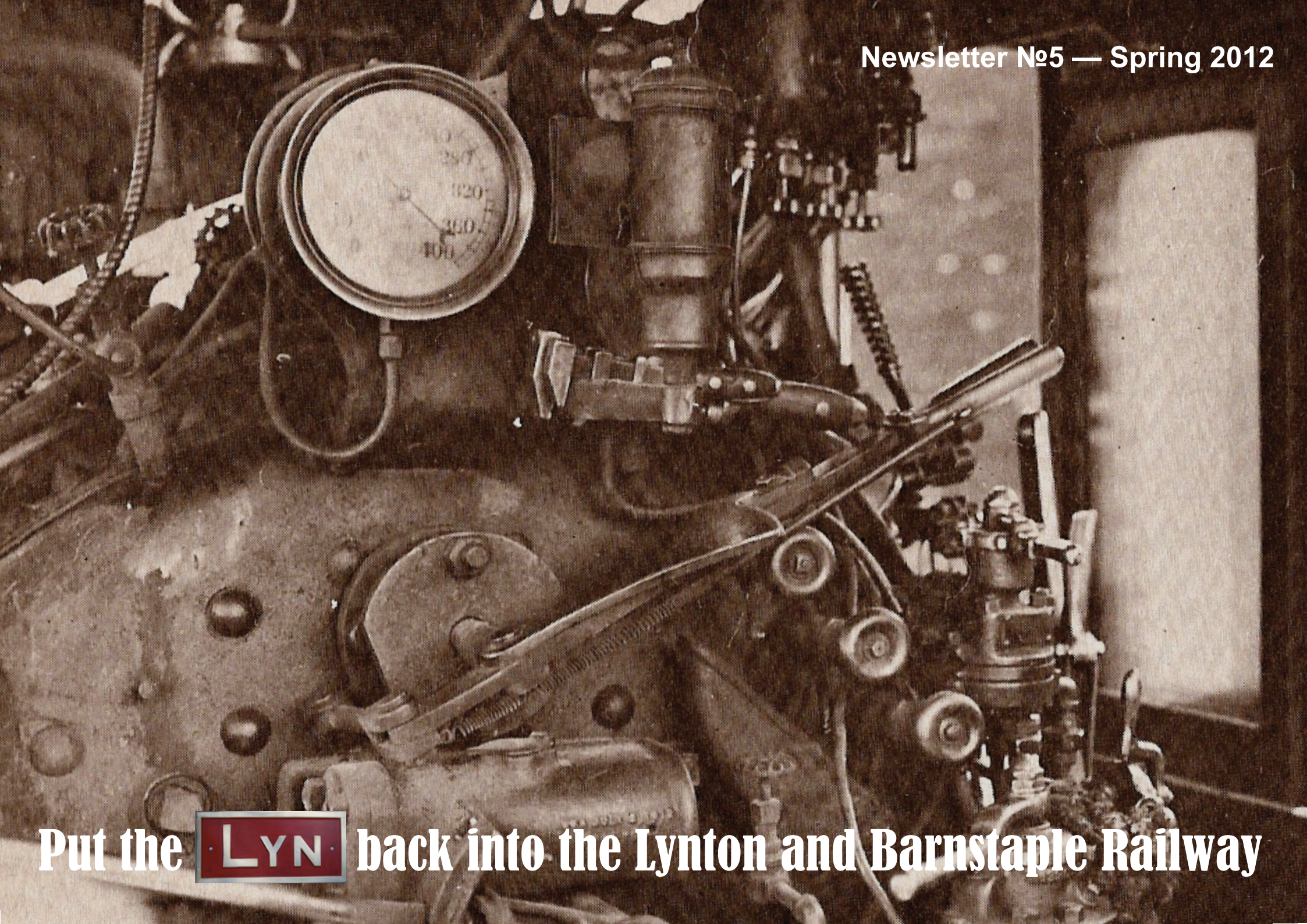


Newsletter №5 — Spring 2012

Put the LYN back into the Lynton and Barnstaple Railway

NEWSLETTER 5

The 762 Club

Building No 762 Baldwin locomotive Lyn
for the Lynton & Barnstaple Railway

Introduction

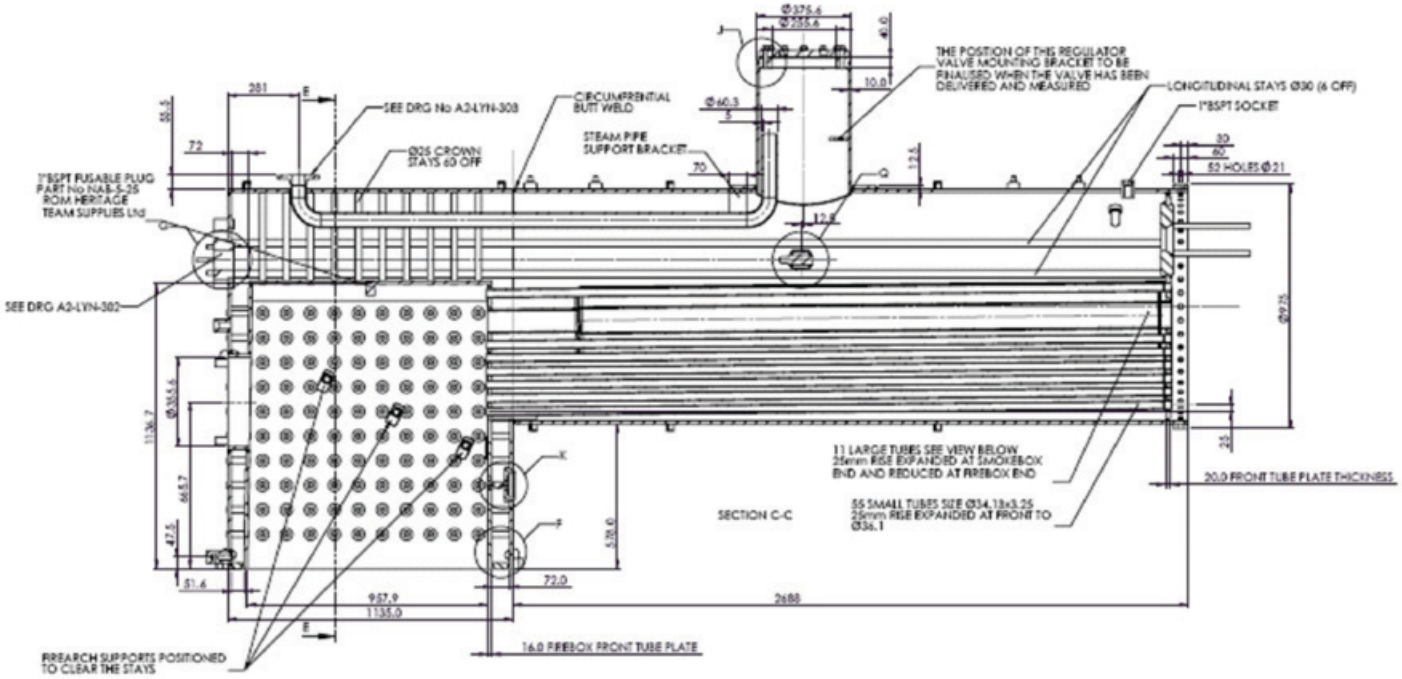
Welcome to Newsletter, No 5 of the 762 Club covering progress and activities of our collective mission to bring the new-build Baldwin 2-4-2T locomotive, Southern Railway No 762 Lyn to the legendary Lynton and Barnstaple Railway. The last four months have seen a number of milestones achieved allowing construction to start on two principle components; the boiler and the cylinder assembly. It has been a long wait, but we feel that it has been worth the effort with detailed design work to ensure that we end up with a locomotive fit for purpose. Photographs of construction will start to appear on the website as the various parts are machined. As ever with these major projects we need your continued support, currently we have funds in place for the boiler and cylinders but this will use up the cash reserves so we need to keep funds coming in either through the purchase of memberships or by sponsoring a component. As ever thank you for your continued support with this project to bring Lyn to Woody Bay.

Highlights

- **Royal Sun Alliance approval received for the boiler, with principle items now ordered and the foundation ring complete.**
- **Construction started on the cylinder assembly by Alan Keef Ltd, with the finished cylinder assembly planned for completion mid year.**
- **Design work underway on the motion and valve gear this will be the next work area to go across to Keefs for machining.**

Technical Progress to Date

Since the last newsletter there has been continuing progress with the boiler and the Boiler Design has now received formal approval for construction from the Engineers at Royal Sun Alliance. Much of the material is now ordered with the first items delivered. Although some work is now in hand Bennett Boilers anticipate starting the main fabrication shortly once the major items such as the boiler barrel and firebox wrapper have been delivered.



