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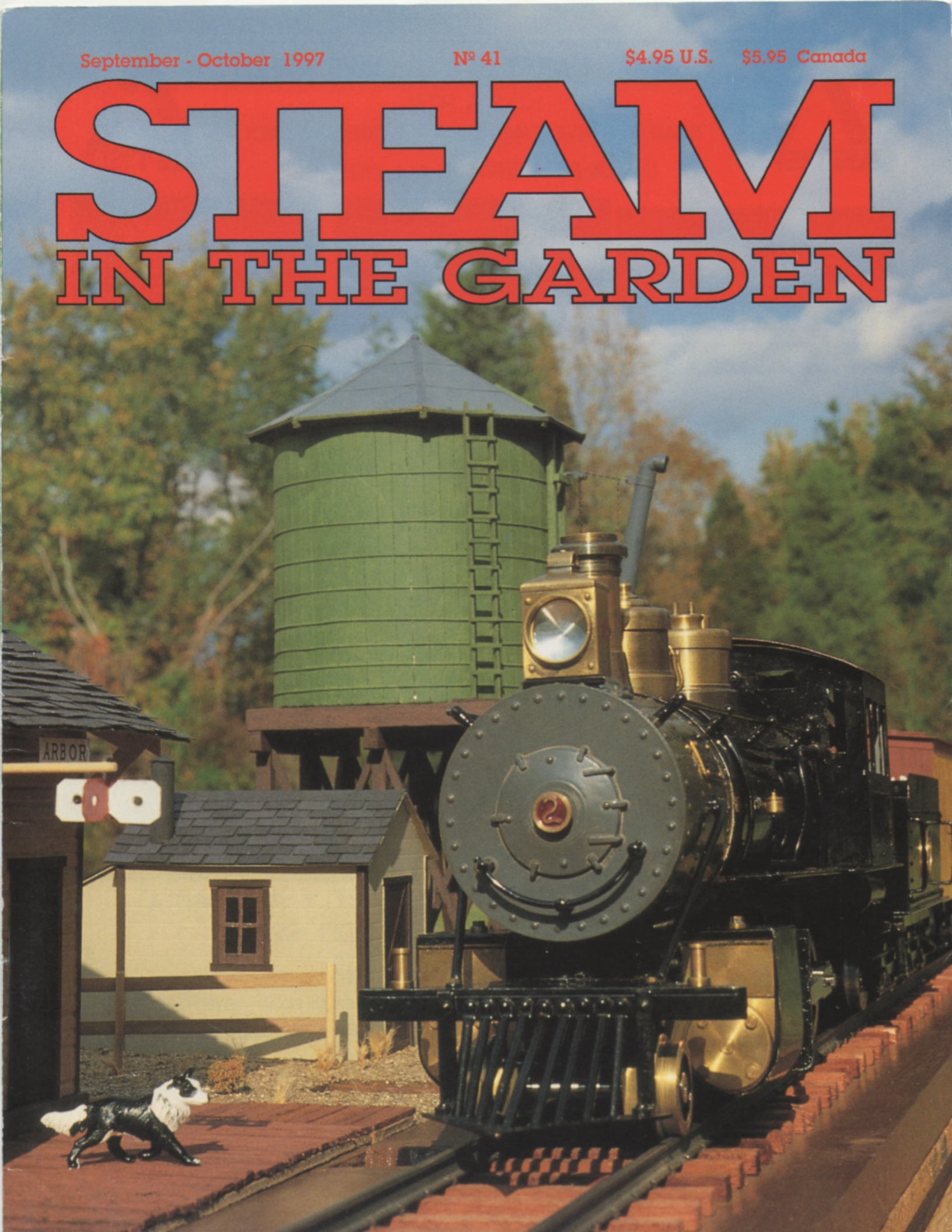
STEAM IN THE GARDEN



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STEAM IN THE GARDEN

Vol. 7, Nº 5
Issue Nº 41
September/October 1997

Articles

Departments

ON THE COVER:

Nº 2, a gauge 1 2-8-0 Consolidation, makes a stop at the water tank at Arbor Station on Northern Railway & Navigation Co. trackage. The locomotive, freight cars and buildings in this photo were all scratch built by Rudy Kouhoupt. No castings were used in the construction of the loco. All components, including the drivers, are of fabricated construction. Nº 2 was completed in 1975 and is a familiar sight at steamups around the east coast. ***Ektachrome transparency by Rudy Kouhoupt***

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Slave Driver
Marie Brown

Graphics Director
Harry Wade

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Harry Wade, Jim Curry

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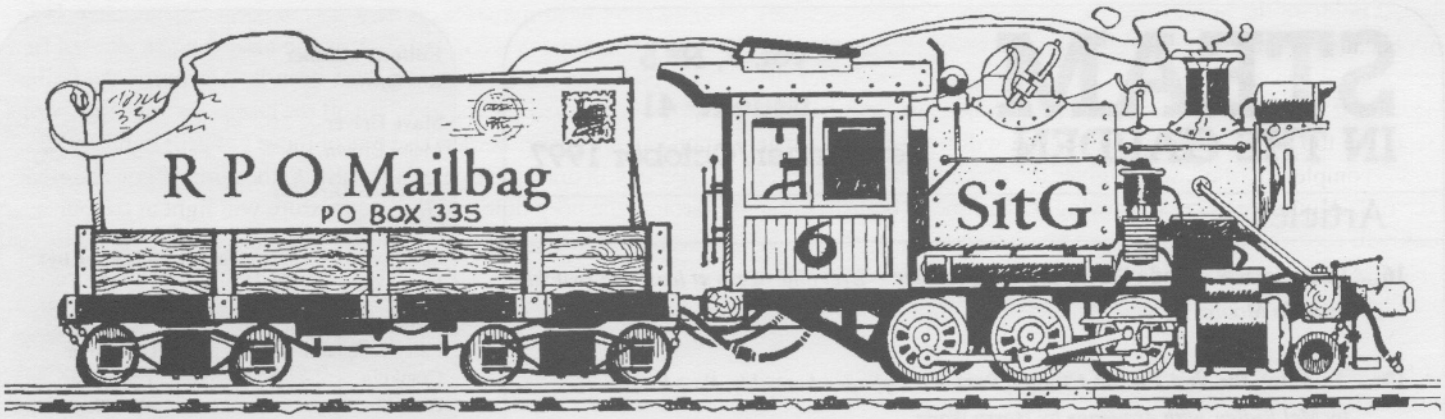


Letters from readers are welcomed and encouraged. Offer advice, encouragement, suggestions or constructive criticism. Tell us about your current project (and don't forget the photos!) or just share live steam experiences. But please keep your letters to a reasonable length so everyone has a chance to use this forum. Some letters may be edited for length or clarity. Send your letters & photos to: SitG, Dept. RPO, P.O. Box 335, Newark Valley, NY 13811, USA.

* * * * * *

Ontario, Canada

Dear Sir,

I would like to express how impressed I am with the quality of *Steam in the Garden*. I just recently renewed my subscription after a few years absence and the change is dramatic. Congratulations.

All the best,
Frank D. Wear

Wombat Locomotive Works
NSW, Australia

Dear Ron,

The Berowra & Nalya Tramway has enjoyed a full year of operations now, though the timetable does seem to be rather variable. Two steamups have been held, the first for the official opening in October last year and another in January this year for the visit of David Anning, a 16mm Association member from the U.K.

Train operations have been spasmodic at other times, although one memorable occasion was in the rain in May this year. A friend and new 16mm member Geoff Wilhelm wanted to test run his brand new Archangel ***Sgt. Murphy***, and another Archangel enthusiast and 16mm member Gary Warton came to assist. Neither of them was going to let a little thing like torrential rain stop them from having fun. ***Sgt. Murphy*** operated perfectly, plus the atmospheric and audio effects from the "raspberry" safety valve were something else.

I have been slowly constructing a Roundhouse live steam kit over the past 2 years, and it is almost complete now. The side tanks and cab are scratchbuilt to resemble some attractive John Fowler locos supplied to a Queensland sugar mill in 1928. The boiler, frames and valve gear are basically original as supplied by Roundhouse, and they have assembled very easily. The need to finish off the tramway for the official opening, and other demands on my time have slowed the completion of this loco, but I am almost there now.

Yours faithfully,

Michael Bickford
General Manager
Berowra & Nalya Tramway Ltd.

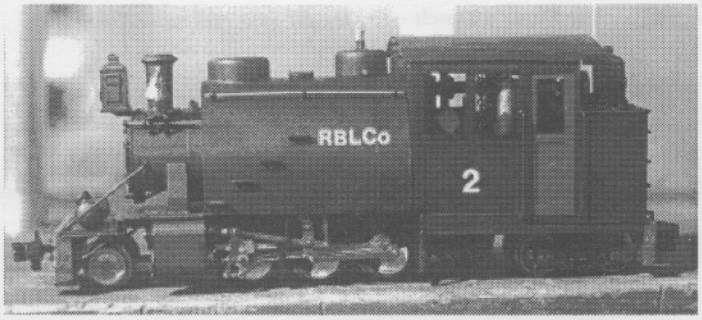
Long Island, New York

Dear Ron,

Enclosed are some photos of my Frank S. rework, with apologies to Jim Hadden of ***Frank the Tank*** fame.

Yours,

Doug Smith



Looks great, Doug! Nice job. -ed.

Ledder Tada Editer

Flatus, Florida

Dear Ron,

I recently had the opportunity to examine a failed Aster Pennsy K4s butane fired boiler. The failure was to the upper, larger, superheater flue tube at its interface with the inner tube sheet. This spot in the boiler design is very vulnerable to leaks because it is the

highest point on the burner flue (in relation to boiler water level) and, because of the gas burner's design, the hottest single place in the boiler. When a K4s boiler is filled through the top boiler fitting, and it is established that the boiler water level completely covers the top superheater flue tube, you will note that the sight glass is completely filled, which gives the illusion that the boiler is over full. A quick glance at drawing #10 in the K4s instruction book will confirm this fact. The net result is that the sight glass is useless as an indicator for efficient operation and is a contributor to boiler failure.

A second bad actor is the gas burner assembly. It has too high a firing rate due to a too-large gas orifice, too-long burner tube, and two non-modulating gas control valves in series. Without sufficient modulation at either of the gas controls it becomes commonplace to overfire the boiler, and when you couple that with the potential for low boiler water level you have a prescription for disaster.

So what is a K4s engineer to do in order to protect his investment, yet meet the schedule? I have two recommendations: shorten the length of the burner tube by an inch and a half and/or rotate the burner tube about its axis 90° in either direction.

Cutting the burner tube short reduces the likelihood that raw flame from the end of the burner (where the flame of the burner is hottest due to the velocity of the gas in the burner tube packing it into the end of the tube) will directly impinge on the inner tube sheet. An alternate to cutting the burner tube short is to tightly wrap the last inch and a half of the burner tube with ceramic insulating sheet and bind it in place with wire turns. Stainless steel wire is preferred, but good old baling wire will work for a time.

Rotating the burner tube 90° improves the flame impingement situation by turning the most active, and thus the hottest, part of the burner flame away from the top of the burner flue and the superheater flue (the areas that are most likely to not be covered by a sufficient amount of boiler water) and directing it at one of the sides of the burner flue.

If there is water level showing in the sight glass, these side areas will be better protected from overheating than the vulnerable, and potentially dry, top areas. This modification requires that a new positioning screw hole be drilled in the burner tube 90° away from the existing hole so as to secure it in place.

Another approach, and the one I like best, is to rotate the whole burner assembly (Part #10-2) 180° and fire with the flame pointing down. The problem with this orientation is that the burner assembly is not securely held in the burner flue and the assembly may move, due to vibration and gravity, back to its starting position. Even in this orientation I would recommend that the burner tube be shortened by an inch and a half to reduce the available firing area of the burner assembly. Icing on the cake would be to correctly profile one of the gas control valves ala the Frank S. series published in SitG this past year. This modification would provide the K4s engineer with real control of the firing rate and greatly lessen the chances of boiler failure due to overfiring. There is one further observation that I wish to share with K4s engineers. Smokebox fires are always a potential problem for butane fired locomotives and the K4s (Hudsons too) is prone to this malady because of the lack of modulation caused by the crude butane gas control valves. Without fine control too much butane can be delivered to the burner – smokebox and stack fires are the result. The gaseous fuel is seeking sufficient oxygen to burn; it finds it either in the smokebox or at the stack. A neat way around this problem is to light off using a drafting fan such as the kind used in alcohol firing. Place the fan in the stack, turn it on low to purge the boiler flues of unburned gasses, and light off the burner through the "peep hole" in the burner holder. Use one of those gas grill lighter sticks. The fan will draw the lighter's flame into the combustion chamber through the peep hole and the gas mixture will light at the burner. Some experience will have to be accumulated to get to "first time, every time", but if you use a gentle hand on the gas supply valve, smokebox and stack fires will be but a memory. Of course, once the burner flame is established, and the burner is hot, the drafting fan can be removed as the boiler/burner combination is designed to be self drafting.

Sincerely,

(Ms.) Ethyl Mercaptin, P.U.

Hamburg, GERMANY

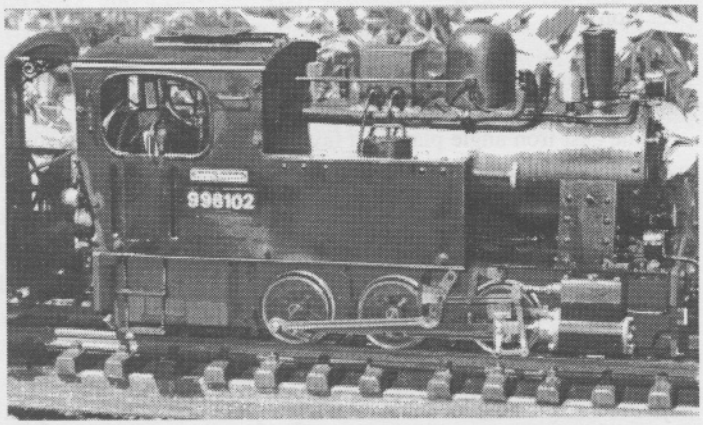
Dear Mr. Brown,

Enclosed are photos of my last built locomotive. It is the 996102 from the "Harzquerbahn". As a plan I had only a copy with all sides in scale 1:43.5. I took it on a Xerox and enlarged it to size 1:22.5. It is a scratchbuilt locomotive; only some castings, the wheels and parts from the valve gear were bought from a dealer in Germany. Speed and direction is radio controlled.

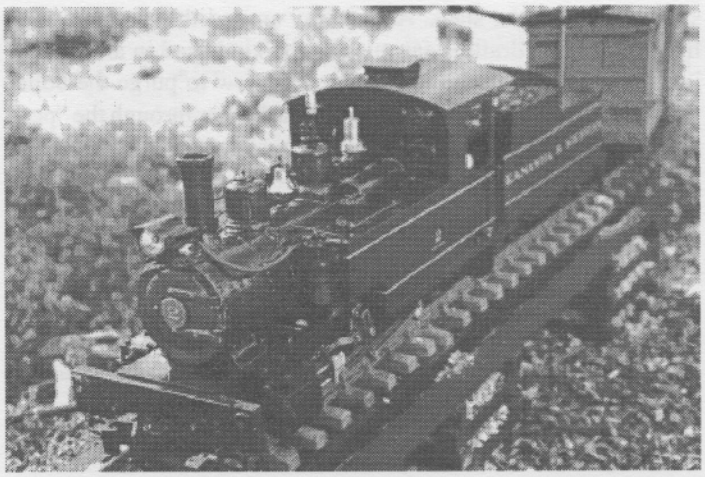
Technical Specifications: Length - 345mm, width - 110mm, height - 160mm, weight - 4.5kg. Wheel diameter - 37mm. Boiler - gas fired, single flue type. Cylinders - brass, 14mm bore x 18mm stroke. Valve gear - Walschaerts.

Regards,

Stefan Korb



A beautiful locomotive, Stefan, Congratulations, and thanks for sharing it with all of us. (Stefan's fine locomotive can be seen in full color on our web site) - ed.



Houma, Louisiana

Dear Ron,

More often than not my customers provide me with wonderful examples of "how it can be done", as in the accompanying photograph *(above)* of an American outline engine built by Joseph Baria of St. Albans, West Virginia. Joseph made this engine by "kit bashing" (a strange term!) a Roundhouse kit. The impressive thing is that this is Joseph's first attempt with live steam.

Joseph is already planning his next home-built engine, a Garratt, and I can hardly wait to see it. Just imagine what he will be doing in a couple of years.

Great job, Joseph!

Happy steaming,

Paul Kenney

Hillsboro, Oregon

Dear Ron,

Here's an item for you to use as you see fit. I really appreciate the shop info in SitG and thought I'd add to it.

The cast iron angle plate is a favorite subject of mine. In some machine shops where I worked it was hard to get the owner to agree sometimes, but they all came around to seeing how practical and cost effective it is to properly "abuse" a plate.

Toolmakers Tip
by Steven R. Gatke

A cast iron angle plate can be extremely useful if abused properly. Too many machinists treat the angle plate like a sacred object. Nothing is handier for quick tooling than a cast iron angle plate. It's easy to drill and tap holes wherever you need them, and to place dowel pins, too (be sure to drill the pilot hole clear through so you can easily drive the pins back out when done). It's also easy to mill small pockets to aid in holding and supporting odd shaped parts.

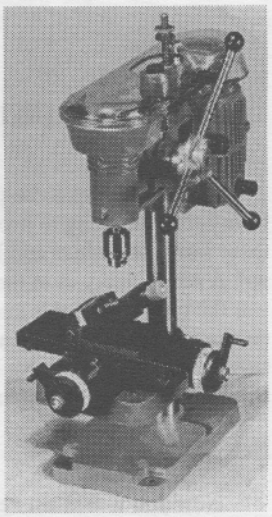
I've made a lot of aluminum tooling through the years, but cast iron is easier to work with, more stable and handier in many respects. I also use a hardened steel angle plate for some tooling functions. Everything has its place; I just usually find that the cast iron angle plate is under-utilized in most shops.

Don't think of your cast iron angle plate as a tool such as a square, gauge blocks or micrometer. Think of it as a tool like an endmill or lathe cutting bit. You form it to your purpose and use it over and over; eventually it wears out and you get another one. Give it a try, I think you'll like it.

Steven Gatke

Thanks for the great tip, Steven. My brother Lloyd, who has been a machinist, toolmaker and model maker all his life, introduced me to something similar a few years ago. He calls his sacrificial device a "flattop", and it is intended to be clamped in a milling vise. The principle is the same as your angle plate; it can be drilled, tapped, milled or whatever suits the job at hand. Very useful! - ed.

WHAT'S NEW?



Treat Enterprises, 19401 Rawhide Road, Sonora CA 95370 - phone 1-800-369-7769 has the excellent Cameron Micro Drill Press in stock. You know all those tiny little holes you drill? Well, those small drill bits should be spinning much faster than your normal drill press or hand drill can manage. The Cameron Micro Drill Press offers speeds up to 30,000 rpm.....and it even has a variable speed control option. It offers unparalleled accuracy and ease of operation, especially when combined with the Preac mini X-Y table *(see What's New?, July/August '98),* also offered by Treat Enterprises. Options and variations include "Deep Throat", a larger version for workpieces up to 16"; Albrecht keyless chucks (expensive, but worth every penny!), a dial indicator for precision control of hole depth, and more. With the right equipment, even drilling holes can be fun! Give them a call on their toll-free number and ask for details on their whole line of precision model engineering products. And please mention that you saw it in *Steam in the Garden. (Micro Drill Press shown here with optional Preac X-Y table and tilting angle vise)*

Sulphur Springs Steam Models Ltd., PO Box 6165, Dept. RB, Chesterfield MO 63006 - Tel/Fax: 314-527-8326 - e-mail: SSSMODELS@aol.com has IN STOCK and ready to deliver, the items you need for that kitbash or scratchbuilt project. Brass rod, hex, square or tubing and structural shapes. Brass strips and copper tubing. Steel, stainless steel, bronze and cast iron. And they won't make you buy 10 feet when you only need 12 inches! Sulphur Springs has a large inventory of O-rings, fibre washers, fasteners, and a whole lot more. An item that I really appreciate are the little plastic bottles with the tiny stainless steel hypodermic tube in the top. Great for applying just a drop of lubricant (or adhesive, or whatever) exactly where you want it. Send $3.00 for their latest catalog...chock full of parts, bits and pieces, Sunset Valley track products and the whole line of Argyle, Wrightscale and Roundhouse locos. Great stuff from some really nice people.

The Birdwater and Raspberry is rolling off the pages of Garden Railways magazine. Bruce Bates and Jack Verducci have teamed up to produce a limited run of official Birdwater equipment. Ten limited edition trains will be produced. Each piece will be individually finished by the artist (Bruce Bates). Each set will be signed and numbered. Birdwater trains will be available starting early in 1998. The train will consist of a Light Industrial Engine, two Birdwater Basic Flat Cars, and a caboose. They are their own prototype and a new scale, "GIn2". GI – denoting a scale compatible with GI Joe or action figures. They will run on any gauge 1 trackage, and no modifications to tunnels or bridges should be necessary. As officially authorized "Bruce Bates Products", each train will come with a certificate of authenticity. The engine will be track powered, running on an Aristo-Craft power truck and equipped with directional, constant lighting. The BFC (Basic Flat Car) and caboose will ride on metal wheel sets in self lubricating, aircraft grade bearings. Interested parties should contact Bruce or Jack at: Verducci Inc., 205 Crystal Springs Center, Suite 40, San Mateo, CA 94402.

