Bay Area Engine Modelers Club, Branch 57 of EDGE&TA

The Crank Calls

December 2010

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$25.00 US
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NEXT MEETING
December 11, 2010 at
Chabot College, building 1500
25555 Hesperian Blvd, Hayward 94545
Doors open at 10:00 AM
Meeting starts at 11:00 AM
Potluck immediately following meeting!

Upcoming Events

Dec 11, 2010 Annual BAEM Club Potluck (note that this is the 2nd Saturday in December!)

2011 annual membership dues are now due!

MEETING NOTES

Bob Kradjian
November 20, 2010

President Don Jones called the meeting to order at 10:00 A.M.

There were no visitors.

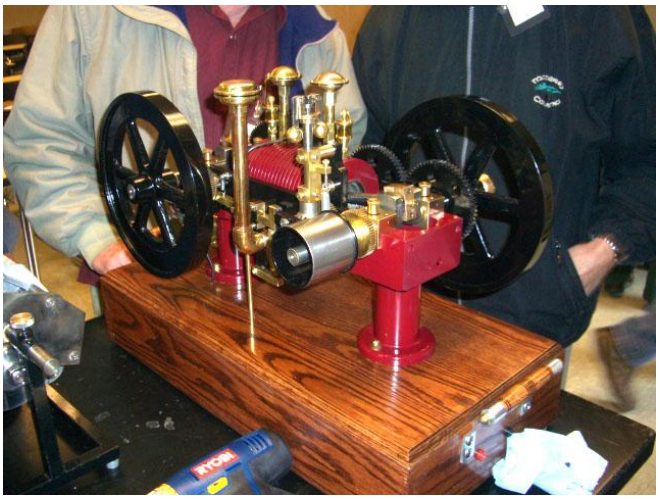
There were two "First Pops", well sort of a potential single pop for the first one. Jim Bove created a lovely muzzle-loading cannon. Not a replica, he simply created it from his fertile imagination. "Just off the wall!" he said. The project stimulated a good deal of discussion about smooth bores, "geared" missiles for Civil War Era cannons that had cogs that fitted into spiral rifling twists in the bore and resulted in greater accuracy, insert blanks that can be purchased for such models, and other topics. Jim included ramrods and a sighting device in his build. The entire cannon is mounted on railroad wheels; it makes you wonder if it wouldn't quickly retreat down the tracks after it was fired.

Treasurer's report was that we are solvent. Our WEME account will be closed and rolled over into the BAEM account. However, Ken Hurst has been busy. His two V-8's are on display at the Wally Parks museum at the Fairplex in Southern California. See *museum.nhra.com* for their site.

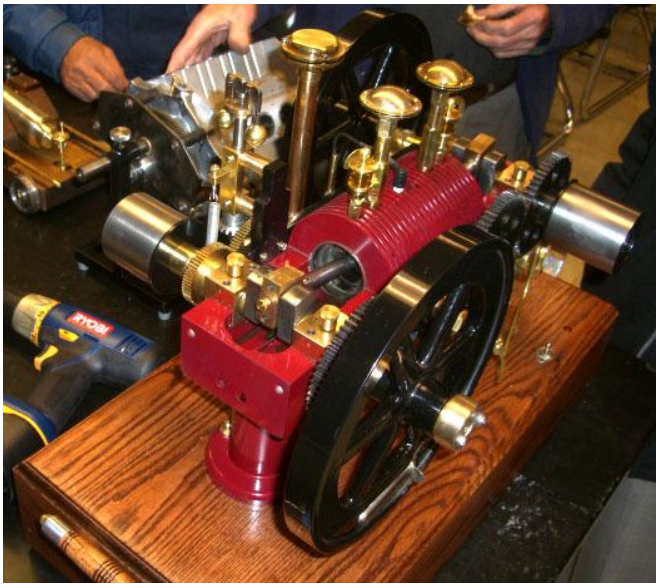
There was no secretary's report. It should be noted again, that the December meeting will be held on the SECOND Saturday (the llth) and an hour later. Bring food, friends, engines, an appetite and good cheer.

George Gravatt has successfully completed his totally original opposed-piston engine. Describing the problems associated with such an ambitious project, George said that the valve's functions were a particular challenge. The compression initially blew the valves off the seat. This was corrected, in stages, by moving the valve seat away from the cylinder until all fell below the outer perimeter of that cylinder. However, this

caused a sharp decline in compression, which caused……..and so it went.



He incorporated an ancillary exhaust port at the end of the power stroke of each piston to port off excess heat. This, while robbing some power, results in an engine that will run for over an hour at only140 degrees. The two central paired exhaust stacks are capped by Dwight's innovative exhaust covers.