Part of the drawings prepared for design approval purposes

Photograph of the regulator steam valve in the blue colour

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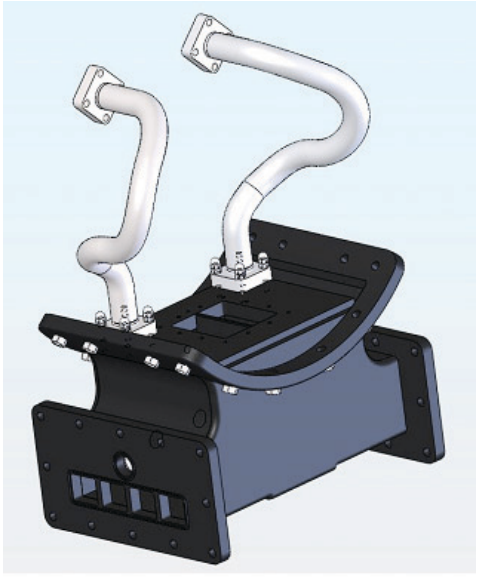
Mike Nelson has completed the boiler design including items such as the regulator mechanism and we have just taken delivery of the regulator and blow down valve. The later items proved to be problematic as the commercial items originally specified were unfortunately discontinued during the ordering process and an alternative supplier had to be identified. As will be seen in the illustration below the longitudinal stays of the boiler provided a challenge for Mike to work around but in the end it has proved possible for the regulator mechanism and stays to co-exist!

The cylinder, valves and saddle design are progressing well and have been the main focus of attention in recent months. Currently the cylinder steam pipes, saddle assembly, blast stand and spark arrestor have all now been designed and modelled in 3D as illustrated below and manufacturing drawings have been prepared.



