

# The NEMES Gazette

NEW ENGLAND MODEL ENGINEERING SOCIETY INC.

No. 123

July 2006

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## Editor's Desk

Victor Kozakevich

Member Jay Striker had written me about a late 1800's water turbine that was about to be scrapped. He was wondering if a network could be formed to find transportation and storage resources to save some of these machines.

Al Goldberg has shared tales of the difficulty of preserving industrial history and machinery. I have a few thoughts on the subject, perhaps it will lead to some other ideas and actions among the members.

One easy one might be to create a "documentation squad", consisting of a photographer to take pictures, a draftsman to make mechanical drawings to capture functional data (perhaps with an animated Solidworks drawing), and a writer to capture the stories about the machine. In other words, the item may not be salvageable, but don't lose the history.

Another possibility would be to raise the funds to move the machine and find it a permanent home. Now, from a business perspective, can we attract enough visitors to help pay the moving costs and upkeep? Anyone have suggestions?

## Next Meeting

Thursday, July 6, 2006

7:00 PM. Meetings 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 31<sup>st</sup> 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 .....	4
Treasurer's Report.....	6
Editorial Schedule 2006 .....	6
Shaper Column .....	6
Web Sites of Interest .....	7
For Sale.....	7
NEMES clothing .....	9
Upcoming Events.....	10



## *President's Corner*

Norm Jones

### **The Meeting**

The July meeting will once again be one of our semi-annual "Poster Sessions". For those of you who are new members, the poster session format is an informal get together where everyone is encouraged to bring in something that they are working on. It is a great opportunity to show off your latest project or get some assistance on a particular problem that you might have encountered. It never ceases to amaze me that our organization has so much expertise in just about any subject that one could imagine. All you have to do is ask!

### **35 Years of Great Engine Shows**

The inclement weather on June 3 and 4 did not dampen the spirits of those who attended Dave Dearborn's 35th annual engine show, held at his home in West Campton, New Hampshire. Dave is particularly interested in steam engines. His show is one of a select few that provides live steam to operate both full size engines as well as models. NEMES was very well represented at this year's event as you can see in the following pictures. The potluck supper on Saturday evening, complete with live entertainment proved to be a great way to cap off the day. Phil St. Jean and Dick Boucher recalled some special moments over the years and both presented Dave and Jackie with gifts to commemorate 35 years of great fun. Check out the pictures and see if you can recognize anyone!



Steam powered woodworking lathe



General View of the Steam Table



Todd Cahill, Dick Boucher (your new president) & Phil Goodwin at the Steam Table



Todd Cahill with his steam engine models



Dave's workshop



Ed Seldin with his new stirling cycle engine



Dave with the featured steam engine, also happens to be on the T- Shirt for sale at the show.



Dave Bono with his steam locomotive model



Dave showing drawing presented to them by Dick Boucher to assembled gathering

Thanks for the memories, Dave and Jackie

## Passing of the Gavel

I would like to thank all of you for the support that you have given me as your president over the past four years. Your new president, Dick Boucher is very enthusiastic about his new role and has many ideas on how to take our organization to the next level. The more of you who get actively involved, the more that we all benefit. The diverse expertise of our membership is truly impressive. We really have an obligation to share this wealth of knowledge with others. Thanks again.

See you on July

*Norm*



## ***The Meeting***

Max ben-Aaron

The June meeting was called to order by Venerable President Norm Jones in the Jackson Room of the Charles River Museum of Industry.

At the May meeting, a sum of \$1000 was voted, unanimously, as a donation to the Charles River Museum of Industry as a token of our gratitude for the use of the venue for our meetings, among other things. A check for \$1000 was ceremoniously handed over to Dan Jaeger by Venerable President Norm Jones. Dan took the opportunity to comment on the mutually beneficial aspects of the collaboration between CRMI and NEMES, especially the volunteers.

