

MODEL ENGINEER

Vol. 201 No. 4330

18-31 July 2008

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COVER STORY

Amazing Titanic model



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HARROGATE SHOW

Locomotives and engines



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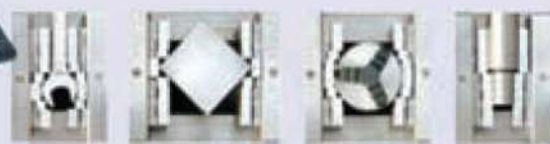
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Published by
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 Berwick House, 8-10 Knoll Rise,
 Orpington, Kent BR6 0EL
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 International Calls: +44 (0)1689 899 200
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Model Engineer is published for \$136.00 per year by Magicalia Publishing Ltd c/o EWA Magazines, 205 US Highway 22, Green Brook, NJ 08812. www.ewamags.com. Periodicals paid at Green Brook, NJ. Postmaster please send address correction changes to Model Engineer c/o EWA at the address above.



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ON THE COVER...

Sensational model of the *Titanic* completed recently by Fine Art Models of Michigan in the United States, valued at a whopping £1.3million. The model is 18 feet long and in its case weighs about 2 tons. The model will be touring major maritime museums around the world, and we hope that it will be possible to include our Ascot exhibition in the itinerary. Story starts on page 77.

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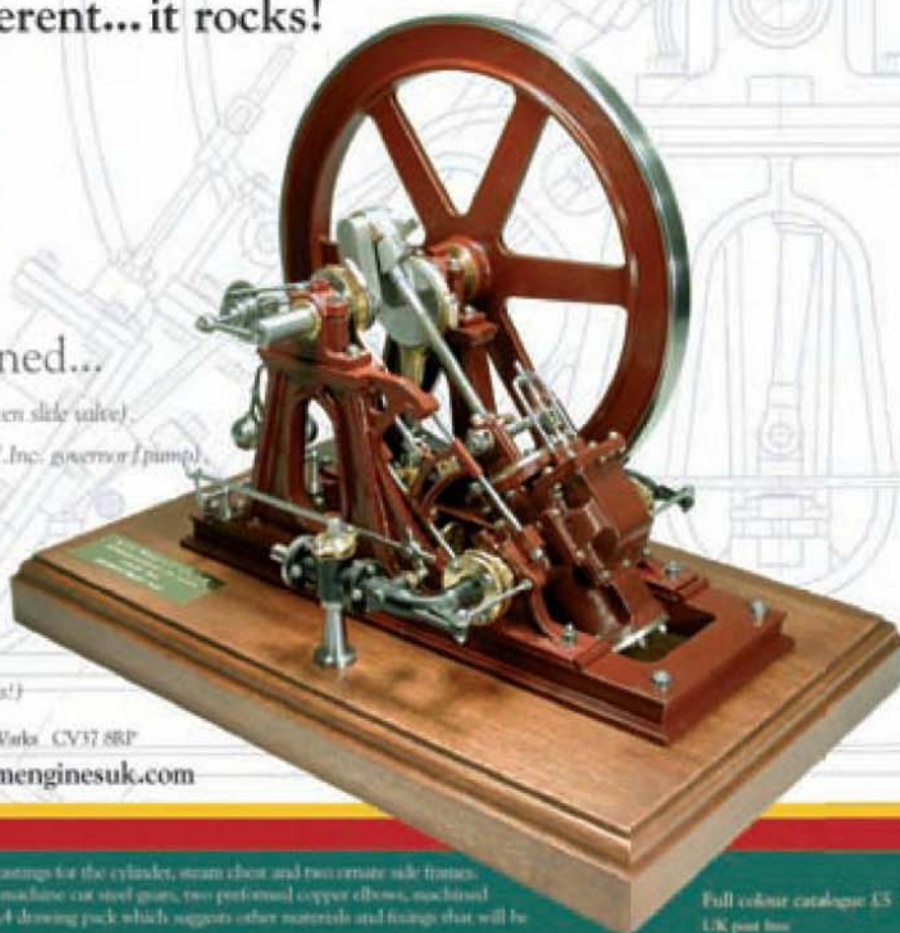
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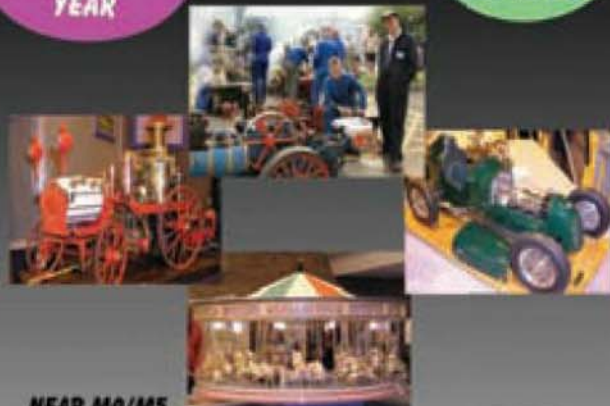
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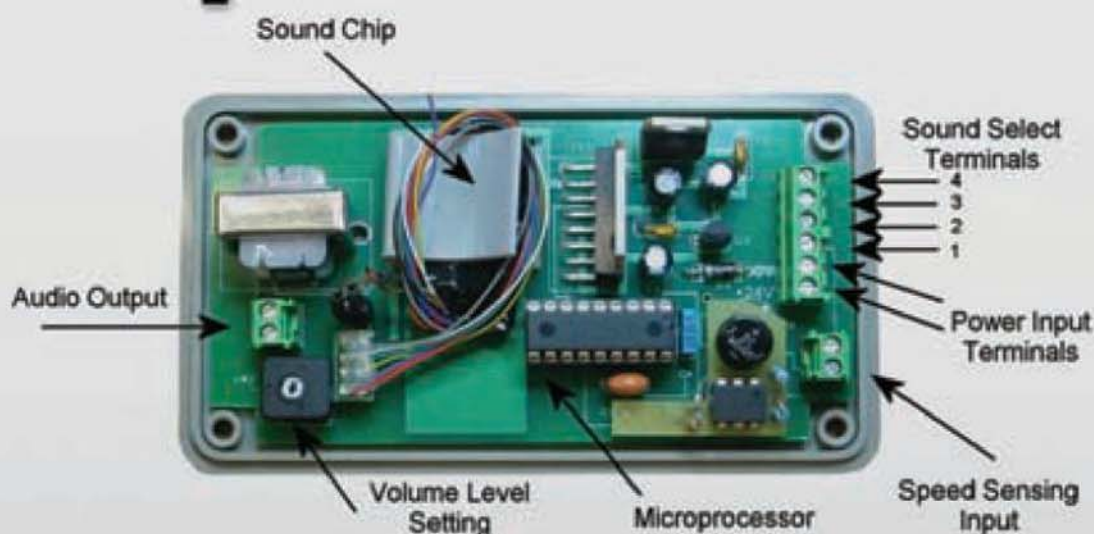
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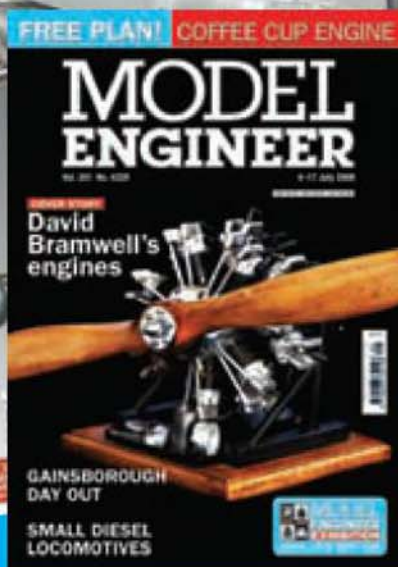
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Have a nice day!

This weekend sees 7½in. gauge activity at the Langford and Beeliegh Miniture Railway, Museum of Power, Langford, Essex with the SEQLEC competition on Saturday July 19. It's near Maldon and should make a most interesting outing with plenty to fascinate the visitor. There is a tea shop on site and the museum itself, formed around a steam water pumping station, has wealth of absorbing exhibits. Next to it is an interesting canal complex. It is all only about half an hour from J28 of the M25.

Life after Modelworks

Modelworks International (Sales) Ltd going into administration has left Duchess builders about half way through their project. Ian Gordon is trying to locate other Duchess builders to have a chance of completing their locomotives through mutual support and bulk buying of some outstanding items such as the boiler. So far they are about 10 in number, but there could be more than 30 more who might benefit from making themselves known to the group. They should contact Ian at: ian.gordon@peak-translations.co.uk to make contact with the other Duchess builders for mutual support and shared expertise, not to mention locating whatever they still need. We have also been asked

Enter now

There are just two months to go now before the 101st Model Engineer Exhibition at Ascot. Regular readers will know that we are highlighting locomotives at this year's event, and hope to see a good display of locomotive designs, including those that originated on these pages.

Our exhibition is best known for its competition models. Every year the standard seems to get higher and higher and last year a large number received Gold Medals, the top accolade in model engineering.

However, the exhibition is also about the chance to show work in progress in the 'loan' category, which does not come under the judge's scrutiny. We also like to see good honest working models in the loan category, especially if they can be shown working.

Your entry form is on page 97. Be sure to fill it in. It is your show. It is as good as you make it.

This year we also have the chance for locomotive men to run 5in. gauge engines on the famous ground level track from Sinsheim. For those that need them, we will have available some driving trucks and passenger wagons.

To run on the Sinsheim rails, see the entry form in the last issue or our website www.model-engineer.co.uk Or contact the editor on 01689 899255 or email david.carpenter@magicalia.com

that if anyone building the 57xx pannier tank, who would like to complete this model, would like to create a self-help group with the idea of pooling requirements. The editor will pass on details.

Traction engine phoenix

A new business, Steam Traction World, has been formed, to "take the positives that Modelworks developed over the years, to continue as market leaders and develop better relationships with our most important asset - you, our customers."

The website of the new business says it intends to keep current and future customers fully informed, via its new Steam Traction World forum.

Letters have been sent to Modelworks' customers explaining the situation and asking if they would be willing to have Steam Traction World complete their models.

A new website, www.steamtractionworld.com and the business name have been registered. The new venture has started discussions with potential investors.

Superb photo by Alan Crossfield of his magnificent Bulldog. Alan recently (issue 4326) wrote an article on realistic nameplates. The scale track and photographic backdrop were the subject of another article in M.E. 4090. The locomotive won well-deserved awards at the National Model Engineering Exhibition, Harrogate, both the Myford Trophy and the Precision Paints Trophy for the best locomotive and best finished model at the show.





Fayette in 3½in. gauge

SIRS, - Malcolm Stride reports in the News section (*M.E.* 4322, 28 March 2008) of the finding of a locomotive thought to be a 3½in. gauge Fayette, and wonders whether instructions were ever given. The locomotive was described as an award winner in the Model Engineer Exhibition 1937.

It was built by R&S Wood, (Father and son) and is illustrated and described in *M.E.* Vol. 77, pp 443-4. The description indicates that they were following the series on Fayette, but added a lot of their own design features, including Greenly's vacuum extractor, from the Halton 5.

LBSC had several queries on a 3½in. gauge model, and he outlined briefly how to build one in that gauge, firstly in *M.E.* Vol. 64, pp 468-70, where he outlined boiler, valve gear and cylinders, and in Vol. 67, pp 342-3, and where an Atlantic version is also pictured.

Dr. R. N. Smith, by email.

Steam turbines

SIRS, - I very much enjoyed the series by Ron Isted on turbine-driven passenger steamers (*M.E.* 4323, 11 April 2008). It may be biological but turbines attract me. I find them to be the most elegant form of propulsion known to date.

In the late 1970s and mid-80s I knew enough not to try to make a Parsons type so I experimented with both Laval and Stumpf machines. I found that their output was way below the theoretical. After some correspondence with the late Professor Chaddock and chats with people on the SMEE stand at various Model Engineer Exhibitions I gave up. They described the problem of low output as being due to 'Dead Steam'. I went on to write a simulation for my Sinclair Spectrum but came to no real conclusions.

In Mr. Isted's article there was a sentence, which was like being hit between the eyes with a brick. This sentence contained the words "or about 2,814mph".

Suddenly the penny dropped. I do not know what the speed of sound is in steam or what the temperature of steam is at 200psi. My problem is that 2,814mph is about 3.7 times the speed of sound in air! As you approach the speed of sound in a gas compression waves start to set up in the gas because the molecules of the gas cannot get out of the way. This means that a gas cannot move faster than the speed of sound, so a column of steam doing 2,814mph sounds dubious. The kinetic energy in the steam would be used up compressing the steam and not going into the turbine. The blades on the Laval and the buckets on the Stumpf turbines are not designed as 'Wave Riders', which ride upon the shockwave. I hope other readers cleverer than I can help with this problem, for if I am right we might start to get somewhere with these elegant machines.

I believe that in the 1980s the city of Pennsylvania experimented with 'alternative' means of propulsion for its city buses. One was made by Lear and had a 30in. single disk turbine. What became of it I do not know.

R. F. Parsons, Hungary.

Film punching

SIRS, - I am retired and a long-term reader of *Model Engineer*, supplied by my local newsagent. Just out of interest, I am in the process of refurbishing a photographic film punching machine, which I was told, originally came from the Ilford Company, with a view to taking currently available, 400ft. spools of unexposed 16mm Kodak cine film, and then punching the additional sprocket holes, to the SMPTE specification required for Standard 8mm cine camera use, and using the existing 16mm sprocket holes as reference points.

I understand that photographic film is produced, and coated with the photographic emulsion in endless sheets of 4ft.

in width, it is then cut (slit) into the various widths for use in cameras i.e. 16mm, 35mm etc. The film punching machine that I have was used with blank 16mm wide film, to punch the sprocket holes required by 16mm cameras and projectors. However, there was no punch/die tooling supplied with the machine when I obtained it, and I would now like to make the necessary tooling.

I have the full ANSI 7½ C482 SMPTE drawing details of the dimensions and tolerances required for the sprocket holes punched in 16mm cine film, but I have not been able to locate any information on the tool making techniques, old or new, that the toolmakers would have used, to produce the punch blades and matching die plates to the correct dimensions and form. The dimensions of a 16mm cine film sprocket hole are 1.829mm wide by 1.270mm high with a tolerance of 0.010mm, and there is a radius (fillet) in each corner of the sprocket hole which is 0.25mm radius with a tolerance of 0.03 millimetre.

I suspect that perhaps watch making techniques were originally used to produce the tooling and I note that files of just 1mm square section are still available from watchmaker tool suppliers, but this punch/die tooling would not have been a 'one off' exercise, the factory film production process would have required the punching tool accuracy and precision to have been maintained, as the tooling became worn and was replaced. The tooling was also being produced by different skilled individuals, although no doubt each punch/die plate set would have been produced by the same individual.

This raises many questions in my mind, for example, how does one produce, on a repetitive basis, and measure, an accurate radius of 0.25mm in tool steel plate? I do have a Zeiss precision measuring microscope to check the other sprocket hole dimensions.

Write to us

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Responses to published letters are forwarded as appropriate.

I would be most grateful if any of your readers could offer advice, on the techniques, the tools and other equipment that might have been used to produce this tooling, or can direct me to an appropriate source of information.

John Cleeve, by email.

When oil and water meet at the Anson

SIRS, - Well not exactly but as good a way as any to hail the meeting of a well-known and elderly gentleman of steam to a much less known and younger gentleman with a healthy interest in the internal combustion engine. I must at once declare that I am that youngish chap and what happened recently to me at the Anson Engine Museum left me feeling both honoured and somewhat humbled by the chance meeting with one Keith Wilson of *Model Engineer* fame.

The day was ordinary enough I suppose and I had travelled north to Poynton to assist with the running of the museum for a weekend in May 2008. It was there that I was passing one of the larger open crank gas engines when one of a group attending the museum suggested the lubricator was

Edwardian Elegance

SIRS, - *Edwardian Elegance* by Ron Isted has been a fine series but for me the excellent one on *Turbinia* followed by his story on channel steamers "takes the cake"! The drawings including "ships' lines" are a delight. His words on cavitation are very good. This is in light of the fact that for over 40 years I've read *Model Engineer* from cover-to-cover.

On page 332 (M.E. 4321, 14 March 2008) the problem of quick reversal is related, but the method is not told. It could be quite interesting because the problem is inherent with turbine-driven vessels. My model steam boat, shown on page 600 of M.E. 4274, 26 May 2006 though not turbine-driven, once had a similar problem.

not working properly. I remarked to the contrary and then almost let it pass when it occurred to me that the comment would never have come from a person who was not keenly involved in engineering of some sort. I asked, in a round about way, if that was the case and it was only at that point I discovered the identity of the gentleman I was talking with. It was Keith Wilson and had he not introduced himself, I would never have known.

Keith was immediately forthcoming with his identity and from the brief conversation we had I discovered he was a major

contributor to the world of model steam through *Keith's Column* in *Model Engineer* magazine. He is on or has possibly completed his 60th engine by now. I was taken aback by the figure 60 and quickly calculated that if this was so then this man was not ordinary and must have had an awful lot of metal pass through his hands. I have since confirmed this figure as perfectly genuine and his models are well known.

I had little enough to reciprocate with but did make mention of one of my heroes, Edgar T. Westbury. Being more interested in model petrol, I

It was solved by making a two-start worm and worm-wheel, for use between the radio-servo and the Kitchen Rudder. With turbines normally irreversible, how was this speedy reversal aboard *Dieppe* achieved?

This article brought back fond memories, because on the way home from the 1933 Scout Jamboree in Hungary a group of us boarded a vessel at 23.30 hours 19 August to arrive at Newhaven after 3am. In view of the hour it is not amazing that despite an interest in marine items due to being a Sea-Scout; even the name of the vessel does not appear in my diary. Who knows? We were possibly aboard *Dieppe*.

John C. Chappell, Ontario, Canada.

have over the years collected many of Westbury's books and publications in M.E. and again I was amazed to find that Keith knew "Ted" as he called him.

I did not get a chance to speak with Keith again before his departure but if I might be allowed to do so through the pages of *Model Engineer* it would be to say thanks for the opportunity and I sincerely hope that if I didn't make an impression the Anson Engine Museum did. It is a treasure of a place and almost a secret to those who do not know of its existence.

Denis O' Connell, Buckinghamshire.

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ON SALE 1 AUGUST 2008

The LBSC Memorial Bowl 2008

The **Sutton Coldfield Model Engineering Society** invites participants and spectators alike to the light-hearted celebration of the prolific small locomotive legacy of LBSC.

The LBSC Memorial Bowl Competition is held annually to celebrate the contributions of Curly Lawrence (LBSC) who made great contributions to the development of the small live steam locomotive. The event this year will be hosted on Sunday, 7 September 2008, by the Sutton Coldfield Model Engineering Society at their Balleny Green track.

A warm welcome is extended to all competitors, their supporters and spectators. The 'social side' of these events is as enjoyable as the event itself and the chance to renew acquaintances and meet new people is a particularly enjoyable part of the day. There are also abundant opportunities to discuss construction, operation and maintenance of miniature locomotives as well as photograph them.

The on-site catering will have sandwiches, beverages and snacks for sale.

1. Station view of the Balleny Green site taken during a Santa's Special.



Track details

The Sutton Coldfield site has a raised level track of 460ft. for 2½, 3½ and 5in. gauges. Additionally, the 2000ft. ground level track can accommodate 5 and 7½ in. gauge locomotives. The maximum gradient on the raised track is 1:220 (minimum radii of 42ft.) and 1:90 on the ground level with a minimum track radii of 40 feet.