Saddle assembly complete with cylinder steam supply pipes

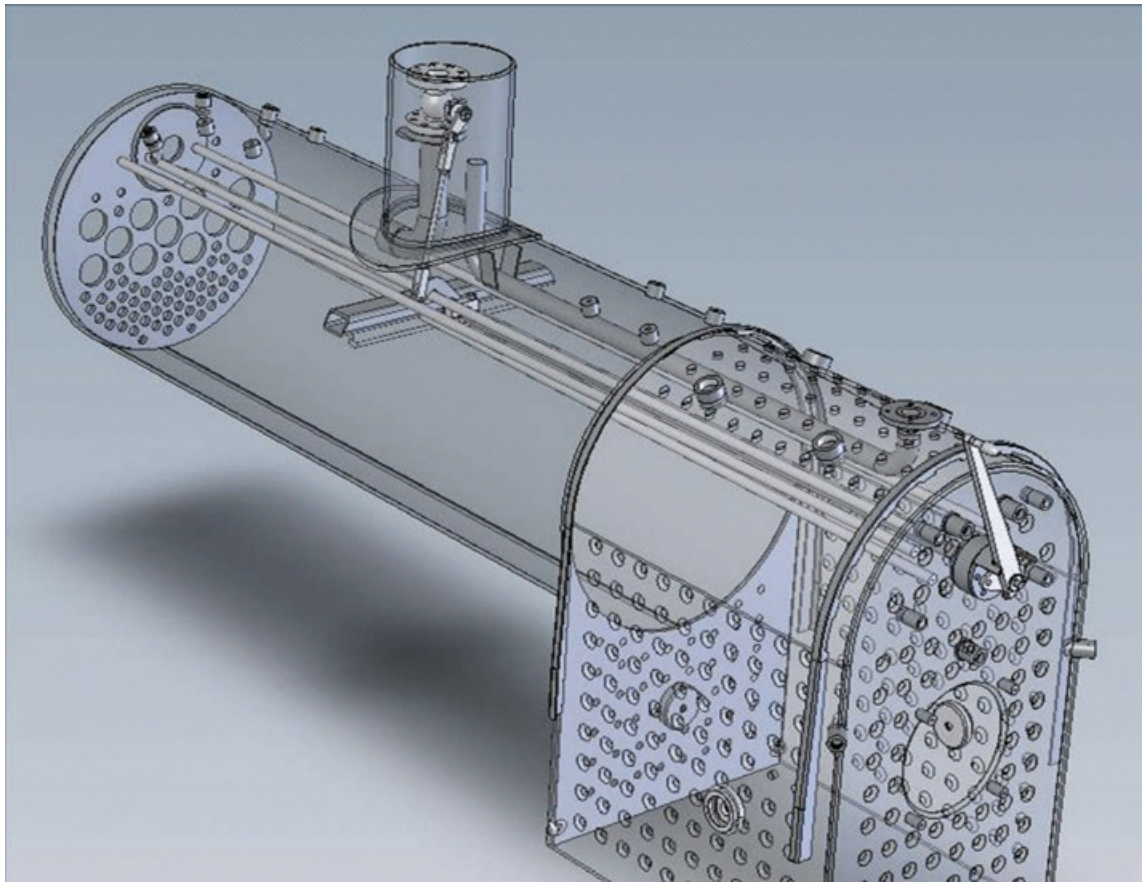
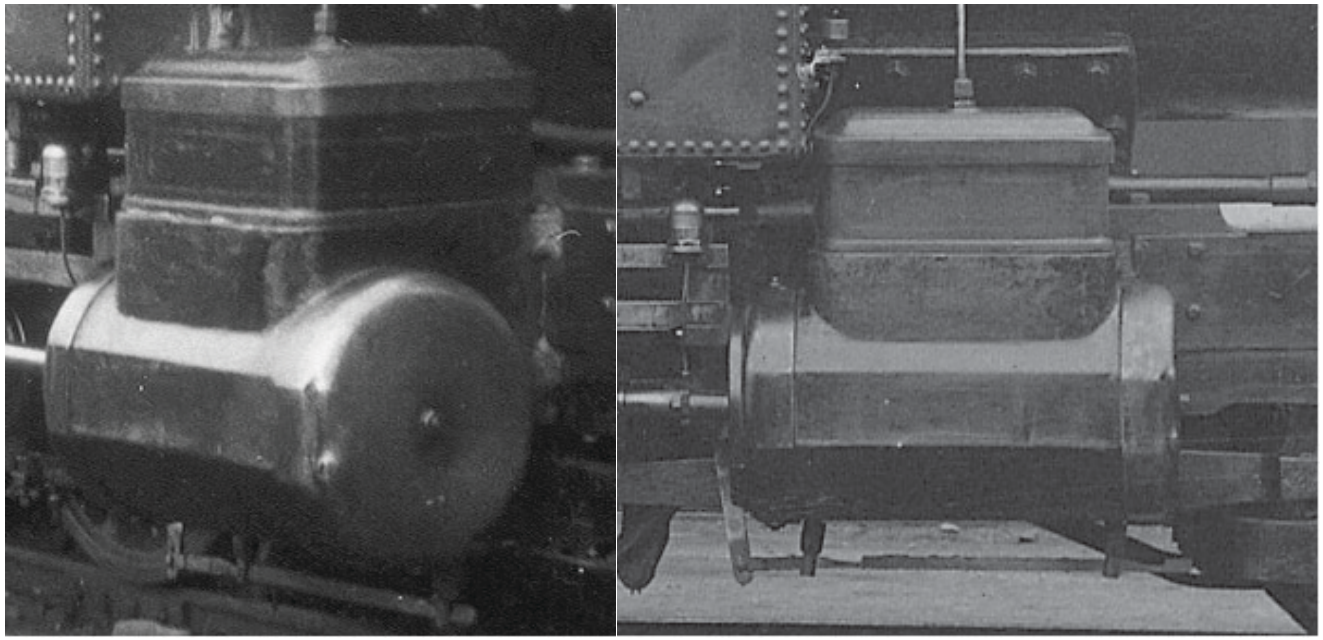


