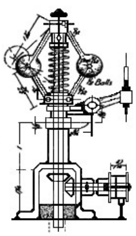

The NEMES Gazette

NEW ENGLAND MODEL ENGINEERING SOCIETY INC.

No. 239 March 2016

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Club Business

Richard Baker

NEMES Apparel. We have NEMES denim button down shirts, t-shirts, sweatshirts, and aprons for sale. The aprons are $20, the denim shirts $35, sweatshirts $25, and the t-shirts $15. Contact Rich Baker if you would like to purchase 978-257-4101.

Dues. The 2016 dues are also due. Please bring your $25 check to the March meeting or you can try out our credit card system. Or mail a check mail to Rich Baker at NEMES,

Next Meeting

Tuesday, March 1, 2016 7 PM

Charles River Museum of Industry & Innovation

154 Moody Street

Waltham, Massachusetts

Directions are Here.

The speaker for the March meeting will be Gary Phillips, speaking on restoring the pipe organ in the Atlantic City Convention Hall.

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).

Deadline for submitting articles is two weeks prior to the next meeting.

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Editor's Desk

Dan Eyring

Last month we published the final episode of the Metal Shaper series. The column space continues in this month's Gazette with content borrowed from the Gadget Builder website, the home of the Connecticut Home Shop Machinist club.

I'm sure this will be interesting for our members, but it would be better for us to be featuring article contributions from our own membership. So if you showed of your prize workshop project at the Model Engineering Show in February, why not gather together some pictures and a few paragraphs of text and send it to me. As Gazette Editor, it's my job to take your raw material and turn it into a finished article. In other words, to make it easy for you to share your favorite project with the rest of the membership.

Frank M. Stieger

In Memoriam

Long Time NEMES Member Frank Stieger

Frank Steiger's daughter, Anne (Stieger) Gould notified me of her father's passing last September at age 91 and told me of his long time involvement with home shop machining, Below are her two emails and his obituary. If you would like to send your condolences to Anne, her contact information is:

Anne (Stieger) Gould

42 Robert Circle

Cranston, RI 02905

annegould79@gmail.com

Wanted to let you know that my father, Frank Stieger passed away in September. I had put together an obituary in his local paper for friends and neighbors to know more about his life. I have been checking on his house and mail every few weeks and meant to let you know sooner, as you send a very nice newsletter. He enjoyed his basement workshop, he certainly had an engineering approach and the picture we used here was the last one ever taken of him. It was taken by his grandson when he was visiting him on 09/01/15 in the workshop.

[Besides the scan of his picture in the obituary] I've attached a copy of the whole picture of Frank in his workshop that tells the story.

Frank M. Stieger

NEWTON – Frank M. Stieger died on September 7, 2015 at Newton Wellesley Hospital at age 91.

He was born in Rochester New York, the son of Franz and Marie Stieger. He was predeceased by his wife of 53 years Mary (Garin) Stieger and daughter Elaine Stieger of Newton, MA.

He leaves behind his loving daughters Anne Gould of Cranston, RI and Marcia Stieger of Fairfax, CA , grandchildren Ralph Kelliher of Daly City, CA, Elaine Gould of Milford, CT and Oona Lyons Kumataka of Fairfax, CA and one great-grandson Cal Kumataka.

He is also survived by a niece Ann Hagen and nephew William Shanley both of Stuart, FL and several grand-nieces and nephews.

During World War II he served as a staff sergeant aerial gunner on B-24's in 1943-45. After his military service he worked for Bausch and Lomb in Rochester and attended Clarkson College of Technology in Potsdam, NY graduating in 1952 with a degree in Chemical Engineering. Later he received a Master of Business Administration attending night school at American International College in Springfield, MA.

His professional positions included Monsanto Co. in Springfield, MA, General Electric Co. in Pittsfield, MA and Polaroid Corp. in Cambridge, MA where he worked 22 years

Frank M. Stieger

before retiring in 1987. During his working years he obtained 3 patents. He was also a member of the American Chemical Society, Society of Plastics Engineers and Appalachian Mountain Club.

He lived in Newton for 50 years and enjoyed reading non-fiction, travelling, photography, hiking, geology, and a home workshop. During his retirement years he was able to care with his wife Mary for their daughter Elaine with Multiple Sclerosis and then later for Mary when her health deteriorated.

