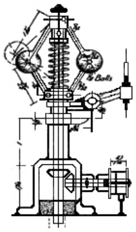

The NEMES Gazette

NEW ENGLAND MODEL ENGINEERING SOCIETY INC.

No. 223 November 2014

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Presidents Corner

Victor Kozakevich

At the November meeting, NEMES member Bob Tanner will present: "Burma, A Living Museum of industrial Technology"

As Bob describes, "Burma is a fascinating place for anyone with an interest in industrial archeology. The Burmese are a hundred years behind us in use of technology, but are ingenious and hard working. On a month-long trip to Burma (Myanmar) we asked our guides to take us to places where people built things. We saw guys making 20' boats with hand tools (starting with a pit saw!), a rice mill that ran on gas produced from rice husks, a factory full of hand-operated looms, another full of power looms from the '50s, reminiscent of the Lowell museum, and wheat threshing using flails. None of this was "for the tourists"; most were places we just wandered into. And then there all the vehicles made out of Chinese one cylinder diesels and abandoned WWII running gear. It was the coolest "museum" I have ever seen, and I have great respect for the friendly, and amazingly hard-working Burmese people who welcomed us with pride to see how they produced their products."

And we're back to the Waltham library in November. For those who haven't been yet, the address is 725 Main St. in Waltham. Turning onto Spring St., to the right of the building, leads to the parking in back. If the lot is full, there is a garage reached by continuing down Spring and making a right on Middle St.

Thursday, Nov 6, 2014

Waltham Library
725 Main 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 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
DEC	NOV 21, 2014
JAN	DEC 18, 2015
FEB	JAN 22, 2015

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Thanks to members who complimented the machining presentation in September. At the October meeting, I mentioned that a company called "Smartflix" (smartflix.com) rents any number of technical videos for about $10 per week. They're located in Arlington MA, so shipping shouldn't take long. I suggest any and all members take a look at their offerings, and consider doing a presentation on a favorite topic, showing selected clips from the video as background. The best part is when you pause the video and ask for comments and questions from the members. Just watch the video, and write down the start time from your DVD player display of a clip you want to show. A similar thing can be done with Youtube videos. Online tools let you burn a copy of the video to DVD for replay at any time. Let me know if you would like to do a presentation, and I'm glad to offer any help.

Club Business

Rich Baker

Dues. It's that time of year again. We will start collecting the 2015 dues at the November meeting. Please bring your $25 check or you can try out our credit card system.

Non-profit status. We have heard from the IRS, and have been told verbally that NEMES is now a 501(c)(3) Not For Profit organization, but we do not have the official paperwork. We will tell you more once the paperwork arrives. Please email treasurer@neme-s.org if you have any questions.

Shop Talk

Max ben-Aaron

TELECOMMUNICATION

Gray and Wheler, investigating the transmission of static electricity circa 1730 discovered the importance of insulating their thread 'wire' from earth contact, using silk (which is not more of an insulator, but less of a conductor than the hemp pack-thread they used as their main conductor). They noticed that wire supports to the pack-thread leaked away the electrical charge. From these experiments came an understanding of the role played by conductors and insulators (names coined by John Desaguliers). C.F. du Fay, a French scientist, after visiting Gray and Wheler in 1732, returned to France where he formulated the first comprehensive theory of electricity called the 'two-fluid' theory. In Philadelphia, Franklin and English experimenters Beavis and Watson, devised a single-fluid/two-state theory (later given the terms positive and negative by Watson) which eventually prevailed.

In 1800 Alessandro Volta described the first electrochemical battery, the voltaic pile, a stack of copper and zinc plates, separated by brine soaked paper disks that could produce a steady current for a considerable length of time.

