at Sears. He was horrified when Percy told him that "production of Maggies was about to stop because Chase Copper and Brass would not ship the last order for oxygen-free copper." Bernstein personally convinced Chase to fill the order.

Percy also played a key role on the design and production of tubes for the proximity fuses that were so successful in blunting the attack of Nazi buzz bombs later in the war.

Of all the gadgets I have in my house, the one that I would miss most keenly (this computer excepted) is the microwave oven. Microwave ovens were invented when Percy noticed that a chocolate bar in his pocket melted when he was in the vicinity of microwave radiation.

Percy Spencer was an American original. I am astonished that PBS has not made a documentary about him. We shall not soon see his like again.

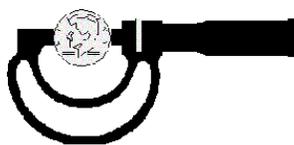
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If what is written here is not what you remember, your suspicions are well founded: This report has been fabricated from snippets I remember together with other Raytheon lore that I acquired elsewhere, notably from "The Creative Ordeal" by Otto J. Scott.

After the last meeting, I put my meeting notes in a safe place – so safe that I cannot find them. I 'know' it has to be within an arm's length from here, where I am sitting in front of my computer, but it is nowhere to be found. They would not have been much help, in any case, because I am becoming hard of hearing and the acoustics of the Jackson Room are awful. Attempts at recording the proceedings have failed.

Please hear my plea: we need another reporter.

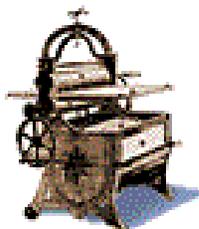
Max



Treasurer's Report

Richard Koolish

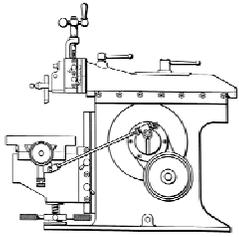
Balance as of March 17, 2006	8964.95
April Gazette printing	-150.04
Speaker's fee	-50.00
3 memberships @ \$25.00	+75.00
 Balance as of April 14, 2006	 8831.91



NEMES Gazette Editorial Schedule 2006

Here are the closing dates for Gazette written contributions in the coming months:

<u>Issue</u>	<u>closing date for contributions</u>
May	4/21/2006
June	5/19/2006
July	6/23/2006
August	7/21/2006
September	8/25/2006

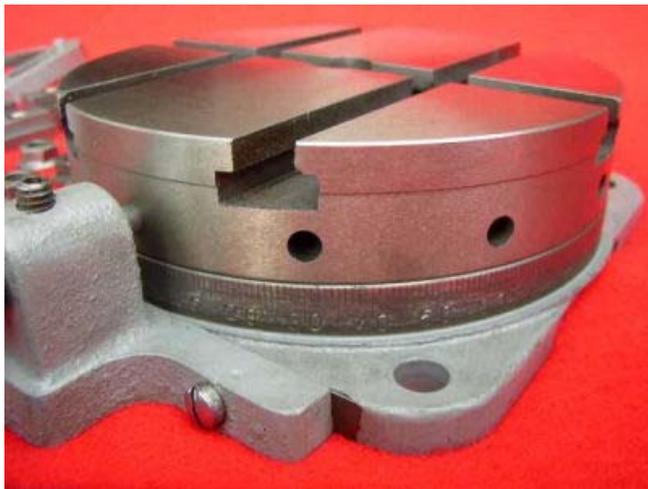


Shaper Column

Kay Fisher

Atlas Rotary Indexer

If I had to identify the most useful shaper accessory, I would say a rotary table. This month's contribution comes from Mike Fendley, in Le Claire, Iowa. I first became aware of Mike's indexer by seeing a "for sale" ad on eBay. Mike graciously agreed to share the pictures and some details of his rotary indexer.

