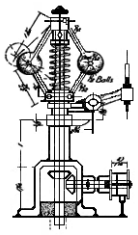

The NEMES Gazette

NEW ENGLAND MODEL ENGINEERING SOCIETY INC.

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President's Corner

Dick Boucher

The Meeting

Our speaker this month will be our own David Ozier. Dave will be talking about his Geothermal heating and cooling system he has had installed in his home.

Miscellaneous Ramblings

I was reading over the December Ramblings and I looked out my shop window as I was typing and realized that even with all the leaf raking I was doing in that period, there are still leaves out there that will have to be picked up in the spring. Fortunately, the latest weather forecast is for more snow so hopefully by this time tomorrow they will all be covered again.

December was again another month of not much rambling. I started the month with a serious reaction to a medication. I had a hernia repaired the day after Christmas and then two days later, I came down with the current round of the flu/cold that has been plaguing everyone. Then just as I was getting better, I was called into my substitute teaching job and have been two weeks straight at that. I guess I am getting old because a day of teaching leaves me with no energy for the evening, just hit the couch at 8PM and nod off sitting up.

The group of fellows and I who have been getting together on Monday evenings celebrated our fifth year at the locomotive building project. We all went out last Monday evening to celebrate with a cordial dinner at a local restaurant. After we ate, we headed back to the shop and got in some time working on the boiler fabrication part of the project.

I know you are all anxious to get the tables set up at our show this month and to secure your favorite spots but I have to ask you PLEASE handle the tables gently so as not to put any

Next Meeting

Thursday, February 7, 2013

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 David Baker) Annual dues are for the calendar year and are due by December 31st of the prior year (or with application).

Missing a Gazette? Send a US mail or email to our publisher. Contact addresses are in the left column.

Issue	Contributions Due
MAR	FEB 21. 2013
APR	MAR 21, 2013
MAY	APR 18, 2013

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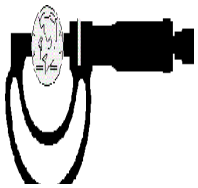
marks in the new floor of the Jackson Room. The configuration of the room has changed, so the tables must be set up in a bit of a different order but I am sure we can figure that out and still have plenty of time to get ready before the museum opens. Norm Jones and Bill Bracket made air manifolds for the show and this also will require gentle handling and a bit more time to set up this first time.

So with that said, I hope to see you all at the 17th Annual N.E.M.E.S. Model Engineering Show. Don't forget to talk it up among your friends.

One last item this month: Norm and I have started the leg work on running a bus trip to Cabin Fever in April. We have decided to use the Motel 6 again, if it is available, because of the close proximity of the "Around the Clock" dinner. This enables the group to leisurely have breakfast before we head to the arena and keeps us from having to wait in yet another line. We don't have the cost yet but it should be close to the cost of the last couple of trips. Norm and I and especially Norm would appreciate an early commitment so we can contract the bus and so Norm won't have to make so many calls to those who show an interest and can't seem to fully make up their minds until the last minute.



Tool Corner

Frank Dorion

This edition of the Tool Corner will offer a few shop tips in the hope that you may find some or all of them useful in your own shop.

The first tip was suggested by Jim Paquette and is related to an article published by Lloyd Bender in the April/May 2007 issue of Machinist's Workshop. That article reported on a test of several different commercial penetrating oils and one home-brewed formula, comparing their relative effectiveness and cost per ounce. Among the commercial penetrating oils, Kano Kroil proved to be the best performer, but a close second was Liquid Wrench at about 1/4 the price of Kroil. However the real eye-opener was the home brewed penetrating oil, a 50/50 mix of automatic transmission fluid (ATF) and acetone. That ATF/acetone mix helped the test specimen to release with only half the pressure required by the Kroil sample and it was the cheapest by far at about ten cents an ounce. However, Jim has provided an important qualifier to these test results. He points out that the ATF/acetone mix, while highly effective, is also highly flammable, much more so than the commercial penetrating oils. Like many of us, Jim often heats up a stubborn nut, then applies penetrating oil and lets it be drawn into the threads as the nut cools. Using the home-brewed ATF/acetone mix in this manner or otherwise exposing it to a flame or heat source could result in more excitement than you care to have at that particular moment. So, by all means give the home-brewed formula a try, but don't forget it's a very volatile mix and treat it accordingly. Another tip regarding use of the ATF/acetone formula was spotted on the net: don't try to mix up a batch in a Styrofoam cup. Guess why!