Competition judging

Each entrant will raise steam in their locomotives and do a few laps of the track to show that the engine performs well and that the driver can handle it. Then the judges also will take the engine around for a few laps.

The cup will be awarded to the entrant whose locomotive, in the opinion of the judges, has given the best performance bearing in mind the aims and objectives of LBSC's designs.

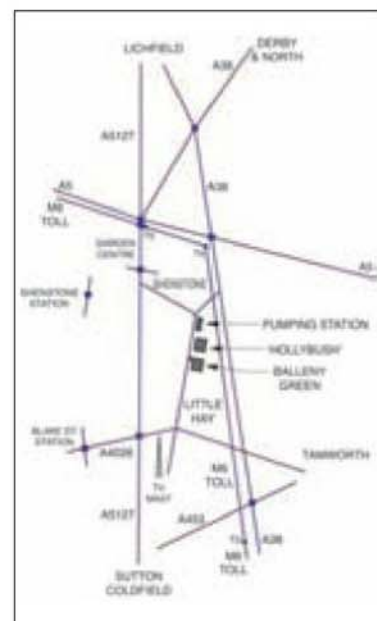
Society background

The Sutton Coldfield Model Engineering Society was founded in 1948 by a group of people with similar modelling interests. The original site, leased from a landowner, was situated at Lea Marston. The members desired to have their own site and, eventually, this became possible through the benevolence of a member who left money in his will to the Society. Following a search, an offer was made to purchase the current site at Little Hay, using these funds. The effort was successful and the members of the Sutton Coldfield MES became landowners.

Spotting LBSC designs

As annual events go, the LBSC Memorial Bowl surely must be one of the most fun.

Development of the miniature steam locomotive owes much to the efforts and advances made by Lillian 'Curly' Lawrence who wrote under the pseudonym LBSC. His designs (possibly 150 total), were published principally in *Model Engineer* and *English Mechanics* between 1927 and 1958 and range from Gauge 1 to 5in. designs, many of them familiar classics.



Directions to Balleny Green

The Balleny Green site is located in the hamlet of Little Hay, north of Sutton Coldfield, south of Lichfield and close to the village of Shenstone. The A38 and M6 toll roads lie to the east, the A5 just to the north and the A5127 to the west. (see map) Car parking will be on-site under the control of the marshals on-duty.

Contact

Participants should contact Neal Harrison, society secretary, T. 0121-378 3992. W. scmes.freemove.co.uk

Titanic super model



David Carpenter has fingers crossed that this stunning model might sail into Ascot.

A sensational model of the ill-fated *Titanic* has recently been completed by Fine Art Models of Michigan in the United States. It is valued at no less than £1.3m, almost as much as the £1.5m that the original cost in 1912.

If £1.3m is a bit steep for you, then Fine Art Models will shortly have some smaller versions, in 1:192 scale at \$14,500. Just

100 will be made in a limited edition and will be available from the Autumn.

The one-off larger version is built to 1:48 scale, and will embark on a world tour of major marine museums which is being planned at the moment. We are keeping our fingers crossed that the schedule might make it possible to bring it to the Model Engineer Exhibition at Ascot in September.

Fine Art Models has already supplied a number of its models to museums around the world. It has an extensive portfolio of models, including almost three-dozen ships, although many of them are sold out. All are produced in limited editions.

It produces other fine models as well as ships, including around 20 locomotives and railway cars, some classic aircraft, vintage automobiles, motorcycles and military vehicles.

The *Titanic* is an accurate replica of the iconic White Star liner, built to works drawings. Fine Art Models says:

"If there were one ship model in the world to build, it would be RMS *Titanic*. Why? Because it had never been modelled before. The plans for *Titanic* had never been released to anyone prior to our expressing interest in doing it.

"We approached Harland & Wolff in Belfast, Northern Ireland, who built the *Titanic*, and proposed that we not only build a definitive model of the *Titanic* as a limited edition, but that we also build the 1:48 scale builder's model of the *Titanic*, which was never built, and do so with the intention of building the finest and most detailed builder's model of any kind ever seen. When Harland & Wolff realized that not only were we serious, but that we had the ability to do everything we said we would do, they agreed to work with us hand-in-hand to accomplish this mission. And a mission it was!

"We began our development in late 1995 and only in December 1998 was our first model complete. The objective was to build both the limited-edition model and builder's model with the same level of detail and do so with absolutely no compromise."

After receiving the original plans for the *Titanic* from the Belfast shipbuilders Harland & Wolff, Fine Art Models spent two years completing the research and design for the model.

In addition, the modellers were given access to the designer's notebook detailing every change made from sister ship *Olympic* to *Titanic*, with additional drawings and measurements.

"How far have we gone with these models? You'll see every minor change made to *Titanic* from the *Olympic*, which was the first in the class. You'll see these changes because we have a copy of the designer's notebook for *Titanic* with every change detailed with drawings, measurements, etc.



"Both the 1:48 scale builder's model and 1:192 scale limited-edition models have hulls made from high-definition resin, with real wood decks containing every detail found on the real wood decks and hand-fabricated brass from the decks up."

Staff From Harland & Wolff worked alongside the model makers of Fine Art Models.

The highly-detailed model is more than 18ft. long and features a hull finished with brass plating, held together by more than 3.3 million rivets.

Each bulkhead on the model, which weighs 1,500lb, is positioned exactly where it was on the 882ft. long, 46,328 ton liner. The decking is all made from wood, as is the deck furniture, which is crafted to precise proportions.

All the ship's exterior windowed cabins are made precisely to scale, including the furniture and fittings inside each one. The lighting on board the ship is so complex that it required the installation of more than eight miles of

fibre optic cable. The model is displayed in an impressive, hand-carved wood and glass case which itself took two craftsmen two years to build. Model and case together weigh around two tons.

The *Titanic* was designed by Harland and Wolff Chairman, William Pirrie, head designer Thomas Andrews, and general manager Alexander Carlisle. Plans were regularly sent to the White Star Line's managing director J. Bruce Ismay for suggestions and approval.

Construction of the *Titanic*, funded by the American J. P. Morgan and his International Mercantile Marine Co., began on 31 March 1909.

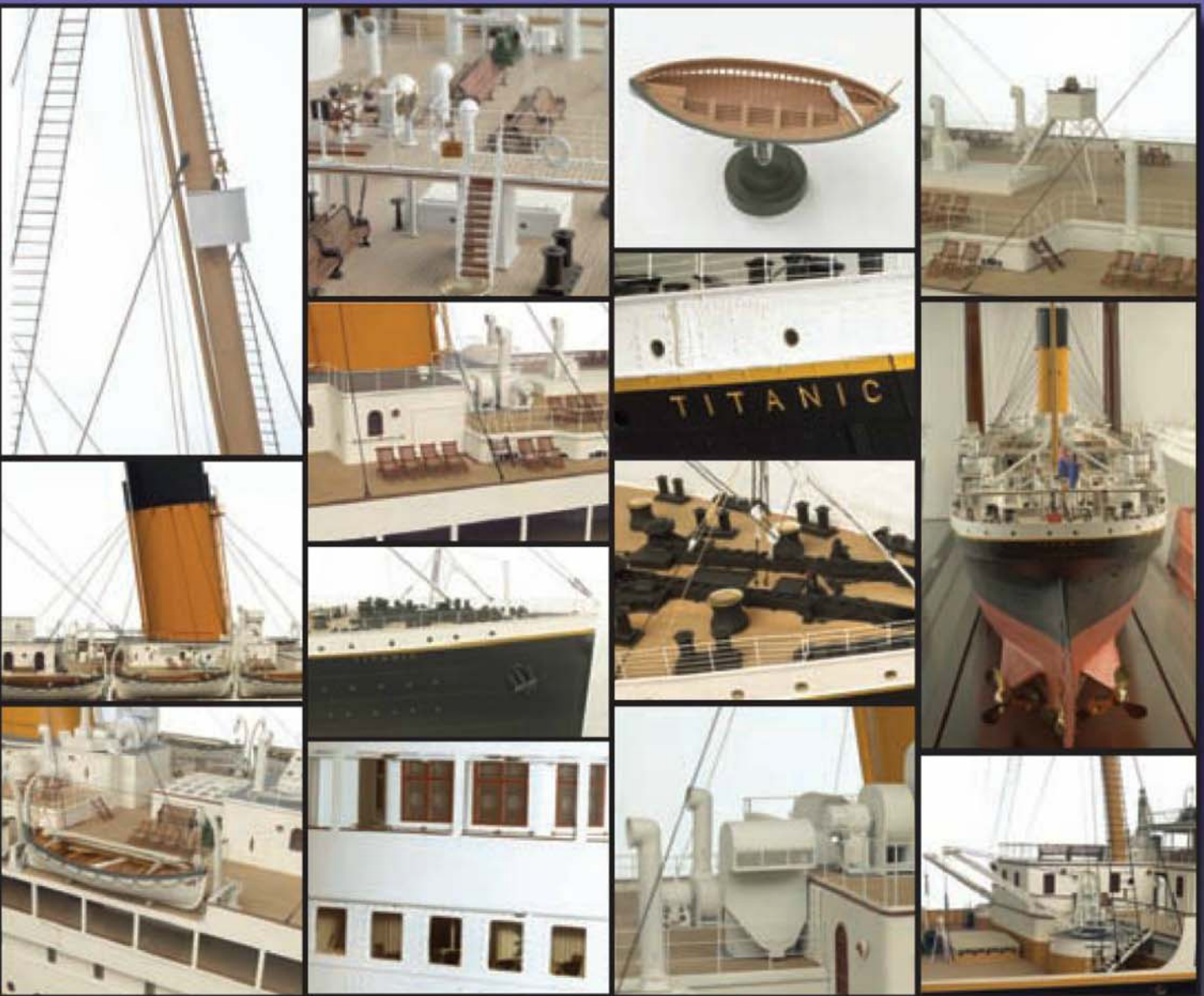
Two years and two months later, the hull was launched, although fitting out was not completed until March 31 the following year.

Titanic sank on her maiden voyage in the early hours of 15 April 1912 after striking an iceberg *en route* from Southampton to New York.

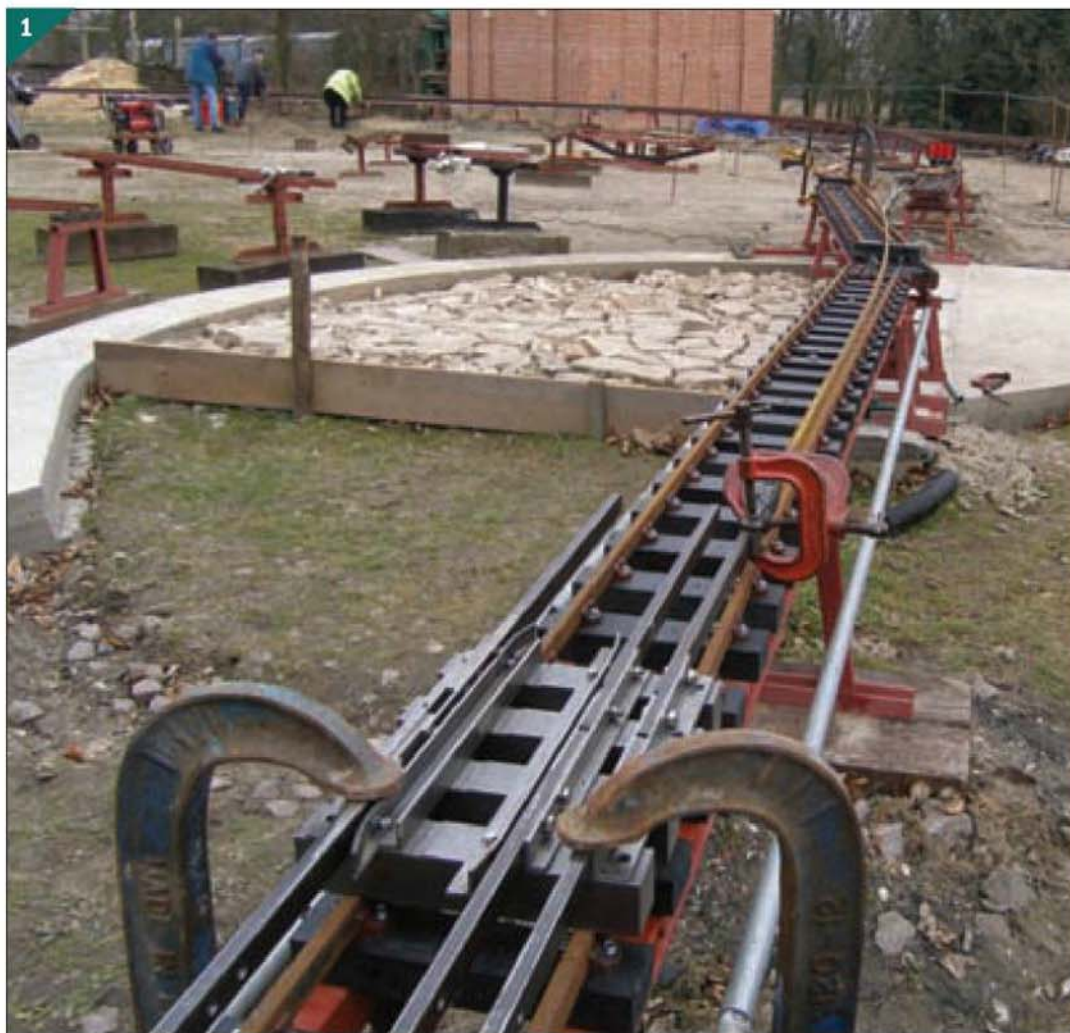
For more see: www.fineartmodels.com

ME





Raised track points the Norfolk way



John Berry describes the work of the **North Norfolk Model Engineering Club** to install a set of points on their raised level track.

1. Testing the theory at the steaming bay approach.

Five years ago our club was offered a track site within the Holt Station yard belonging to the North Norfolk Railway. The site, roughly 'P'-shaped and much larger than the previous site, gave the club members some qualms as to how we could build a track within the offered land. We decided to build an out-and-back line with a large turntable at the base of the 'P' (**fig 1**). This would give us about a 1,000ft. run. At about this time, a committee member and his wife visited the Waushakum Live Steamers

track in Massachusetts USA and discovered their high line points. Photographs and rough dimensions were taken together with some very helpful advice from the Waushakum members. Most of this information has now been developed into our version of their brilliant idea.

The plan

Two 'Y' points would be installed back-to-back to the north of the station (**fig 1**). This would allow maximum operational flexibility. It must be easy to operate. The track should not be less than 40ft. radius. One point

would be built and thoroughly tested before the second one was constructed. Both 3½ and 5in. gauge locomotives must be able to use the track. The back-to-back distance between the points must be greater than the longest passenger trolley. Some form of protection must be given to prevent a 3½in. gauge locomotive running 'wrong road'. The club treasurer also requested that it should not cost a lot.

The theory

The basic principle of the points is that if you fix one end of a multi-gauge track and bend it over a fixed distance, the opposite rail ends will expand and contract in a fixed ratio to the angle of movement. If you make the free end (pivot point end) as half lap joints, the rails will slide together and at the same time maintain the gauge. The rails and sleepers are only fixed at the moving end of the point. The track is then allowed to slide sideways in a controlled manner towards the pivot end. This allows the track to naturally form a transitional curve supported by the base frame (**photo 1**).

Construction

Our track is built of steel 'A' frames fixed to cut down railway sleepers (**photo 2**). These carry a steel frame underneath recycled plastic sleepers to which are fitted PNP chairs to accommodate 10 x 20mm bar rail. The 18ft. long sub-frames for each of the points were built in a similar manner.

Wheels were fitted at both the moving end and at the mid-point for support. The sub-frame pivot is a substantial stainless steel shaft running in hard nylon bearings (**photo 3 and 4**).

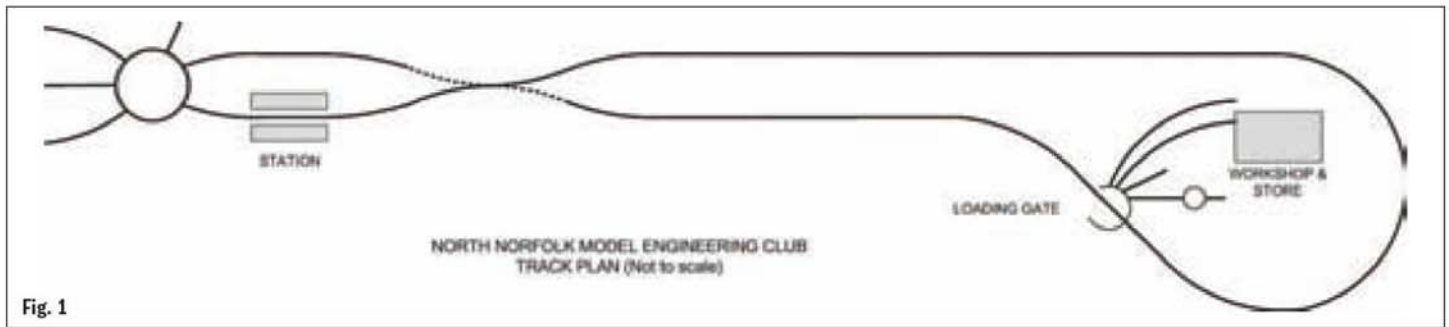


Fig. 1



Thanks to the club's civil engineering group, known as Gordon and his slaves, dead level concrete bases were laid to accommodate the pivot supports and point ends. Having 'millimetre perfect' bases over 45ft. considerably aided both the assembly and alignment.

On the basis that 'you discovered the idea - you can build it', 35mm square BMS machined for the rails has been used for both the fixed ends of the points and the sliding joints. Two of these sleepers are bolted firmly to the moving

end of the beam and the rails welded to them. Two more are fixed to each of the aligning tracks, which also provide the track alignment lock.

Four of the same size steel sleepers provide the base for the sliding joint. All the fixings are stainless steel.

No welding was used on the joint so that should a problem arise a replacement part can be quickly fitted. Great care was also taken that the half lap joints were mirror images for both the gauges to maintain the maximum support for the wheels. A substantial

machined guide for the bar rails was also installed 8in. from the sliding joint to ensure the rails did not bend to close to the lap joints.

Check rails

One of the more interesting challenges was the check rails (photo 5). Fortunately, the 3½in. gauge locomotives seem to have only one set of wheel standards; a very good thing. Five inch gauge have several, ranging from 'steam roller profiles' to near scale. This is not a good thing when building a club track with any type of points.

Fig 1. North Norfolk Model Engineering Club track plan with raised track points at the dashed lines.

2. Track construction

3. Aligning the pivots. Note the big hammer!

4. The base frame in place.

5. Check rail alignment.

When constructing check rails on a dual gauge track, this can be a problem. We have, therefore, decided that the club will only allow 5in. gauge locomotives to run with wheel profiles to the standards



RAISED TRACK POINTS



6. Checking the 5in. gauge.

7. The first works train crossing. Not a 'hi-vis' vest in sight!

8. Installing the second point.

9. Testing the two points at speed.

10. After 12 months service.

of the Society of Model and Experimental Engineers, Martin Evans or GL5 Main Line Association (photo 6). This action promptly banned the author's 2½in. scale narrow gauge locomotive, but allowed his wife's 5in. gauge locomotive to sail through. You cannot win all of the time!

To complicate matters even further, a four rail system was required to allow 3½in. gauge locomotives to shunt within the station and turntable area. The fourth rail terminates 15 yards beyond the north point and is being provided with an alarm to warn 3½in. gauge drivers that

they are 'wrong road' and must return to the turntable

Constructing the first point took about 90 hours which included making some basic drawings and experimenting with long lengths of bar rail clamped to the track (photo 1). Constructing the base frame took about 40 hours and another 16 for the concrete bases. Club members did all of this work.

