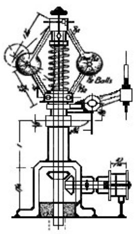

The NEMES Gazette

NEW ENGLAND MODEL ENGINEERING SOCIETY INC.

No. 252 May 2017

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Club Business

Rich Baker

Club Elections. The subject of annual elections came up at last month's meeting .It doesn't seem possible that another year has gone by so quickly. The May meeting is when we come up with a slate of officers to fill the various positions for the next term. Please consider accepting a nomination to serve the organization. While there are only four elected positions. additional appointed positions do exist. This year we need someone to oversee our web site. Errol Groff justly deserves great praise for his efforts in setting up and maintaining this priceless resource. Duties would include: posting meeting information, posting special events, updating a calendar of events, and posting pictures taken a various events that would be of interest to our members.

NEMES Show Thank You. The February NEMES Show was an overwhelming success, and we want to thank everyone for helping plan, setup, run, and clean up after the show. Thank you to all of the exhibitors, and a huge thank you to Gail Martha, Terri Groff, Bea Boucher, Leslie Jones, and Leisa Mingo for feeding us.

Online Store. The NEMES Online Store is now live, and you can order NEMES apparel and pay your dues from the comfort of your living room. The link is available on the www.neme-s.org.

NEMES Apparel. We have NEMES denim button down shirts, t-shirts, sweatshirts, and aprons for sale. The denim shirts $35, sweatshirts $25, and the t-shirts $15. Order online or contact Rich Baker at 978-257-4101 if you would like to order one.

Next Meeting

Thursday, May 4, 2017, 7 PM
Charles River Museum of Industry & Innovation
154 Moody Street
Waltham, Massachusetts
Directions are Here.

Speaker for May:

John Morley will be speaking to us about his ¼ scale Piper Cub airplane, and a fellow member will bring a turbine jet! Should be a good time!

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

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Shop Talk

Max ben-Aaron

The Keller Mill

While perusing machine tool historical references I occasionally note mentions of a "Keller" machine. I've found that it was a type of large hydraulic tracer mill, used primarily in the automotive and aircraft industries. The two names Keller and Pratt & Whitney, were often used together.

It seems that P&W (not P&W Aircraft) bought Keller Engineering in the thirties. A Keller is not hydraulic, but electrical tracing - same idea as P&W's Electro Limit comparison gauging equipment. Keller tracing rigs were found on such diverse machinery as Monarch lathes and P&W vertical shapers.

Further down this article, there is a picture of a big Keller. Before machines came along this size, there was no such thing as machine tool big enough to make the dies for the solid steel top automobile.

It appears the machine could produce three dimensional work. The templates were full scale. Larry Vanice volunteered the follwing information:

"In 1964, I was given an orientation tour of a Detroit area die shop that made our dies for stamping International Truck bodies. Our industrial designers made full scale clay models of the truck bodies when a new model truck was to be released. Then the models were measured and templates made. Our patternmakers used the measurements and templates to create hard models of each body panel. The models were made of a material of wood veneers laminated with phenolic or some such plastic. The material was hard and stable. The models were shipped to the die shop and mounted on the Keller machine. A huge block of steel was then cut to match the model. The Keller left long ridges in the steel from the ball end cutters travelling in straight lines, following the model. Then die makers went to work on the die with burrs and stones in flex shaft machines and electric or air die grinders. They called the process "barbering." Final polishing was done by hand."

There came a point where one, two, or more, orders of magnitude finer resolution passes with progressively smaller sensor-tip and driven tool (and on to burr, abrasive wheel, or buffer flap was no longer as economic as a measure of hand work. Because other pressing tasks piled up for which the shop had no other option but to clear the table and set up the next job, so it would have had to leave the ridges.

A CNC certainly does not have the problem with ridges. These days the clay model can be electronically converted to a 3D file and sent straight to a CNC mill. Is barbering still needed?

I'd like to learn more about the machine and also hear the experiences of those who may actually have worked with one.

Below iare excerpts from two articles on the Keller.

