

Enhancing Your Own Creativity and Applying it to Tool and Clock Making

**A presentation by Jim Haubert
for**

NAWCC

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2013 by Jim Haubert

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Hello,

My name is Jim Haubert and I want to thank all of you for the honor of inviting me to address your chapters.

By dividing my presentation into two parts I hope to first convince you of my capabilities so that the second part, where I would like to discuss enhancing creativity, will have more value.

I started learning to run a lathe at 12 years old sometime in 1959 in the basement of our house. My father started his last machine shop there and I started learning how to arc weld and braze using a carbon arc torch the following year.

Throughout my life, something that my dad told me has stuck with me, “You shouldn’t have to brag, your workmanship should speak for itself”.

I guess I have taken that message to heart, as I tend to be low key about what I can accomplish. So forgive me if I am now appearing to brag.

By the time I graduated from high school my dad had long since outgrown the basement & was renting a location where I continued to work with him full time as a machinist/tool & die maker.

In 1972 I struck out on my own to become the Experimental Machinist for Harley-Davidson’s Racing Department. I also enrolled in night classes for Auto Body Sheet Metal repair. I had long wanted to learn how to hand-form sheet metal.



This last skill came in handy when I repaired a badly damaged pendulum bob for a pinwheel jeweler's regulator not quite two years ago.



**I discussed the repair process
here:**

<http://mb.nawcc.org/showthread.php?83840-Pin-wheel-pendulum-bob&highlight=Pinwheel+bob>



Early in 1973 I left H-D to start my own business to provide high quality prototype design, machining and fabrication for those involved in the transportation industries.

In late 1975, I negotiated a retainer with H-D and for the rest of the 70s I built experimental & prototype motorcycles for H-D under contract from the basement of our own Victorian home.

One of the motorcycles that I restored/replicated is on permanent display at the Indianapolis Motor Speedway Museum.



During our time in this house, my wife & I were furnishing it w/period antiques. I started learning how to repair antique clocks from a member of the NAWCC who was a clock repairman/collector and I joined in 1976.

Shortly after learning the repair craft I built the bushing tool that won the first place honor at the NAWCC national in Pasadena, CA. in 2012.



Because I was interested in large regulator clocks and couldn't afford any in the 70s, I started to build my own prototype in 1979. It was to be a test bed to try ideas that I had (and future ones) that I couldn't find solutions for in my reading.

After the gearing was completed I made a depth tool for locating the arbors. This is the tool that was honored with a second place at the above mentioned National Convention.

Although I always maintained my own shop, I had to work in various shops and one of them was the Tool & Die Shop of West Bend Company (where they made cookware). Being surrounded by many really dedicated, talented craftsmen, this experience really opened my eyes as to considering different points of view for solving problems.

Years later I worked as an Instrument Maker for the Physics & Astronomy Department of Arizona State University. This position helped me gain experience working with ultra high vacuum chambers and electron microscopes. I also added ultra high vacuum welding to my skill set.



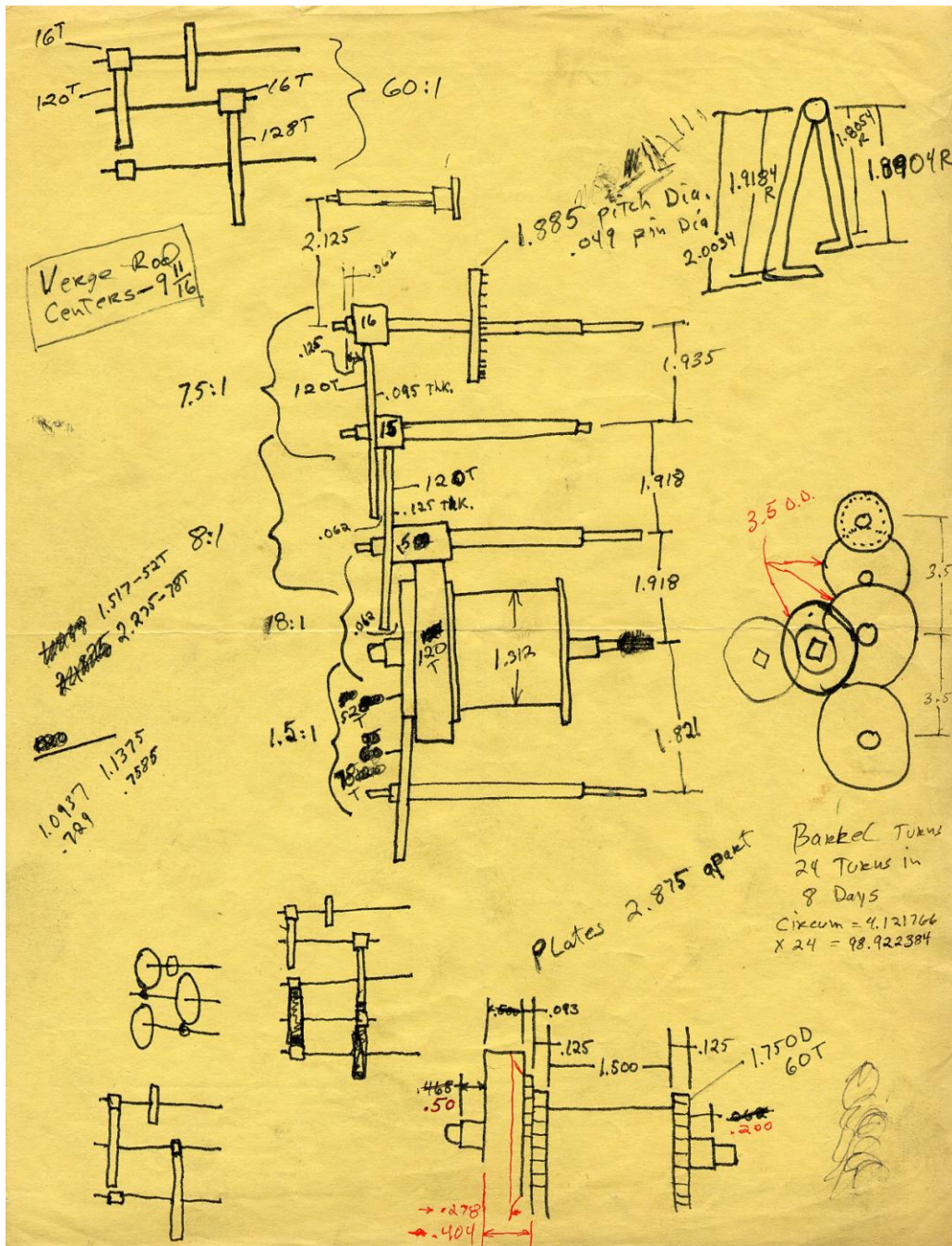
We tested welds such as these with a helium leak detector that would sense the presence of helium atoms. If one atom of helium could get through, the weld had to be redone.



Here is the prototype regulator I referred to.

