

The NEMES Gazette

Vol 1 No 8
December, 1996

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*The Newsletter of the New England Model Engineering Society,
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From the Editor's Desk:

John Wasser has volunteered to set up the NEMES web page, and the October issue of the Gazette is now on his web page. It will probably be moved onto the museums website when things get more organized. For now, issue six minus the graphics, is at "<http://www.tiac.net/users/wasser/NEMES/Issue6.html>" As time goes on we will hopefully get the graphics onto the web page as well as the rest of the issues of the Gazette.

This is the first issue of the Gazette that is being mailed only to those who have paid their dues. Hopefully we'll have it right and everyone who should get one will get one. Joe Masciovecchio, our Treasurer, is now printing the labels, so there are two places that mistakes could have crept in. First in transferring the list from Ron's Computer to Joe's, and second in getting all the correct people checked off as they pay their dues. So, be sure to check your mailing label to make sure the label is right, and let Joe know if he needs to make any corrections. Joe will have a master list at the meeting December 7 so that you can make sure your info is correct. Newcomers to our meetings will be put on the mailing list for two issues to give them a chance to decide if they want to join.

See you all next Thursday night. -- scl

The Founders Corner by Ron Ginger

Dick Boucher, Bea Boucher, Max ben-Aaron, Ed Rogers, Steve Lovely and I met to start making plans for our first show, to be held Feb 15, 1997. The following is some of our plans. We decided for this show we would mainly 'keep it simple'. We may have to make changes in the future, but for this show we will mostly just see what develops.

PURPOSE

The NEMES Show is an event for members to have an opportunity to display items they have built to like-minded builders. It is purely a social event, no prizes are awarded, no grading, selection or ranking of items is conducted. We want to encourage ALL members to show some of the work they are doing.

Secondarily, it is an event for the Museum to help bring in admission paying visitors. In a small way it is the Clubs way of supporting the museum, in return for club use of museum facilities.

CONTENT

The items displayed at the show will be items principally built by the exhibitor. We expect these items will be mechanical devices of precision construction such as tools, fixtures, model engines, scientific apparatus, clocks, etc.

We do not restrict the show to models. Full size items are most welcome, but the location of the show, with the requirement to carry items up a short flight of stairs will obviously limit the size of items displayed. Photos of your large items would be great.

SAFTEY RULES

Since we want the items shown to be operational we must have firm rules to assure the safety of the exhibitors and the viewing public. The following set of safety rules will be observed. We will be meeting with the Waltham Fire Marshal and may have to alter these rules to meet their requirements.

* Equipment and displays must be constructed in such a manner that their operation does not endanger exhibitors, visitors, or damage the building.

* Operating equipment MUST have the exhibitor in attendance at all times.

* No engine can be operated that is unusually dangerous or noisy, such as airplane engines with propellers, or engines with large exposed moving parts. We welcome such engines for static display.

* All liquid and liquefied fuels MUST be stored in approved containers.

* Each exhibitor will be limited to an absolute minimum amount of fuel to allow operation during the show. Generally, we think one tankfull of fuel should be sufficient. In no case is any exhibitor to have more than 1 quart of liquid fuel, or one container of compressed gas.

* Each exhibitor with fuel will also have an approved fire extinguisher ready at hand.

* All fuel tanks, supply lines, connections etc will be made in accordance with good mechanical practice. A shutoff valve must be incorporated in all fuel systems as near the fuel source as practical.

* The exhibit area should be kept neat and tidy. Place carrying crates or boxes under the table, out of the way of visitors. Promptly clean up any spills Do not block aisles or doors.

* A 3 member safety committee will have final jurisdiction in determining if exhibits meet the safety standards. [we need volunteers for this]

REGISTRATION

Since tables will need to be rented, we need a fairly accurate idea of the amount of space needed. A registration form will be distributed to members of NEMES at the next meeting. Members may copy the form and distribute it to non-members. The show is NOT limited to NEMES members only, all are invited.

After a long discussion, we decided to impose a \$5 registration fee on exhibitors. We dont want to use our dues, which

were set to cover the meeting and newsletter expenses. We will use part of the registration fee to provide a few "door prizes" for the exhibitors.

Max ben-Aaron has volunteered to be the registrar, to collect the forms, and keep track of the list so we can gauge the number of tables to rent.

Space will be allotted in the order registrations are received. No specific table location reservations will be made, but pre-registered exhibitors will be guaranteed a minimum of 4 feet of table space.

Max will stop accepting registrations if we exceed our total available space.

Un-registered Exhibitors will be admitted the day of the show only as space allows, and may be severely limited in space or connection to electricity or air lines.

