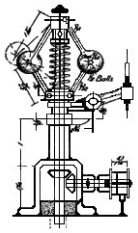


The NEMES Gazette

NEW ENGLAND MODEL ENGINEERING SOCIETY INC.

No. 238 February 2016 © 2016 NEMES

Club Business

Richard Baker

Dues. The 2016 dues are due. Please bring your $25 check to the February meeting or you can try out our credit card system. Or mail a check mail to me at NEMES, 288 Middle Street, West Newbury, MA 01985.

20th Annual NEMES

Model Engineering Show

Please invite all of your friends and family to exhibit or attend the 20th Annual NEMES Model Engineering Show at the Charles River Museum of Industry. The show will be on the third Saturday of February, which is February 20, 2016, from 10 AM until 4 PM. Exhibitors can start setting up at 8 AM.

We are looking for door prizes to raffle off to the exhibitors. If anyone has an item that they would like to donate to the club, please bring it for a door prize. All donations are now tax deductible.

Want to help out with advertising our show? Just download the show flyer Here, then make a few copies and post them at your work place, your hardware store or anywhere you think people who might be interested will see it. The more the merrier!!!

Next Meeting

Thursday, January 7, 2016 7PM

Charles River Museum of Industry & Innovation

154 Moody Street

Waltham, Massachusetts

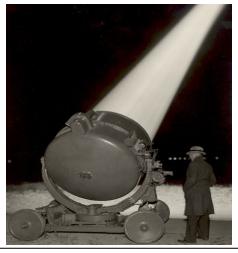
Directions are Here.

Rollie Gaucher will be our speaker for February, talking further about fixturing complex work for machining and other things as well.

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

Deadline for submitting articles is two weeks prior to the next meeting.

Table of Contents



Searching for Speakers

Bob Timmerman

We hope to be able to get Daniel Forg of Peter Forg Manufacturing Co in Sommerville. He is the *fifth* generation in his family to run the company. He wants to think about this, and wants me to call him back in a week. He may want to do March instead of February, so we might want a back up speaker.

Jeff del Papa is working on getting a metallurgist friend in to present to us.

If that does not work out, we may be able to get an organ builder, but I would like to have a month or two notice on the organ, so I can try get it into the American Guild of Organists local newsletter (my wife is a church organist)..

Speaking of the AGO, sometimes they are invited to an open house at Fisk or Noack up on the North Shore. It may be possible for NEMES to tag along. Fisk in particular has a very impressive wood shop, a small but complete metal shop, and a shop where they make the metal organ pipes (they cast them). They usually have their open house on a Saturday. Noack is smaller in scale, and sub out their metal work to Dick Boucher, I believe.

If anyone has an idea or a contact for a speaker, please contact me and I will follow up.