Lots of exhaust ports on this engine! On one side of the engine is a train of four large gears. I'm sure George will protect these from prying fingers before its run for the public. The entire project is nicely presented on a finger-jointed case with a shiny red automotive enamel spray paint job. You could think of it as a pair of Siamese-twinned singles joined the top of the head.

Mike made a nice presentation on "Balanced Cutting." This is also called hollow mill cutting. The shop-made balanced cutter, made from hardened Drill Rod, is held by a drill chuck in the tailstock and cuts the metal stock mounted in the lathe spindle, down to a major thread diameter. The tailstock ram is used to advance the cutter onto the metal stock.

A die holder is slid over the ½" cutter (which changes role and becomes the pilot for the holder) to keep the holder aligned with the work piece. Grasping the die holder by hand, the die can be forced onto the work piece until the required thread depth is cut. Then, by releasing one's grip, thread cutting ceases and the die/holder rotates with the work piece. Stop the lathe and unwind the die holder/die from the newly formed screw and all that is left to do is to dress up the screw head and cut off the now finished screw from the remaining raw stock.

It is a bit difficult to express verbally.

Mike plans an article in *Model Engine Builder* magazine issue #23 which will be published in January. "Balanced cutters" on Google lead to information on plywood cutters and hay cutters as well as thread makers.

News has arrived that Bob Haagenson, our wonderful member from Pomona, California suffered a stroke three weeks ago. He is recovering with some residual left-sided weakness. All of us at BAEM send our love and support. For cards, it's Bob Haagenson, 462 W. Alvarado St., Pomona, 91768. Bob is an amazingly talented and prolific builder. We have all been amazed at the variety and excellence of his engines; and have greatly enjoyed his cheerful good company at our WEME shows.

Speaking of shows, we discussed some aspects of our potential hook-up with the Good Guys show next August. Scarcity of hotel rooms, high fees for vendors were potential problems; but the overall benefits for all concerned parties are considerable. More details will be available after the New Year.

Jim Piazza reminded us that we are now celebrating the tenth year of our BAEM club website. Jim has done heroic work in establishing and maintaining the site. Every BAEM member

owes him a debt of gratitude for his consistent and faithful efforts.

Carl Wilson gave us a course in the fine points of casting in Zamak 3 alloy (also known as Mazak). This metal, which melts in the 800 degree range is well suited for applications as the frame for the little wobbler engine developed by Malcolm Beak and used by our club. It is used in drawer pulls, carburetor bodies, etc. Starting with a pattern made on a Gorton 3:1 pantograph for the molds, Carl's ingenuity allowed him to develop a shop-sized foundry out of a flower-pot and ceramic wool. This material, also called Kao, is an excellent insulator. Carl was able to determine the shrink Zamak, its 0.04" over a 2 inch space between centers on the wobbler engine frame.

This theme was also explored by Peter Lawrence who gave us detailed information on heat-treating piston rings and then went on to another big subject: silver-soldering boiler plates. For the latter, he is specific that we should use Harris 56 silver solder which avoids the danger of volatilized cadmium. He gave useful details about the use of white flux and the need to insulate (again using Kao wool) parts of the boiler away from the intended solder joint.

The flux vaporizes, then turns to powder, and finally to a glassy coating which signifies the ideal heat for silver solder to flow. MAPP gas provides needed extra heat over a straight propane torch. Some tips on the use of propane and MAPP gas. The MAPP tanks cools with steady use and should be placed in a bucket of hot water.

For piston rings, the heat treat should be at 1150 to 1200 degrees. Fourteen hundred degrees will anneal the rings. Peter uses a dental burn-out furnace with a thermocouple to monitor the heat level. Supplies for all this hot stuff can be obtained from the Claymaker on 1240 N. 13th St., San Jose. Check at (408) 295-3352 for a possible address change.

Carl Wilson's report on the Black Widow V-8 starter project reminds us that this engine will be a history making replacement for the Challenger. Maybe some time in late 2011. Kudos to Hurst, Giles, Jones, and all associated with this great project!

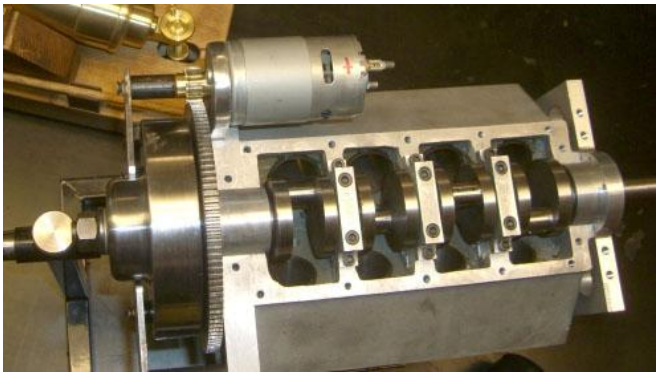
Remember, it is December 11, not 18 for our Christmas Party!

