

# The NEMES Gazette

NEW ENGLAND MODEL ENGINEERING SOCIETY INC.

No. 178

Feb. 2011

© 2011 NEMES

## Gazette Staff

Editor	Frank Hills
Publisher	Bob Neidorff
Events Editor	Bill Brackett
Meeting Notes	Todd Cahill

## NEMES officers

President	TBD
Vice Pres.	Jeff Del Papa
Treasurer	Richard Koolish
Secretary	Todd Cahill
Director	Mike Boucher

## NEMES web site

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

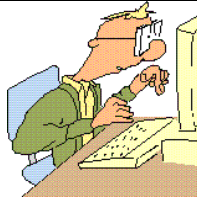
## Contact Addresses

Frank Hills, Editor  
464 Old Billerica Rd.  
Bedford, Ma. 01730  
[hills@aerodyne.com](mailto:hills@aerodyne.com)

Richard Koolish, Treasurer  
212 Park Ave.  
Arlington, MA 02476-5941  
[koolish@dickkoolish.com](mailto:koolish@dickkoolish.com)

Bob Neidorff, Publisher  
39 Stowell Road  
Bedford, NH 03110  
[Neidorff@ti.com](mailto:Neidorff@ti.com)

Bill Brackett, Event Editor  
29 East Main St  
Northborough MA 01532  
[thebracketts@verizon.net](mailto:thebracketts@verizon.net)



## Editor's Desk

Frank Hills

### Submarines for the Common Man?

Anybody want to buy a submarine? No, you can't get it with nuclear power. You can't get it with torpedoes, missiles, or other implements of destruction. And no, you're not going to sail it under the Polar ice cap like the Nautilus. But you will be dry in it, unlike those underwater scooters you see in James Bond movies. Spend a little extra and you might have a nice cushy seat. A little more and you could get a refrigerator for snacks. Feeling special? How about your own stateroom! No, we're not talking used Jacques Cousteau here! This is not your grandfathers WWII Barracuda-class warship either. Anyone with sufficient cash in hand can buy one. My question is, what will you do with it?

It's true, the personal submarine has been around for almost 25 years, but until about 10 years ago you never heard about them because they were the toys of the super rich and were typically used like expensive scuba diving gear on big yachts.

-Continued on page 2

## Next Meeting

Thursday, Feb. 3th, 2011

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

## Membership Info

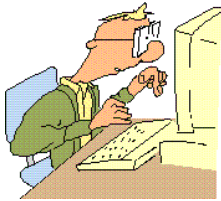
New members welcome! Annual dues are \$25 (mail applications and/or dues checks, made payable to "NEMES", to our Treasurer Richard Koolish, see right) Annual dues are for the calendar year and are due by December 31<sup>st</sup> of the prior year (or with application).

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

Addresses are in the left column.

## Contents

Editor's Desk.....	1
NEMES Gazette Editorial Schedule .....	2
President's Corner.....	3
The Meeting .....	3
Miscellaneous Ramblings.....	3
Metal Shapers .....	4
Upcoming Events.....	7
NEMES Show Flyer .....	8



## **Editor's Desk**

-continued from page 1

But there are now many companies in the business of building submarines commercially for research, tourism, and even private use. Unless you're looking to blast one of your neighboring countries ships out of the water, the technology is well understood and with modern materials and construction techniques, quite simple. Fiberglass, Plexiglas and stainless steel are the most common construction materials. Marine gel-cell deep cycle batteries and small diesel engines provide the power. Almost everything else is "off the shelf" marine and chemical industry hardware. Amazing!

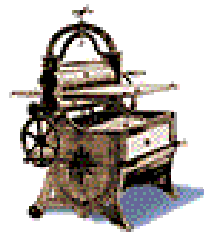


I suppose I should have figured that with existing technology and the high availability of the "common" yacht that someone would come up with the idea of building a yacht submarine. Just so you can show the Jones's that you can keep up. But I'm still having trouble believing that someone would actually buy one. Perhaps I've seen too many episodes of "Voyage to the Bottom of the Sea"

Next month "Who Cut the Methane?"