Potomac Steam Industries, 5505 St. Charles Dr., Dale City VA 22193 - tel: 703-680-1955 -- fax: 703-590-9399 -- e-mail: diesel@erols.com announces the perfect accessory for alcohol fired live steam locomotives. The Wada Works self-contained Steamup Fan. No more loose battery packs and wires to get in the way! The Wada Works Steamup Fan is designed to balance squarely on the stack of any alcohol fired engine to make steaming easier and better. The unit will retail for $49.95 and will be available directly from PSI or through your Wada Works authorized dealers beginning immediately.

Sierra Valley Enterprises, 2755 Saratoga Ave., Merced CA 95340 - phone 209-722-8278, builders of those wonderful 1:20.3 scale museum quality models and excellent metal wheelsets, has just introduced a detail item that is often overlooked....55 gallon drums. Take a look around any industrial or railroady area, and keep an eye out for 55 gallon drums. I'll bet you will be surprised at how many of them you see. They can be found sitting upright, laying on the ground (usually surrounded by weeds and lots of rusty junk), elevated on wood or metal cradles for the dispensing of their contents, and even on locomotives, flatcars and so on. Your work train or MOW train will need several of these. In other words, they're everywhere! Gary Watkins of Sierra Valley designed these drums to sit in a wood cradle on his Munger Mining Series cars, and they look terrific. The Sierra Valley drums are machine turned, so they look "right" on both ends, thus you can display them on their side, in a cradle or laying empty and discarded on the ground, without fear of laughter and scorn from your nit-picky friends. The drums have a proper bung on one end, so you will know where to attach the dispensing spigot or valve. Gary tells us that Ozark Miniatures has a valve that's just perfect for the Sierra Valley drums. Contact Gary at Sierra Valley Enterprises and ask him about his 55 gallon drums and all the other 1:20.3 scale goodies in his lineup.....and please mention that you saw it in SitG.

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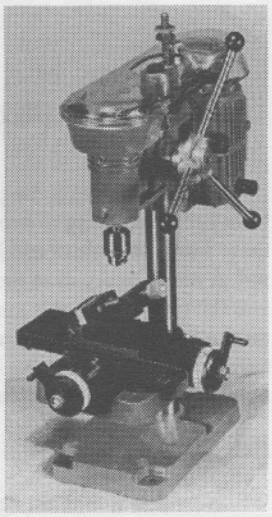

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few childhood nostalgia buffs! Equally, if our live steam garden railways run on utilitarian benchwork topped with unballasted track, where scenic effects are limited to a Pola depot plonked on the boards beside the permanent way, then this certainly would not impress our electrically powered LGB friends, who often run carefully weathered steam outline trains through scale scenery. In fact, I would go as far as to say that we then merely reinforce their prejudices.

Let's have a look, then, at what we can do to produce a railroad empire that is both a pleasure to work with fire and water while also providing enjoyment when just 'setting on the porch' and looking.

Narrow Gauge Empire

While reliable commercial live steam locomotion in both G-scale or my own 16mm to the foot will run happily on any garden railroad of the appropriate gauge, I would say that there are several design considerations to be taken into account when constructing a line which will be largely steam powered.

First of all, most of us have admired the large and complicated LGB type layouts employing fifty odd switches and a complicated electrical control system! Nevertheless, without wishing to denigrate anybody's creative work, I must say that prototype narrow gauge lines were just not like that. A narrow gauge railroad, be it running in Colorado or Caernarvon (Wales), is built to the narrow gauge solely because it would have been too expensive to construct a standard gauge line, and, for similar economic reasons, track complications were kept to a minimum. For most of us this has to be good news – after all, I have similar economic factors to consider myself!

Trackplan Topics

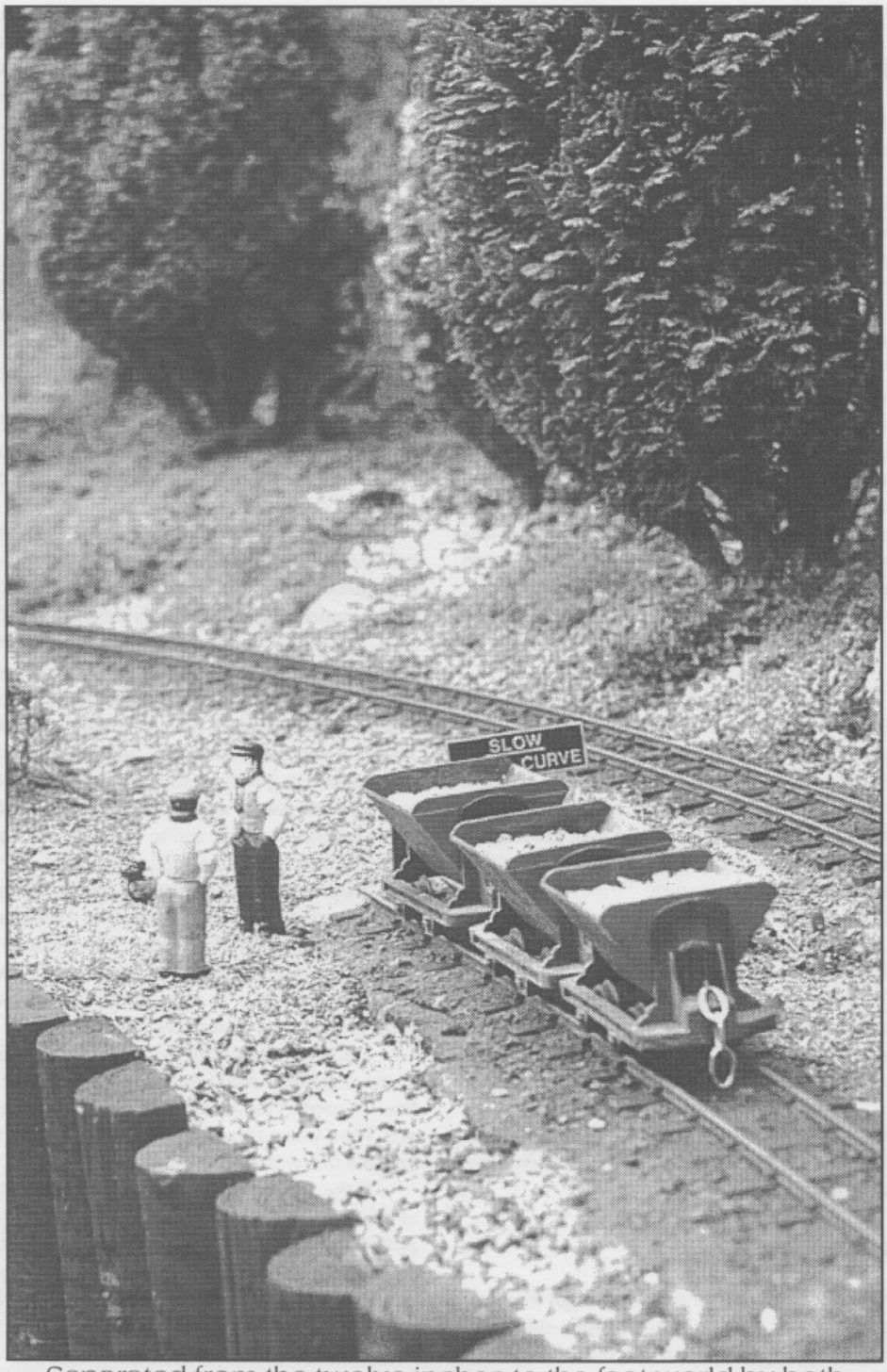
All of us have had fun drawing complicated track plans to fit into our proposed site, and certainly most of mine were rejected on grounds of both cost and complication. If I strip away all the complexities, then, what we are left with is either an end to end railroad or a continuous run.

Some people like the idea of running from somewhere to somewhere, with both passing loops and spurs on the way, and certainly it is possible to conduct real railroad operations under these conditions. On Peter Jones' superb Compton Down Railway this is very much the case, and Peter has cannily and ergonomically sited both termini within a couple of paces of each other.

For myself, well – I delight in a continuous run. An indolent toad by nature, I like to sit and watch the trains go by, while sipping a cup of tea and sneaking one of my wife's homemade cookies. Bearing in mind the other demands that may be made of our garden, it is very much worth looking at the long 'dog-bone' or 'dumbbell' arrangement whereby the railroad landscape hugs one, or maybe two sides of the available space, with either viewing or recreational space taking up the major portion of the garden.

Whatever basic plan is chosen, there are certain fundamental tenets that will ensure pleasurable running. First of all, try to ensure that at least a part of your railroad is as close to waist level as possible (there are codicils to this that I will address below). Plan to use the largest radius switches that your topography will allow, and of course it follows that tight curves should be avoided if at all possible. Please don't use lengths of straight track joined together with set curves - yes, it might appeal to your tidy mind, but it will never, ever, look right. Many narrow gauge lines had no straight sections at all on the main line!

Don't spend a fortune on switches. You will need reversing loops (or a wye if you have the space) on your end-to-end, a passing loop if



Separated from the twelve-inches-to-the-foot world by both height and half-timbered cosmetic facing, this trackbed is also built on a substantial base of thermalite blocks. Note the ground cover slowly creeping over the horticultural grit, while small figures scale the scene.

your line is long enough and a couple of spurs to both look right and to provide storage for a couple of rakes of stock. A continuous run may require a passing loop or two, and similarly a couple of spurs.

When planning garden lines it is often considered that the chosen track plan is immutable. Well, if you look at the history of any narrow gauge enterprise, you will note that track arrangements altered with the vagaries of the traffic on offer. For our own purposes we require a working railroad within a reasonable time scale – while more sophisticated arrangements may be put in place later if desired.

Garden Scale Civil Engineering

I don't know how many people I will upset with this particular section, because you see I am not particularly fond of utilitarian timber viaduct marching across the garden. I will make the point, however, that if one is conducting building operations on a perfectly flat plot and health considerations preclude any sort of bending, then of course compromises have to be made. If this were the case, then I would consider using climbing plants or box hedging to disguise the benchwork, while making a particular feature of one of those glorious American trestle constructions. Miniature conifers can also be potted and dropped into appropriate holes in the benchwork, while 'window box' arrangements can be put in place to provide a living backdrop for ones depot.

Most gardens, however, are not perfectly flat and any prospective railroad can take advantage of the topography to allow for ground level sections and maybe a short tunnel and cutting, while still providing a raised section for engine servicing.

Now here I should nail my colors to the mast and state that it is desirable to build the strongest and most level track bed that one can obtain – given the parameters of space, finance and permanence.

Grading the Route

Wot, no gradients?? That's right – no gradients! Believe me, I know all about those dreams of steam locomotives lifting a heavy train up a 10% grade, every puff sharply delineated and echoing off the mountains!! However, I would ask you to believe that despite your every effort, a gradient will appear at some point on the route, and make no mistake, your steam locomotive will find it! If you put a purpose built gradient on your railroad, your Roundhouse or Pearse locomotive will certainly climb it, but in the end it will spoil your running pleasure.

A ground level track bed should be a very solid affair, rather like a well built, albeit narrow, concrete path. It should have a well tamped hard-core foundation and a good three inches of shuttered concrete. Many people construct a dwarf wall using thermalite blocks on a substantial foundation, and this is also a strong and effective substructure for your trackbed. Whatever the construction method, please ensure that your permanent way steers clear of full size trees or you risk eventual disturbance.

What you will eventually end up with is a working railroad running through a denuded and shattered landscape. Don't worry however, because we have some terraforming to do!

A Rock and a Hard Place

Many of our narrow gauge tracks are/were built through marginal and sparsely populated uplands. Now this is a happy happen-stance because rock is always 'in scale', and appropriate rock constructions will provide the bare bones of many a miniature railroad empire. Certainly as I wrestled these great lumps of Cornish granite about my own garden it helped me both to plan my landscape and to provide a framework for me to (hopefully) clothe with appropriate living foliage. This is where imagination, together with our hard won indoor modelling skills, will produce a working three dimensional portrait of narrow gauge steam railroad operation.

This is not an operation to be hurried. The siting and construction of these components of a highland landscape will determine both the character of our railroad and, in particular, the way it is viewed. When photographers visit a preserved steam line, they go to great lengths to find a suitable framework to enhance the impact of their shots, and here we have a unique chance to design the landscape to specifically suit both photographer and observer! You see, I believe that it is worth taking our own camera into the garden when scenic work is under way. There is no need to take a photograph – just get down to track level, use the viewfinder and shift the scenic elements to suit!! At this stage your imagination will have to provide the greenery, but the basic shapes will be there. Observe your line from all the likely viewing angles and adjust with care – when you see your railroad featured on the cover of SitG you'll be so glad you did!

Twice around the Daffodils

It has, since my earliest days in this eclectic hobby, been my contention that there are basically two sorts of garden railroad, at least in the scenic narrow gauge scales of G or l6mm. Setting aside for the moment any thoughts of track gauge or motive power, I would say that one either has a model railroad running manfully through a twelve inches to the foot garden, or a scaled miniature landscape with our moving trains as part of the scenery. Most people now settle for something in between, provision usually being required for the distaff side and of course any children or family pets who also may have a claim to recreational space in the ancestral acres.

It is how this compromise is approached that dictates what sort of railroad we will have. Sometimes a right-of-way has to be ~~fought for~~ negotiated tactfully, more particularly where a well established and carefully planned garden is lovingly tended by one's partner! It may be, however, that our erstwhile railroad constructor *likes* the idea of a tiny railroad running through standard garden plantings. There is certainly a case for saying that the prototype was built through the landscape 'as found', and ones own railroad, albeit in miniature, is doing exactly the same. A matter of perception, I think – and 'different strokes for different folks'.

Here I am going to make the assumption that you, dear reader, wish to have some sort of narrow gauge enterprise that runs through a believable miniature empire, and to this end will make a few suggestions that may be taken up or discarded as you will.

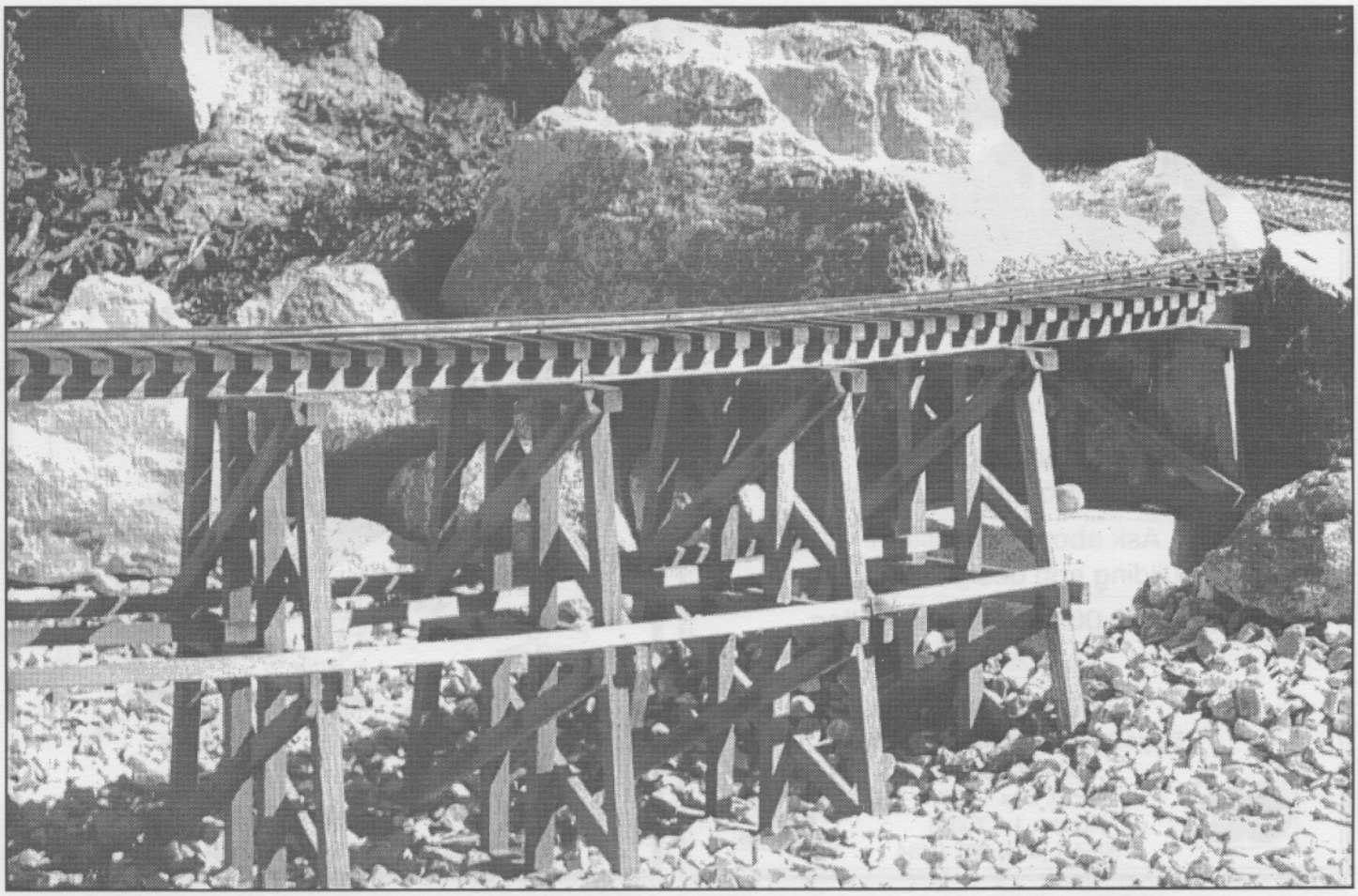
With the basic landscape elements in place I decided to approach the cultivation of my scenic effects in a very similar way to that generally described in *Model Railroader*. Now indoor modelers construct a designer landscape calculated to display their trains to best advantage. It is as much an art form as an oil painting, and the skilled exponents of this form of modeling treat it as such!

I didn't think of it myself, of course. My early inspiration was found in the delightful photographs of Grover Devine's South Pacific Coast line featured in early copies of *Garden Railways* and *Steam in the Garden*. Here was a steam powered line running through living scale scenery, and this was what I wanted.

If the area encompassed by your railroad empire is any sort of size at all, then your heart may sink at the envisaged cost, time and effort of providing living scale plantings for your creation. This is, however, where serendipity strikes again, because you see, if you look at photographs of a real narrow gauge line, taken at different points in its history, you will see that the landscape evolves over time, and that is just what your railroad environs will do.

I will not here embark on a long treatise about miniature plantings, largely because I intend addressing scale gardening in a later issue, but here will merely make a few points to get you started – and to enable you present a believable landscape from almost day one.

First of all I return to my earlier statement that rock is always 'in scale', and this is as true of fine gravel as it is for a two hundredweight boulder. To kill those livid scars of bare earth, cover the ground with



Rock is *always* in scale! This newly built trestle spans brand new scenery and looks much like the prototype must have looked when first built. Nature (with a bit of help from us) will eventually clothe the rawness of new construction. Meanwhile – it looks just fine!

cheap and plentiful horticultural grit from your local garden centre. After all, there are lots of railroad locations where there is nary a tree or bush in sight! Anyway, from a horticultural point of view, this grit will provide a non-organic mulch that is a highly suitable environment for dwarf conifers and the smaller ground-cover types of alpine plant.

The First Tree

In a couple of locations plant one or two (no more for the moment) real miniature conifers. Some nurseries have actually modified dwarf conifers to provide a sort of semi-Bonsai effect, and I have several of these on my own line. Check the label for rate of growth, eventual size, and (again using the viewfinder of your camera) site for optimum artistic effect.

If, like myself, you are a horticultural incompetent, then do read the planting instructions. Some small trees, for instance, do not do well in windy locations, while others prefer partial shade.

Do try to restrict the roots of these first plantings, perhaps by planting in a sunken pot or in a pocket of earth between the rocks. If you wish to experiment with alpines, then, as a rule of thumb, it's worth buying a couple of the scrappiest and most insignificant pots of ground cover that you can find. Plant this close to your trees and dress all of your work with yet more horticultural grit.

Having planted your two trees and perhaps a couple of potted alpines then it is a good idea to add something man-made to scale this small diorama. Nothing expensive – perhaps a small linesman's hut or even a simple length of fencing.

Steam your locomotive, hook up to your heaviest consist and slowly drive your train before coming to a halt by this small green oasis in your rocky vista. Framed by the rugged upland scenery, and with it's lightly oiled paintwork complemented by the living green of the trees, your pride and joy sends a plume of steam into the evening sky. Get down to track level, get close in and take a portrait format photograph of your railroad, preferably against the light and with some kind soul holding an umbrella to protect against lens flare from the sun – then send the results in to SitG!

Addendum

I didn't mention heather, did I? That first resort of the garden railroader, and certainly the most unsuitable plant (except for daffodils)! Fine for rockeries and providing a brave show of color throughout the year, but do keep it away from the tracks. After a couple of seasons it goes straggly, woody and needs a lot of trimming to look like anything at all. Look at small alpine ground cover plants instead – after all, they are the same price!

Till next time.....

The Fitter's Bench

by Crankpin

CAD drawings by Harry Wade

Milling Machine Tooling.....

Just as in the lathe, the vertical and horizontal milling machine have a motorized "spindle" for holding and driving cutting tools and accessories. In both machines the spindle is hollow and has an internal taper of some type in its near (cutter) end. In the vertical milling machine the milling cutters are held in a tapered collet inserted directly into the spindle. In the horizontal machine the milling cutters are mounted on another bar, called an "arbor" (Fig. 1), which is in turn inserted into the taper in the horizontal spindle and becomes an extension of it. In both cases the inserted tooling, arbor or collet, is drawn into the hollow spindle by a threaded drawbar inserted through the far end of the spindle. A spindle drawbar, and in the case of the horizontal mill, the arbor, is standard equipment with a new machine, but collets are not.

