

Maidstone Model Engineering Society.



Mote Park - After the storm !

October, 1987.

NEWSLETTER - SPRING / SUMMER 1988.

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October 2nd : F. Deaprose
October 16th : P. Ashby

October 9th : A. Tate
October 23rd : C. Williams

Please do your duty on your allocated day. If you cannot attend on that day please let Chris Williams know so that alternate arrangements can be made. Thank You.

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MAIDSTONE MODEL ENGINEERING SOCIETY OFFICERS 1988

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Chris Williams and Peter Kingsford.

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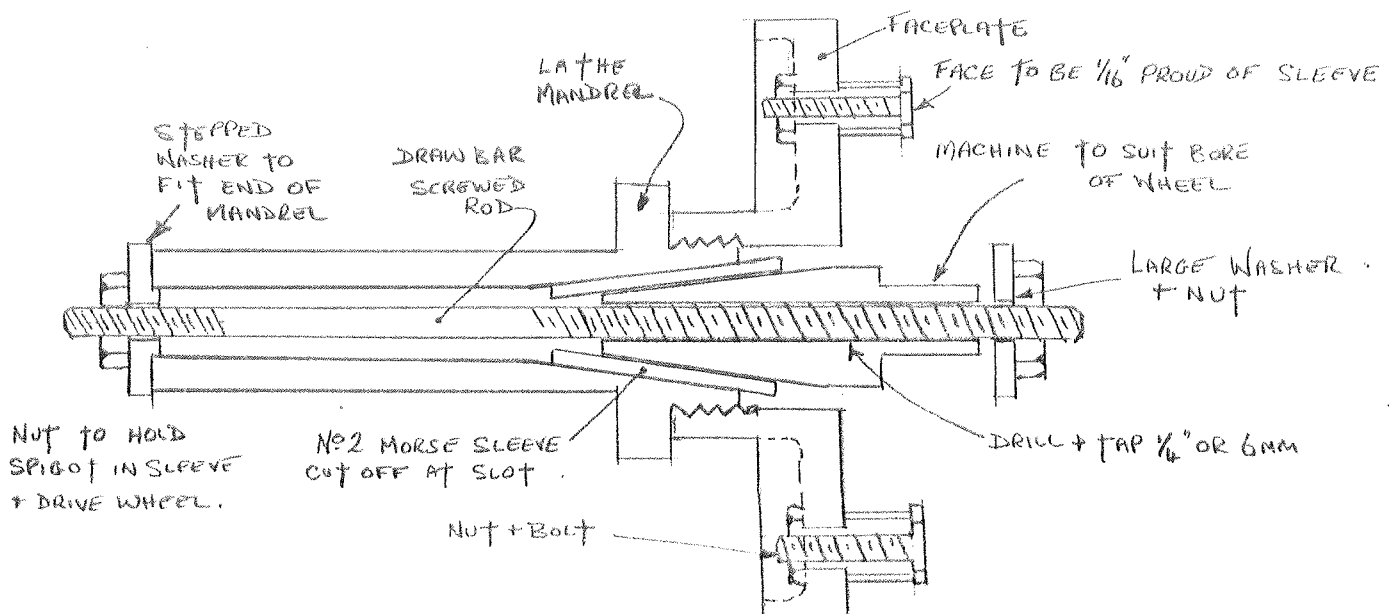
Wilf's Ramblings.

by Wilf Hills.

The following assumes you have a Myford lathe, otherwise adapt to suit your lathe.

One of the problems that beginners come up against when machining wheels, most of the writers say take a steel disc or an old wheel, machine a spigot to fit the bore in wheel and away you go. Beginners are unlikely to have a suitable disc or wheel and even more experienced modellers some how never have a suitable piece, its either too big or small. The following gets over these problems.

For the spigot, machine a No.2 taper to fit the mandrel and machine to fit the bore of the wheel,(good practice job), or buy a No.2 sleeve, cut off at the slot for drawbar clearance, machine a No.1 taper on material for a spigot and loctite in sleeve. When set, drill and tap 1/4" or 6mm according to what screw rod you can buy at the ironmongers for the drawbar. Machine spigot to fit wheel bore, make stepped washer to fit gear end of mandrel. Now for the disc, find or purchase 3 No. 3/8" x 2" long set screws and nuts (or nearest available metric), cut 3 pieces of tube that will go over the bolts a suitable length according to how far sleeve stands out from faceplate. Face each end, fit the three set screws head outwards through the tube and faceplate with washer and nut behind faceplate, arrange so that the heads will clear finished diameter of wheel. It is not necessary to be three equal segments. Now carefully face the heads of the screws and you have a true surface to machine your wheels with clearance for the lathe tool behind the flange. The drawbar must stand out from the spigot for nut and washer to hold and drive wheel. An alternative if you doubt your ability to machine a No.1 taper on the spigot is to bore the sleeve parallel 7/16" diameter x 1/2" deep and make a suitable spigot, loctite and when set, turn down to fit the bore of the wheel and drill and tap 1/4" or 6mm.