Dan also mentioned the 'Lowell Loom Project', spearheaded by John Bottoms. This project is an ongoing effort to recreate a loom of the type that Francis Cabot Lowell and Paul Moody developed to start the first industrial

manufacturing enterprise in these very buildings in 1813. No example of their original loom is known to have survived. Even the patent application and the patent model were destroyed in a Patent Office fire in the 1870's. A portion of the donation will be earmarked for the loom project, which will be the an educated guess, the result of much research, as to the actual loom configuration, and which has been 'recreated' by Garland O'Connell. His design is now virtually complete and the construction phase is about to begin. If you would like to volunteer to assist, you are encouraged to see John Bottoms.

Election.

June is the month specified by our bylaws for electing club officers. The following slate was unanimously elected:

Venerable President Dick Boucher;

Vice President Frank Dorion;

Treasurer Dick Koolish;

Membership Secretary Ed Borgeson.

The post of Secretary was not filled. It will be retained by Max ben-Aaron, on a *pro tem* basis, until a suitable candidate steps forward.

The speaker of the evening was Jim Phelan, co-owner of the Burkart and Phelan, a firm of flute makers, in Shirley, MA, founded in 1982 by Lilian Burhart and Jim Phelan who married in 1984. Lilian had been employed making flute bodies, keys, padded flutes and piccolos and tested instruments for the Verne Q. Powell company where Jim had recently become general manager. The company (B&P) was originally founded to provide outside contracting services to Powell for the manufacture of a line of piccolos that Lilian had created, which combined the best acoustical qualities of all the piccolos she had studied.

Jim recognized the need to bring 20<sup>th</sup> Century engineering and manufacturing techniques into the flute-making process, pursued a mechanical engineering degree at Northeastern University. After a few years as a mechanical engineer, Jim joined Lilian to use his 18 years of experience to build beautiful instruments.

Jim's talk was illustrated with slides, so, in this description, an essential dimension is missing.

Animal bones, bored out, and bird bones, which are hollow, turned into flutes twenty or more thousand years ago, have been found with stone-age artifacts.

Perhaps only a hollow log, used as a drum, might have been used as an older musical instrument.

Flutes and piccolos are woodwind instruments - although frequently made of metal and other materials (such as crystal or ivory) – that do not use reeds. There are three types of flute, all of which are hollow tubes where the musician causes the air inside the instrument to vibrate:

- (1) The recorder/penny-whistle/fife which rely on air blown through a sharp-edged orifice (a fipple);
- (2) The syrinx (pan pipes) in which air is blown across the open end of a closed tube;
- (3) The transverse flute/piccolo, a hollow tube stopped at one end, where air is blown across a lip plate.

A flute usually consists of three parts: the headjoint, with the lip plate, the middle joint, or body, and the foot joint. Holes are bored along the body, to produce a range of notes. Padded keys are suspended over the holes, by a system of rods and keys, that are soldered onto the tube.

The sound quality is largely determined by the material used for the headjoint and so Burkart headjoints are available in silver (Sterling or 998 silver), gold (10 or 14K) or platinum. The metal and the geometry govern the timbre (sound color) of the instrument.

Piccolo headjoints are provided in wood (granadilla), Sterling silver and 14K gold.

Jim explained that the major dimensions in the flute design are fixed by the laws of physics of the standing waves that are set up by air vibrating in the body. The mechanism, however, is fabricated from many small parts that are stamped or formed, and silver-soldered together and it is this aspect that lends itself to modern production methods. Wire electro-discharge machining (EDM) has made the creation of stamping and forging dies accurate and economical and, together with hydraulic presses, have done away with many of the repetitive forming steps, allowing the technician to concentrate on the more highly skilled arts of assembling the components into mechanisms that are functionally efficient and economical to

manufacture, resulting in a better instrument at a competitive price. Modern measuring equipment – an optical comparator, for instance – ensures that the tools and fixtures are accurate to start with and retain their precision in use.

Many of the technicians in the company have Master's degrees in music and are accomplished flautists and they are fully aware of the necessity of attention to detail, and, in particular, which details contribute most of the sound quality of the instrument.

The production process involves putting a high polish on the instruments and the health of the staff is safeguarded by elaborate measures to filter out the abrasives, the solvents used in the polishing compounds, and metal dust from being inhaled by the polishers.