Jim also shared a nifty shortcut he came up with for making a custom index plate for a dividing head. Here's the story in his own words:

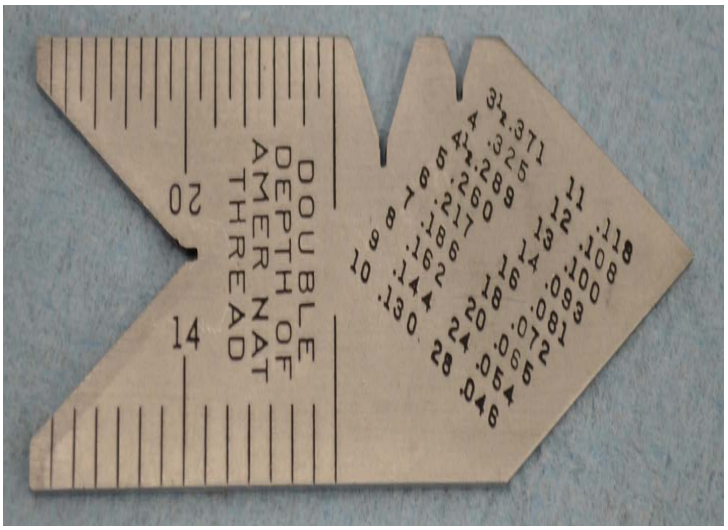
"I priced a couple of dials for a South Bend lathe and nearly choked at the price. Grizzly wants $235.00 each for the dials on the compound. So, I decided to make them. They have 250 graduations so none of the standard plates for a dividing head will work. To do 250 divisions with a 40:1 reduction requires a 25 hole plate.

I was going to set up the dividing head to make the plate when a much simpler method came to mind. Fortunately I had some 5-1/4" discs with a 1-1/16" center hole. I ground one to make sure it was flat [the plate was a bit warped]. I set the blank plate with the undersized center hole up on the Bridgeport. Next I finish bored the center hole with a boring head. Finally, I set my DRO to do a 25 position bolt circle and drilled the holes. Total time including grinding the plate flat, boring the center hole, drilling the 25 indexing holes and drilling the 3 mounting holes was about 2 hours.

Turned out to be a really simple job. I probably spent more time thinking about it than the 2 hours that it took to do it."

And here's one more from Jim. You may recall that last time we discussed the various features of the humble center gage, including the table of Double Depth of American National Threads that appears commonly on these gages. After reading that edition of Tool Corner, Jim had this to say:

"I dug around in my tool box (went fishing) and found 4 fish (center gauges). Surprisingly none of them had the depth chart on them, so I made a chart using the info in your article. Interestingly, if you have the compound set at 29-1/2 degrees for thread cutting, you can calculate the depth of feed on the compound by multiplying the number from your chart by 1.154. I am currently cutting a bunch of 12 pitch threads so the depth of feed is 0.125" on a direct reading dial or 0.0625" on an indirect dial (0.108 X 1.154 = 0.125")." [As you can see in the photo, 0.108 is the number shown on the center gage's table for a 12 pitch thread.]



Thanks, Jim, for these helpful suggestions.