--

Robert W. Timmerman PE, CEM, LEED AP

Shop Talk

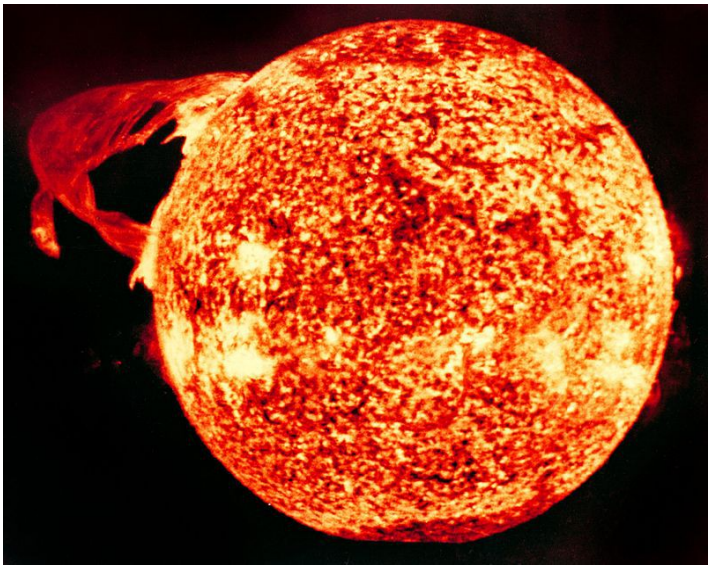
Max ben-Aaron

Sliding Down the Razor-Blade of Wireless Technology

The Sun, an enormous fusion reactor that provides all our energy, is very active. Some of that activity is in the form of coronal mass ejections (CME's), which are massive bursts of gas and magnetic fields arising from the solar corona and released into the solar wind, as observed in an instrument known as a 'white-light coronagraph'.

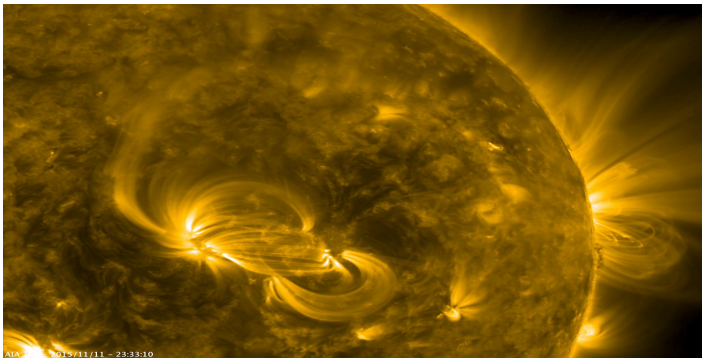
CME's are associated with enormous changes and disturbances in the coronal magnetic field and with other forms of solar activity, most notably solar flares or filament eruptions. A broadly accepted theoretical model of the causes of CME's has not yet been established. They seem, most often, to originate from active regions on the Sun's surface; groupings of sunspots associated with frequent flares.

Around the time of solar sunspot maxima the Sun produces about three CMEs every day, whereas near solar minima, there is about one CME every five days. They release huge quantities of plasma consisting primarily of electrons and protons. Bursts of plasma, (called solar prominences), and electromagnetic disturbances radiate into space above the sun's surface, near the corona, but sometimes further into the Solar System, or even beyond (interplanetary CME's).



In magnetohydrodynamic theory, 'Magnetic Reconnection' is the name given to the rearrangement of magnetic field lines when two oppositely directed magnetic fields are brought together. Recent research shows that the phenomenon of magnetic reconnection is closely associated with CMEs and solar flares. This rearrangement is accompanied with a sudden release of energy stored in stressed magnetic fields.

On the sun, magnetic reconnection may happen in 'solar arcades'. A solar arcade is a series of closely occurring loops of magnetic lines of force that quickly reconnect into a low arcade of loops, leaving a helix of magnetic fields separate from the rest of the arcade. The helical magnetic field and the material that it contains may violently expand outwards forming a CME.



This also explains why CMEs and solar flares typically erupt from what are known as the active regions on the sun where magnetic fields are much stronger on average. The shock wave of the traveling mass of solar energetic particles causes a geomagnetic storm that may disrupt Earth's magnetosphere, compressing it on the day side and extending the night-side magnetic tail.

When the magnetosphere reconnects on the night side, it releases power on the order of terawatt scale, which is directed back toward Earth's upper atmosphere. Its energetic particles can cause particularly strong aurorae in large regions around Earth's magnetic poles known as the *Northern Lights* (aurora borealis) in the northern hemisphere, and the *Southern Lights* (aurora australis) in the southern hemisphere.

Humans at high altitudes, as in airplanes or space stations (think ISS), risk exposure to relatively intense cosmic rays. The energy absorbed by astronauts is not reduced by a typical spacecraft shield design and, if any protection is provided, it would result from changes in the microscopic inhomogeneity of the energy absorption events.