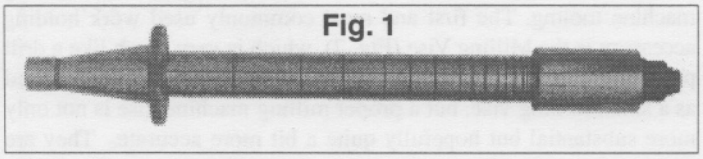


Fig. 1

The primary method of holding cutting tools in the vertical mill is the collet (Fig. 2). Although milling machine collets are similar to those used in the lathe, a series of different tapers has been developed for milling machines. These are not "special" collets in the usual sense of the word, but are special in that they are usually found only on mills. There are a number of different tapers (and matching collet types) found on milling machines these days such as R-8, Browne & Sharp, and Morse with the R-8 (Fig. 2), which is fast gaining in popularity as the standard collet type for medium sized and larger milling machines.

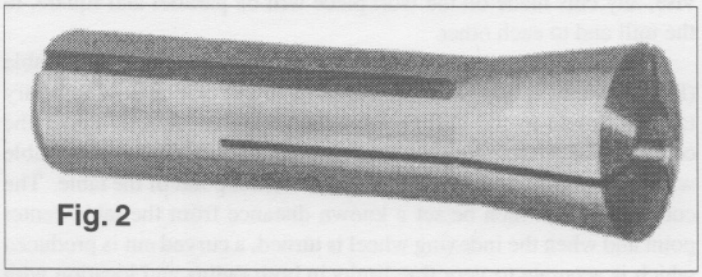


Fig. 2

Small milling machines, and especially the mini-mills, often use one of the less common collets or a type unique to that manufacturer. This often leads to a situation where collets for a particular machine are available from only one source, usually the manufacturer, and therefore tend to be priced higher than other, more common collets.

Although there are a few true horizontal mills of a size just right for the home shop, the great majority of horizontal mills tend to be found in commercial or industrial shops and are therefore typically larger and heavier than those which will typically be found in the home shop. To handle the cutting loads imposed upon them they often have quite large or heavy arbor tapers not found in vertical machines or other smaller machines. Examples of these tapers are Browne & Sharpe and NST (National Standard Taper – Fig. 3). The NST tapers are always made with a "dog" or slotted drive arrangement in the arbor which enables them to drive large cutters through extremely heavy cuts in hard materials without slipping. Strictly commercial stuff here.

The typical milling cutter intended for use in the vertical mill is called the End Mill (Fig. 4) and is held by its shank in a collet or chuck. End mills are made in a range of shank sizes, as described in the next paragraph, and a range of cutter sizes and the two need not necessarily the same. For instance, an end mill with a 3/8" shank, the most common size next to 1/2", can have a cutter size of 1/6" to 1/2". Thus you may have an assortment of cutter sizes (widths) all with a 3/8" shank.

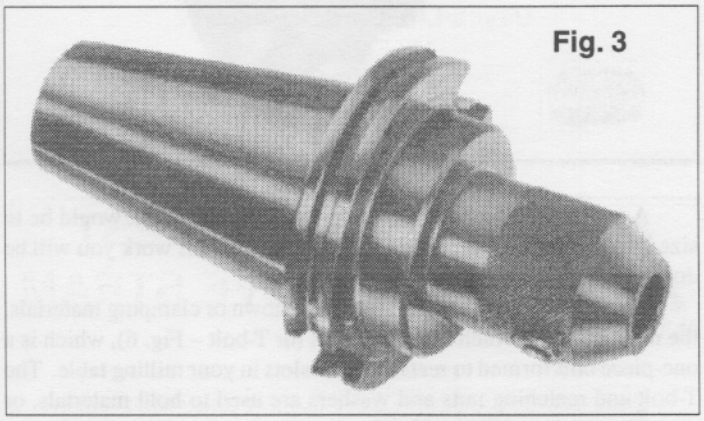


Fig. 3

The first bits of the basic tooling for the milling machine are the collets (Fig. 2). If you have a small mill you will eventually need 3/16", 1/4", and 3/8" sizes, or their metric equivalents, because in the U.S., small HSS milling cutters and tooling are commonly made with either 3/16" or 3/8" diameter shanks. The shank is the straight portion of the cutter body which is gripped by the collet. If you have a larger mill, particularly one which takes R-8 collets, the foregoing sizes can

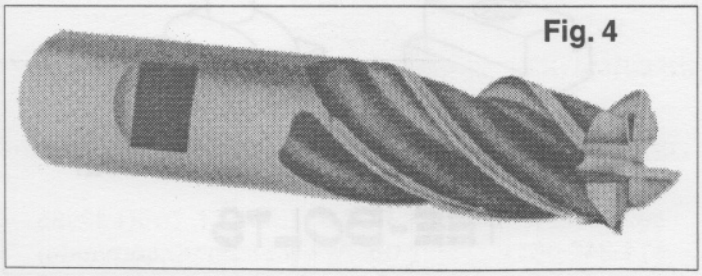
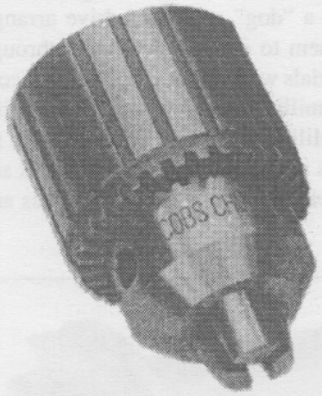


Fig. 4

be expanded to include 1/2", 5/8", and 3/4", in order to accommodate the larger milling cutters. Only occasionally does one find common cutters with 1/4" or 1/8" shanks. There are cutters made in these sizes and smaller but these are usually intended for highly specialized applications such as electronics or aerospace and are not readily available to the amateur.

A spindle mounted drill chuck (Fig. 5) similar to one used in the lathe, is a very useful item to have because you will soon find it advantageous to drill in your mill. The mill drill chuck is usually mounted either on a separate straight shank which is held in a collet, or it is mounted on a tapered shank which is inserted directly into the spindle in place of a collet. In a pinch your lathe tailstock chuck could easily be adapted for use in a mill by fitting an alternate shank which matches the spindle taper.

Fig. 5



A useful guideline for selecting the mill drill chuck would be to size it to match the lathe tailstock drill chuck, as the work you will be doing will be of similar size.

Next we must have an array of hold-down or clamping materials, the most basic of which is the Tee bolt (or T-bolt – Fig. 6), which is a one-piece bolt formed to match the tee slots in your milling table. The T-bolt and matching nuts and washers are used to hold materials, or your vise, to the milling table.

Fig. 6

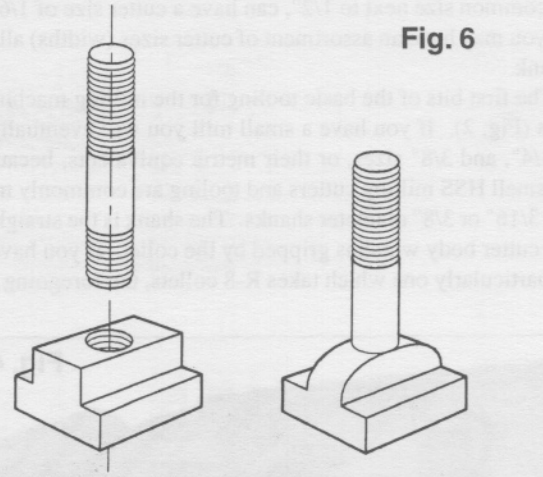
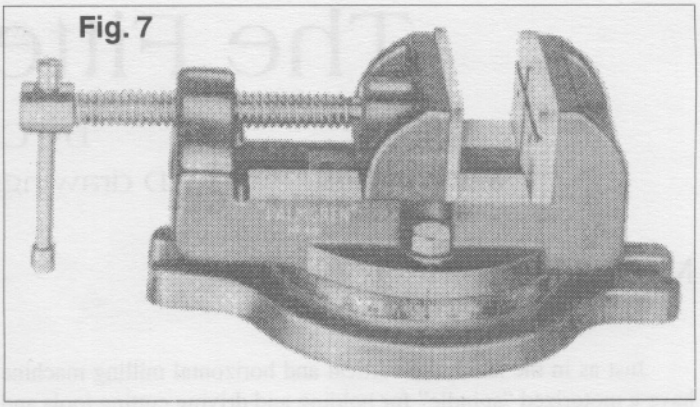


Fig. 7



Hold down bolts, nuts, and T-bolts are made in a variety of lengths and diameters and are offered individually or in sets at reasonable prices, and once bought never seem to wear out. You can never have too many hold down bolts. It should also be self-evident that all T-bolts and hold-down devices must match the width of the tee slots on your milling table.

There are beyond this three additional principle bits of milling machine tooling. The first and most commonly used work holding accessory is the Milling Vise (Fig. 7), which is very much like a drill press vise. It is not at all uncommon to see a good drill press vise used as a small milling vise, but a proper milling machine vise is not only more substantial but hopefully quite a bit more accurate. They are sized by the width of their jaws and can be had in a wide range of sizes from 1.5" or 2" wide and upward, and in several increments of accuracy. Accuracy in a milling vise means its ability to hold a workpiece truly square to the surface of the milling table and parallel to the selected mill table axis. As with all of the other machines and tooling I have described until now, accuracy costs money and a really fine vise might cost several hundred dollars. But for our small work there are a number of smaller domestic and imported vises that can be had for less than $100/US that will work very well.

The Milling vise is bolted to the milling table with short T-bolts, and before they are snugged up the vise is roughly positioned using a square or straightedge against some flat part of the mill. Then, in order to produce truly square work, the vise must be aligned with one axis of the mill using a dial or other type of indicator. When this is done you can then be sure that within the limits of accuracy of your vise, any cuts made on the workpiece will be parallel and square, to the mill and to each other.

The second most commonly seen accessory is the Rotary Table (Fig. 8) which is used to make radiused or circular cuts. The rotary table is bolted to the milling table and centered directly under the centerline of the spindle. The work is in turn bolted to the rotary table where it is positioned with respect to the center point of the table. The cutting tool can then be set a known distance from the table center point and when the indexing wheel is turned, a curved cut is produced which is accurate to very fine limits in both radius and location with respect to the spindle centerline.

Rotary tables are made in diameters of from 3" or 4" up to several feet, the most common sizes for our use being very closely in line with our lathe chucks at 4", 6", and 8". Occasionally one might see a 10" or 12" rotary table in an amateur's workshop but in diameters of 10" and larger they become very large and heavy pieces of equipment indeed, often exceeding 75 pounds for the 10" size and 125 pounds for a 12". Nasty business if dropped on one's foot. For our work, however, we needn't worry about this as a 4" or 6" table will do nicely, and the 8" almost has more capacity than we can use.

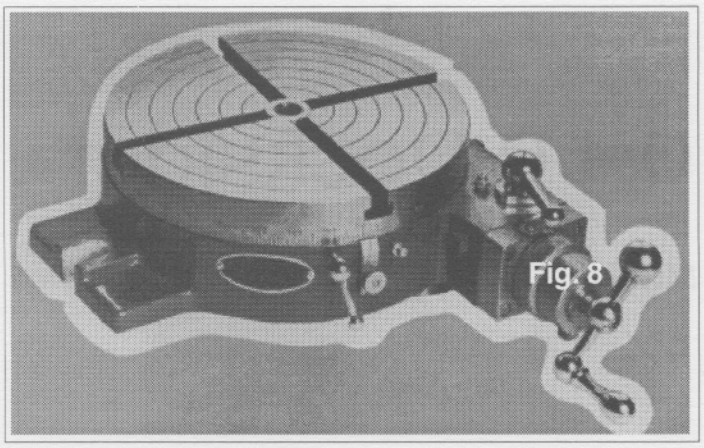


Fig. 8

The most common use of the rotary table in live steam work is for cutting the radiused slots in valve gear components such as the expansion links in the Stephensons and Walschaerts valve gear, and for any other radiused cuts.

The last device you are likely to encounter in the workshop is the Dividing Head (Fig. 9), which is not all that common in the smaller shop due to its cost (about three times the cost of a decent lathe chuck), its size, and its relatively limited use to the average model maker. It has but one principle use and that is to provide a work holding device that will allow you to mark, drill, cut, or mill at very exact intervals around a circle. The workpiece is held in a chuck, exactly the same chuck you would find on a lathe, which is threaded on a spindle. The spindle is connected to the crank handle through a set of reduction helical gears, and as the indexing crank handle is turned, the chuck rotates. The stopping points of the chuck are determined by either a pin and detent plate on the chuck backplate, or by replaceable dividing plates and a spring loaded detent pin located in the backside of the crank handle. When a division point is reached, the detent pin is dropped into the plate, and you carry out the work to be done at that point. Depending upon which division plate is in place, any number of divisions of a circle between 1 and 450 can be dialed up. Great for spotting and drilling smokebox rivets!

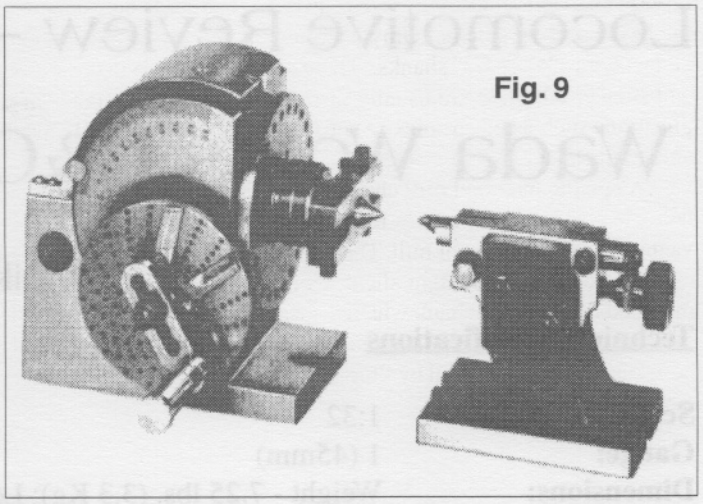


Fig. 9

Last issue you may recall I mentioned the question of "headroom", and because the dividing head is an accessory which sits up rather high on the milling table it requires the most headroom of all the other milling machine tooling. For this reason it is sometimes difficult if not impossible for the small mill owner to make use of a dividing head. However, there are less expensive and less space consuming ways to provide basic geometric dividing by 2's, 3's, 4's and 6's than to buy a dividing head. I will describe this alternative in a future issue. For the really fastidious, compulsive, or superscale model maker, one who takes pleasure and comfort from knowing that a circle of bolts is EXACTLY right on centers, the dividing head can be indispensable. For the rest of us it is an accessory that can, or must, wait.

And so also must our next episode, where we will come to the end of this series on the basics of machine tools. Many more interesting investigations, however, await us down the road.

Locomotive Review –

Wada Works B&O 0-4-0 Docksider

by Mike Moore

Technical Specifications

Scale:	1:32
Gauge:	1 (45mm)
Dimensions:	Weight - 7.25 lbs. (3.3 Kg); Length - 11.1/4" (283mm); Width - 3.3/8" (88mm); Height - 5.5/8" (143mm)
Cylinders:	12mm Bore - 18mm Stroke
Valves:	Cross Porting 'D' Valves
Valve Gear:	Walschaerts
Fuel:	Alcohol
Boiler:	Type B with 4 fire tubes
Capacities:	Water - 220 cc; Alcohol - 90cc
Fittings:	Safety Valves - (2), Displacement Lubricator, Water Sight Glass, Pressure Gauge, Kadee Nº 1 scale couplers, R/C Mountings
Detail Castings:	Bell, Headlamp, Westinghouse Air Pump, Handrails, Builder's Plate, Steps, Front/Rear Buffer Beams, Whistle
Available from:	Potomac Steam Industries - North Jersey Gauge One - Cross Creek Engineering (see their ads in this issue for contact information)
Price:	$2500.00

The Prototype

In order to reach Baltimore's inner harbor, the Baltimore & Ohio railroad had to travel over Pratt Street from its terminal at Mount Clare. The B&O operated many other street trackage routes, but the Pratt Street run remained the favorite and best-known route. In fear of startling horses on the streets, the city fathers forbade steam powered locomotives on Baltimore streets. The B&O was forced to use horses to pull the cars from the yard to the warehouses and wharves that lined the harbor. Starting in 1845 the city allowed steam operations during nighttime hours, so the B&O began operating small 0-4-0 engines shrouded in streetcar-like cabs to reassure the omnipresent horses.

In 1912, four 0-4-0 saddle-tank switching locomotives were purchased from Baldwin Locomotive Works. These engines became B&O class 16 and were numbered 96 through 99. All four were oil burners as built, but numbers 96 and 98 were subsequently converted to coal burning tender locomotives.

Numbers 97 and 90 had 19" x 24" cylinders, 48" drivers and weighed 120,000 lb. with 27,600 lb. of tractive effort. The boiler pressure was 180 lb./sq. in. Nº 97 and Nº 98 continued to operate the Pratt Street line until replaced by diesels and scrapped in May, 1951. Nº 96 and Nº 99 were scrapped in September, 1945 and March, 1944 respectively.[1]

Model Description

Wada Works has been known in live steam circles for their excellent diesel/electric GP9 locomotives and diesel/electric conversions of LGB electric locomotives. In addition, Mr. Kosaku Wada, the proprietor of Wada Works, has appeared at U.S. live steam meets with locomotives that he has built, including a Class A Climax and a steam turbine. Mr. Wada has been building custom locomotives for clients in Japan since 1975. Thus in 1995, when Mr. Wada announced that he would be entering the U.S. live steam market with U.S. prototype models, his first offerings were eagerly awaited. The B&O Docksider, Wada Works first production live-steam model locomotive, proves the adage that good things come to those who wait.

The 1:32 scale model successfully imparts a sense of the bulkiness of the prototype locomotive. When running it one can imagine this locomotive threading its way through the crowded streets on a dark night.

The model is alcohol-fired with the fuel tank attached to the back of the cab, where the oil-bunker would have been on the 1/1 scale version. The alcohol burner is mounted between the frames and is connected to the tank by a plastic tube. The burner can be removed from the firebox by taking off the tube and unscrewing one screw. Since the B&O switcher was a saddletank locomotive with no tender, there is no tender on the model to provide space for a fuel tank, water storage, or water pump. As provided, there is no way to refill the water in the boiler. Wada Works has promised to provide a filler valve for the boiler in the future.

The boiler is an internally fired, four tube, B-type boiler with a two-wick burner in the firebox. Water filling is done through a plug fitting hidden in the steam dome. The two safety valves are contained in the false rear sand dome. The boiler backhead is fitted with a pressure gauge, water glass, and throttle and blower valves. A displacement lubricator is fitted to the steam line after the throttle. All of this gear makes for a rather crowded cab, but Wada Works had made everything accessible by mounting the cab roof on a two-bar linkage which flips it up out of the way. The model is available either manually controlled or with two R/C servos installed. Mine is a manually controlled version with a throttle lever mounted be-

low the right side of the cab and the forward/reverse lever mounted below the left.

The model is supplied with numerous details that add to its scale appearance. A headlight is mounted on the smokebox front and a taillight is mounted on the cab back. Kadee #1 scale couplers are mounted on hefty buffer beams both front and back. A brass generator casting is mounted on the top of the alcohol tank and a brass air pump casting is visible through a cutout in the left cab wall. A bell is mounted atop the boiler along with a stubby stack and water fill. The 1:32 scale fireman is provided with a ladder to climb the oil bunker/alcohol tank, running boards with handrails and a platform on which to stand when filling the saddle tank. Steps lead up to the boiler top and platform from the running boards.

The smokebox front is a detailed casting with a B&O capitol dome plate mounted on center. A number plate here might have been more prototypical, but that capitol dome really looks great.

The saddle tank is enhanced with rivet details and the raised diamond tread on the steps and water fill platform has to be seen to be appreciated. My model is painted black, lettered "BALTIMORE AND OHIO" on the boiler sides, and numbered 98. The generator and air pump castings are painted grey.

Photo by Mike Moore

Model Operation

I took delivery of the locomotive at the 1997 Garden Railway Convention and its first few runs were on Walt Swartz's elevated portable track. This proved to be an ideal environment for the Docksider. I filled the boiler with distilled water until the water glass was about three-fourths full. Then I flipped up the cab roof and filled the lubricator with oil. Finally, I made sure the fuel valve was turned off and filled the alcohol tank. A suction fan was placed on top of the smokestack to draw a draft, the fuel valve was turned on and the burner lit from underneath. The firebox extends well below the boiler so a steaming bay with a cutout under the track would be helpful here. After about five minutes there was enough steam pressure in the boiler to crack open the blower valve, and a few minutes later full pressure was raised. The suction fan was removed and the locomotive run back and forth a few times to warm up the cylinders and clear out condensed water.

Directional control is accomplished on the manual version by pushing the lever under the left side of the cab forward to reverse and backward to go forward. The throttle lever is reached under the right hand side of the cab. When I first started out a gust of wind blew out the burner, but after that the locomotive ran smoothly for about 20 minutes with no intervention required. I shut off the alcohol and blew out the fire when the water ran low. I ran the Docksider six times during the convention and have since run it on Paul and Harry Quirk's portable track and the new permanent track at the Pennsylvania Live Steamers club site. I even attempted to run it on a temporary track laid out on my deck, where it sped down the sloping track and didn't make it around a too-sharp curve.

