

The NEMES Gazette

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

There's been talk at the last few meetings about the possibility of exchanging newsletters with other groups, and it is beginning to happen. This morning I got the first newsletter from another organization, The Broadside, Newsletter of the U.S.S. Constitution Model Shipwright Guild. NEMES is mentioned, with the information that we meet on the first Thursday of the month at the Charles River Museum of Industry in Waltham. Looking through The Broadside there were several familiar names. Their next meeting is going to be November 5th at 7:00PM in the Hull Room, Bld No. 5 at the Charlestown Navy Yard. They suggest that if you're going to the meeting you should vote before you go as it's election day.

I haven't looked at the names on the mailing labels I got from Ron for this issue yet, but I expect that we'll be sending the Gazette out to some other groups starting this issue because there are quite a few more labels than there were last month. Which brings me to the subject of dues. This is the last issue that we are going to be mailing to everyone who signed up at our various meetings. Starting with the next issue we'll only be mailing them out to those who have paid their dues. Hopefully we won't make too many mistakes, but just in case I'll get about the same number printed up for the December issue so if you don't get one and you should have you can get it at the meeting. As always, you can give the dues to Joe at the meeting, mail them to Joe (see his address above,) or give them to me if you can't find Joe.

I want to thank the people who've sent me letters and material for the Gazette, and to remind you that the material has to come from somewhere, so please send something along. Remember also that we've set February 15, 1997 aside as the date for the First Annual New England Model Engineering Show at the Charles River Museum of Industry. We need to get going on it if we want it to be a good start to what will hopefully be an annual show to look forward to every February. Think about what part you might be able to play in making the show a reality and let Ron know at the meeting.

See you all next Thursday night. -- scl

The Founders Corner

Again, I thought we had a great meeting. The V-8 was exactly the kind of Show and Tell I like to see. I hope we get to see it a few more times as it gets completed. Keep bringing in the great projects fellows, I'm sure we all enjoy them.

I was a bit surprised at the last meeting when the question of Internet access came up, as to how many of us have access. It got me started thinking about more use of the net for our club. I've checked with Ultranet, and we could have a WEB site to post our newsletters, and maybe as a storage point for plans and articles. A minimum account is only about \$20 per month. Maybe I'll experiment with my WEB page and see if

it looks usefull. If you want to see what I've done try <http://www.ultranet.com/~ginger> Let me know what you think about this.

It might also be usefull to have a mail list server. Then we could keep up e-mail converstaions. Does anyone have access to a system that could be a list server?

Our November meeting speaker will be Ray Hasbrouck. Ray is a master model maker, and has designed a number of very interesting engines. One of his designs was shown by a member in September, and the engine Roland built for our joint steamboat is to Ray's design. I'm sure it will be an interesting evening.

I'm about out of speakers. I would love to have some suggestions for future meetings. Please let me know what you would like to hear about. or, better yet, how about a couple volunteers to be a 'Program Committee' to plan the next couple meetings?

I would also like to have a few volunteers to help plan the February show. I hope you are all finishing up some nice project, or polishing up an old one to bring to the show.

For the December meeting lets try the topic of TINY. Lets talk about small machines, small tools, techniques for doing tiny things. Maybe some projects that fit into your pocket? Machines like the Unimat or Sherline. Any watchmakers in our group?

-- Ron Ginger

Calendar of Events

Thursday November 7, 1996 -- NEMES MEETING at the Charles River Museum of Industry

Thursday January 5, 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 -- First Annual New England Model Engineering Show at the Charles River Museum of Industry

The Meeting, October 3, 1996

The meeting started out with some words from Ron Ginger. The Steam Expo is coming up on the 5th and 6th of October at the Museum. This show is a STEAM show, the only exclusively steam show in New England. NEMES is going to be organizing a Model Engineering Show at the Museum in February. We still haven't decided if it will be a competitive show or a non competitive show. It will be open to the public and will also be the first chance for everyone to bring something in to show at the first time. We need to get started on the show.

Lot's of people don't want to compete with the experts, so the general trend seems to be not to have judging at the show. NEMES has been running along for over half a year now and seems to be going strong, but we need to get organized a little more formally. A charter statement is needed, and so are a Program Committee and a Show Committee. We need to organize if NEMES is going to endure, but we don't want to get too formal and spoil the flavor of the group with too many rules and such.

