

**Modeling the O&W
NO. 33 in a Series**

**Confessions of an Engine Builder
Class U, Class U-1 and Class V Double Cab engines of the O&W**

By
Mal Houck



Drifting easily past the Winterton Depot after completing a modest “pusher assignment is Class V No. 278 as captured by photographer Bob Collins. Long considered one of the most photogenic of O&W “Double Cab” engines despite 63” drivers, often regarded as too small for passenger service, the Class V engines steamed easily and rode well at higher than freight train speeds of the time and served dutifully in what is now known as “dual service,” pulling both freight and passenger trains. Here the “Prince of Camelbacks” shows its clean lines and proportions as the friendly engineer acknowledges his photographic capture for posterity with a friendly wave.

In a modest departure from my usual format of modeling description in past editions of this column, when I have selected a modeling topic (either finished or nearly so) and proceeded to engage in a sometimes not so brief historical outline followed by a modeling description; -- here I shall introduce the reader only to some current O&W locomotive modeling. Some of this is more a portrait of me and my O&W modeling interests, in short.....”The confessions of an Engine Builder.”

It should come as no surprise to readers and those who know me that presently absent an operating layout my modeling efforts have been directed elsewhere....and, for those having viewed OWRHS Convention and other show displays of my work, a focus of some years has been towards locomotive building. In a shortest expression of my modeling direction.....I’m an engine builder.....and for all other projects, first and foremost a model steam engine builder!

A part of my fascination with railroading generally is founded in my appreciation of, as author and editor Jack Farrell stated in his farewell edition of his well regarded publication “Locomotive Quarterly,” that “. . . most human of all machines; -- the steam locomotive. . . “

The steam locomotive is a creature unlike any machine we have today. Commencing to move, in motion it seems to glide with a “chuff” ending in the resonant auditory decay of a deep breath

exhaled. Automobiles, diesel engines, and aircraft must “rev up” their engines in order to advance into motion, but the steam engine has all of its energy stored in the ferocious pressure and heat of the boiler and the superheated steam within. An engineer’s crack of the throttle admits a tiny measure of steam to the pistons with then the thermodynamic properties of steam expanding to do the rest. Author Sam Posey, in his work “Playing with Trains,” likened the sensation of motion in a steam engine to that of being drawn forward (by that invisible force of steam), as opposed to being pushed and shoved by the workings of an internal combustion engine. Romantic? . . . yes! Attractive? . . . all the more so!

Exactly how I came to be so focused upon the O&W is now so long in the past as to fairly defy explanation in any overall sense; -- but for certain I find the O&W locomotive roster, as it developed over the “Steam Era,” to be fascinating and quite so in some of its peculiarities. Despite the attraction of many “O&W-ophiles” to the supremely elegant, almost regal and clean Class Y “Light 400” 4-8-2’s (myself included), the brutish appearances of the “Bullmoose” 2-10-2’s and the more athletically fit and powerful demeanor of the “Big 400” Class Y-2 4-8-2’s the face of the O&W was, for a large part of the early 20th Century, the numerous Camelback or, in O&W parlance, “Double Cab” engines.

With the wide Wooten fireboxes required by the use of anthracite coal fuel the O&W rostered many classes of Double Cab engines, with several classes having significant members. The O&W Double Cabs saw system wide service. The Class P 2-8-0’s slugged coal up the ruling grade above Forest City before the Bullmooses arrived, and then further wandered about the Southern Division in general manifest runs. The Ten Wheelers of Class U-1 and the 2-6-0’s of Class U and Class V rolled the O&W “Name” passenger trains, often in multiple sections on busy vacation weekends, to the Borscht Belt of Sullivan and Ulster Counties; -- but they could also be found on freights in the months of lesser passenger traffic demands. Then too some were fitted with footboards for assignments to yard switching and the ever present “Pick ups.” Easy steaming and easy riding the Class U, Class U-1 and Class V Double Cabs were well liked by O&W crews and are often recorded in photos leading the wooden cars of the Great Timber Fleet. . . . “To the Mountains. . . .” but were muscular enough to obtain assignments leading the heavier steel cars as well. A modeler’s roster of O&W engines must surely include Double Cabs.