Model Performance

This is one of the best performing locomotives that I have in my roundhouse. It ran flawlessly out of the box and has not disappointed me since. It is a strong pulling locomotive, although I have not had an opportunity to test its maximum capacity. Mr. Wada was able to pull well over 20 MDC freight cars on Jim Stapleton's track.

nor criticisms and suggestions on the operation of the Docksider. First, both of the safety valves on my locomotive tended to lose their set position during transit. I have to reset them on the first run of the day. I think I will put a drop of glue on the threads to keep them from unscrewing. Second, the blower valve is supplied with a knurled brass knob, which becomes hot enough to burn fingers during a run. The operator might tend to flinch from the blower knob or avoid its use entirely – with disastrous results. The fire doesn't always want to stay in the firebox and boiler tubes when not persuaded by a strong draft. The blower must always be turned on when the locomotive is not in motion. If steam pressure is lost, the burner must be put out or a suction fan used. This is a lesson learned from painful and embarrassing experience.

The manual controls work well when they are easily accessible on an elevated track, but become awkward when there are obstructions such as trains on another track. On a ground level track the operator must reach below the cab and fumble around trying to find the control lever while following the locomotive around the track in a less-than-graceful stooped position. This can lead to a compulsion to grab the locomotive to stop it, thus sloshing the alcohol in the burner around and risking a fire. This is a locomotive that screams to be radio controlled. It is available with R/C servos installed and as soon as I can obtain servos I will mount them in my Docksider. This locomotive would be perfect for switching cars and

Wada Works Docksider doing what the prototype was built to do - moving freight cars and making up trains.
Photo by Scott McDonald

making up trains for its larger brethren to pull out on the main line. If a boiler filler valve is fitted, it could be kept in steam all day. Perhaps at the next meet I attend, I will suggest using the Docksider to make up trains, rather than doing it by hand.

Finally, I had some trouble determining the water level in the boiler. Sometimes, when I thought the water glass read three fourths full, the cylinders would prime when steam was raised. Also, on some runs the water would run out first and on other runs the alcohol first, even though the water and alcohol levels were the same on every run. I just chalked this up to either my ineptitude or the unreliability of a water column in a Gauge 1 sized tube. I have since been informed by Potomac Steam Industries that Mr. Wada has redesigned the water gauge and is proposing to replace the boilers on the already delivered Docksiders with the redesigned model.

Conclusion

I would not hesitate to recommend the Docksider to anyone looking for a fine running, great looking 1:32 scale locomotive. The craftsmanship and engineering on this locomotive are unsurpassed. Wada Works has turned out a quality product that is well worth the price. I look forward to more North American prototype models in 1:32 scale from Wada Works.

[1]***Impossible Challenge II, Baltimore to Washington and Harpers Ferry from 1828 to 1994*** by Herbert H. Harwood, Jr. Copyright 1994 Barnard, Roberts and Co., Inc., Baltimore.

BUILDING THE VEST POCKET CLIMAX

text and photos by Mel Ridley

drawings from the author's sketches by Harry Wade

Section 6 – The Cylinder Assembly (part 1)

6:0. THE CYLINDER ASSEMBLY. We now embark on the most critical and, probably, the most time consuming part in this series. It will require a degree of patience and a number of skills, but by tackling each step in turn and not worrying about the end product, we will get there.

A full set of castings for the major components makes things a lot simpler. Whilst a lathe is essential, the cylinders and 'D' valve have been designed so that no milling operations are required. In fact, no milling operations are required anywhere on this loco. If you do have a mill, however, it will save a bit of manual labour. Whilst a bench table/disc sander is a useful asset and saves lots of time, all you need is to be adept with a file for these operations.

Before we start, let us familiarize ourselves with the assembly and see how it all fits together, and how, in the model, it becomes a separate 'bolt-on' unit.

To digress slightly...like many conventional early day locos, Climax cylinders slope down from the smokebox toward the big end. Unlike those engines driven straight onto a driving wheel however, where the weight of the reciprocating masses and downward force caused hammerblow to lightly laid track, these forces were transferred in the Climax to a transverse drive shaft which, according to the manufacturers, absorbed those forces. Labbe & Goe and not a few engineers besides apparently found otherwise. Particularly at high speed, the loco merely attempted to shake itself to death.

Referring to Drawing 6:0. The cylinders are bolted to a saddle folded up from a pre-cut fret. Once aligned, and with the live steam and exhaust pipes added, they are soldered in place. Behind and in line with the cylinders, the pre-aligned trunk guides for the crossheads, together with the motion plate, are fastened to the same saddle and, straddling the frame and gearbox, bolted in situ.

MATERIALS REQUIRED: Set of castings comprising Cylinders with Front & Rear Covers, Valve-chest Body & Top, 'D' valve, Crosshead, Connecting Rod, Trunk Guide & Motion Plate, Dummy Drain Cocks & Exhaust Manifold, Saddle Fret, 6" of 3/16" & 9" of 1/4" hex brass, 4" of 1/2" brass round, 12" of 1/16" s/s rod, 2" of 1/8" bms rod, 12" plus of 3/32" o/d and 1" of 1/8" o/d copper tube, a couple of 1/4" hex 3/32" x 40T nuts & nipples, 1 - 5/16" hex l/8" x 40T nut & nipple, 12 - 8BA x 1/2" cheesehead steel screws, 2 - 8BA nuts, 24 - l0BA x 1/2" steel countersunk screws, 10 - l0BA x 1/2" steel screws with 11BA heads, 4- l0BA steel nuts and 1 - 4BA x 1/2" sockethead cap screw.

The castings for this operation differ greatly in the treatment they are about to receive, so identify them against the drawings and we will tackle each one in turn. DO NOT clean and fettle them all beforehand.

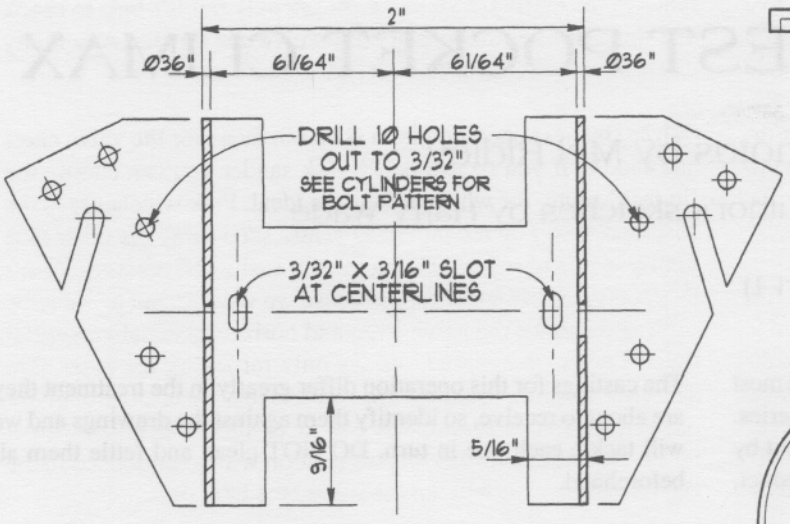
6:1. CYLINDER SADDLE: This arrives in the form of a flat cad/cam fret with predrilled pilot holes to locate the cylinders and trunk guides. There are no routed fold lines as in the gearbox because we need to retain the structural integrity after bending to allow fitment of the steam lines. Unless you are very skilled, don't try and perform this operation in the bench vise. It requires a sheet metal folder to allow accurately for the development with a corner rather than a radius along the fold, so shop it out. Dimensions are given in Drawing 6:1.

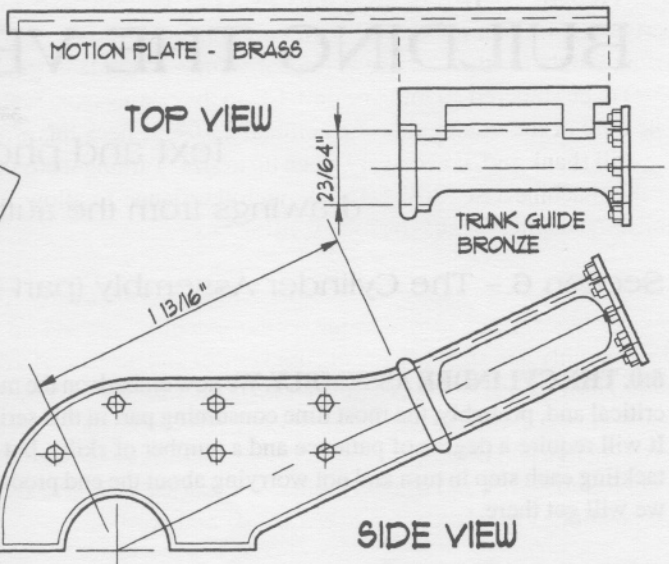
Whilst still in the flat and before marking off, drill the pilot holes 3/32" for 8BA clear and clean up the swages. Find the centreline on the fret, scribe a line and mark off 61/64" either side. When folded at 90°, this will allow for the .036" wall thickness plus development and give an outside dimension of 2" with a height of 1" at the apex measured from inside the fold. If it isn't 1", then read on.

Locate the saddle on the chassis. The outside edges should coincide with the outer edges of the frame and the inside edges of the 'H' section the inside. Refer to Drawing: If either of the inside edges protrude over the 5/16" frame thickness, then the 'wings' for the cylinders will not be at the same height, i.e. 1". Don't despair, whilst this means that the cylinders will not be at the same respective heights across the chassis, they CAN still be aligned later on to serve their purpose. BUT...look out for a couple of mild repercussions later on; angularity of the steam pipes (unseen) and possible slight misalignment of the motion plates against the chassis which may be seen. Pedantics take note, it's up to you.

Having established that the saddle is 'square', (or not, as the case may be), we need to drill a couple of 3/32" holes alongside each other and open up into a 3/16" lengthwise slot on either side. These will locate on the chassis holes already drilled and give some fore & aft adjustment needed for the assembly later on.

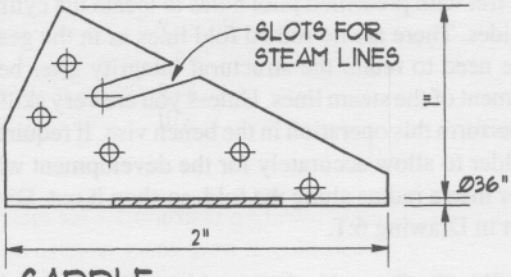
The logical sequence of events would now dictate that we go on to the cylinders - we're not. In an effort to prevent those lucky individuals with their newly acquired and currently obsolete milling machines from making fancy patterns on the backs of the cylinder castings, we are going to assemble the Crosshead Guide & Motion Plates, which will be used to check off dimensions for mounting the cylinders.





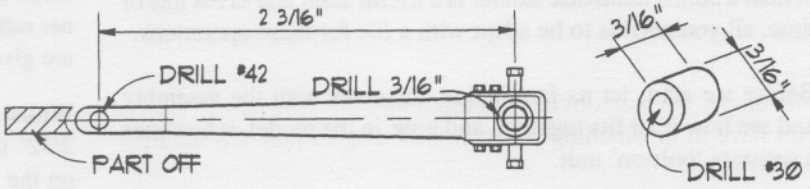
TRUNK GUIDE and MOTION PLATE

2 OFF - 1 EA R & L BRZ & BRASS CASTINGS



SADDLE

1 OFF - Ø36" BRASS SHEET

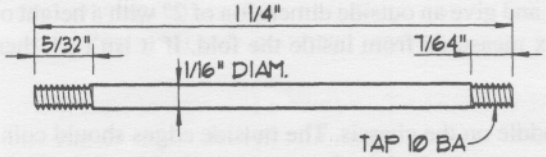


CONNECTING ROD

2 OFF - N.S. CASTING

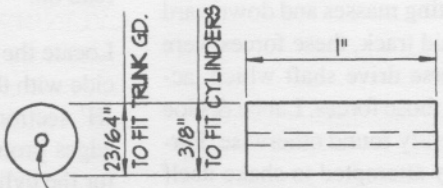
ROD BUSH

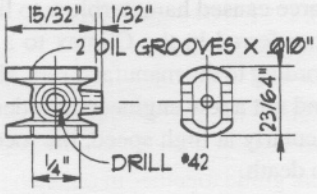
2 OFF - BRASS ROD



PISTON ROD

2 OFF - S.S.
DRAWN 2X FULL SIZE



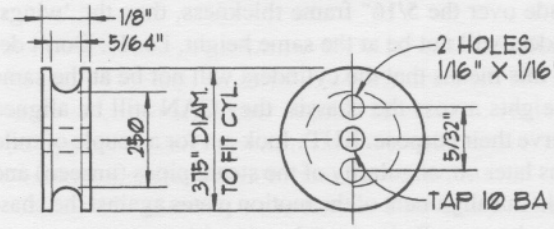


ALIGNMENT JIG

1 OFF EA SIZE ALUM OR BRASS

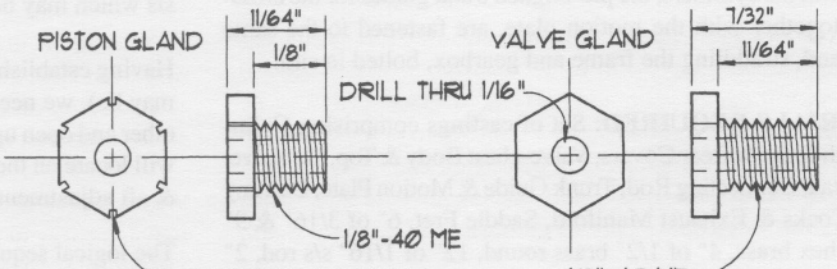
CROSSHEAD

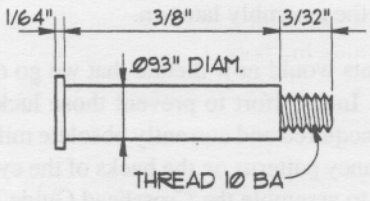
2 OFF N.S. CASTING



PISTON 2 OFF - BRASS

DRAWN 2X FULL SIZE





GUDGEON PIN

2 OFF 1/8" BMS/CRS
DRAWN 3X FULL SIZE

PISTON & VALVE GLAND NUTS

2 OFF EACH 3/16" HEX BRASS
DRAWN 3X ACTUAL SIZE

UNLESS SPECIFICALLY NOTED,
ALL PARTS ARE DRAWN FULL SIZE.

Locomotive design by Mel Ridley

6:2. TRUNK GUIDE & MOTION PLATE: This comes in two parts – the motion plates which are left and right handed, and a Trunk Guide for the Crosshead (an early form of the later guide bars) to be soldered up into one unit. Clean the castings and fettle. The bore of the trunk guide is a nominal 23/64". Check this with the drill shank and, if necessary, open up to size. Turning it around in the machine vise, drill 5/16" through the flange to allow for adjustment where it sits over the stuffing box.

Using soft jaws, clamp lengthwise in the bench vise, gently file smooth any surface irregularities on the mounting bracket so it fits smoothly and squarely in both the vertical and horizontal axis within the channel section of the motion plate. Flux the two parts, flange forward with the end of the bracket in line with the channel so the flange and nbw detail stands proud, and solder with multi-core. Remove flux and solder residue. You can see now how they are positioned in relationship to the saddle and gearbox.

Incidentally, a quick reminder here regarding the use of **SOFT AND SACRIFICIAL JAWS in BENCH & MACHINE VISES,** which I know have appeared before in the magazine but feel it worth repeating. Apart from protecting the jaws themselves against damage from hacksaws, etc., the primary purpose is to prevent damage to the workpiece, and more particularly, marring work already carried out. Throughout this series, where we are working with relatively soft castings in the vise, make up some jaws from brass angle, the size obviously determined by your vises. They don't have to be anything fancy, just as long as they are square and do the job. I use several sets made from brass, steel, wood and plastics. They are indispensable and easily and affordably replaced when worn. This will be especially important in the following section on cylinders, where they will also be used in a sacrificial capacity.

6:3. CYLINDERS: The raw castings arrive with an extension to the body at one end for mounting in the lathe. This end is also the gate, so remove excess sprue and dress the end, making it suitable for chucking in the 3-jaw. Leave alone the ceramic remains in the bore and ports until later. As a trial, hold the saddle and left hand trunk guide together in one hand and offer up the casting with the mounting face against the saddle. You will see how little material needs to be removed by comparing the width of the cylinder body against the mating flange. You can do the same for the other side with the body held upside down.

6:3:1. THE BODY: Chuck the casting, ensuring it is as concentric as possible, and slowly drill 11/32" for a depth of 1". This will remove most of the ceramic. On fairly high speed, drill 23/64", again VERY SLOWLY. You can now either bore to finished size, or use a 9.5mm drill using plenty of cutting oil and ream 3/8" to a depth of 7/8". Turn 1/64" off the end, leaving 3/64" exposed up to the base of the valve chest. Part off giving a finished body length of 13/16".

Place it vertically in the machine vise, grasped by the mounting flange and valve seat, and ream through from the other end until it just pokes through. Before we proceed further, hold the casting up to a bright light and inspect the bore for any irregularities or blow-holes in the casting. I've had a couple only but it's best to check and this can't be established until we've got this far. Any faulty castings will of course be replaced.

6:3:2. The next operation is to skim the faces for the valve chest and saddle. If you have a bench disk sander you can choose the 'lo-tech' route, for which 100 grit is ideal. Pick whichever is the best face, rest it on the table and gently sand away the other face until it is free of pockmarks, gradually easing off pressure. Don't take too much off either face because we will run out of valuable tapping depth for the valve chest and horizontal misalignment of the cylinders. Remember, we are only removing the outer skin and crud from the casting. The valve chest surface particularly needs to be flat and level. The two faces should ostensibly be at 90° to each other, but any slight variation will go unnoticed in the final assembly. We will lap the valve face later on.

For the file brigade, mount the cylinders end on in the bench vise using brass jaws, in this case say 1" angle, with the face just proud of the jaw tops. Using a smooth-cut file, file across as level as possible, utilising the 'sacrificial' jaws as a guide. With an effective platform approaching 3" across, it will be almost impossible to get a hunchbacked surface.

For the battalions patiently awaiting instructions for their turn to try out their milling machines, you now know what to do so you can just get on with it.

6:3:3. ALIGNMENT JIG: These simple mandrels or spindles will be required later on for cylinder alignment and as a centre for the crosshead, but we will make them now as the cylinder mandrel has another use in the next operation. See Drawing: 6.3.3.

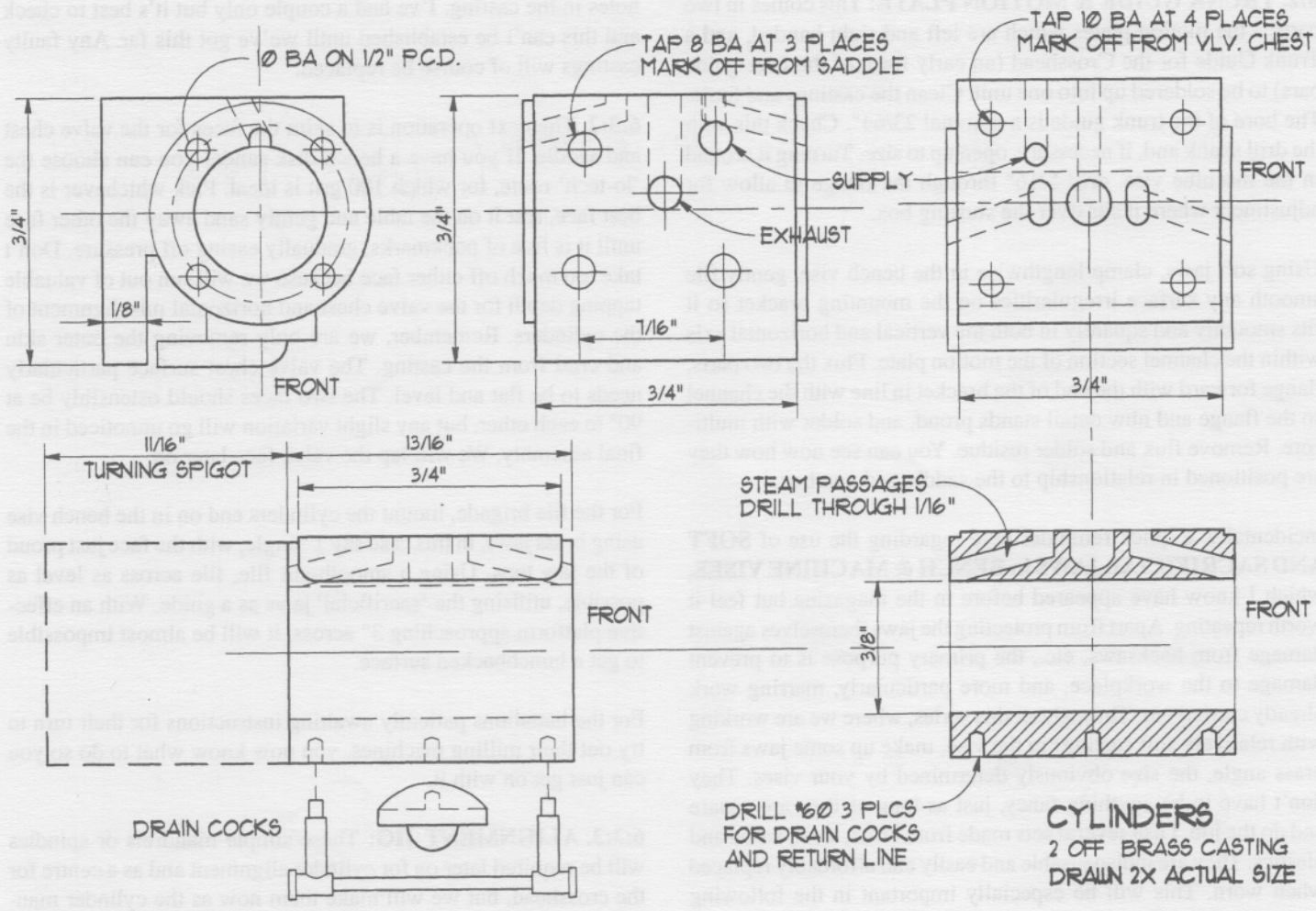
CYLINDER MANDREL: Turn down a 1" length of brass hex or round stock to 3/8" to be a good sliding fit in the bore. Centre and drill through 1/16". For the **TRUNK GUIDE**, repeat the above operation but to 23/64" o/d.