November 9, 1922 *Eliminate Waste—Wi*

Keller Type F Automatic Die-Sinking Machine

The automatic die-sinking machine shown in Fig. 1 is designated as the Type F and has recently been placed on the market by the Keller Mechanical Engraving Co., Brooklyn, N. Y. The machine is intended for work in which impressions up to 36x20 in. and 8 in. deep must be made, and is adapted to the manufacture of forming, stamping and forging dies as well as metal patterns and core boxes.

The machine is intended for smaller and lighter work than the Type BG machine described on page 389, Vol. 55, of *American Machinist*. Since the Type BG machine carries work of very large weight, the work remains stationary and all movements are made in the head carrying the spindle and tracer. The Type F machine is different, because of the moderate size of the work. The horizontal movement is in the work table, which is provided with a range of speeds for cutting as well as a quick-return movement in each direction. The vertical movement and the in-and-out or transverse movement are in the head. Lead screws operate all the movements. There is also a contouring movement, so that a templet, ridge or groove in the pattern can be followed.

The control of all movements is electrical, as regards both the automatic feed and the pushbuttons employed for hand control. The control cabinet contains all of the mechanism necessary for the complete control of the movements. Although the illustration shows the machine equipped with the control board and an angle plate fixture, the control cabinet, which is a separate unit, is not shown.

The machine works from a master, which it reproduces. This master can be of plaster, cement or wood, as only a very slight pressure of the tracer is exerted upon it. However, all the required pressure is applied to the cutting tool, so that large cutting power as well as accuracy in reproducing the patterns can be obtained. The arrangement of the master and the work when cutting a steel die for an automobile front axle is shown in Fig. 2. The work leaves the machine in practically the finished condition, so that only a small amount of handwork is necessary to completely finish it.

The table has a working surface of 53x22 in. It is provided with T-slots and an oil channel around its edge. Its horizontal travel is 36 in. and speeds from

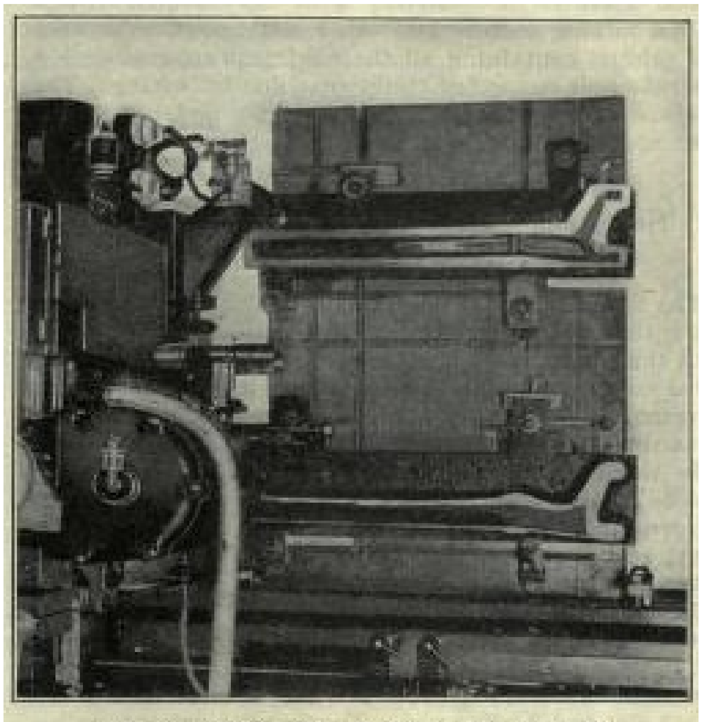


FIG. 2—WORK AND MASTER ON KELLER TYPE F MACHINE

1½ to 12 in. per minute are obtainable through rheostatic control and change gearing. The slide carrying the spindle has a vertical travel of 20 in. on the head; the rate of speed varies from 0.01 to 0.83 in. per stroke. The slide is counterbalanced. The transverse movement of the head is 8 in. This movement is electrically controlled so that the tracer can follow the impression of the master. All the moving slides have large bearing surfaces and are provided with tapered gibs, so that wear can be taken up.

For the purpose of following an outline templet in one plane, there is provided a contouring attachment similar to a profiling attachment. The device is controlled by a pushbutton and follows the outline whether it be inside or outside. The automatic and semiautomatic controls make the machine adaptable to a great variety of operations in which forms must be accurately cut.