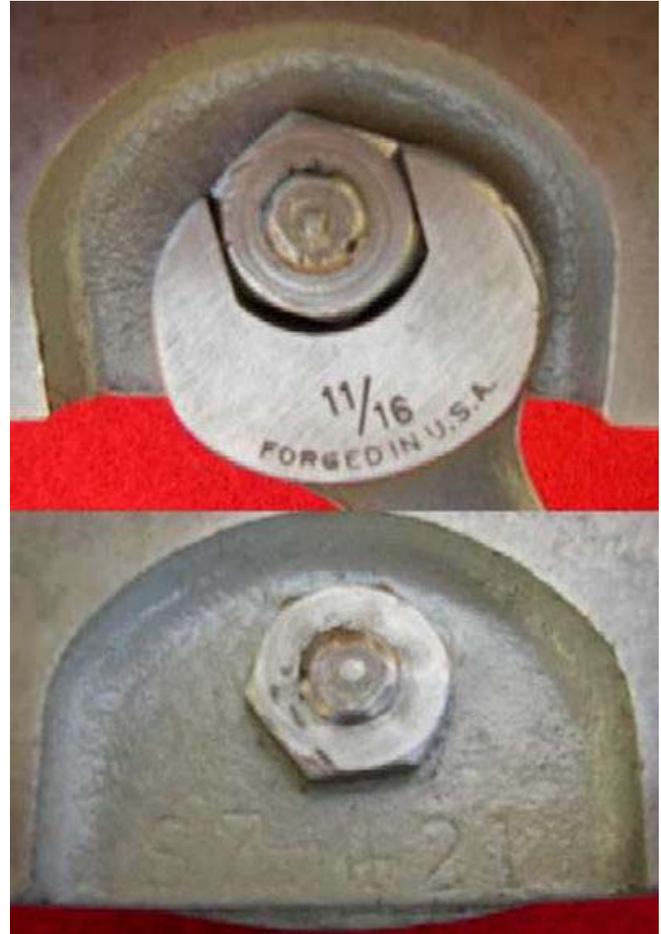


Atlas Rotary Indexer Photo by Mike Fendley

"This is an Atlas 7" shaper rotary indexer (S7-421) that I purchased off eBay a few years back. It was rough, but intact except for the two tiny holes. I made the T-nuts, studs, clam shell clamp, chuck adaptors, and adjustable clamps. I found the wrench (with another open end at the opposite end) in a surplus place for \$2, cut off the unneeded end and rounded it, then reground the 11/16 end to make it shorter so it would fit the tiny slot. It was a high quality wrench to begin with and added to the unit. The tool post grinding of the unit made the most difference. I only removed 0.005", but that cleaned it up nicely. I then took a couple of passes on the stepped edge as well and that really made it look nice. The only dings in the unit were the two 1/8" drill holes. I patched them with Devcon epoxy mixed with cast iron

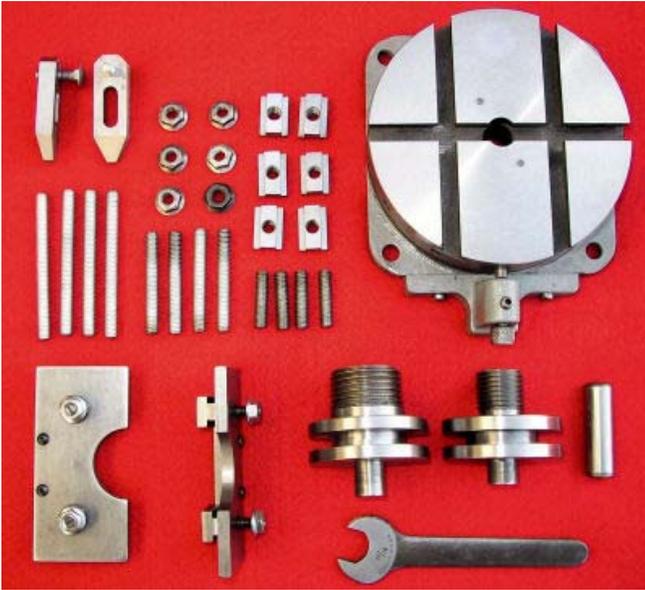
fillings. I should have used more cast iron and really packed it in. The tool post grinding almost made one hole disappear! If I had put more cast iron dust in it, they both might have disappeared. Lots of work went into it.