OPEN ISSUES

There are still many details to be worked out, and we will need a number of people to help on the day of the show.

We decided we could not arrange for a central air compressor system at this show. It would be nice, but since we don't know how many engines might need it we thought it best for this year to not attempt it. If someone has the pipe, and wants to help with this, please contact me.

The museum has a small kitchen and coffee pot, so if someone will offer to make the coffee we can have coffee for the members during the show. We suggest you may want to bring a bag lunch, so you can stay all day. We will need volunteers to come early to setup tables, and some to stay late and clean up.

There are lots more details, but this is enough for this newsletter. We will be discussing this at the next couple meetings, and everyone is welcome to make suggestions or offer to help.

DECEMBER MEETING

Remember the theme for December is SMALL. Lets see those small tools, small projects, techniques for making small parts. And keep bringing in those great Show and Tell items.

-- Ron Ginger

Calendar of Events

Thursday December 5, 1996 -- NEMES MEETING at the Charles River Museum of Industry

Thursday January 2, 1997 -- NEMES MEETING at the Charles River Museum of Industry

Thursday February 6, 1997 -- NEMES MEETING at the Charles River Museum of Industry

Saturday, February 15, 1997 -- New England Model Engineering Show at the Charles River Museum of Industry

Thursday March 6, 1997 -- NEMES MEETING at the Charles River Museum of Industry

Group purchase of free-machining steel.

The best prices I found work out to about \$8 for one 18" length each of 1/4", 1/2", 3/4" and 1" round in 12L14 leaded free-machining steel (\$0 postage+handling charge). How

does this price compare with mail-order? Anybody know? Can anybody get a better deal for us? These prices are predicated on about sixteen purchasers showing willing.

I did not check prices for 5/8" and 7/8" round, but, extrapolating, I think we might be able to offer 6 sizes, from 1/4" to 1", for about \$14-\$15 for one 18" length of each size.

Larger diameters are more expensive. If we want to add 9" of 1 1/2" round it will cost an extra \$6 or so (for a total of \$21 for 7 pieces). The bad news is that 3" round is \$24/foot and 4" round is \$32/foot. The good news is that we do not need to buy a whole 12' length. Cutting such thick stuff might be a problem, though.

We will need a volunteer with a bandsaw, (or a _big_ lathe and chatter-proof parting tool) if this is to become a reality. Said volunteer will get a discount for services rendered.

Max ben-Aaron

This is a proposal being put forth by Max. We actually need two things to make it happen. Sixteen people who want to get in on it, and someone to do the work of cutting up the material from the larger pieces actually purchased. Let's try to get something finalized at the meeting so we can make our first group purchase-- scl

The Meeting, November 7, 1996

Once again, the meeting started out with some words from Ron Ginger. There were some new faces in the crowd, so Ron asked if anyone there for the first time would introduce themselves. We had six newcomers. Ed Rogers asked how we would determine if we were called off by the weather. There was some discussion and it was determined that we should listen to the radio for Northeastern University, and if their classes are cancelled then our meeting is cancelled also. If we do miss a meeting we won't try to make it up, we'll have the next meeting on the next regular meeting night.

Don Strang has contacted Loctite to see if they might give a technical seminar on their products for us at a meeting. Jerry Bruning is the local rep. He lives in Hampden NH and is currently taking classes on Thursday nights at Babson College. He might be able to stop at our meeting after his class if things are set up ahead of time. Ron will be looking into it.

Along the lines of getting future programs scheduled, we need a program committee. It should be two or three people who get the guest speakers for our meeting scheduled 2-3 months in advance. We also need to get our group more formally organized. Not so organized that we all choke on it, but organized enough so that the meeting will still happen if Ron hits it big in the lottery and retires to Maine sooner than expected. Without a minimum of organization NEMES is too apt to disappear in a puff of smoke if only one person is keeping things together. We also have an agreement with the Museum where they are giving us a one year trial. We have certain goals to meet in order for them to consider us a success and worthy of continued support.

Should we get a web page? An amazing number of us have web access, and it was decided that a web site would be a good thing. We even have a volunteer to put it together, John Wasser. He'll be getting it together on his own account, then once it's up and functioning the way we would like it to the plan is to move it onto the Museums Web site.

An exception to the newsletter only being mailed to the people who have paid their dues is the new people. We'll send it to newcomers for a couple of months to remind them to come again and to let them get a feel for NEMES so they can decide if they want to join. We'll also be exchanging newsletters with some other groups and sending complementary copies to Bob Washburn of Strictly IC and Joe Rice of Live Steam.