After those years, he became a member of many organizations including World Boston, Walk Boston, Mass Bay Railroad Enthusiasts, Newton Genealogy Club, and the Society of Industrial Archeology to name a few and travelled extensively including a trip to Europe. He remained an active member in some of the organizations and a frequent patron of the Newton library until his death. He was well-known and liked in his neighborhood often offering his help with home maintenance projects. He is fondly remembered by family, friends and neighbors.

Services to be arranged at a future date.

Searching for Speakers

Bob Timmerman

April is the 20th anniversary of the first meeting of the newly formed NEMES club in 1996. Bob is hard at work lining up story tellers, from among the members who were at those first meetings, to describe what the club was like in the early days. Don't miss this meeting, you will hear great stuff about the early days of NEMES.

CHARLES RIVER MUSEUM OF INDUSTRY & INNOVATION

From the Museum

Dan Eyring

Director Bob Perry wishes to thank all those members of NEMES who made the 20th Annual NEMES Model Engineering Show such a great success. Over 500 people attended the show, making it hands down the largest and most successful event ever for CRMII!

In celebration of NEMES' 20 years as an outstanding club for home shop machinists and model engineers – and as a celebration of NEMES 20 year relationship with the CRMII, Bob Perry has announced his intention to host a three month NEMES exhibit in the Fall of 2016 in the Folsom Gallery at CRMII (currently showing an exhibit of Todd Cahill's stunning industrial drawings.).

The exhibit will explain how and why the NEMES club came about, will show off some of the best work of NEMES craftsmen, and will let Museum visitors become acquainted with the uniquely talented practitioners of this challenging and rewarding craft.

Small models and like items will be exhibited inside glass cases. Large objects, such as farm engines, airplane, and other large unique works will be displayed on pedestals in the Gallery area to allow close up up 360 degree viewing.

We also plan to chat informally with NEMES modelers, to draw out how their work was conceived and carried out, what motivated their project in the first place, and any interesting stories they care to tell about their experiences as a NEMES member over the years.

Since the Gallery space is finite, we will be depending on NEMES to help decide which and what kind of works should be displayed and how they can be best displayed.

The world of Model Engineering and Model Engineering shows is largely invisible. The terrific event on February 20th certainly shows how interested the public is when they have the opportunity to look into that world. Visitors to the planned NEMES exhibit (especially young people) will be fascinated by what they see and motivated to find out how they can take part in the Model Engineering Hobby.

Planning updates on the Fall NEMES exhibit will be posted in the Gazette. If anyone has questions about the exhibit or wants to participate, please contact Dan Eyring at editor@neme-s.org.

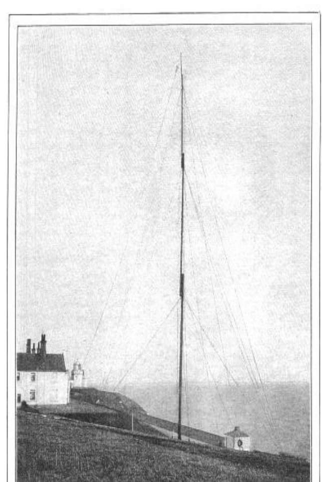
Shop Talk

Max ben-Aaron

The Story of the History of Radio / Wireless

There are great difficulties in documenting discoveries like the invention of wireless telegraphy. Many attempts have already been made to write its history. Although it looks superficially like an exact subject clearly marked out, claims and counterclaims make it an intellectual minefield.

Long story made short: Guglielmo Marconi began his wireless experiments in England in 1895. On June 2nd of 1896, he filed his provisional specification of a patent for wireless telegraphy. He demonstrated the system to the British Post Office in July of the same year. The British patent was accepted on July 2nd of 1897, and by the US Patent Office on July 13th of that same year.



MAST AND STATION AT SOUTH FORELAND, NEAR DOVER, ENGLAND, USED BY MR. MARCONI IN TELEGRAPHING WITHOUT WIRES ACROSS THE CHANNEL TO BOULOGNE, FRANCE.

From a photograph.

In March of 1896, Alexandr Popov demonstrated a similar wireless system in Russia, having demonstrated a more rudimentary system a year earlier.

But actually, the history of wireless ought to start a bit earlier, to put the subject in perspective.

