

A Metal Easel For Oil Painting

By

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What I'm up against

Oil paintings are commonly done on a canvas.

The canvas is stretched over a wooden frame and stapled in place.

An easel serves to hold such a canvas while a painting is being made.



Goal

- Design and build a painters easel that will:
 - 1) Work in the studio, classroom and outdoors
 - 2) Facilitate “sharp focus technique” (like a photograph)
 - 3) Stand up to hard usage

Detailed Easel Requirements

- Must fit into SUV for transport
- Must be hand portable
- Must be as light weight as possible
- Must be stable in the wind (no tipping over)
- Must hold painting securely
- Must not cover up edges of painting
- Must be adaptable for large canvases
- Must provide hand support for extra fine brushwork
- Must move boxes of painting equipment
- Must allow painting to be tilted back
- Must allow painting from both sitting and standing positions

A Friends Reaction

- “Well hell, Norm. Why don’t you just put a motor in it and drive it to class?”

Basic Design

- Copied from a hand truck



Finished Easel

Front



Back



Materials

- 1 ½ x 1 ½ structural aluminum
- Aluminum sheets, angles and small square tubes
- Miscellaneous 1018 mild steel, angle, plate, rod
- Miscellaneous bolts, screws, nuts, washers, pop rivets, threaded couplings and all thread rod
- Small amount of red oak
- Small amount of Masonite untempered board
- Wheels
- Glue
- Aluminum paint

Metal Joinery Techniques

- Mostly nuts and bolts
- Brazing

Disassembled

- Truck Base
- Rectangle
- Canvas Rails



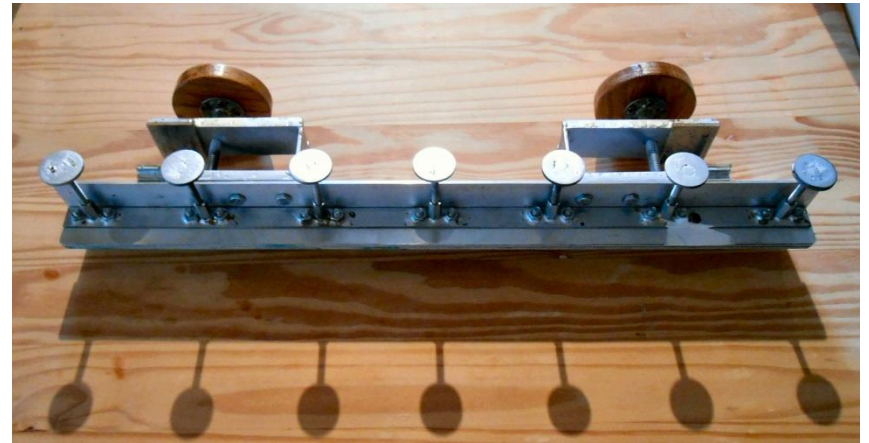
Basic Functionality

- Truck Base provides mobility and load handling.
- Rectangle fits between the Truck Base uprights and slides up and down. This is the major height control for the canvas.
- Canvas Rails clamp inside the Rectangle and move up and down with it.
- Canvas Rails can be placed anywhere inside the rectangle.
 - Allow holding of different size canvases.
 - Keep canvas from falling out of easel.
 - Allow painting from sitting and standing positions.



A Closer Look at the Rails

- Underside of bottom rail.
- View looking from bottom of easel upwards.
- Large wooden hand wheels are part of clamping mechanism of Rail to Rectangle.
- Small round knobs are part of mechanism to hold bottom side of canvas to easel.



Rectangle Clamp Detail 1

- Two bolts hold rectangle clamp to rail.
- One large bolt with hand wheel closes clamp on Rectangle.
- Note the two pieces of Masonite glued to the inside of the clamp. These provide friction.
- Each Canvas Rail has two clamps.



Rectangle Clamp Detail 2

- Clamp made from 1/8 mild steel and 1/4 key stock.
- Key stock has been brazed to top and bottom of clamp to reinforce it.
- Some day will mill new clamp from steel flat... to avoid some brazing.



Rectangle Clamp Detail 3

- Hand wheel made of red oak
- Hand wheel attaches to a washer with wood screws
- Washer brazed to threaded coupling.
- Threaded coupling screws onto tension bolt that forces the clamp closed.
- Some day will turn new hand wheel holders from stock.