Ron introduced Karen LeBlanc, Director of the Charles River Museum of Industry, at this point to tell us more about the Steam Expo. People will be here starting at 5 AM on Saturday to get things going. This is the Third Annual Steam Expo and there should be a good time for all. 21 Steam Boats will be in the Charles River above the Dam, coming from as far away as Maryland to take part. There will be 4 Stanleys and a Grout Steam Car, a 12 Ton Stream Roller, and an 1890 Steam Pumper. The Steam Table will also have compressed air for the modelers who don't want to put steam through there models. 17000 flyers have gone out, and there are 1300 parking spaces within walking distance. The Museum will be providing Breakfast and lunch for the exhibitors. This is the only all Steam Show in New England and the Museum wants to keep it that way to preserve the unique nature of the event.

After Karen had finished talking about the upcoming Steam Expo Ron took the floor again and the talk turned to field trips. Starret had been mentioned previously as a possible destination and Ron asked who might be able to set it up. Kay Fisher says that he lives right near Starrett and that if you go any work day and ask for a tour, they will assign an apprentice to take you around and show you whatever you want to see. If over 3 or 4 people are going to be going they like you to call ahead so that they can be sure that they will have people available to take you on the tour. In general, if there is some event you'd like to see NEMES put on, set it up and organize it. You'll get something started and have a good time to boot.

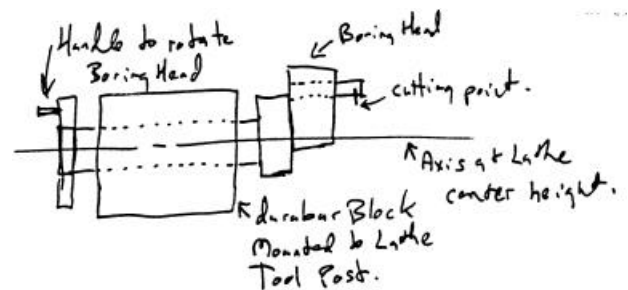
Ed Rogers was first on the signup sheet to talk this time. Last meeting there were some pretty nice things that people had brought in that got lost in the flood of projects. The signup sheet will hopefully keep anyone from bringing something in and not getting a chance to show it. When Ed got up with an old fifty-caliber ammo can I didn't figure he had much to show. Then he popped it open and pulled out a 1/4 scale model he's working on, scaled directly from the 1940 Ford Flathead V-8 sitting conveniently on his workbench for whenever he needs to double check a dimension. The block is carved out of a solid chunk of aluminum, and the crank is machined from the round.

It's going to look scale on the outside, but he's made a few changes inside to simplify things. The oil pump will run off the end of the cam, with a universal joint to take care of the play and prevent the excessive wear he figures he'd get if he attached it directly. The crank is oil drilled and it'll have a forced feed oil system. The cam he made from 1/2 inch stock. He cut each lobe individually, mounting the blank in a fixture that let him clamp it off center so that he could turn the cam profile as a series of circle segments. When all the lobes were finished he cut the bearings down to the proper diameter. The block has carved out water passages, with screwed in steel cylinder

sleeves. The crank is balanced, with bearing inserts on the main bearings but not on the rod bearings. Ed says he figures that he doesn't really need rod bearings after seeing the way the model airplane engines hold up so well without them. There are two rings per cylinder, with the grooves cut while the piston was held in a fixture he made that holds the piston by a bolt connecting rod. The rings were heat treated in a small sealed crucible with some paper to eat the oxygen sealed in with the rings to keep them from oxidizing. Ed has done all the work on his 1924 South Bend lathe and a horizontal milling machine. He's planning on water cooled heads, and a wet sump oil system. It'll run on gasoline with spark ignition when it's done. It's a really nice project, and Ron told Ed to be sure to bring it back for progress reports

Errol Groff brought in the fixture he mentioned when he talked about threads last time. It's a block of steel with a groove in the middle to hold a tool bit. One end is machined so that the bit is held at a thirty degree angle from horizontal when the block is held flat on the surface grinder, and the other is set so you can grind a tool for cutting an acme thread. Clamping the bit in the groove lets you hold it so by grinding one side then the other you come out with a perfectly formed angle on the bit for cutting the desired thread.