I have been discussing this clock and my experiences with it for the last few years at:

<http://mb.nawcc.org/showthread.php?74057-Owner-built-precision-regulator>



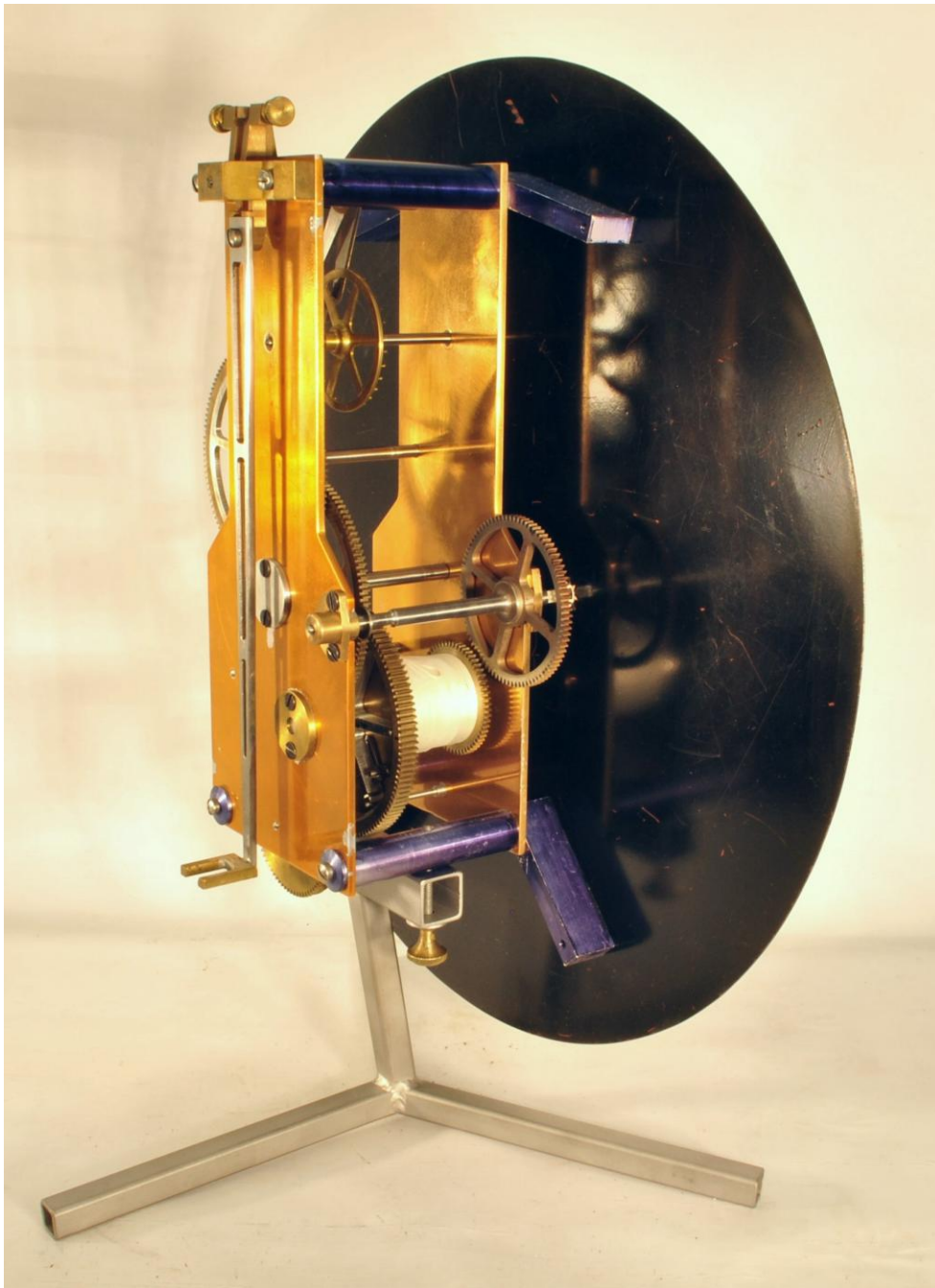
This is my original sketch for the prototype, which is also the extent of my blueprints.

Notice the level of sophistication!





From that sketch I built this movement. Shown here in the cabinet with the dial removed.



Most of the materials used for this movement came from shop leftovers.

The plates are not made of brass. They are aluminum because that is what I had on hand. I polished them and sprayed them with a clear lacquer that I tinted so they would look like brass. I used Bergeon bronze bushings at the pivot points.

The wheels are cut from left over bronze tube stock and I shrunk them onto the aluminum centers before cutting the spokes and teeth. The dial is cut from the lid of a 55-gallon drum and the pendulum tubes are sink drain tubes filled with lead.

The bob weighs 30 pounds.

One of the earliest of many experiments was to use glass end stones on the winding drum arbor. This yielded the largest single reduction in friction of any change. I was able to reduce the driving weight from its initial 10 pounds to around 8 pounds. These end stones are now sapphires.

This prototype was my first attempt at gear cutting and I had a lot to learn.



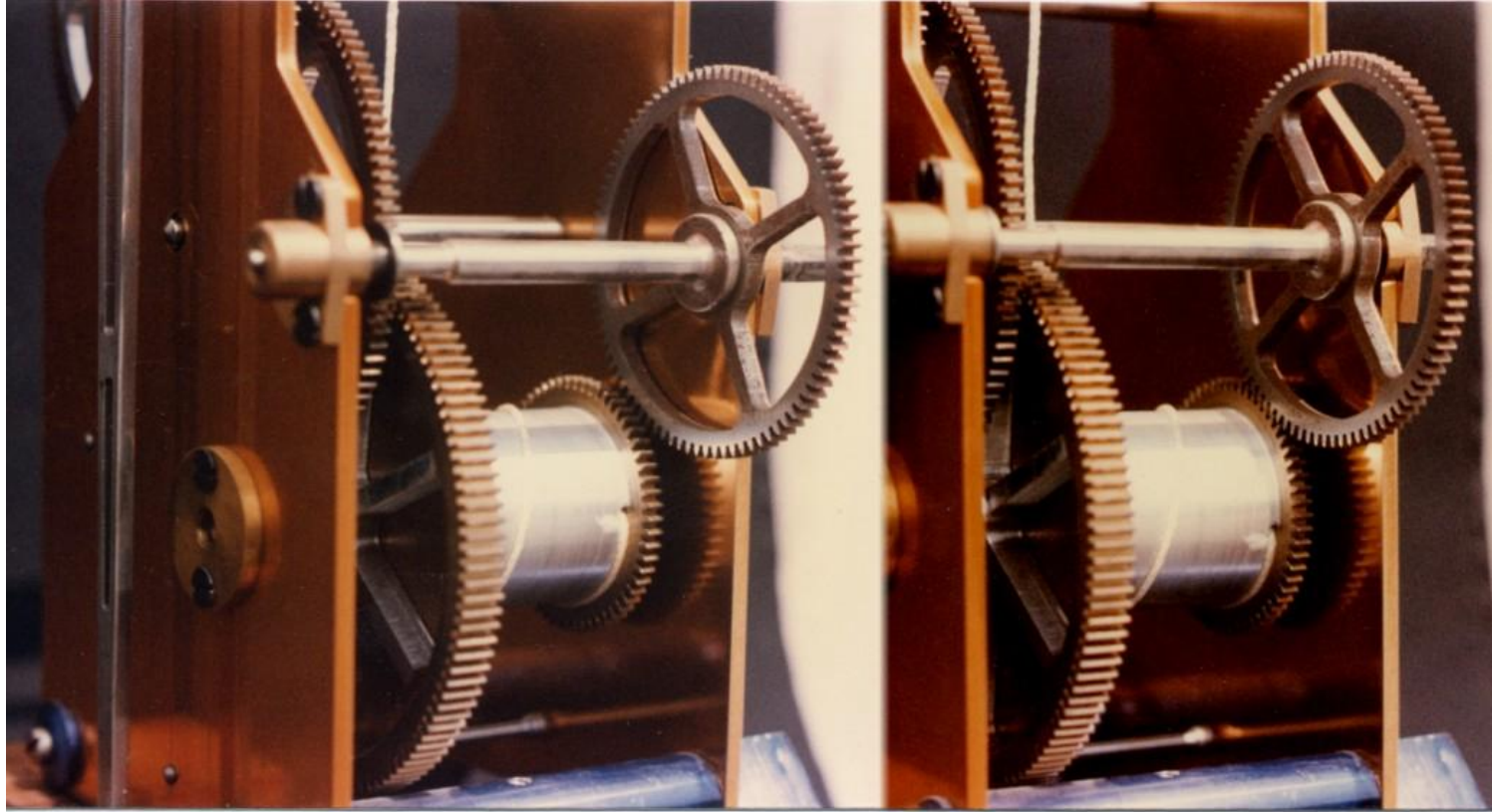
For the wheels, I started with a woodruff key cutter and ground the tooth shape into the sides of the cutting teeth. To provide cutting clearance I used a die grinder to relieve the sides by hand almost to the cutting edge.