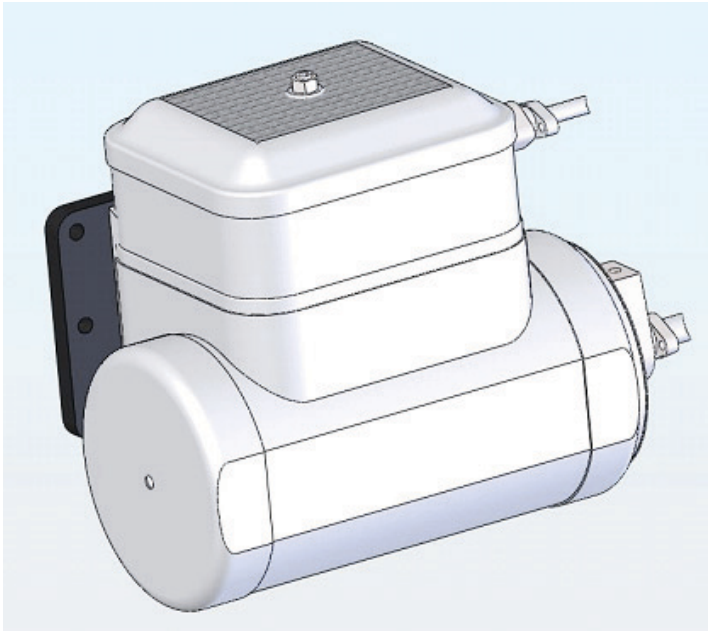
Illustration of regulator valve and operating mechanism

A meeting was held at Alan Keef Ltd on 13th Feb. which approved the design of the saddle and cylinders for construction and it is anticipated that ordering materials and manufacture of the saddle will commence in April.

The cylinder and valve design is now complete in 3D and the careful thought which has been put into hiding the modern design and piston valves within the constraints of the external envelope and appearance of the original slide valve units has paid off as can be seen when comparing the photos of the original and the illustration below.



Photos of Lyn's cylinders and valve chest



External appearance of cylinder and valve chest

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The completed design confirms that not only can the external appearance of the original be maintained but we can also obtain the traction performance we require with a thermal efficiency which is slightly higher than we estimated!

The key problem was to create steam passageways of sufficient size that steam flow is not restricted and this is one area where raising the boiler pressure from 180 psig to 250 psig has been of real benefit.

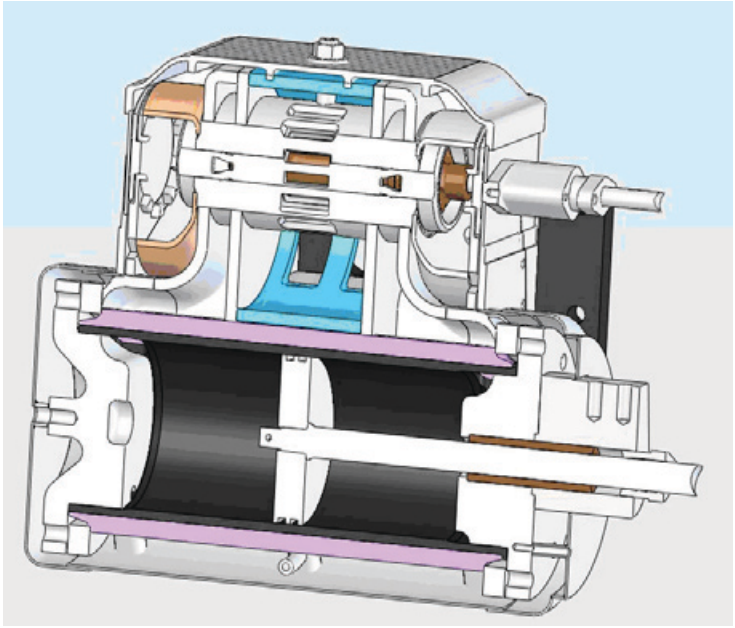
The sectional illustrations show how the pressure increase helps in a number of ways:

- The steam supply passageways can be made smaller as the steam density is increased
- The cylinder diameter can be reduced while maintaining the same piston thrust.
- The saving in volume thus achieved has then been used to:
    - Accommodate the increased volume of the piston valve assembly
    - Provide space for larger exhaust passageways
    - Increase the thickness of cylinder insulation wherever possible.

The sectional illustrations show how tightly packed the complete assembly is under the covers and whilst the design will significantly outperform the original slide valve arrangement maintaining the external appearance of the valve chest has presented a number of challenges!