When I first heard of these things, my assumption was that they must be small, cramped and of very limited in endurance. Maybe they have a diving time very similar to that of a scuba diver. But I was wrong. Though that is true of the model pictured above, there are now versions that might be considered ocean-going yachts, with kitchens, bathrooms, showers and guest rooms. The model seen below can hold more than 10 people and can transport them across the Atlantic Ocean in style and comfort. Its 213 feet long and weights 1500 tons! Not quite in the super-yacht category (except maybe in price). But still, it's bigger than my house!



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

<u>Issue</u>	<u>closing date for contributions</u>
March '11	Feb. 18, 2011
April '11	March 25, 2011
May '11	April 22, 2011
June '11	May 20, 2011
July '11	June 24, 2011

## 2011 NEMES Membership Dues are PAST DUE!!

**Please use the form below with a check to pay your dues, either at the meeting or by mail so we you be assured to get credit for paying the dues.**

Please send a check for \$25.00 made out to NEMES to:

Richard Koolish  
212 Park Ave.  
Arlington MA 02476

AND PLEASE PRINT NEATLY!

Name \_\_\_\_\_

Street \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_ ZIP \_\_\_\_\_

HomePhone \_\_\_\_\_

Work Phone \_\_\_\_\_

email \_\_\_\_\_



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

Dick Boucher

### ***The Meeting***

This month Jay Eshbaugh, Vern's son, will be talking about the upgrade of the Haystack Antenna in Westford Massachusetts. Jay writes:

In 1960, the Advanced Research Projects Agency (ARPA) funded a program to develop a large steerable dish antenna in Westford, Massachusetts to be used for long distance communications. When the antenna was completed in 1964, it was state of the art, but the mission for which it had been built no longer needed it. Converted to a radio telescope, it was used to map the moon for the Apollo missions and perform the 4<sup>th</sup> test of Einstein's theory of general relativity, among other things.

Fifty years later, the antenna needs to be upgraded to once again be state of the art. This upgrade requires an antenna surface tolerance of 0.004" over a 120-foot span (a factor of 10 improvement from the original), and it must maintain that tolerance while moving at 5 degrees/second.

During the summer of 2010, the major construction portion of the antenna upgrade occurred, involving one of the largest crawler cranes in the US. As system engineer for the upgrade and one of the site managers during construction, I had access to all phases of the construction. This presentation will cover the major lifts and detail some of the unique aspects of the upgrade.

### ***Miscellaneous Ramblings***

This month we did indeed ramble. Bea and I and thirty-three others have just returned from our annual bus trip to York Pennsylvania and the Cabin Fever Expo. We have a tremendous show ourselves at the Charles River Museum of Industry and Innovation next month, but the arena in the York Fairground that the Cabin Fever show is held in is 150,000 square feet. In that space is a large pond for radio control boats - both steam and electric. This year there was a large dump-truck load of dirt with a model of a walking dragline on top of the dirt looking to all the world like they were strip mining in the hall. Along with that there is a large area set aside for the Gauge 1 and "O" gauge live steam model locomotives. Next there is table after table with an air line on it for the running of steam engines. There is also plenty of space for the running of gas engines from the make or break and

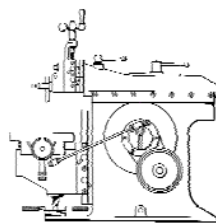
hit and miss engines putting away all day to the intermittent roar of high-speed engines. This year there were the Bentley rotary aircraft engines, a one-sixth scale eight-cylinder Duesenberg SJ, a four cylinder Offy, numerous V-8 engines and two cylinder motorcycle engines all drawing a large crowd when they were fired up.

For the "stuff" collectors, there was a silent auction and the outside edges of the halls had vendors along the entire distance. I myself got a couple of nice tooling additions for the shop and the bus driver is always aware that the bus is heavier coming home.