This worked well on the aluminum test rack shown, but the bronze wheel rims were another story. The bronze was much tougher than regular brass and each tooth ended up with a slight curve to it. The curve was larger on the wider teeth and sharper on the narrow ones. I had to slightly file each of the 120 teeth on every wheel to straighten out this curve so the gearing would not bind.

I believe the curve was caused by the cutter head flexing on its shank when entering and leaving the material.

As I developed this movement, an idea occurred to me to fix the great wheel firmly on it's arbor (rather than have it float) and wind the drum w/teeth cut into one of the flanges. This method of winding is shown in this photo.

The winding arbor is spring loaded to keep it from adding friction to the train. To wind, you just push the key/crank in to engage the gear w/the drum teeth and wind the weight up. Release the key/crank & the arbor pops back out of engagement.

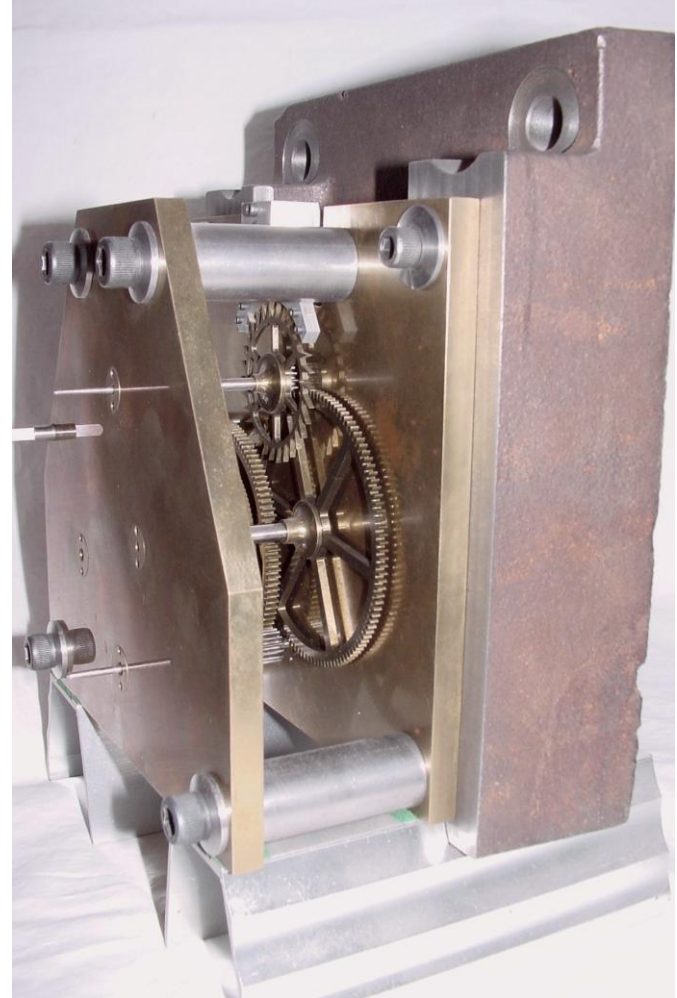
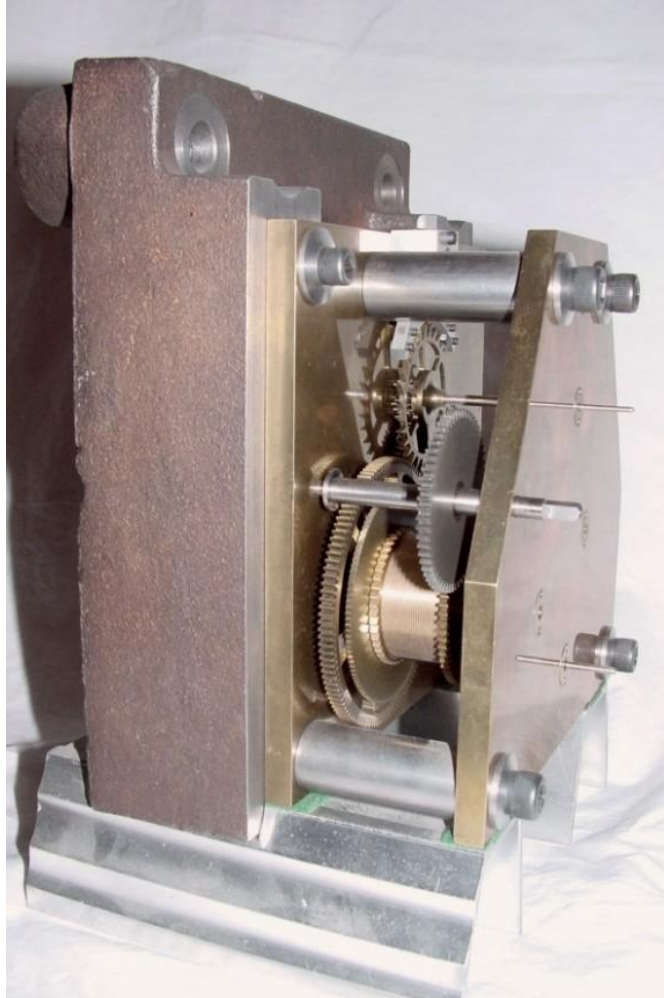


I've never seen this method before or since but it allows the great wheel to be as concentric as possible to the arbor rather than 'kicked' off to the side by the action of a ratchet pawl on one side.

Knowing that the gearing wasn't what it should be, I was pleasantly surprised when I compared the clock to the WWV signals. I found that it would keep time to 1.5 seconds in 3 weeks when the temperature stayed rather stable. That large house tempered day to night temperature fluctuations quite well.

This taught me that a solidly anchored, heavy pendulum could even out gearing sins that were not too extreme.