In September 1, 1859, an intensely bright event, known as the Carrington Event**,** a powerful geomagnetic solar storm during solar cycle 10 (1855-1867)**,** lasted f**i**ve minutes before disappearing. It was a solar coronal mass ejection that hit the Earth's magnetosphere and induced one of the largest geomagnetic storms on record. The associated "white light flare" in the solar photosphere was observed and recorded by English astronomers Richard C. Carrington (1826–1875) and Richard Hodgson (1804–1872).

Telegraph systems all over Europe and North America failed, in some cases giving telegraph operators electric shocks. Telegraph pylons threw sparks. Some telegraph operators could continue to send and receive messages despite having disconnected their power supplies.

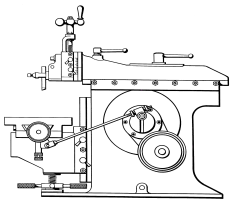
By analyzing ice cores containing thin nitrate-rich layers we can reconstruct a history of past solar storms predating reliable observations. Space scientist Kenneth G. McCracken and others have gathered data from Greenland ice cores, to show evidence that events of this magnitude—as measured by high-energy proton radiation, not geomagnetic effects—occur approximately once per 500 years, with events at least one-fifth as large occurring several times per century.

We dodged a bullet when the solar storm of 2012, of similar magnitude to the Carrington event, passed Earth's orbit without striking the planet. Studies show that a solar storm of this magnitude, occurring today, would likely cause widespread problems for modern civilization.

A joint venture from researchers at Lloyd's of London and Atmospheric and Environmental Research (AER) in the United States, in June 2013, used data from the Carrington Event to estimate the current cost of a similar event (to the U.S. alone) at $0.6–2.6 trillion.

I will leave it to your imagination to assess the havoc that would be caused by a massive CME in this day and age. Coronal mass ejections, along with solar flares of other origin, can disrupt radio transmissions and cause damage to satellites and electrical transmission line facilities, resulting in potentially massive and long-lasting power outages.

Imagine the Internet, all financial communications, air traffic control and the GPS network disrupted simultaneously. It may also be likely that most of the physical electronic substrates (semi-conductors, integrated circuits, etc.) would be fried causing great delays in service resumption. As time goes by and the ‘Internet of Things’ gathers steam, such an event might well bring about the collapse of our civilization (It’s being so cheerful that keeps me going . . .)



Metal Shapers

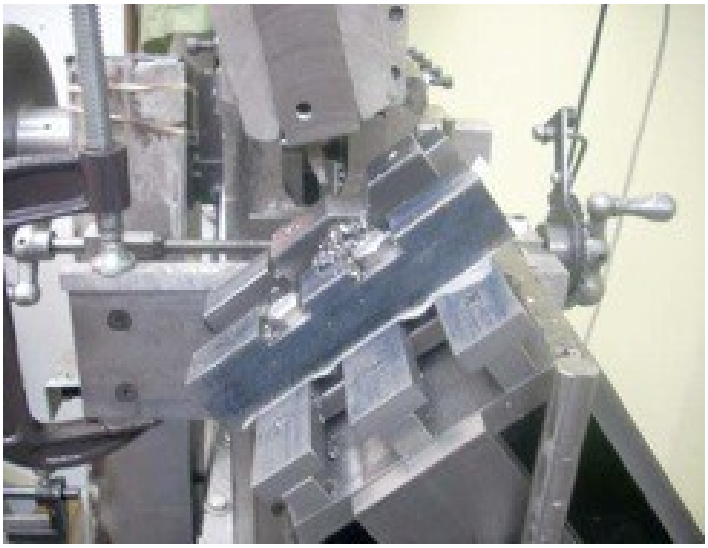
Kay Fisher

R. G. Sparber’s Gingery Shaper - Part 70

Building a Vise For the Gingery Shaper

The shaper is a lot more useful when I can actually hold parts.

Here you see my new vise holding a block of CRS as I machine a V into it. The C clamp on the left is a horizontal stop. One of my next projects will be to make a nicer stop.