Digressing modestly here, my mention of the muscle power of the subject Double Cabs is easily understood with a passing knowledge of a few of the “rules” of steam engines. “Tractive Effort” (or “T.E.”) is the horizontal pull, if you will, along the centerline of the engine and therefore the train. T.E. is no more than a measurement of the included energy of a vehicle’s (yes, and since they move.....locomotives ARE vehicles) motor; -- which in the case of steam engine is the boiler and the force which the expanding steam can exert upon the faces of the pistons. This’s a vast oversimplification of the definition of T.E. since many other variables affect T.E. – but quite sufficient for now. The weight on the drivers affects how much of the T.E. can be applied to train to pull it. The weight (mass) of the engine and the friction between steel wheel and steel rail is paramount. The lighter the engine.....the less friction to the rails, and the lesser the force available to pull the train behind the loco.

The “yardstick” as an empirical to quickly judge the locomotive is the Factor of Adhesion. That’s a calculated number obtained by dividing the weight on the drivers by the T.E. As a rule the optimum Factor of Adhesion is around 4. If it’s less than 4, then the engine might be one that is considered “slippery” and may require some adjustment to boiler pressure thereby lessening T.E. – not good. If the Factor is greater than 4, then there’s just extra weight of engine to lug around; -- also not so good. The Double Cab engines of the O&W, with large drivers and small, all had an acceptable factor of adhesion in the area of 4 and with reasonable T.E. in the vicinity of 30,000 pounds; -- all very much acceptable for the period of time when they went into service and for the toils assigned them by the O&W managers. Other factors aside, this soundness of design was one reason why the O&W modified their “modern” (built and delivered in the 20th Century) Double Cabs and kept them in service for as long as they did.



With a clean stack Class U-1 No. 251 moves Northbound out of Liberty, on the crossovers, this fine bright sunny summer day in 1940, during its last season of service. December of this year will see this high stepping Double Cab consigned to the oblivion of the dead line, only to await the pain and burn of the scrapper's torch. Leading two of the O&W's AC&F 57' steel coaches No. 251 pulls an interesting mix; -- with a leased coach following and then trailed up with some of the last members of the Great Timber Fleet, as evidenced by the visible truss rods beneath.


Returning to topic, in the mid-1970's Nickel Plate Products followed their delightful HO scale models of the O&W "Light 400's of 1973, with Class U and Class U-1 Double Cab engines.



OBSERVER

Published By THE ONTARIO & WESTERN RAILWAY HISTORICAL SOCIETY, INC.
An Affiliate N.R.H.S. Chapter