I'll finish up with a tip I've found very useful that doesn't seem to be common knowledge. The faces on a micrometer need to be perfectly clean for the micrometer to be accurate. Unfortunately there are many ways that these critical surfaces can become contaminated in a shop environment. Oil, grease, chips, dust, general shop crud – all of this stuff can wind up on your micrometer faces at one time or

another. Giving them a swipe with the nearest shop rag is not likely to clean these precision surfaces thoroughly. Think about how little it takes to make a “tenths” reading micrometer inaccurate and how many times you’ve checked a mike to find it’s a few tenths short of the zero mark. I don’t remember where I heard about this technique, but one reliable method for getting your micrometer faces clean of most common contaminants is to use a clean dry piece of paper. Close the micrometer down on the paper lightly until there is resistance when you pull on the paper, but not so much that it won’t slide out from between the faces. Pull the paper slowly out from between the two faces and watch what comes out with it. Repeat two or three time if the faces are very dirty. Paper like newsprint is not very good for this technique – its poor quality makes it tear easily. Common writing or printer paper should work fine; even a dollar bill works well in a pinch. I’ve been using this method for quite a few years and it seldom fails to do the job.

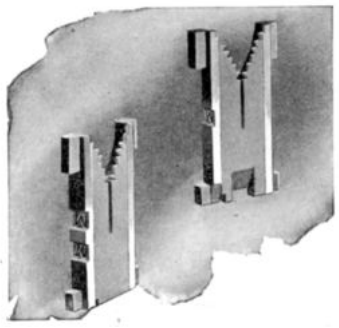
Shop Talk

Max ben-Aaron

The Linotype machine is sometimes called a typesetting machine, but this is not correct: it does not set type. It is, strictly speaking, a composing machine — a substitute for typesetting. It does do composition but its products are solid slugs in the form of lines of type with the printing face cast on the edge. Rather than producing single type characters, the Linotype machine casts metal bars, or slugs, of any length desired up to 36 ems, each complete in one piece and having on the upper edge, properly justified, the characters to print a line. These slugs are automatically assembled in proper order as they are delivered from the machine, when they are immediately available either to be printed from directly, or for making electrotype or stereotype plates. They answer the same purpose and are used in the same manner as composed type matter.

In reality, a Linotype machine is four machines, arranged to work harmoniously together: A magazine of matrices, the assembling mechanism, the casting mechanism, and the distributing mechanism.

The magazine at the top of the machine, sloping to the front, carries the matrices in channels. The matrices, made of brass, slide down these channels on edge, with the face or punched edge down, and the V-end extending toward the upper part of the magazine. Each of these channels will hold twenty matrices. The brass are matrices shaped like this, with the teeth in the V at the top being coded with the identity of the matrix , for redistribution:



In the edge of each matrix either one or two letters are engraved in intaglio. The thickness of an individual matrix depends on the width of the character. The two-letter matrix bears two characters, one above the other, one of which may be, say a Roman face and the other an italic, small capital, or black face. A slide on the assembler operated by a small lever, selects either the character on the upper portion on the matrix, or the character in the lower position.

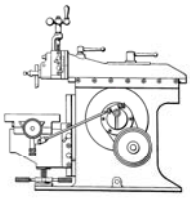
Matrices are constantly circulated in the Linotype. From the magazine they are carried to the assembler, passed to the molding mechanism, where the line is cast, and then raised to the top of the machine distributed back into their proper channels in the magazine.

The assembling mechanism has a keyboard with 90 keys, which act directly on the matrices in the magazine where the matrices are arrayed in their respective grooves. When a character is selected, the first matrix in the appropriate groove in the magazine drops down onto a conveyor belt and is carried in its proper order to an assembler, which plays the part of a printer's stick. The correct spacing or justification of the line of matrices is accompanied by means of spacebands, which are assembled automatically between the words in the line by the touch of a lever at the left of the keyboard. When the assembled set of selected matrices and its spacebands constitute an entire line, the operator, presses a lever on the side of the keyboard to raise the assembler. When the assembler reaches its highest point it automatically starts the machine and the line of matrices is moved to the casting position.