An intimate knowledge of metallurgy is very necessary because the metals tend to work-harden in the manufacturing process, and over time, precipitation hardening (changes in the crystalline structure of the metal, similar to the change from austenite to martensite in steel) will affect the tonal qualities. The instrument must have a fine tone when made and must keep that tone, though it may mellow with time so manufacturing steps may include accelerating the precipitation-hardening process.

The mechanism – the rods and ribs that hold and connect the keys – an assembly of stampings and forgings, are precisely aligned in fixtures and are-welded together with a tiny welder. Then they are silver-soldered together on a curved plate as a unit. This unit is then soft-soldered to the perforated tube which constitutes the middle joint. It has to be soft-soldered because the heat needed to silver-solder everything together *in situ* would cause the tube to deform.

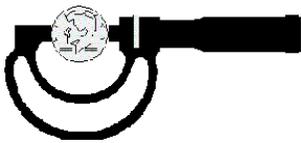
The piccolos, made of granadilla, which is a member of the rosewood family, are bored out with a tapered bore. The reamer used to form the bore is a good example of the application of modern production methods. It is made of tungsten carbide. It has a 1 degree taper and is difficult to make by conventional means, so it is formed as an almost cylindrical cone, and turned into a single-flute reamer (a D-bit) by wire EDM.

The use of automation and modern production methods has often been touted as a means of relieving workers of tedious repetitive labor and releasing them for more rewarding, highly skilled, work. Alas, in most cases, industry pays only lip service to this ideal and the goal is really cheap production. It is refreshing to see that there is one industry, however small, where the ideal is adhered to.

We thank Jim for an interesting and illuminating talk, well delivered.

When I got home after the meeting, one of the questions I wished I had asked (there is always at least one) was about "left-handed" flutes. Almost all flutes are made to be held pointing to the player's right. I should have asked: "Are there any 'left-handed' flutes?". I discovered that in the middle of the 19th Century, there was a famous duo of touring flautists, the Doppler brothers, Karl and Franz. To prevent the possibility of tangling flutes and so that audiences could see the flying fingers of both players, Karl Doppler had a special flute made so he could play to the left.

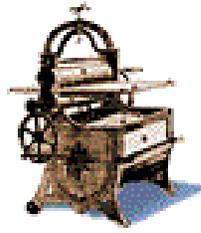
Max



## ***Treasurer's Report***

Richard Koolish

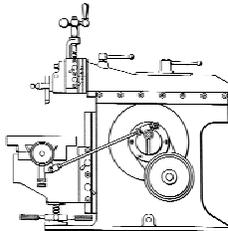
Treasurers Report Balance as of May 18, 2006	8564.84
June Gazette printing	-174.75
CRMI donation	-1000.00
New AV cabinet materials	-103.37
Membership income	+ 25.00
Balance as of June 20, 2006	7261.72



## ***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>
August	7/21/2006
September	8/25/2006

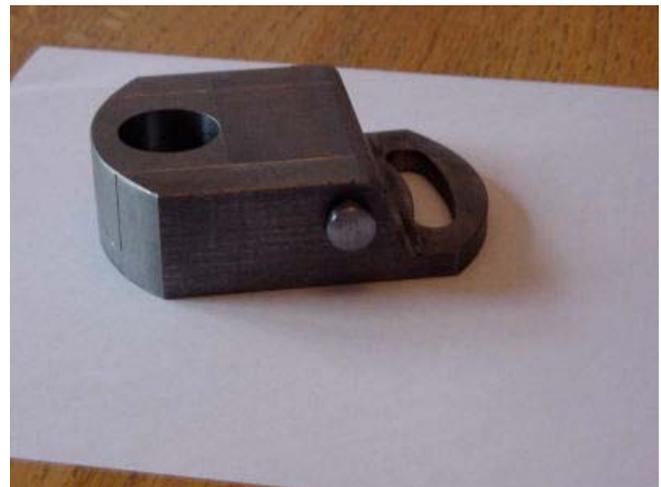


## ***Shaper Column***

Kay Fisher

### ***Building a Clapper Box and Clapper***

When building a new clapper box and clapper - Pete Verbree was concerned about the amount of metal around his taper pin, since his original was cracked. He asked me to measure my machines to see how much metal is there. At the time I had three shapers. My 9" Lewis had 0.15" of metal in front of the taper pin, my 7" Rhodes had 0.185" and my 7" Logan had 0.13". All were larger than his, which had only 0.1".