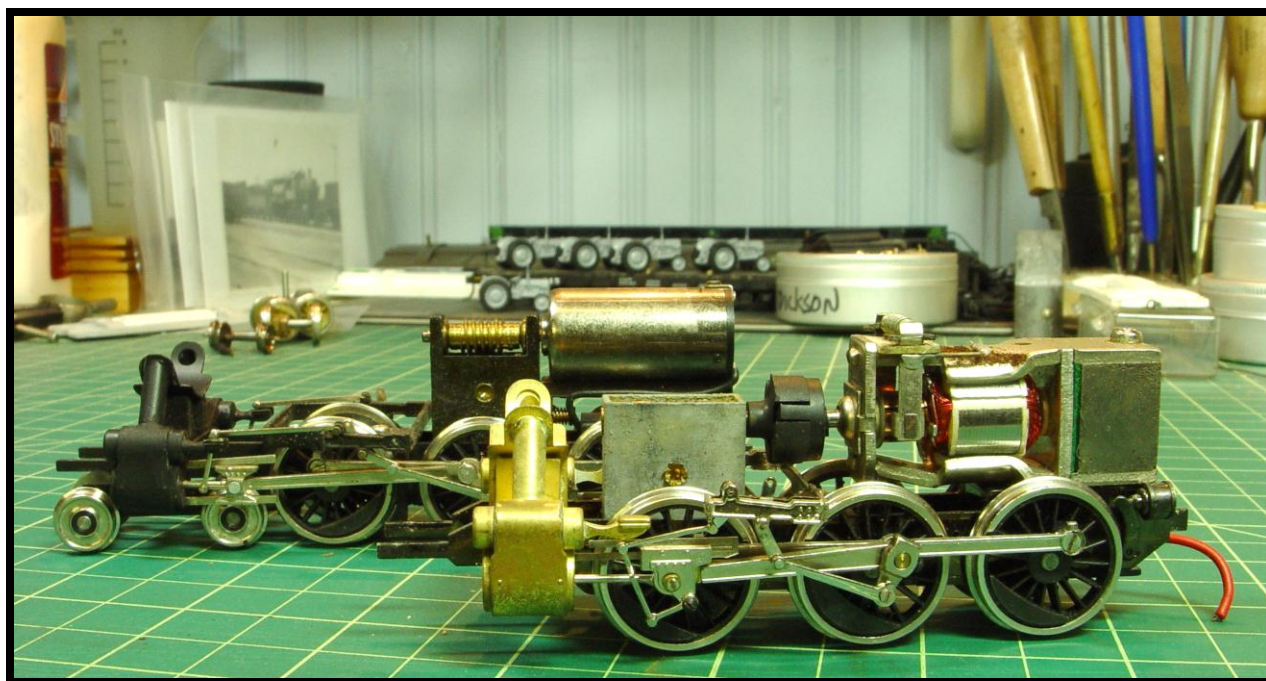
February 1980



THIS MONTH: "U" CLASS CAMELBACK
· THE PROTOTYPE AND THE MODEL ·

This historic Observer cover, above, is worth inclusion for the image of an early effort to improve and rebuild one of the NPP Double Cab Class U-1 engines. The lessons of the “Learning Curve” from this rebuild were retained and refined for use during the current flurry of Double Cab rebuilds.

These engines were, most unfortunately, poorly designed and so poorly running that NPP took many back as returns and they were subsequently re-manufactured and sold under Dick Truesdale’s Model Express label. While the Model Express engines ran somewhat better, and were factory painted, the improvement was uneven and the detail execution was unimproved. As a result these engines are even currently obtainable at often very reasonable prices and, in some cases, at “fire sale” prices.



In the foreground is an original NPP U-1 mechanism. The open frame motor is a copy of a DC-71, but it succeeds in throwing off a tremendous back EMF to the extent that the wheels sparked vigorously when running (and “running” only marginally so(!)) The motor profile is so high that the superstructure is raised, then with the result that the cab is too low. The gearbox on the front driver axle serves only to sum the play and overall slop in the mechanism to the detriment of ANY smooth running. . . . in most cases. A Model Express mechanism is to the rear and, while improved with a can motor and a new, albeit oversized, gearbox the overall improvement was uneven; -- some ran well and others didn’t.

Beginning with the original models (not having any fear of engaging a complete rebuilding) and over the ensuing years I was able to acquire a number of these O&W Double Cabs with the intent to re-detail and rebuild them into more than one class of O&W engines. Those several NPP Double Cab models, in varying states of disassembly ranging from untouched to nearly finished languished in project drawers for years as other modeling adventures displaced them.

One early attack upon the shortcomings of the NPP Class U-1 engines resulted in a modeling effort so extensive that I have sometime characterized it as “defying any reasonable description!” Indeed I did complete a single Class U-1 engine (not the least of which required the scratchbuilding of a new gearbox(!)). That model was the subject of the very first of my contributions to the Observer back when it was a more frequent publication serving also as the OWRHS newsletter. The February 1980 Observer contained a narrative of this work, and the publication cover is reproduced above.

Some recent reflection and casting about for some engine building projects which had taken a hiatus of some time, brought me back to the Double Cab engines of the O&W, and the fires of Camelback building was rekindled over summer 2009 with a plunge into creating a long planned Class L 0-6-0.



This image is of Class L 0-6-0 No. 52, the “Oneida Switcher” as described in detail in an earlier edition of this column. This model was the impetus for the summer 2009 Double Cab building project(s).

Now, I’m fairly undisciplined when it comes to modeling and though I don’t have a lot of spare evening time (since a good portion of my law practice involves many transactional public zoning, planning, conservation and local legislative hearings related to land use), I have assembled a compact and well equipped shop.....and I can work fast.....according to some! My lack of discipline, if that it be, has any number of projects in process and “In the wind” at any one time. I work in fits and starts.....usually not for very long periods at any one time, but I often “group” tasks of the same or similar nature and method together.....and after a couple of weeks of evenings working on the Class L engine (and with the bench having become the usual mess attendant to locomotive building) my attentions wandered elsewhere.



Here is an O&W Class V 2-6-0 rebuilt from a NPP Class U 2-6-0; -- 63” drivers, cut down steam chest and raised cab profile.....newly fabricated footboard pilot—all in an early stage of construction.

An acquisition of some 63” drivers then renewed my interest in creating a model of an O&W Class V 2-6-0, all well begun even before the 0-6-0 was completed; and now other O&W Double Cab engines have followed. The Class V project, seen above well before completion, was temporarily set aside to simmer while in process until some valve gear links showed up in the mail. As is often the case with

engine building (but somewhat rarely for me since my home shop is relatively well stocked) one task had to await the arrival of some needed parts.