Canvas Rail Detail

- Canvas Rail is just two pieces of aluminum angle bolted together.



Canvas Pin Detail

- Canvas pins hold the canvas to the easel.
- Keep canvas from coming loose and falling.
- Long piece of mild steel runs length of rail and is bolted to it.
- Couplings brazed to the strip of mild steel and allow canvas pins to be screwed into the wooden canvas stretcher. This allows for a really tight grip. Need to be checked for tightness periodically.
- Multiple pins allow different widths of canvas.
- Canvas pins leave entire face of canvas free and clear for painting.



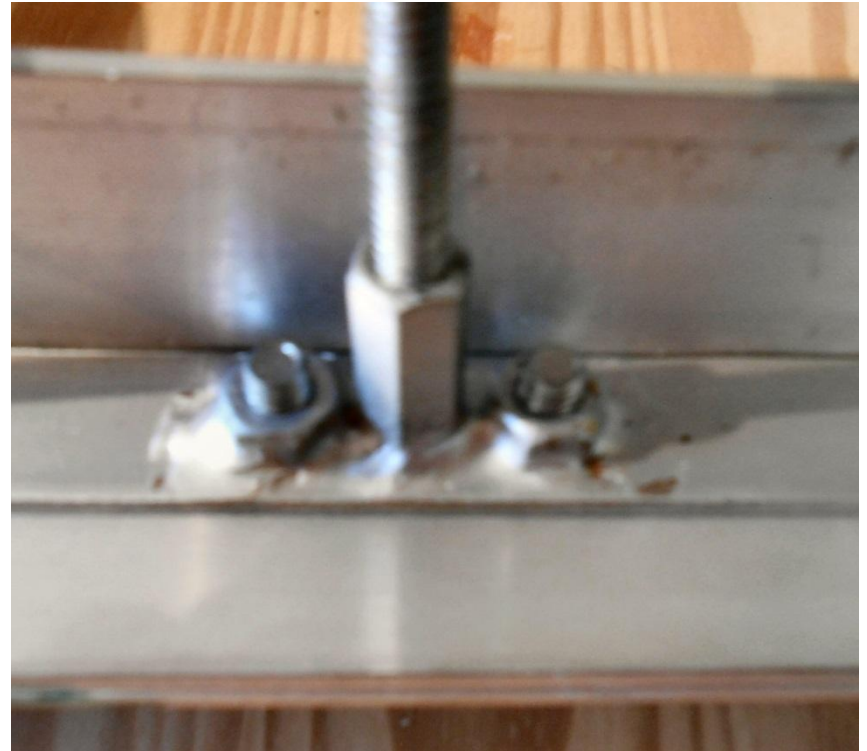
A Closer Look

- A Canvas Pin
- Two fender washers brazed to a nut and bolt.
- Note that bolt tip has been ground to a point to dig into the wooden canvas stretcher.
- Some day I plan to turn some new grips from stock and knurl them.
- Will likely braze new grips to all thread.



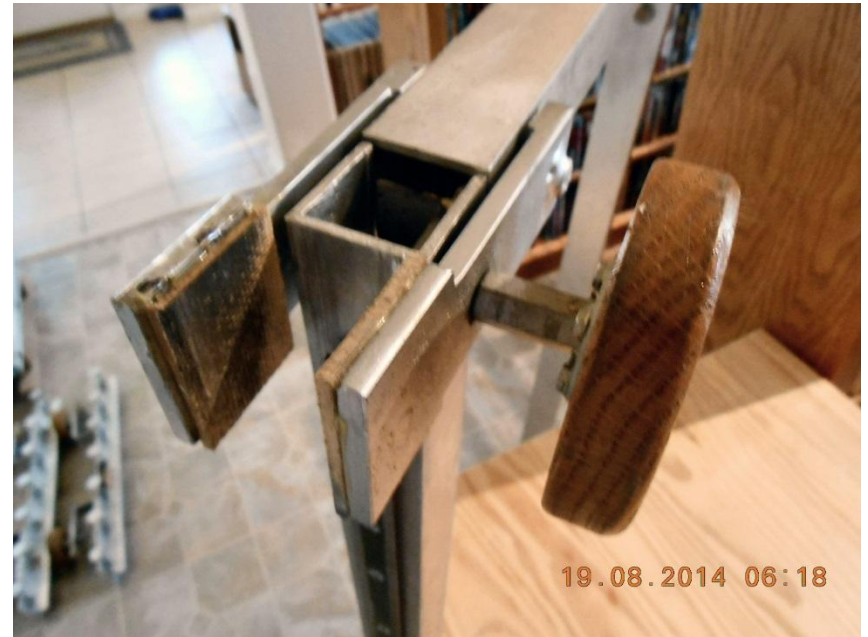
Yet Another Closer Look

- Canvas pin base
- Easel is 20 years old. It could stand some wire brushing and repainting.