Well, so much for our ramblings it is time to think about our own show in Waltham. The date this year is February 19<sup>th</sup>. Garland, Norm and I have been trying to do something about our need for a better supply of air for the steam engines on the floor. It is a perplexing problem. We have investigated purchasing a new compressor but noise is the major consideration in that direction. Garland has done a mathematical analysis of our volumetric needs at the show and has determined that the compressor we have is large enough so he has supplied us with a larger hose to get the air from the compressor to the Jackson room for this year. If anyone has a quiet, and I emphasize quiet, compressor like a dental unit for their own display, it would be a great help if it were brought along.

Well I guess that covers just about everything this month see you at the meeting and again at the show.

Dick B



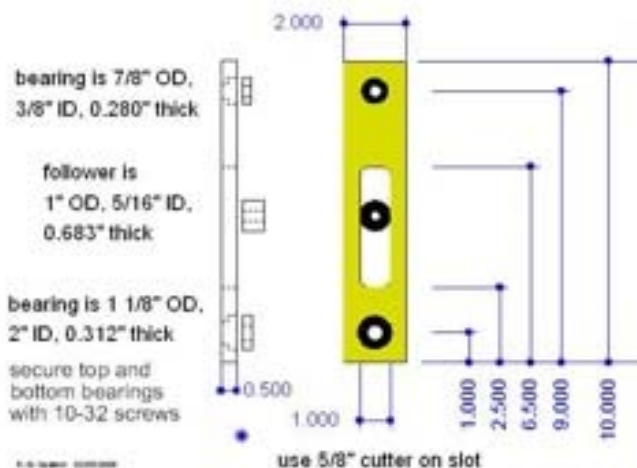
## ***Metal Shapers***

By Kay Fisher

### ***R. G. Sparber's Gingery Shaper - Part 11***

#### **Redesign of the Crank Yoke**

Gingery designed the crank yoke assuming minimal machining capabilities. The rules change when you have a mill/drill and full size lathe. Rather than piece the yoke together with 1/2" square bar stock and cast end pieces, I have chosen to cut it from a single block of 1018 steel. I also spent the extra money to use ball bearings on top and bottom, plus a ball bearing follower in the slot.



**Crank Yoke Drawing by R. G. Sparber**

I show the slot as 1.000" wide but will probably make it a little wider to permit the follower to roll as it moves.

#### **Cone Pulley Design**

I chose to make my own cone pulleys because it was impossible to find exactly the sizes that I needed. It also saved me money and turned out to be amazingly easy and fun.

#### **The Power Train**

Before designing cone pulleys, the overall power train must be designed. Through the generous help of many on the gingery\_machines Yahoo group, I was able to piece together the important parameters.

1725 RPM Motor	Pulley Diameter	RPM
Motor Pulley	1.5	1725
Outboard Pulley	7.6	340.46

Cone	1st Cone Diameter	2nd Cone Diameter	Ratio
Small Sprocket	10		
Large Sprocket	40		

Cone	1st Cone Diameter	2nd Cone Diameter	Ratio
Step 1	2.625	3.88	0.68
Step 2	3.000	3.50	0.86
Step 3	3.500	3.00	1.17
Step 4	3.875	2.63	1.48
Cone 340.46 RPM	Small Sprocket RPM	Large Sprocket RPM	RPM Delta
Step 1	230.63	57.66	15.30
Step 2	291.82	72.96	26.35
Step 3	397.20	99.30	26.35
Step 4	502.58	125.65	

**Cutting Speed in Feet/Min**

Length of Stroke	Ram Cycles per Minute			
	57.66	72.96	99.3	125.65
1	8	10	14	17
2	16	20	28	35
3	24	30	41	52
4	32	41	55	70
5	40	51	69	87
6	48	61	83	105

Material	Cutting Speed
Cast Iron	60 Feet/Min
Machine Steel	80 Feet/Min
Carbon Steel	50 Feet/Min
Brass	160 Feet/Min