Testing

Due to some bad planning on the author's part, the first point was installed just prior to one of the club's busiest weekends. A very rapid learning curve ensued by all the club members present, but it worked. Further testing continued during both passenger and non-passenger hauling without any point problems. There was an expansion problem across the track alignment joint which occurred during our brief summer. Several different adjustments also had to be made to the check rails before a compromise setting between the 3½ and 5in. gauge was obtained. Although tested at up to 10mph, the running rule is now cross at a walking pace which has proved to be trouble free (photo 7).

After extensive testing over nine months, the second point

was installed together rack alignment locking bar (photo 8 and 9).

This opened up a brand new can of worms. Nothing wrong with the point, it was built to almost the same dimensions. It was the operational alternatives that gave the points-man a severe problem. Locomotives used for passenger hauling mixed with light engines for members' enjoyment can work very well, but the points-man/men have to be on the ball or on Valium. Our club does not differentiate between a passenger train and a light engine on running days except that a passenger train has priority. We strongly disagree with some other clubs' 'get off we need to raise money' weekend operations. The only exception being a tea train which leaves the steaming bays as fast as possible. We do not like cold tea. Our next task is to build a fully signalled model of the track to train our members on the point and signal operations.

Maintenance

Fortunately this is fairly simple. A monthly lubrication of the sliding joints with chain oil and a greasing of the landing strips on the point's outer ends, together with our normal pre-operational track inspection seem to be sufficient (photo 10). A simple wooden cover is used for the point sliders when they are not in use.

The future

Mechanising the points is being investigated. There would be no problem in moving the beam either electrically or by hydraulics. Designing a remote-

controlled fail safe positive track alignment lock is more of a challenge. Interlocking the points with the signals is also needed. We also have the problem of fitting a trouble free sliding anti-tip rail to the support base beams. A third point is also being considered in the long term, to allow faster access to the steaming bays.

Summary

In the past, one of the difficulties of raised tracks was finding a reliable points design, which would allow a full train to continue over them. We also appreciate that other clubs have installed some good ideas to solve the problem. Should any other club wish to expand their operations, we submit our variation of the Waushakum track for consideration. It is relatively cheap and easy to build, it is simple to operate and can be installed almost anywhere. Our club is most willing to demonstrate the points to other clubs should they be interested.

The NNMEC would like to thank the following for allowing us to use their ideas, materials and land: The North Norfolk Railway PLC Directors and staff for their generous support. PNP (Paul Norman Plastics) for both advice and assistance and for the thousands of bar rail chairs and fixings. OMJ, Horsford, Norfolk for the advice and supply of hard nylon for the pivot pivot bearings. The Friends of Peveril's Orchard Railway, Suffolk for the bar rail at cost (no, you cannot have some back!).

Special thanks to the Waushakum Live Steamers for the superb idea in the first place.

ME



McONIE'S OSCILLATING ENGINE

Anthony Mount continues work on the side frames and describes how to make the bearing pedestals.

*Continued from page 744
(M.E. 4328, 20 June 2008)*

12. Drilling a bearing fixing hole.
13. Machining the slot for a cylinder bearing.

The next job is to machine the seatings for the cylinder pivot bearings. The plywood plate can be used again and, with the casting set square, the bottom edge and front can be picked up with an edge finder and the hole for the bearing drilled (**photo 12**). The hole for the tie bar can be drilled through the boss using co-ordinates to locate it. Picking up from the top flange, the lightening hole can be drilled through the hook.

With all the external surfaces machined, now is the time to drill the holes in the bottom edge for the fixing studs. They can be positioned using co-ordinates after the end and side edges have been located with an edge finder. A couple of stud holes are also required in the top flange, but these need to be tapped 7BA by about 10mm deep.

The frame needs to be relocated at an angle (**photo 13**), to machine the slot for the bearing, in the top of the fork that receives the bearing cap.

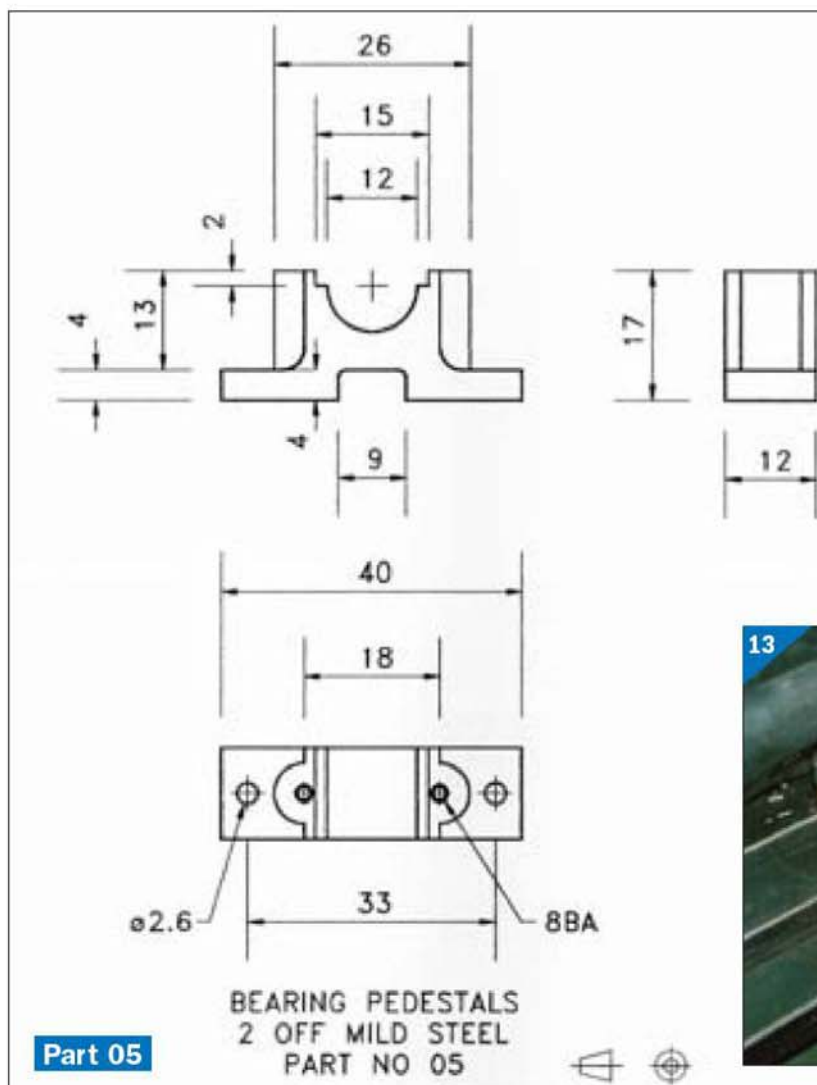
Also, the area around the hole on one side needs to have a seating machined to receive the flat face of the bearing.

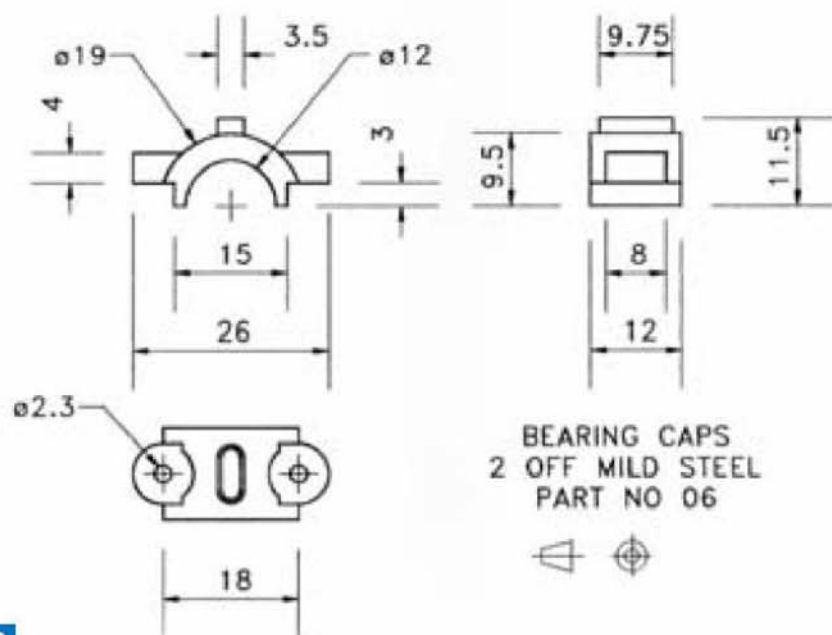
That is about as far as we can go with the side frames for the moment. The housings for the cylinder bearings, and slide bar lugs, are integral parts of the side frames. I will describe how to make and fit these later.

Bearing pedestals (Parts 05 and 06)

Standing on top of the main frames are two bearing pedestals for the crankshaft. Full-size they would have been castings, but for the model they are just as easily machined from the solid.

You will notice on the general arrangement drawings that there is a block on the top of





Part 06

14. Machining the slot in a bearing pedestal.

15. Machining bearing cap tongue.

16. Reaming the hole for a main bearing.

17. Cleaning up the sawn edges of a bearing pedestal.

the main frame over which the pedestals fit. This is to take the thrust of the piston against the crankshaft. I have not shown a corresponding cut out in the base of the pedestals

on the detail drawings. The block limits any chance of adjustment of the pedestals for lining up the crankshaft.

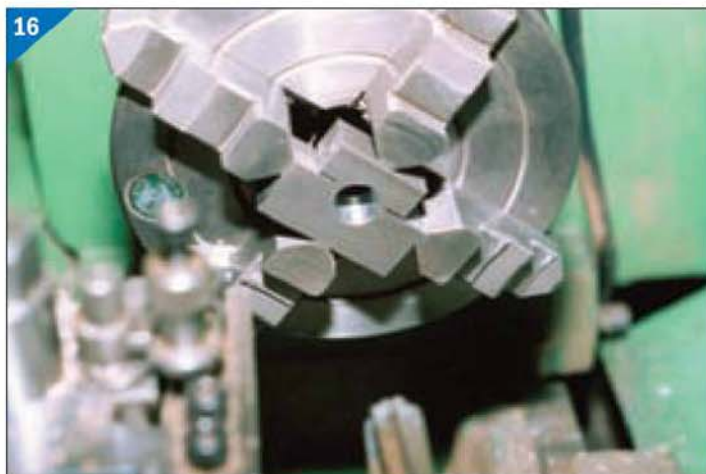
If you want to fit the blocks, I suggest you temporally assemble

the main parts of the engine and fit the crankshaft; then mark the location of the pedestals, make the cut outs in the base of the pedestals, and fit the blocks to the main frames.

The method of machining the pedestals was to drill most of the holes first in the raw block, then to cut out the general shape, with the rounded ends applied as separate pins silver-soldered into pre-drilled holes.

For the pedestals make up two blocks of mild steel 40 x 17 x 12mm and two blocks 26 x 12 x 12 millimetres. Machine a 15mm wide x 2mm deep slot in the top of one long edge of the bigger pieces (**photo 14**), and then machine tongues on the smaller pieces (**photo 15**), to fit into the slots.

Set up the two pieces in the 4-jaw independent chuck (**photo 16**), and drill and ream 12mm diameter. The grades of mild steel I used for the two parts were slightly different; one machining much easier than the other. This caused a problem when drilling the hole as the





centre drill and then the drill ran out. To correct it I drilled under size and bored it out to just under reaming size. The boring process did not go off centre.

Set up the big piece on the milling machine to machine the slot in the bottom (if you want to). Then, with the caps in place, position the stud holes, using co-ordinates, and drill through the caps into the pedestals below. The caps were then removed and the pilot holes continued right through the pedestals.

The pedestal was repositioned upside down in the machine vice and the pilot holes opened out the 8mm diameter. As the drill will be cutting unevenly, as it breaks out into the cross-drilled hole at the top, you may prefer to finish this hole with a slot drill rather than finish with an ordinary drill.

Two 6mm cross-drilled holes are needed at the roots of the side steps. These holes break into the 8mm holes and cannot be drilled directly with an ordinary drill as it will try and wander off. You have a choice of plugging the 8mm hole with a tight fitting mild steel plug and drilling through it and then knocking out the plug or to drill the hole with an over centre cutting slot drill or three lipped end mill. Start with a 5mm drill and open out with a 6mm one. These types of cutter do not wander off when partly cutting into another hole.

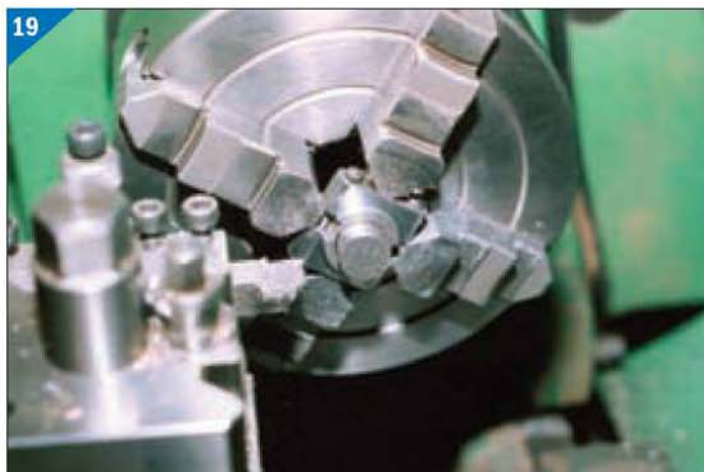
The pedestal is now getting a bit difficult to hold as the top face has only a small area. A short stub of 12mm dia. steel can be placed in the bearing

hole and this will take the thrust from the vice jaws much better than the top face. Saw away the waste material at the ends and then using a 6mm end mill clean up the sawn edges leaving a nice curve in the bottom corners at the drilled hole (**photo 17**).

The embryo pedestal is now full of holes and needs the round sections that take the cap studs. So drill and tap the ends of two lengths of 8mm dia. mild steel rod 8BA and place them in position in the blocks and silver solder in place. They can be made a little over length, leaving them protruding at the bottom where a ring of silver solder can be dropped over. The other end of the rods can be held flush with the top of the pedestal with a small clamp.

The two caps can also be held in the machine vice with the aid of a short stub of 12mm mild steel in the bearing hole and the ends machined with rebates either side of the stud holes (**photo 18**). The extreme ends can now be either filed round or rounded with a band sander. The two caps can now be mounted together in the 4-jaw independent chuck (**photo 19**), set to run true and a boss turned on each side 19mm diameter.

The oil reservoir is not the usual oil cup but is elongated across the top of the bearing. Set the cap in the machine vice and drill a 2.5mm hole about 5mm deep, then change to a 1mm drill to continue through into the bearing hole.



18. Machining the rebates either side of the stud holes.
19. Turning a boss on a bearing cap.
20. Machining the outside of an oil reservoir.
21. Cleaning up the bore of a bearing pedestal.
22. Bearing pedestals and bearing caps at various stages of machining.

Change to a 2.5mm slot drill and form a slot 3mm deep either side of the central hole stopping about 0.5mm from the sides of the cap. Change to an end mill say 6mm dia. and mill away the top of the cap for a depth of 3mm leaving a wall thickness of 0.5mm either side of the oil reservoir slot (**photo 20**). The ends of the reservoir can be rounded with a small flat file.

Now mill the ends of the cap to form the pads where the stud nuts go. If you use an 8mm slot drill, it can be set on the centre-line of stud holes

and fed in vertically to form the pad; that leaves triangles of metal to remove between the pads and the oil reservoir. These can be filed away, or the corner of the belt sander used to remove the bulk of the metal, and the final finish applied using Swiss files.

Finally the base and cap can be held in the machine vice and an end mill passed through to clean up the bore (**photo 21**). **Photograph 22** shows the parts at different stages of machining.

●To be continued.



15-day skeleton timepiece

John Parslow describes how to plant the train and set up the escapement.

Continued from page 741 (M.E. 4328, 20 June 2008)

A simple depthing tool is used to plant the wheel train (photo 13). This John Wilding type design has been described many times, so please forgive me for repeating the description for the benefit of first-time clockmakers. The tool is simple and straightforward to make (fig 33). However, a few precautions need to be taken if the tool is to be accurate in use:

- The baseplate must be flat.
- The runners must be square to the baseplate.
- The points and location diameters of the runners must be concentric.
- Bushes, used to adapt wheels or pinions to fit the runners, must be concentric.

A common source of inaccuracy is run-out when drilling the holes for the runners. Check this by spinning in the lathe, with a

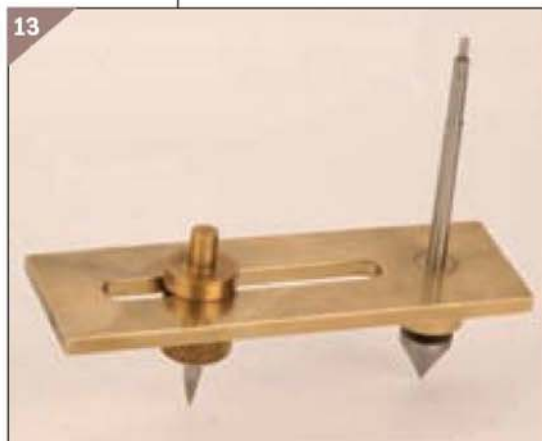
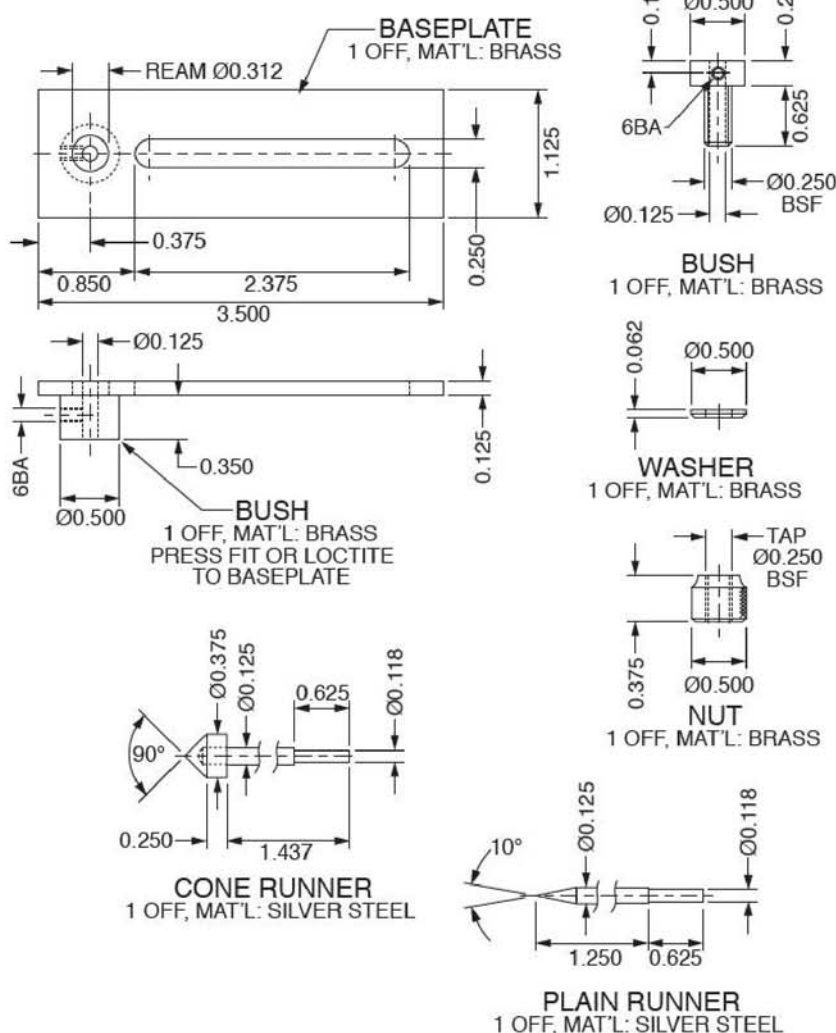
length of silver steel (about 4in.), in the hole.