Two separate motors are provided, one being a variable-speed motor of ¾ hp. for controlling the various movements. A 2 hp. d.c. motor for 110 or 220 volts is directly connected to the lower cone-pulley shaft mounted on the rear of the column. The spindle driving pulley is carried on the upper cone-pulley shaft. Two separate spindle driving pulleys, as well as two spindles, one for slow speed and one for high speed, are provided. The slow-speed spindle has the back gears mounted as a unit on the spindle head. The high-speed spindle is driven by means of a grooved pulley from the pulley shaft of the slow-speed spindle. The slow-speed spindle runs in adjustable bronze bearings and is equipped with a No. 9 B.&S. taper; the high-speed spindle has a No. 7 taper. A range of speeds from 80

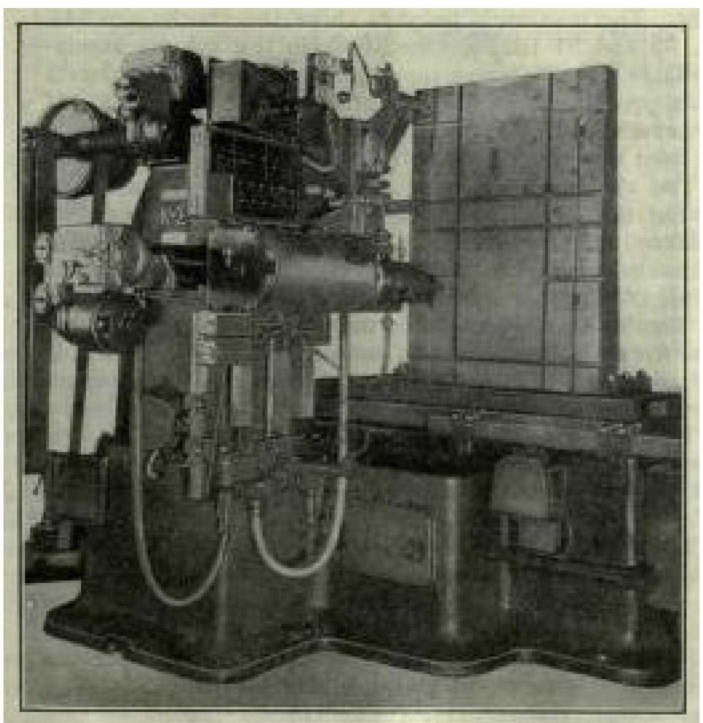


FIG. 1—KELLER TYPE F DIE-SINKING MACHINE

neither of the electro-magnetic clutches A and B will be engaged and the cross-feed screw will be stationary. As the longitudinal feed of the saddle proceeds, the tracer will reach the inclined portion of the template and will be deflected inwards. When this deflection is sufficient to close the gap between the contacts P the electromagnetic clutch giving outwards motion of the cross-slide will be engaged, the cross-slide feed screw will then be driven at a speed depending on the motor speed and the effective gear ratio and the cross-slide will be moved outwards at a constant rate. This will go on until the deflection of the tracer is reduced and the contacts P open again when the outwards motion will cease. The continued feed of the saddle will, however, again deflect the tracer and close the contacts P and the whole cycle will be repeated. Thus the cross-slide will not move continuously as would be necessary in order to give a smooth taper to the work but will move in a series of steps as shown in Fig. 393. The length x of these steps will depend on the magnitude of the tracer movement required to make and break the contacts P and on the angle α of the taper, the height of the steps, h, will depend on the tracer movement for make and break, while the angle β of the steps will depend upon the ratio of the rate of feed of the saddle along the bed and the rate of feed of the cross-slide outwards when the clutch is engaged. This angle β also represents the steepest taper that can be copied by the system; while it can be made large by using a low saddle feed rate and a high speed of cross-slide motion, it cannot equal 90 degrees, so that square corners cannot

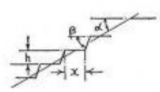


FIG. 393.

be copied with this system. Despite this defect, systems of this kind are still used to a considerable extent because they are simple and reliable and because the size of the steps can be made very small—usually smaller than the ridges left by a sharp-nosed tool in ordinary turning. One of the earliest machines to use an on-off electrical system of this kind was the Keller die-sinker, of which thousands are in use today; this machine will now be briefly described.