**Cone Pulley Calculations**

C = Distance between pulley centers  
d1, d2, d3, d4 = diameter of 1st sheaves  
D1, D2, D3, D4 = diameter of 2nd sheaves  
L = Resulting belt length



	Step			
	1	2	3	4
<b>C</b>	10.000	10.015	10.015	10.000
<b>d</b>	2.63	3.00	3.50	3.88
<b>D</b>	3.88	3.50	3.00	2.63
<b>L</b>	30.24	30.24	30.24	30.24
<b>d/D</b>	1.48	1.17	0.86	0.68

The key output of the above calculation is the outboard pulley diameter and the cone pulley diameters. The outboard pulley is specified by Gingery to be 8" but since I plan to make my own, I can tweak it a little.

I started with advice from "JohnW" saying that the best range of speeds for the ram is 50 to 120 strokes per minute. That puts the center of the range at 85 SPM. With the cone pulley diameters set to give a 1:1 speed ratio, it was easy to adjust the outboard pulley such that the RPM of the large chain sprocket is 85. This is the same as the SPM of the ram.

Next came finding the best diameters of the cone pulleys. This was more cut and try plus listening to advice from "CT2" rather than any scientific or mathematical approach. The trick is to get speeds that are equally spaced across the range of speeds plus be sure that the needed center to center distance of the cone pulleys does not vary much. Note near the bottom of the spreadsheet that there is only a 0.015" shift in center to center distance as we move through the speeds. This means we can change speeds and not have to adjust the center to center distance or, even worse, change the length of the belt.

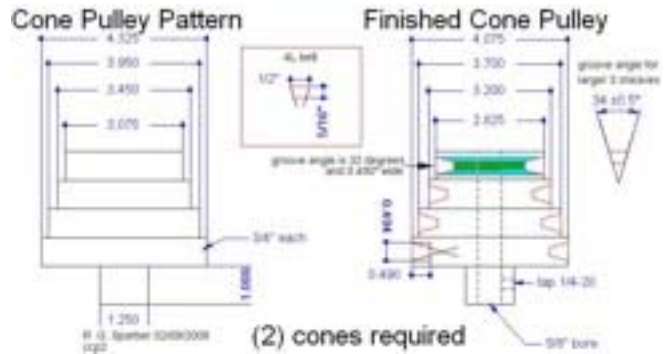
**Pulley Design**

There are few essential books in our hobby. One is Machinery's Handbook. I frequently use about 0.01% of it and on rare occasion venture out into new, uncharted pages. One of these adventures was the section on "V-Belts and Sheaves". This section was not helpful in the choosing of the best diameters for a cone pulley, but was invaluable

for finding the belt length and center to center distance used in the above spreadsheet, plus the geometry of a sheave.

The finished cone diameters, below, do not match the values given in the spreadsheet above because the handbook says to add 0.2" to the speed diameter to get the sheave diameter. For example, the spreadsheet calculates 3.875" for the largest sheave. You see 4.075" below.

This turns out to be a 3% correction, which is not much, but easy to implement.



**Cone Pulley Drawing by R. G. Sparber**

I plan to use a 4L belt. The dimensions of the 4L groove come from the handbook.

The cone pulley pattern will be built from MDF. A 3/4" thick sheave is thicker than normal, but my other choice was 1/2" and that would be too thin. I also did not worry much about shrinkage and machining allowance. I just slapped a 1/4" onto the finished diameter. Each step in the cone pattern has about 2 degrees of draft to insure easy extraction from the sand.

The 7.6" diameter outboard sheave is straightforward. I will cut the 1 1/2" motor pulley from round stock.

Stay tuned for part 12 next month. Keep sending me email with questions and interesting shaper stories.