**Clapper Box and Clapper** Photo by Pete Verbree

It is best to ream that taper hole so that, when the taper pin is installed, it seats against the two support sides of the clapper box holder and it is a free fit on the clapper itself. This is done by reaming the whole assembly together, then removing the clapper and taking an extra light turn of the taper reamer in its hole. My Lewis shaper's taper pin falls out on occasion so I rap it into the hole with a leather hammer. Perhaps the previous owner of Pete's shaper put his tapered pin in too tightly and cracked the clapper box.



**Clapper Parts** Photo by Pete Verbree

The bottom line is that Pete remanufactured the clapper for his Atlas 7B. Here is his story.

"I finally finished the new clapper for my Atlas today, so I thought that I would send you some pictures. I beefed up the box by adding to the area around the taper pin, bringing it to approximately .187"



**Clapper Installed** Photo by Pete Verbree

I got carried away fitting the clapper to the box, I scrapped them to a clearance of approximately 0.001". I realize that this is not necessary but I need the practice for when I fix the cross slide."

Thanks Pete for your input and inspiration.

Keep sending me email with questions and interesting shaper stories.

My email address is:

[KayPatFisher@Yahoo.com](mailto:KayPatFisher@Yahoo.com)

Kay



## ***Web Sites of Interest***

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



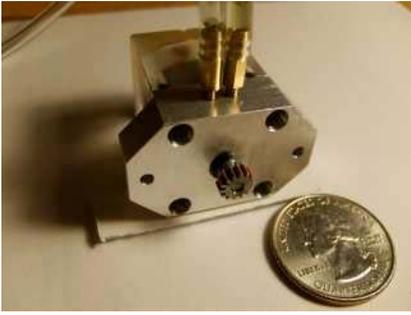
## ***For Sale***

### ***Help Wanted***

I'm Jim Hachey, a Worcester resident and machinist who, in my spare time, enjoys making miniature machinery. I'm a member of NEMES (New England Model Engineering Society in Waltham, MA).

I'm currently trying to make a mini hydraulic axial piston pump. I made a request for assistance last month, and would like to offer an update on my project.

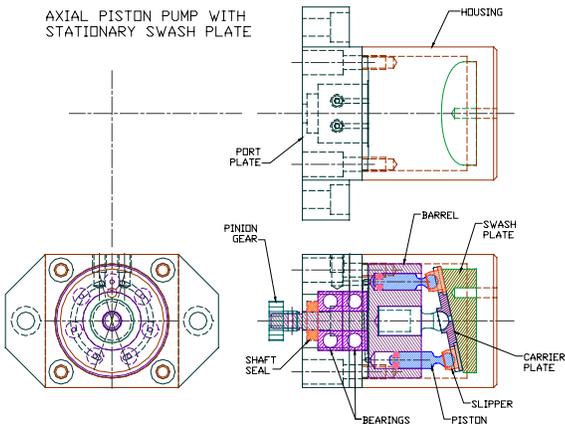
I've got a functioning unit that pumps liquid (hydraulic oil) on a small scale. Now for a basic explanation of how it works. A pinion gear transmits input power (for now a 12V DC motor) to the shaft and piston barrel which ride on two ball bearings.



The barrel has seven reamed holes equally spaced about the shaft axis, each carrying a piston. Each piston has a ball end swaged to a cup slipper.



A 7-slot carrier plate captures and holds each slipper in radial position against an inclined swash plate



A compression spring seated in the end of the barrel keeps the carrier plate pushing against the swash plate. As the barrel and pistons rotate, the carrier and swash plates pull and push the pistons causing reciprocating motion which draws in liquid through the inlet port and pumps it out the outlet port. Radial slots milled into the port plate guide the oil to and from the

pistons. The port plate houses the bearings and a small o-ring which provides a seal on the shaft.