Rectangle Detail 1

- Rectangle viewed upside down.
- Rectangle has two clamps at its base. These hold the rectangle in place on the Truck Base uprights.
- Design is mostly the same as elsewhere on the Easel.
- The difference is that the clamp is made of $\frac{1}{4}$ inch mild steel.



Rectangle Detail 2

- A “T” rail is fixed to both sides of the Rectangle.
- This is made from layers of aluminum with the top of the “T” made from steel.
- Aluminum does not slide well against Aluminum.
- The steel has been filed along both edges for clearance.



Rectangle Detail 3

- “T” rail is held in place with machine screws and runs the full length of the Rectangle.



Rectangle Detail 4

- “T” slot attached to Truck Base upright serves as a guide for the “T” rail.
- This holds the Rectangle firmly to the Truck Base and allows the Rectangle to slide up and down.
- Again, stacked aluminum with a steel top held on by machine screws.



Rectangle Detail 5

- Picture shows the top of one of the Truck Base uprights.
- “T” slots are paired to allow movement only up and down.
- Originally, the “T” slots ran the full length of the upright but, excessive friction and binding forced me to shorten them to two abbreviated pairs.



Trouble

- The “T” slot and rail system was difficult to implement.
- Experienced severe binding and friction.
- Tried everything including Clover abrasive... what a mess that was!
- In the end, disassembly and reworking the parts with a metal file fixed everything.



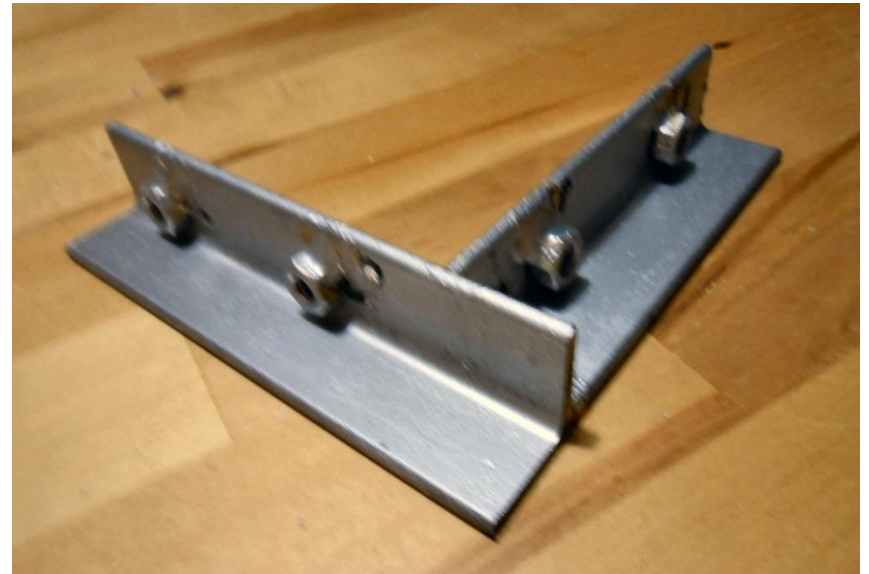
Rectangle Detail 6

- Two furniture rollers bolted to the top-back of the Rectangle allow the Easel to be easily rolled in and out of my SUV.



Dirty Secret

- Two pieces of mild steel angle brazed together at a right angle.
- Four nuts welded to angle over top of drilled holes.
- Four of these are what hold the Rectangle together... from the inside.



Rectangle Detail 7

- Four bolts secure the steel angle inside the Rectangle.
- This leaves no bolts on the front or back of the Rectangle to interfere with the movement of the Canvas Rail clamps.
- Thus the ugly steel angle is hidden from view.



All the way down

- With the Rectangle moved all the way down, the Easel is 58.0 inches tall.
- This position is used to haul the Easel in my SUV.