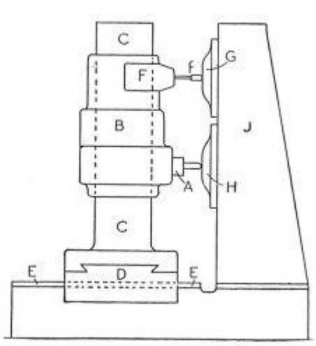


Fig. 394

The cutter spindle A Fig. 394, is carried in bearings in a head B, which can move up and down the column C. The latter in turn can move perpendicular to the plane of the paper on ways provided in the saddle D which itself can slide in or out along the bedways E of the

machine. The head B also carries the tracer unit F whose stylus *f* bears on the master G, of which the work H is to be a copy. Both the master and the work are clamped to the face of a column J which in effect is integral with the bed of the machine. The machine may be operated either by giving a constant downward feed motion to the head B and a step by step motion to the column C on its ways in the saddle D, or by giving a constant crosswise feed to the column C and a step-by-step motion to the head B. In either case the appropriate member would be returned to its starting point between the steps and the contour of the work would be obtained by the in-and-out motion of the saddle D, which is controlled by the tracer unit as follows. The in-and-out motions of D are obtained from constantly running electric motors which by means of electro-magnetic clutches can be connected to the lead-screw which moves the saddle; these clutches are controlled by contacts which are made or broken by the movements of the tracer. The principle of the tracer contact arrangement is shown in Fig. 395. The tracer *f* is carried in a ball-socket joint on a spring-strip support K and at its inner end engages a conical recess in a lever M which is pivoted at O. At its other end this lever has contacts P and Q which switch in or out the clutches that engage the in-and-out motion of the saddle D. When no force acts on the tracer *f* the contact P will be made and the in-feed of the saddle will be engaged; the saddle will therefore move in towards the work until the tracer engages the master, when the end force applied to the tracer will flex the strips K slightly and thus cause the lever M to rotate about its pivot and to break the contact Q, when the inwards motion of the saddle will cease. As the head is slowly moved down the column and the tracer meets a protuberance on the master it will be deflected upwards thereby moving the lever M and making the contact Q; this will engage the clutch to give the outward motion of the saddle which will continue to move until the pressure on the tracer is relieved and the contact Q is broken. Similarly if the tracer meets a depression in the master the pressure on the end of the tracer will be reduced and the spring strips K will move it to the right, thereby causing the lever M to make the contact at P and engage the in-feed of the saddle D and cause the tracer to follow the contour of the master. If the slope of the protuberance on the master is greater than that which would result from the maximum outwards feed rate of the saddle in conjunction with the steady downwards feed of the head B, the whole tracer spindle will be moved to the left by flexure of the strips K and the increased motion of the lever M will move the contact