Three runners are required for this clock: One 0.125in. plain dia. for depthing the escapement; one stepped down to 0.118in. dia. to suit the 12 leaf pinions; and one stepped down to 0.078in. dia. to suit the eight leaf pinions. The points of the runners should be hardened and tempered to straw colour. The cone on the cone runner can be left soft.

Depthing the train

Each wheel and pinion needs to mesh correctly. This is done using the depthing tool. When correctly meshed, the centre distance between the two runners is transferred from the depth tool to the clock plates. To do this, a wheel and its mating pinion are put on the depthing tool using suitable runners. Bushes will be required to adapt the Great Wheel and the Hour Wheel to fit the runners. The remaining wheels can be mounted via their collets. Set the runners so that the tips of the wheel teeth and pinion leaves just brush together. Using a micrometer, or a vernier caliper, carefully measure the distance between the runners. Now reduce the distance between the runners by the sum of the wheel tooth and pinion leaf addenda. The wheel and pinion should now mesh correctly. The addendum

Fig 33



for a 0.6 module wheel tooth is 0.032in., and that for a 0.55 module pinion is 0.018 inch. Thus, the spacing between the runners needs to be reduced by 0.050 inch.

Planting the wheel train

The wheel train is planted one arbor at a time, starting with the winding arbor, then moving progressively along the train, marking each new pivot hole position from the previous one. The pivot holes are located on the vertical centre lines of the frame plates, except for the third wheel and the reverse minute arbor (fig 34). These are offset as shown in fig 35. All marking out is done on the front plate.

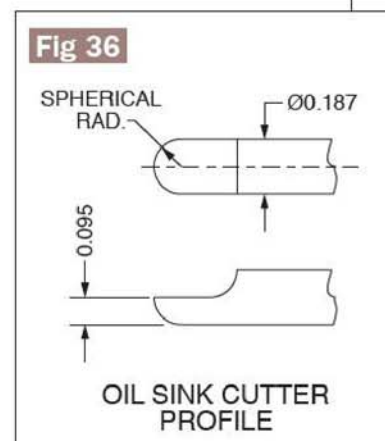
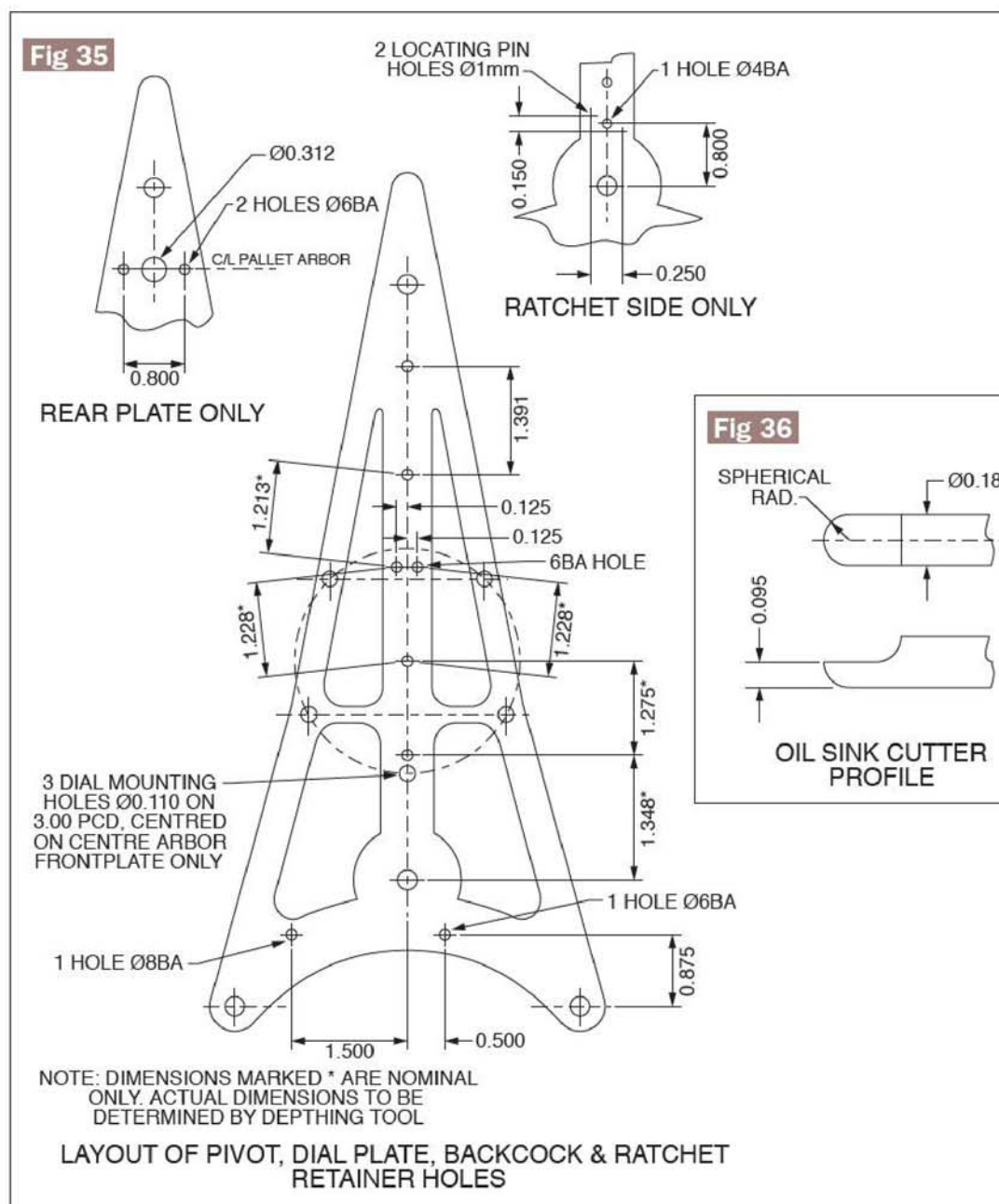
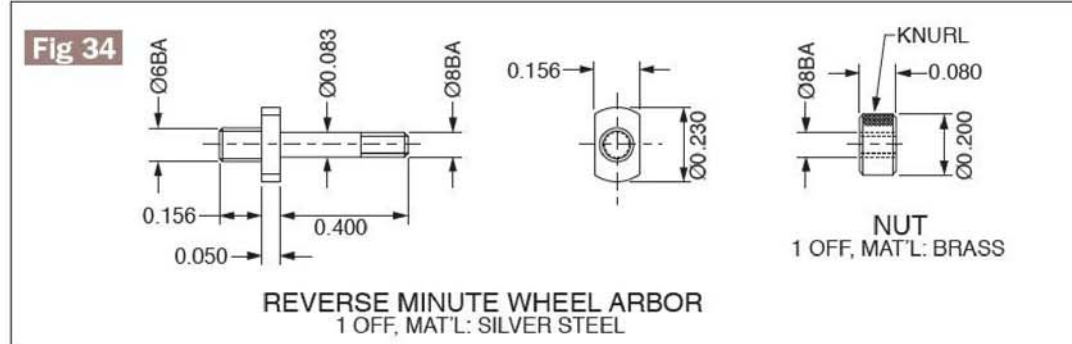
Clamp the two plates using the shouldered location dowels used previously. Mark the plates front and back to avoid errors as planting proceeds.

Fit the cone runner in the fixed bush of the depth tool, and the 0.118in. dia. runner in the moving bush. Place the cone runner in the winding arbor hole, and rest the point of the other runner on the surface of the front frame plate. Adjust the runners so that the base plate of the depth tool is parallel with the frame plate. Depth the great wheel with the intermediate pinion as described under the above heading 'Depthing the train'.

Transfer the setting to where it intersects the centre-line of the front plate, and mark off the position of the intermediate arbor. Centre-punch the position of the arbor and drill through both plates a few thou. smaller than the diameter of the intermediate pivot intended for the front plate. Separate the two plates and open up the hole in the rear plate a few thou. smaller than the rear pivot diameter.

The pivot holes are then broached to fit the pivots. Using a five-sided tapered broach, and working from the inside of the frame plates, open up each hole until its pivot will just enter the hole.

At this stage, the oil sinks should be cut in the outer faces of the frame plates. First, countersink the pivot holes to ensure accurate location before

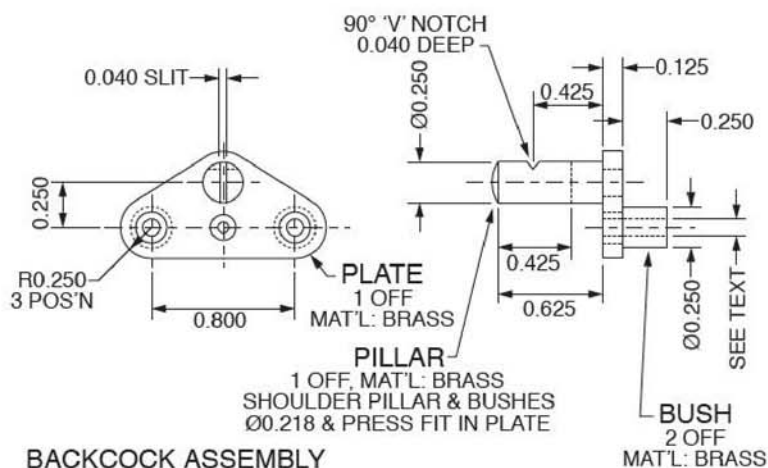


using the oil sink cutter (fig 36). The oil sinks should be about 0.150in. dia. in the rear plate for the intermediate arbor, and about 0.125in. dia. for all the other oil sinks. Important: The front centre arbor pivot hole, does not have an oil sink.

Finally, broach the pivot holes to give the correct pivot fit. This is difficult to describe. The aim is to provide the minimum clearance that will allow the wheels to spin freely and gradually come to rest without a jerk. One test is: while holding

the plate horizontal, the arbor should be able to tilt about 5deg. from the vertical in all directions.

Assemble the clock frame with the intermediate arbor and wheel in position and check that the wheel spins freely as described. If it stops quickly, or with a jerk,


Fig 37

then one or both of the pivots may be a little tight. A final test is to quickly invert the frame. A distinct click should be heard as the arbor drops and takes up the end shake. Check also that the Great Wheel and intermediate pinion mesh correctly. If there is a fault correct it now, before planting the next arbor. The above procedure is carried out for each of the remaining arbors, one at a time.

The hole for the reverse minute wheel arbor (fig 34) is marked out from the centre arbor pivot hole, and is drilled and tapped 6BA in the front plate only.

Setting up and planting the escapement

Before describing how to set up the escapement, an explanation of how it works may be helpful for the first-time clockmaker:

The pallet on the left of the anchor assembly, fig 20 (M.E. 4326, 23 May 2008), is the entry pallet and the one on the right is the exit pallet. The escape wheel rotates clockwise, driven by the mainspring via the wheel train. 'Drop' is the term used for the small amount of rotation of the escape wheel that takes place between one pallet releasing a wheel tooth and the other pallet arresting one; in this clock about 1deg. of rotation. This provides the necessary mechanical clearance.

Assume that the escape anchor is swung over to the right, such that the tip of one escape wheel tooth just rests against the mid-point of the entry pallet half-cylinder. The escape wheel is now locked. As the anchor swings to the left, under the influence of the pendulum, the entry pallet unlocks the escape wheel, which now starts to turn clockwise.

The tip of the tooth slides

along the curved surface of the of the entry pallet giving it a push, known as the impulse, until it reaches the edge of the pallet.

Meanwhile, the exit pallet has moved from a position just clear of the outside diameter of the escape wheel, into the space between two teeth. At this point, the entry pallet releases the escape wheel, which is now free to rotate until a tooth 'drops' into the mid-point of the exit pallet, when it is again locked. The escape anchor then swings again towards the right, unlocking the escape wheel until the entry pallet locks the next tooth, and the whole action starts again.

To achieve this action, the distance between the pallets and the distance between the escape and pallet arbors needs to be adjusted. The two 10BA screws are used to adjust the distance between the pallets. The lower screw is used to reduce the distance between the pallets, and the upper screw to increase it. Once correctly set, further adjustment of these screws is not required.

On my original clock the escape wheel is 1.410in. dia. and the centre distance between the two pallets 1.325 inches. The distance between the escape wheel arbor and pallet arbor on my clock was 1.391in., so this should be a good starting point. However, individual escapements will vary slightly from these dimensions

Using the 10BA adjusting screws, set the pallets 1.325in.

apart. Fit suitable runners to the depth tool and set them to 1.391in. apart. Mount the escape wheel and escape anchor on the depth tool and set the escape wheel to a position halfway along the pallet half-cylinder, using spacers.

Carefully examine the action of the escapement with a jeweller's loupe. The aim is to have the tip of an escape wheel tooth dropping onto the mid-point of the pallet half-cylinder, and to have equal entry and exit drops. The spread of the pallets determines the point at which the tooth tip drops onto the pallet, and the distance between the escape and pallet arbors controls entry and exit drops. These two adjustments are interdependent, and some experimenting will be required to achieve a satisfactory setting.

A few hints may be helpful: With one tooth and pallet in the locked position, the other pallet must be clear of the outside diameter of the escape wheel, otherwise the escapement will jam. Too close a setting of the pallets will cause this. Too wide a setting of the pallets will cause a wheel tooth to drop onto the pallet below the mid-point. To equalise entry and exit drops, adjust the distance between the escape and pallet arbors. To reduce entry drop, move the arbors closer together. To reduce exit drop, move them further apart.

Once the escapement is working smoothly on the depth tool, the position of the pallet frame arbor can be

marked-off from the escape wheel arbor pivot using the depth tool. The position is centre punched and a pilot hole drilled through both plates a few thou. smaller than the pallet frame pivots.

Backcock (fig 37)

When making the backcock plate, the two fixing holes for 6BA screws must be drilled with the tapping drill only, so that the backcock can be accurately positioned on the rear plate.

To do this, use the same drill used for the pallet frame pivots, and drill a pilot hole at the pivot position in the backcock plate. Again, using the same drill, locate the backcock on the rear frame plate, square it up and clamp in position. Drill the rear frame plate 6BA tapping size by spotting through the backcock plate, and tap 6BA. Remove the backcock and open up the pilot hole, in the rear plate only, to 0.312in. dia., as shown inset in fig 35. This procedure will ensure that correct depth of the escapement is maintained. The mounting holes in the backcock plate can now be opened up and the bushes and pillar fitted (photo 14).

The suspension spring top block needs to be a close but free fit in the 0.040in. wide slit in the pillar. The two pallet arbor pivot holes (one in the front plate and one in the backcock) can now be broached and the pallet frame fitted.

● To be continued.

HARROGATE'S MODEL ENGINEERING SHOW: A grand weekend

Roger Bunce and **Michael Jones** continue their report with a look at some Stirling engines, locomotives, I/C and stationary engines on display.

*Continued from page 736
(M.E. 4328, 20 June 2008)*

On the Stirling Engine Society stand was a remarkable collection of low temperature differential (LTD) Engines made by Martin Gregory (**photo 1**).

His display illustrated many types of LTD engine including: those using membranes instead of pistons, a Ringbom engine, multi-cylinder engines, and an engine in which the displacer comprises the sector of a circle which rotates.

Martin's engines are beautifully designed and made. M.E. is hoping that he will provide us with more information



on these intriguing engines, including the design and construction of a simple engine especially for the beginner.

Locomotives

Locomotive enthusiasts were quite busy inspecting the details of some of the fine models on display. The models of D. McKay (**photo 2**) and D. A. Roberts (**photo 3**), were both excellent 5in. gauge Stirling

Single locomotives in the competition section. This gave visitors a unique and instructive opportunity to compare the efforts (and appreciate the fine details) of two builders on exactly the same locomotive.

The 5in. gauge *Rocket* model by A. Crossfield, in its bright yellow livery, certainly caught one's eye (**photo 4**). One has to speculate on the alleged joys of driving such a beastie in the rain.

At first glance, one might think *Colorado* on a British locomotive was a name from the imagination of the model builder. However, the information provided by R. W. Gull for his 5in. gauge LNER 'A3' Pacific locomotive shows the model was based on the prototype built in Doncaster in 1928 (**photo 5**). The class was fitted, in the late 1950s, with Kylchap exhaust (double blastpipes) the exhaust drifted into the forward vision of the driver. To cure this, German-style smoke deflectors were





fitted which gave the class a distinctive look. As displayed, the model depicts these BR modifications as well as having a streamlined 'banjo' dome from a higher pressure boiler fitted to the class.

Readers of *Model Engineer* may have recognised the name Empire of India on the GWR 4400 5in. gauge locomotive built by A. Crossfield (**photo 6**). His article (*M.E.* 4326, 23 May 2008) explained how he made nameplates by drilling, piercing, filing and soft-soldering. The actual results were very impressive.

Midland Crimson Lake was the chosen livery for the first 100 of the locomotives that where were to be commonly known as 'Horwich Crabs'. This model of No. 13026 by G. Raynor is shows how they would have looked before the rest of

the class were presented in black livery (**photo 7**). Six years doesn't seem such a long time to build a locomotive model from scratch when one appreciates the results achieved.

I/C engines

An interesting collection of internal combustion engines was on display across club stands as well as entered in the competition. A stalwart I/C design is the *Kiwi* Mk. II, a fine example of which was exhibited by J. G. Winrow (**photo 8**).

A splendid example of an H. R. D. Vincent 1936 Meteor motorcycle engine was displayed D. Elliott (**photo 9**).

Reciprocating I/C engines are certainly the most common type modelled, so it was quite interesting to see two Wankel rotary engines built by P. Thompson (**photo 10**).



More models around the show

Marine steam models were in abundance this year. A triple expansion steam engine was exhibited by S. Nesbit (**photo 11**). This was complete with propeller, thrust bearing and shafting. It was displayed turning over which was a treat for the eye. The cylinders were supported on turned front columns and cast back standards - a design which was typical of many marine engines.

J. A. Cogdon built his 1:12 scale W. A. Coomber rotary engine without the benefit of



castings (**photo 12**). In this type of engine the rotary motion is produced directly by the action of the reciprocating piston rod through rollers on the ends. These act on a track of constant diameter, although it is not circular.

June and Valerie were side by side throughout the exhibition. They are, in fact, a pair of triple expansion marine steam engines constructed by G. Aisthrope (**photo 13**). He constructed his own patterns to the design of J. P. Bertinat and had them cast. Engines of this type (often seen in museums) powered many of the fishing vessels that set out from Grimsby.

The oldest working clock in the world, the medieval clock from Salisbury Cathedral, was modelled in approximately 1:6



This is a list of certificates, awards and trophy and shield winners presented at the National Model Engineering and Modelling Exhibition 2008.

Locomotives 1 - 3½in. gauge

3½in. gauge *Sweet Violet*, J. Wadworth.