The following came from the eBay ad itself:



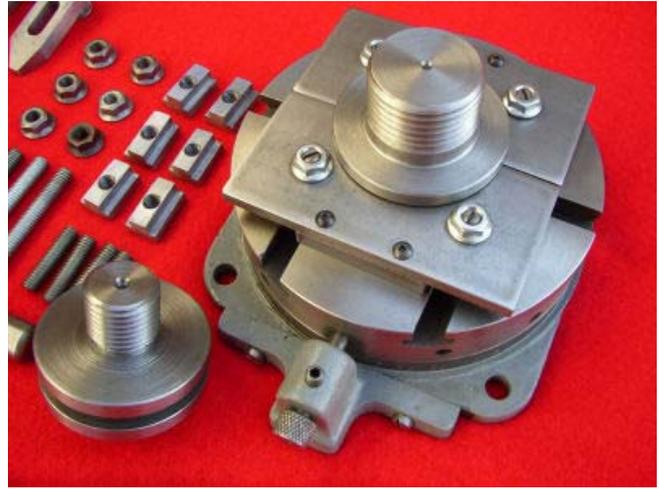
Wrench and Part Number Photo by Mike Fendley

It has a removable tapered pin that can index 12 positions. The actual diameter of the indexer is 5.5" and was designed to fit an Atlas 7B shaper and the MF series mills. It will also fit most small mills, and up to 10" shapers if you bolt it asymmetrically (2 opposite ears.) It fit my 8" Logan perfectly in this fashion. It can bolt onto the top and the side of the Atlas shaper. The indexer has a slot for a key for alignment. The 5/16" mounting holes are 4.5" c to c square, and 6 3/8" c to c on the diagonal. The indexer's table was accurately tool post ground on a lathe (using an Atlas tool post grinder of course) removing no more than 0.005 to get a beautifully flat surface and edge.



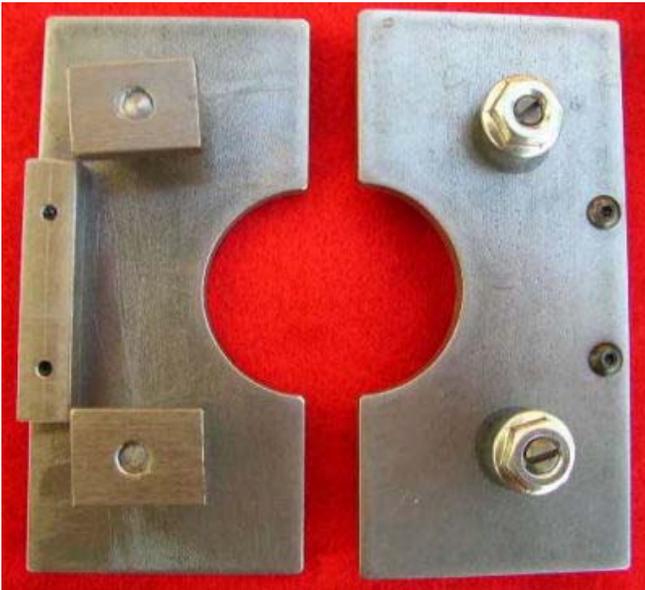
Indexer with Accessories Photo by Mike Fendley

Accessories included are: 6 – 5/16" T-nuts, 6 – flanged 5/16" nuts, 12 – 5/16" studs, 4 @ 3.125", 4 @ 2.125", 4 @ 1.125" in length, 4 – 1/4" T-nuts, 4 – 1/4"x20x 1" studs, 4 – 1/4" flange nuts, 2 – 5/16" slot hold down clamps with 1/4" elevation screws on each.