German physician, anatomist and inventor Samuel Thomas von Sömmerring in 1809 created an 'electrochemical' telegraph based on an earlier, less robust design of 1804 by Spanish polymath and scientist Francisco Salva Campillo. Both of their designs needed multiple wires (up to 35, in order to visually represent almost all Latin letters and numerals). Messages could be conveyed electrically up to a few kilometers (in von Sömmerring's design), with each of the telegraph receiver's wires immersed in a separate glass tube of acid. The sender applied, sequentially, electrical currents through the wires representing characters of a message. At the recipient's end the currents electrolysed the acid in the tubes and released a stream of hydrogen bubbles which the telegraph receiver's operator could observe and record as the transmitted characters. The multiplicity of wires was clumsy, the cost was prohibitive and the baud rate was very low but the principle of the virtually instantaneous transmission of information, electrically, was established.

In 1819, Hans Christian Oersted, a Danish physicist made an epochal discovery when he noticed a fundamental connection between electricity and magnetism - the deflection of a compass needle near a conductor carrying a current.

The first commercial electrical telegraph was constructed in England by Sir Charles Wheatstone and Sir William Cooke. They used the deflection of needles to represent messages and started operating over twenty-one kilometres (thirteen miles) of the Great Western Railway on 9 April 1839. Both Wheatstone and Cooke viewed their device as "an improvement to the [existing] electromagnetic telegraph", not as a new device. In contrast with some systems relying on making sounds of clicks, their system used pointing needles that rotated above alphabetical charts to indicate the letters that were being sent. Their telegraph also required multiple conductors and printed the letters from a wheel of typefaces struck by a hammer. This machine was based on their 1840 telegraph and worked well; however, they failed to find customers for this system and only two examples were ever built.

Beginning in 1836, the American artist Samuel B Morse, the American physicist Joseph Henry, and Alfred Vail developed an electrical telegraph system. Morse independently developed a version of the electrical telegraph that he unsuccessful demonstrated on 2 September 1837. This system sent pulses of electric current along wires which controlled an electromagnet that was located at the receiving end of the telegraph system. Soon after he was joined by Alfred Vail who developed the register — a telegraph terminal that integrated a logging device for recording messages to paper tape. This was demonstrated successfully over three miles (five kilometers) on 6 January 1838 and eventually over forty miles (sixty-four kilometers) between Washington, D.C. and Baltimore on 24 May 1844.

Beginning in 1836 Morse, Henry and Vail developed an electrical telegraph system to send electric pulses along wires which controlled an electromagnet located at the receiving end of the system.

A code was needed to transmit natural language using only these pulses, and the silence between them. This key invention reduced the number of conductors needed to a single one, with a ground return, making the system economically feasible. Morse therefore developed the forerunner to modern International Morse code. The patented invention proved lucrative and by 1851 telegraph lines in the United States spanned over 20,000 miles (32,000 kilometres).

The system for telegraphy developed by Morse and company was designed to make an indentation on a paper tape when an electric current was received. Morse used mechanical clockwork to move the paper tape in his original telegraph receiver. The electrical current energized an armature that pushed a stylus into the moving paper tape, indenting it. When the current was interrupted, a spring retracted the stylus, leaving that portion of the moving tape unmarked.

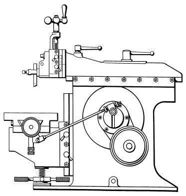
Operators translated the indentations into text messages. Early on, Morse had planned to only transmit numerals, using a dictionary look-up for each word. The code was soon expanded by Vail to include letters and special characters. Vail counted the movable type he found in the type-cases of a local newspaper in Morristown to determine the frequency of use of letters in the English language Shorter marks were called "dots", and the longer ones "dashes", and the letters most commonly used were assigned the shorter sequences of dots and dashes.

The receiver's armature made a clicking noise as it marked the paper tape in the original Morse telegraphs. Telegraph operators quickly learned to translate the clicks directly into dots and dashes, writing these down by hand, rendering the paper tape unnecessary. To mimic the sounds of Morse code receivers, the operators vocalized a dot as "dit", and a dash as "dah". Dots which are not the final element of a character became vocalized as "di". For example, the letter "c" was then vocalized as "dah-di-dah-dit".