As an aside, my tendency in locomotive building is to look about for suitable similarly configured and proportioned models as closely as possible to an intended project engine. This's the method employed by the late Bill Schopp in his many articles of engine "conversion" in the 1960's and 1970's as published in RMC. Oh, I can and have built entire engines and mechanisms from scratch.....but to economize some time (and to avoid some of the headaches and tinkering(s) needed to iron out the inevitable hitches and lurches) I try to start with a mechanism and, if possible, a superstructure that will require only some modifications in order to create a presentable model. The accumulated NPP Double Cabs were more than adequate "fodder" for the present flurry of engine building.

All then in process came to be two Class U 2-6-0's and [another] Class U-1 4-6-0 and then following.....with some periodic musings over the possibilities of a Class P 2-8-0; -- all from that project drawer brimming with the Double Cab projects longer forgotten that I'd originally wished!

Another digression is order here, and to answer the question often posed to me; -- "Why do you build in brass.....?" Well, to begin that's a medium and material in which I'd always had the greatest success. Oh, in the past I'd tried scratchbuilding engines with superstructures largely crafted from styrene or PVC, but none had ever gotten to a stage even nearly finished. Brass was the material with which I had worked.....and worked truly from the beginning of my self inflicted apprenticeship as an engine builder.

My dad had always loved anything made of brass and, living in an early Nineteenth Century home many hinges, latches, locks and other household fittings were of brass.....then requiring some facility to work with them. Father was an accomplished woodworker and also became an accomplished metal worker.....making many items not only of brass but then working in silver making jewelry. Beyond his formal education as a physician, and graduate studies in medicine, and registration in medicine in several states, I think sometimes that his proudest a certification was that from an evening course he took.....to become a Blacksmith! So, with metal working somehow running in the family, so to speak.....and watching and learning from the elder, I guess it was no great leap to acquire the skills for metal working.....and then metal working in miniature as commanded by HO scale engine building.....A well equipped shop also helps....

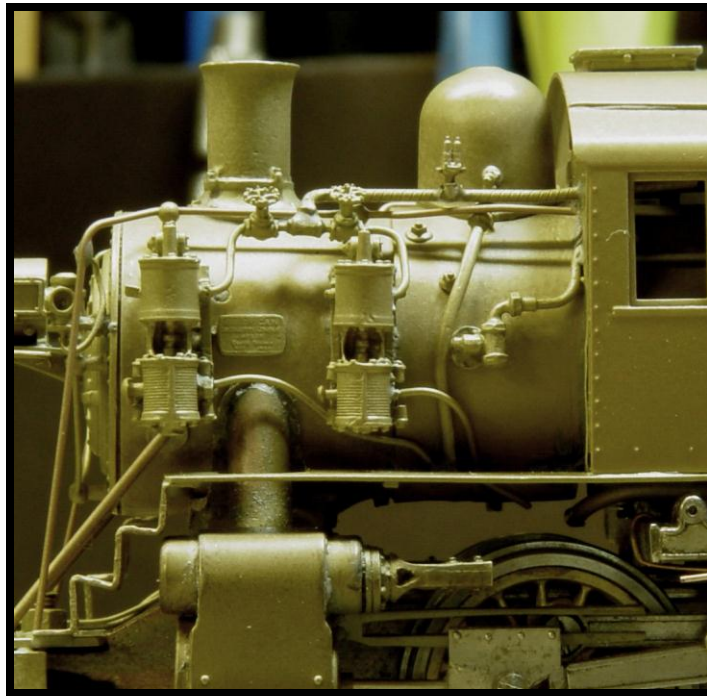


Working in brass requires skill in that “Black Art” of soldering and some special equipment. I first saw it done as a child by my grandfather as he heated a large copper soldering iron on the grates of a coal furnace to fix and repair some broken toy; -- but soldering tools have advanced well beyond that less refined approach. I classify soldering in two categories; -- (1.) Electrical soldering; -- PC boards and layout wiring and such, and (2.) “Structural” or Fabrication soldering; -- which is the hallmark of model building in metal. This image is of my workbench soldering station. The right hand iron is fully adjustable and usually bears a chisel tip for tinning parts and flowing solder into joints, while the iron on the left is a lower heat iron and has a fine pointed tip for miniature electrical work, or small jobs such as locomotive handrails and piping.