We have talked in the past about doing a field trip to Starret. Don Strang went and brought a report back. He took the 1 PM tour and had to leave at 4 PM. A Machinist in Training is assigned as a guide for up to nine people. If you are going with a group, let them know ahead of time so they'll be sure to have guides available. Don recommends the afternoon tour, and going with a group of three or four people so that your group doesn't get too big for one guide to handle. Don also noted that Starret is a good example of how to change with the times, as opposed to Brown & Sharpe. When things started to really change in manufacturing Starret stayed basically the same and changed only where they needed to. B&S on the other hand went wholesale for updating everything to be the latest and greatest. Today Starret is successful, with the original plant still going strong and successful facilities all around the world. B&S on the other hand is mostly a marketing organization now and practically dead.

Tours at Starret begin at 9 AM and at 1 PM. They last 3 hours. If you are going it's a good idea to call ahead to Joel Shaughnessy, the Personnel Director, at 508-249-3552. To get there take Route 2, go right at 2A to Athol Center. Pass the High School on the left, the the State Police, etc. Go a little over a mile down the hill to the river. Right at the stop sign to the Starret Complex. Go to the visitors parking lot on the left, then cross the street and back down to the river. Enter at the Personnel Door on the left in the last building before the dam. Wear comfy clothes and shoes (especially shoes.)

Our first annual show is coming up February 15, 1997, and we need to get going on it. We will have a mention in Strictly IC, and hopefully will be in Live Steam as well. It'll be our first real time to stand around and meet each other. It'd be nice to build it into a big show, but first we have to get it going. (See more on the show elsewhere in this issue.)

Show and tell started off with Kay Fisher, who passed around a bunch of pictures from the Western Minnesota Steam Threshers meet last summer and from the RC Sub Regatta.

Don Strang had a Drill Dr brochure, and pointed out that I had gotten Puegot's name wrong last month. It was Renault Puegot who first put 6 facets on a drill, not Rene Puegot. I've never been good at French names.

He had a Scientific American book on fractures. He also passed around a separate picture of the SS Schenectady, a welded tanker that broke in half sitting at the dock. In model engineer he noted that there are recurring themes in the letters section that seem to repeat every 20 years or so. Does the big locknut go on the top or the bottom? Should RR wheels be coned or flat? What make Jo Blocks stick?

The book had the answer, it's the film of liquid between the two blocks. They are flat to about a millionth of an inch, so

when they are wrung together there is a film of liquid about 11 atoms thick between them. If you get the blocks truly clean they don't wring together. Providing them with a film of various liquids in the experiment gave differing adhesions. Oil from the skin was one of the better liquids to use. An interesting bit of trivia that came up was that the 4% or so of carbon in cast iron accounts for about 20% of the volume, which is why it can be so dirty to machine.

Wayne Singer brought in a truck from the 1 1/2" scale Climax he is building. It's based on Kozo's book, but is double the 3/4" scale of the unit in the book. The wheels are made out of a piece of 5 1/2 diameter durabar 14" long. He did them on a rotary table, and has 141 operations in each of the eight wheels that it takes to build the locomotive. He started in July and now has the main frame and the two trucks done. He's going to do the brakes next. It'll take about 100 pieces for the two trucks. He's using sintered bronze bearings and will be loading it to 400 lbs and pushing it around a track to make sure that things are working correctly before he does more work on it.

Ron Brought in a copper boiler that he had started. It was going to be a mini traction engine, but when he looked at all the cleats he'd need to attach to the wheels he decided to make it into a Roller instead. He finds the work on the boiler relaxing. Anneal, hammer, anneal, hammer, and first thing you know the sheet copper has formed into the shape you want. He made the forms to bend it over out of high density particle board. When you are hammering it all just flows, up to a point where it suddenly stops flowing and then you need to anneal it again. He has the boiler all done now, except for the foundation ring and the staybolts. For heat he's got a big Sievert torch connected to a 20 lb. propane tank. He followed Kozo's method of doing a boiler from the article in Live Steam a few issues back. A discussion of heating methods for silver soldering started up. Some of the points made were that you can use oxy acetylene if you keep the flame low enough that you can't hear it. If you can hear it it's too hot. A rosebud tip is better than a welding tip for silver soldering, it spreads the heat out. Map is cheaper than oxy acetylene, and just as hot. Dick Boucher uses the gas log out of an oven to heat the entire boiler up inside a brick house, then uses the torch to add the extra heat needed to flow the solder. Use preforms, they will just sit there and suddenly flow into the joint when the temperature is right. Dick also asked what spent coke is, since people keep referring to it as something to pack boilers in for insulation while you are soldering them.