The transmission of signals between the two points, initially on the earth's surface, demands three elements, all of which appear to be indispensable: a transmitter, a receiver, and, between the two, an intermediary medium to carry the communication. Generally the most costly part of the installation, and the most difficult to set up is the intermediary medium. For example, consider the cost of all the telephone wires in the US telephone system.

To examine the history of wireless from the beginning, we must speak, if only briefly, of earlier attempts attempts to develop wireless telegraphy. The history of these trials is very long, and is closely mixed up with the history of ordinary telegraphy.

Shortly after Ampère made public the idea of constructing a telegraph, Gauss and Weber set up between their houses in Göttingen the first real telegraph connection. In 1838, Professor C.A. Steinheil of Munich expressed, for the first time, the clear idea of replacing the return wire of a telegraph with a connection of the line wire to the earth. In a single step he covered half the way to the final goal of a wireless telegraph, saving the use of one-half of the line of wire.

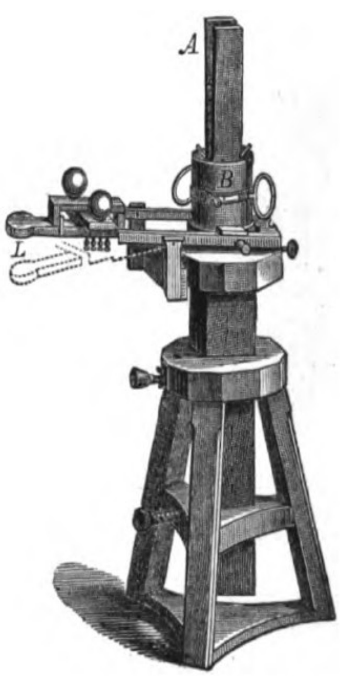


Fig. 748.—Gauss and Weber's Sending Apparatus.

Steinheil, advised, perhaps, by Gauss, had a very clear conception of the part taken by the earth considered as a conducting body. He seems to have well understood that, in certain conditions, the resistance of such a conductor, can be independent of the distance separating the electrodes which carry the current and allow it to go forth. He also thought of using the railway lines to transmit telegraphic signals.

In 1837, William Cooke and Charles Wheatstone in England began using an electrical telegraph that used electromagnets in its receivers. Their system used pointing needles that rotated above alphabetical charts to indicate the letters that were being sent. In 1841, Cooke and Wheatstone built a telegraph that printed the letters, from a wheel of typefaces struck by a hammer. (This idea came to fruition more than a hundred years later in some computer printers!). 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.

Cooke and Wheatstone Double-needle Telegraph Instrument of the Type used on the Great Western Railway

Beginning in 1836, the American artist Samuel F. B. Morse, the American physicist Joseph Henry, and Alfred Vail developed an electrical telegraph system that sent pulses of electric current along wires which controlled an electromagnet that was located at the receiving end of the telegraph system. A code was needed to transmit natural language using only these pulses, and the silence between them. Morse's code was the forerunner to modern International Morse code system for telegraphy, which was first used in about 1844.

Morse's name is universally known in connection with the very simple apparatus invented by him, and demonstrated, in the autumn of 1842, before a special commission in New York and a large public audience. His apparatus worked easily and surely, even though in the very midst of his experiments a length of about a mile of wire was suddenly and accidentally destroyed.

Subsequently, the very happy idea of replacing the wire with the water of a canal serendipitously occurred to Morse. The accidental breaking of his wire, which looked a for a moment as though it would compromise the legitimate success he expected, thus suggested to him a fruitful idea which he did not forget. His later numerous attempts to use the earth and water as signal conductors obtained some very remarkable results.

Morse’s code was designed to make indentations on a paper tape moved by mechanical clockwork. When electric currents reached Morse's original telegraph receiver, an electromagnet engaged an armature that pushed a stylus onto the moving paper tape, making an indentation on the tape. When the current was interrupted, a spring retracted the stylus, and that portion of the moving tape remained unmarked. Operators could translate the indentations marked on the paper tape into text messages.

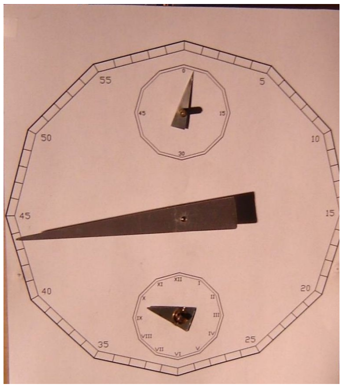
A Printing Electrical Telegraph Receiver, with Transmitter Key at Bottom Right

In his earliest code, Morse had planned to transmit only numerals, and use a codebook to look up each word according to the number which had been sent. However, the code was soon expanded by Alfred Vail to include letters and special characters, so it could be used more generally. Vail estimated the frequency of use of letters in the English language by counting the movable type he found in the type-cases of a local newspaper in Morristown. The 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.