All The Way Up

- With the Rectangle moved all the way up, the Easel is 76.5 inches tall.
- A large canvas set this high would make a great sail and with enough wind might tip the Easel over.
- Canvas can be up to 46 inches tall with almost unlimited width.



Truck Base Detail 1

- Front of the Truck Base with wheel removed.
- Note 8 bolts at lower left.
- These screw into a piece of mild steel inside the aluminum frame.
- Steel piece is drilled horizontally to accept axle.
- Note hole in end of axle for cotter pin.



Truck Base Detail 2

- Truck shelf is two pieces.
- Exterior piece is a hollow box made from aluminum sheet riveted to aluminum struts.
- Interior piece is made from aluminum struts held together with all thread rod.
- Wooden extension serves to level the easel.



Truck Base Detail 3



Truck Base Detail 4

- Holes cut in edge of shelf help conceal internal rods and nuts.
- One less sharp edge.



Truck Base Detail 5

- Truck bottom has hard rubber pads to keep easel from sliding around on slippery floors.



Truck Base Detail 6

- ¼ inch mild steel flat is held on by 6 bolts.
- Hole in this plate allows shelf to pivot around the axle.
- The axle does double duty as a hinge pin.
- Inside the aluminum strut is a block of mild steel drilled and tapped.



Truck Base Detail 7

- Inside the aluminum strut is yet another block of mild steel.
- Three bolts at each end hold the block in place.
- The middle of the block has been drilled and tapped to allow a diagonal cross brace to be attached.



Truck Base Detail 8

- Each block hole allows the easel to be tilted back by an additional 3 degrees.
- Top hole in diagonal fits top row of holes in block.
- Bottom hole in diagonal fits bottom row of holes in block.



Diagonal Strut Detail

- Diagonal brace bolts to truck upright.
- Inside there is yet another block of mild steel drilled and tapped.
- Note that the diagonal strut has been painted with aluminum paint.



Tilting The Easel

- Maximum tilt is about 17 degrees.
- Have never used this feature.
- Discovered that I like my canvas vertical... less light glare off fresh paint.

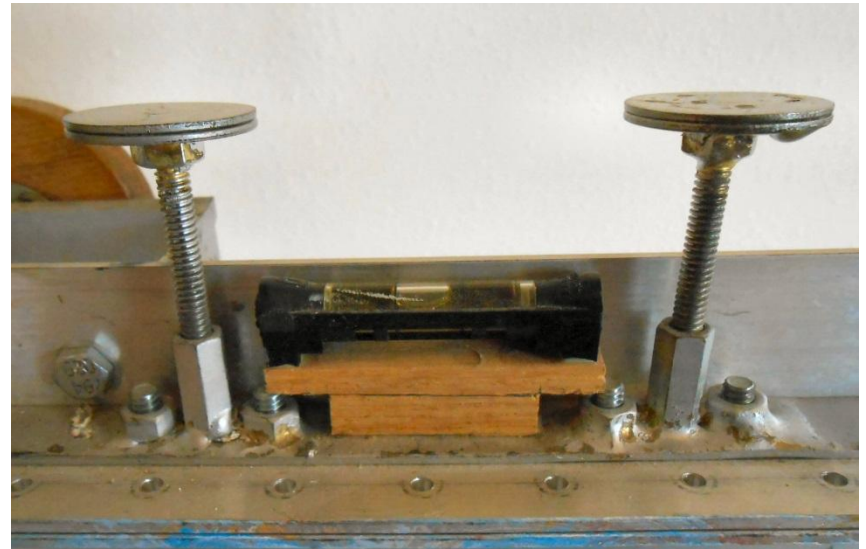


That's a lot of steel, Norm!

- Yes, easel weighs 75 lbs... without tool and supply boxes.
- Object is to heavily weight the bottom to keep the easel from tipping over.
- Putting big wheels on an easel makes it inherently unstable.
- Having 6 months of painting effort go face down in the dirt would be reason to give up painting.
- Worse yet, it could stick to the floor... don't need a mess like that!

Getting it straight (more or less)

- Glued a plastic bubble level to the top rail.
- Hopefully the painting will be close to level when it's in the easel.