Erroll Groff passed around a drawing of the threading bit sharpening fixture that he talked about at the September meeting. (see page 7 for a copy of the drawing) He also showed us a fixture that he had for providing a back stop for the spindle hole of a 14" SB lathe so that you can slide the piece into the spindle onto the stop, tighten up the chuck, and know exactly how far into the spindle the piece goes.

In addition to the Drill Doctor, Ed Kingsley had some Lindsay Metal Working Catalogs. Anyone who didn't already have one could take one. He also had a couple pads of Admiral Metals notepaper. They are open 1-4 on Thursday afternoons and sell non ferrous metals only. If you don't see what you want, ask. It's all under computer control so if you're looking for a specific size piece of a specific alloy they can find it quickly if

its there. They are at 11 Forbes Road, Woburn Ma 01801. Tel 1-800-423-6472.

Ed had hoped to have the Drill Doctor available to sharpen some drill at the meeting, but unfortunately it stopped running in the middle of the second drill he tried to sharpen. It seemed to be doing the job pretty well up till when it quit. It will do Masonry points, 135 degree split points, and 118 degree points. It uses a diamond wheel spinning at 20000 RPM to do the sharpening. They cost \$20 each and are supposed to be good for about 400 typical drills. It uses a plastic chuck with metal fingers in it to hold the drill, and has three separate holes that the chuck fits into as you go through the sharpening process. After the first 15 or 20 drills the wheel is supposed to wear in so that it will do a smoother job on the drill points. Ed is going to get one that works and give us a report on it.

The second half of the meeting marked a first for NEMES, our first invited guest speaker. Ray Hasbrouck is the man who design the first thing Ron Ginger ever made out of metal, a small steam engine. During the break Ray unpacked the engines he had brought to show us. I was impressed with the fitted wooden cases he had to transport everything smoothly and safely.

Our meeting was the first time that Ray had ever attended a Model Engineering Society, and he said he really enjoyed being able to talk to a group of people who understood and appreciated what he was doing. Ray was born in 1921 and graduated from High School in 1939, which positioned him just right for WW II. In 1943 he graduated from Kings Point and went into the Merchant Marine until 1946. In 1985 he retired from IBM after 35 years. For the last 25 years he's had a basement workshop to build steam engine models. He's a self taught machinist and has built about 30 models and designed about 10.

The first model he showed was the engine from the Monitor, of Monitor Vs Merrimac fame. He first became interested in it when he saw a half finished model of an unusual steam engine in the South Kensington Science Museum in England. There amidst all the jewel like models sat a single half done model with opposed cylinders. He was intrigued to find out why it was there and investigated. It turned out to be the model of the Monitors engine, and it was only half done because no one knew how to make a reversing gear for it.

During the Civil War, the Confederacy rebuilt a captured ship to be totally armored with iron plates above the water line. They steamed the Merrimac up to Hampden Roads one day and promptly sank two Union ships. The first they rammed, but after that they just sailed up and fired broadsides while Union shot bounced off their armor plate. After sinking two ships they steamed back home because it was getting dark. The next morning they returned to finish of the Union ships, but were met by the Monitor. A four hour battle was fought to a draw and a new era in Naval Warfare had begun.

John Erikson was born in Sweden in 1803. He went to England, where he designed the underwater screw propeller. In 1839 he came to the US. He was a successful inventor and engineer. In the Civil War, when the North learned that the Merimac was being built, they called for proposals for a vessel to counter it. Erikson proposed the Monitor design. He

built it on spec in 100 days at the Continental Iron Works in Brooklyn. It went together between October and January, and contained 40 innovations that were patented or used in the Maritime Industry later. The hull was designed to have about 18 inches above the waterline, and many of the people at the iron works while she was being built were convinced she'd never even float, but when she was launched she floated exactly at the design water line. She had a 9 foot diameter prop with a 16 foot pitch. Ray decided he'd like to build a model and sent to the Smithsonian, got nothing back. He went in person, found that they had nothing on the engine, although lots on the ship itself. The Department of Naval History had nothing, but checked the cross referencd file at the Naval Archives and sent him three references. Rear Admiral McCready had a forty year personal file on the Monitor and wanted to help. A second reference was to a man named Peterkin who eventually put out a book that had a plate in it that showed the valve gear. He spent a year and a half tracking down info on the engine.

The second model he brought to show us was the first marine engine in the US, built in 1804 by John Stevens to power the Juliette on the run from Hoboken to Manhattan. The third model was one he brought to the show at Wyandotte his first year. He was away from his table for a while, and when he got back his wife told him that a woman had been by and was interested in his engine. He figured it was too bad he'd missed her, but figured if she really wanted to ask him about it she'd be back. She did come back, and it turned out she was Cherry Hines, winner of numerous model engineering awards in England. She was interested because she had never seen the type of valve that he had used on the engine. It's an oscillator with a lever to control the engines direction and speed.