TECH TOPIC

Carl Wilson

Dwight Giles brought his Black Widow V-8 to illustrate his talk on the starting system.

The starter motor is from an electric kiddy car. Dwight suggests buying the car then throwing it away after removing the drive motor. I wonder if one of Dwight's grandkids is wandering around the yard looking for his car. Oops, sorry, that's a bit off topic. Back to starter motors.



Dwight did some layout work and determined that the motor could be mounted at a center distance of 2.75" from the center of the crankshaft to the center of the motor. Now it was time to calculate a usable gear train that would mount at the center distance, have a reasonable gear ratio, and fit the "ring" gear into the crankcase. Because of the number of unknown parameters it was necessary to "cut and try" various trial possibilities. Dwight eventually arrived at a 26 DP 17 tooth pinion driving a 126 tooth ring gear. DP stands for Diametral Pitch. Skipping a formal definition it is correct to say that DP is a measure of the size of the tooth: the larger the DP the smaller the tooth. Twenty six DP is fairly small: the teeth are about 1/8" wide half way down their length.

(Most machine shop textbooks have excellent presentations on the calculation of gear parameters. I suggest Technology of Machine Tools, by Krar et al.)

Dwight makes his own gears using involute milling cutters and an indexing head. The immediate problem was indexing the teeth for the gears. Dwight uses a Brown and Sharp type indexing head with a gear ratio of 40:1. It requires 40 turns of the crank to rotate the work spindle one turn. The rule for calculating indexing is to divide the ratio of the head by the number of teeth in the gear and leaving any remainder as a common fraction reduced to the lowest common denominator. First the motor pinion of 17 teeth: 40 divided by 17 is 2 6/17. The whole number is the number of full turns of the crank, the numerator of the fraction is the number of holes to be additionally indexed, and the denominator is the number of holes in the circle to be used. This turned out OK as the normal set of index plates for the B&S index head has one circle of 17 holes. Turning the handle 2 full turns and then 6 more holes on a 17 hole circle would index the work to the next gear tooth.

The problem is the 126 T ring gear. Its indexing would be 40/126 which can be reduced only to 20/63: that is 20 holes on a 63 hole circle. And wouldn't you know it: the standard set of index plates does not have a 63 hole circle. All is not lost! It is not that hard to make a special plate with any number of holes. Dwight used the method of calculating the "X and Y" co-ordinates of each hole and drilled them using the digital readout on his milling machine. A piece of cake, except for the calculations. Let's see, you can do it with a scientific calculator using trigonometric functions, or with a spreadsheet, or the co-ordinates have been published in several books. At a guess they are probably available on line, but I haven't looked. And, there are a number of methods of making direct dividing appliances for the lathe which use such pre-divided bits as plumber's tape and band saw blades. Magazines for the hobby are a good source of such devices.

One more note: all of the descriptions of indexing refer to the indexing moves as "holes on a circle" and then caution to not count the initial hole. Indexing moves are really the spaces between the holes so for this example move 20 spaces from the initial hole. Counting holes or spaces, it amounts to the same thing.

Dwight likes to make several gears at one time so he makes a custom mandrel, stacks the blanks on the mandrel, turns the outside diameter to size in the lathe and moves the mandrel to the dividing head in the milling machine to cut the gears. Do yourself a favor and just scratch the blanks with the cutter on the first go-round, then count the number of teeth. Measure twice and cut once.

Some final notes: the gear ratio of a 17T pinion driving a 126T gear is 7.41 to 1 and with this ratio the electric motor drives the crankshaft at about 2200 rpm with plenty of torque. A Torrington

sprag clutch couples the gear to the crank and provides the over-running feature usually furnished by the Bendix drive.

Ladies and gentlemen, there you have it: Dwight Giles on how to design the starter drive for a model V-8 engine.

WANTED:

The mini-foundry has been a success pouring Zamak, a zinc die casting alloy. The use of Zamak for model engines was pioneered by Jerry James of BAEM and it is fitting that Dwight Giles and I have continued exploring its uses. Mike Rehmus is going to be promoting is use in Model Engine Builder. We are seeking a supply of scrap die cast material for further experiments. Anything you have to get rid of is of use to us. Sources of this alloy include carburetor bodies, die cast fittings for thin wall conduit, and parts of door locksets. Thanks in advance for any contribution.