Larry Twaits brought in his One Night Ball Turning Fixture, inspired by George Thomas's "Model Engineer's Workshop Manual." He recommends TEE Publishing and a credit card as a good source for the book. The fixture is made from a boring head and durabar cast iron and mounts on the tool post. Bore out the durabar to be a good fit on the arbor of the boring head, put it on the lathe so the axis of the boring head is at center height (this is what's critical to getting the ball to come out round,) and turn the handle to cut the round ball. He decided to make a ball turning fixture because he's working on a Quorn and wanted to be able make the ball handles he needs for it. Now he's got lots of ball handles. The tool bit that he uses is 'loctited' into a piece of 1/2" drill rod at an angle to so that the fixture can swing around far enough to get into the angle where the ball is attached to the stock in the chuck without interference.



For clamping the balls for drilling holes in them or whatever else you might want to do, take 1" squares of 1/4" aluminum with holes drilled in them. Put one on each side of the ball and clamp the sandwich in the vise. For making balls Larry suggests starting with just enough stock sticking out of the chuck to form the ball and to allow the fixture to rotate far enough to cut it. Move the stock out of the chuck as needed.

You can make a double ball handle in one piece, but it is tedious. Larry recommends making them in two parts. A ball with an arm on it, then a second ball with a hole in it to fit the end of the arm. Use Loctite adhesive to glue the two parts together. This method is not the best one to use for precision balls, but if you want something along the lines of a ball handle it works well.

Don Strang brought up the article on the Tiawanese lathe in the recent Home Shop Machinist and expressed amazement that the author would end by saying that he would consider buying a similar machine in the future when the headstock has no means of assuring the alignment of the spindle with the bed. "Fool me once, shame on you, fool me twice, shame on me."

After the break, we came back to get going with our first "Theme" meeting, with the theme being drill grinding. Don Strang had a host of different drill grinders on the table when he started talking about them, ranging from a piece of plastic trash that was so bad the company gave a refund and didn't want it shipped back, to the TRD/SRD grinder of Ron's. It goes for about \$1000 new, but Ron got it second hand for only \$300.

The wishbone unit is for sharpening drills #30 and smaller by hand on an oilstone. It has two wheels on it that are 120 degrees apart, and a place to clamp the drill between them so that it can be used to hold the drill at the correct angle as you stone it. It's similar to the unit in one of Guy Lautard's books but is more complicated.

The "Champ" is nice, but it costs about \$2000. Darex makes a nice unit in the \$500 range.

The Quorn does a great job grinding four facet drills. It's a very British design by Prof. Chaddock that you can spend forever on. It's a lot more than you need to grind four facet drills, but if you have one it does a good job. Don has built one, and had a bunch of drills that he had done on it showing various grinds to pass around. Drills from the orient are often not well done, and need grinding when new in order to cut evenly. 118 degrees will give a more or less even lip, and Don grinds his drills to a 120 degree point. When grinding a drill don't put it in a jaw chuck as it's hard to get a proper grip with one over the flutes.

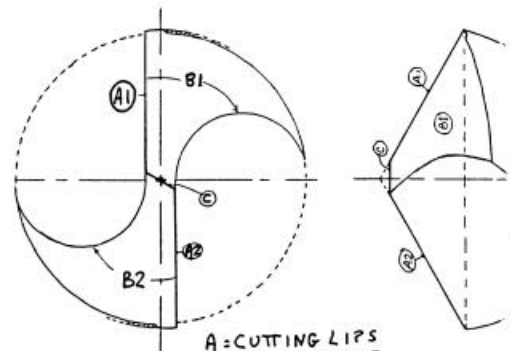
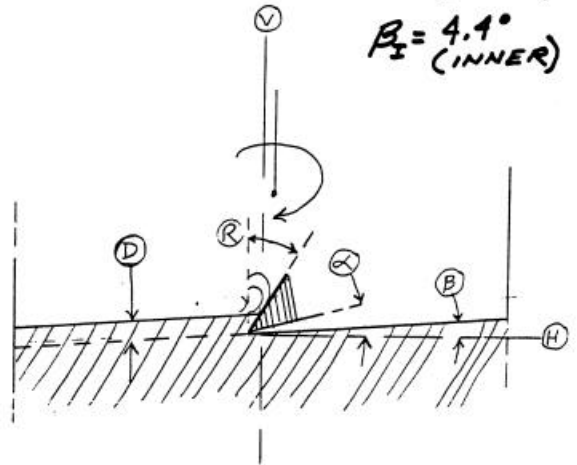
How much clearance do you need in a twist drill, and why? You need clearance so that the drill will clear the bottom of the hole it is cutting as it cuts deeper and moves down. A 1/2" drill cutting .015" per revolution will need 4.4 degrees of clearance near the center, and less as you move out towards the outer lip. 10 to 12 degrees of clearance is typical on drills. The primary clearance is at the cutting edge, more is required at the back of the drill so that it will clear the hole also.