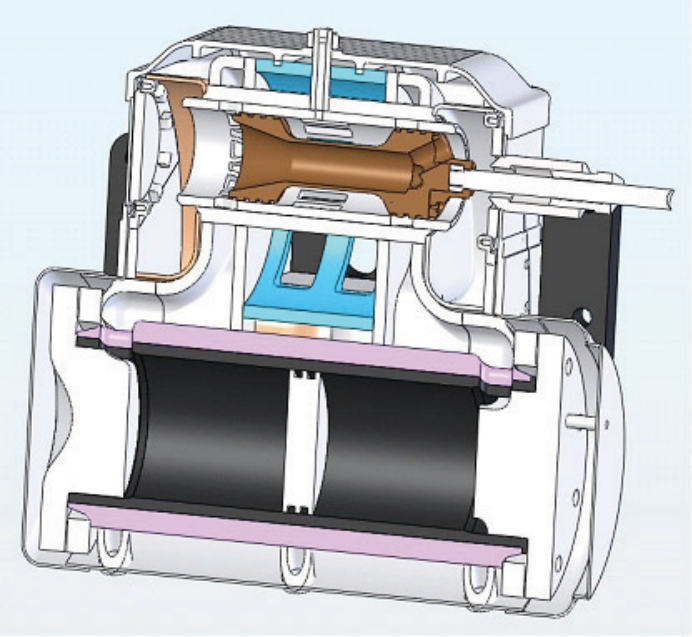
In most cases compromise has been avoided but in two areas appearance has taken precedence over function:

- The steam chest volume is smaller than is ideal. This may affect admission pressures slightly at high power outputs at maximum line speed but in practice should have negligible impact for the majority of running.



Half section through cylinder on longitudinal centre line

- The transfer passageways are longer than desirable and this contributed excessively to the cylinder clearance volume leading to a significant loss of thermal efficiency. However after much tweaking of the design by slightly reducing the crossectional area and expert manipulation of the 3D model by Mike a compromise has been achieved which has only a small impact on thermal efficiency and has tenable mean gas velocities within the port.



Half section through valve chest on longitudinal centre line

As can be seen on the left the design has large exhaust passageways and to further improve the release of exhaust steam hollow floating bronze valves have been incorporated. This means that both exhaust passageways are utilised which helps reduce back pressure maximising the useful work performed in the cylinder and wear on the valve against the liner is minimised.

Both cylinder and valve chest liners are cast iron and will be shrunk in place using liquid nitrogen.

From a manufacturing perspective getting the correct order for fabrication and welding is critical and to aid Keefs Mike has provided a staged assembly and welding guide in 3D.

It has also been agreed that once the cylinders and saddle are complete that Keefs will manufacture the chimney and smokebox door and it is intended that these will be on display at the September L&B Gala while the cylinders and saddle will be shown at Keef's Open Day which is on the same weekend.

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For those who would like to view the design progress on a regular basis 3D images of the SolidWorks models being created as part of the design for manufacture process by Mike Nelson can be viewed on the web page which he maintains at http://www.machineconcepts.co.uk/baldwin242/baldwin.htm

Finance

Members will find enclosed a copy of The 762 Club's accounts for the year ending 2011 with this newsletter.

In summary the outgoings of the Charity have been for design work on the locomotive and manufacturing of locomotive items. 'Non-productive' outgoings are almost negligible and the Club attracts little or no general administrative expenses other than that necessary of being a charity in producing year end accounts and the usual bank charges.