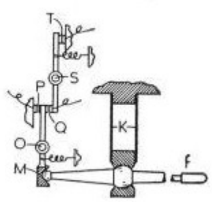
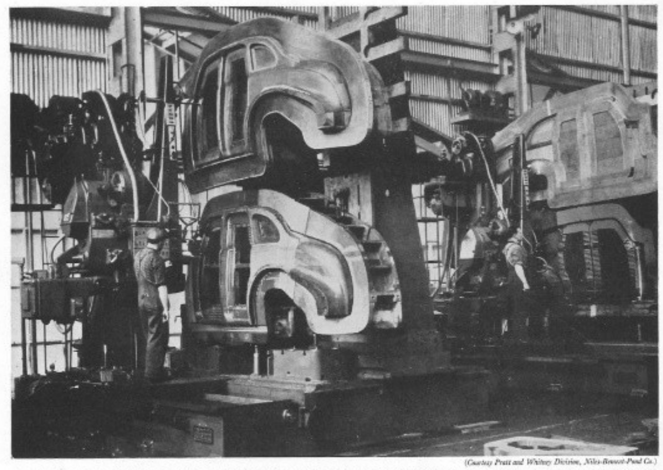
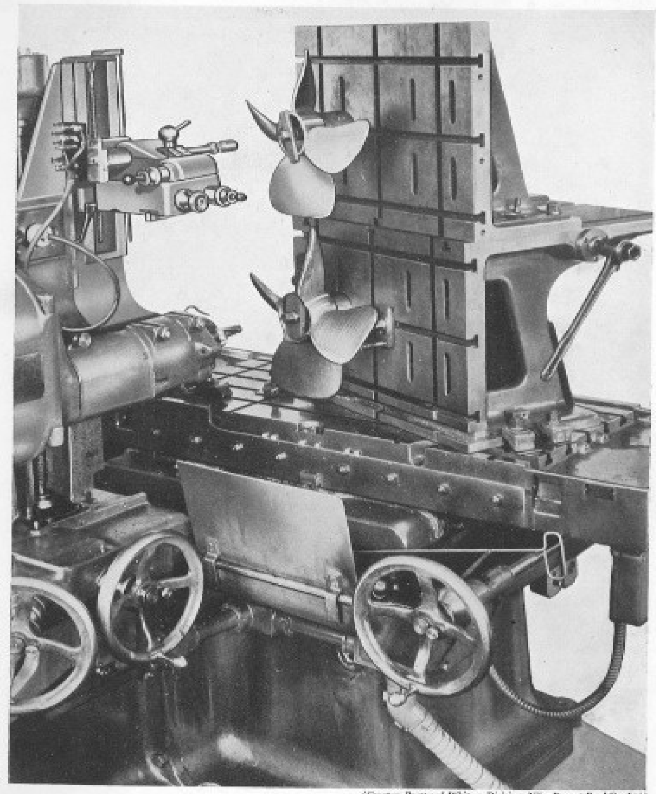


Fig. 395.



(Courtesy Pratt and Whitney Division, Niles-Bement-Pond Co.)

MACHINING AUTOMOBILE PRESS DIES ON KELLER AUTOMATIC MILLING MACHINES. ABOVE THE DIES ARE SEEN THE "MASTERS".



(Courtesy Pratt and Whitney Division, Niles-Bement-Pond Co. Ltd.)

ONE OF THE SMALLER KELLER AUTOMATIC MILLING MACHINES.

The profile on the workpiece is being reproduced from the "master" mounted on the top table.

Tool Corner

Frank Dorian

Last month we talked about the tapered parallel gages Brown & Sharpe maked for checking hole diameters. I saw Jim Paquette later in the month and he mentioned that he has extended the range of his gages by simply slipping a ground tool bit between the two gages to take readings larger than the set's regular 1"capacity. Leave it to Jim to come up with a neat idea like that.

This month, we will review another type of tapered tool for checking hole size. As far as I know, Starrett is the only company that made them. And, as usual, there's some interesting variety. Below are the most commonly found types, the Starrett numbers 269A and 269B.

The A gage measures holes from 1/10 to ½ inch andthe B gage goes from ½ inch to 1 inch, with bothgages being graduated in increments of 0.001".These gages are small, only 2¾" long. As far as Iknow, they are still in Starrett's catalog.

So, why are we talking about these gages? You might be surprised at how accurate they are.

They were good enough that Moore Special Tool, maker of the famous Moore jig borers and jig grinders, had Starrett make a special version of these gages for Moore's customers.

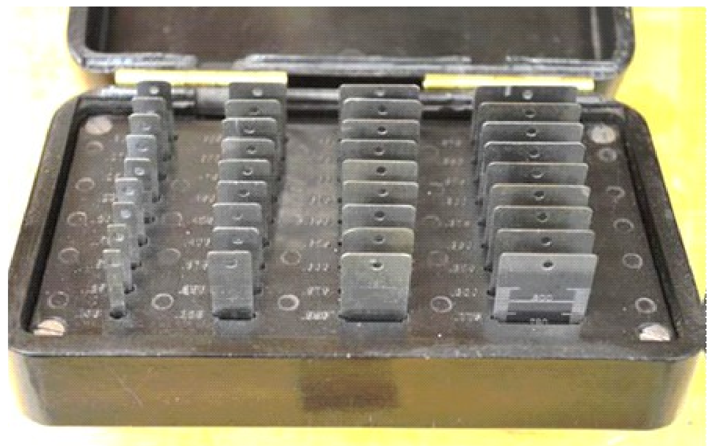
In addition to being accurate, these gages are very easy to read. An accurate reading of 0.001" is no problem to see. If you read the gage carefully, you can do better.