The cabinet to the rear, with the large dial on the front is a homebuilt resistance soldering machine. I constructed it using a 12 volt 30 amp transformer and a Variac® with an overload breaker and pilot light. The meter on the front is an ammeter; -- but I’ve never calibrated it and simply rely, by experience on the position of the ammeter needle and Variac® knob to gauge a proper heat for the job I’m attending. The copper clad carbon probe and ground clamp are in the notches on the left of the work station.

With this setup I can solder together two pieces of ½” X 3/8” sold brass stock (and probably even larger stock, though ½” X 3/8” is the heaviest I’ve ever tried) or, with the dial turned down I can solder together brass wire scaled to 1 ¼” (and smaller) in HO scale.

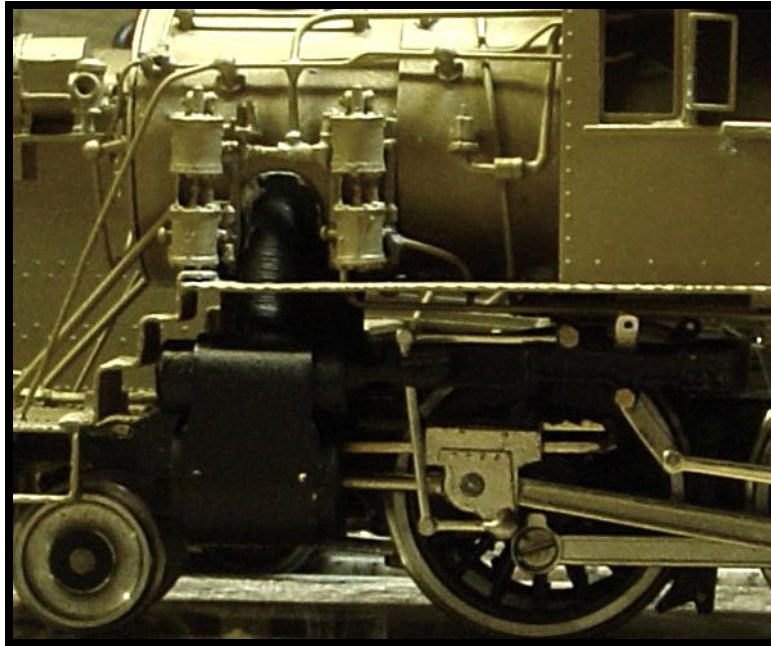
For the locomotives I so love to build brass is absolutely perfect; it’s plentiful, available in almost any size or shape, cuts, turns, mill, bends and solders easily.....and the “feedstock” locomotives I work with and from are all in brass. Since I’d mentioned that I work fast.....nothing is better for fast working than a brass fabricated model with soldered details. Oh, brass stock can’t be cut and scored like styrene or resin parts, but it works and cuts not so very much harder, and it’s stronger – as needed for engines. The feature I really like is that there’s no waiting for glue to dry or epoxy to set; -- tin the parts, assemble them, add flux, ground the “parent” part or assembly, touch the carbon probe to the joint or part to be attached, stomp on the “piggyback” foot switch and the flux sizzles and solder “wicks” into the joint. I let my foot off the switch pedal, the joint “freezes” and I move on to the next chore.



Here’s a close-up image of the piping to the air pumps on the Class V 2-6-0 while still under construction. The pump brackets were soldered in place, the pumps on top, the piping and fittings soldered in place with the carbon probe and resistance soldering machine. A final positioning and orientation of the “faucet” style valves feeding the pumps was accomplished with a trusty soldering iron. Drilling holes for piping in the relatively hard lost wax cast air pumps can be very frustrating with a resultant series of many broken small drills. I replace all of the original pump castings with either Precision Scale or Cal-Scale castings. While most of the domestic lost wax cast detail companies began by providing castings to the Asian Rim builders, a number of them shortcut expense by using a single casting as pattern and producing their own detail parts. The result is a degraded detail, plus additional shrinkage in the copied part. NPP seems to have done this, along with other builders.....with the result, at least for the Double Cab air pumps, that they were undersized.

To drill a hole for piping in a “fresh” casting, I first clamp it in a vise attached to an “X-Y” table on a hobby drill press. Then using a 2mm end mill in the drill press chuck I position the end mill in exactly the place I want to drill. . . and just touch the casting a couple of light “dabs” until there’s a nice “flat” on which to drill. Then I replace the end mill with a

#76 drill bit generously lubricated with “EZ-TAP ®” and drill completely through the pump casting! Often trying to drill a deep blind hole will simply hasten drill bit breakage, but with even pressure and good lubrication the bit will survive a through-and-through. The hole entirely through the casting allows me to move the piping back and forth and makes the precise bending and shaping of the piping less critical and . . . [important for me]. . . FASTER! When the piping is soldered up the hole fills with solder and is unnoticeable.