A further point you will seldom see in text books, centre drill work before you face the end. However well you set your lathe tool there is always a small raised centre, if you must face first and use a slocombe drill after, put a smooth file across the end before you centre drill, you will save small drills and get more accurate work.

Another idea for beginners is a bench block, two of the tool makers still market them, but a much cheaper and in many ways superior tool, (but not in looks), is an overhead valve car cylinder head with valves and studs removed (cleaned and given a coat of paint). You now have something to stand on your bench, you can give a good clout without damage to your vice. Machine up your rivet snaps to fit suitable holes in the head, leave as big a shoulder as possible or better still fit a thick washer to spread the load. If you wish to drive out a pin or shaft there is usually a suitable hole to support the work, if not you can always enlarge one to suit. You can machine an old chisel to fit one of the holes, cutting edge upwards, you will find it useful to rough cut material, in fact it makes a useful Blacksmiths anvil with suitable tools added. If you use two or more holes with fitted pins you can bend or straighten round or flat bar. Some of the tapped holes are useful to clamp part finished units while you do your filing and fitting in the vice, in fact, the longer you use it, the more uses you will find.



Garratts and Super Garratts

by Andy Probyn.

Many model loco builders like to produce in exact miniature the locomotive that most inspires them. Others like to go their own way and design a freelance loco. Some builders like to take a design that was never actually built and make it in miniature, it must be very rare however to have the opportunity to make an example of a complete locomotive type which, to the best of my knowledge, has never been built in full size or model form. Before you grab your hacksaw and rush off to the workshop however I should point out that the minimum requirement for this loco is eight sets of cylinders and at least sixteen driving wheels. What sort of mythical Super beast can this be I hear you ask, the answer is a Mallet Garratt or Super Garratt.

The ordinary Garratt is composed of three units, two tenders with all the cylinders, driving and trailing wheels attached and a boiler which is slung between the two. On a Super Garratt each power tender is articulated on the Mallet system, making no less than five articulated units in the complete loco. To quote from "Railway Wonders of the World" circa 1935, "Several engineering firms have designs now ready for remarkable types of articulated locomotives. Messrs. Beyer, Peacock & Co. Ltd., for instance, have patented designs for a giant locomotive for which they anticipate the constant increase

in the weight of freight trains will ultimately create a demand." It differs from the Beyer Garratt in that there are four, instead of two, sets of independently articulated bogie driving trucks. They are grouped in pairs, and are propelled by eight cylinders for simple expansion. The design shown is for a 2-6-6-2 + 2-6-6-2 type.

Let's look at the history of the Garratt and some of the reasons for its success before considering its Super version. Invented in 1907 by H.W.Garratt, it was not until 1909 that the design was taken up by Beyer Peacock who built two 2' gauge 0-4-0 + 0-4-0 locos for Tasmania. These locos were unusual in having the cylinders at the inner ends of the power bogies (which must have led to very odd axle loading) and in being built compound with high pressure cylinders on the rear unit and larger low pressure on the front. One of these locos came back to Britain at the end of its working life, it spent some time on the Festiniog Railway where it managed to avoid the usual Festiniog conversions in spite of being too large for the tunnels on the line. This loco is now in the national collection at York.

The next Garratt was built for the Himalaya Darjeeling in India, a well known 2' gauge line with very tight curves and a grade of 1 in 25 +. One would have thought the Garratt ideal for this line, however, it was not successful, quite why I don't know, though it did have an early form of reversing gear which would on occasions break so that both units set off in opposite directions!

In spite of this early setback, Garratts were soon proving their worth, with the first express passenger Garratts built in 1915 for Brazil. There are several reasons why a locomotive thought of initially as only a heavy haulage narrow gauge engine should be so successful, unlike many articulated and semi-articulated systems, weight distribution is good. On a curve the boiler unit throws its weight towards the inside of the curve counteracting centrifugal force unlike a Mallet or the modified Farlie (the North British answer to the Garratt) where the weight is thrown out on a curve. Some of the last American express locos look like a Mallet with two sets of independent four coupled drivers, however they are actually rigid eight wheelers with two sets of cylinders. As the boiler on a Garratt is on its own unit, free from wheels etc., it can be made any convenient shape, short and fat being favourite. There is ample room for a large ash pan necessary for long runs and the two tenders give good water capacity to match, plenty of wheels give a low axle load well spread out. No wonder the design was so popular with the growing railways of what was then the colonies. Garratts were also built in Germany, France, Belgium and Holland for anything from heavy freight to express passenger, though they never achieved much favour in their homeland. We have to look at the design strengths and weaknesses to see why this occurred.