When you have things right, the Arris should come out at 130 degrees from the lip. The two lips are not on the center line, but are offset by D/13 to get things right. The apex needs to be D/3 down from the axis and the drill should be turned 13 degrees from the wheel. Swinging at the 13 degree angle cuts more clearance at the center, less at the edge. The Darex has a cam at the back that rotates it from the back to control things. There are all sorts of variations to get the clearance right.

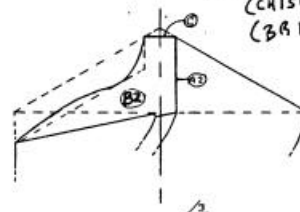
PROFILE VU
X SECTION OF CUTTING LIP
PATH FOR 1 REV
— UNROLLED —

R = RAKE \angle
 α = CLEARANCE \angle
 β = CUT \angle
D = DEPTH OF CUT

EXAMPLE
1/2" DRILL
D = .015
 $\beta_o = 0.55^\circ$ (OUTER)
 $\beta_i = 4.4^\circ$ (INNER)



A = CUTTING LIPS
B = CLEARANCE
C = ARRIS
(CHISEL TIP)
(BRIDGE)



The amount of force it takes to push a drill into the hole varies with the advance per revolution and the design of the point. The straight arris point requires the most thrust. Next comes the spiral arris, followed by the four facet drill. The modified split point, introduced by Rene Peugeot yeilds a four facet arris so it acts like a pointed chisel. In all of the designs the arris is the point of contention between the drill and the hole, it has to crush its way in before the cutting lips have anything to cut into.

At this point Ron showed his machine. So far all of the sharpeners have held the drill in a collet and positioned the drill so it could be swept across the wheel with a complicated swinging and turning motion. Ron's is different. The drill is held in a pair of fingered V Blocks that slide and clamp together to hold the drill on a specific axis above the machines slide. The point of the drill slides past the inside of a circular cup wheel and comes out symmetrically ground if the clamping block is square.

The wheels need to be properly dressed, although I think Ron said that they were self dressing. I do know that he got 6 extra wheels for about \$80 to go with it because he was concerned that he would have trouble with the wheels not lasting and still has all 6 and is using the original wheel that came with the machine. Before Ron got it he had just about given up on trying to grind drills. He's happy with it and is glad he got it second hand for \$300, although he didn't want it bad enough to pay \$1000 for a new one and held out for the bargain.



After an hour or so of all sorts of neat stuff on grinding drills and discussion of machines that can run to over \$2000 Henry Szostek put a slightly different perspective on things. He makes his living cutting metal, and says there's no way he can possibly justify sharpening a drill when it's so much cheaper to just buy a new one.

Tools and Techniques by Ed Kingsley

The Tool Shop will remain open for us, again, until 6:15 or whenever we stop buying stuff. If you haven't stopped in yet, drop by. Finding that unexpected little gizmo always makes *my* evening.

Last month I mentioned that at each of my stationary power tools I have: a stool, a rubber mat, a mechanical pencil (with a large eraser), safety glasses, a roll of paper towels and toilet paper and a tape measure. I forgot to mention the drill/tap/decimal-fraction conversion chart, a small rolled steel 'soldering' brush and a toothbrush. Sounds a bit like a very strange bathroom, when I read that all back, but what we make is chips - read MESS - and keeping up with it, easily, is part of the process, n'est ce pas?