The monitor engine has two cylinders in line, with two directly opposed pistons. The crank sees the pistons as if they are 90 degrees from each other so the engine has no dead spot. The pistons are connected to the crankshafts single throw via bellcranks and the stroke is less than the crank diameter, reducing the stress levels on the crank and bearings. It uses trunk pistons, with the connecting rods pivoting from the middle of the piston so no crosshead is needed. It is likely that the bearings on the piston end of the rods were a problem, since they were inside the engine where they would have been at nearly the temperature of the steam and difficult to reach with lubrication. The reversing is handled by two bevelled sector gears that engage a bevel gear on the eccentric. They are mounted on a block that rotates with the shaft and pivot as a second block that also rotates with the shaft is moved along the axis of the shaft. As they pivot they cause the eccentric to rotate on the shaft. It's a very slick setup and allows the position of the eccentric with respect to the crankshaft to be positively controlled while the engine is running. Turning the wheel to move the block and pivot the sector gears while the engine was running brought it to a gradual halt and then started it up going the opposite way.

The model of the Monitor engine has an external flange joining the two cylinders. On the actual engine it was inside.

The Monitor has been located, and two brass lanterns and four feet of chain have been brought up, but it is not planned to raise any more. Most likely the ship and the area surrounding it will become a Marine Sanctuary.

Erikson built the entire ship in 100 days. How did he manage to build such a unique engine in such a short time? It wasn't a new design but was modified from the engine of the "Day-light", which seems to be as elusive as the data on the engine itself.

Working pressure was probably between 40 and 70 psi, which was high back then. It would have put out about 400 horsepower, and drove the ship at 6 1/2 knots. The original had a bore of between 32 and 40 inches. The model is in 3/4 inch to the foot scale.

The guns on the Monitor were 11 inch bore muzzle loaders firing 160 pound balls. They were the biggest guns available at the time, although they were not allowed to be used with the full charge of powder because they had failed in trials. If they had been able to use the full charge, perhaps the Monitor would have defeated the Merrimac.

The information on the reversing gear came from a plate in the book on the Monitor that Capt Ernest W. Peterkin USNR (Ret.) put out after Ray had begun searching for the data to build the model.

The second engine has two cranks and one cylinder. The two cranks are kept in sync by gears and the side thrust is cancelled as the piston goes up and down so no cross head is needed. There are two rotary valves, one at each end of the cylinder, activated by a gear rack attached to a single slip eccentric. The rack goes up and down and causes the valves to rotate. To reverse the engine it needs to be stopped, then a wheel attached to the eccentric via a shaft and bevel gears can be turned to move the eccentric. There is no positive control of the eccentric, but you don't have to reach down into the machinery to move it and change direction. In 1804 the gears would have all been hand cut. The original had a 5 or 6 inch bore and about an 8 inch stroke. It probably ran on about 40 psi steam.

The third engine he brought to show us was a Kribel Oscillator. It has a single control lever on the top. In the middle it stops the engine, to either side it will cause the engine to run in the direction chosen. The top of the cylinder is a cylinder, with the shoe of the valve lapped to it. The lever moves the shoe so that the valve events change with respect to the position of the cylinders and cause it to reverse.

That was it for the three engines that he had planned to show us, but he had a couple of other engines with him and we convinced him to tell us about them as well. The most recent engine that he's built is a four cylinder V. The cylinders are cast iron, and the pistons are aluminum. The cylinders are 5/8 bore and 1/2 inch stroke. A single lever on the top of the engine controls a four way valve that controls the engine. The engine has piston valves in the head, run off of a fixed eccentric via a rocker arm. The control valve changes the engines direction by switching the exhaust and the intake connections. The weak point on this engine is the piston pin bearing. There is no provision for lubrication to it, so what he usually does is tip the engine upside down and squirt some oil in before he runs it. He also had three two cylinder versions of this engine, one the same size, one half, and one double. All ran very nicely for us. The V4 is designed for an RC boat where the single control will allow a single servo to control the engine.

The final engine he had was a bottle engine made from a brass bud vase.

Tools and Techniques By Ed Kingsley

DRILL DOCTOR II - The Demonstration

Sadly, the replacement Darex Drill Sharpener arrived Friday, the day AFTER the November meeting. On the bright side, 'we've' had some time to get acquainted with each other and sort out a few of our differences. The Drill Doctor has character, stamina and some good moves. In my opinion, it also has a couple of shortcomings; shortcomings that I think can be overcome with some patience, a little technique and developing some 'feel' for just how the little guy does the job. I encourage you, once again, to bring a drill (one please) to the December meeting, preferably between 1/4" and 3/8", HSS or carbon steel, and we'll give last month's demonstration another try.