The Class U engines have similar twin pumps, but lower down on the boiler side and plumbed up in a slightly different manner. This image is also of one engine in process – with a few solder blobs to be cleaned up. All of the larger parts of what is seen here were soldered up with the trusty carbon probe, and the last of the details were soldered in place with the solder-flake-and-hot-iron exercise described below.

A word here upon soldering technique; -- tiny solder joints are finished by shaving off a flake of solder. The solder flake is then picked up by touching it with a #11 X-Acto blade touched to a drop of liquid flux. . . and then transferred and positioned on the joint, already fluxed, to be soldered. A touch of the hot iron and this minimal flake of solder melts and it “wicks” into the joint. That’s the last of the operations applied to very small parts. . . the results of this method are what is seen in the above images.

The close-up images here are taken with the models finished, but still as yet unpainted. I’ve found by experience that close-ups are more difficult to light and capture detail when the model is complete and painted than when unpainted. . . so far as the detail often does not show. In advancing to the installation of DCC sound decoders and speakers I’ve also learned to complete a model and install the decoder, wiring, plugs (as needed for later disassembly or maintenance), with a speaker and speaker enclosure BEFORE final painting lettering and weathering. No matter how well thought through the process and preparation for a DCC sound install, it’s inevitable that some damage is imparted to a painted model when it’s taken apart, holes are drilled and reamed for wires and plugs in a DCC install. . . I’ve now just found it better to do that work at this stage prior to painting, rather than afterwards and then face up to the paint repairs and touch-up jobs.

The somewhat dull finish of these models is a part of my preparation for final painting. I clean all brass models by soaking them in MEK to remove oils and solder flux and blast with #340 ALOX grit. . . and I often do this more than once during fabrication and building, but then at the end I blast one last time and then coat with an industrial finish known as Steelcote “Stays-On”®. This’s a clear finish specially formulated for non-ferrous metals, and it contains highly purified shellac as an ingredient. I know many modelers who undercoat with the time tried true and trusty Floquil zinc

chromate . . . but chemically that does absolutely nothing when not applied to steel or other ferrous materials. The Steelcote finish is positively tenacious when cured. . . and on one of the Double Cab superstructures I'd coated it too hastily and got an ugly resulting drip and run right on the cab roof. A dip in MEK did NOT affect it, so I had to remove the "Stays-On"® by means of another trip to the blast cabinet!

Some hobby machine shop – model building images follow with more detailed captions; --



"Hobby Lathe"



"Big Lathe"



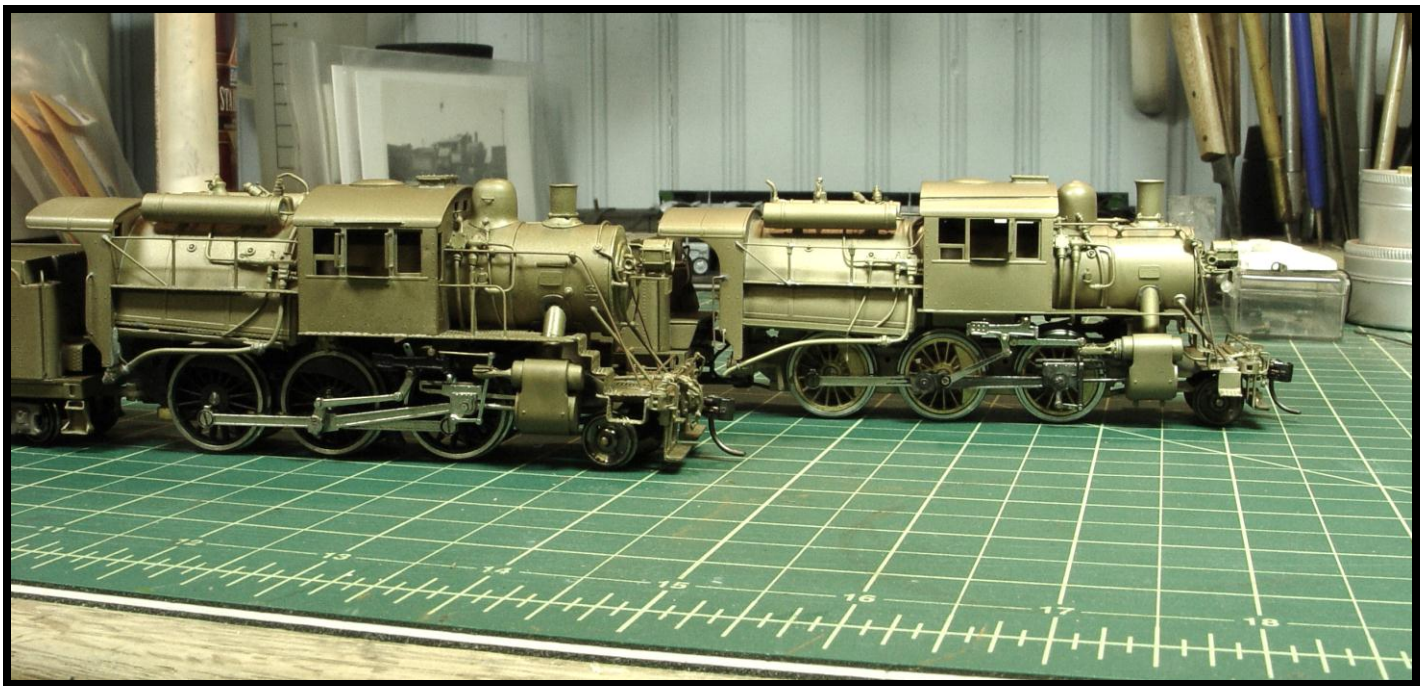
"Hobby Mill"