CUTTING LUBRICANTS FOR ALUMINUM

There has been an interesting thread on rec.crafts.metalworking, the Internet newsgroup for machinists, about the use of citric acid solvents as a lubricant for machining aluminum. Allegedly, it's non-

toxic and slipperier than owl pellets. I don't know how good it is from experience, but I can personally recommend "LTD Edge Lube" as an excellent lubricant for aluminum. I was trying to counterbore a hole in an aluminum plate with a slightly dull (is that like slightly pregnant?) tool and, at my lowest speed, could not stop the chatter. I was using AlumTap, which has always worked for me before. I don't know why I

tried the Edge Lube, I hadn't used it before, but I glopped some on the cutter and the chatter stopped and the finish of the hole was remarkable. It is a waxy stick about 1 1/2" in diameter and 8" long. Costs about \$7. It's also the only lube I know of that you can use on the bandsaw. Works quite well there, too.

THE PRECISION MUSEUM - Windsor, Vermont

I stopped by the museum while visiting friends in Cornish, NH, over the Columbus Day weekend. I arrived an hour and 10 minutes before closing, so my visit was short and hectic, and I probably missed as much as I saw.

The museum is housed in a building, constructed in 1846, part of a complex of buildings housing the Robbins, Kendall & Lawrence Armory which, at that time, was the most modern manufacturing facility that had ever been built anywhere in the world. They made the first truly mass produced rifles as well as the machinery to manufacture them. That is, however, another story which deserves a separate article.

The building now houses the National Machine Tool Collection; "The leading historical record of America's manufacturing past and its influence on the world", as the brochures tell us. What that is, actually, is a big room full of really old machines. All of the tools are originals, except for several scale model dioramas of machine shops and steam power plants that'll knock your socks off. They too, are an article unto themselves.

As you enter the main hall, the first exhibit is a foot powered lathe, circa 1825, and displayed on the wall above it is a Hypertherm Plasma Cutting Nozzle. An interesting contrast. This and a vintage 1938 Bridgeport Miller are the only contemporary machines in the exhibit. One item that caught my eye was a lathe, made in 1825, with a granite bed. Said bed was about 18' long, 6" wide and 13" deep. The fairly thin iron ways lay on top of and were fastened into the stone. The lathe was used to make machinery for the Crown and Eagle Mills of North Uxbridge MA.

There were several large Planers on display. One I rather liked was a Lamson & Co Planer (no date given) which had iron vertical side bracing (of the overhead carriage) cast to resemble a three piece-three panel, gothic cathedral window.

A small and wonderfully clever horizontal mill was identified as being built around 1825 and fashioned faithfully after the design of the original (presumably first) milling machine, built circa 1818, in Middletown, CN, by one Simeon North. It needs to be noted that the origin, date and designer of the first actual true 'milling' machine is uncertain, but is attributed to Mr. North, in 1818. I have a drawing of this mill which I will give to our editor for inclusion in next month's newsletter.

Since modern machining, and therefore modern machinery, developed in the arms industry (is there something familiar here?), there are many examples of machines dedicated to specific arms building tasks. One of the most fascinating is an 1818 Blanchard Rifle Stock Lathe. It is a pattern copying device which employs a 'follower wheel' pressing against a rotating rifle stock pattern. Linkage connects the follower wheel to a rotating cutter, similar to a cutter on a horizontal mill, which shapes the wooden 'blank' that rotates adjacent to the pattern. An entire stock could be shaped in under 3 minutes on this machine!

About 10% of the museum was devoted to an exhibition of the work of local artist, Maxfield Parrish. During the '20's, Parrish was the most recognized and reproduced working artist of the time, and his work is held in high esteem today. Parrish was also an Architect and a machinist and is quoted as saying that, "I only paint to support my machining". Several of his original paintings are on display as is an architectural model of a typical 'main house-middle house-outhouse-barn' complex, indigeneous to rural New England. This model (viewed from different angles) served as the inspiration for a number of his paintings. Leaving, I noticed a model motorcycle, about 9" long, that he had designed and built. It had a wind-up, spring powered motor, chain drive and a gyroscope cradled in the handlebars, to keep it upright while it ran. Amazing!

Adjacent to the entrance is the "Machinist's Hall of Fame", with portraits and biographies of about 4 dozen of our crafts super heros, including many whose 'work' is on display. Upstairs is a library and an exhibit of several rifles produced by the original armory. I should also mention that a number of the machines have been motorized and are able to be run remotely.