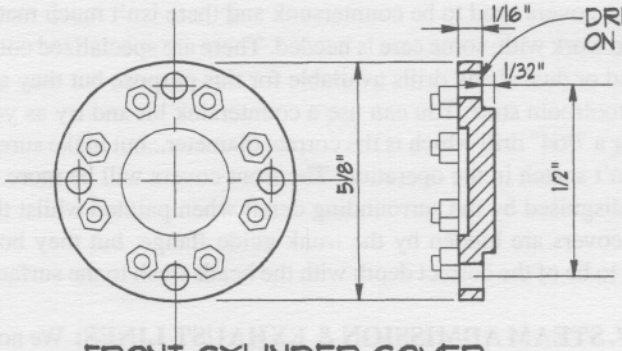
6:3:4. DRILLING & TAPPING: We now have a cylinder which is starting to look the part. The next series of operations can be done in almost any order, but I suggest we tackle the more complex piece first, that of the steamways, so if it does go wrong, we haven't wasted a lot of time on other more mundane operations such as drilling and tapping a myriad of small holes.

Consulting the drawing, we need to drill a couple of steamways which run from the end of the cylinder bore to the ports. Carefully clean out any ceramic remnants from the ports, taking care not to damage the port edges.

Mount the block in the bench vise with the alignment tool inserted partway to prevent crushing the bore. Using a four-square Swiss file, file a small flat roughly 45° to the bore, so creating a notch at the top, and gently centre pop.

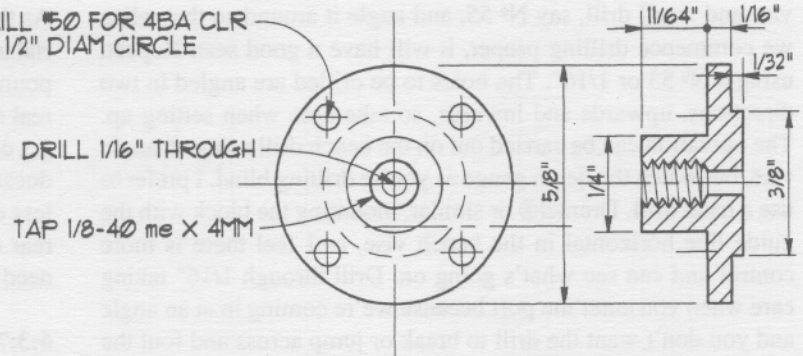
Remove the cylinder block and, with a fine felt-tip pen, draw a line from just above the bottom of the port to the pop-mark as a guide for the next operation. Open out the pop-mark using a pin





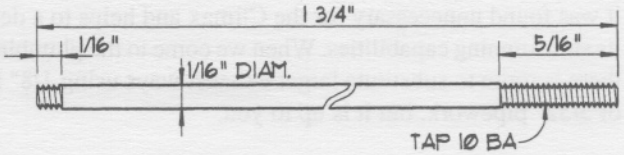
FRONT CYLINDER COVER

2 OFF BRASS CASTING 2X ACTUAL SIZE

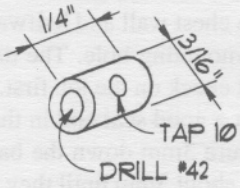


REAR CYLINDER COVER

2 OFF BRASS CASTING 2X ACTUAL SIZE

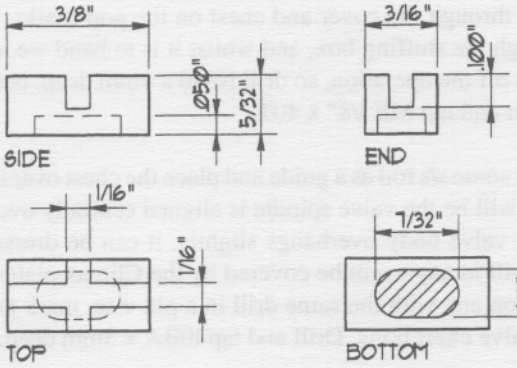


VALVE ROD 2 OFF - S.S. DRAWN 2X FULL SIZE



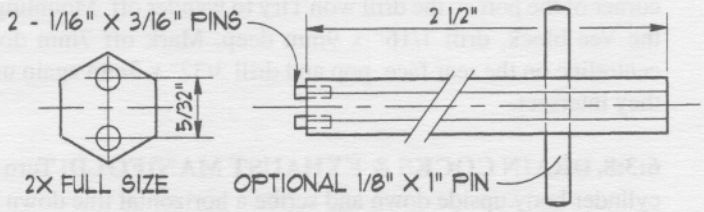
VALVE ROD

2 OFF - BRASS ROD
NOT TO SCALE



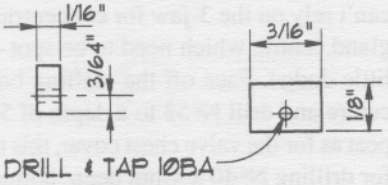
SLIDE VALVE 2 OFF - BRASS CASTING

DRAWN 2X FULL SIZE



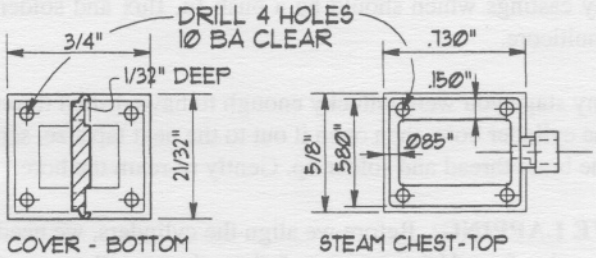
PISTON ADJUSTER

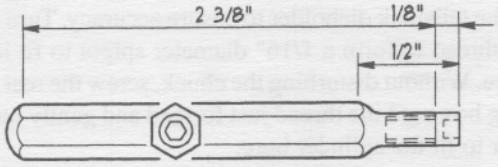
1 OFF 1/4" HEX BRASS



SPINDLE BLOCK

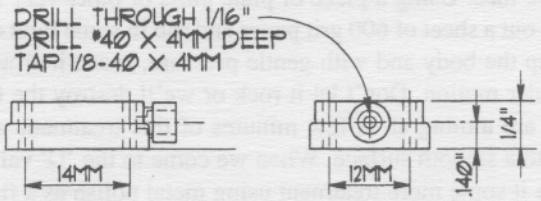
DRAWN 2X FULL SIZE
2 OFF - BRASS





VALVE CHEST COVER SPANNER

1/4" HEX BRASS 4BA SOCKET HEAD CAP SCREW
SPANNER FITS 10 BA HEX BOLTS



VALVE CHEST & COVER

2 OFF EA BRASS CASTINGS

UNLESS SPECIFICALLY NOTED, ALL PARTS ARE DRAWN FULL SIZE.

vise and small drill, say Nº 55, and angle it around so that when we commence drilling proper, it will have a good seat. Repeat, using a Nº 53 or 1/16". The holes to be drilled are angled in two directions, upwards and inwards, so take note when setting up. The operation can be carried out on the bench drill using an angle vise, but watch the depth gauge as you're drilling blind. I prefer to use a hand drill, Dremel® or similar, mounting the block with the guide line horizontal in the bench vise, as I feel there is more control and can see what's going on. Drill through 1/16" taking care when you enter the port because we're coming in at an angle and you don't want the drill to break or jump across and foul the other wall.

VALVE CHEST & COVER: File or sand the top and bottom of the valve chest so there is a good seat. Drill Nº 50 l0BA clearance holes through the cover and chest on the pop-marks. Drill 1/16" through the stuffing box, and whilst it is to hand we may as well finish off the operation, so drill Nº40 x 4mm deep, bottom with a 'D' bit and tap ME l/8" x 40T.

Insert some s/s rod as a guide and place the chest over the block so what will be the valve spindle is aligned centrally over the ports. If the valve body overhangs slightly, it can be dressed off later and will in any event be covered by the Climax plates. Clamp in position and with the same drill in a pin vise, mark positions for the valve chest bolts. Drill and tap l0BA x 3mm deep.

6:3:6. CYLINDER COVERS: Clean off any excess sprue. Chuck the front cover (with the nbw detail) in the 3-jaw and using the parting tool skim down to 5/8" o/d. Move the top slide in by 1/16" and turn down to 3/8". Move in another 1/32" for the register and part off.

The rear cover requires slightly different treatment because we can't rely on the 3-jaw for concentricity of the register and piston gland centre, which need to be spot-on, and for which we have a little dodge. Face off the stuffing box giving a length of 11/64", centre and drill Nº53 to a depth of 5/16". Open out to 1/16". Repeat as for the valve chest cover, this time using the tailstock chuck for drilling Nº40 x 4mm deep, bottoming and tapping ME 1/8" x 40T. Skim the o/d down to 5/8", move in 1/16", turn down to a few thou' over 3/8", say .380". Move in another 1/32" for the register and part off.

Now for the dodge. Chucking a piece of 1/4" or larger brass rod, turn down 5/16" to 1/8" diameter, and thread it ME 1/8" x 40T using the tailstock dieholder to ensure accuracy. Turn down a part of the thread to form a 1/16" diameter spigot to fit in the piston rod bore. Without disturbing the chuck, screw the rear cover by its stuffing box onto the thread just formed and gently turn down the register to fit the cylinder bore.

Both covers are fastened using countersunk 10BA screws. Sit a cover onto the cylinder body and note particularly where the outer valve chest screws may intersect. 'Pop' 4 holes on 1/2" PCD and drill Nº 50 for l0BA clear. Mark the corresponding positions on the body, drill and tap l0BA x 4mm deep.

As the covers need to be countersunk and there isn't much material to work with, some care is needed. There are specialized compound or dual shank drills available for this purpose but they are real toolroom stuff. You can use a countersink bit and try as you go, or a 7/64" drill which is the correct diameter...but make sure it doesn't snatch in the operation. The front covers will be more or less disguised by the surrounding detail when painted whilst the rear covers are hidden by the trunk guide flange, but they both need to be of the correct depth with the heads flush to the surface.

6:3:7. STEAM ADMISSION & EXHAUST LINES: We now need to drill a couple of holes for the exhaust and live steam lines, but a quick word of explanation first. It is usual for the exhaust line to be of a larger diameter than the live steam side to prevent a throttling effect, i.e. the pistons have to do more work to expel the used gasses. Whilst more power is generated in this arrangement, it was found unnecessary for the Climax and helps to a degree in its slow running capabilities. When we come to the plumbing side, there is room to substitute larger exhaust ways using 1/8" instead of 3/32" pipework, but it is up to you.

Mount the valve chest in position without the cover and very lightly scribe a line in the rear inside corner to mark a boundary prior to drilling the 1/16" LIVE STEAM LINE. This exits at a 45° angle into the valve chamber just inside the chest wall and halfway between the rear port and valve chest mounting hole. The dimensions are given in Drawing 6:3:7., but check on the job first. Drill 1/16" vertically for a few thou' to get a good seat and in the Vee Block, at 45°, drill 4mm deep. Measure 3mm down the back of the block in line and cross drill 3/32" about 3mm until they intersect. The EXHAUST STEAM LINE exits from the centre port, again at 45°. Start this operation by hand using a pin vise in the corner of the port so the drill won't try to wander off. Mounting in the Vee block, drill 1/16" x 9mm deep. Mark off 7mm down centreline on the rear face, pop and drill 3/32" x 3mm again until they intersect.

6:3:8. DRAIN COCKS & EXHAUST MANIFOLD: Turn the cylinder body upside down and scribe a horizontal line down the centre. Pop three holes, one in the centre for the exhaust and the outer two l.1/2mm in from each end so they are 17.1/2mm apart. Drill each Nº 60 (.040") x 1.1/2mm deep. Having fettled the dummy castings which should be a push fit, flux and solder in with multicore.

If at any stage you were unlucky enough to have drilled through into the cylinder bore, then open it out to the next tap size, screw in some brass thread and solder up. Gently re-ream the bore.

VALVE LAPPING: Before we align the cylinders, we need to lap the valve face. Using a piece of plate glass or other very flat surface, lay out a sheet of 600 grit paper and rub in some light oil. Firmly grasp the body and with gentle pressure, move it around with a circular motion. Don't let it rock or we'll destroy the flat surface we are aiming at. A few minutes of this treatment will bring it up to a smooth surface. When we come to the 'D' valve, we can give it some more treatment using metal polish as a final lapping compound.

6:3:9. CYLINDER ALIGNMENT: Having fitted the saddle to the chassis, cut a 5" length of 1/16" s/s rod and insert in the Alignment Jig. Clamp a cylinder block with the mounting flange squarely aligned at the top corner of the saddle. Insert the jig into the cylinder bore and joggle around until the rod passes through the centreline of the gearbox driveshaft. Scribe through the saddle mounting holes, remove the block, centre-pop and drill № 51 x Smm deep. Care is needed with the bottom two holes as they will exit in the vee just about where the mounting flange and cylinder body meet. Tap 8BA.

6:4. PISTON & PISTON ROD: Chuck a piece of brass, face and turn down about 1/2" or so until it is say .380", 5 thou' larger than the bore. Using the parting tool, start to part off a piece 5/32" long. We need a couple, but do them one at a time. Cut a groove for the piston ring in the centre 5/64" wide by 1/16" deep, or just under if you don't have a round nose tool, and round it off with a rattail Swiss file to 1/16" deep. Centre, drill № 55 and tap l0BA using the tailstock chuck. Now turn down so it is a good sliding fit in the bore, gently round off the sharp edges and part off.

6:4:1. For the piston rod, cut off a piece of 1/16" s/s rod 1.1/4" long, having marked off 5/32" for the piston and 7/64" for the Crosshead in from each end. Put the l0BA die in the 3-jaw, the rod in the tailstock chuck and, using cutting compound, cut the thread by hand up to the marks, doing the crosshead end first. Due to swaging that occurs in the threading process, you will now have to gently file the piston end until it can enter the rear cylinder cover. Chuck it in the 3-jaw using a pin vise if it doesn't hold down to 1/16" and keep testing as you go.

The last operation here is to drill a couple of holes in the end of the piston and make a tool to enable adjustment once it is in the bore. Thread the piston onto the rod, hold it face up in the bench vise and scribe a line across the axis. Mark the two hole locations 5/32" apart on centreline, pop and drill 1/16" x 1/16" deep.

6:4:2. ADJUSTMENT TOOL: Part off a 2.1/2" length of 1/4" hex brass, rounding off one end and facing the other. Mount vertically in the bench vise and scribe a couple of intersecting lines over the long axis to find centre. Pop and mark the other two holes 5/32" apart on centreline. Pop both of these, transfer to the machine vise and drill 3 x 1/16" holes, the centre one 1/16" deep, the two outer ones 1/8". Insert a couple of pieces of 1/16" rod in the outer two, flux and solder up and part off 1/16" long. Dress the ends so they are a nice fit in the piston. Rub the tool on all faces against some coarse emery paper and it forms a good gripping surface. If you want the deluxe model, you can if you wish stick a 1" x 1/8" pin through it about halfway down its length as a key, but it really is superfluous as we don't require any amount of torque in the adjustment process.

6:4:3. GLAND NUTS: As all four are made from the same material, we will do them in one batch.

VALVE CHEST: Chuck some 3/16" hex brass and face off. Centre and drill № 53 x 1/4" deep followed by 1/16". Turn down a 1.1/64" length to 1/8" and thread ME 1/8" x 40T using the tailstock dieholder. Part off giving an overall length of 7/32".

PISTON: The procedure for these is the same as above excepting that the threaded part is only 1/8" long, giving an overall length of 11/64". HOWEVER, in order to adjust the gland when the loco is up and running, because there is insufficient room to get at it with a spanner, we need to notch it for adjustment with a small screwdriver.

Proceed as for the valve chest until you commence to part off. With the parting tool, go down to 1/8" dia. or so and skim along for a further 1/4", then part the piece off. Holding it securely end on in the bench vice, use a jewelers piercing saw and gently cut six notches around the periphery where the hex angles intersect. These only need to be 1/64" or so to do the job. Saw off the excess material and dress the ends.

6:4:4. CROSSHEADS: The nickel silver Crosshead is cast with a mandrel at one end for turning. Clean out any ceramic from the interior. Saw off the excess sprue and dress the end. Chuck it in the 3-jaw, centering as concentric as possible and turn down to 23/64", checking as you go for a good sliding fit in the trunk guide. It needs to be a good fit, otherwise excess wear will occur in the stuffing gland.

Put the parting tool over to 45° and cut a couple of oil grooves about 1/4" apart either side of the gudgeon pin. They only need to be a few thou' deep. Part off the piston boss giving an overall length of 1/2". The boss should protrude 1/32".

Drill through 1/16" for the gudgeon pin and open out to № 42, cleaning away any swarf. We will drill and tap for the piston rod when we come to align the assembly later on.

6:4:5. GUDGEON PIN: Turn down a length of 1/8" BMS to .093" for 3/8". Turn down the first 3/32" to .070" and thread l0BA. Part off leaving a 1/64" shoulder. Later on, we'll add a l0BA nut to the threaded portion and grind or saw it down to locknut size.

6:4:6. CONNECTING RODS: Clean off any ceramic around the nbw detail and grind off sprue remaining at the big end. These rods suit either side, so at some time we'll remove one of the big end oil containers. I suggest this is done later rather than sooner because we might end up fitting them upside down whilst playing with the subassembly prior to fitting.

Take a pair of dividers set to 2.3/16" apart and scribe a line from the centre of the big end for the gudgeon pin. Centre pop and drill through 1/16" at both ends. Open out the little end to № 42 (.0935") and the big end by degrees to 3/16". Turn up a 3/16" o/d bush from Bronze, Gunmetal or Brass if you haven't got the former, centre, drill and open out to № 30 (.1285"). Part off 3/16" and push fit into the big end. The big end pin is 1/8" dia., but we need a little leeway when we come to spring on the rod.

Cut off the end of the rod at the little end, leaving about 3/32" protruding beyond the centre. Test assemble the crosshead, connecting rod and pin and check there is sufficient angular move-

ment for the rod as it rotates about the flycrank. You may well have to file a small radius around the top and bottom faces of the connecting rod to accommodate this. See Drawing.

6:4:7. SLIDE VALVE & SPINDLE: All we should have to do on the 'D' valve is to clean it up and check dimensions against the job. When laid on the valve face, it should just cover both ports but with the slightest fore & aft movement exposing a port edge. Refer Drawing. If necessary, file a tiny bit away from each end. Ensure the slots on the top surface are clear and unobstructed. Lap the valve surface the same way as for the cylinder face, taking care not to rock it. Having satisfied yourself it's nice and smooth, spot a few drops of metal polish on the valve face and rub it gently fore and aft on the cylinder chest to finally lap it in.

VALVE ROD: Mark off some 1/16" s/s rod as you did for the pistons, 1.3/4" long, and thread l0BA either end 1/16" and 5/16" respectively. The 5/16" end will require the same treatment as the piston, so chuck it in the lathe and gently file down until you obtain a good fit through the valve chest gland. If you didn't make a couple of bushes for the spindle ends as described when we made the eccentric spindles in Section 4:3, then you can do so now. Refer Drawing:

SPINDLE BLOCK: Now all we need are a couple of pieces to actuate the slide valves. Made from 1/16" x 1/8" brass strip, mark off to size, drill & tap l0BA as per drawing, noting the hole is vertically offset. Try for fit in the valve, which should allow it to slop up and down without fore & aft movement. Poke the spindle through the gland nut and valve chest and screw on from the inside.

6:5. TRIAL ASSEMBLY: We now need to locate the trunk guides and motion plate and, as part of that process, centre the crosshead. Mount the saddle with the cylinder bodies attached and bolt loosely to the chassis using two 8BA x 1/2" screws and nuts, checking that the saddle mounting slots are in midway position over the chassis. Check the cylinders again for alignment and tighten up.

With a rear cylinder cover in place - it doesn't have to be fastened - slip on a trunk guide with its alignment jig inserted so that the front flange coincides with the cylinder cover and the top of the motion plate is parallel with the top of the chassis. If you look underneath, the cutout for the flycrank will be centered about the drive shaft. Refer Drawing. Scribe through the saddle for bolt hole location. Centre-pop, drill № 51 and tap 8BA. One hole will exit in the space between the trunk guide and plate, the other will pass right through the mounting lug and into the bore of the guide. This won't interfere with the crosshead, but clean away the swarf inside if you go that deep. Lightly fasten with 8BA x 1/4" cheesehead screws.

CROSSHEAD: We are now ready to locate the crosshead, which needs drilling and tapping for the piston rod. Insert the alignment jig into the cylinder and offer up a crosshead through the trunk guide. Using a pin vise and 1/16" drill, mark the location of the piston rod end in the crosshead boss. I know this is cheeky but it works.

Mount the crosshead in the machine vise, ensuring it is truly vertical, and drill through and tap l0BA. Clean crosshead and piston thoroughly. Now fit the connecting rod and gudgeon pin. Tighten up and saw or file the end of the thread with nut down to locknut size so it can enter the bore. Using bearing fit, screw the piston rod into the crosshead checking for interference with the end of the connecting rod. Slide on a gland nut and poke the rod back into the cylinder. Fasten up the gland nut and back off about 1.1/2 turns. Fit the piston onto the other end using the special tool we have made and screw up until it is flush with the end of the rod. DO NOT use bearing-fit at this stage.

