GARDNER

Engine Forum

Autumn 2011

www.gardnerengineforum.co.uk

No. 20

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Gardner Engine Forum Philosophy

"The aims of the Forum are to promote and foster interest in all Gardner engines"

Subscription

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Contents **Page**

Chairman's Notes	2
HF13 70th Anniversary	3
Rally Report	11
T Series Catalogue	16
Fuel Quality Directive	14
Letters	18
For Sale	19
New Members	20

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Cover Picture

HF 13 at
Bugsworth

CHAIRMAN'S NOTES

A phone call from the editor has jolted me out of the illusion that all I to do now that the stoppages (on the canal) are upon us is wait for Christmas to come over the horizon,turkey ,plum pudding etc. “I want half a page for the magazine he said,so here goes.

The rally or Gardner gathering was a real good do,with many more road exhibits attending that expected. This was mainly due to Harold Lomas passing the word around. The standard of exhibits was high - what about the Tate & Lyle sugar tanker on its first trip out since restoration and the 1950’s Atkinson with 10 times more HP on the flat than under the bonnet!

I am starting to piece together ideas for 2013 at Wrenbury, It would be nice to have a sponser but in the current climate that is a dream.

Thanks to all who helped at the rally and a special thanks to the Navigation Inn.

Sorry about the weather on the Sunday I will try better next time

Mike.

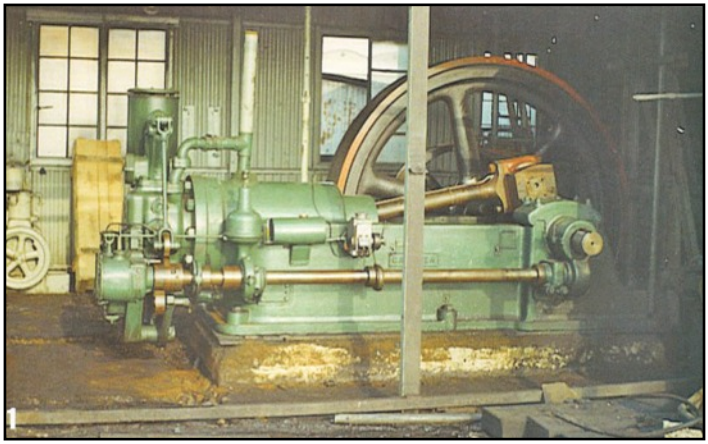
Gardner HF13

Visitors to our rallies will have seen the superbly presented HF13 ,
To celebrate its 70th birhday Cliff Noble penned the following article
which first appeared in the Stationary Engine Magazine .
It is reproduced here with the permission of the author

Another day and another 'phone call - this time from the late Bernard Latham (of Industrial Loco Preservation fame). "Cliff, McAlpine are moving from their plant yard in Hayes to Northampton and Bill McAlpine has asked me if I know anyone who would like the large open crank diesel engine which is in the yard, and knowing of your interest in large things, I have said I would let you know that it is available; if interested please get in touch with the Plant Manager."

So, a phone call was made and arrangements to view the engine were confirmed for the following Saturday morning. On arrival on site, Colin Strong and I were conducted to the Engine House and shown the Gardner 13HF, which was for disposal!

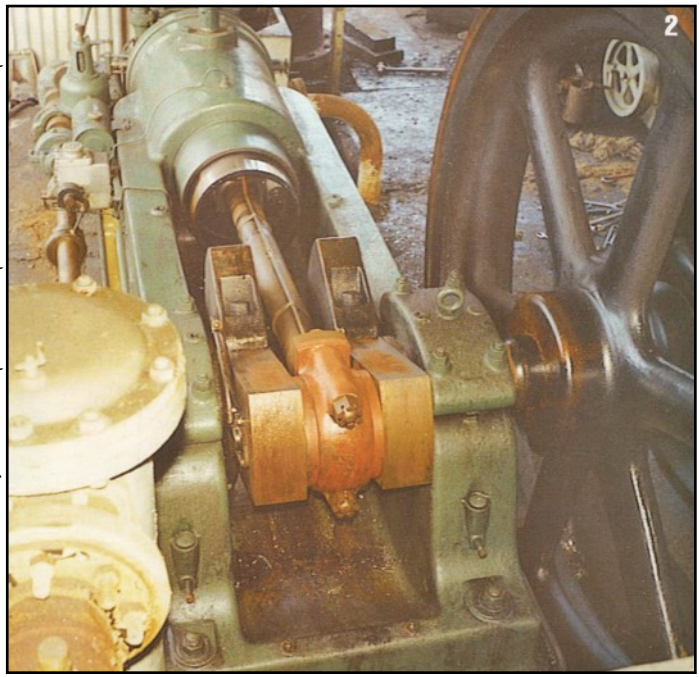
When contacted, we had no idea of the size of this unit; 98hp with a bore of $14^{1}/_{2}$ inches and a stroke of 24 inches! The plant mechanic attempted to start it for us, although it had not been run for nearly a year. This did not happen; there was water found in the fuel lines, but it turned over on the compressed air system with ease. The engine had been used to drive a large two-phase vertically opposed compressor, which had supplied the Workshops with compressed air. During the war period McAlpine worked for the Ministry of Defence and the engine was regularly run seven days a week, and often 24 hours a day. We were impressed, but having given the matter considerable thought, and bearing in mind the size of the unit, we declined the offer to accept the engine, and departed disappointed, but feeling that we had made the right decision. How could we possibly