I only wish I had had a day or more to spend there, but I will definitely visit again next year. Open - Memorial Day to November 1st. Admission is \$5. Call ahead and get the 'grand tour'. Highly recommended. (802) 674-5781 or check out: http://ourworld.compuserve.com/homepages/Precision_Museum

The longest covered bridge in the US and the home and museum of the famous sculpter, Saint-Gaudens, are just minutes away. Makes a great foliage trip.

THE DRILL DOCTOR- Darex Corporation, the leading industrial manufacturer of drill sharpening devices, has recently brought out a model designed for the home shop. Curt Anderson, spokesman for the Darex Corporation, has been kind enough to lend us one, which I will bring and demonstrate at the November meeting. The 'Drill Doctor' uses a diamond wheel and sharpens 'regular' 118 or 135 degree, HSS and Cobalt drills as well as Carbide Masonry drills. It also splits points. Capacity is 3/32" to 3/4". Bring a drill and try it out at the break. Because of our time constraints, HSS drills only please, 1/8" to 3/8".

Resources

We've talked about setting up a pool of specialized equipment that members of the NEMES could call upon to do those occasional job where you need a specialized tool so that we could spend more time on our projects directly and less on making the tools to make the tools, etc. Well, Howard Evers has stepped forward and is the first member to volunteer equipment for the pool.

Clip and Keep the Following for Reference:

Howard Evers has teh following for loan to any member who may need them for restoring equipment or other worthy projects.

TAPS:
 1/2-10 ACME LH
 3/4-8 ACME LH
 3/4-10 ACME
 1 1/4-4 ACME LH
 1-4 ACME
 1 1/2-6 V
 1-14 V
 1 1/4-7 V

REAMERS:
 Brown & Sharp #9 and #11
 Jarno #7
 Morse #3 w/#3 shank
 (ROUGHER)

Letters

High their:

Some meetings ago interest was expressed in setting up a "co-op" for the joint (bulk) purchases of materials for the benefit of members. For this to come about we need to do more than talk about it; some organization is required. Perhaps this can take the form of a sub-committee.

First of all, we have to agree on a procedure to decide on the material to be purchased.

- o sign-up list?
- o debate?
- o ???

Then the sub-committee needs to implement the purchase & distribution:

- o to find a supplier and to determine the cost/subscriber
- o to inform the membership about the details (sizes, cost &c.)
- o to round up subscribers and collect the payment in advance
- o to buy the stuff
- o to divide it up (cut up a free-machining bar, for example)
- o to distribute the material to the subscribers.

Can we take this a step further? I am willing to serve on such a sub-committee, if that is the route we take.

Max ben-Aaron

An interesting discovery:

At some point we all need a morse taper shank for a fixture or tool, and quickly find that they need to be turned to difficult to achieve tolerances if they are to work well. Then we find that blank taper shanks are very hard to find, and when we find them they are shockingly expensive. Finally we discover that imported morse taper arbors for jacobs taper drill chucks are priced right and make great live (soft) centers, runners (female centers), etc.

In the past I have bought large JT #6 shanks to have enough material to cut size. But recently I discovered that JT #6 and #33 are not the largest sizes, JT #5 is HUGE, about 1 3/8" in diameter and more than two inches long. A look through an Enco catalog will show that the JT #5 arbor is only \$2.50 for MT #1, and \$6.00 for MT #2 and that they are easily machined. At this price they are inexpensive enough to use freely as arbors for wheels, expanders for laps (make a mating hole in the soft lap material with an easy to find morse taper reamer), etc. I use them enough that I have made adapters for my mill and lathe (making a good brown and sharp to MT #1 adapter is another story) to use lower cost MT #1 shanks.

Larry Twaits

Classifieds

For Sale: Little Engines 1/2" Scale Engine. 4-6-4 Hudson 70% Complete. Finished Coal Fired Boiler. Fully Sprung Chassis Assembly. Tender Frame & Truck Side Frames. All Castings to Complete. Finished Smokebox & Stack, Rivet Detail & Handrail Posts. VanBrocklin Water Gage, Check Valves & Blowdown. Cyl. Liners and Rings. Precision Scale Detail Parts Pump, Generator, Headlamp, etc. Reeves Steam Gage, Grates, Valves, etc. Riding Car & Many Other Parts. \$450 firm. Bill Vелlette, 1 Smith St. A210, Chelmsford, Mass 01824-1707, Tel (508) 256-4274

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