Here, in the image to the left, the "Big Lathe" (an 11" swing Logan) is cutting a blank for what will be a scratchbuilt smokebox front to dress off a Class P 2-8-0. The shoulder will slip inside the boiler front, but I'll cut it off first and reverse positions in the lathe to shape the front.

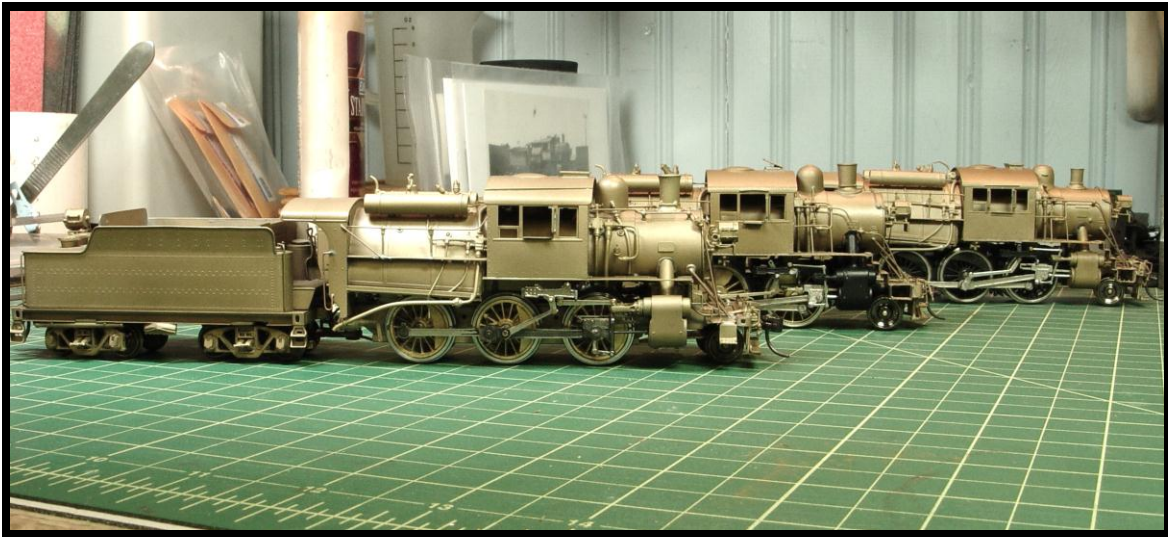
The "Big Lathe" lives in the barn shop out back and is a valued and retained holdover from the days of rebuilding and restoring Indian Motorcycles; - having turned out many a new bushing and spacer. The old Logan lathe at its best working as an "engine lathe" cutting large and heavy parts, but for the final finish work in model building parts must retreat to the basement shop for attention at the "Hobby Lathe." Here, in the upper right image, a blank rod of Schedule 360 brass rod was first machined on the Big Lathe to a scale 79" outside diameter to become a center section of a Class P boiler. Solid rod is way, way too heavy, so it has to be bored out (meaning that most of the stock winds up as lathe cutting chips(!)). The Big Lathe roughs the stock out with a big and ugly boring bar, and then it's on to the Hobby Lathe to finish. This image shows the final cut on the boiler section.....boring it out to wall thickness of 0.016" which is my preferred metal gauge for HO scale boilers. While it might seem a waste of stock to make a thin tube from solid stock.....it doesn't take that long,AND the headaches of rolling flat stock, annealing it and then soldering up a [decidedly] weak butt joint at the bottom centerline is no bargain a' tall! This technique works only on a straight and un-tapered boiler section; -- for a "wagon top" or "semi-wagon top" boiler as found on a Bullmoose, one must retreat as an engine builder to the time tried and true method of rolling boiler sections one at a time and then butting them together.....