In the original Morse telegraphs, the receiver's armature made a clicking noise as it moved in and out of position to mark the paper tape and telegraph operators soon discovered that they could translate the clicks directly into dots and dashes, and write these down by hand, making the paper tape unnecessary. When Morse code was adapted to radio communication, the dots and dashes were sent as short and long pulses. It was later found that people become more proficient at receiving Morse code when it is taught as a language that is heard, instead of one read from a page.

To reflect the sounds of Morse code receivers, the operators began to vocalize 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"

In the 1890s, before it was possible to transmit voice, Morse code began to be used extensively for early radio communication. In the late 19th and early 20th centuries, most high-speed international communication used Morse code on telegraph lines, undersea cables and radio circuits. In aviation, Morse code in radio systems started to be used on a regular basis in the 1920s.



On Building My First Clock

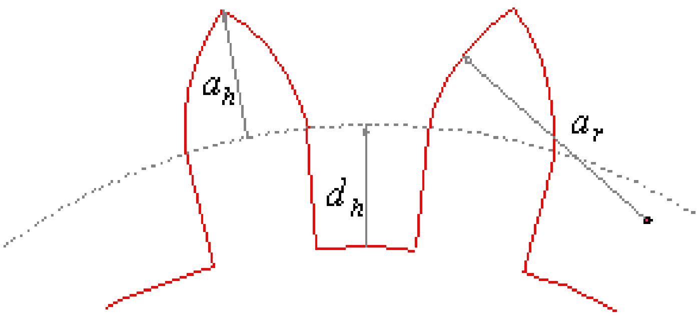
John Moran / Gadjet Builder

In this spot, I will post over a number of monthly issues John Moran's clock building article, which can be found at: http://www.gadgetbuilder.com/Clock/Clock.html

I've been interested in clocks for a number of years but have only maintained and repaired our family clocks until recently. With a mini-lathe, my horizon expanded to making bearing inserts and other small items needed for repairs. Major repairs on a flea market purchase inspired me to build a clock from scratch.

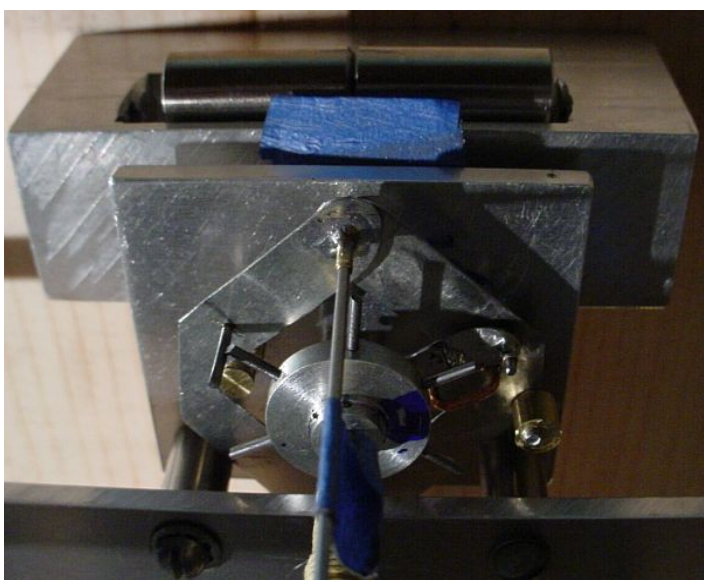
I read several books on clock making and poked around on the web for all the info I could find. I liked the look and gearing simplicity of astronomical regulators but didn't find an existing design I liked so I used my trusty spreadsheet to design my own. The spreadsheet was helpful in verifying gear ratios, gear sizes, conflicts (gears hitting adjacent shafts) etc. My implementation includes ideas from a number of sources including "How to Build a Regulator Clock" by J.M. Huckabee and "Clock Design and Construction" by Laurie Penman.