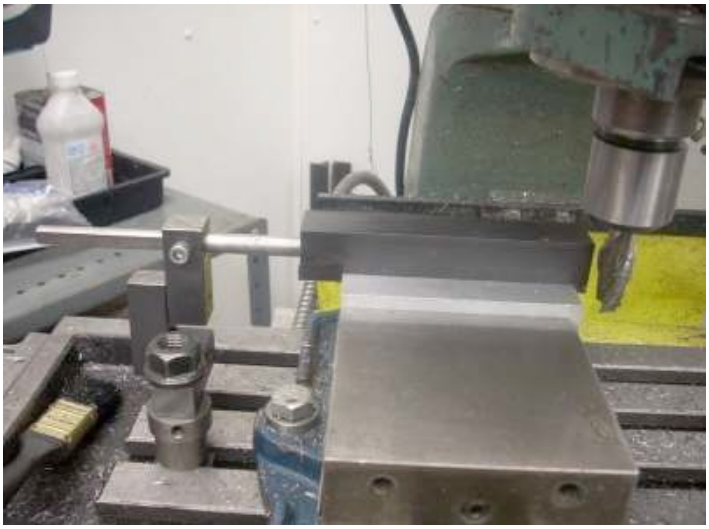
Vise in Use Photo by R. G. Sparber

Truing Soft Jaws Photo by R. G. Sparber

The first step in making the vise is to true the soft jaws on my mill/drill vise. Note the parallel clamped in the bottom of the vise. This width is about the same as the blocks I will machine.

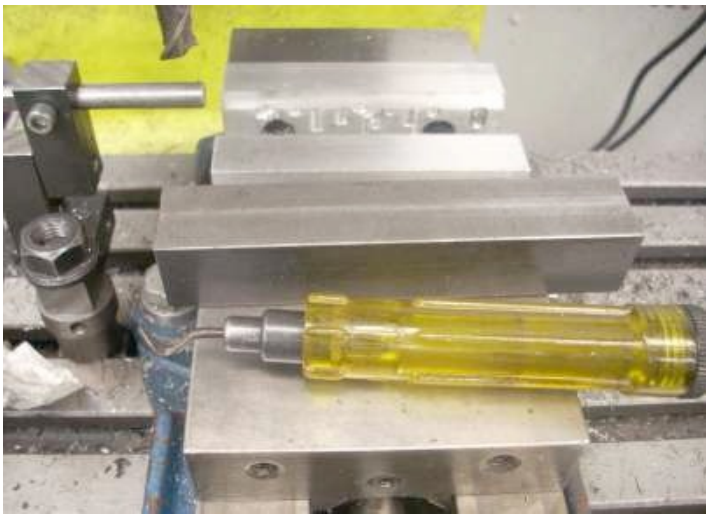
Why not do this work on my shaper? Simple – it is not accurate enough. Maybe when I learn more about how to set up and run the shaper, I will get similar results to my mill/drill.

First the ends are squared. This is not essential but looks nice. Note the stop on the left. It insures that both blocks are the same length.



Milling Ends Photo by R. G. Sparber

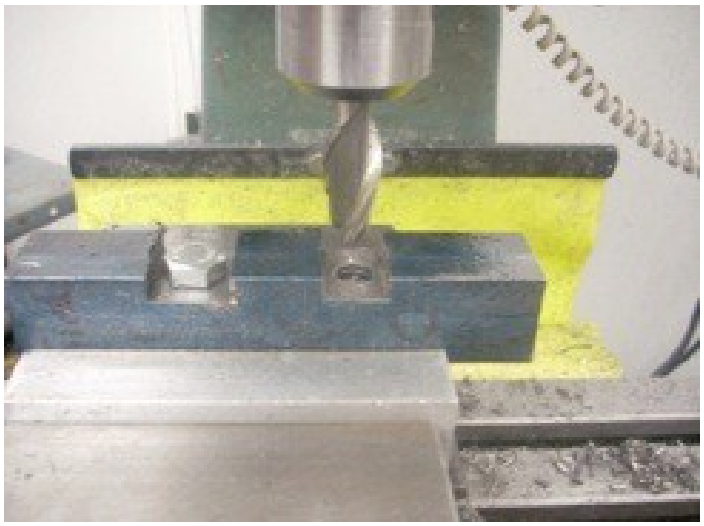
I first cleaned up one end of each block and removed all burrs. Then the stop was set and both second ends were cut.