Locomotives 5 to 7¼in. gauge

- 1st 5in. gauge LMS Mogul Horwich Crab, G. H. Rayner.
- 1st 5in. gauge Stirling 8ft. Single, D. McKay.
- 1st 5in. gauge *Rocket* Locomotive, J. Swindlehurst.
- 1st 5in. gauge GWR *Empire of India*, A. Crossfield.
- 1st 5in. gauge Stirling 8ft. Single, D. A. Roberts.
- 1st 7¼in. gauge Dart GWR 14xx Class 0-4-2T, A. Middleton.
- 2nd 5in. gauge LMS 'Duchess' Pacific 4-6-2, D. Wilson.
- 2nd 5in. gauge LNER 'A3' Pacific 4-6-2, R. W. Gull.
- 3rd 5in. gauge Metro Tank, S. Atkinson.
- H.C. 5in. gauge GWR 'Dean Single', G. Smith.

Workshop Equipment

- 1st 'Stent' tool and cutter grinder, T. Bratten.
- 2nd Four-facet drill grinding jig, P. J. H. Bowler.
- 3rd M.E.S. Abrasive Band Machine, G. Jackson.
- 3rd M.E.S. Kennet tool and cutter grinder, G. Jackson.
- 3rd Workshop bending rolls, P. Martindale.

Stationary Engines

- 1st 1:4 scale Goblin 35 jet engine, J. Heeley.
- 1st 1:3 scale 1923, 3-litre Bentley engine, M. Sayers.
- 1st H. R. D. Vincent 1936 Meteor, D. Elliott.
- 1st I/C engine, T. Pasco.
- 2nd Richard Trevithick's H. P. dredging engine, J. Mark.
- 2nd 'Kiwi' Mk. 2, 15cc I/C engine, J. G. Winrow.
- C Stuart Turner Twin Launch engine, T. Bratten.
- H.C. 1:12 scale Benson Pillar engine, J. Mark.

Miscellaneous

- 1st 1:10 scale J. Fowler double frame mole drainer, R. Thurston.
- 1st 1:4 scale Studer cylindrical grinder, M. Leafe.
- 1st 1:8 scale La France steam fire engine, H. P. Stumm.
- 1st Bracket clock, D. Lawson.
- 1st Mystery clock, M. Waters.
- 1st 1:10 scale J. Fowler single frame mole drainer, R. Thurston.
- 2nd 5in. gauge Backhead and footplate for NSWGR C8 locomotive, B. Glover.

Fairground Models

- C 1:24 scale Model Fairground, R. F. Whatmore.

Model Boats - Kit built

- 1st 1:32 scale *Sir Lancelot* minesweeper, T. Pearce.
- 2nd 1:40 scale German WW2 'U-Boat' type VIIC, C. Behan.
- 3rd Trans Sund Oil Tanker, B. Southam.

Model Boats - Scratchbuilt

- 1st 1:19.2 scale *Charles H. Barrett*, RNLI lifeboat, P. Farrow.
- 2nd 1:96 scale Royal Yacht *Britannia*, C. Johnson.
- 3rd 1:12 scale sailing ship, G. Cutler.
- H.C. *General Havelock*, B. Young.

Model Wheelwrights

- 1st 1:12 scale WW1 Water Cart Mk. II, B. Young.
- 1st 1:12 scale Manchester-type horse bus, P. J. Field.
- 2nd 1:12 scale GWR two-horse delivery van, B. Young.
- 3rd 1:96 scale Monmouthshire farm wagon, D. A. Roberts.

Rolling Stock

- 3rd 5in. gauge 10-ton Coal Wagon, D. J. Capel.
- 3rd 5in. gauge Morris & Griffin 10-ton slurry wagon, D. J. Capel.
- 3rd 5in. gauge 10-ton brine tank wagon, D. J. Capel.
- 3rd 5in. gauge 10-ton coke wagon (c. 1894), D. J. Capel.

Junior Section

- 3rd Burgess Wooden Clock, T. Barnes.

Trophy and Shield Winners

Barry Jordan Trophy for Best In Show: 1:3 scale 1923, 3-litre Bentley, M. Sayers.

Precision Paints Award for Best Finished Model: 5in. gauge GWR locomotive 'Empire of India', A. Crossfield.

Myford Shield for Best Locomotive: 5in. gauge GWR locomotive 'Empire of India', A. Crossfield.

Chester UK Shield for Best Workshop Equipment: 'Stent' Tool & Cutter grinder, T. Bratten.

Eventex UK Shield for Best Boat: 1:19.2 scale 'Charles H. Barrett' RNLI Lifeboat, P. Farrow.

N.A.M.E. Shield for Best Club Stand: City of Oxford Society of Model Engineers.

Winner of the Warco Trophy for Best Stationary Engine: 1:3 scale 1923, 3-litre Bentley, M. Sayers.

Doug Hewson Trophy for Best Rolling Stock: 5in. gauge 10-ton Coal Wagon, D. J. Capel.

Mount Fleet Models Trophy for Best Mount Fleet Model: 1:32 scale *Sir Lancelot* Minesweeper, T. Pearce.

Special Commendation for Club Stand Display: Bradford Model Engineering Society.



13



14

scale by B. Arrige (photo 14). The original is dated to 1386 and it did not have a dial, rather it struck the hour on a bell. The frame is held together by metal dowels and pegs. The escapement is a verge and foliot type.

In conclusion, the ambience at the show was wonderful and the models superb. The show really is worth a visit - it's a grand weekend out!

ME

ENGINEERING'S LOCAL HEROES

Timothy Hackworth of Shildon

Roger Backhouse pays tribute the man whose railway achievements were destined to be overshadowed by the Stephensons.

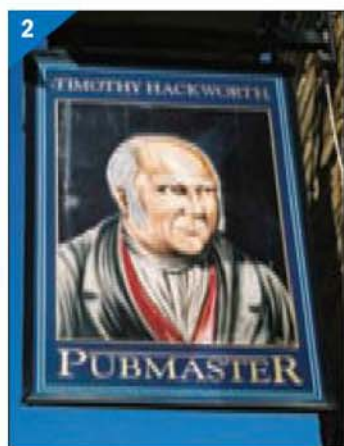
1. Timothy Hackworth statue depicted with Royal George locomotive, the world's first six-coupled engine, in Shildon Town Centre.

2. Timothy Hackworth public house sign. What would the Methodist Hackworth have made of this? The picture does not do him justice.

3. Sanspareil in Locomotion Rail Museum. This engine ran in the Rainhill trials of 1829 but was overweight and a cylinder failed.

4. Fireman's view of the Sanspareil replica in the Locomotion Museum.

5. Sanspareil shown as it would have been at the Rainhill trials.



Timothy Hackworth's place in railway history has always been overshadowed by George and Robert Stephenson. Yet he was an innovative engineer and the man who first made a steam public railway work successfully. Hackworth was born in 1786 in Wylam, Northumberland where his father was a colliery blacksmith. After apprenticeship at the colliery, he became in turn foreman blacksmith, assisting William Hedley building *Puffing Billy* and other early locomotives. He took part in the celebrated 'Wylam experiments' of 1811 which proved an iron wheel could grip a smooth rail. Later he moved to Walbottle colliery in County Durham.

George Stephenson, another Wylam man, asked Hackworth to supervise his new locomotive works in Forth Street, Newcastle, in 1824. Hackworth did so for a few months but after a return to Walbottle was appointed resident engineer to the Stockton & Darlington Railway in May 1825, some four months before the line opened to traffic. His salary was £150 a year plus a free house and coal.

Responsibilities included the stationary winding engines for inclines and the wagon fleet.



Effectively, Hackworth was the world's first railway manager. He also developed the railway works at Shildon that made wagons until the 1980s. Hackworth had his hands full. Not only were the first S&D locomotives unreliable and underpowered but the stationary engines broke down frequently. Horse wagon train drivers were difficult to

manage and given to fighting to ensure right of way.

In response to engine problems Hackworth designed and built at Shildon the first six-coupled engine, the *Royal George* of 1827, incorporating parts from an earlier unsuccessful engine. With vertical cylinders, it was claimed to be the first to drive wheels directly without intermediate levers or gears. This, and other engines, successfully worked coal trains for several years. Their slow speed suited the S&DR.

The engine also used Hackworth's own design of plug wheel, one depicted on older £5 notes. Although plug wheels were soon outdated it



was an innovative response to the frequent failures of wooden wheels. Only the centre boss could be turned true on Shildon's small lathes, with the remainder of cast iron segments built up around it encompassed by a wrought iron tyre.

Hackworth also changed boiler design. Instead of using one through tube he developed the return flue boiler, increasing the surface area for heating but with the odd result of the fireman working at the chimney end of the boiler. Several people, including his son, claimed he was first to use the exhaust steam blastpipe properly. The history is disputed but there is no doubt he used the principle successfully early on.

His best-known engine was the *Sanspareil* built for the Rainhill trials on the Liverpool and Manchester railway. Hackworth invested his own money to develop the engine but it was unsuccessful there. He could not see his engine weighed, so could not contest that it was allegedly overweight. A cylinder, cast by Stephenson's at Forth Street, failed, wrecking fuel economy, so *Sanspareil* lost to the celebrated *Rocket*.

Despite failure the engine was sold to the Bolton and Leigh Railway where it hauled trains until 1844 and was then used as a stationary engine until 1863. It is now preserved in Shildon, a remarkable survivor from the early days of railways. Although technologically advanced for the time, there is little doubt that the *Rocket* had

more features influencing later engine development.

However, Hackworth's own innovations were considerable. He had an inventive mind and among other introductions claimed for him were the spring balance safety valve, cylinders beneath the smokebox, eccentric driven feed pumps, using waste steam to preheat water, a steam drying chamber in the boiler and equalising beams. The Shildon engineer, Daniel Adamson, also credited him with the invention of the crank axle.

Soho Locomotive Works

After his spell working for the Stockton & Darlington Railway he left its employment in 1833 to become a contractor to the company. This allowed him to develop his own Soho Locomotive Works at Shildon. One building remains as part of the Locomotion Museum.

Here he built over 40 engines including, in 1836, the first steam locomotive for Russia. It was taken there accompanied by his son John Wesley, a heavy responsibility for a 16 year-old.

John Wesley Hackworth was a good engineer in his own right. Born in 1820 he assisted his father closely. After working as works manager at Soho he moved to Darlington to set up his own machine works on the death of his father. Here he specialised in stationary engines and developed the Hackworth radial valve gear. After experiencing financial difficulties, he gave up the business and turned to



consulting engineering until his death in 1891.

In his private life Timothy Hackworth was highly respected. He was a devout Methodist frequently travelling to preach in chapels in the surrounding area. A keen family man, he had two sons and five daughters. Some of his descendants maintain an interest in the Shildon area and the Locomotion museum.

Visiting

Visitors to Shildon can explore scenes associated with Hackworth including the rail trail up Brusselton Incline which once gave him so much bother. Hackworth is commemorated by a statue. His house, *Sanspareil* and a Soho works building form part of the Locomotion Rail Museum. A local primary school and pub bear his name, though one wonders what the Methodist Hackworth would have thought of the pub.

If Hackworth's many contributions to railway

6. Hackworth's House - now part of the Locomotion Museum. The house was provided free to Hackworth on him taking up duties as manager of the Stockton & Darlington Railway.

7. Cauldron type wagon at Shildon. Wagons similar to this would have made up the principal traffic on the Stockton & Darlington Railway.

8. The only remaining building from Hackworth's Soho Locomotive Works.

development are overlooked in the wider world he is certainly not forgotten in Shildon. And how many other engineers can be truly said to have reinvented the wheel? Truly he was a pioneer.

Further reading

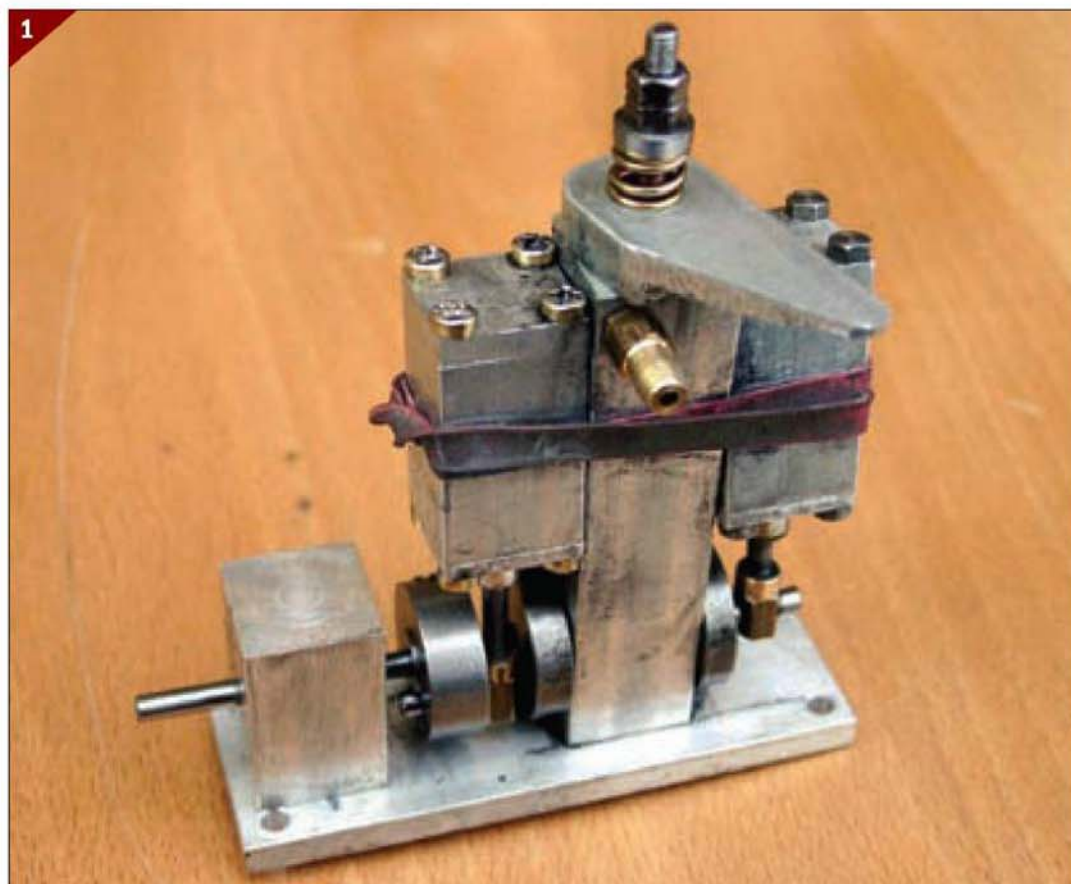
James W. Lowe, *British steam locomotive builders*. Guild Publishing. 1975 Reprinted 1989.

Robert Young, *Timothy Hackworth and the locomotive Shildon*, 'Stockton & Darlington Railway' Jubilee Committee. 1923 reprinted 1975. **ME**



The Postie Motor

Dave Fenner describes a rough and ready twin-cylinder oscillator that makes for an easy project.



I guess these days, I just don't have the attention span for a major model-making project, so my workshop activities tend to concentrate on bits and bobs of workshop kit, augmented by general bodging. Old habits die hard, and in the past, for commercial purposes, workshop items such as jigs

1. Motor complete with red rubber band.
2. Component parts of cylinder assembly.



and fixtures had to be made as economically and speedily as possible, so 'exhibition finish' is something of an alien concept.

The motivation for this little project came from two different sources. The first was Stan Bray's excellent book *Making Simple Model Steam Engines*, which describes in detail a number of small oscillating engines and boilers - many of which might be considered as weekend projects. The second was an advert by Stuart Models showing their 'Puffin' engine-boiler set for model marine application. Naturally the Stuart article would be built from their typically high quality castings probably using mainly brass and gunmetal.

Having spent some 50 years living in Scotland, it is only to be expected that a touch of stereotypical parsimony may have rubbed off. I therefore wondered whether

something similar might be built, using stock materials purloined from the scrap box, rather than castings. This led me to consider using aluminium, which, in turn, raises questions concerning its suitability in this context. Bearing situations involving steel on aluminium (alloy) are commonplace in modern overhead cam car engines, however aluminium-to-aluminium is not a combination I have any experience of. Initial running suggests that at the low surface pressures involved at the cylinder to pillar sliding interface, it is a perfectly viable arrangement.

What's in a name?

After I had test run the contraption, our local postman, Dougie called, and I told him that I had just tried a new engine and had christened it the Postie

Motor. His eyes lit up, and then he asked, "Is that because it runs really fast?" I didn't answer immediately and his expression became somewhat crestfallen - "I hope you're not going to say it runs very slowly". I then enlightened him by explaining that for a jury-rigged trial, on compressed air, I had used one of those famous Post Office issue red rubber bands to hold the cylinders in place.

General description

Three cross sections of aluminium were used, $\frac{5}{16}$ in. square for the cylinders, pillar, and drive shaft housing, 1in. x $\frac{3}{16}$ in. for the base, and $\frac{5}{16}$ in. x $\frac{5}{16}$ in. for the upper cylinder covers. Also required was a little brass for the pistons and big ends, 3mm dia. stainless steel for the connecting rods, silver steel for the shaft and steel bar for the crank webs cum flywheels.

Looking at the $\frac{5}{16}$ in square it looked possible to accommodate a bore of about 11mm and still leave metal to take four screws to retain the end caps. As can be seen from **photo 1**, a different type of screw was used on each cylinder. For the first I used 7BA, but then realised that I had a stock of several hundred M3 screws, and it would clearly be a good idea to try and use some of these. With a Pozidriv, they are also more convenient for assembly and dismantling. However, when roughing things out for size, I did not take sufficient account



of the head diameter of either type, which lead to a bit of reducing to fit after assembly.

Photograph 2 shows one of the cylinders reduced to its component parts. As can be seen, the port face has been drilled through in two places and for a depth of 2mm in the centre to form a pivot recess.

For the piston assembly, the rods were cut to length, threaded, and fitted with oversize pistons which could then be turned to size ensuring concentricity. No rings or seals are fitted, but each piston has a couple of grooves cut, and these may serve to retain oil and thus perform a sealing function.

The pillar has ports drilled down from the top surface which intersect with those drilled across for inlet and exhaust, then those for in/out of each cylinder. These may be seen in **photos 3** and **4**. The silver steel

rod, on which the cylinders pivot, can also be seen. **Photograph 5** illustrates the underside of the regulator/reverser, showing the milled passages.

The main crankshaft is a piece of $\frac{3}{16}$ in. silver steel (because I had a suitable reamer) with a flat filed at each end at 90 degrees. These flats accept the grub screws which retain the two crank webs (**photo 6**) ensuring correct phasing.

Running

The initial experience was disappointing, due entirely to everything being just a bit tight. It needed the best part of 30psi to get going, but did at least run. It was then dismantled and each subassembly checked for freedom of movement, and eased as necessary. Another 'tweak' here, was to mill away



3. Drillings in top of pillar.

4. Port face drillings.

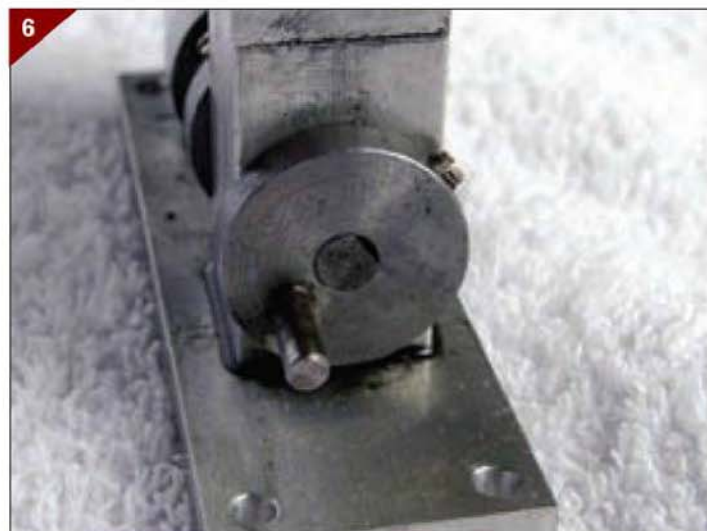
5. Regulator/reverser showing passages.