The casting mechanism consists of the metal pot, the mold disk, mold, ejector, and trimming knives. When the line of matrices leaves the assembler it passes to the casting position front of the mold disk. It then advances until it reaches its casting position, when the pump plunger descends into the molten metal and forces the metal into the mold and against the matrices. Then the slug is trimmed so that when it drops in the galley it is a perfect line of type, ready for to be assembled in the galley.

The distributing mechanism shunts the matrices to their appropriate slots in the magazine for reuse. The returning matrices are pushed into a distributor box, where they meet the "matrix lift" and are lifted, one at a time, to distributor screws and distributor bar proper The teeth in the matrix and the grooves in the bar are so arranged that when a matrix arrives at a point directly over the channel in which it belongs, it "lets go" and drops into its channel.

If there is a matrix in the line which is not designed to drop into one of the channels operated by the keyboard, it will be carried clear across the distributor bar and dropped into the last channel. From there it will find its way to the sorts box.



Metal Shapers

Kay Fisher

R. G. Sparber's Gingery Shaper - Part 33

Machining and Assembling the Down Feed (part 3)

Truing Up Soft JawsPhoto by R. G. Sparber

I am now preparing to machine the casting again and this time I want maximum accuracy. My soft jaws are set to approximately the spacing that will exist when the casting is clamped. With the vise tight, I machine a fresh surface on the step of the fixed and movable soft jaws. This guarantees that my soft jaws are perfectly true at this spacing.

Mill Setup 4 (Almost) Photo by R. G. Sparber

The casting is now securely held by my soft jaws on Reference 2 and 2 prime. Reference 1 is parallel to the mill table.

Mill Setup 4 Photo by R. G. Sparber

A jack is snugly placed under the end of the casting and a hold down clamp added. You can barely see the slide pads that have just been cut with an end mill. This is zero reference for my Z axis. I then raised the cutter 0.240" and cut the clamp support blocks. That leaves 0.010" for shims so I can accurately adjust the distance from the underside of the clamps and the top side of the slider.

After Milling Photo by R. G. Sparber

The end mill was then set to be 0.02" below the wear pads and the remainder of the surface cut.

Drilling 1st Clamp Photo by R. G. Sparber

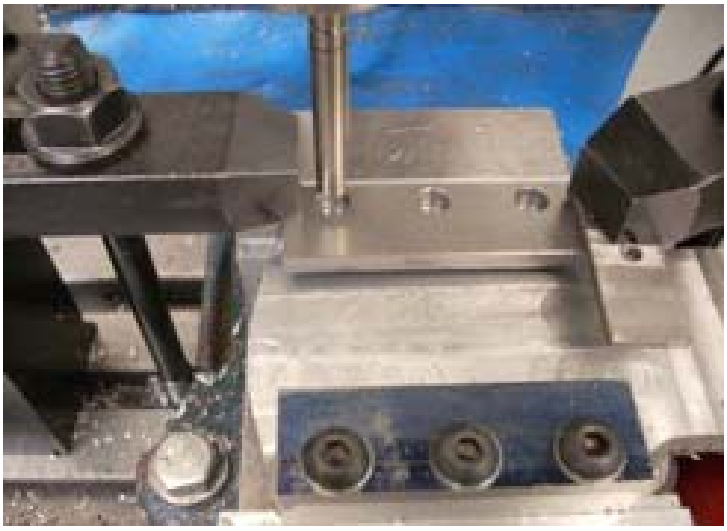
Without moving the casting, the first clamp is placed down and secured with a pair of hold down clamps. A 1-2-3 block was used to insure that the edge of the clamp is on the same plane as Reference 2. Since the clamp was machined so the edges are parallel, this alignment insures that the edge facing away from us is also parallel to Reference 2. Later I will transfer this alignment to the second clamp.

I chose to drill all the way through to make tapping easier and reduce the risk of the tap bottoming and breaking off.

Since all is secure, I was able to pilot drill and tap all 3 holes before adding screws. In general I would not do this if there was any chance of things slipping.