THE TOOL SHED

Andy Kotlikoff will be staying open for us until 6:15 PM, on our meeting nights, until further notice. If our patronage continues at the present level, this will become a permanent arrangement. For any of you new folks, The Tool Shed is a 'used tool emporium', located at 471 Main St, Waltham, just a couple of blocks East of the Common. Tel (617) 647-7970. Even if you don't find anything to buy, it's becoming a sort of 'pre-meeting schmoozer'.

Between Admiral Metals, The Tool Shed and the NEMES meeting, first Thursdays are beginning to seem a little like Xmas - 12 times a year.

THE 'FIRST MILLING MACHINE'

Here is a drawing of what is believed to be the first Milling Machine, approx 1828. A machine virtually identical to this is in the collection of the Precision Museum. Note the ingenious work table "ways", two sets of "V's" cut into the ends of four axially adjustable iron cylinders. Note also the rack and pinion drive. Only x-axis movement here, but the beginning of wondrous things to come. For more details, refer to the article on the Precision Museum in Windsor VT, in November's Newsletter. (see page 8 for the drawing.)

ADMIRAL METALS

Each Thursday, that there is a NEMES meeting, I do two things before I arrive. The last is to stop by the Tool Shed, in Waltham, and the first is to goto Admiral Metals, in Woburn.

For years, I looked for a source of Aluminum Bar and Plate without any luck. About a year ago, a local machinist friend suggested that I give Admiral Metals a try. When I took on a project that required an Aluminum Plate, 12" by 18" by 1/2", I gave them a call. They politely told me that it would cost at least \$50, due to a minimum charge requirement, but suggested that I drop by the weekly "yard sale" of "drops, side-cuts and randoms", and see what I might find. The fellow I spoke with all but guaranteed that I would find what I needed.

The Admiral Metals "Yard Sale" is held every Thursday from 1PM to 4PM. It is strictly cash and carry. Credit cards are not

welcome (but with a lot of trouble and a lot of walking back and forth you may work something out). Stock is "as you find it" and pieces cannot be cut into the length you 'really' want. A very long piece can be cut in half to fit into your car, but that's about it.

That's all the 'bad' news. On the positive side, the man on the phone was quite right. I did find exactly what I was looking for, and much more. Admiral Metals sells only Aluminum (rod, bar, sheet, plate, tubing, pipe and extruded shapes such as angle, channel, tee and I-beam); Copper (rod, bar, tube, pipe, wire and foil); Brass (rod, bar, sheet, plate, pipe, wire, angle, channel and tee); Bronze (rod, tube sheet and plate) and Stainless Steel (rod, hex, square and flat bar). But, no ferrous metals.

The "Sale" is held in the bay at the far right end of the complex (as you drive in). Entering the bay, there are shelves on your left containing Aluminum, Brass and Copper pieces. To the right are barrels of cuttings, mostly Aluminum. A little further down, at the end of the shelving is the service desk where Bob, Brian or Mary wait to help you. Bob and Brian are swell guys, but unfortunately, I have yet to have the pleasure of meeting Mary.

Opposite the desk is the weigh-in scale. Beyond the desk, on the right, are more shelves, first of Stainless Steel, then Brass, then Aluminum Plate and then Aluminum Bar and Rod. Further back are the Aluminum shapes, tubing and pipe, and usually a barrel or two of Stainless Steel cuttings.

What I didn't realize for several months was that when Bob or Brian asked if there was something they could help me find, they really meant it. Admiral Metals keeps track of its cut plate inventory by computer and it's all printed out in a list, by size and alloy. So ask, and they'll probably find it for you.

They stock most of the usual alloys:

Aluminum - 1100, 2011, 2017, 2024, 3003, 5052, 6061, 6063, 6511, 7075 and more. Stainless Steel - 303, 304, 316, and 416. Obviously not all stock in all alloys is available at all times.

What about prices?

Copper, Brass and Stainless Steel all sell for \$2.50 a pound.

Aluminum shapes, bars, rod, pipe and tube is all \$1.50 a pound.

Aluminum Plate - up to 4 square feet - is \$2.00 a pound.

Aluminum Plate - over 4 square feet - is \$2.75 a pound.

Some examples:

Aluminum Plate (< 4 sq ft) - 12" x 12" x 1/2" = 6.88# @ \$2.00 = \$13.75

Aluminum Bar - 1/2" x 2" x 24" = 2.29# @ \$1.50 = \$ 3.44

Brass, Copper or SS Rod - 1" diam x 12" long = 2.73# @ \$2.50 = \$ 6.82

(several months ago I wrote a little Basic program to help me out with weights ...)