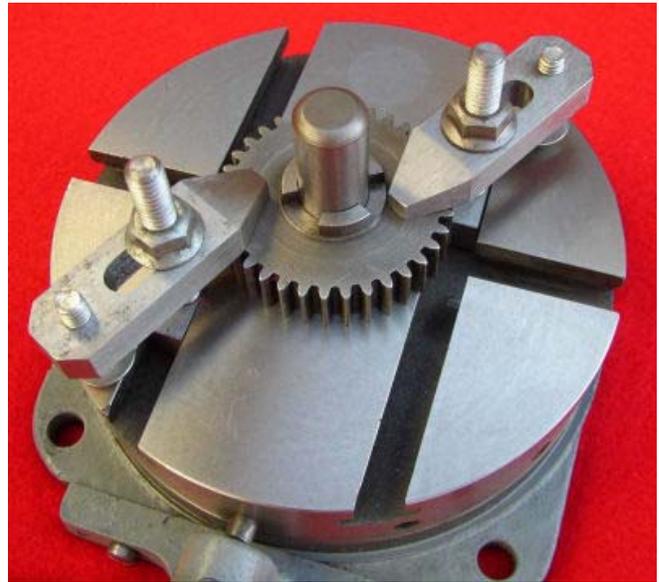
Chuck Adaptors Photo by Mike Fendley

The chuck adaptors allow you to machine special bolts on your lathe, leaving the bolt in your chuck (2 different mount sizes), screwing it to your indexer, and then using your shaper or mill cut 4 flats, or 6 flats, keeping everything concentric. Always remember to cut on the "right side" of the chuck to keep it tight and not unscrew it from the adaptor.



Chuck Adaptor Clamps Photo by Mike Fendley

Two chuck adaptor clamps (using the 1/4" T-nut set up), 1- 1"x 10 TPI chuck adaptor, 1- 1.5 x 8 TPI chuck adaptor, one 5/8" hardened pin for alignment of the indexer on a mill or for centering round gears, pulleys, etc., and one 11/16" wrench to fit the special nut locks at the underneath sides of the indexer.



Three Tooth Clutch Setup Photo by Mike Fendley

These photos show a "3 toothed clutch" set up on the indexer. A pin was used for concentricity of the gear on the table, clamps were applied, the pin removed, and then three passes with a mill or shaper tool, indexed 3 times gives you a flawless clutch. Offset the cutter 0.002" past the center line to allow the mating 3 toothed clutch to engage the one you machine. The gear in the picture was machined in this fashion. The 1.5 x 8 TPI chuck adaptor has a 1.530 "registration" area beneath the threads that fits my SB chuck. You may need to

turn this down some to fit your chuck. Both adaptors may be a little "tall" depending on your chuck. Flat machinery washers can make up the difference by putting them on first or by facing the adaptor's threaded area to get proper clearance on your chuck.



Path of 1 of 3 cuts. Photo by Mike Fendley

It's a great little indexer. I've got a bigger shaper and a bigger indexer now. I sold it on eBay for \$355 to a home shop guy (now friend) who has an Atlas shaper and a 6" Atlas lathe. I hope he enjoys using it as much as I enjoyed putting it together."

Thanks Mike for that information about a great shaper (and mill) accessory and how to fit it up with useful accessories.

I bought an 8 inch rotary table with indexer from ENCO a few years ago for around \$229. The first thing I did was make a nose piece to match my lathe. In hind sight I wish I had purchased a smaller 6 inch rotary table. I have yet to need the size of the 8 inch table and it is heavy. But I use a small 7 inch lathe, 8 inch shaper and the smallest Bridgeport mill ever made. Also my 8 inch indexer came with a MT3 taper and both my mill and lathe are MT2. At the time 6 inch rotary tables with indexers were hard to find. Now I see them regularly.

Grizzly Industrial has them for \$255:

<http://www.Grizzly.com>

Smitty tools has one that cost a bit more and the indexer is extra:

<http://www.Smitty.com>

Lastly, Harbor Freight has one available with the indexer for \$169:

<http://www.HarborFreight.com>

Most 6 inch indexers are MT2 but be warned at these low prices don't expect Starrett quality. When I purchased my 8 inch rotary table from ENCO the store was local in New Hampshire and I had to reject the first two they brought out from the warehouse because they were binding up.

Keep sending me email with questions and interesting shaper stories.

My email address is:

KayPatFisher@Yahoo.com

Kay



Shop

Tips

Gang-Saw: Buzz-cutting your head.

Bob Beecroft

I've made a number of special heads for my model airplane engines over the years. Cutting cooling fins has never been the most fun part; tiny endmills turning as fast as an old Bridgeport will go is a pain at best. With a VFD, I could spin a little 0.062" cutter at double speed, but it is still a slow and repetitive process at best. It is also too easy to ruin a head with one tiny false move.

Faced with the prospect of making a dozen engines with some significant performance improvements, amongst them making a dozen special heads, was something short of a romantic notion.