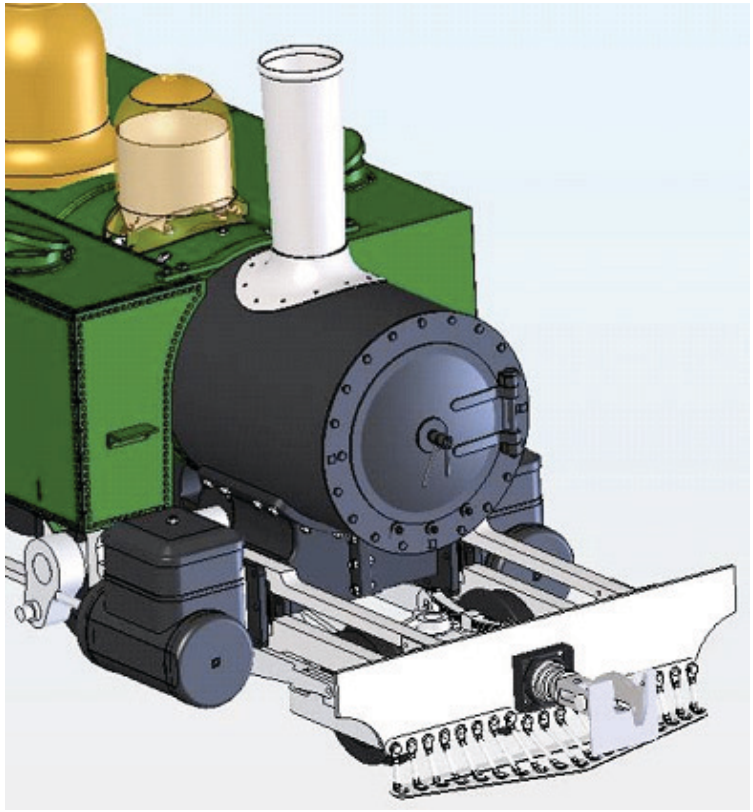

Illustration showing the items currently under construction: Boiler, Saddle, Cylinders, Smoke-box Door and Chimney (Note framing, motion and apron plate are incomplete/missing!)

Members will notice a relatively high amount of monies held. These monies are duly allocated for the boiler construction (the most expensive component on the locomotive) some for the cylinder manufacture and continued design costs. Our goal has always been to maintain a positive cash flow in order to maintain progress on the locomotive.

The next batch of sponsorship items has been uploaded to help fund the cylinder manufacturing work.

Membership has remained fairly static over the post Christmas period however in the last few weeks sponsorship activity has renewed and membership enquiries have risen. A number of existing members have continued to donate by taking out another 'membership'.

All appropriate VAT is reclaimed by the Club and a further gift aid submission will be made to reclaim gift-aid support on member donations. Over £9000 has already been recovered earlier this year on gift-aid submissions.

Sponsor a Part

It is the plan going forwards, that as each major assembly goes into the construction phase a dedicated parts sponsor list will be released. This is the case of the cylinder assembly and you can see a new parts list that relates to this on the website.

To donate to the project simply click the link on the 762 Club website or send cheque made payable to **The 762 Club** to Jon Pain, 26 Oaklands, Bideford, N.Devon EX39 3HW.

Where requested, donors can receive a choice of certificate (see enclosed images) and their names added to the website, acknowledging their contribution.

There are also a number of very exciting rewards available to contributors. — please see these on the website www.762club.com

Historical Note

This report first appeared in The Engineer on 30 September 1898

> **It is a somewhat curious and interesting fact that the Lynton and Barnstaple Railway — a light railway of 23½in gauge, in one of the most picturesque districts of Devonshire — is to have an American locomotive.**