Block Squared Up Photo by R. G. Sparber

The top face is cut, deburred, and then rotated so it sits against the fixed jaw of the vise. The cycle repeats until all 4 sides are square. The exact dimensions of the block are not important but it is critical that it be square and that I take the same amount of material from each face to minimize warpage. I took 0.004” from each face.

Tapping for Bolts Photo by R. G. Sparber



Milling for Bolt Heads Photo by R. G. Sparber

The horizontal holes are a loose fit to the bolts I have selected. These bolts will engage the T nuts. The holes being tapped use the same size bolts and will clamp the part being machined. I placed the tapped holes so there are 0.5" from the T nut bolt holes. Only later did I realize that the two center tapped holes are too close together. If I try to put a bolt in each hole, the heads hit.

One of my "rules" with the Gingery shaper is that all bolts that are adjustable must use the same socket. That goes for this vise.

I could have counter bored the space for each bolt head but that becomes a place for swarf to collect. Instead I milled a slot which is much easier to clean. There is enough room for the socket to engage the bolt head plus an extra 0.01" on each side.

I used grade 2 bolts because these T nuts are not very strong. Paying the money for grade 8s would not have made any difference except to my wallet.

The "T nuts" are nothing fancy. In fact, they aren't even Ts. I was able to cut them from $^3/_8$" x 1" CRS bar stock. By making them 1" x 1", there is no chance of sliding them into the T slot wrong.

T Nuts & Bolts Photo by R. G. Sparber

The "T nuts" are nothing fancy. In fact, they aren't even Ts. I was able to cut them from $^3/_8$" x 1" CRS bar stock. By making them 1" x 1", there is no chance of sliding them into the T slot wrong.

Vise Finished Photo by R. G. Sparber

Above shows the finished vise except for washing off the bluing.

This arrangement did not work very well. The vise jaws would not grab the table. I think this is because the table was cut with the shaper and so has tiny ridges on it which greatly reduce clamping friction. I fixed this later.

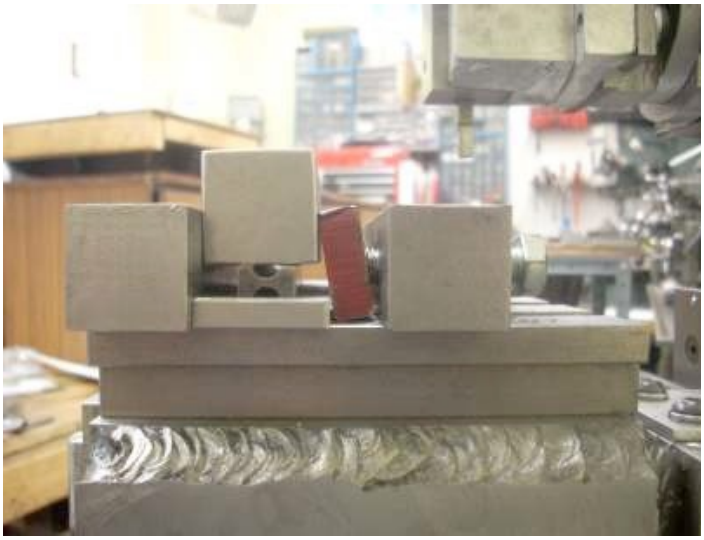
And finally here is a side view. My goal was to raise the block up enough to cut the V. This didn't work well as the block lifted a bit when hit with the cutter. The idea was to have a "Kurt Vise" action from the movable jaw (the tilting red bar).