The lower right image of this machining collage is a "Hobby Mill" making a cut on a locomotive bottom retainer plate. I replace ALL brass loco bottom retainer plates with heavy plates milled from a thick section of Schedule 360 brass plate which is thenstraight, straightSTRAIGHT! I've now come to machining these retainer plates a bit more than in the past. Originally I simply made very heavy thick plates but that was sometimes a difficulty when milling out the cut-out for the gearbox. My present and more refined method is to further mill the plates to a shallow "U" shaped, or channel section. The side webs provide the enhanced stiffness I seek and the thinner center section of the web avoids having to counterbore the screw holes to recess the screw heads holding the retainer plate in place. The retainer plate is easily relieved in its thinner center section, with the use of a 1/8" "mill drill" bit which cuts through the blank plate easily and forms a nice radius on the inside corners of the cuts.

All of this. . . engine building, fabrication. . . soldering and hobby machining is to some degree (and readers please pardon my descent into whimsy), and for me, a very enjoyable exercise in making large pieces of metal into small pieces of metal! This will continue for some time, and will continue with some more O&W Double Cab building. One visitor to my shop nearly thirty years ago (and a camping-hiking-O&W-exploration companion of long, long ago), the late John Winterbottom, addressed me, with a very uncanny Boris Karloff inflection as "Dok-torr Drom-med-dary" as I was attacking the first of these NPP Double Cabs. His whimsy was accepted oh, so long ago, and now when I revived this effort to model the face of the O&W as represented by these Double Cabs another shop visitor suggested that the articles and columns I write should then be the "Dromedary Chronicles!" I enjoyed the verbal jab . . . and both of us paused wistfully to recall John W. in his origination of this characterization.....so I guess it can be so.....but for a more expansive coverage I shall designate such columns as the "Engine Builder Chronicles," and since there are variations in the modeling and modifications done to each. . . I suspect I'll be preparing more columns, on each Class of engine.....as a continuation of the "Engine Builder Chronicles."



Here are the two 2-6-0's with footboard pilots. The Class U to the front will be completed as No. 255, and still has an unmodified Model Express mechanism; -- which seemed to run quite well with little attention beyond lubrication and removing some burrs from the side rods. To the rear in Class V No. 278, which has a more squat profile due to its 63" drivers and slightly lower boiler (then with the cab raised about a scale 1 1/2 feet. No. 278 required a new gearbox from my parts drawer(s) supply and a specially fabricated motor mount whereas the motor shaft extends right through the gearbox and serves as the worm shaft as well.



This image shows all three of the Double Cab 2-6-0's that were successively crafted at my bench. No. 247 is sandwiched between No. 278 in front and No. 255 in the rear. The mechanism for No. 247 was originally a Model Express product but it turned out to be one that was in the "Doesn't run so well. . ." category. Model Express re-used the NPP drivers and those tend to be a problem, When made, NPP's supplier used the traditional pot metal driver centers, but then pressed them onto axle shafts with grossly oversized knurling on the ends. The result was that some of these NPP drivers were either not quartered properly, were not straight on the shaft or, in some cases, were out of gauge. No. 247 had a bad center driver and proceeded down the track with a pronounced lope and lurch. New 69" brass centered drivers, a Samhongs gearbox and a correct re-quartering of the drivers cured all ills!



The last Summer 2009 edition to the Double Cab project is No. 253. For this one I'd given up on the NPP mechanism it came with, and substituted an Overland Models 4-6-0 mechanism from the late 1980's; -- a superb running piece of machinery, but with only the long frame Baker [Direct] Valve gear frame to detract. For the time being I'll live with that but, of course, it will sooner or later be changed out!

So, this column will close with an anticipation of further future columns addressed to the creation of this miniature NYO&W steam locomotive roster.....and with more specifics about the building of O&W Double Cab engines.

Until then More Later,

Mal Houck