Any locomotive superintendant has to juggle with several factors when deciding on new motive power, the weight of the trains to be pulled, the axle loading of the track or bridges and the maximum wheelbase that can be accommodated on curves are just some factors. If a single rigid wheelbase loco can be used this will always be more efficient than a Garratt, if loads are such that double heading has to be resorted to, then a Garratt will be a better bet. In Britain we

have relatively short runs with a well laid heavy duty track bed, not so in many developing countries where railways were speculative to help "open up" areas of the country. They were laid with light track, often to narrow gauges and with tight curves in mountainous regions. When traffic grew, the railways were hard pressed to transport heavy trains across railways which were not initially designed for such loads and the Garratt was arguably the most successful way out of the problem.

This is not to say that the Garratt is the answer to all ills, the largest Garratt ever built was sent to Russia in the 1930's, it was not repeated however and shortly after a class of 4-14-2 heavy freight locos appeared - a better answer where curves were not a problem. New Zealand tried a Garratt, it could pull trains far longer than could be accommodated on passing loops and its full capacity was never realised. Zig Zag reversing could also severely hamper the Garratt's potential as long trains could not be accommodated. It is not unusual for a class of Garratts to be replaced by a more modern rigid loco, like the L.M.S. 2-6-0 + 0-6-2 locos which were withdrawn when the standard 9F 2-10-0's came on the scene. Incidentally these Garratts had many parts interchangeable with other L.M.S. locos and this was generally considered to be a poor move with axleboxes, etc. having a short life under the extra weight upon them. The L.N.E.R. had one Garratt, used for banking and eventually withdrawn in the 1950's when its non-standard boiler came up for renewal.

The only surviving British Garratt is an industrial 0-4-0 + 0-4-0 to be found in Bressingham, Norfolk. It was one of two built to do the work of two saddle tank locos on difficult industrial lines.

And so to our Super Garratt, a natural progression of the design. What a locomotive this would have been with its eight sets of cylinders and twenty four drivers. This would not have been the first Garratt with eight cylinders however, there was a class of eight cylinder double atlantic Garratts used in Tasmania. They were short lived however, being victims of their own success, they rode very smoothly and this was said to be a contributory factor in a bad accident when one rounded a curve too fast. In the event the class were replaced with a twin cylinder rigid design, much to the relief of the maintenance department one suspects.

The steam loco had a good innings, one hundred and fifty years of production is good going for any one type of machine. I doubt if the deisel electric will still be produced in its present form in 2088, gas turbine or linear induction motors are possible contenders for its replacement. If the steam loco had been taken further it is quite likely that we would have seen much more of the Super Garratt, where it was a likely contender for the next stage of development from the American Mallets. Locomotives like "Big Boy" had got just about as large as they could, given the fact that the wheels and boiler all have to squeeze under the loading gauge and the length and overhang of boilers rounding curves. Garratts and Super Garratts overcome both these problems and so could have been the way forward in the evolution of the steam locomotive.

We hope to continue at high speed in the next article, under steam but on the pneumatic rather than steel tyre.

Safety valves (again)

by

Jim Ewins

In recent times there has been a spate of designs for large 1" scale engines with wide fireboxes purporting to be accurate representations of their prototypes.. It does not seem to be realised by the designers of these engines that because of their large fireboxes they have a great capacity for the generating of heat which must be allowed for when it comes to the design of suitable safety valves. In the past, safety valve 'design' has been a hit and miss operation which got by in the absence of definite requirements at the boiler test stage. Now that we have the Southern Federation rules in this matter it is no longer good enough just to guess when it comes to the essential parameters associated with the discharge capacity of these valves particularly when it is desired to produce those of near scale external proportions.

Some years ago I addressed myself to this problem during the construction of my 9F which is an engine of proportions very similar to those mentioned above. It soon became apparent that with these larger engines it was not possible to make valves to scale that would discharge at a rate to satisfy the Southern Federation requirements. It seems that the designers of these engines in question have either not tried to conform to these requirements or do not understand the difficulties. Even in full size it is clear that similar difficulties have been met and these have been overcome either by using three valves (as on the S.R. and S.A.R Pacifics) or by locating the valves away from the top of the barrel with an internal chute to gather the steam higher up (as on the B.R. 9F).