The first successful trans-atlantic telegraph cable was completed on 27 July 1866, allowing trans-Atlantic telecommunication for the first time. Earlier transatlantic cables installed in 1857 and 1858 only operated for a few days or weeks before they failed. The international use of the telegraph has sometimes been referred to as the "Victorian Internet".

The electric telephone was invented in the 1870s, based on earlier work with harmonic (multi-signal) telegraphs. The first commercial telephone services were set up in 1878 and 1879 on both sides of the Atlantic in the cities of New Haven and London. Alexander Graham Bell held the master patent for the telephone that was needed for such services in both countries. The technology grew quickly from this point, with inter-city lines being built and telephone exchanges in every major city of the United States by the mid-1880s. Despite this, transatlantic voice communication remained impossible for customers until January 7, 1927 when a connection was established using radio. However no cable connection existed until TAT-1 was inaugurated on September 25, 1956 providing 36 telephone circuits.

In 1880, Bell and co-inventor Charles Sumner Tainter conducted the world's first wireless telephone call via modulated lightbeams projected by photophones. The scientific principles of their invention would not be utilized for several decades, when they were first deployed in military and fiber-optic communications.



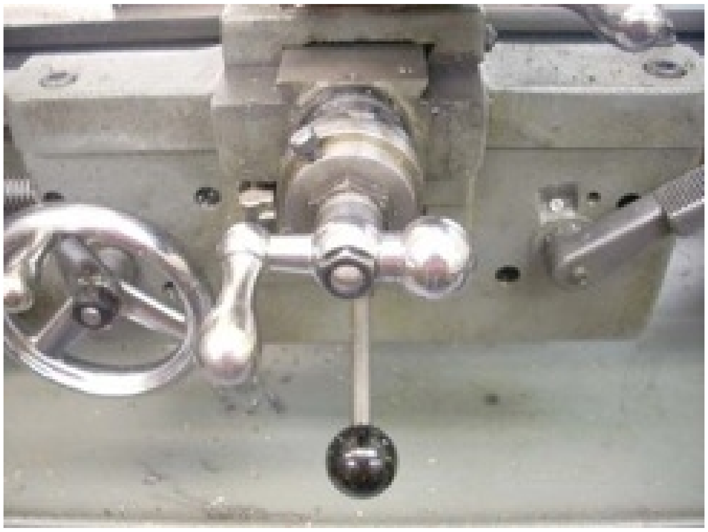
Metal Shapers

Kay Fisher

R. G. Sparber's Gingery Shaper - Part 55

Casting Ball Cranks

I have always liked the look and feel of the ball crank on my Craftsman® Atlas® lathe.



Atlas Lathe Crank Photo by R. G. Sparber

I used this ball crank as a pattern to cast more ball cranks. I removed it from the lathe and slid a $^{3}/_{8}$" diameter rod through the hole.

Flask Parts Photo by R. G. Sparber

The first step was to assemble the flask. My furnace can be seen in the background with its new lid. The old lid kept falling apart so I broke it out and cast a new one. So far, this is going well.

Flask Assembled Photo by R. G. Sparber

The smallest flask was a bit cramped but would have worked. I decided to not fight it and used the larger flask.

I rammed up a blank drag and inverted it. The pattern was then pushed down into the Petrobond.

Pattern in Pertobond Photo by R. G. Sparber

I then carved down until the center line of the pattern was exposed. After dusting, the cope was added and rammed full of Petrobond.

Cavity in Drag Photo by R. G. Sparber

Here is the cavity formed in the drag. The gate has been cut from the ball over to the sprue imprint.

Cope Half Photo by R. G. Sparber

The cope's half of the imprint came out just as clean. The white circle is the end of the sprue. After pulling the sprue pin, I carved it into a funnel.

An old flask was rammed up to hold a second copy of the ball crank.

It would have been an uneventful pour except my thermocouple died as the melt was going through phase change. I had to judge the time to pour by actually looking at the melt. While I waited for the melt to be ready, I made up a new thermocouple and was able to use it just before the pour. Luckily I was at the right temperature (700C).