My email address is:

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

Kay

## 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 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!

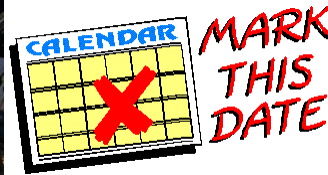
Artwork by Richard Sabol, printed on front and back:

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)



## 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*

### Calendar of Events

Feb 3<sup>rd</sup> Thursday 7PM  
NEMES Monthly club meeting  
Charles River Museum of Industry; Waltham, MA  
781-893-5410  
<http://www.neme-s.org>

Feb 19<sup>th</sup> 10:00-4:00  
14<sup>th</sup> Annual NEMES Model Engineering Show  
Charles River Museum of Industry; Waltham, MA  
781-893-5410

Feb 26-27  
Snow Movers Winter Transportation Festival  
Demos from Model T Snowmobiles to  
1914 Lombard Log Hauler  
Owls Head Transportation Museum Owls ME  
<http://www.ohtm.org/>

March 3<sup>rd</sup> Thursday 7PM  
NEMES Monthly club meeting  
Charles River Museum of Industry; Waltham, MA  
781-893-5410

March 18-20 Maine Boat Builders Show  
58 Fore St Portland ME  
[www.portlandcompany.com](http://www.portlandcompany.com)

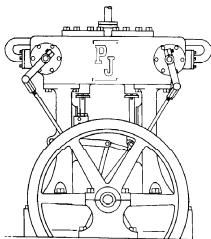
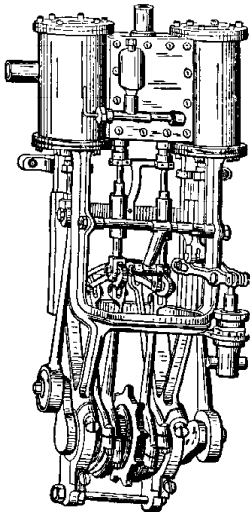
**REMEMBER THIS!**

# 15TH ANNUAL N.E.M.E.S. MODEL ENGINEERING SHOW

**FEBRUARY 19, 2011**

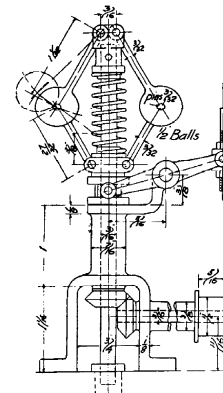
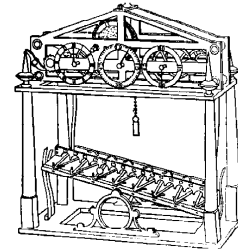
**10:00 AM TO 4:00 PM**

**CHARLES RIVER MUSEUM OF INDUSTRY  
WALTHAM, MA**



SEE OPERATING SCALE:

- ◆ STEAM ENGINES
- ◆ GASOLINE ENGINES
- ◆ AIRCRAFT ENGINES
- ◆ STIRLING CYCLE ENGINES
- ◆ CLOCKS
- ◆ MACHINISTS TOOLS AND FIXTURES
- ◆ LOCOMOTIVES
- ◆ TRACTION ENGINES
- ◆ MODEL BOATS - STEAM AND GAS  
AND MEET THE CRAFTSMEN  
WHO BUILT THEM.



EXHIBITORS SETUP STARTS AT 8:00 AM  
COMPRESSED AIR FOR RUNNING MODELS  
GAS ENGINES ALLOWED  
NON-MEMBER EXHIBITORS WELCOME

GENERAL ADMISSION FOR SHOW AND MUSEUM

ADULTS	\$5.00
CHILDREN 6-12 WITH ADULTS	\$3.00
EXHIBITORS AND CHILDREN UNDER 6	FREE

**Directions:**

Take Rte. 128 to Rte. 20. Go East on Rte. 20 to Central Square, about 2 miles. Right on Moody Street. Cross the river, left on Pine Street to municipal parking lot on left. Short walk over the footbridge to the museum.

For additional information call the Museum at 781-893-5410 or go to [www.neme-s.org](http://www.neme-s.org)