This next stage takes far longer to describe than to do, so here goes. Slightly ease off the motion plate screws and try the crosshead for a nice sliding fit. At what you think is the optimum position, tighten the screws. Rotate the flycrank to 6 o'clock, twist around the connecting rod and carefully spring on to the big ends. Rotate the flycrank by hand checking that there is no undue interference at all positions. It may be that at the end of the stroke, a bind is caused by the piston bottoming on the cylinder cover or at the front by the crosshead and gland nut. Adjust the fore & aft position by moving the saddle. Firmly tighten the motion plate screws, check once more, clamp the motion plate to the chassis and drill right through l0BA clear as per Drawing.

We'll take a bit of a breather here and will finish up the CYLINDER section in the next issue.

Thirty Minute Shop Project -- "Vision Helper"

by Jerry Reshew

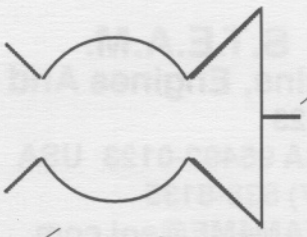
CAD drawings from the author's sketches by Jim Curry

Can't see the water level in your gauge glass?
Here's a classy solution!

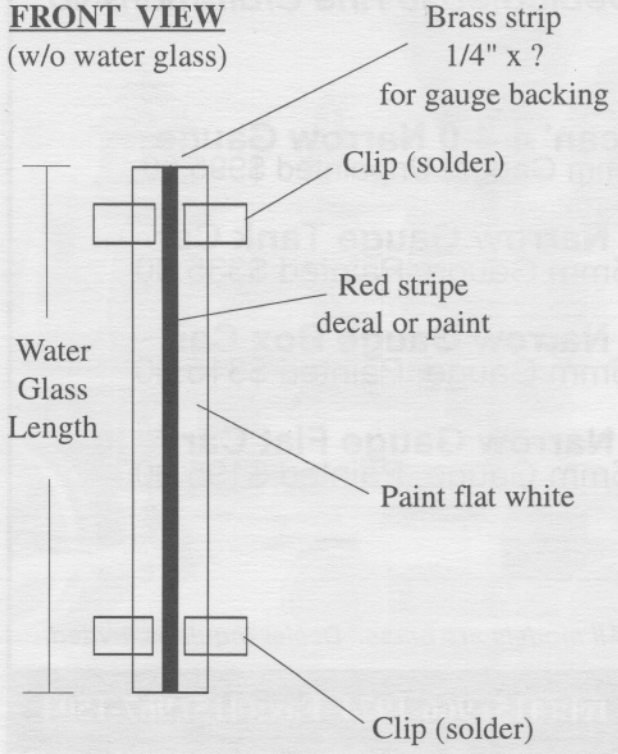
The sight glasses on many of our miniature locomotives appear to have been placed in such an awkward location that they are rendered all but useless when you need them most – while the engine is running around the track. It is to somewhat mitigate the problem of "where is the water?" that I designed and built the Vision Helper out of some readily available small bits, and about half an hour in the workshop.

The drawing tells it all...except that the paint should be allowed to dry for a few days before applying the color stripe. The stripe is really the key to the operation of this gadget. The white paint collects and reflects ambient light onto the water column, and the stripe is refracted at the level of the water.

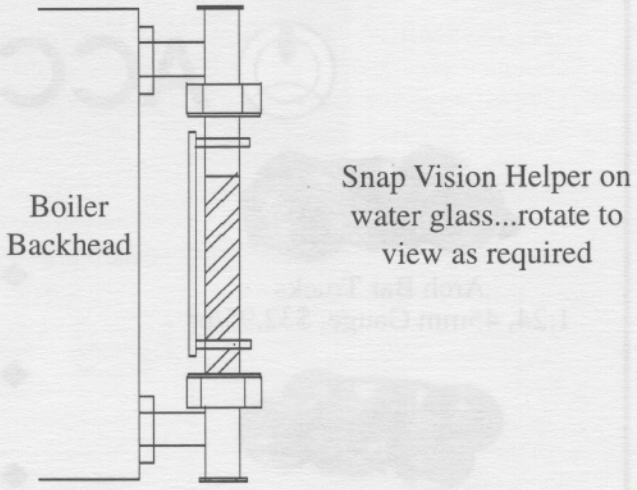
TOP VIEW



FRONT VIEW
(w/o water glass)



Typical Installation



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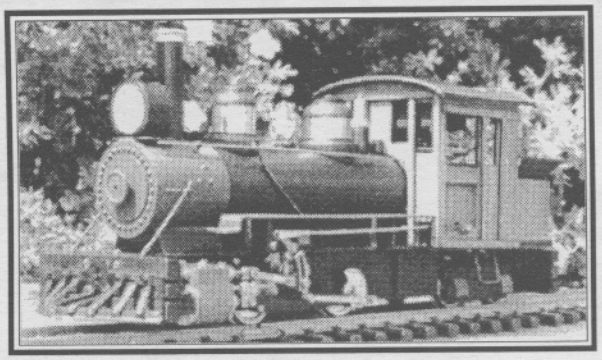

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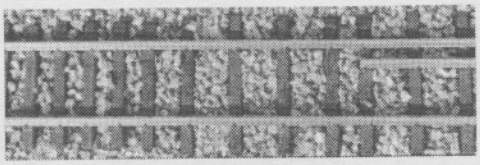

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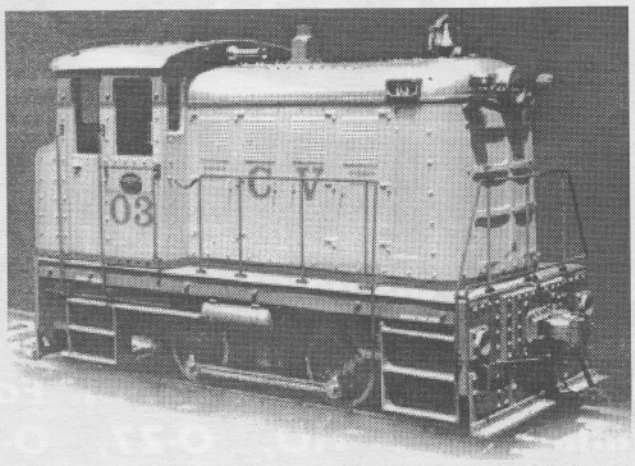

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A History of Merlin Locomotive Works

by James Ritson

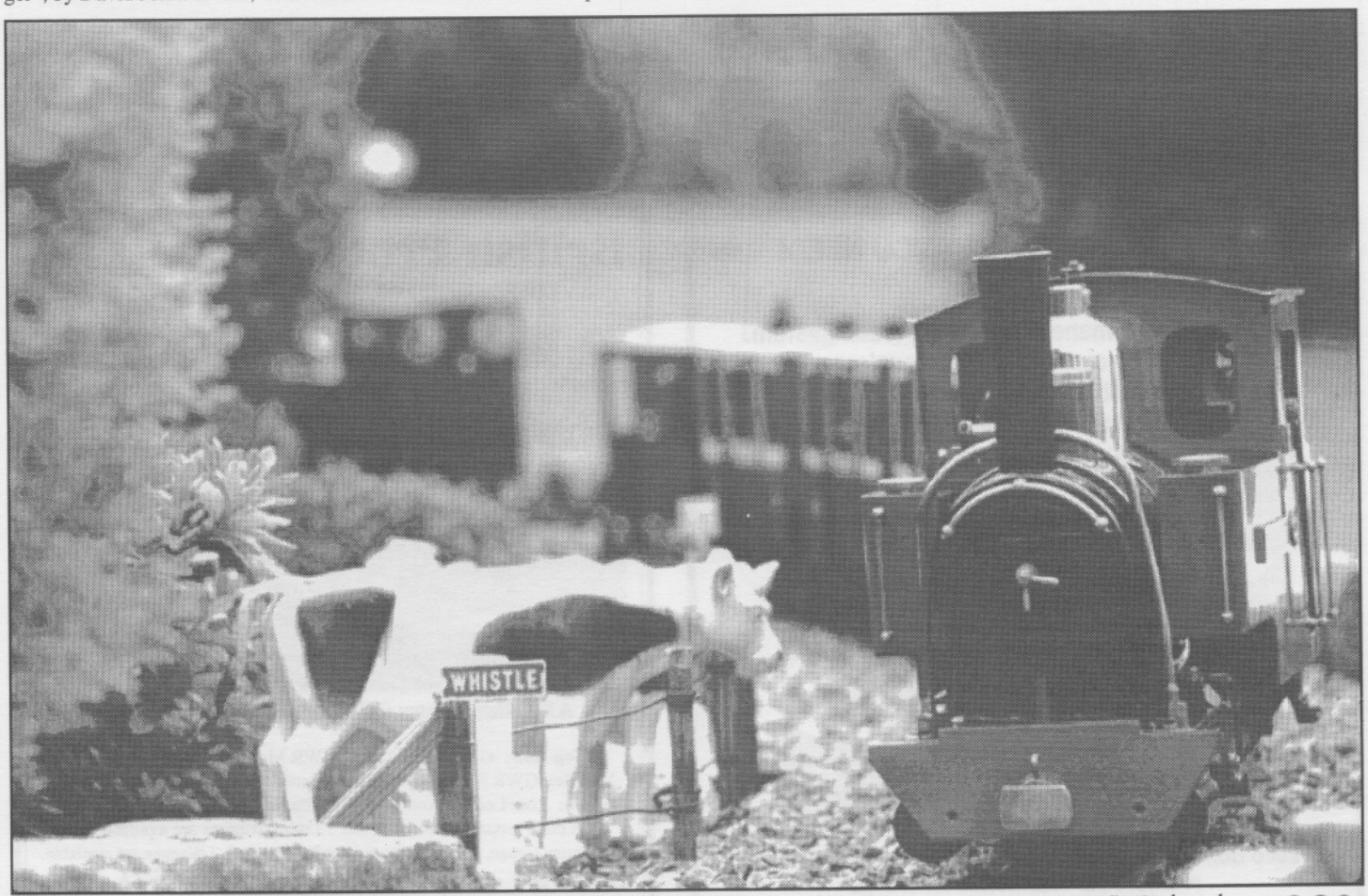
Towards the end of the nineteen seventies only Archangel in Britain and Beck in West Germany were producing large numbers of small scale live steam locomotives.

Tom Cooper started to import Beck's products into Britain through his shop, "Minitrains", in Kendal, Cumbria, in the northwest of England. These engines were European style 0-4-0 tank engines called "Anna". They had gas fired boilers and slip eccentric valve gear. Beck built them with an inside framed gauge 1 (45mm) chassis, and Tom was able to convert them to gauge 0 for the British 16mm scale/32mm gauge market. No mean achievement on an inside framed model. They were well designed and built economically, so that Tom was able to offer live steam locomotives to people at a considerable saving over Archangel products.

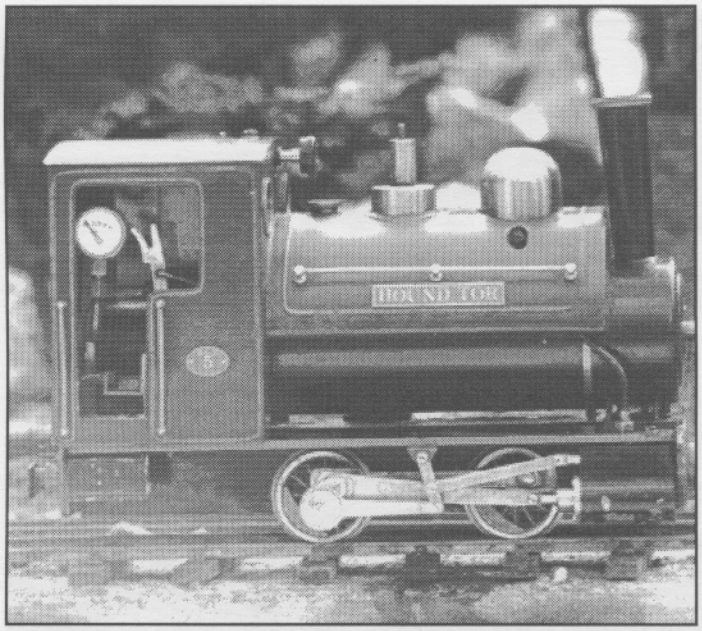
At the end of 1979 Tom changed the name of his business to Merlin Models. It is possible that he got the idea for this name from a cartoon character, Mr. Merlin, which appeared in a newsletter called the "Messenger", by David John. In fact, Tom and David later collaborated to produce a "Merlin's Messenger", but that was a couple of years after Merlin Models came into existence, so it is possible that Tom's choice of name was pure coincidence. What is certain is that from this time onwards he often referred to himself as Mr. Merlin, "working his magic" with small scale live steam.

Early in 1980 Merlin models began offering re-bodied versions of "Anna" to make them more British looking. A few were turned out with an 0-4-2 wheel arrangement, and there was also a matching 4-wheel tender available. Merlin also offered a "de Winton" and a Glyn Valley Tramway "Sir Theodore", which were built by Jim Wilde and Robin Gosling, but marketed by Tom.

It was around this time that Merlin began the custom of giving their locomotives a name beginning with the letter "M". Those re-bodied Annas with saddle tanks were called "Monarch"; those with side tanks were called "Midas", and when Beck produced a larger 0-6-2 locomotive called "Helene", it too was Anglicized and offered as "Matador". Alas, there



The first remotely reversible locomotive from a Beck chassis was "Maestro". It had an 0-6-0 chassis, which retained the Beck cylinders, and used a form of Walschaerts valve gear which was being tried out by Beck just before they went bankrupt. It retained the Continental style body. The throttle was in the front dome. It was an instant hit and was soon given an English style body and the name Midas Mk.3. (circa 1983) Photo by Tag Gorton



This was one of the earliest Merlin conversions of the Beck Anna. It retains the Beck 0-4-0 slip eccentric chassis, which has been converted to gauge 0. It has been fitted with an English style saddle tank body and was marketed under the name Monarch, thus starting a long line of products to have a name beginning with "M". (circa 1980-81) Photo by Tag Gorton

was little demand for it and none were produced. Merlin even offered a saddle tank version of the Mamod loco called "Maestro", which looked quite like "Prince" on the Festiniog railway.

By the end of 1980 business was looking promising, and it was decided that bigger premises would be needed. The Welsh Development Office was offering grants to people who would set up businesses in rural areas of the Principality. So in January 1981 Merlin Models moved to Llanfair Caerenion, and into a small factory unit right next to the Welshpool and Llanfair Light Railway, one of the "Great Little Trains of Wales".

Colin Cooper, Tom's son and a qualified machinist, became the workshop manager at Llanfair, and one of his first achievements was the design of a model of the ex-Sierra Leone Hunslet 2-6-2 locomotive, running next door to the factory on the Welshpool and Llanfair line. At first it used Beck cylinders, but it was essentially a brand new design, and with radio controlled throttle, Walschaerts valve gear and even a whistle, it marked an important new technical development for Merlin Models.

At the Nuremburg Toy Fair in early 1981 Beck showed a new 0-4-0+0-4-0T Mallet loco called "Bertha", and while Tom began to think about modifying it, Colin was busy putting new bodies on the Anna chassis, and getting the Hunslet into production.

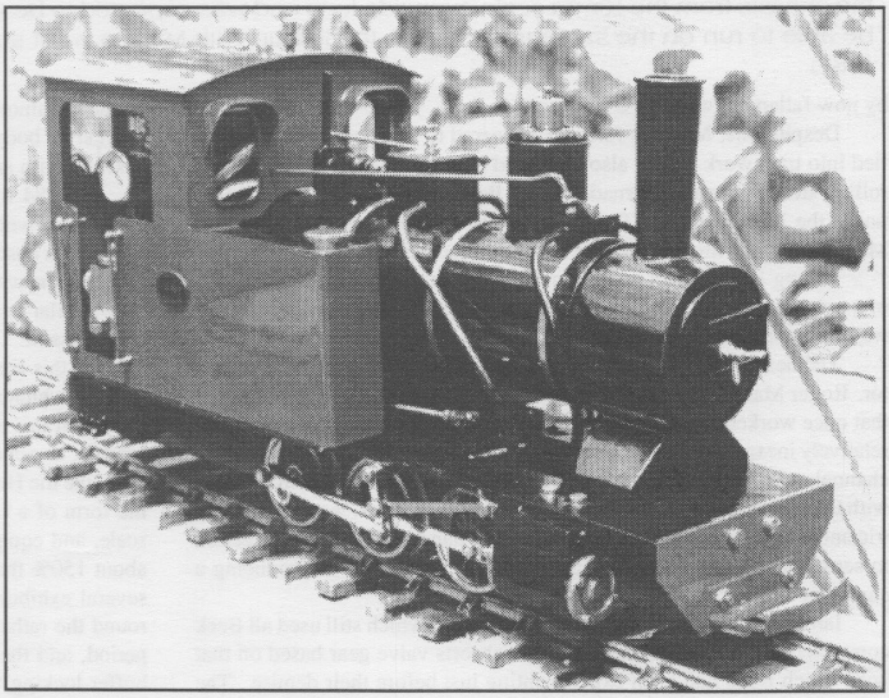
The timing of the advent of an almost entirely Merlin built Hunslet could hardly have been better, because in the summer of 1981 Beck went bankrupt and Merlin were left with a quantity of unused components, but no source of suitable engines to modify.

The story of how Beck's assets were brought to Britain has been told elsewhere. Suffice to say that Tom never actually owned Beck, although he liked people to have that impression, and he even traded as Merlin-Beck for a time.

Merlin were soon buying the old Beck Anna slip eccentric chassis and other components from the new owner, on which they then put their own British style sidetank or saddle tank bodies to sell as Midas or Monarch. Other models were planned including a version of Anna with an American style body, to be called "Mustang". However, the feedback from America was unfavorable and the idea was dropped. Despite this, work on the other British style locomotives continued apace, and they even produced a dozen or so copies of the old Beck Bertha loco, now renamed "Matador". A few of them were imported into America by an almost unknown but very enthusiastic garden railway live steamer by the name of Marc Horowitz. Interestingly, although it was ostensibly a mallet type loco, it actually had sliding axles instead of a pivoting bogie. One side effect of this was that it was not possible to convert the chassis to gauge 0, and thus only gauge 1 models were produced.

In 1982, with things moving along nicely, a young Ian Pearse joined the company. Already an accomplished model engineer, he brought with him a prototype of a cute little 0-4-0 tank engine with oscillating cylinders. It was designed to be economical to manufacture, and seeing this, Tom put it into production in early 1983, with Ian earning a royalty for each copy. There were two versions, an open cab, side tank model called "Little Wonder", and a nicely proportioned saddle tank version called "Minstrel".

Also during 1982, Merlin produced an 0-6-0 version of the 0-4-0 Midas, still with slip eccentric valve gear, and with the center axle driven. Merlin had had little success with the re-bodied Mamod so it had been dropped, and this new loco was allotted it's name, "Maestro". Sadly, it too was a poor seller and only about five were made. Interestingly, in June of 1982, Eric Lloyd of Wrexham and the famous Lloyd County Railroad was commissioned to design and build a prototype mogul based on one of the unsold slip eccentric Maestros. Eric produced a pleasing design for a 2-6-0 tender loco that bore more than a passing resemblance to the late nineteenth century Colorado narrow gauge locomotives. Regrettably, it never progressed beyond the prototype stage as Tom Cooper had



Matterhorn, circa 1988. This was an attempt to entice LGB owners to try live steam, and was based on Major running gear on an inside frame chassis, with a Continental style body. It was usually supplied with LGB-type couplings. Loco owned by Geoff Spenceley. Photo by Maelor Davies

Heidi was perhaps the most convincing model of a Continental-style locomotive, and was designed for Marklin. It used the chassis from the 10mm scale Avonside loco and was expected to be sold to complement their electric models and be able to run on the same track. Sadly, the link-up with Marklin went sour and relatively few were produced. (circa 1987)
photo by Dave Pinniger

by now fallen out with his U.S. agent.

Despite this, Merlin's fortunes appeared to be good. They diversified into trackwork. They also marketed a fine range of wooden bodied rolling stock, which were made by Ian Pearse's father Donald and sold under the Merlin name. Their main competitors were still Archangel Models, and Merlin were able to maintain their price advantage.

During 1983, Tom's son Colin decided that he must take up the offer of much better paying jobs elsewhere and he left the company. Ian Pearse was put in charge of the workshop in his place.

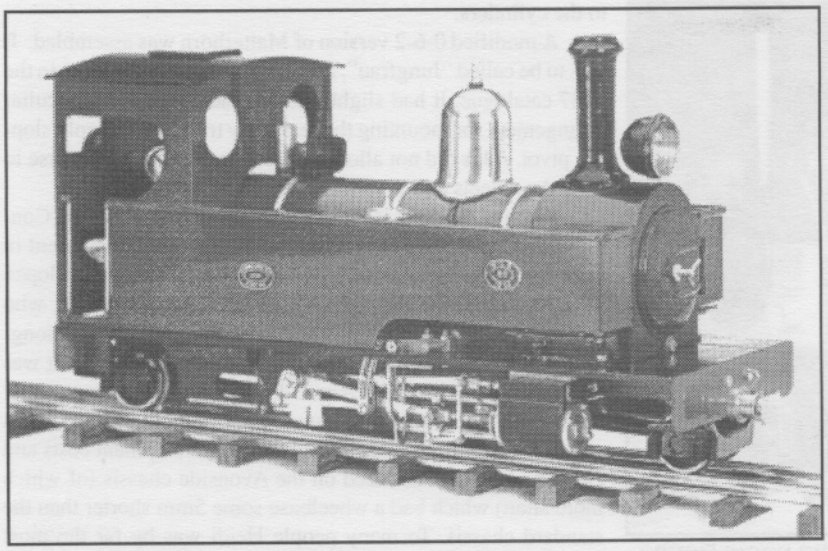
The next important development was in response to a new competitor. Roger Marsh produced a model of an Avonside loco called "Ogwen", that once worked in the Penrhyn quarries. Its breakthrough was that this relatively inexpensive locomotive could be remotely reversed, with single-channel radio control of both speed and direction. All the Merlin engines, with the exception of the much more expensive Hunslet, were slip eccentric and had to be pushed along the track by hand in the desired direction to set the valve gear. So Tom gave Ian Pearse the task of producing a cheap loco that could be reversed by radio control.