For a tolerance of ±0.001" or ±0.002", these gages are all you need. Why else would you use these gages?

First, I don't think there is another tool for the job that's faster and easier to use. There is no need to move your lathe carriage back a foot or drop your mill table way down to make room for this tool. Three inches of clearance will do. Pick the wrong size gage? Flip to the next appropriate size in a second. They are not bulky or delicate like a dial bore gage so it's easy to keep them handy. They are not sensitive to "touch" like other small hole gages and they are self-centering– anybody can use one and get it right. Also, because they take a two-point measurement, they can be used to check a hole for roundness. Finally, if you think you have a bell-mouthed hole, use the gage to compare the entrance and exit diameters. Any difference is easily detected.

The one caution with these gages is that, to get an accurate measurement of hole diameter, the hole should have a clean sharp edge, free of burrs and not chamfered. Since a sharp boring tool almost always produces the clean hole you need, there usually isn't much of a problem Some may find it difficult to see the value in these gages because they are so small, but the value is certainly there. Starrett also made metric versions of the A and B gages, but I've never seen either of them. In 2002, the A gage set sold for $85 and the B gage, $99.

Moore Special Tool took a somewhat different approach for their taper gages. Instead of attached gages, Moore had Starrett make sets of individual gages, with each set having a larger range of sizes than the versions in the Starrett catalog. The Moore gages were also shorter than the Starrett versions. At only 1½" long, they were even easier to slip in between the tool and the work piece. Each gage overlapped the next size by 0.010" for convenience. And Moore stated that the gages were accurate to **±0.00025"**! The smaller set of Moore gages came in a fitted black plastic case and covered sizes from .095"to 1.005". There are 36 gages in the set.



In addition, Moore offered a larger set of 40 gages that covered a range from 0.995" to 2.005". This larger set came in Moore's typical lovely mahogany case.

There's no question about who made the gages for Moore, see here:

In addition to the above sets, Moore also offered two metric sets in equivalent sizes. The Moore gages come up on eBay and at auctions from time to time. The larger set is less common and tends to bring a fairly high price, but the smaller set can be purchased quite reasonably at times and is probably the more useful of the two. Don't pass up a set if there are a few gages missing – typically the price on a partial set is much lower and as long as only a few are missing, the set will still be very handy. If you get a chance to buy one and the price is right, you will never regret the purchase.

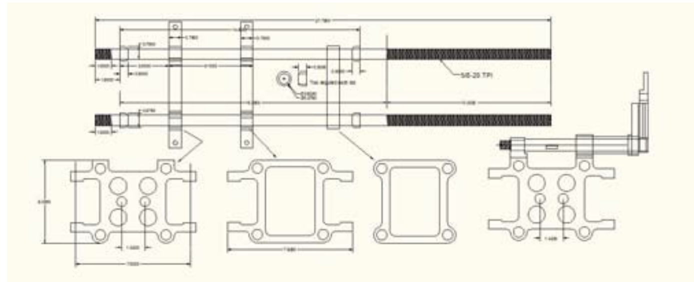
From the Gazette Archives

Stanley 1906 10 HP Engine Rebuild
By Rolly Evans

My latest project has been rebuilding a 1906 Stanley engine. The reason for the rebuild is that the engine had been at some time taken apart and re-assembled incorrectly. The cylinder block was upside-down and all the link bars were back end too.

This engine was an early 1906 engine without a hookup dog as was later changed in1908. The engine I used in building my StanleyEX is of the 1908 style.