The next time, all went well. I'm using a sheet of paper between vise jaws and table. No more slipping jaws. I also did away with the sloping block between screws and block. The block stayed down much better with just a bar parallel to the part being cut.

You can also see the wonders of being able to rotate the table 45 degrees. The vertical front support bar does not rotate and I am able to continue to steady the table.

I've still got a lot to learn about using this shaper but that will come with both time on the machine and asking questions of those generous souls that are far ahead of me on this journey.

Vise on Table Photo by R. G. Sparber



Vise Side View Photo by R. G. Sparber

Thanks Rick for that great construction article. That concludes the 70 parts from R. G. Sparber on building the Gingery shaper.

Keep sending me email with questions and interesting shaper stories.

My email address is:
KayPatFisher@gmail.com

Kay

CHARLES RIVER MUSEUM
OF INDUSTRY & INNOVATION

From the Gazette Archives

When NEMES first started, there was a great deal of discussion at meetings by and among members about what they were doing in their shops. I wish I'd been there then to listen in. Fortunately, at least in the early Gazette issues, these conversations were well minuted. So I'll use this column to bring back some of this interesting material from early meetings, as well as early contributions to the Gazette.

Not surprisingly, my first retro piece features Rollie.

Rollie Gaucher on Radius Turning Tool

June 1996

Roland Gaucher followed up the 1/4 scale Bently BR-2 he showed at our first meeting with a radius turning tool that fits into the cross slide of his lathe with a T-nut. He's got card-board patterns he used to cut out the major parts, but says that since in order to get a perfect sphere the point of the tool needs to be exactly on the centerline of the lathe that unless you have the same lathe that he has you probably wouldn't be able to use them.

The tool only produces a true sphere at the diameter it is set for, so when using it he checks the diameter, and when it is right he stops advancing the cross slide or he won't get a true sphere. Originally he turned it with a lever, but found that doing it that way he was not able to get a good finish on the sphere.

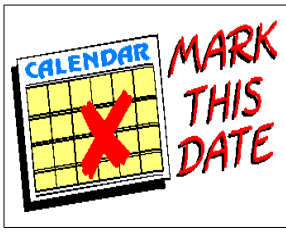
So, he added a "wormgear" drive to swing the point around and was able to produce spheres with a good, smooth finish. He used a 60 degree flycutter set at the helix angle of a 1/2-13 thread to put 150 nicks around the outside of his gear blank and then used a 1/2-13 tap to hob the gear to it's finished dimensions.

The final arrangement is a 1/2-13 screw driving the 150 tooth gear that gives the smooth advance of the bit around the sphere needed to produce a good finish. Use conventional methods to hog out most of the metal, then use the radius turning tool to finish up.

The first thing I noticed about the tool when Roland unpacked it was the professional quality black oxide finish on it. He has a friend who runs a company in Worcester that specializes in doing Black Oxide. They have a $25.00 minimum, so after you've collected up a box of small parts you can take them and get them done.

Black Oxide coating adds only millionths of an inch to the dimensions of the piece, so you can even do things

like screw threads, and provides some amount of rust resistance. It only works on ferrous materials, and doesn't make the metal look better, just black.



Upcoming Events

Errol Groff

Feb. 4 Monthly meeting of NEMES

Check website (http://neme-s.org/) for meeting location and speaker information

Feb. 5-7 Model T Ford Snowmobile Club

17th Annual Meet

9:00 start

Sunset Motor Inn, Morrisville Vermont

http://www.modeltfordsnowmobile.com/

Feb. 20 20th Annual NEMES Model Engineering Show

10:00-4:00 at the Charles River Museum of Industry, Waltham MA.

Show Flyer Here

Feb. 28 Worcester Model Railroaders Show and Sale

10:00 to 3:30 at 754Southbridge St,Auburn, MA.

Show flyer HERE