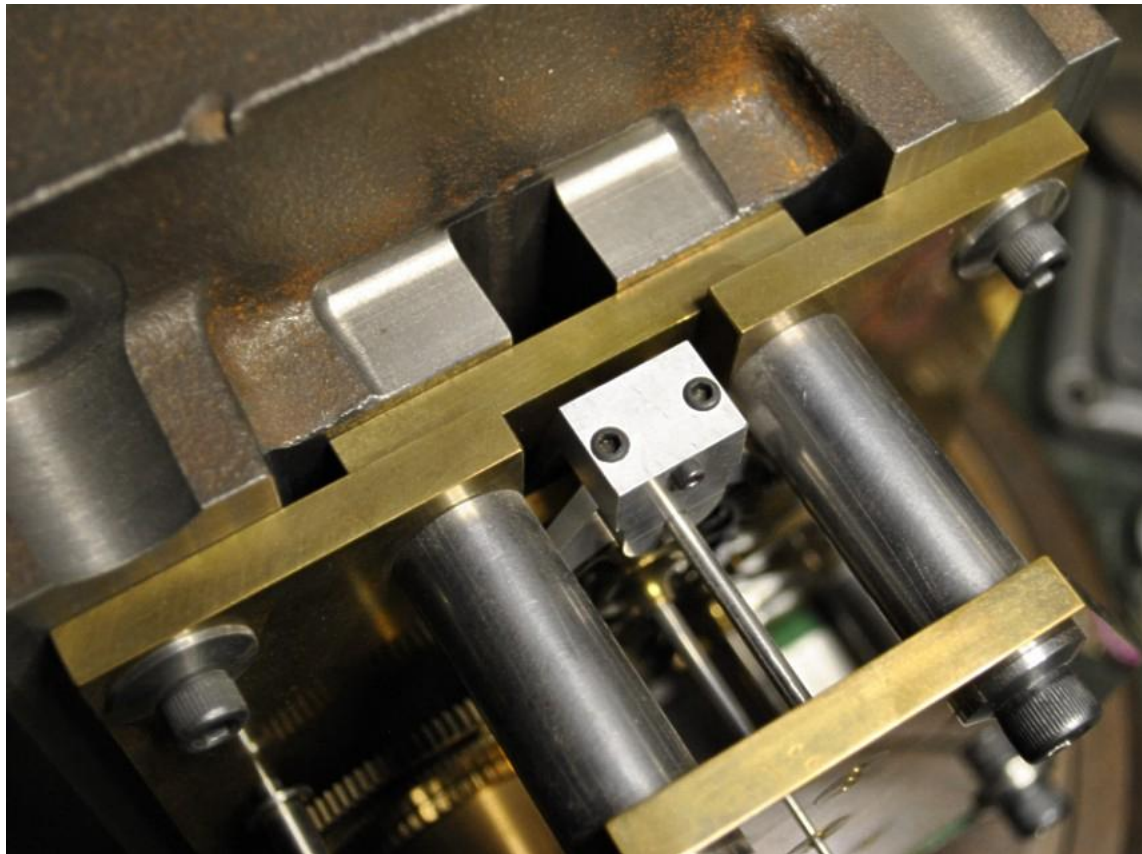
After building and modifying this movement through the years, the lessons learned were incorporated into the next generation movement shown below, and still being developed.



Very often precision clocks have a massive mount for the movement and pendulum. E. Howard went so far as to use cast iron for the entire back of some of his regulators.

What strikes me as odd is that so often the movement rests at the bottom of the plates on arms protruding forward. This places the mounting at the farthest distance possible from verge, which is the fulcrum for the crutch.

My preference now is to mount the movement as solidly as possible at the top and use large posts to assure the most stiffness for the entire assembly. The posts are made of steel rather than the traditional brass. The end shake of any of these arbors is only .001 inch and I did not want that to change with temperature variations.