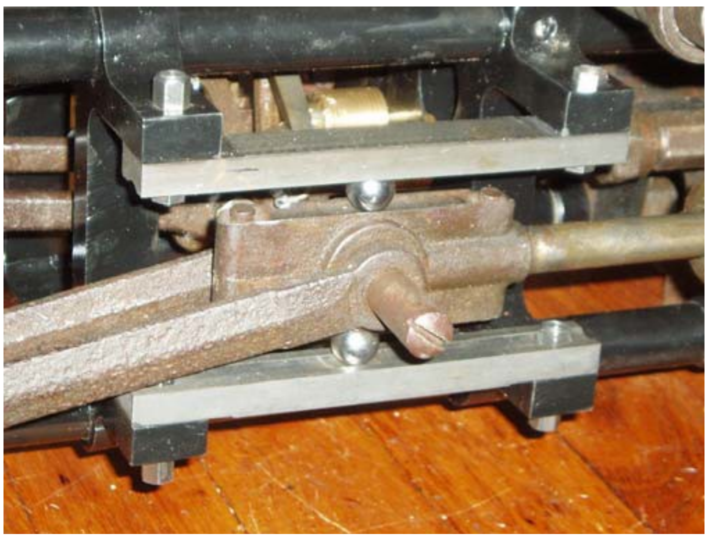
I decided if I was going to pull the engine apart I would make a new frame to convert the engine to hookup as well as make the engine frame much stronger as the early engines do a lot of twisting.



I started by doing CAD drawings and designing a new frame, making it from stronger 4140 plate and oversize rod of ¾" instead of the original 5/8" rod. I used 4340 steel for the rods.The plate drawings were sent over to Apex machine to be water jet cut to shape.

After the plates were cut, I set them up in the mill to finish bore the holes to size and trim other areas as required. Once the rods were turned and threaded, I made some jigs and set the complete frame together in the welding shop to silver braze it together.

I decided to make new crosshead tracks as this engine uses ½" ball crossheads and as part of the frame I would make it all new. I machined up the tracks and sent them out to S&P metallurgy for hardening. When I got them back I set up the surface grinder and ground them to finish size.



The engine is now complete, tested and running on air. Rolly Evans

Coming Events

Errol Groff

May 6th & 7, Saturday and Sunday,,CAMA Spring Power-up
Route 7 north of Kent, CT
http://ctamachinery.com/
Contact: John Pawloski, PO Box 425, Kent CT 06757 860-927-0050
email j.a.pawloski@att.ne

6-7 May Zagray Farm Museum Spring Gas- Up and Swap Meet

544 Amston Rd. Colchester, Rt. 85 north from Colchester, 1-1/2 miles on right.

Contact: Ed Bezanson, 85 Dayton Rd., Waterford, CT 06385; 860-208-2422;

email: edwin_c_bezanson@sbcglobal.net www.zagrayfarmmuseum.org

May 7 ATCA Western MA. 13th Annual Antique Truck Show

Location: South Deerfield, MA At the Yankee Candle Corp Headquarters, Yankee Candle Way, off Rt 5 and 10. Rain or Shine! Free admission and registration.

Contact Name: Craig (vendors) or Doug Vendors call Craig 413-834-1677 or Doug 413-522-4092

7 May New Hampshire Power of the Past Collectors Dunstable Show

Dunstable MA, Rts.3 and 113, 1 mile west on Rt. 113, follow signs.

Contact: David Beard, 584 South Mammoth Rd., Manchester, NH 03109 603-623-2217.

20 May Scantic Valley Antique Engine Club 40th Annual Antique Engine and Tractor Show

Tolland County Agricultural Center, 24 Hyde Ave. (Rt. 30). Vernon CT

From 1-84 exit 67 onto Rt. 31 toward intersection of Rts. 30 and 31, 150 yards east on Rt. 30 toward Tolland, show is on the right.

Contact: Joe Perko Jr., 168 Monson Rd., Stafford Springs, CT 06076 860-558-3043

email: tiredironcollector@hotmail.com www.svaec.com

21 May 11th Annual Hillside Tractor Ride

Cummington MA, Rt. 9 to Fairgrounds Road, to Cummington Fairgrounds.

Contact: Francis Judd, 145 Berkshire Trail w., Goshen, MA 01032; 413-268-3264

email: gdjuddandsonsll@verizon.net

May 26, 27, & 28 Bernardston Gas Engine Show and Flea Market

Route 10, Bernardston MA Exit 28 off I91

Contact: Vickie Ovitt (engine show) 413-834-0103 Harvey Phelps (flea market), 413-648-9551

http://unitedchurchofbernardston.org/