Another means to do the head cooling fins is, of course, the use of an appropriately sized jeweler's saw in the mill. Again, old man Murphy can wreak havoc. Often, it will ruin that head on the **last cut**, or with some luck, it can be ruined earlier in the process, at least making the grief come sooner. Clearly, a better and simpler way had to happen.

Using a 'gang' of saws of the appropriate thickness, and spaced appropriately seemed like a good way to go. Once set up properly, things should progress smoothly, quickly, more accurately, and with better results.

So, the Gang Saw was born for this little project. This mandrel can be loaded with thicker or thinner saw blades, thicker or thinner spacers, and more or fewer cutting blades giving a pretty universal tool once completed.

Just a general overview here: The mandrel itself is from AISI 1144, commonly known as "Stressproof". It has made some great crankshafts for me in engines turning in excess of 30,000 RPM, so I figured it would be good enough for this. Also, I happened to have it on hand. Another nice feature of the 8 foot bar of 1144 that I have is that it's SO close to 1 inch, that the 3" saws with 1" ID must be **very** carefully pushed into place. There just isn't any slop; it gives an **excellent** fit.

<http://www.niagaralasalle.com/products/stressproof.html>

For the spacers, I used 6061-T6 aluminum 1½" OD ¼" wall stock I had on hand. I trimmed the ID to leave them about two thou oversized so as to slip into place easily.

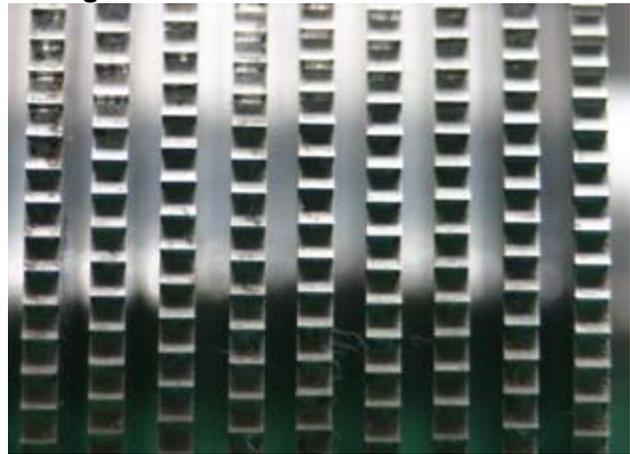
The nose-cap is made such that it can accommodate another half-inch stack height, and a narrower stack at any size would be easily accommodated with an appropriate spacer.

Here are a few photos to show the general arrangement. Detailed plans and more photos will be published in Home Shop Machinist or Machinist's Workshop sometime later in the year. For that article, some minor changes will be suggested and shown on the drawings. For a one-off for me, this is filling the bill just fine.

This photo shows the main arbor and spacers:



Here are nine of the 12 3" 170 tooth HSS blades: Enough teeth to make a shark envious!



Completed & working: Trial first cut:



I'm very pleased with the initial results. This tool will be a very useful addition to the arsenal.

Bob@TheAeroSmith.com



Web Sites of Interest

Sign up for the NEMES mailing list at:
<http://groups.yahoo.com/group/nemes>

Here's a website with animations of several types of clock and watch escapements:
<http://www.geocities.com/mvhw/escapement.html>



For Sale

Tools needed

My son is a full time farmer in the western part of Massachusetts. On March 20th, one of his barns burned to the ground. The barn contained all of his tools. The fire also burned a truck he was working on including the good and bad engines. If anyone has any excess tools or knows someone who has retired from the hobby or DIY scene, this hardworking farmer would appreciate the donations. He needs everything: sockets, wrenches, hammers, table saw, drill press, grinder, welder, acetylene torch, etc. You guys know what it takes to keep farm machinery running. He also needs 6' and 10' roll up doors.

All items will be greatly appreciated.

Bob Bober 508-872-4165

Machinery for sale

1. Boice Crane band saw, 14 inch pulley, 15 inch throat, capacitor-start motor not working - \$150 or best offer
2. Linley left hand miller, 18 inch bed, working \$300 or best offer
3. Southbend model A, 3.5 foot lathe - number 86442 include two 3-jaw and one 4-jaw chucks, various tail pieces and misc tools \$400 or best offer.
4. Old, belt-driven drill press, used to drill large aluminum casting. Heavy base. 70 inches tall. Free

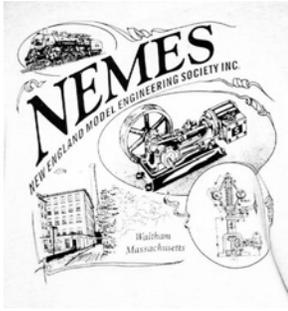
Machinery is located in Wilmington, MA in a basement. Access is via downward sloping driveway to garage doors.