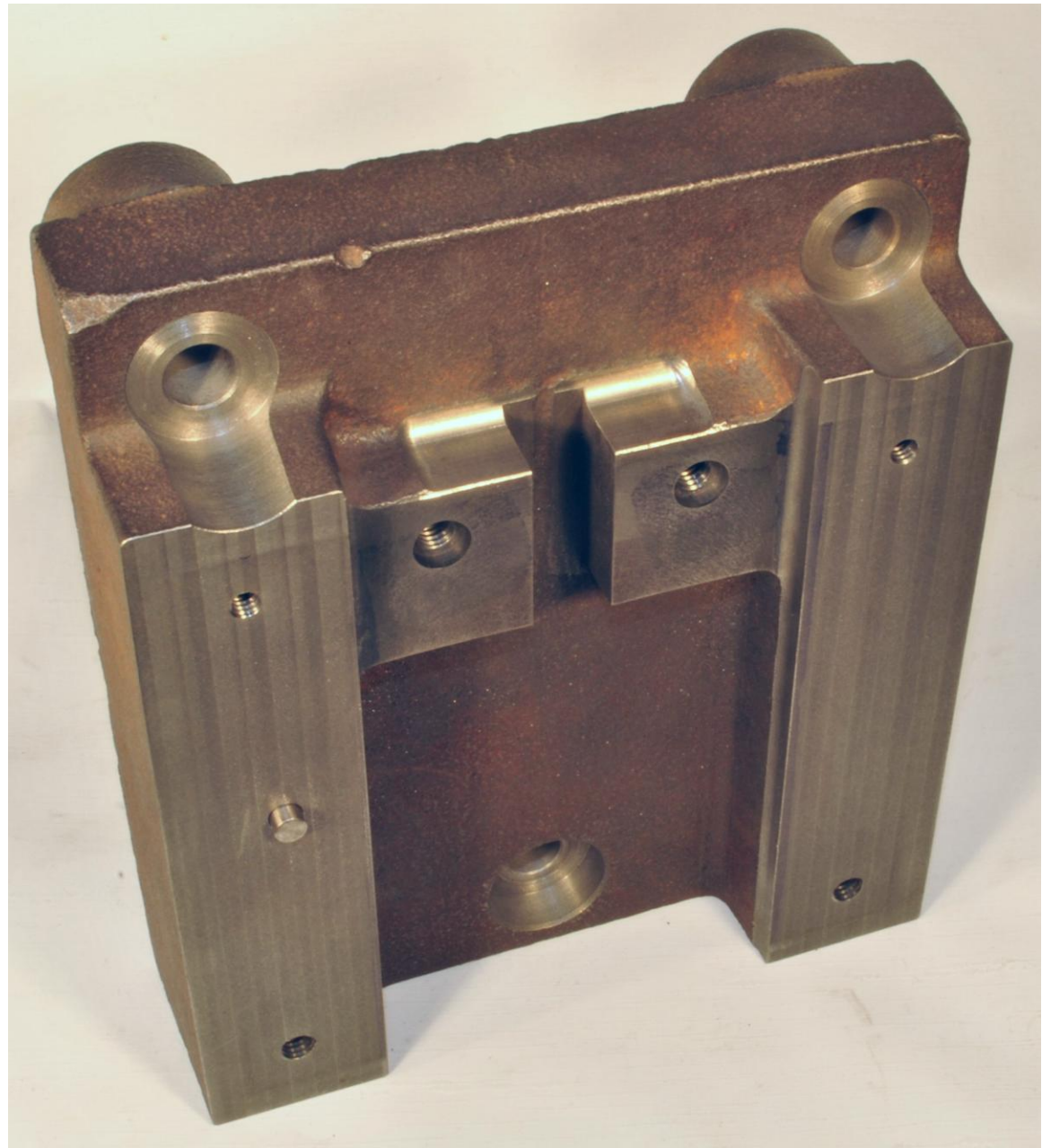


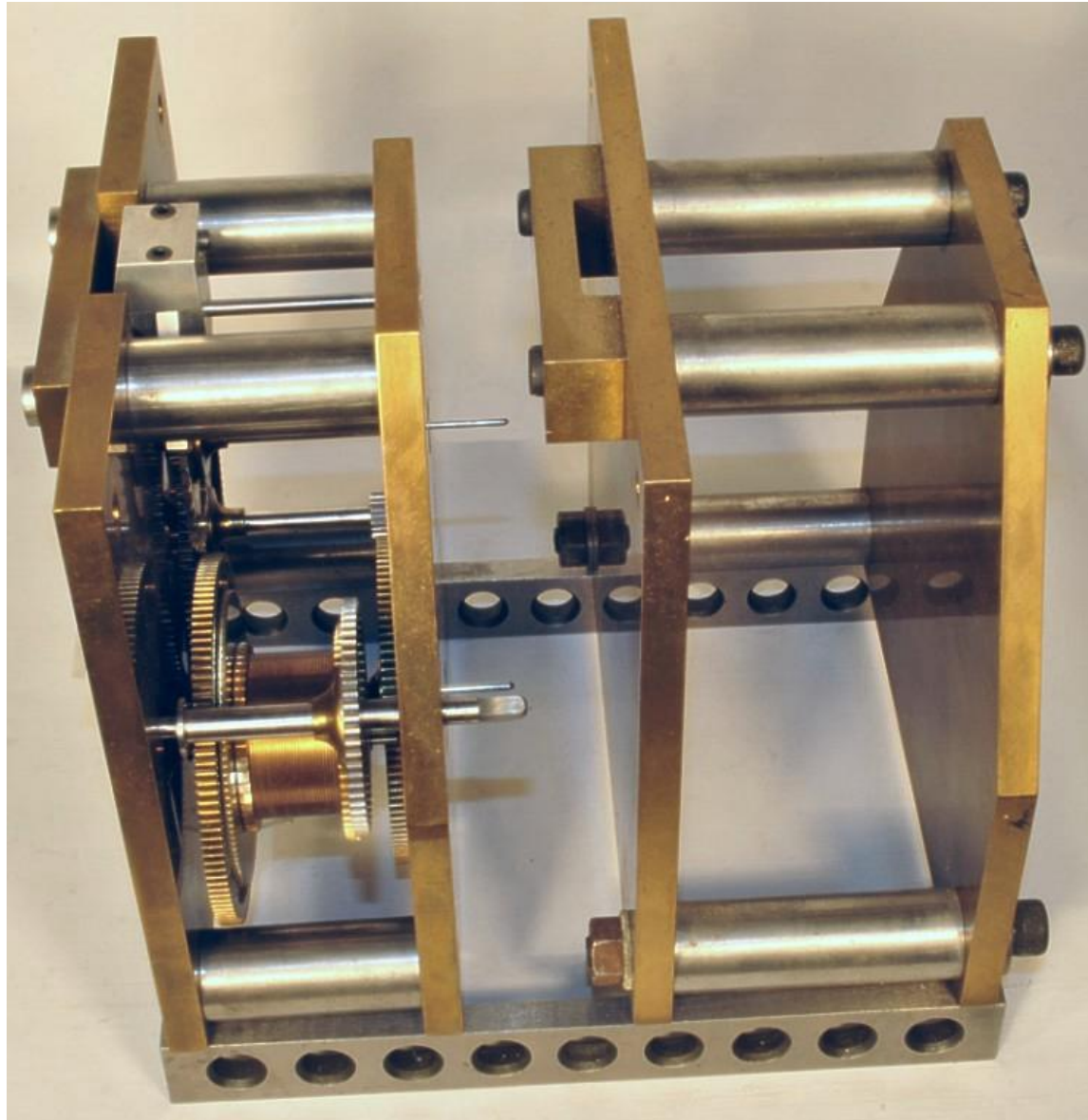
In the machined casting for the mount, the spring-loaded plug for the winding arbor is in the large left boss. The movement is screwed tightly at the top and in the same horizontal plane as the verge.

The counterbores around the two closely spaced holes locate the top posts. These posts protrude through the bridge and into the casting.

The 3 large bolt holes are for securing the movement to a wall. These holes go through round bosses on the rear. The back of the cabinet will be bored to clear these bosses and be screwed to the rear of this mount so that the wood cabinet will float slightly away from the wall.

This way the mounting of the pendulum will not be affected by humidity or temperature changes that might distort the cabinet.





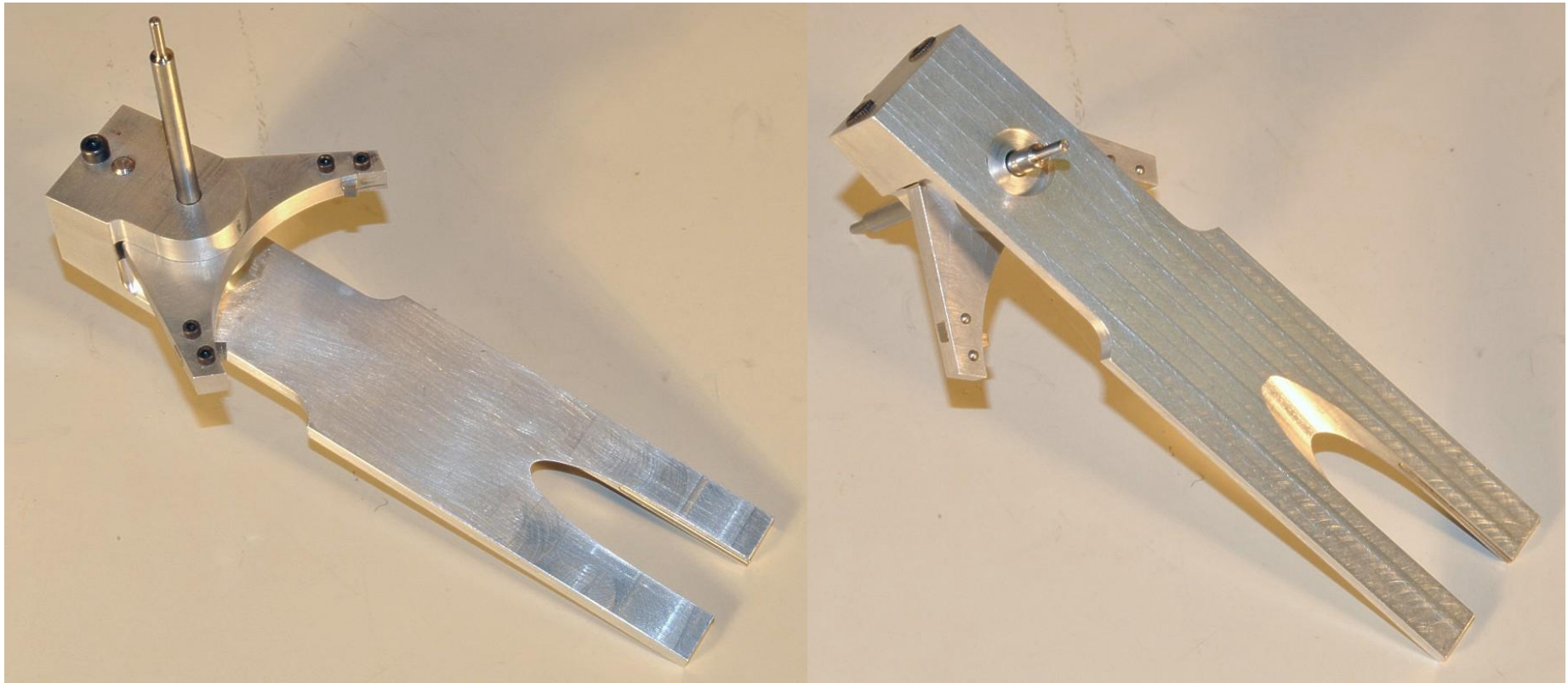
On the right is how I initially set the movement up to use a traditional crutch system with the bridge screwed to the top plate from the rear. However, by the time I got to making the verge I realized that I could design the stiffer system on the left.