This is a match drill operation so the DRO is not used. The goal is to get each tapped hole perfectly centered in the clearance hole, not to perfectly locate each hole relative to the casting. I could have drilled the clearance holes after clamping the steel but didn't think of it until later. That would have guaranteed that each set of holes is aligned.

I used a spiral point tap held in the drill chuck. The mill was brought up to speed and then power cut. When the spindle's RPM seemed about right, I drove the tap into the hole. In all cases it went in more than half way but not all the way through. That is better than having it go all the way through and then either rip out the cut thread or yank the casting out of the vise. The remainder was cut by hand. Since I'm using a spiral point tap, there is no need to reverse and break the chip. I just gently turn the tap while flooding with WD-40.



Drilling 2nd Clamp Photo by R. G. Sparber

The back clamp was positioned by using a close fitting rod. At this point I had finished drilling the front left hole and moved the Y axis to the back clamp. This insures that the clamp bolts line up. It is not critical but would look sloppy if they were off by a lot.

Securing 2nd Clamp Photo by R. G. Sparber

After drilling and tapping the first hole, I added a screw. Then packing was added to insure that this back clamp is parallel to the front clamp. Again, it is not that critical but would look sloppy.

The remaining 2 holes are drilled, tapped, and secured with screws, one at a time. All top machining is now complete and the casting can be safely removed from the soft jaws.

Stay Tuned for part 34 from R. G. Sparber next month.

Keep sending me email with questions and interesting shaper stories.

My email address is:

KayPatFisher@gmail.com

Circuit Corner

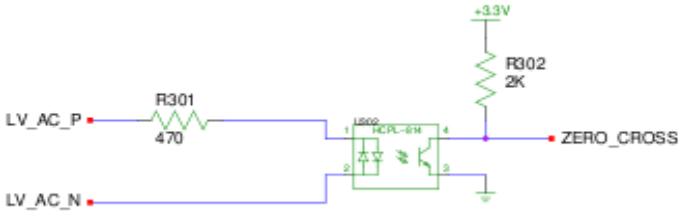
George Gallant

A simple but essential component of my EDM electronics is the zero cross detectcircuit. For the finished design I want to regulate the voltage that is supplied to the electrode. When probing to detect the work piece I would like a low voltage (5VDC), when burning the max available (70VDC), and none when (0VDC). The scheme that will be used is to proportionally turn the AC power ON/OFF during every 60Hz cycle. This is similar to a light dimming circuit.

To synchronize this switching behavior I need to known when the input AC voltage crosses from high to low or lo to high. Conventionally this is referred to as the “Zero Cross” point. For my circuit I use an AC Input Phototransistor Optocoupler . The input voltage is applied across a LED and the light is channeled onto the gate of a photo reactive transistor. When there is current flowing thru the LED(s) the transistor will be ON and during the time when there is no applied voltage the transistor will be OFF.

Commercial opto-isolated IC’s have been produced for over 40 years now and are readily available to the home electronics builder. The particular IC I selected is the HPCL-814. Internally it contains 2 LEDs that are inverted relative to each other. This activates the transistor on both the positive and negative cycles. If you need to distinguish the positive from the negative you could use 2 single LED devices with appropriate connections. You could also use a single package and get a rectangular signal but this would necessitate the use of and external diode.

The following schematic represents the circuit:



LV_AC_P & LV_AC_N are inputs from the 12VAC transformer. Don’t infer anything from the P & N signal names. Two external resistors are required. R301 to limit the current flowing thru the LEDs and R302 to provide a positive voltage when the transistor is OFF.

The value of R302 is affects the frequency response for the device and we must limit the current thru the transistor to less than 50ma. 2K seems like a convenient choice.

R301 is a little more complicated. You need to read the spec sheet and calculate a good value for your implementation. The lower the value of R301, the narrower the pulse width of the zero cross signal and the closer to the true crossing. But, the smaller the value the higher the current flowing thru the LEDs. Again we must limit the current to 50ma. The 12VAC transformer supplying the input power is measuring 19.9VDC peak to peak so a 500 ohm resistor would limit the current to 40ma.