Admiral Metals has been running their "Yard Sale" for about a year and a half and are still trying hard to get the word out. They believe that they are the only outlet of this kind on the

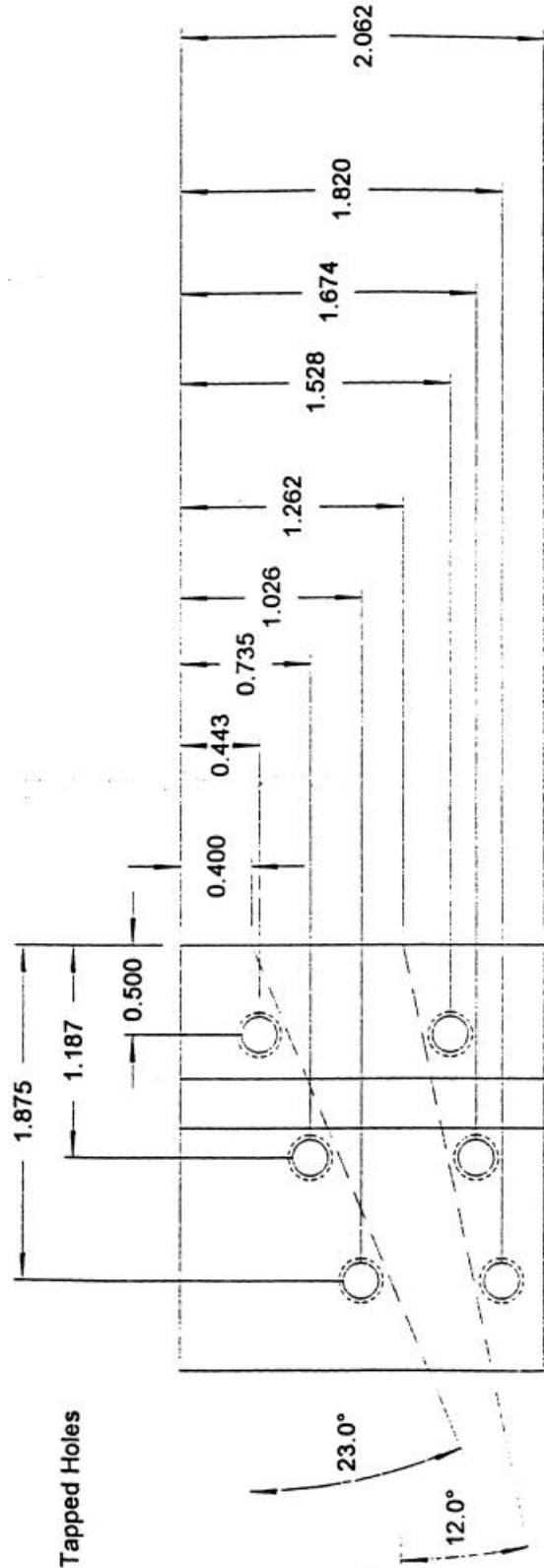
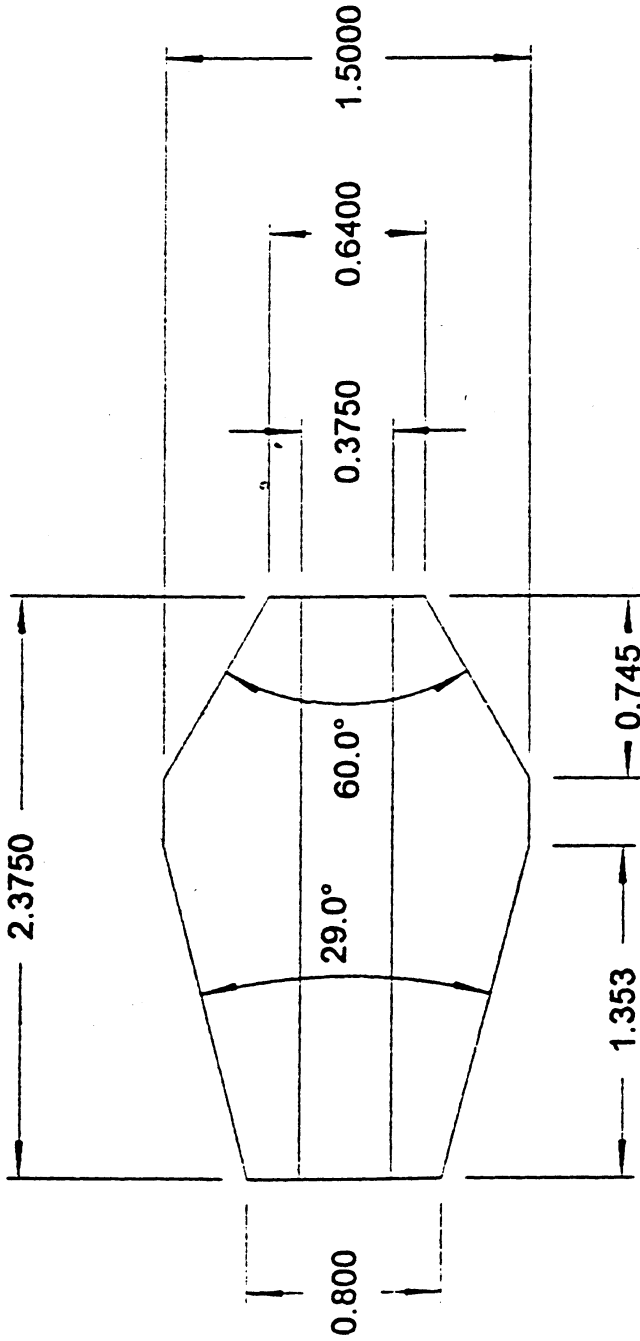
entire East Coast. I hate to tell you how much more my cellar weighs than it did a year ago, and Aluminum doesn't weigh that much !