Because I have been reducing the driving weight of my prototype, I found I could bring the plates much closer together by using thinner line for the weight.

Another traditional area that I am paying attention to is the verge design.

There has been discussion that it is not a good idea to have the verge contact the pendulum shaft at a spot where it could set up a harmonic vibration in the shaft. I agree with this line of thinking but then I asked myself, “If the crutch could cause a harmonic vibration in the larger pendulum shaft, what about a vibration in the slender crutch that is usually used in movements?”

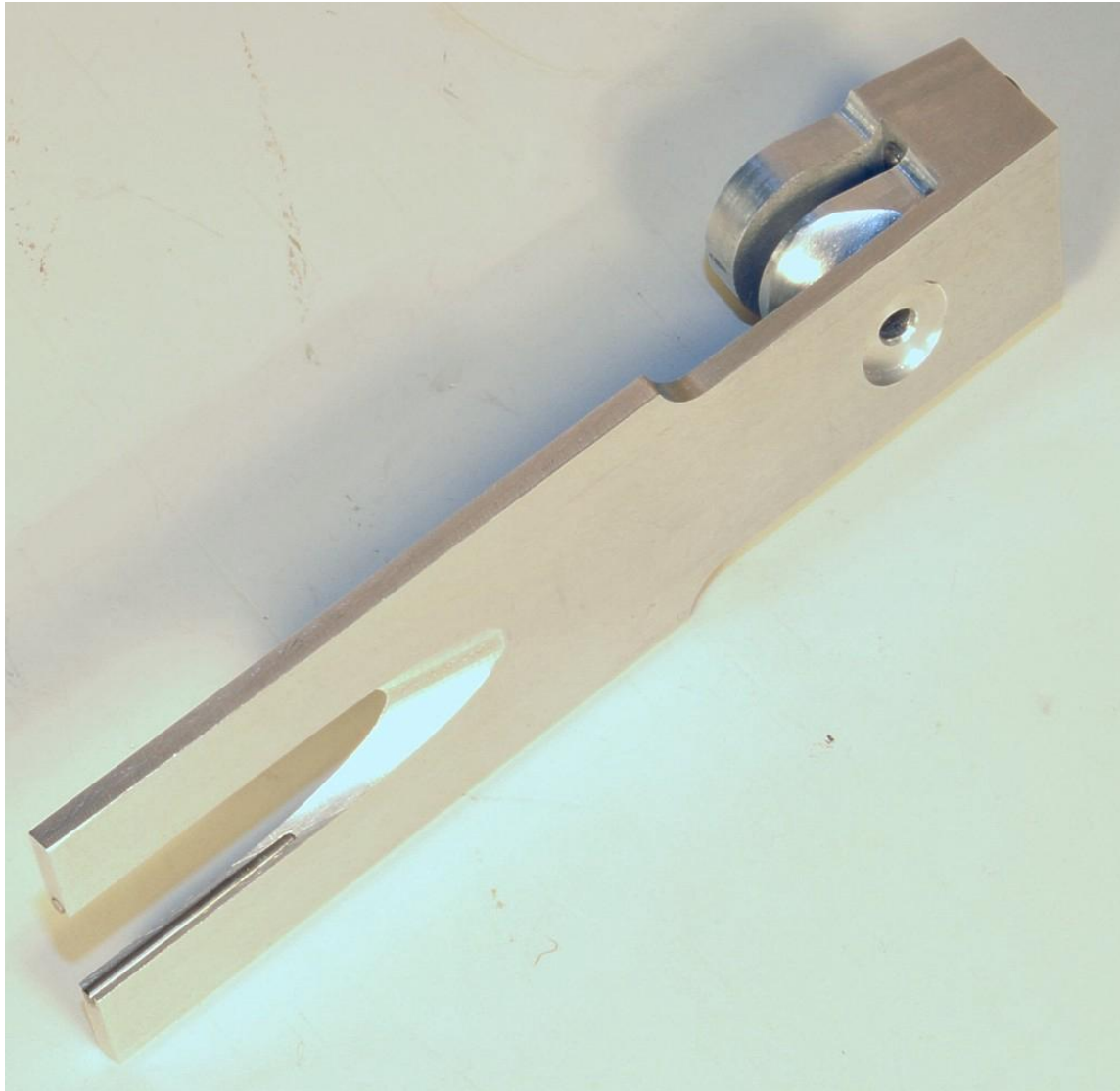
This thought led me to seek a stiffer design for the verge.



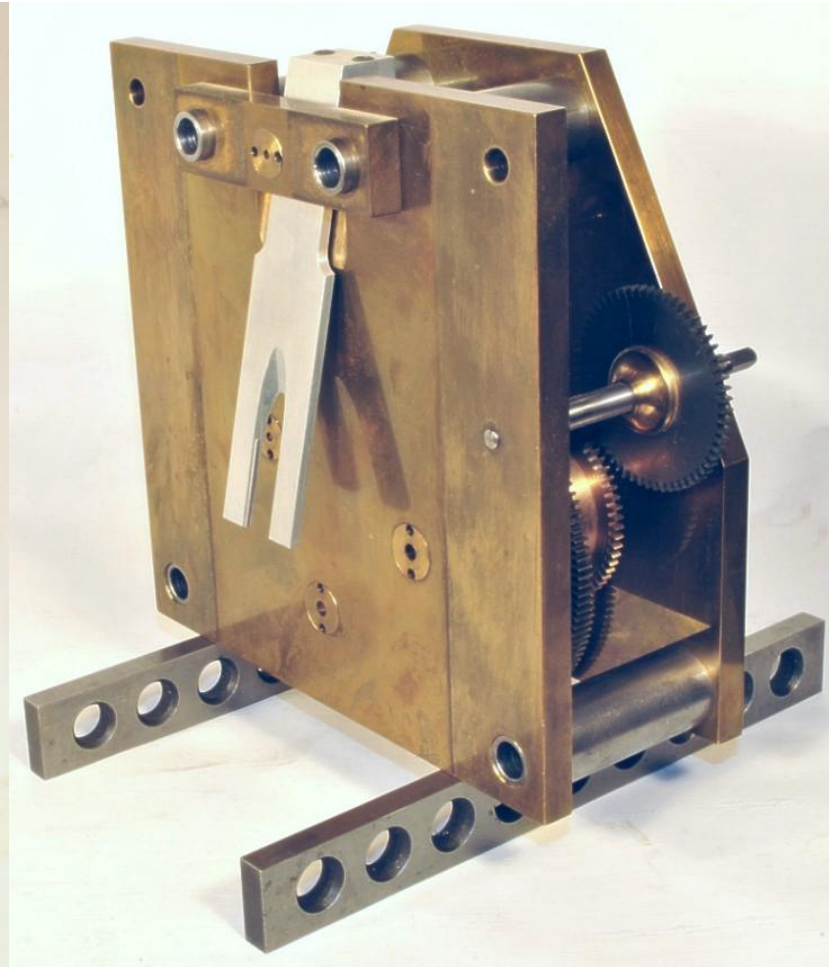
I wanted to increase the width of the crutch to resist flex and chose aluminum to save weight. Aluminum is 325% lighter than brass so this assembly only weighs 39 grams or 1.3 ounces. I still plan to remove more weight however.