An Interesting Tool

Canvas Stretcher

- I assemble my own canvases for a variety of reasons:
 - 1) I use portrait grade canvas because it is smoother.
 - 2) I want exact control of the canvas size for artistic reasons.
 - 3) I want my canvas stapled on the back of the stretcher... so the painting does not need a frame.
 - 4) Stretcher grips the canvas and provides leverage for stretching it tight. Does double duty as a hammer for staples that are not in all the way.



About the Top Canvas Rail

- The top rail is different than the bottom rail.
- It has holes drilled in it.



The Support Rail

- Support Rail is ½ inch square aluminum tube with a hook built onto it.
- The long screw fits into any one of the holes on the top Canvas Rail.



Support Rail Revealed

- Support Rail hangs from top Canvas Rail and rests against the bottom Canvas Rail.

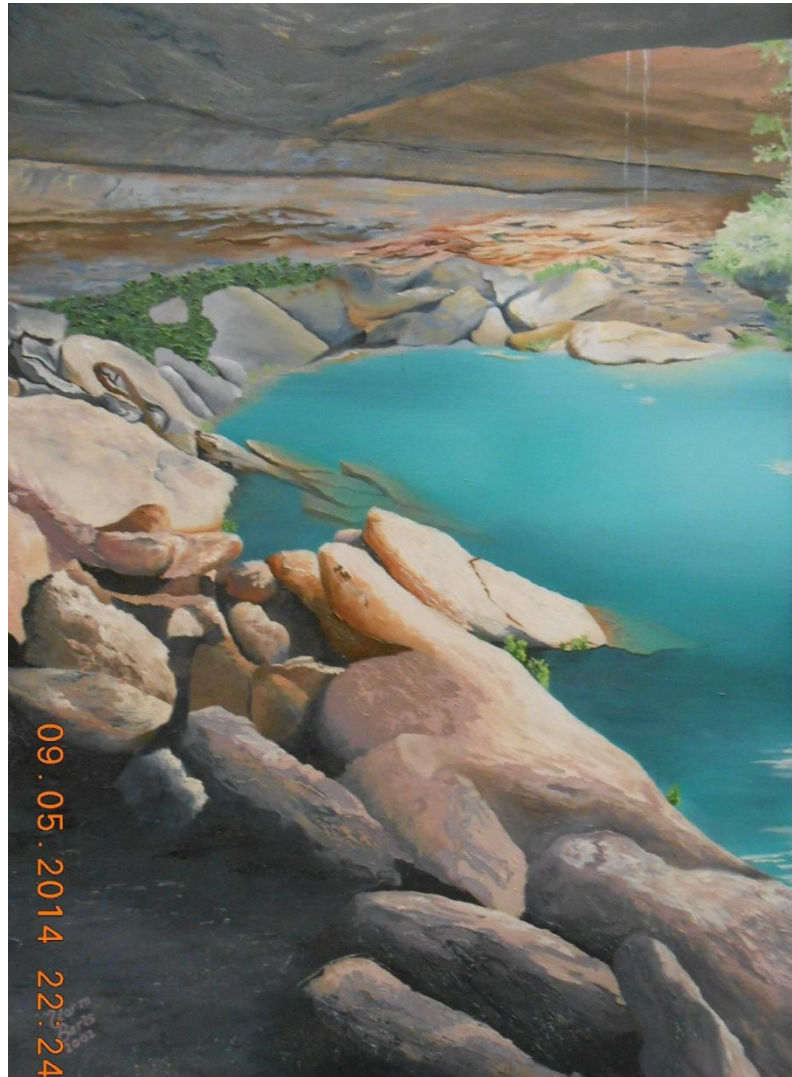


Painting in Sharp Focus

- Front of Canvas Rails extend beyond canvas.
- There is a gap between the Support Rail and the painting.
- This keeps the Support Rail out of the paint.
- Support Rail is a hand rest that allows very fine control of the brush.



Hamilton Pool



Yosemite



Galveston



Sandy Tobias



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Easel Detail Summary

- Stands between 58 and 76.5 inches tall
- Weighs 75 lbs.
- Contains around \$300 in materials.
- Took 4 months to build (working intermittently).
- Contains features not found on any commercially available easel.
- Estimated market value \$1000 to \$1200

The Future

- Need to make some new Canvas Rails
- Need to grip canvas from the back and from inside the stretchers.
- Need free and easy access to the edges of the painting.
- Goal is to produce paintings that don't need frames... an important commercial consideration.

The End