The solution on my model 9F was to build into the boiler two 'pockets' with large pipes leading to the highest point. In this way I was able to design a taller valve so that only a scale height projected above the barrel whilst the body of the valve was of scale diameter. This solution is possible because it turns out that the predominant requirement in valve design concerns the characteristics of the spring which dictate that it must have a minimum room in which to work. One can design a tall slender spring or a short stubby one to have the desired characteristics but one cannot have a short slender spring. I have written a computer program for this which makes things very easy since it will compute the relevant spring parameters given any desired spring diameter and wire diameter. This program is based on research I carried out on the 9F and recorded in the S.M.E.E. Journal (Vol 4 No. 7 Dec. 1979) and in the S.F. News. If one wishes to design valves to conform to the S.F. test conditions it is all there!

It may be that none of our members will be building the engines indicated above but since there is a general tendency to build larger some may find it of interest if I give designs suitable for boilers having grate areas of between 45 sq. inches and 50 sq. inches. which is a range of areas also encountered with narrow gauge engines built for 5" gauge such as the 'Dholpur' design built by our Norman Clark. With this in view I set the computer the task of designing a short (squat) valve and a tall one suitable for fitting into the 'pocket' mentioned above. The majority of large firebox prototypes use two, three or four valves which helps us with models because of the inherent difficulty of getting the steam away without the pressure rising above the 10% level. Actually this constraint is more severe than that imposed in full size practice but we are stuck with it so we must abide by it. The designs I have shown indicate the grate area one valve will cope with so provided that in the case where several valves are used all are set to release at the same pressure, the total grate area protected will be the given figure multiplied by the number of valves used. In making valves to these specifications the body design should be such that the various clearances around the ball, past the spring and through the adjuster

should have at least the 'through-way' area I have shown otherwise there may be a large enough back-up of pressure within the body impeding the discharge to cause the pressure to rise out of limits. The body outline can be made to suit the prototype and where the 'pocket' is used just that portion projecting above the boiler cladding needs to be of scale appearance. The particulars I have shown are for the 'sizzler' but 'pop' valves of the same general dimensions give rather greater discharge owing to the action of the secondary seating.

SAFETY VALVE DESIGN FOR MODEL COAL FIRED LOCOMOTIVES by J.Ewins

Name of engine	Any with Tall Valve
Gauge	Any
Scale	Any
Grate area sq. in.	25
Number of Safety Valves	1
Seating diameter in.	0.27
Wire diameter in.	0.04
Number of active turns	16
Free length spring in.	1.28
Fitted length spring in.	0.972
Spring winding t.p.i.	12
Spring winding mandrel diameter in.	0.16
Outside diameter of spring in.	0.28
Minimum Through-way (square inches)	0.1
Diameter of release holes if 4 in number (inches)	0.17
Diameter of release holes if 6 in number (inches)	0.14
Diameter of release holes if 8 in number (inches)	0.12

SAFETY VALVE DESIGN FOR MODEL COAL FIRED LOCOMOTIVES by J.Ewins

Name of engine	Any with Squat Valve
Gauge	Any
Scale	Any
Grate area sq. in.	25
Number of Safety Valves	1
Seating diameter in.	0.27
Wire diameter in.	0.048
Number of active turns	6
Free length spring in.	0.86
Fitted length spring in.	0.552
Spring winding t.p.i.	6
Spring winding mandrel diameter in.	0.31
Outside diameter of spring in.	0.463
Minimum Through-way (square inches)	0.1
Diameter of release holes if 4 in number (inches)	0.17
Diameter of release holes if 6 in number (inches)	0.14
Diameter of release holes if 8 in number (inches)	0.12

I was pleased to receive a letter the other day from Joan Winwood. Some of you may remember Michael and Joan and girls who moved to North Wales. Nice to hear from them, and she has sent me a quiz to be included in the newsletter :

THESE ARE ALL THINGS THAT YOU FIND AROUND THE WORKSHOP - BUT WHAT ARE THEY?

- 1) A ghostly plane.
- 2) A cleaner shoe.
- 3) An angry uncontrolled movement.
- 4) Upright flour maker.
- 5) Warder in charge of the engine.
- 6) Tri-mouthed food.
- 7) A puffing lamp.
- 8) A bad habit.
- 9) A rigid figure.

ANSWERS BELOW

??