My clock uses aluminum plates with press in bearings as suggested by Huckabee. The bearings are closed on the end where possible with centering via contact on the end of the shaft as suggested by Penman; to accomplish this, the 1/4" bearing shells are made from steel with a 1/8" brass insert pressed in and then bored with a home made D bit. Pinions are barrel type as suggested by Penman. Shafts are drill rod, gears are cut from junk yard brass using information and methods from cSparks site, scaled up for clocks. The bearings and barrel pinions are labor intensive but according to Penman are the most energy efficient approach and therefore should need minimum driving weight.



Parts of a wheel tooth

I bought some aluminum for the plates and built a crude test version of an Arnfield gravity escapement. This was powered by wrapping a string around the shaft; it ran for about 12 minutes before the weight reached the floor. Debugging took about a day, where I changed things quickly by soldering them together -- my understanding of the escapement was sketchy initially, improving as I varied angles and sizes of the parts to get it running.



Escape Test

The knock on gravity escapements is that they are noisy and sure enough, the test version clacked each time it advanced. The final version is much lighter, the escape wheel is lighter, the escape teeth are shorter and the result is a modest tick. Adding a case should muffle the sound to nearly inaudible.

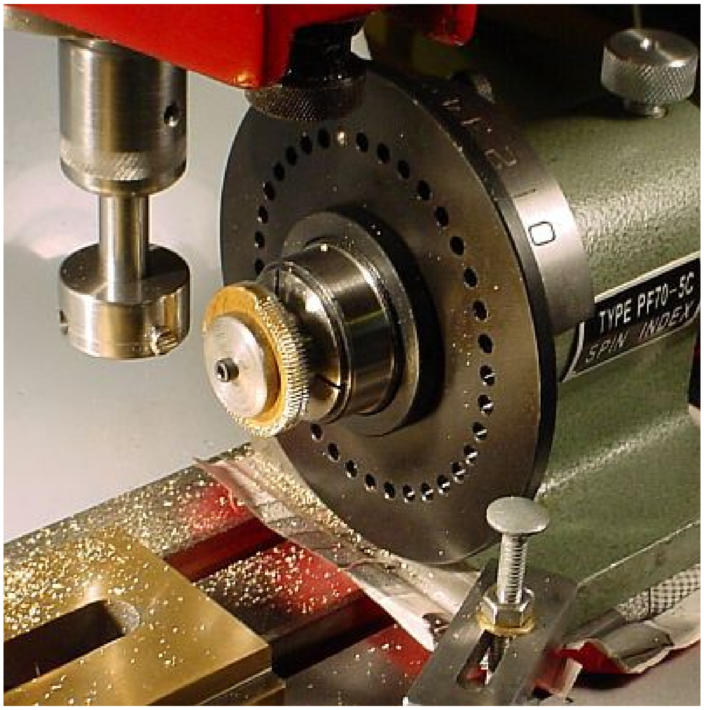
The gear and shaft for the second hand were added with the string wound on this new shaft. More weight was required, of course; run time was over an hour. This picture shows the seconds shaft and some press in bearings; the leftmost bearing is through-drilled for a shaft to drive a hand.

Seconds Shaft Detail

This clock is a work in progress so it remains to be seen whether it will work properly when completed. A number of issues remain to be addressed including temperature compensation of the pendulum.

Tooling

Gear cutting requires a small amount of specialized tooling. I use a 5C spin indexer to hold and index gears for cutting -

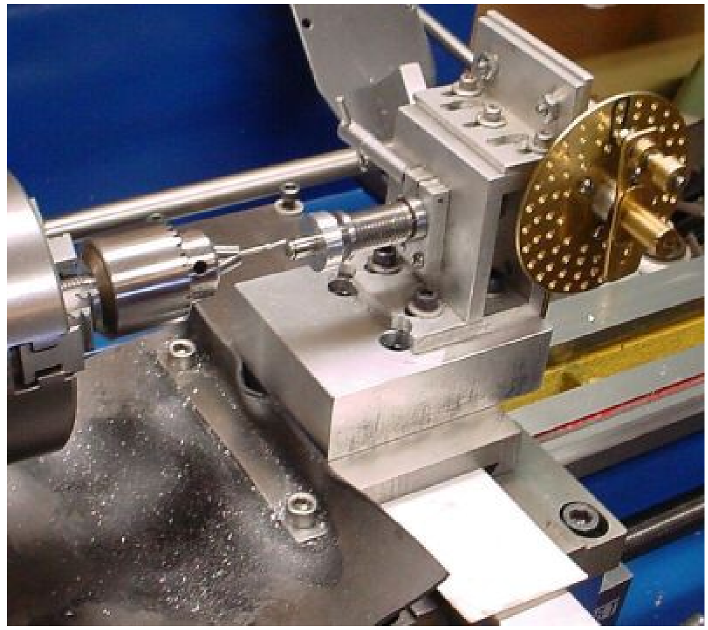


which limits the possible tooth counts to those which divide evenly into 360 (one of the things which led to designing a clock rather than building from a plan).