6. Detail of crank.

sections of the pillar port faces in an attempt to reduce viscous drag.

The rubber band is still in place, and one minor experiment was to add port face pressure by gripping with finger and thumb. Adding pressure reduced revs, so any thoughts for a permanent bracket will need to take account of this.

After a bit more fiddling and between five and ten minutes running in, the little engine settled down nicely, and will now self start happily on about 7psi, and motor quite impressively given more pressure. **ME**



Peter Spenlove- **Spenlove** offers some useful modifications for bench shears.

1. 'Hill'shear' bench vice mounted shear. The main parts (green) are made from forged steel.
2. The drilled and tapped hole for the length stop (arrow). Note the gear teeth which allow positioning the handle to suit the job.
3. Stud installed in the tapped hole with the length stop in position.
4. The anti tip-up finger in position. The washers under the bolt allow the finger to be adjusted to various thickness materials. The finger swings backwards out of the way.

Apart from the usual workshop tools, there are two which are extremely useful and which I would be lost without. One is the shearing tool, the other is the ever-popular horizontal/vertical band saw.

A bench shear is especially suited for cutting sheet and thin plate.

I have one which was made some years ago for Hills of London (photos 1 - 4). There is a clearance groove, by the handle, to allow the sheared edge to pass by. It is useful to have helpers to hold large sheets while the 'lever-puller' guides the sheet while cutting.

I noticed a bench shear advertised in the *Model Engineer*. This looks identical to mine and, if it is, it should prove ideal for use in the workshop.

My tool is made from steel forgings, with large close-fitting bearings fitted with grease nipples. The blades, which seat in pockets, are removable for sharpening and replacement.

The gearing is arranged to allow setting the lever at the most suitable position for comfort and to fold for storage.

The half-length handle is quite adequate for most work

and far easier to use while guiding a piece of metal.

Although the clamping block is gripped in the vice, the shear can be turned and clamped at any convenient position. This is particularly useful when trying to cut close to a scribed line, which would otherwise be difficult to see.

Two modifications

I have added two modifications to my shear; both involving $\frac{3}{16}$ in. BSF fixing holes, which are no more than $\frac{3}{16}$ in. deep.

The first modification involves a finger to act as a stop, when feeding strip or rod through the jaws, for cropping several pieces to a fixed length (photos 2 and 3). This is held in place by a piece of studding.

The second modification is useful when shearing small pieces off longer strips (photo 4). These normally tip upwards before the shearing is finished which can distort an otherwise tidy square cut. A BMS finger is used to prevent this happening. It can be swung out of the way when not needed, or removed when cutting large sheets.

Note: There are some washers under the 'anti tip-up finger'. These allow it to be raised or lowered to suit different thicknesses of

material. If thin stock is being cut, one or more washers from below are placed above. The screw is a knurled cap head. It is screwed down finger tight - no need to use a key or spanner.

The fixing hole was spot faced to allow the washers to seat properly. These were only $\frac{3}{16}$ in. dia., i.e., non-standard.

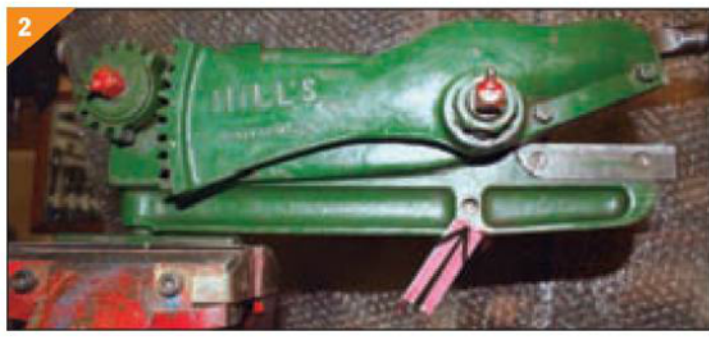
A tip: Pop a few washers on a nut and bolt. Tighten well and grip in the lathe chuck to turn their O/D to suit your spot facing seating.

Readers with lots of bench space may prefer to remove the vice block, and make a new steel base to be bolted or screwed to the bench. This is also useful for people who only have a small bench vice on a light bench, and who want to cut thick metal using the full length handle.

Cutting hard materials

The normal jaws are not designed for cutting hard materials such as piano and spring wire. To cut these, make and fit special jaws in which pieces of HSS are silver-soldered onto carbon steel jaw blanks. The blanks can be drilled for the fixing screws. One can buy ground tool bits in $\frac{1}{8}$ x $\frac{1}{16}$ in. section, usually in lengths of about 2 to 3in., from cutting tool stockists.

ME



THE MODEL ENGINEER EXHIBITION

19th - 21st September 2008 Ascot

Please return completed form to:
Model Engineer Competition,
9 Tranmore Lane, Eggborough,
E. Yorkshire DN14 0PR

ENTRY NO.

OFFICE USE ONLY

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CLASS	ENTRY NO.

ENTRY FORM - COMPETITION & LOAN MODELS

PERSONAL DETAILS (Please print)

Surname _____ Forename(s) _____ Age: _____

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Post Code: _____

Home Tel No _____ Daytime Tel No _____

Model Club or Association _____

Have you entered before? (Y/N) _____

Do you purchase or subscribe to a Magicalia Publishing Ltd magazine? (Y/N) _____

How many years have you been a modeller? _____

Mail Order Protection - please tick this box if you would prefer not to receive mail from other companies which may be of interest to you ☐

MODEL DETAILS - PLEASE TICK BOX IF MODEL IS FOR LOAN ☐

Entry Class (competition entries only) _____

Model Title (to be used for catalogue and display card) _____

Model Description _____

Model Scale _____ Length _____ Width _____ Height _____ Weight _____

Type of construction _____

Parts not made by you and commercial items _____

Have you supplied a photograph? (Y/N)

Are you supplying Judges Notes? (Y/N)

Value of Model (Magicalia Publishing Ltd will not insure the model unless a value is entered) £ _____

Name and address of your local newspaper _____

To help you get the best from The Model Engineer exhibition

These notes are written purely for guidance. Full information is contained in the Competitors' Information booklet which is sent to every entrant as part of the information package. If you have an item and are unsure as to the Class into which it should be entered, leave that section blank and we will take care of it. The Judges have the right to move any competition exhibit into another class if they feel that by doing so its chances of gaining higher marks or a more appropriate award are improved.

If the item is offered as a Loan exhibit please indicate this by writing Loan on the form in the box identifying the Class. Loan models are not judged but carry all other privileges associated with competition entries.

Part built models are particularly welcome in the Loan Section; visitors like to see work in progress, and entry does not preclude the item being entered in competition when completed.

The classes listed below are those associated with mainstream model engineering.

Club exhibits

Where a club is exhibiting, each model should be entered on a separate entry form and clearly identified as a club exhibit by entering Loan/Club in the class section box. This ensures that we have a full record of all models on display during the show and facilitates matters of administration and insurance.

Additional forms

If you do not wish to deface your copy of the magazine we are happy to receive photocopies of the entry form, one for each model. We will be pleased to send out extra forms if required, so if you know of a modeller who is not a reader of one of our magazines but who you think may wish to participate, please advise them to contact our Exhibitions Office, or simply photocopy the entry form for them.

The success of the show depends largely on the number of models on display. Your work could well be the stimulus which inspires someone else to start in the hobby. There can be no doubt that this event is our showcase on the world of modelling in all its aspects. Every modelling discipline needs more and more participants, and it is by displaying not only the crème-de-la-crème, but also examples of work of a more achievable standard, that people are encouraged to join into the wonderful world of modelling, in whatever aspect.

We look forward to seeing a sample of your work at the show!

Engineering Section

- A1 Hot air engines.
- A2 General engineering models (including stationary and marine engines).
- A3 Internal combustion engines.
- A4 Mechanical propelled road vehicles (including tractors).
- A5 Tools and workshop appliances.
- A6 Horological, scientific and optical apparatus.
- A7 General engineering exhibits – not covered by the above

Railway Section

- B1 Working steam locomotives 1" scale and over.
- B2 Working steam locomotives under 1" scale.
- B3 Locomotives of any scale, experimental, freelance or based on any published design and not necessarily replicas of full size prototypes, intended for track duties.
- B4 Scratchbuilt model locomotives of any scale, not covered by classes B1, B2, B3, including working models of non-steam, electrically or clockwork powered steam prototypes.
- B5 Scratchbuilt model locomotives gauge 1 (10mm scale) and under.
- B6 Kitbuilt model locomotives gauge 1 (10mm scale) and under.
- B7 Scratchbuilt rolling stock, gauge 1 (10mm scale) and under.
- B8 Kitbuilt rolling stock, gauge 1 (10mm scale) and under.
- B9 Passenger or goods rolling stock, above 1" scale.
- B10 Passenger or goods rolling stock, under 1" scale.
- B11 Railway buildings and lineside accessories to any recognised model railway scale.
- B12 Tramway vehicles.

Marine Models

- C1 Working scale models of powered vessels (from any period). Scale 1:1 to 1:48
- C2 Working scale models of powered vessels (from any period). Scale 1:49 to 1:384

- C3 Non-working scale models (from any period). Scale 1:1 to 1:48
- C4 Non-working scale models (from any period). Scale 1:49 to 1:384
- C5 Sailing ships and oared vessels of any period – working.
- C6 Sailing ships and oared vessels of any period – non-working.
- C7 Non-scale powered functional models including hydroplanes.
- C8 Miniatures. Length of hull not to exceed, 15in for 1:32 scale, 12in for 1:25 scale, 10in for 1:16 scale; 9in for 1:8 scale. No limit for smaller scales.
- C9 For any model boat built from a commercial kit. Before acceptance in this class the kit must have been readily available for at least 3 months prior to the opening date of the exhibition and at least 20 kits must have been sold either by mail order or through the retail trade.

Scale Aircraft Section

- D1 Scale radio control flying models
- D2 Scale flying control-line and free flight
- D3 Scale non-flying models, including kit and scratch-built
- D4 Scale flying radio controlled helicopters

Model Horse Drawn Vehicle Section

- G1 Carriages & other sprung vehicles. (Omnibuses, trade vans etc.) Wagons, carts and farm implements. Caravans.

Junior Section

- J1 For any type of model, mechanical or engineering work, by an under 14 year old.
- J2 For any type of model, mechanical or engineering work, by an under 16 year old.
- J3 For any type of model, mechanical or engineering work, by an under 18 year old.

All entries will be judged for standard of craftsmanship, regardless of the modelling discipline, i.e. a boat will not be competing against a military figure. Providing a model attains sufficient marks it will be awarded a gold, silver or bronze medal.

Model Vehicle Section

- K1 Non-working cars, including small commercial vehicles (e.g. Ford Transit) all scales down to 1/42.
- K2 Non-working trucks, articulated tractor and trailer units, plus other large commercial vehicles based on truck-type chassis, all scales down to 1/42.
- K3 Non-working motor bikes, including push bikes, all scales down to 1/42.
- K4 Non-working emergency vehicles, fire, police and ambulance, all scales down to 1/42.
- K5 Non-working vehicles including small commercial vehicles (e.g. Ford Transit,) scale from 1/43 or smaller.
- K6 Any available body shells including Concours, in any scale or material, to be judged on appearance only.
- K7 Functional model cars/vehicles which must be able to move under its own power of any type. Can be either free-running, tethered radio controlled or slot car, but must represent a reasonable full size replica.

DUKE OF EDINBURGH CHALLENGE TROPHY

Rules and Particulars

1. The Duke of Edinburgh Challenge Trophy is awarded to the winner of the Championship Award at the Model Engineer Exhibition.
2. The trophy remains at all times the property of MAGICALIA PUBLISHING LTD.
3. The name of the winner and the date of the year in which the award is made will be engraved on the trophy, which may remain, at the discretion of MAGICALIA PUBLISHING LTD., in his/her possession until required for renovation and display at the following Model Engineer Exhibition.

4. Any piece of model engineering work will be eligible for this Championship Award after it has been awarded, at The Model Engineer Exhibition, a Gold or Silver medal by MAGICALIA PUBLISHING LTD
5. No model may be entered more than once.
6. Entry shall be free. Competitors must state on the entry form:
 - (a) That exhibits are their own bona-fide work.
 - (b) Any parts or kits which were purchased or were not the outcome of their own work.
 - (c) That the model has not been structurally altered since winning the qualifying award.
7. MAGICALIA PUBLISHING LTD. may at their sole discretion vary the conditions of entry without notice.

COMPETITION RULES

1. Each entry shall be made separately on the official form and every question must be answered.
2. Competition Application Forms must be received by the stated closing date. LATE ENTRIES WILL ONLY BE ACCEPTED AT THE DISCRETION OF THE ORGANISERS.
3. Competitors must state on their form the following:
 - (a) Insured value of their model.
 - (b) The exhibit is their own work and property.
 - (c) Parts or kits purchased.
 - (d) Parts not the outcome of their own work.
 - (e) The origin of the design, in the case of a model that has been made by more than one person.

NOTE: Entry in the competition can only be made by one of the parties and only their work will be eligible for judging.

4. Models will be insured for the period during which they are in the custody of MAGICALIA PUBLISHING LTD.
5. A junior shall mean a person under 18 years of age on December 31st in the year of entry.
6. Past Gold and Silver medal award winners at any of the exhibitions promoted by MAGICALIA PUBLISHING LTD. are eligible to re-enter their model for the 'Duke of Edinburgh Challenge Trophy'. Past winners at any of the exhibitions promoted by MAGICALIA PUBLISHING LTD. will not be eligible for re-entry into the competition unless it has been substantially altered in any way.
7. MAGICALIA PUBLISHING LTD reserve the right to:
 - (a) Transfer an entry to a more appropriate class.
 - (b) Describe and photograph any models entered for competition or display and to make use of any such photographs and descriptions in any way they may think fit.
 - (c) Refuse any entry or model on arrival at the exhibition and shall not be required to furnish a reason for doing so.
8. Entry into the competition sections is not permitted by:
 - (a) Professional model makers.
 - (b) Anyone who has a financial interest in the direct supply of materials and designs to the public.

NOTE: If unsure, please contact the Competition organisers prior to the show.

9. The judges' decision is final. All awards are at the discretion of the judges and no correspondence regarding the awards will be entered into.
10. Exhibitors must present their model receipt for all models collected at the end of the exhibition and sign as retrieved.
11. The signed release for each model must be presented to security staff when leaving the exhibition complex with display model(s) after the close of the exhibition.

IMPORTANT NOTE: PLEASE MAKE COPIES, INCLUDING PHOTOGRAPHS, OF ALL INFORMATION RELATING TO YOUR MODEL, AS MAGICALIA PUBLISHING LTD WILL NOT ACCEPT LIABILITY FOR ANY LOSS.

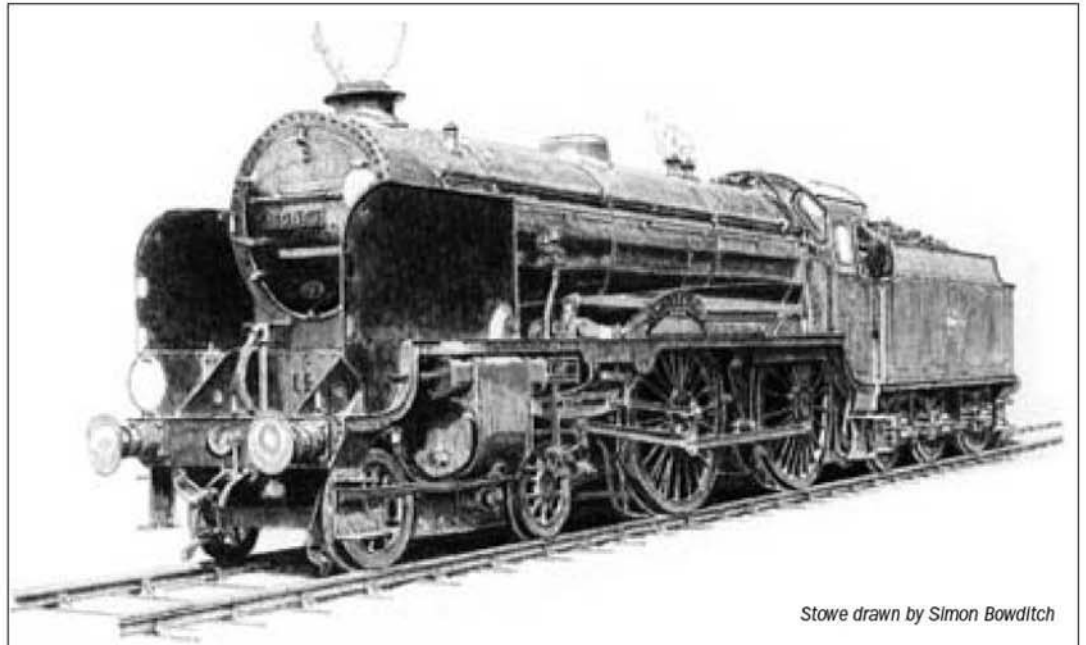
CLOSING DATE 3RD SEPTEMBER 2008

STOWE - Southern Railway Schools class locomotive

Neville Evans

describes the injector
clacks and brakes.

*Continued from page 761
(M.E. 4328, 20 June 2008)*



Stowe drawn by Simon Bowditch

As can be seen from **photo 1**, of the left hand injector clack, as fitted to 'Repton', these artefacts were rather obtrusive, and were fitted to both sides of 'Schools' and 'Nelson' class locomotives. The problem with objects of this size and importance is that the demands of scale appearance and functional ability do not necessarily coincide. I have therefore

1. The side clacks on 'Repton'.



drawn the offending object in two ways: to scale with the pipe bolted on by means of a square flange, and the more practical, but rather unsightly, union and cone (**fig 1**). Take your pick. The innards of the clack are of my usual pattern with an O-ring bedded onto a small shuttle, and should give every satisfaction. Please don't be tempted to increase the lift of the shuttle as this will prove counter productive. The mechanics of gas or liquid flow as it passes around a ball or a shuttle valve are understood by very few. We are lucky to have Gordon Smith, who has devoted a lot of time to the study of these matters, as can be seen by his evident mastery of safety valve design. Gordon has shown that by attention to correct proportion, one safety valve can be made to do a job that defeats two incorrectly designed valves. To the casual eye, there isn't much difference between them; on trial however there isn't any comparison between them.

Brakes

The braking system of our little 'Schools' differs from that of the full-size locomotives in that it is operated by steam rather than by vacuum. Having said that I must point out that my friend 'Ivor the engine', in collaboration with Colin Burrow and others of the local clubs, has perfected (if I may use that suspect word) the vacuum brake system on his Trevor Shortland designed GWR '6100' tank. It really does work very well, and gives very effective and progressive braking that is effective with a couple of trucks, carrying a few passengers. Ivor uses a vacuum ejector which is reliable, and why not, as the only movement that takes place is that of steam rushing through a venturi, causing a pressure drop. The principle, as stated in D. Bernoulli's well-known theorem, is that pressure drops as velocity increases, a principle that keeps an aircraft and any other flying device animate or inanimate, airborne. A larger train would obviously have to brake itself. The old



adage that 'the engine starts the train but the train stops the engine' is even more true at 1/12th scale than in full-size, because the weight of the train is greater in proportion to

the weight of the engine. For passenger hauling on a modern continuous club track the train is either vacuum braked, operated from the locomotive, fitted with a hydraulic system

of braking, or may even have an advanced form of inertia brake. Mechanical brakes were phased out in full-size, starting from the latter end of the 19th century. The LNWR persisted

with its continuous chain brake for many years, although this system was so inefficient that it reputedly seemed to cause the train to accelerate rather than to slow down.