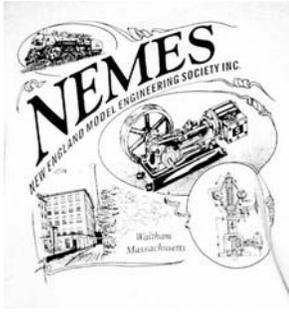
The photos show that I made the first housing out of clear polycarbonate plastic so I can view the internal parts while the pump is running. My first observations showed that the pump leaks internally and through the shaft seal if resistance is put against the outgoing oil. Somehow the barrel is not staying sealed against the port plate. I think part of the problem is having a stainless steel barrel rotating against an aluminum port plate - couldn't resist, grabbed the aluminum because it was faster to machine, bad choice. First change is a separate port plate made of O-1 tool steel and lapped for flatness. Second, both bearings support the shaft only on one end now, probably need to move one to each end. And I'm experimenting with other alternatives for a better shaft seal - have a few miniature U-cup seals with segmented spring.

Still have my eyes and ears open for any engineering and/or machining input from NEMES members. This is just too much fun to let go of, but I'm a machinist not an engineer. I'm sure some of you have worked on a pump or two before. I can be reached at [j.hachey@att.net](mailto:j.hachey@att.net).

### ***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](mailto: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.

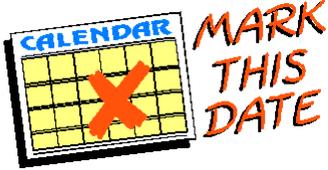
Mike Boucher  
 10 May's Field Rd  
 Lunenburg, MA 01462-1263  
[mdbouch@hotmail.com](mailto:mdbouch@hotmail.com)

### ***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



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

*Bill*

July 1-2 Antique Engine Meet  
Boothbay Railway Village  
Rt 27 Boothbay ME  
[www.railwayvillage.org](http://www.railwayvillage.org)

July 1-2  
The Fabulous '50s, Sensational '60s & Antique  
Aeroplane Show  
Owls Head Transportation Museum Owls ME

July 6th Thursday 7PM  
NEMES Monthly club meeting  
Charles River Museum of Industry 781-893-  
5410  
Waltham, MA

July 9<sup>h</sup> Pepperell Show  
RT 111 Pepperell, MA Ken Spalding 978-433-  
5540

July 16th 9:00am The Flea at MIT  
Albany Street Garage at the corner of Albany  
and Main Streets in Cambridge

July 22-23  
The Fabulous '50s, Sensational '60s & Antique  
Aeroplane Show  
Owls Head Transportation Museum Owls ME

July 29-30 Raitt Homestead Show (Elliot  
Antique Tractor and Engine Show) Engines,  
tractors and other farm equipment. Antique  
tractor pull demonstration. Exhibitors: get there  
by 5:00pm Thursday with a trailer or motorhome  
and park on the show line free for the weekend.  
Rt. 103, Eliot ME. Lisa Raitt 207-748-3303

July 29-30

NEMES Gazette

Wings & Wheels Spectacular; Classic Cars &  
Aerobatic Air Show  
Owls Head Transportation Museum Owls ME

Aug 3rd Thursday 7PM  
NEMES Monthly club meeting  
Charles River Museum of Industry 781-893-5410  
Waltham, MA

Aug 5-6 Scribner's Mill Show  
Sebago Lake Region near Harrison ME  
207-583-6455

Aug 12-13 Straw Hollow Engine Show  
Boylston, MA  
J. A. Resseguie 508-869-2089

Aug 19<sup>th</sup>  
29th Annual New England Auto Auction  
Owls Head Transportation Museum Owls ME

Aug 20th 9:00am The Flea at MIT  
Albany Street Garage at the corner of Albany and  
Main Streets in Cambridge

Aug 25,26,27 Waushakum Live Steamers  
Annual Meet Weekend  
Holliston MA  
<http://www.steamingpriest.com/wls>