The fly toothcutter is per the previously mentioned method; these cutters take some time and care to make but the material is cheap and they work reasonably well. In my picture you can see the extra hole in the fly cutter used to add relief when making the cutter; the fly cutter is chucked in the lathe while making the cutter. Gear cutting is a slow process with a fly cutter and spin indexer - it takes over an hour to make the 3 passes needed to complete a gear.

Fly Cutter Form Tool

The barrel pinions and escapement were drilled using a small Jeffrie's type dividing head, a gift from a friend. The lathe chuck can't grip the small drills involved so the shaft of a small Jacobs chuck is held in the lathe chuck, i.e. a chuck-chuck. The chuck-chuck scheme works but requires some fiddling to minimize runout and even at that has runout of 1 or 2 thou, generally not a problem with normal size drills but bothersome with drills under 25 thou, common for barrel pinions. I made a small spade bit from 1/8 drill rod by turning the end down to 0.022 for a length of 1/16, hardening it, then grinding it in the Mini-Tinker; this is used to spot the holes which are then drilled with a small twist drill as described earlier.

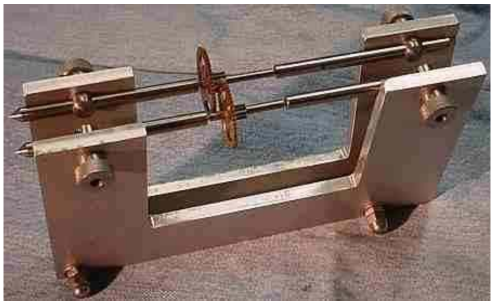


Gear Cutting Setup

Cutting trundles for barrel pinions from piano wire was a slow process initially. So, I made a "Whack Bang Wire Cutter" which cuts lengths of piano wire 0.240 long. The bottom part is center drilled 0.250 and has flats machined in the sides to make it easier to hold in the vise. In use the wire stock is inserted in the small hole until it contacts the far side, the cutter/punch is inserted and whacked with a hammer. A wadded paper towel catches the trundles as they exit the cutter. Hardened drill rod seems to hold up well enough in this application to allow cutting quite a few trundles.

"Whack Bang Wire Cutter"

I designed and built a [depthing tool] to aid in placing the shafts.



Next month's installment will cover the Escape Gear and Escapement and the Winding Arbor, Gravity Clutch and Ratchet.

From the Gazette Archives

Ray Hasbrouck Talk

December 1996

The second half of the meeting marked a first for NEMES, our first invited guest speaker. Ray Hasbrouck is the man who designed the first thing Ron Ginger ever made out of metal, a small steam engine.

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.

[See video of Rich Carlstedt's version of this model at https://www.youtube.com/watch?v=VWn8gQ9Ykpk
Detailed pictures of Rich's version of the model are at http://www.stationarysteam.com/monitor.html.]

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 of their armor plate. After sinking two ships they steamed back home because it was getting dark. The next morning the 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 propellor. In 1839 he came to the US. He was a succesful 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 reference 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 [https://ia700708.us.archive.org/11/items/drawingsofussmon00pete/drawingsofussmon00pete.pdf]
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 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 use strunk 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 crank shaft 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 information on the reversing gear also came from Peterkin's book.

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 anew design but was modified from the engine of the “Daylight”,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 3/4inch 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.

Upcoming Events

Errol Groff

Mar. 3 Monthly meeting of NEMES

Check website (http://neme-s.org/) for meeting location and speaker information

13 Mar. **RAILFAIR 2016 Model Railroad Show *and* Open House**

Ayer/Shirley Regional Middle School 1 Hospital Road, Shirley MA

10:00 a.m. to 4:00 p.m.

WWW.NVRRA.COM

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