Ian came up with an 0-4-0 reversing engine which still used all Beck components, but with a simplified Walschaerts valve gear based on that with which Beck had been experimenting just before their demise. The model turned out to be too powerful for the 0-4-0 chassis and was prone to doing wheelies down the track. (!) So Ian redesigned it as an 0-6-0, with the rear drivers favored. This was put into production with a Continental body, and picked up the name "Maestro" again.

The new Maestro was an instant hit, and was so popular that Tom wanted an English outline version to sell. Ian duly obliged by fitting the D-shaped smokebox from his Minstrel and designing a brand new English style body. This became the "Midas Mk3" and was also very successful, with around twenty five being made.

In 1984 Merlin again tried offering an 0-6-0 version of the 0-4-0 Midas, still with slip eccentrics and with the center driver favored. It was sometimes described as a simplified version of the Walschaerts equipped Maestro and was manually controlled. It was even offered as a kit. It was very similar to the earlier 1982 slip eccentric Maestro and was similarly unsuccessful.

At this time the Hunslet was about the most advanced 16mm live steamer which was widely available. Archangel produced some stunning models at this time, but the more sophisticated ones were mostly one-off models, as opposed to being produced in batches of several models at a time like the Hunslet. Tom decided to offer an even bigger locomotive in the form of a Leek and Manifold 2-6-4T, produced to the full 16mm/ft scale, and equipped with Beck cylinders. It would have a price tag of about 150% that of the Hunslet. A prototype was built and exhibited at several exhibitions, but it was so massive that it had difficulty getting round the rather tight curves generally found on garden railways of the period, and the large overhang at each end meant that it was prone to buffer-locking, too. These problems were not easily resolved, and so the project was allowed to be quietly forgotten. The prototype was probably sold at a later date and the author would like to know where it is now. (As a footnote, the current Pearse L&M model is built to 15mm scale, with side springs on the rear bogie to help it round the curves, and couplings which are pivoted from behind the buffer beam to get round the problems of the original locomotives.)



This accurate model of the Welshpool and Llanfair Hunslet 2-6-2 was designed by Tom Cooper's son Colin in 1981, and was in production by 1982. The leap from converting Beck engines to producing these almost completely Merlin-built engines represents a huge technical leap. At the time it was one of the best narrow gauge live steam models available from any supplier. The early models used the Beck cylinders and were usually finished in light green. This later Brunswick Green version had acquired the later Merlin cylinders. The Hunslet remained at the top of Merlin's line until the end. photo from 1989 Merlin catalog

A catalog of the period shows a line drawing of a proposed Garratt-type locomotive, but this was never produced, not even as a prototype. In fact, there were quite a number of models proposed and/or advertised at this time which never reached the detailed design stage. Merlin did occasionally take on commissions for one-off models though, and it is believed that a 0-6-0+0-6-0 Garratt was produced for a Swiss customer sometime around 1984, but it never went into regular production. Rumors suggest that it employed two Maestro chassis, but other details have proved elusive.

Little Wonder and Minstrel continued to sell well and Tom was keen to offer an upgraded version with piston-valve cylinders replacing the oscillators. He also wanted to fit single channel radio control for both speed and direction. Here he ran into technical difficulties. Speed and direction could be controlled through a reversing valve, where the direction of the steam in the cylinders is reversed to make the engine run backwards, but the cylinders for this need to be lapless, or at least have equal lap. The Beck cylinders had unequal lap and therefore could not be used.

Back to Ian Pearse then, who designed new lapless cylinders, which he fitted to a brand new, outside framed 0-4-0 chassis. He mated this chassis with the Minstrel's D-shaped smokebox and body, and a slightly longer saddle tank, to produce another "Monarch". An old Merlin name to be sure, but this time it referred to the first true all-Merlin locomotive. Monarch became available in late 1984 and quickly helped to establish Merlin as one of the major producers of small live steam locomotives.

In early 1985 Ian took the British-style Midas Mk3 sidetank body and mounted it on the new power unit to become the "Mayflower", and later that year he designed a longer boilered 0-6-0 version of the Mayflower called "Major". This and the Mayflower were soon available with a radio controlled whistle on the second (spare) channel, and it was usually fitted as standard on the Major. The Monarch could not be so fitted because the saddletank meant that there was nowhere to hide the second servo.

These excellent locomotives were extremely successful and helped convert many people to the delights of controllable live steam running in the garden. The author was one of those converted, in Spring of 1987, with a Merlin Major with whistle.

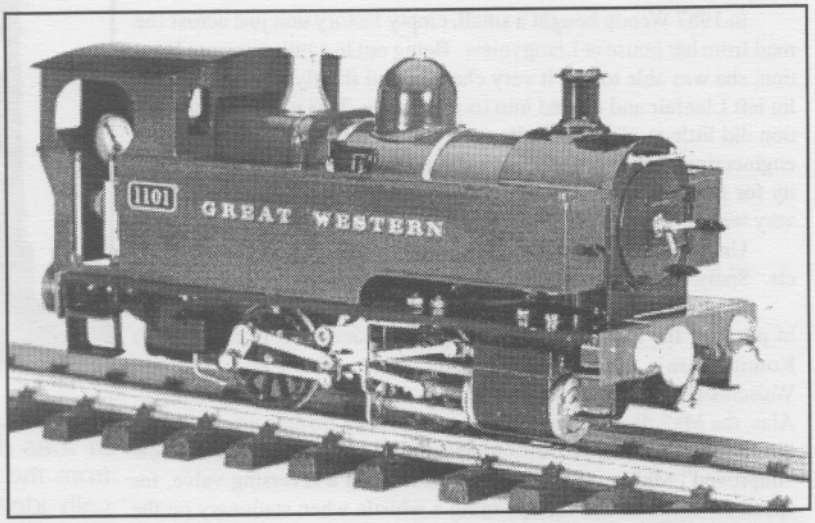
If Merlin is still a well known name in garden railway circles it is largely because of the success and popularity of these three models, together with the more sophisticated and expensive Hunslet which had quickly received the new cylinders.

Merlin now was at its Zenith. Archangel were still more expensive and their output was low, and the relatively new Roundhouse Engineering were mostly concentrating on less sophisticated models (Pooter excepted!), usually with slip eccentric valve gear and manual control.

If the reader should think that the author has placed undue credit at the feet of Ian Pearse instead of the founder Tom Cooper, it must be remembered that while Ian was in the workshop getting the locos built, Tom was also involved in many other time consuming activities, including his various publishing ventures.

To an outside observer of that time it would have come as a shock to know that matters were far from well within the company. Despite Tom's enthusiasm, and the skill of his engineers, his backers became alarmed that Merlin continued to run at a loss. In late 1984 consultants were brought in by the chairman, and Tom was demoted. Ian Pearse was given responsibility for day to day running and was able to get the finances close to the break-even point by mid-1985. Further "professionals" were introduced, who advised the company to adopt some dubious business practices which did little to help it climb out of its dire financial straits. In March, 1986 Tom left the company altogether and in October, 1986 three engineers, including Ian Pearse, were made redundant. Wendy Davies, the bookkeeper, was put in charge.

Returning to the locomotives – in 1986 an attempt was made to entice LGB fans to try live steam with "Matterhorn". This was an inside frame 0-6-0 locomotive for gauge 1 only, and it used Major running gear with a Continental body suggesting Orrenstien and Koppel heritage. It too could be fitted with a whistle. It wasn't particularly popular and only a few of either version were produced. There was also a prototype 0-4-0 version of Matterhorn assembled which used the Mayflower rods and valve gear on an inside frame chassis. Allotted the name "Montana", it does not



The Avonside tank loco was Merlin's most successful attempt at offering an entry level loco for 10mm scale, standard gauge 1 running. It used a clever combination of standard parts to give a good representation of the real locos, and proved to be very popular. This is one of the later models with fixed valve gear. Early models had Walschaerts gear, manually controlled.
photo from 1989 Merlin catalog

This locomotive was first produced by Beck with the name Bertha, and a dozen or so were built by Merlin after Beck's demise and given the name Matador. Although meant to look like a Mallet-type loco, it did not have a swivelling bogie. Instead, the axles were allowed to slide to get it around the curves. This meant that it could not be converted to run on gauge 0 track. (circa 1981)

photo by Roger Loxley

appear to have been put into production. Instead the Maestro body was fitted to the standard outside frame Mayflower chassis and advertised as "Mistral". It didn't catch on and only a very few were sold.

Although it might still take a while to become apparent to outsiders, Merlin had started to decline. Sad to say that although Tom Cooper, and later Wendy Davies, came up with plenty of good ideas, it usually took someone else's engineering talents to convert those ideas into well engineered reality.

It wasn't long before rumors started to be heard of poor quality control. Quite a few otherwise delighted customers had to send their relatively new locomotive back to the factory for repair, including the author. Those that requested spare parts often had to wait a very long time indeed, and received them only after making many phone calls. Sometimes not at all.

In 1987 Wendy bought a small, empty factory unit just across the road from her house at Llangyniew. Being out in a rather remote location, she was able to buy it very cheaply, and shortly afterwards Merlin left Llanfair and moved into its new home. This new accommodation did little to stop the decline and soon most of the few remaining engineering experts left. Wendy's daughter Julie assumed responsibility for final assembly and testing, and after a while she was doing it very well.

Under Wendy's direction Merlin launched a batch of new models. Sadly, they were mostly ill-conceived.

The popular Major was redesigned with Walschaerts valve gear in place of the reversing valve. This may have been in response to Roundhouse's newly revised Lady Anne, which had "proper" Walschaerts valve gear and a separate throttle (no whistle, though). Alas, the Mk2 design was a poor one and many owners who had seen the original versions were disappointed by the performance of this new "improved" Mk2 model. The design still used a reversing valve, for speed on one side and for operating a whistle when stationary on the other. Attempts to circumnavigate the shortfall of only being able to blow the whistle when stationary meant that after another redesign the main steam pipe now went underneath the boiler to the whistle valve, instead of through the gas flue, before continuing on to the reversing or throttle valve. With this loss of superheating and all the additional plumbing hanging out in the cool surrounding air, there was often practically nothing left to power the engine when the steam finally made it to the cylinders.

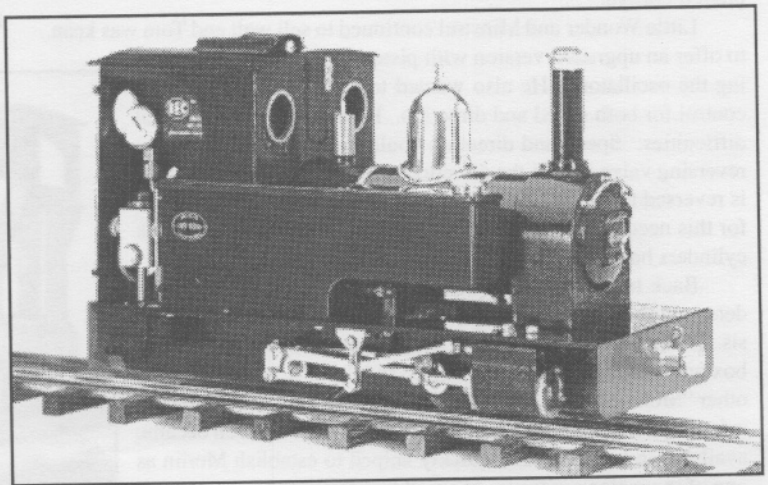
A modified 0-6-2 version of Matterhorn was assembled. It was to be called "Jungfrau", and the prototype was shown in the 1987 catalogue. It had slightly longer sidetanks and a peculiar arrangement for mounting the rear pony truck on a steeply sloping pivot. This did not allow the pony truck enough traverse to keep the wheels on the rails. None were ever sold.

Perhaps the most intriguing attempt to break into the Continental market was "Heidi". This was completely different in appearance from any of the previous models and was developed for, and funded by, the famous German firm of Marklin, who were interested in selling a G scale live streamer to run alongside the various electric German models then available. It was hoped to be able to use their new digital control system to allow steam and electric models to run side by side. Marklin put up a considerable sum of money to cover the development costs and Heidi was produced, based on the Avonside chassis (of which more anon) which had a wheelbase some 5mm shorter than the standard chassis. To many people Heidi was by far the most convincing Continental style model ever produced by Merlin and should have been a big hit. But, although a few were sold it never went into full scale production and disappeared from the scene amid rumors of financial impropriety and a very disgruntled Marklin discontinuing its relationship with Merlin.

Next, someone went down to Llanfair and measured up the W&L Countess. A prototype model was built but its looks suffered badly from the need to use as many standard parts as possible, and for a scale model it just didn't look right. Nor had it been properly developed when it was sold to Tag Gorton. He tried in vain to sort it out, but eventually he sent it back to Llangyniew with a "Fix it or give me my money back" ultimatum. Merlin fitted the Countess body onto a Major Mk2 chassis and returned it to Tag.

It ran in a fashion, but no longer bore any resemblance to the original full size locomotive. Only the one example was built and Tag has now modified it using many parts from Pearse locomotives.

Not every new design was a disaster. One success story was "Mayfly", which was a Mayflower chassis fitted with a nicely detailed etched brass body. Since it was mounted on a standard Mayflower chassis it per-

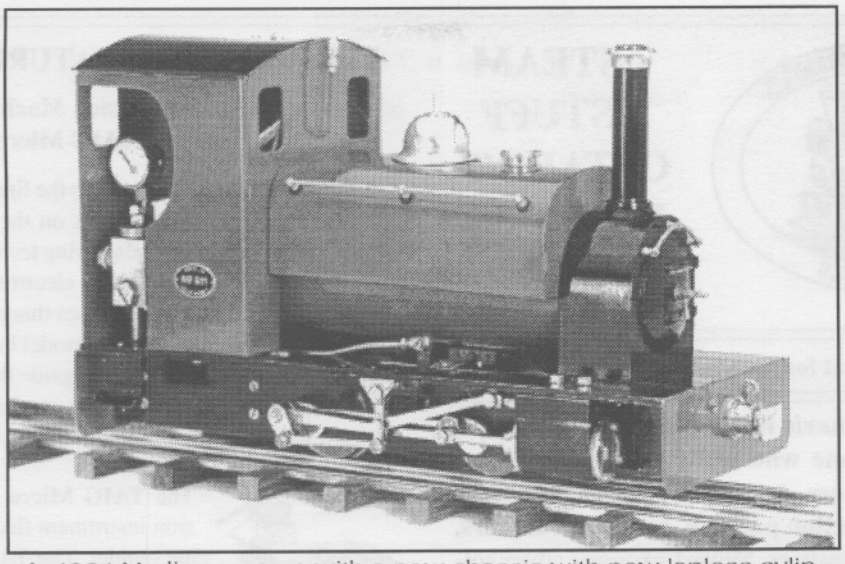


In 1985 the new Monarch chassis was fitted with the body from the Midas Mk 3, and was named Mayflower. Mechanically identical to Monarch, it became the most popular Merlin loco of all time. Later it was given a stretched 0-6-0 chassis to become Major, and a remote controlled whistle was offered as an option on the spare second channel. There was even a super-detailed body version offered, called Mayfly. John Shawe briefly marketed a coal fired version under the name "Black Diamond".

photo from 1989 Merlin catalog

formed well and was reasonably successful. One example is currently the mainstay on Peter Jones' Compton Down Railway.

Still hoping to get into the American market, a U.S. version of the Matterhorn was built, with an American style body on the 0-6-0 inside frame chassis, and with a tender. It was called "Mustang", but didn't look right, so later an extension was bolted on to the front end and a pony truck fitted, whence it was called "Mogul". Like the Countess before it, it was very poorly conceived and the crude manner in which the front extension was fitted made it look out of proportion. It had an ugly cab and the tender was out of scale with the engine. None were ever sold.



In 1984 Merlin came up with a new chassis with new lapless cylinders that allowed single channel radio control of both speed and direction through the use of a reversing valve. Given a saddle tank body, it was the first all-Merlin locomotive and was a huge success. It was reasonably priced, well designed, reliable and easy to operate. Monarch's typically British narrow gauge looks brought in many new operators to the live steam hobby.

photo from 1989 Merlin catalog

The last of the narrow gauge engines to be produced were "Meteor" and "McCoy", both of which were surreptitiously obtained from Ian Pearse's designs. Meteor was an 0-6-0 and McCoy an 0-4-0. Both had Walschaerts valve gear, and a rotary valve used for the throttle on one side and the whistle on the other. The first Meteors had an etched brass body to one of Donald Pearse's designs. Donald kept the artwork though, so when he and Wendy fell out, Wendy was unable to get any more made. These locos had new features to bring Merlin locos up to date, including a lifting cab roof and a steam shutoff valve so that the lubricator could be refilled under steam, giving almost unlimited duration. Since these were fairly complicated engines to produce, they have suffered many problems and their reliability has not generally been good.

Finally, over the years Merlin have produced two 10mm scale gauge 1 locomotives. The first one was available around 1985 and was a good representation of an 0-4-0 Avonside 1101 class tank locomotive built for the Swansea Docks. Despite the 10mm scale, it used standard Merlin cylinders and the early ones had Walschaerts valve gear, manually controlled. The body lifted off like the Hunslet. They were a good, inexpensive entry level loco for gauge 1 and were quite popular, about twenty five being sold.

The second gauge 1 loco was designed at Llangyniew, and was a rather poor attempt at a scale model of the Fowler 2P dock tank. Like the Countess, it suffered badly from the use of many standard parts and it didn't look convincing. Only three were built.

Other designs were sketched out, and outside consultants were also asked to produce drawings for new models, but somehow the inspiration and drive just wasn't there anymore and Merlin spent more and more time just repairing and refurbishing customers engines, rather than manufacturing new stock.

By the early nineties Merlin's business had slowed to a trickle. The word was out that their quality was poor, and this was particularly so after Julie left in 1989 to get married. As time moved on it became very rare for Merlin Locomotive Works to be seen at any of the garden railway shows in Britain, and when the author called in at Llangyniew in the summer of 1993 it was clear that there was very little going on in the workshop. Now even the once ubiquitous Merlin advertising has disappeared.

So, what has happened to the former staff? Tom Cooper suffered a terrible car accident shortly after leaving Merlin and lost a leg. His recovery was long and painful. He was awarded damages, which funded the Steamlines projects for a while, but he has found success elusive. He eventually sold his magazine, by then called Garden Railway World, to David Joy who has made a big success out of it under the new title *GardenRail*.

When Ian Pearse left the business in 1986 he returned to the agricultural industry for a while before setting up his own locomotive manufacturing company in 1992, "Pearse Locomotives". Among his offerings are up to date and improved versions of the designs for Meteor, called "Genesis", and McCoy, called "Auric". But these are properly engineered and very reliable models, much better in every way than their earlier Merlin counterparts. These and his ever expanding range of locomotives have now taken over the share of the market once dominated by Merlin. In many ways his models are now what Merlin locomotives should have become.

Donald Pearse sold his wooden rolling stock business to Brandbright in 1987 and they have continued and enlarged it with much success. Donald helps out in his son Ian's locomotive works and would like to retire one day!

Wendy Davies gradually disappeared from the garden railway scene and was last spotted at the Llanfair show in 1995. Since then she seems to have dropped out of sight. Recently a burglary at the Llangyniew factory saw the loss of even those locomotives that had been sent back for repair. Since Wendy no longer carried insurance there is no hope of compensation for their unfortunate owners.

Once the leader in the production of live steam locomotives, for all practical purposes Merlin has now faded away.

Author's Note:

Well known author Tag Gorton and his friend Steve Morris have built up a stock of drawings and spare parts for Merlin locomotives, and Tag is prepared to rebuild Merlin locos on a time permitting basis. He is well known as a rejuvenator of dead Merlins, and if you have questions, or even a moribund loco that needs a complete rebuild, he would be most willing to take it on.

Since he does this as a hobby in his spare time it might take a few months for a complete rebuild, but unlike the original manufacturers he is reliable and completely honest.

If you need spare parts, advice or his rebuilding services Tag can be contacted in the United Kingdom on (01752)-845938.