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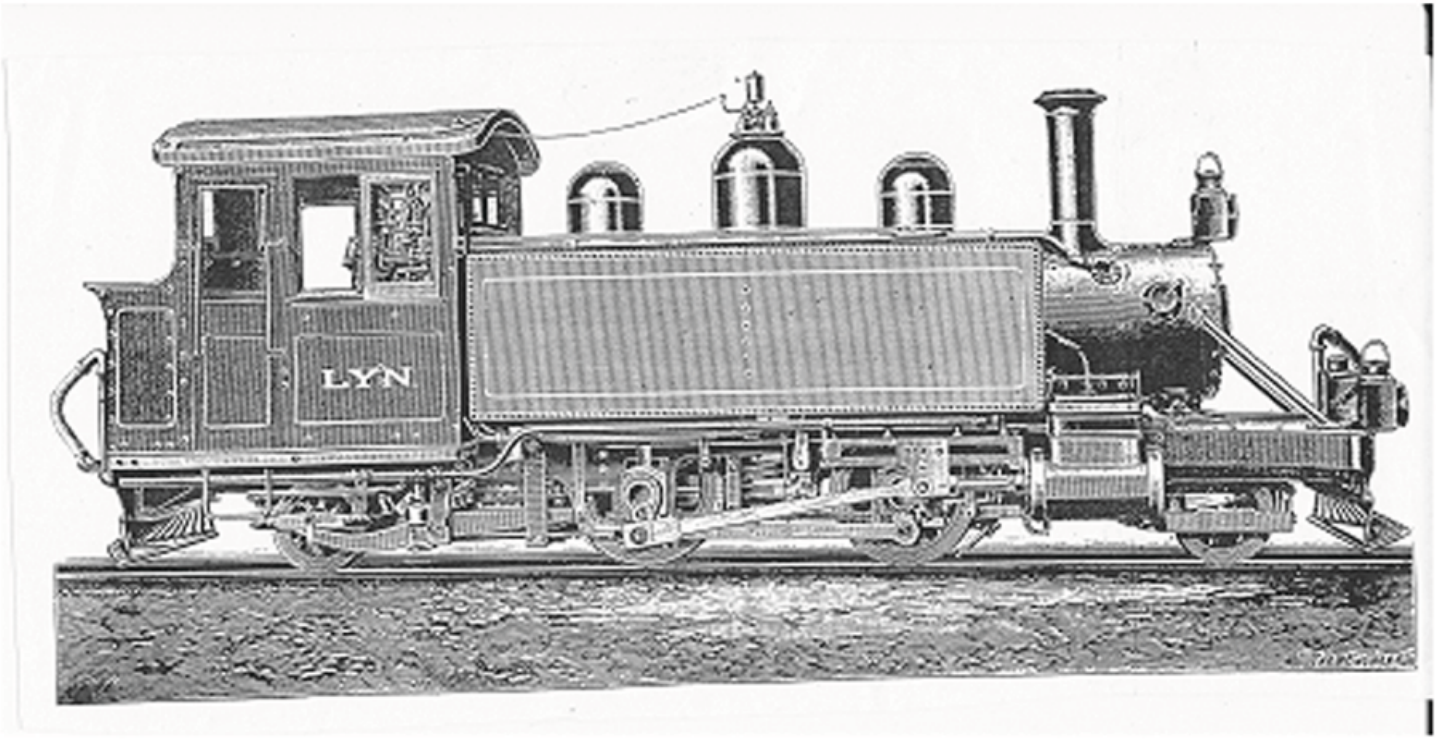
This little engine is a tank locomotive, with four coupled driving wheels and a pony truck or two-wheeled bogie truck at each end. The cylinders are outside the frames and the connecting rod is attached to the crank pin of the rear driving axle. The crossheads have the two-bar overhead guides. Bar frames are used, of the American pattern, and there is a very American-looking cab, with the coal bunker behind. Side or wing tanks are used, although in American practice it is more usual to put a combined tank and coal bunker behind the cab. Plain slide valves are used, operated by the Stephenson link motion, with a rocker arm connection to the outside valve rods, as in American practice. The firebox is of copper, this being one of the special English requirements, but the smokebox has an American extended front with ash discharge funnel at the bottom. Bituminous coal will be used for fuel.

As the engine is intended to be a "double-ender", or to run with either end leading, it has an iron pilot or cow-catcher at each end, and has two sand-boxes, with pipes before and behind the driving wheels. The engine is equipped with the vacuum brake and Jones and Calthrop's couplings. It was built by the Baldwin Locomotive Works of Philadelphia, USA, and its leading dimensions are as follows:

Gauge of line:	1ft 11½in
Cylinders:	10 x 16in
Journals of driving axles:	5 x 6in
Journals of bogie axles:	3½ x 6in
Driving wheels:	2ft 9in
Bogie wheels:	1ft 10in
Driving wheel base:	5ft
Total wheel base:	17ft 7in
Length overall:	26ft 10in
Width overall:	6ft 6in
Height overall:	9ft

Boiler, diameter of barrel:	2ft 10in
Firebox, length:	3ft 1in
Firebox, width:	2ft 6¼in
Firebox, depth:	3ft 5in
Boiler pressure:	180lb
Tubes, 84, diameter:	1¾in
Tubes, length over tube plates:	8ft 11in
Plates of boiler shell:	5/16 in
Plates of firebox shell:	½in
Tube sheets:	½in and ¾in
Grate area:	7.7sq ft

Heating surface, tubes:	339.2 sq ft
Heating surface, firebox:	40 sq ft
Heating surface, total:	379.2 sq ft
Capacity of coal bunker:	28 cu ft
Capacity of water tank:	800 gallons
Weight on driving wheels:	28,500lb
Weight on leading bogie:	8,000lb
Weight on trailing bogie:	8,500lb
Total weight:	45,000lb



How can you help?

You can help by actively spreading the word, identifying other interested prospective members, supporters and donors.
You might be interested in buying additional memberships and we encourage you to do this.

If you haven't yet supported the club, please do take the time to look at the club website and either take out a membership or sponsor a component. When the locomotive is at Woody Bay hauling the L&B's very own heritage train, you can be proud to state that you have contributed to making it a reality.

Do you have any Baldwin photographs, anecdotes or articles?
We would be happy to upload these to the 762Club website www.762club.com

www.762club.com