Most of the metal poured into the flask ended up in the sprue. The ball crank cavity is actually rather small.

Pattern & Two Castings Photo by R. G. Sparber

Much to my amazement, both cranks came out very nice.

Notice that I left the rod imprint empty so as to receive a cast in the rod. It will be used to hold the crank in the lathe.

I did have a problem with cope/drag registration. This problem was pointed out to me by someone on one of the Yahoo club sites. My alignment “pins” on my flasks are too sloppy. Rather than using large tapered flats, I should use close fitting pins that are tapered on the ends. This is the first time that it has really mattered. It isn’t a show stopper, just more obvious on these small parts.

Casting Minus Sprue Photo by R. G. Sparber

The bandsaw was used to remove the sprue and the larger pieces of flash. A belt sander cleaned up one end of the rod. The right end of the rod will go into my lathe chuck. The left end will be cut off next.

Casting After Rod Cut Photo by R. G. Sparber

Before I can drill the 3/8” hole through the crank, I must get a flat surface so the drill bit does not skid off center.

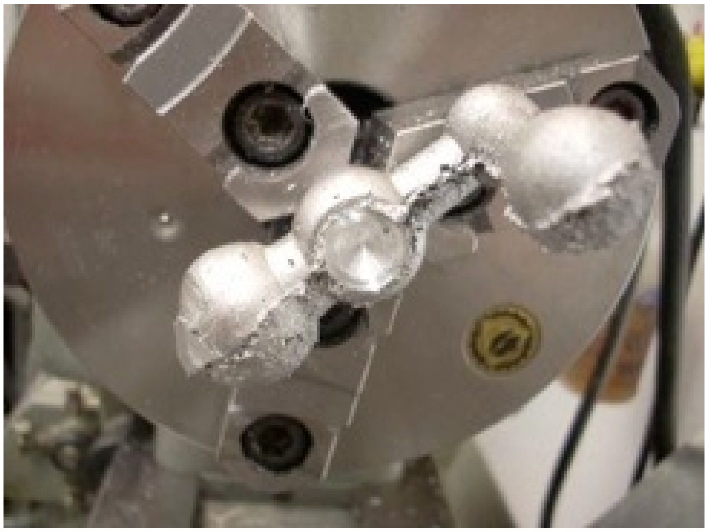
Casting Ready for Lathe Photo by R. G. Sparber

The belt sander on the left face gave me a fairly flat surface.

Ready To Drill Photo by R. G. Sparber

A $^3/_8$” drill is positioned to drill the through hole.

You can clearly see the difference in finish between cope and drag. The cope is nice and smooth and the drag was a bit rough. I believe this was due to the fact that the pattern was pounded into the cope so it compressed the Petrobond and gave a strong, smooth surface. The drag was gently rammed down so as to not stick to the cope.



Forming Land Photo by R. G. Sparber

I drilled down a little bit and then used a ½” two-flute end mill in the drill chuck to form a land that was true with the hole.

Drilling Through Photo by R. G. Sparber

I drilled until the ball handle was cut free from the cast in rod.

Casting Drilled   Photo by R. G. Sparber

The part is now ready for a clean up on the belt sander and with a wire wheel.

Casting Cleaned Up Photo by R. G. Sparber

It looks a bit rough but is not too bad.

Drilling for Set Screw   Photo by R. G. Sparber

The last step was to drill and tap for the set screw. I chose to use a 10-32 set.

Down Feed Mounted   Photo by R. G. Sparber

The down feed still needs a few parts before it is complete.

Cross Slide Mounted   Photo by R. G. Sparber

The cross slide on the left side is done. Gingery shows a second crank on the right side but another version of the shaper didn't have one.

Stay tuned for part 56 from R. G. Sparber next month.

Keep sending me email with questions and interesting shaper stories.

Upcoming Events

George Gallant

Due to a snafu in communications, the “Upcoming Events” is not available at this time. Should/when they become available, they will be posted them on NEMES web site. Perhaps we need to return to Morse Code and telegrapghs.