A much more comprehensive collection of photos of Merlin products is available at the *Steam in the Garden* website at:

<www.steamup.com/sitgonline/roundhouse/merlin/merlin.html>

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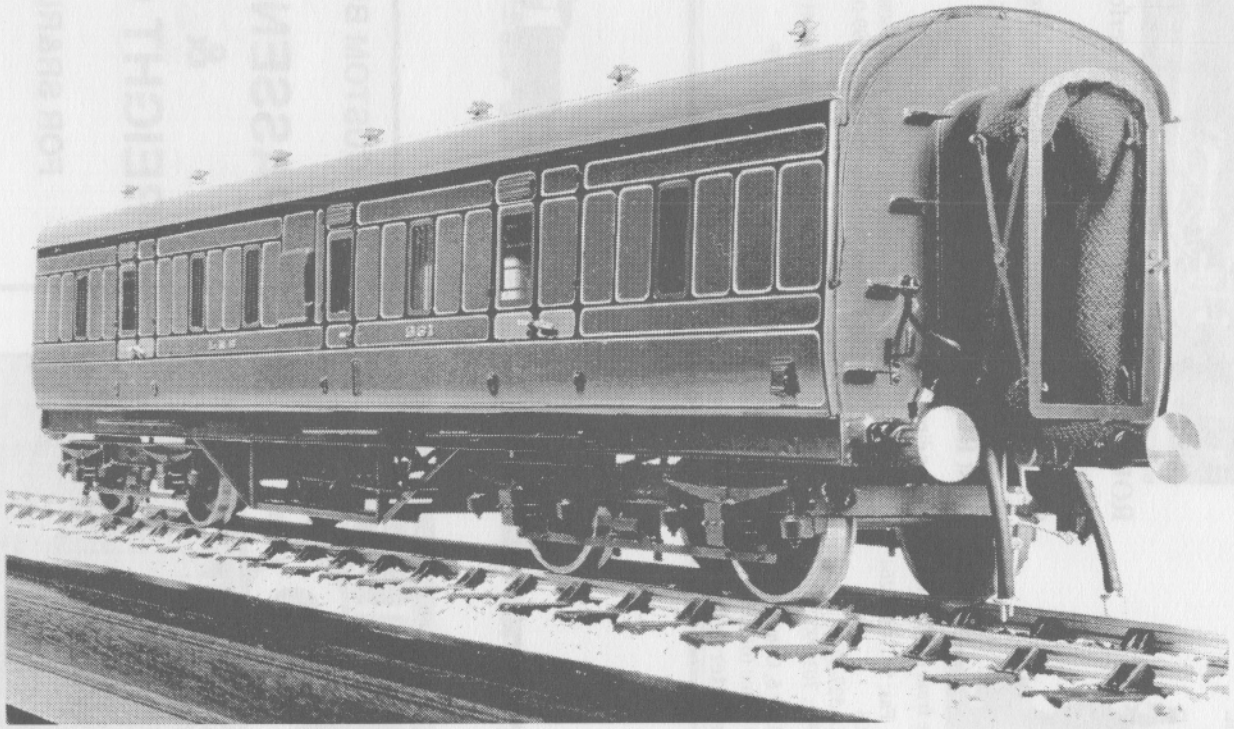

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- **Material:** 95% brass, including roof
- **Price:** £ 660 plus shipping

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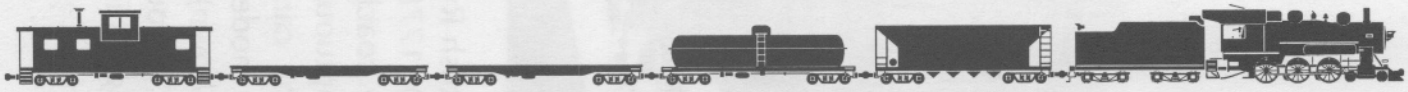


Steamup Report.....

Pennsylvania Live Steamers

by Harry Quirk & Mike Moore

PLS celebrates their new permanent gauge 1 track

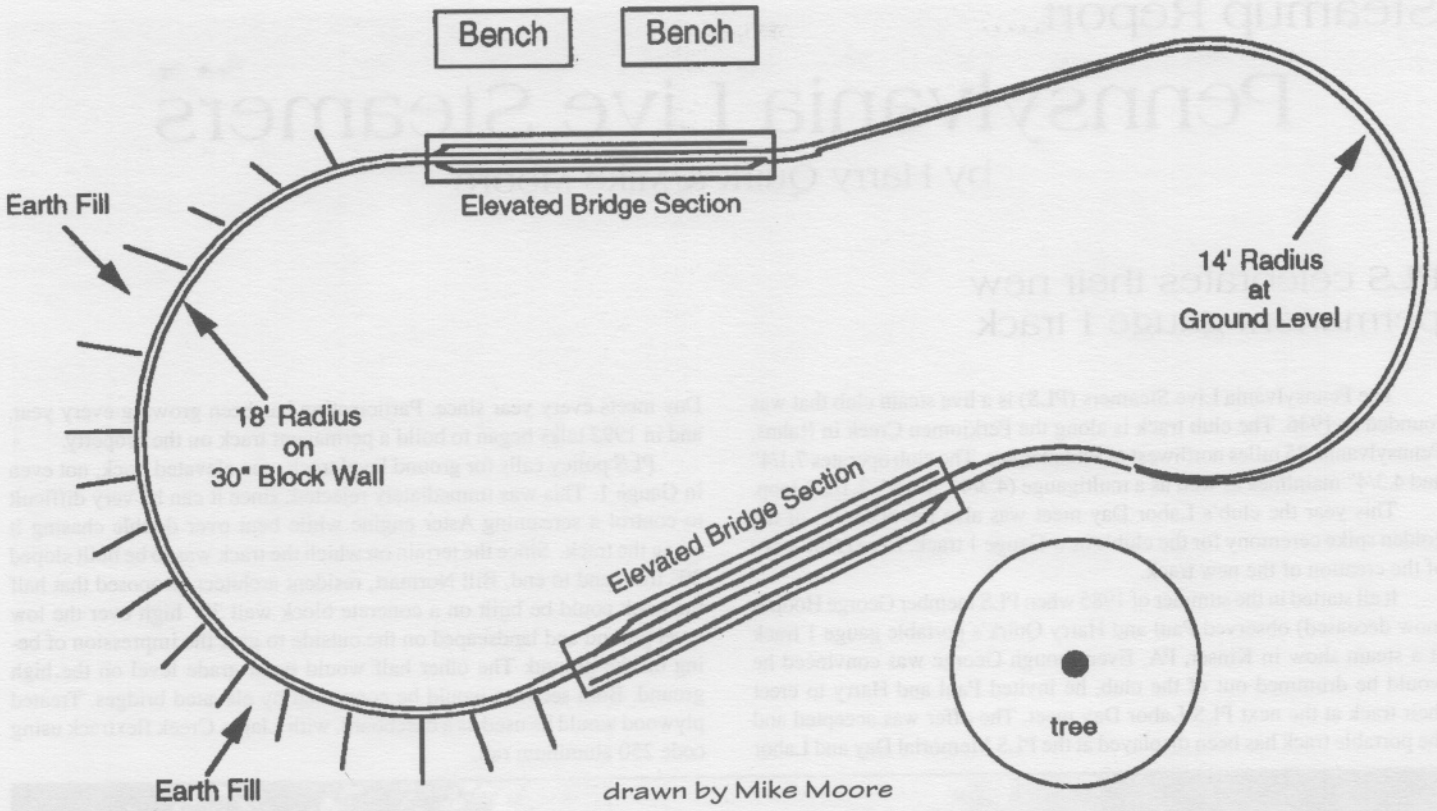
The Pennsylvania Live Steamers (PLS) is a live steam club that was founded in 1946. The club track is along the Perkiomen Creek in Rahns, Pennsylvania, 35 miles northwest of Philadelphia. The club operates 7.1/4" and 4.3/4" mainlines as well as a multigauge (4.3/4", 3.1/2", 2.1/2") loop.

This year the club's Labor Day meet was also the occasion of the golden spike ceremony for the club's new Gauge 1 track. Here is the story of the creation of the new track.

It all started in the summer of 1985 when PLS member George Hoopes (now deceased) observed Paul and Harry Quirk's portable gauge 1 track at a steam show in Kinser, PA. Even though George was convinced he would be drummed out of the club, he invited Paul and Harry to erect their track at the next PLS Labor Day meet. The offer was accepted and the portable track has been displayed at the PLS Memorial Day and Labor Day meets every year since. Participation has been growing every year, and in 1992 talks began to build a permanent track on the property.

PLS policy calls for ground level track – no elevated track, not even in Gauge 1. This was immediately rejected, since it can be very difficult to control a screaming Aster engine while bent over double chasing it along the track. Since the terrain on which the track was to be built sloped 30" from end to end, Bill Normart, resident architect, proposed that half the track could be built on a concrete block wall 30" high over the low level ground and landscaped on the outside to give the impression of being on the ground. The other half would be at grade level on the high ground. Both sections would be connected by elevated bridges. Treated plywood would be used as a baseboard, with Llagas Creek flextrack using code 250 aluminum rail.

The final frantic days in late August, trying to get construction completed in time for the Labor Day meet. The PLS club site is one of the nicest club sites in the country, and the members enthusiastically support all scales and gauges. Photo by Harry Quirk



The ground portion would be supported on metal studs attached to metal standards and then back filled with crushed stone for drainage and appearance. Inside the elevated section a three foot wide path of baseball infield dirt would be laid to provide good drainage while preventing dropped small parts from being lost in the grass or gravel.

Tentative approval was given to proceed in the fall of 1995, but two things prevented an immediate start. First, no new construction could be started in 1996 due to the 50th anniversary celebration, and second, the proposal had to be approved by the general membership. At the membership meeting on March 15, 1997 the vote to build was unanimously approved and work was begun on March 19, 1997.

Work had no sooner started when a dump site was encountered (concrete, wire mesh, burned wood, trash, mud & water, and *more* mud & water). It looked as if the project was dead in the water (no pun intended).

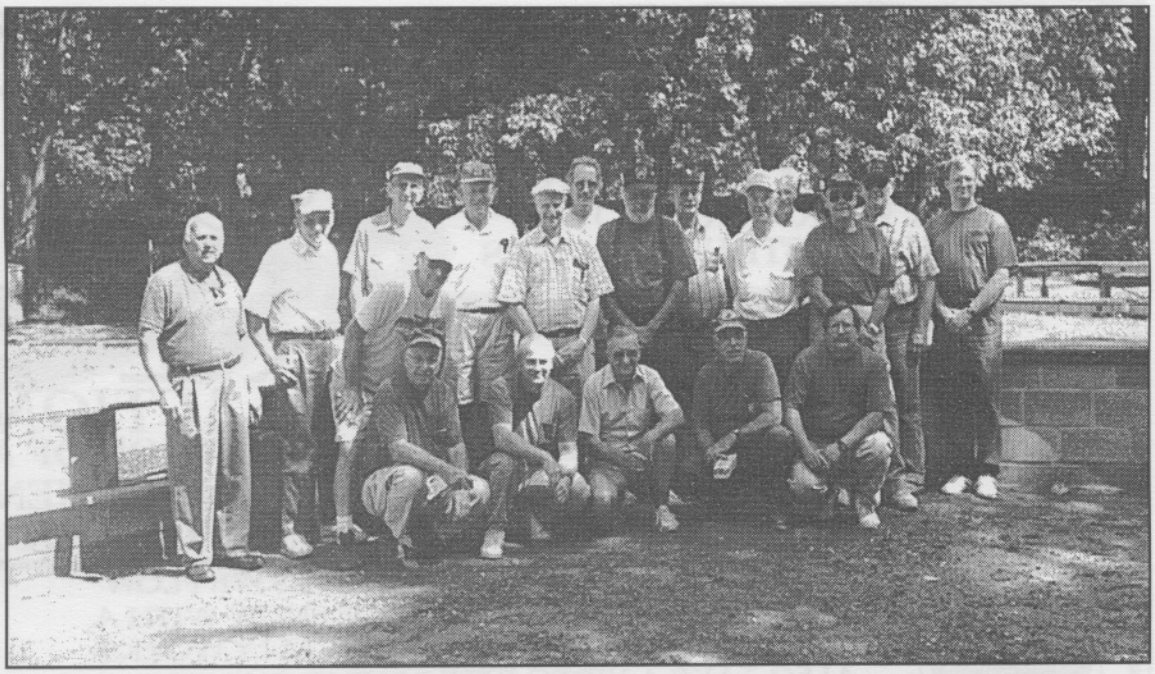
A family that plays together..... Mike Moore and his daughters, Kristin (5) and Vicki (10), prepare their Aster Grasshopper for a run on the new Pennsylvania Live Steamers Gauge 1 track.
Photo by Barbara Moore

The crew persevered, poured footings, and finally got the block wall started on April 16th. Work progressed at a steady pace until the main line was completed on August 23. An opening was left in the block wall for a trestle to be built by John McCracken. The trestle will be removable and a plywood section will fill its place during the winter. Piers and abutments for the two straight bridge sections were designed by Bill Normart. Two sidings were added along each mainline over the elevated bridge sections. Forty-seven work days and over 2300 man hours were required to complete the track.

During construction Paul and Harry's portable track was set up to provide a Gauge 1 track for use during the Memorial Day and

summer public meets. This track also served as an enticement to Gauge 1 steamers to show up and work on the new track. Several times Paul and Harry arranged with out of town steamers to work on Saturday and play on Sunday. This strategy backfired at least twice when PLS president Walt Mensch (a non-Gauge 1 steamer) showed up on Sunday raring to go to work.

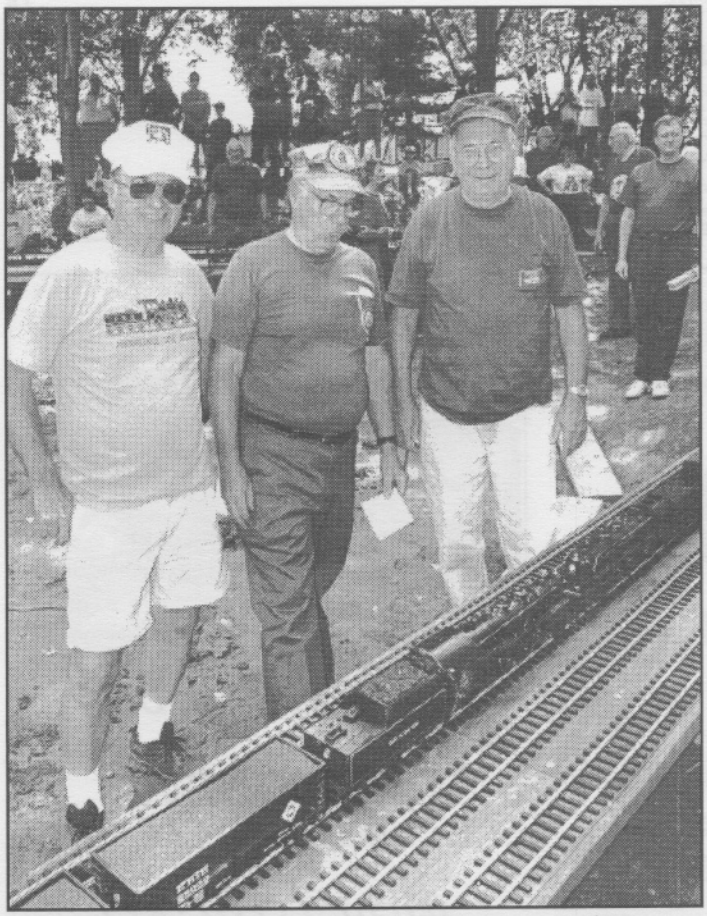
Although the landscaping is not yet finished, a golden spike ceremony was held on August 30, 1997. Paul and Harry Quirk's Aster Mikados touched pilots at the event as PLS president Walt Mensch presided. Paul and Harry each drove a golden spike into a mainline tie. A full size silver spike was presented to Walt in appreciation for his tireless leadership during construction. A dedication ceremony will be held in the spring of 1998 after the final grading and landscaping is complete. Gauge 1 live steamers from the surrounding states attended the event and at some points during Saturday the new track was so heavily used that the now redundant portable track saw some action.



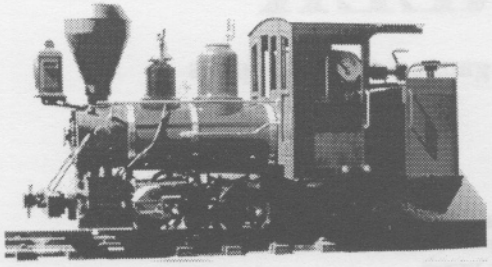
Most of the crew that worked to complete construction. Photo by Paul Quirk

The PLS now have a beautiful Gauge 1 track to run on, which is the culmination of the work of many members, both non-Gauge 1 as well as Gauge 1. They should have many years of satisfaction from it.

Future plans call for a tunnel/walkover for the ground level track, an extensive storage yard, and possibly a turntable. The PLS welcomes Gauge 1 steamers to run on the new track, so if you are planning to be in the Philadelphia area, please drop by and see us.



Quite a crowd formed for the Golden Spike ceremony. (l to r) Paul Quirk, PLS club president Walt Mensch and Harry Quirk did the honors, with Paul and Harry each driving a real gold spike as their Aster Mikados touched pilots. The PLS members have a beautiful new gauge 1 track they can really be proud of. Photo by Ron Brown



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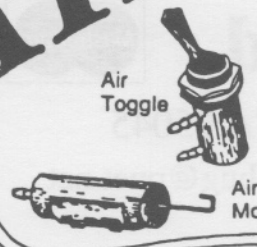

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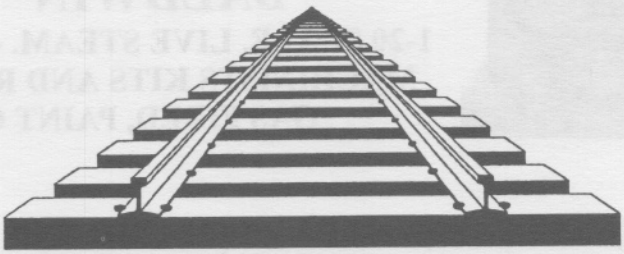

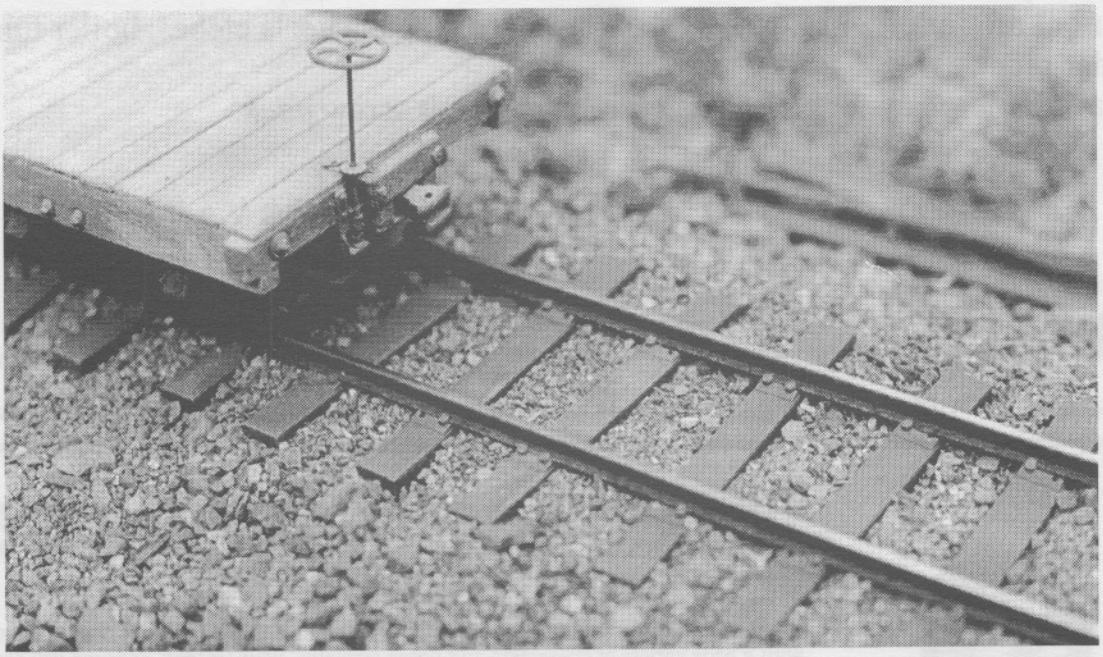

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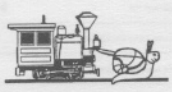

Steam Scene - outside rear cover: Top photo - Rhone & Black Diamond № 295 (a Maxwell Hemmens Porter) moves a heavy load of coal down Thyme Mountain.
photo by Stan Kopiczak

Bottom photo - Rich Victorian livery and living steam contrast delightfully with the lush, rain dampened pastoral idyll traversed by the 16mm Tincroft Valley Railway *(see Artful Bodger - this issue).*
photo by Tag Gorton

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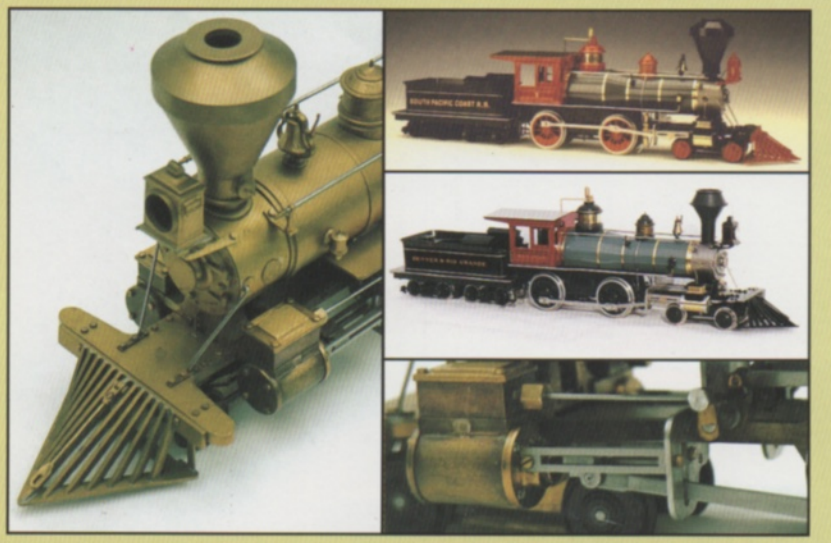

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