It looks out of proportion because the arbor doesn't transmit any torque. It can therefore be quite small in diameter.

Because the verge meets the pendulum shaft at an angle I inserted hardened .050 diameter pins for the contact points. This assures that the pendulum receives the impulse at its centerline.



The left view shows the clearance cut for the verge/crutch assembly, the ruby jewels and the extended posts that locate the movement. On the right is how the assembled movement looks from the rear.



**Now I would like to
address the topic of
creativity and when I say
I'm going to start at the
beginning, I'm not
kidding.**

My earliest memory is of my being in a diaper and crawling on our living room floor. I then stuck something (probably a hairpin) into an electrical outlet.

I could not yet walk or talk, but perhaps because of the trauma of the event, I have always recognized that the process for understanding how to view the world around me has never changed to this day. I hesitate to use the term “thought process” because I feel that the entire process is not well recognized.

What I am saying here is that my power of comprehension was fully developed at least as early as the event I mentioned, and very possibly at my birth.

I have long felt that we all are born ready to go to work on what we need to do but we get pulled off that path in varying degrees by the adults that are entrusted with our care.

Recently I discovered that I am not alone in my feeling this way.

This quote is from Buckminster Fuller (the inventor of the geodesic dome) in his book, 'Utopia or Oblivion'.

"I am convinced that neither I nor any other human, past or present, was or is a genius. I am convinced that what I have every physically normal child also has at birth. We could of course hypothesize that all babies are born geniuses and get swiftly de-geniused. Unfavorable circumstances, shortsightedness, frayed nervous systems, and ignorantly articulated love and fear of elders tend to shut off many of the child's brain-capability valves. I was lucky in avoiding too many disconnects."

My wife has been in Early Child Special Education for over 40 years. She showed me a story of a preschooler who drew trees using the color blue. He was 'corrected' because we all 'know' that trees are not blue.

He 'corrected' his behavior and at the same time his enthusiasm for school started to deteriorate.

Coincidence?

What particularly got my attention from this story was that a short time before, I had viewed a television presentation. Part of the show had discussed a certain type of butterfly that confounded those studying it.

These butterflies only picked out a certain type of yellow flower for their food from entire fields filled with what looked like the same flowers.

Only when someone had the wisdom to try ultraviolet light did the investigators learn that there was a different pattern on the surface of certain flower petals not visible to us 'enlightened' humans.

Blue is at the high end of the visible spectrum (close to ultraviolet). Who are we to tell a child that trees are not blue?

Should we re-educate the butterflies to tell them they should only see yellow? How about re-educating dogs to only hear sounds that we hear, or smell what we smell?

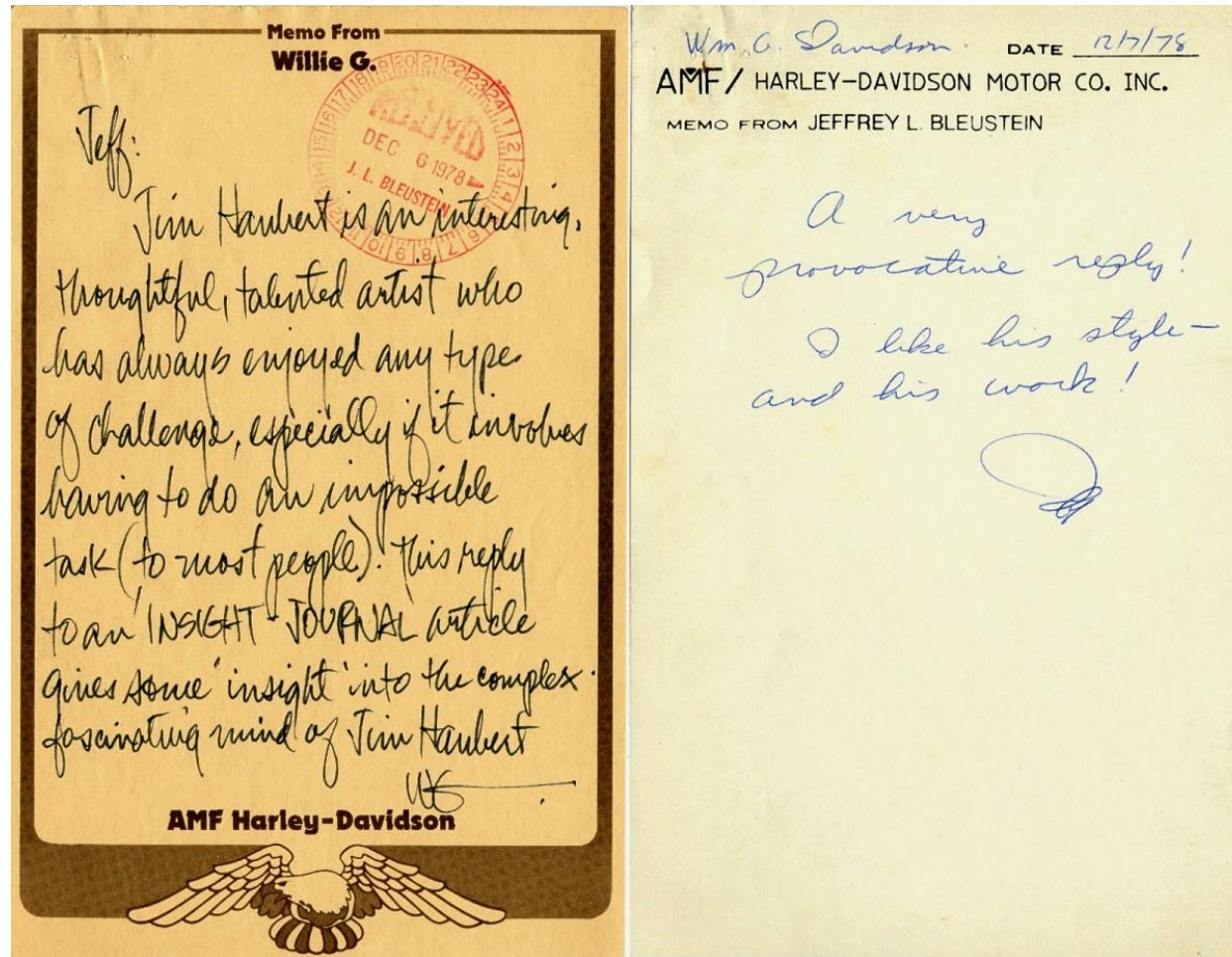
Isn't it odd that we don't try to re-educate the animal world, but we do it to our own children?