Heard at Mote Park during the 1960 running season (but worth repeating I feel):-

If you run your train on electric rails, what do you want the coal for?
 Look! They put the petrol in the tender!
 I wonder how they steer the thing? Oh! I see - with that little wheel at the side of the cab.
 Where's the clutch?
 How many gears have you got?
 He has to shut that little door to keep the coal from falling out.
 Where can you buy the kits to make these engines?
 He's letting all the steam out of the hole in the top 'cause he doesn't need it!
 That's not a real fire; it's just made to look like one, they're electric I tell you - can't you see the third rail?
 Why does blowing the whistle make it start?
 Anyone could drive one of them things; you only have to sit there and put coal on the fire - like being at home.
 What does he want water for? He told me it was a steam engine.

If you hear any others this year - let our worthy editor know! It shows people have given it thought!!

Don Paterson.

Did you get them all right?

- 1) Spirit Level. 2) Vacuum Pump. 3) Cross Slide. 4) Vertical Mill.
- 5) Screwdriver. 6) Three Jaw Chuck. 7) Blow Torch. 8) Vice. 9) Set Square.

ANSWERS TO QUIZ :

CHAIRMAN'S REPORT

The weather last "summer" was well down to its usual standard of doom and gloom, even our weathermen found it easy to get the forecast for every Sunday of Wet and Windy correct. However, in spite of this our stalwart team have managed to keep our finances on an even keel with Sunday running, and the problem is not lack of enthusiastic drivers but lack of paying passengers who like sitting behind a small steam engine in the pouring rain - I can't understand 'em! The ravages of time are being attended to on our track at the moment. Some of the older track support beams have needed supports in the centre to ensure the reinforcing remains "reinforced" and we must not lose sight of the fact that raised tracks like ours have got to be continually looked after. The big blow of October caused havoc to Mote Park but we must all lead blameless lives in "Model Engineering" as everything that fell missed our track and clubhouse. I couldn't believe that we had been so lucky, quite a few clubs have suffered extensive damage. The Club Loco is not progressing anything like as fast as I had hoped and this particular ball has been firmly kicked into my court, however I am now making progress again having completed (I hope) the most pressing "Domestic" engineering projects. The Flycranks have all been bored for the crank pins and milled to shape. I am however having second thoughts about the connecting rods that I have fabricated by welding, and I am going to flame cut some much lighter ones from Plate. I would like a pound for every time I have dropped a "ricket" like this during my years in our hobby. Finally, I would like to bring your attention the temporary (we hope) export to Belgium of our Vice Chairman Peter Chislett. Peter has retired from the R.A.F. having reached the dizzy heights in spite of the weight of scrambled egg on his hat! We wish him every success in his new venture in the commercial world - I suspect that with one of our stalwarts over the other side of the dyke we will be going a bit international in the near future.

G.Kimber 2.3.88.

* SUE'S SPOT*

Hallo Everybody and welcome to the Spring/Summer Newsletter 1988. Hope you enjoy this issue, the closing date for articles for the next copy is Sunday August 7th. It will help if any submissions can be typewritten. Rather a slow and disappointing start to the season, a lovely sunny day last week but hardly anyone turned up to run or help. I do hope that this is not a foretaste for the summer to come, the public are our bread and butter and I do not feel it is fair to let them down particularly when they provide the funds to maintain the club. So please remember THE CLUB NEEDS YOU. Right, now I've got that moan off my chest I will not need to have a nag at Adrian for the rest of the week. Let's run through some of the events scheduled in the next few months. This year we have been officially asked to run on June 5th which is when the Maidstone Marathon is being held and so we have agreed to run (our engines, not members) that day from 11 to 1 and from 3 until 5. It is all in aid of supplying an image intensifier for the coronary care unit at Maidstone Hospital, a worthy cause I am sure you will agree and wish to support. Open Day is July 9th and all help will be much appreciated. All evening meetings commence at 7.30. Lots of evening runs are arranged for the summer in the hope that we may get at least one fine evening. For details of events or any visits to/from other clubs please see the Club Noticeboard or contact our Secretary. There is always the odd spot of maintenance to be done around the Club, painting of course is an on going thing with still parts of the guard rail requiring attention so any volunteers ? A suggestion made to me for inclusion in the newsletter is if any members have unwanted plans (Unfinished or even unstarted) to let me know. I can then put a list in the newsletter so that if anyone has a particular interest in seeing plans for a particular model, they know who to contact. The idea is to save unnecessary expense because once one has bought and seen plans one sometimes decide against progressing any further! Alas I am running out of room so all I can say is hope to see you all soon, take care and happy steaming.

Sue