Let's make a deal for all pieces
Contact Frank Kaszynski @ 617 489-2199

Shaper Work CD

Put out in 1944 by the New York State education Department this 326 page manual is chock full of valuable tips and information on using the King of Machine tools....The Shaper. Covered is everything you need to know about the care and feeding of the shaper, use of the shaper, even how to sharpen tools for the shaper. Scanned and saved in Adobe Acrobat format. The CD now has a lot more info on it, and the price has increased accordingly. \$10.00, shipping included.

Errol Groff
180 Middle Road
Preston, CT 06365 8206
errol.groff@snet.net

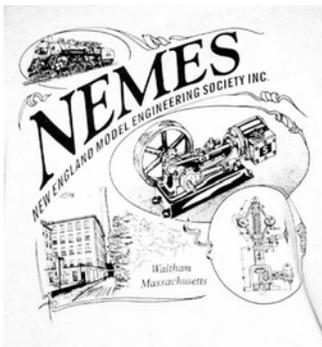


NEMES clothing

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.

Mike Boucher
 10 May's Field Rd
 Lunenburg, MA 01462-1263
mdbouch@hotmail.com

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



**MARK
THIS
DATE**

Upcoming Events

Bill Brackett

To add an event, please send a brief description, time, place and a contact person to call for further information to Bill Brackett at wbracket@rcn.com or (508) 393-6290.

Bill

Thanks to Norm Jones and Richard Sabol for their inputs.

May 4th Thursday 7PM
NEMES Monthly club meeting
Charles River Museum of Industry
Waltham, MA 781-893-5410

May 7th NHPOTP engine show
RT 113 Dunstable MA
Contact Robert Wilkie 207-748-1092

May 21st Waushakum Live Steamers
Steam-up
Holliston MA
<http://www.steamingpriest.com/wls>

May 21st 9:00AM The Flea at MIT
Albany Street Garage at the corner of Albany
and Main Streets in Cambridge
<http://web.mit.edu/w1mx/www/swapfest.html>

May 23-24 9:00-5:00 and 25 9:00-3:00
EASTEC at Eastern States Expo
West Springfield MA 800-733-4763
www.sme.org/eastec

May 27-28 Bernardston Show
Rt 10 off Rt 91 Bernardston, MA
Contact Vickie Ovitt 413-648-5215

May 27th and following
American Precision Museum opens
Windsor VT
<http://www.americanprecision.org/>

May 28th
Fiddleheads Classic Auto & Antique Aeroplane
Show
Owls Head Transportation Museum Owls ME

June 1st Thursday 7PM
NEMES Monthly club meeting
Charles River Museum of Industry 781-893-5410
Waltham, MA

June 3-4 Dearborn Homestead Show
Campton, NH Dave Dearborn 603-726-3257

June 3-4 Cranberry Flywheelers Meet
Edaville RXR S Carver MA.
Contact David Moore 508-697-5445

June 11th
Rods, Customs, Muscle Cars & Antique Aeroplane
Show
Owls Head Transportation Museum Owls ME

June 17-18 9:30AM-3:00PM
Pioneer Valley Live Steamers Father's Day Run
Southwick Ma
www.pioneervalleylivesteamers.org

June 18th 9:00AM The Flea at MIT
Albany Street Garage at the corner of Albany and
Main Streets in Cambridge
<http://web.mit.edu/w1mx/www/swapfest.html>

June 25th Waushakum Live Steamers
4th Annual Van Brocklin Meet
Holliston MA
<http://www.steamingpriest.com/wls>

June 25th
Convertible Meet & Antique Aeroplane Show
Owls Head Transportation Museum Owls ME

June 24-25 Orange Show
Orange Airport Orange MA

June 25th NSOCC show
Topsfield Fair Grounds
Contact Ed Rogers 781-233-3847