To get there: From 128, take Washington Street (toward Winchester). You will pass a strip of interesting stores on the left, then Staples, and come to a stop- light with a Getty gastation on your left. Take a 300 degree turn to the left (a Hard left) onto Cedar St and an almost immediate right turn onto Forbes Road (only about 100 feet). Follow Forbes Rd past the Holiday Inn, Crown Plaza Mote, and through about 110 yards of woods, straight into the parking lot.

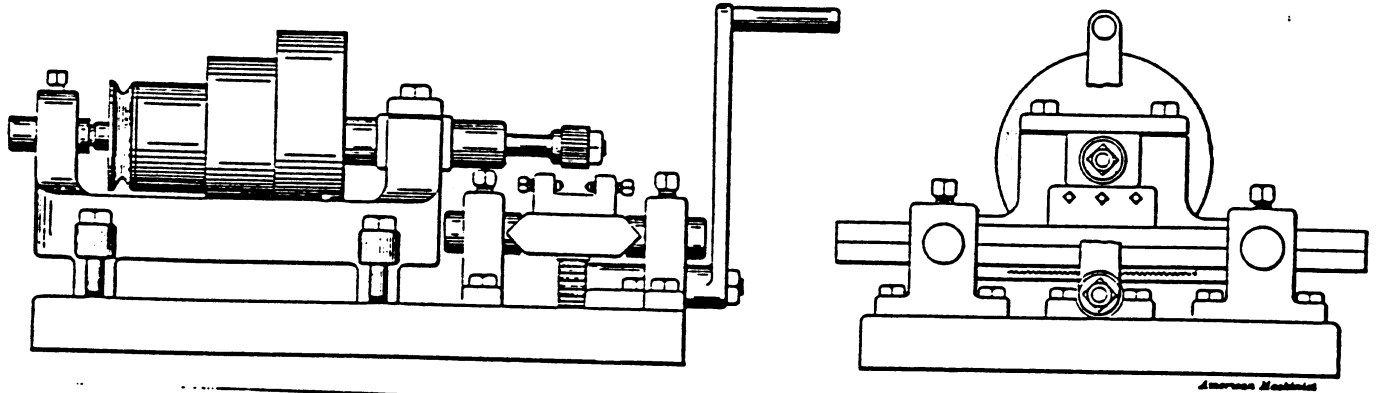
The address is 11 Forbes Road, Woburn MA. The Telephone is (800) 423-6472.

The Thursday afternoon, of the first NEMES meeting, I met this bearded guy at Admiral Metals, then again at MSC Supply Co. (which is about a mile and a half away) and finally at the Tool Shed. It turned out to be Ron Ginger, so I think it augered well. Whatever that means. I'll look for the rest of you at Admiral, on the 5th.

This is the drawing of the fixture for grinding threading tools that Erroll Groff brought to the meeting in October. It allows you to grind in 12 degrees of clearance if you hold you tool horizontally, or 23 degrees of clearance if you use a holder that tilts the toolbit up 11 degrees like an Armstrong holder does.



(6) 1/4-20 Tapped Holes



[Figure 17. - Edward Parkhurst's drawing of the milling machine shown to him in 1851 by Robert Johnson as "the first (milling) machine that he had ever known of".]

Reprinted courtesy of the Precision Museum. There is a machine just like this at the Precision Museum.

The NEMES Gazette

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newsletter of The New England Model Engineering Society