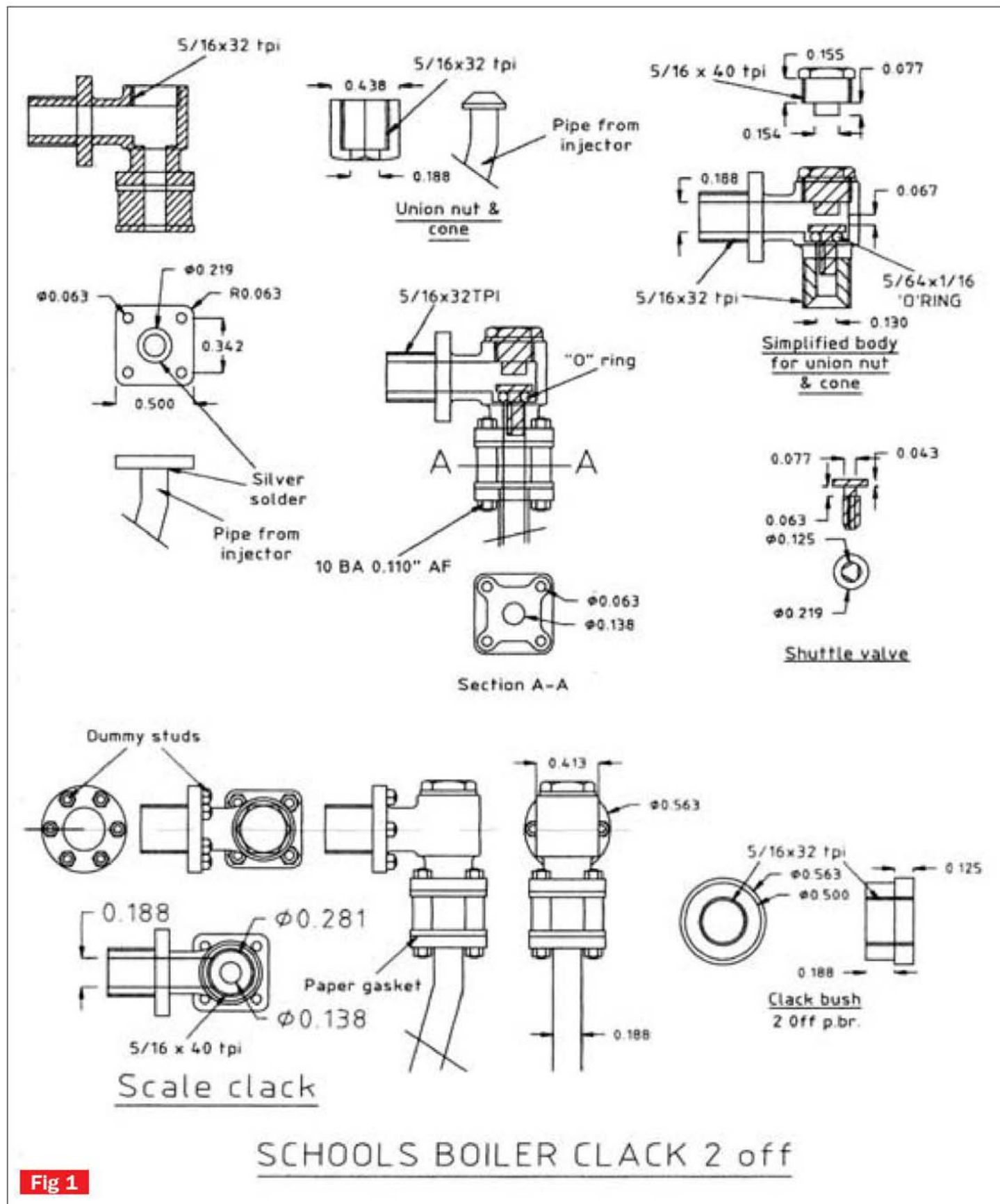
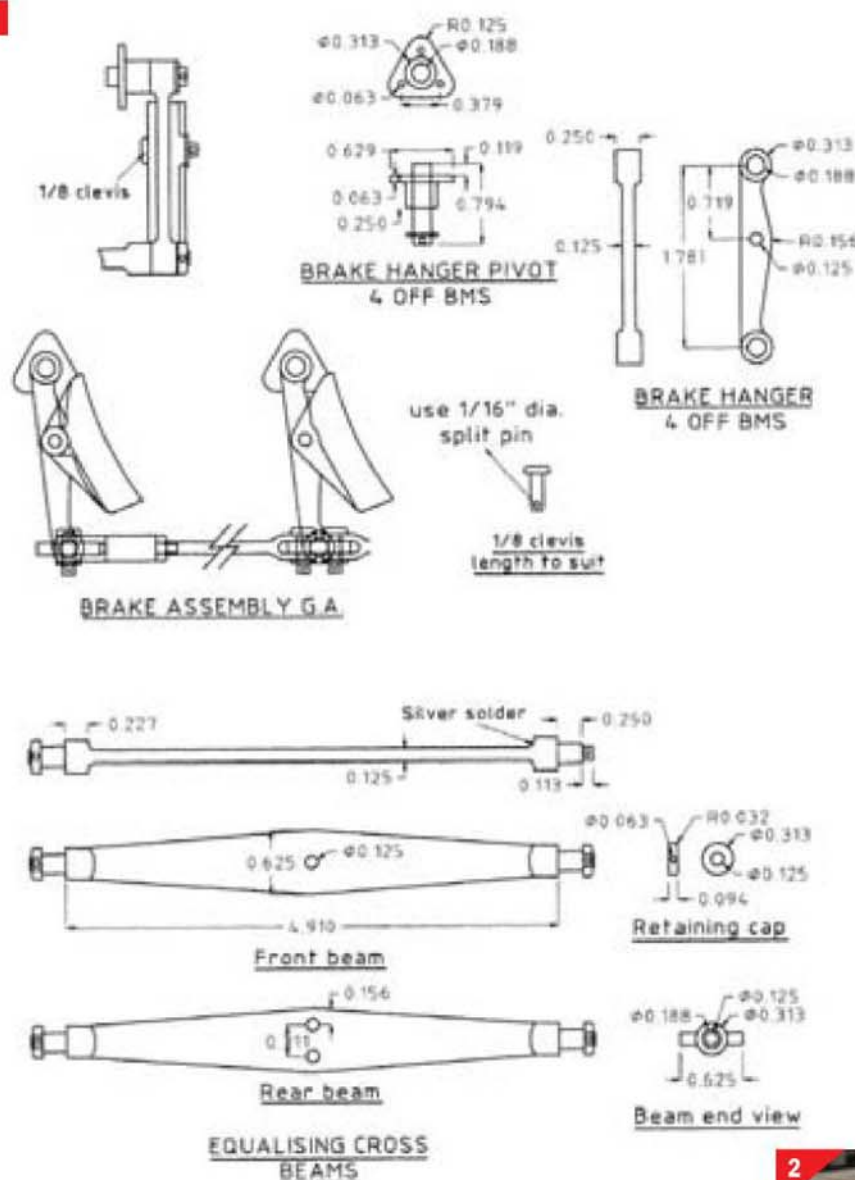


Fig 2



In the days of the Southern Railway, and indeed with steam until its very end, most goods trains used unbraked, loose coupled wagons, and braking power was confined to the locomotive and the guard's van. The goods locomotives were required to be powerful enough up the hills and heavy enough down the hills to exert some real braking power. It must be borne in mind, however, that the average speed for a loose coupled goods train in Great Britain as a whole was about 15mph. This of course relied on consummate skill on the part of the driver in taking up the slack of 50 or 100 three link couplings without any breakages, and after that, close co-operation was needed with the guard who, when descending a bank, had to judge his braking to a fine degree to maintain a tight chain on those wagons in front of him that the guard's van could control on its own. On a down hill section of track, the driver slowed half the train with the engine brakes, and

2. Brake hanger and shoe - note the use of split pins.

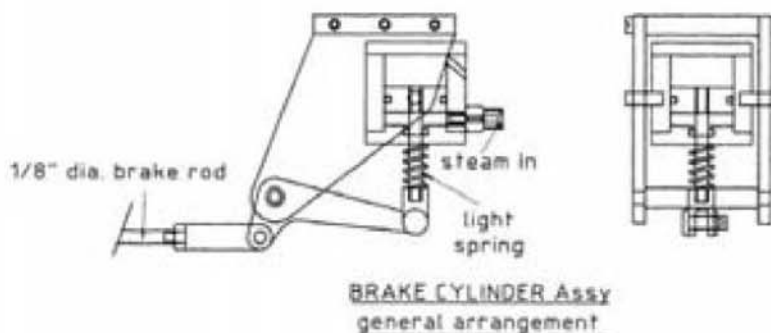


Fig 3

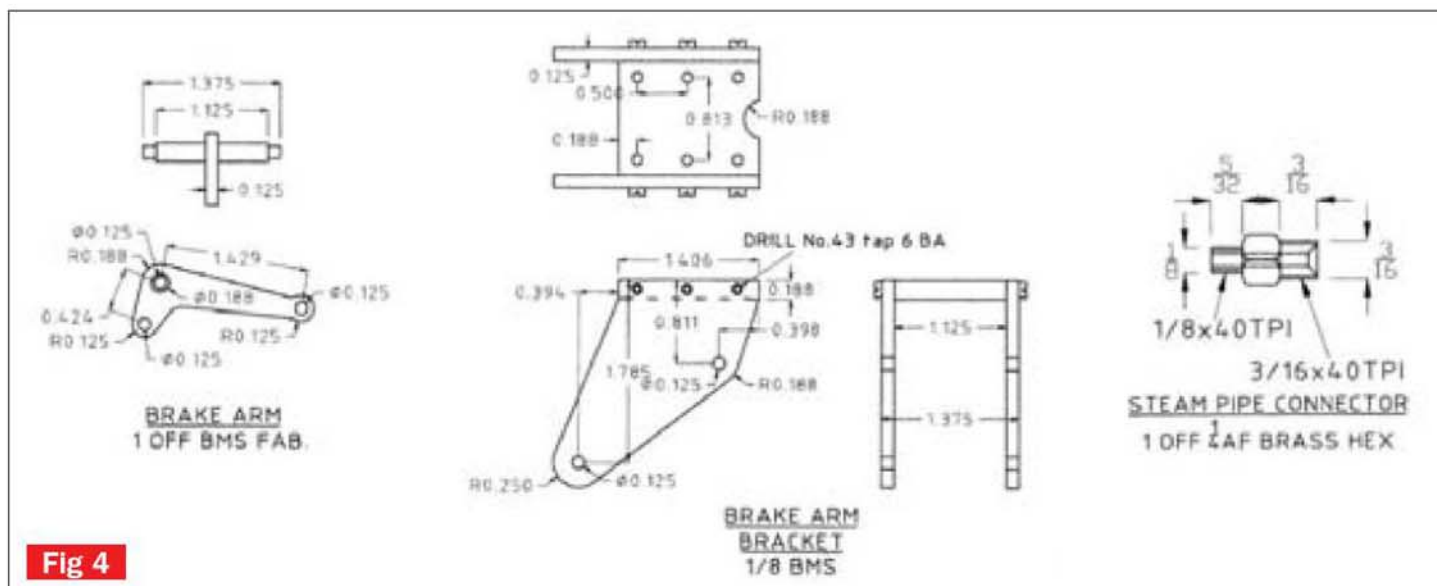


Fig 4

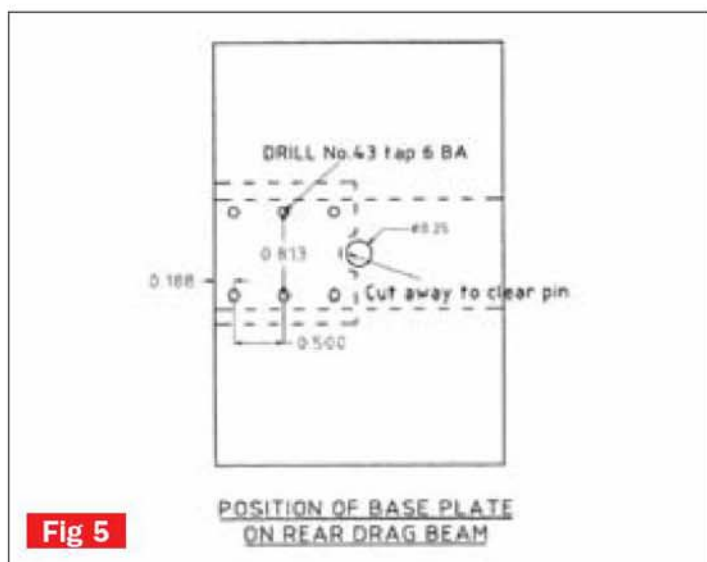


Fig 5

the guard the other half with the brake of his heavy guard's van. It will be noticed that the brake hangers of the express engines are quite slim and elegant compared to the heavy duty variety that we see on the six and eight coupled goods engines (photo 2).

I have had to make a small and unnoticeable change to the design of the equalising arrangements because the prototype arrangement can't very well be reproduced in scale size. I have therefore decided on a similar set up to that of the 'Loch' which is simple to make and works very well. The tricky bit is the brake control valve, which will have to be held over to a later date. The only castings used are those for the brake shoes themselves (fig 3), the brake cylinder being

machined from a piece of brass or phosphor bronze of suitable dimensions (fig 6). It will be noted that the cylinder is pivoted on trunnions (fig 3). Obviously, one is faced with the choice of pivoting the cylinder, or using a sliding joint on the lower end where piston rod meets brake arm. I have chosen the former as it means that there is little or no sideways force exerted on the piston rod gland. I have drawn separate end covers as I have always thought that it is far easier to obtain a truly cylindrical bore if the tool is able to pass right through. There is also the point that if you use a piece of phosphor bronze, then it will probably be cored out anyway. Please feel free, however, to modify the job by turning a blind end, top or bottom. In full-size practice with

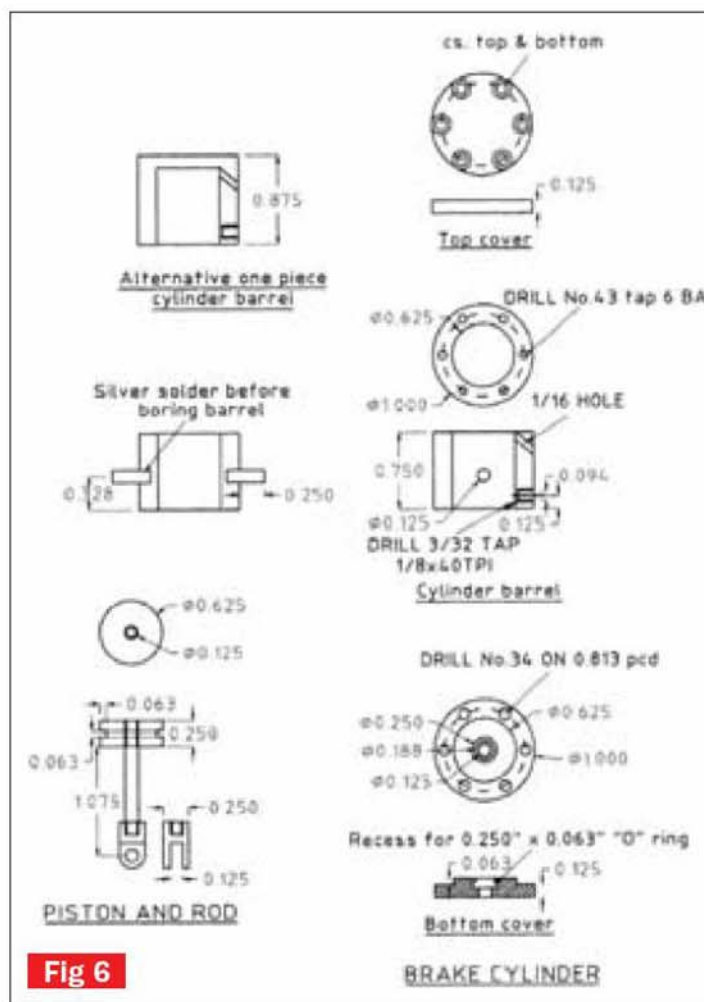


Fig 6

locomotive cylinders, it was normal to make the rear cover, the one with the gland, as part of the casting. I can remember Don Young specifying such an arrangement on his Gresley A3. Not for the faint-hearted, bearing in mind the enormous price of a set of castings. Don't

forget to put a small spring on the piston rod where shown on the G/A side view (fig 3). This spring holds the brake shoes in the OFF position. I think that the strength of said spring is best arrived at by a spot of experimentation.

●To be continued.



Malcolm Stride reports

Notices

Kinver & West Midlands SME Open Day

The society will be holding an open weekend on July 26/27 at its Marsh Lane site, Kinver near Stourbridge, West Midlands. The 3½, 5 and 7½in. gauge tracks will be open (the latter for smaller locomotives) and an exhibition of members models including *Catch Me Who Can* will be put on. Contact Allan Bellamy (T. 01746 761008) for more details.

UK club news

The annual dinner dance and ladies night of the **Birmingham SME** was held in March at the Greswolde Hotel and was attended by a good crowd of members and guests. Dan Bartlet was awarded the Rose Bowl for "unstinting service to the society over the previous year." The boiler for the club *Speedy* has been finished and hydraulic tested and is now ready to be fitted. The other mechanical repairs are progressing.

Members of **Bournemouth DSME** have modified some of the riding trolleys so that more than one-two car train can be operated in future. Progress is being made with the signalling. A very successful cream tea and cakes Sunday was held in April. During the event Derek and Lena Adams were presented with a card and some flowers to mark their 50th Wedding Anniversary which was on the previous day. The 16mm track is now basically complete and the group have commenced 'the tinkering stage'.

Frimley & Ascot Locomotive Club is another that had a snowy start to the running



season (photo 1) with Sam Rust and Bob Dowman doing a sterling job with the snow clearing train. In spite of the snow, 300 passengers turned up for rides. Following an increase in levels of vandalism, the society has taken the decision to report all instances which result in loss, so that even if the perpetrators are not caught, those in authority will be made aware of the problem. I would urge all clubs affected to report every instance of vandalism, however small, for the same reasons. The signalling computer has now been set up to log traffic on the track and the tolerances on the speed measuring software have been changed, so those warned now really have been speeding!

The Small Model Steam Engine Group (SMSE) at **Guildford MES** is proving popular enough to schedule some more meetings at the club room. The group was started for those who like to run their Mamod, Wilesco and other similar models and also to encourage junior members into the society. The next meeting of the group will be at the Stoke Park track site on 31 August from 2-5pm. By the time you read this the grand opening of the new club house extension will have taken place. The opening was planned to be carried out by Councillor Andrew Hodges, the leader of Guildford Borough Council.

The 46th Anniversary Dinner at **Hereford SME** earlier in the year was enjoyed by 52 members and guests. John

Arrowsmith, as the only remaining founder member, gave a brief outline of how the club started and has flourished over the years and described its progress from the first meeting in the snug bar at the Ship Inn (as the Hereford Live Steamers) up to the present day with the modern headquarters and club house with associated track facilities at the Broomy Hill site.