I am reminded of what Mark Twain said.

“The reason that man is at the top of the evolutionary chart is because man is the only animal that makes out charts.”

For me, it is only my ability to function in a physical body that has matured. Concerning what people generally refer to as “thinking”, what passes for maturity in our culture has, by and large, never happened for me.

In 1978 I responded to an article printed by our local newspaper and my letter resulted in this memo and the reply on the right being written at Harley-Davidson.



**In this memo, the writer describes my mind as fascinating
& complex.**

On the other hand, I see it as completely the opposite.

**My 'mind' appears to be complex because our culture has
made complexity its goal by using science and linear
thinking in an attempt to justify and 'explain' everything.**

**The process I use regularly to do an "impossible task" is
entirely normal and simple to me but it does not fit a nice
neat pigeonhole.**

I have come to recognize that there are two perspectives that exist within each of us.

I refer to them as the artist and the engineer.

Throughout the ages others have given them different names such as male vs. female, animus vs. anima, positive vs. negative etc.

I always have to balance the artist (creative) with the practical (engineer) and I can always feel the tug of war. The artist wants no boundaries to create without restriction. The engineer wants to be grounded in logic and linear thinking.

Constantly I have to decide which one is of primary importance for a given situation.

Neither one can exist without the other.

The artist can accomplish nothing without the discipline of the engineer. But the engineer can never come up with a creative solution because his process is linear and needs a starting point.

This is why I said that the “thought process” is not well understood.

Unfortunately our culture elevates logical, linear thinking at the expense of the artistic, creative side of our existence.

What we call our thought process does not fit a single explanation when the two components must exist in harmony – not in the domination of one over the other.

We seem to be at a point in our history very similar to what was going on at the end of the Dark Ages and the beginning of the Renaissance.

All thought had been rigidly controlled by one group and the birth and development of science was shattering old superstitions.

Now however, we have pushed science to discovering it too has limits. These limits are especially obvious when it comes to explaining us and our relationship to the world.

I strongly believe that the upswing in people taking up craftwork of all types is an intuitive reaction to sensing the limits of linear thinking.

The NAWCC is a great outlet for people interested in timekeeping to showcase their work.

Local chapters and the online watch & clock forums are able to help those wishing to develop their skills.

Just like the child who painted blue trees, some of you may feel that your work is not ‘good enough’.

Please let me show you a clock entered in a different category at the same craft competition where I entered my tools.

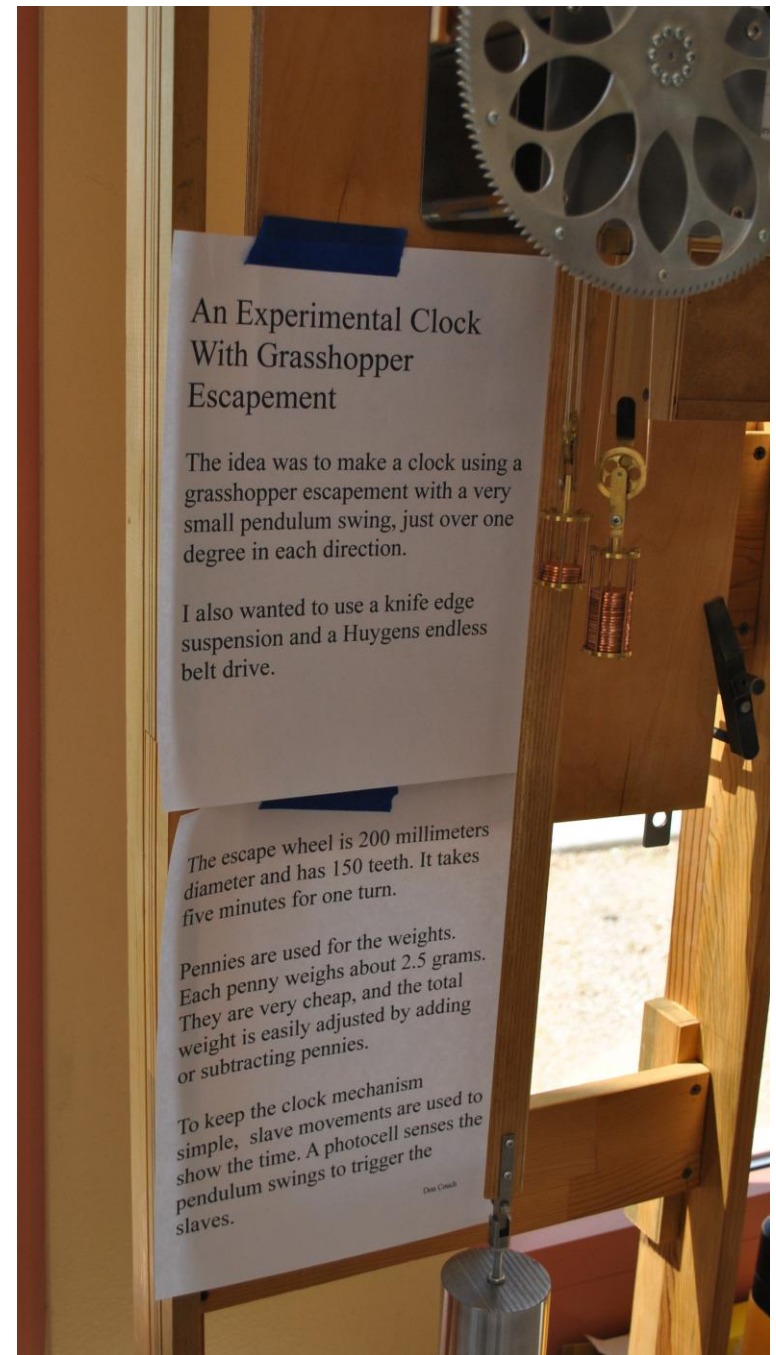


Don Couch from the Keywinders chapter in Arizona built this.

Before the judging Don had expressed doubts that he could compete with the fancy, polished, jeweled items that were around him.

The judges recognized the care, innovation, and execution of his project and properly awarded him the Blue Ribbon for first place in his class.

Furthermore, he built this with a Sherline lathe, proving that a person does not need the biggest, the fanciest or the most expensive equipment to create a masterpiece.



Now that we are adults, the task of changing years of conditioning is not going to be a walk in the park. But I would like to leave you with a few words of encouragement.

If you want to improve, be content to be thought foolish and stupid.

Epictetus, Greek philosopher associated with the Stoics, AD 55-c.135

Great spirits have always encountered violent opposition from mediocre minds.

Albert Einstein

Never let anyone talk you out of painting your trees blue.

Jim Haubert