The zero cross signal will be fed to an interrupt pin of the controlling CPU. Once there it will activate a timer to generate an output pulse to drive a Triac. As such it is important that every zero cross behaves the same, not that they are exactly at the zero voltage point.

Notes:

1. For this implementation I am using the low voltage transformer leads. If there is a phase difference from the 120VAC it will be compensated for in software.
2. To be more exact, you should account for the voltage drop across the photo diodes.
3. These devices have a reputation of not aging gracefully. It is best to allow for a large margin of variation.

There are a few side effects to using to using opto isolaters. As there name implies, they “isolate” one side of the system from the other. In our case, the high voltage AC is isolated from the low voltage DC control. This can be beneficial as 120VAC usually lets the smoke out of most 3.3V CPU’s.

It can also be very detrimental to the health of the person debugging the circuit as there WILL be high voltages in close proximity to the low voltage circuits. Any careless movement can result in a severe reminder of just how dangerous 120AC can be.

wikipedia.org has an excellent write-up about the history and technology relevant to opto-isolators.

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 or 508-393-6290.

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

Feb 16th 10:00-4:00
17th Annual NEMES Model Engineering Show
Charles River Museum of Industry 781-893-5410
Waltham, MA

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

March 23-24th Midcoast Model Festival
Owls Head Transportation Museum Owls ME
http://www.ohtm.org/

MEMBERSHIP FORM

For 2013 Calendar Year

Name _____

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City _____State_____ZIP_____

Phone (_____)_____ New [ ]

(_____)_____ Renewal [ ]

EMAIL _____

Please enclose form in an envelope along with $25 cash or check made payable to NEMES. Dues can be brought to the next meeting or mailed to our treasurer:

David Baker
288 Middle St.
West Newbury, MA 01985

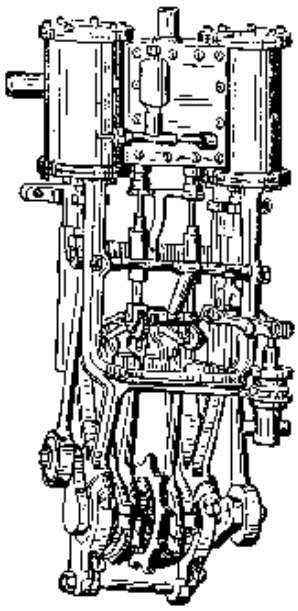
17TH ANNUAL N.E.M.E.S.

MODEL ENGINEERING SHOW

FEBRUARY 16, 2013

10:00 AM TO 4:00 PM

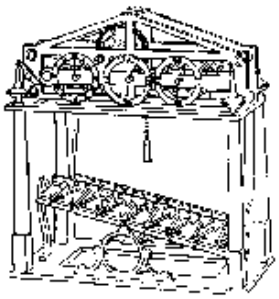
CHARLES RIVER MUSEUM OF INDUSTRY
WALTHAM, MA

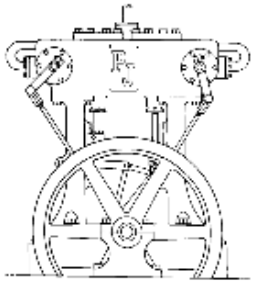


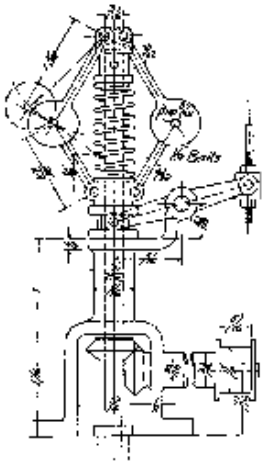
SEE OPERATING SCALE:

- 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	$7.00
CHILDREN 6-12 WITH ADULTS	$5.00
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