Members of **Kinver & West Midlands SME** are hoping to be able to link up with the celebrations of this year's bi-centenary of Richard Trevithick's *Catch Me Who Can* locomotive. The club is constructing a working 5in. gauge replica that has already been on display at some of the events (see *M.E.* 4326, 23 May 2008). The main intention is to raise awareness of the club and to boost the membership.

A new double aspect bank protection signal has been installed at **Lancaster & Morecambe MES**. As a train passes the signal, the train itself causes the signal to show red and remains set until the same train reaches the top of the bank, when the first wheel of that train resets the signal back to green. This removes the possibility of trains (or light engines) bunching up climbing the west bank approaching the level crossing and the station.

The trophy night at **Leeds SME** saw three awards being made. The One off Trophy was awarded to Charles Appleyard for his 1886 patent Atkinson gas engine. The Ted Tait Trophy went to Steve Russell for his

1. Sam Rust and Bob Dowman with the snow clearing train at Frimley & Ascot Locomotive club.

In Memoriam

It is with the deepest regret that we record the passing of the following members of model engineering societies. The sympathy of staff at *Model Engineer* is extended to the family and friends they leave behind.

Peter Bramhill
Martin Lodge
L. Sleight
Oom Gijs de Vries

Kinver & West Midlands SME
Barnsley SME
Birmingham SME
Centurion SME

G1 project rolling stock and the Wanless Trophy was awarded to Nigel Bennett for his 3½in. gauge *Tom Rolt* chassis. The committee has decided that a spring clean was necessary and the garage and workshop have been cleared of all unwanted items and general rubbish. Some other items were despatched to the tip to tidy the area round the club.

The **Lyndsey Model Society** hosted an excellent fund raising day with several trains running, mostly carrying passengers to make money for the Breast Cancer Trust. Apart from the traffic receipts there were a number of donations from both members and the public making for a good day's total for the charity and also a very enjoyable day. My correspondent Doug Hewson reports that he had a morning in the new Peak Forest signal box learning how to use the newly installed block bells with Bob Willis in Belle Isle Box. Good fun. Doug says that a really good crowd turned up and it was made better as people kept coming and going rather than all arriving at once. The club were running two passenger trains full most of the time.

The annual club lunch at **Maidstone MES** was described as "a very enjoyable event - food good, company, brilliant." A total of 55 members and guests turned out.

Work continues apace at **North London SME** with just four panels needed to complete the loop on the ground level track and much clearing and tidying of the site carried out. The refurbished boating pond will be filled by the society landlords, Three Valleys Water Plc, which will save the society some money. Ideas are being sought as to how best to improve the steaming bay/workshop area.

In common with many others, **Reading SME** found that the start of the running season was blessed with more than a little snow. The snow cleared during the day, but the weather was still cold enough to deter visitors. A more recent event was the arrival of Mike and Chris Jones' *King James II* for its first run at the track (photo 2). The new locomotive went round without problems and will be a fine addition to the locomotive roster.

The May main line rally at **Ryedale SME** was very well supported by people from all over the country, from Dundee to Salisbury and over to Wales, either bringing locomotives, wagons, coaches or a mixture of all three. The society was very fortunate with the weather and only had to endure a strong wind at times, there were several people walking around with very sunburnt faces after three days.

On the Saturday there were 42 locomotives, 38 on Sunday, and 20 on Monday, with approximately 250 wagons and 18 coaches completing the line up. Several new faces were there including five from the Bromsgrove club, who

while at first apprehensive at running to a timetable and signals very soon found their feet and thoroughly enjoyed themselves. Every rally has new faces who find out that the rally isn't a thing to be dreaded, but is very enjoyable. While for safety reasons the signal boxes are manned by passed out people, the three yards and the shed were manned by a mixture of Ryedale SME members and other clubs members, who without fail had trains marshalled and ready on time. As to be expected some locomotives had minor problems but these were either overcome or a replacement locomotive supplied for the train just like the full-size.

The AGM at **St. Albans DMES** was well attended, perhaps due to the member's work in progress and displays held on the same evening. Fred Bearton's side lever paddle engine was chosen by members as their favourite item and Fred received a medal to mark his award. Because of the inclement weather at Easter, the Easter egg regatta was held on 20 April and the better weather generated a good turn out of boats. The club 'puffing season' on 13 April started well enough with eight members attending with four steam locomotives. Part way through the day, however, drivers became aware of a distinct clunk as they crossed one of the track joints. Closer inspection revealed some sheared fish-plate bolts. The fault was quickly rectified and steaming continued until the rain started shortly afterwards. Such was the rain that everyone got soaked and it took members about half an hour to get Les Proctor's car off the, by then, muddy track site.

At the AGM of **Stafford DMES** the Man of the Year award went to John Milloy, for his sterling work on the 16mm project, and the Founders Trophy for the best non-railway model was awarded to Stuart Phillips for his mill engine. It is reported that excellent progress is being made with the club locomotive and coach project.

A list of member's interests is being compiled at **Stamford MES** which should be of considerable help for those seeking the right person to answer a query. The Bits & Pieces evening produced a good assortment of articles for the members to examine. These included a small lathe which was being refurbished following a very traumatic life in which it ended up as a 'box of bits'. Other items included a selection of steam engines, a miniature fireman's shovel and two paintings from Grahame Cooke. One of Grahame's paintings was chosen for the cover of the Guild of Aviation Artists Painting of the Year catalogue.

The display by **Tonbridge MES** at the local Angel Centre proved very beneficial with eight membership forms handed out during the event. Some refurbishment and modification has been carried out to the signalling system to improve reliability and to repair the ravages of time.

World club news

Canada

The auction at **British Columbia SME** had, among the usual engineering goodies and magazines, some unusual items. The Vice President, John Ostler scooped a load of apple juice at a good price. As he comments "more than just bolts go at the BCSME auction." I suppose the question is, is he going to drink it, pickle boilers in it, or ferment it?

One of the more unusual items at the May meeting of the **Toronto SME** was Rob Stehlik's improved Fire Fighting Robot. The four wheels are connected in such a way that they all turn parallel with each other, allowing the robot to turn on itself. Each wheel has a drive motor in its hub. Two opposing wheels are sprung to absorb any small floor irregularities. The body, which contains all the electronic controls and the fire extinguishing pressurised water tank, is made of bright green laser cut acrylic pieces. Sensors

2. Mike and Chris Jones' 7½in. gauge *King James II* at Reading SME.



in the turret can detect heat and light and sense the distance from a candle that the robot is intended to extinguish in competition. The robot was approx 9 x 9 x 6in. high. Rob demonstrated the robot extinguishing a candle set up on the bench. The CAD drawings for each component were described as "masterpieces".

South Africa

Leon Kamffer of the **Centurion SME** bravely took his Shay to the track for an inaugural run on the society open day in May. The open day also saw a big turnout of large steam locomotives so much so that the Chairman reports that he even heard the remark at the steaming bay: "it looks like the Nationals!" The clubhouse has been loaned a

genuine SAR clock as well as a classic Siemens telephone instrument, resplendent with hand crank etc.

United States

The material for the new eastern loading ramp at **New Jersey Live Steamers** is now available and the facility should be installed and in use later this year.

Humour time

For those contemplating re-building an old locomotive (from **Maldstone MES**):

*"When a loco grows old
And its fire gets cold
Its tubes you can't see through
With failed boiler test
and pistons at rest
I think its k*****d,
don't you."*

DIARY

JULY

- 18 **Rochdale SMEE**. Colin Wrangles: **ELR**. Contact Bob Denyer: 0161 959 1818.
- 18 **Romford MEC**. Track Maintenance. Contact Colin Hunt: 01708 709302.
- 19 **Chesterfield MES**. Public Running. Contact Mike Rhodes: 01623 648676.
- 19 **Langford and Beeleigh Miniature Railway**. **SELEC** 7½in. Gauge Locomotive Efficiency Competition.
- 19/20 **Peterborough SME**. Sacrewell Miniature Traction Engine Rally. Contact Lee Nicholls: 01406 540263.
- 19 **Romford MEC**. Trackside Afternoon. Contact Colin Hunt: 01708 709302.
- 19 **Romney Marsh MES**. Boiler Testing. Contact John Wimble: 01797 362295.
- 19/20 **East Somerset SMEE**. Open Days. Contact Roger Davis: 01749 677195.
- 20 **Bristol SMEE**. 3½in. Gauge Rally. Contact Trevor Chambers: 0145 441 5085.
- 20 **Frimley & Ascot LC**. Club Run. Contact Bob Dowman: 01252 835042.
- 20 **Leicester SME**. Public Running. Contact John Lowe: 01455 272047.
- 20 **Lincoln DMES**. Running Day. Contact Terry Peacock: 01522 681424.
- 20 **Maldstone MES (UK)**. Public Running. Contact Martin Parham: 01622 630298.
- 20 **Norwich DSME**. Running Day. Contact Shirley Berry: 01379 740578.
- 20 **Nottingham SMEE**. Public Running. Contact Pete Towle: 0115 987 9865.
- 20 **Oxford (City of) SME**. Running Day. Contact Chris Kelland: 01235 770836.
- 20 **Plymouth MSLS**. Public Running. Contact Malcom Preen: 01752 778083.

- 20 **Saffron Walden DSME**. Public Running. Contact Jack Setterfield: 01843 596822.
- 20 **York City & DSME**. Running Day. Contact Pat Martindale: 01262 676291.
- 21 **Model Steam Road Vehicle Soc**. Post Rally Round-up. Contact John Bagwell: 01452 304876.
- 22 **Romney Marsh MES**. Meeting. Contact John Wimble: 01797 362295.
- 23 **Hull DSME**. Shep, Watson & Wilson Trophy Competition. Contact Tony Finn: 01482 898434.
- 23 **Oxford (City of) SME**. Running Day. Contact Chris Kelland: 01235 770836.
- 24 **Sutton MEC**. Evening Steam-Up. Contact Bob Wood: 020 8641 6258.
- 25 **Newton Abbot & District MES**. Meeting. Contact Graham Day: 01626 772739.
- 25-27 **Oxford (City of) SME**. Dreaming Spires Rally. Contact Chris Kelland: 01235 770836.
- 26 **Brighton & Hove SMLE**. Public Running. Contact Mick Funnell: 01323 892042.
- 26/27 **Kinver & West Midlands SME**. Open Weekend. Contact John Campbell: 01384 891244.
- 26 **Old Locomotive Committee**. Lionsmeet at Butterley Park Miniature Railway Society, Midland Railway Centre. Contact A. P. Bibby: 01254 812049.
- 26 **Westland & Yeovil DMES**. Track Running Day. Contact Gerald Martyn: 01935 434126.
- 27 **Bedford MES**. Public Running. Contact Ted Jolliffe: 01234 327791.
- 27 **Bristol SMEE**. Public Running. Contact Trevor Chambers: 0145 441 5085.

- 27 **Cardiff MES**. Public Running. Contact Don Norman: 01656 784530.
- 27 **Chichester DSME**. Steam on Sunday. Contact Brian Bird: 01243 536468.
- 27 **Edinburgh SME**. Track Running Day. Contact Robert McLucke: 01506 655270.
- 27 **Harlington LS**. Public Running. Contact Peter Tarrant: 01895 851168.
- 27 **High Wycombe MEC**. Public Running. Contact Eric Stevens: 01494 438761.
- 27 **Hull DSME**. Charity Running Day. Contact Tony Finn: 01482 898434.
- 27 **Leicester SME**. Public Running. Contact John Lowe: 01455 272047.
- 27 **Maldstone MES (UK)**. Public Running. Contact Martin Parham: 01622 630298.
- 27 **North Cornwall MES**. Sunday Steam-Up. Contact Geoff Wright: 0156686032.
- 27 **Norwich DSME**. Running Day. Contact Shirley Berry: 01379 740578.
- 27 **Nottingham SMEE**. Public Running. Contact Pete Towle: 0115 987 9865.
- 27 **Saffron Walden DSME**. Public Running. Contact Jack Setterfield: 01843 596822.
- 27 **Taunton ME**. Public Running. Contact Nick Nicholls: 01404 891238.
- 27 **Westland & Yeovil DMES**. Public Running. Contact Gerald Martyn: 01935 434126.
- 27 **Wigan DMES**. Open Day. Contact John Chamberlain: 01744 882255.
- 28 **Bedford MES**. The Perfect Ground Level Passenger Carriage. Contact Ted Jolliffe: 01234 327791.
- 29 **Birmingham SME**. Acorns Hospice Fun Day. Contact John Walker: 01789 266065.

- 29 **Leighton Buzzard NG Rly**. Vintage Vehicles Rally. Enquiries: 01525 373888.
- 29 **MELSA**. Sunday in the Park. Contact Graham Chadbone: 07 4121 4341.
- 29 **Romney Marsh MES**. Meeting. Contact John Wimble: 01797 362295.
- 30 **Oxford (City of) SME**. Running Day. Contact Chris Kelland: 01235 770836.
- 31 **Leyland SME**. Lazarus Evening. Contact A. P. Bibby: 01254 812049.
- 31 **Sutton MEC**. Busy Night. Contact Bob Wood: 020 8641 6258.

AUGUST

- 1 **Aylesbury (Vale of) MES**. Track Night. Contact Andy Rapley: 01296 420750.
- 1 **Maldstone MES (UK)**. Evening Run. Contact Martin Parham: 01622 630298.
- 1 **Romford MEC**. Competition Night. Contact Colin Hunt: 01708 709302.
- 2 **Cardiff MES**. Steam-Up & Family Day. Contact Don Norman: 01656 784530.
- 2/3 **Dockland & E. London MES**. Public Running. Contact John Slocombe: 01708 222658.
- 2 **Ickenham DSME**. Public Running. Contact Ian Mortimer: 01895 635596.
- 2 **Romford MEC**. Trackside Afternoon. Contact Colin Hunt: 01708 709302.
- 2 **York City & DSME**. Summer Meeting. Contact Pat Martindale: 01262 676291.
- 3 **Bristol SMEE**. Public Running. Contact Trevor Chambers: 0145 441 5085.
- 3 **Frimley & Ascot LC**. Public Running. Contact Bob Dowman: 01252 835042.

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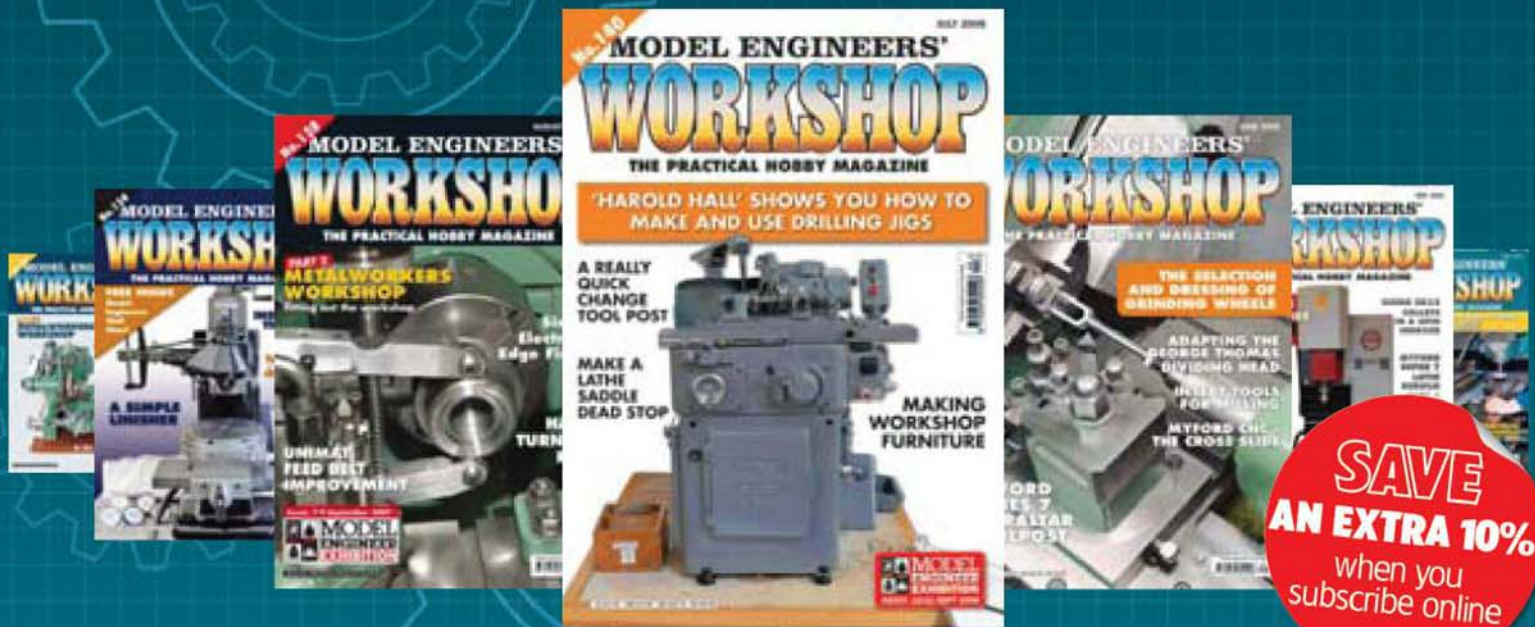


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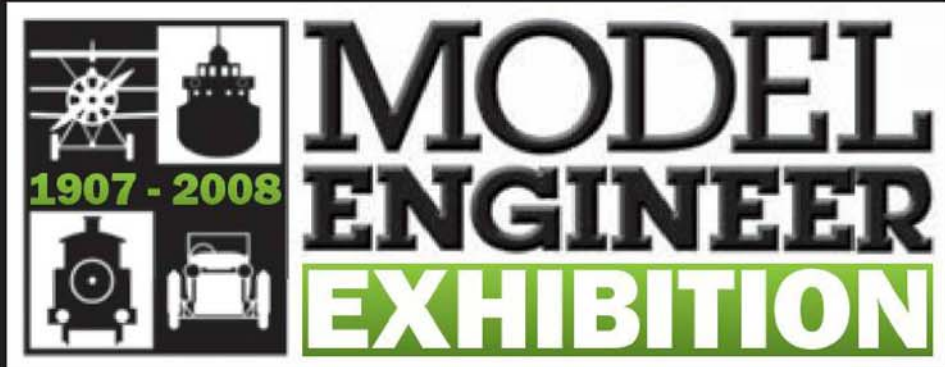
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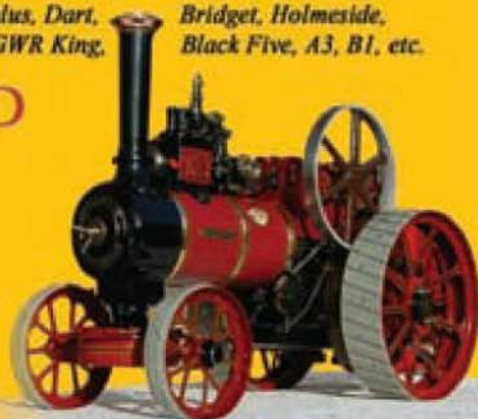
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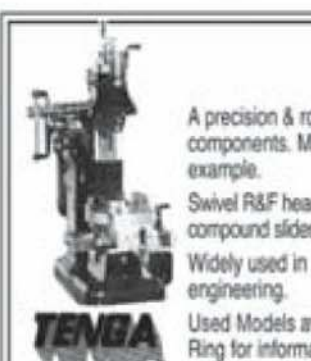
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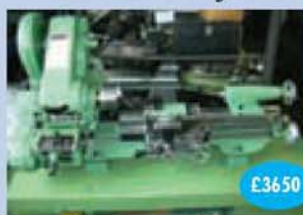
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Adjustable Grib Strips
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Drawbar
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Spindle Taper MT2
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