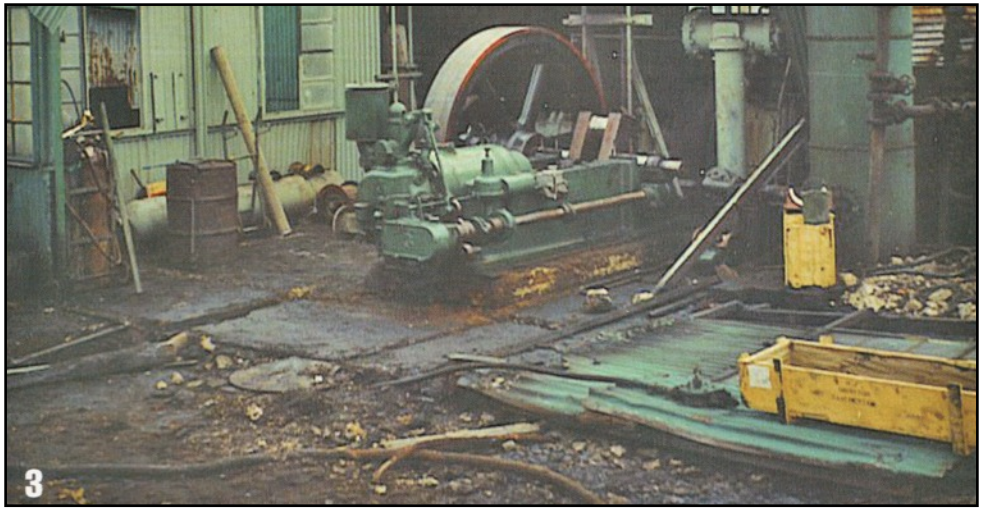
With the front of the engine house removed we got our first decent sighting at the engine

move this unit with a shipping weight of 12½ tons, and if acquired what would we have done with it? The following Tuesday I received a phone call from Sir Bill McAlpine saying that he was extremely disappointed in our decision as despite contacting several Museums and Associations, he could find nobody interested in taking the unit for preservation, and if that was the case, it would finish up being scrapped, as there was now a time limit on clearing the old site, would we please, therefore, reconsider? Well, at this point common sense deserted us and we agreed to go back for a second inspection, with more.
positive thoughts as to how the unit could be handled (bearing in mind that we were currently reconditioning the Tangye FL9 acquired a year previously). On this visit we were promised crane assistance with lifting the unit, but dismantling and transport was down to us. Following a close inspection with regards to access and dismantling we agreed to accept the offer, not realising how long a project this would be or the magnitude of the problems along the way.

So, on the third weekend of March 1971, we arrived on site with oxyacetylene cutting gear, as it was necessary to dismantle the steel building around the engine before commencing work. (Photo 1) shows the front removed from the Engine House, with a view of the unit and the Ruston compressor engine used to charge the air receiver (not original equipment). (Photo 2) gives some idea of the sheer physical size of the components when the Ruston 2ft diameter flywheel is viewed through the spokes of the Gardner flywheel.
By Saturday afternoon we had disconnected all necessary components and in (Photo 3) we see the roof gone and the crankshaft disconnected ready for the first lift to remove the flywheel assembly. In the background the transfer pipes of the two-stage compressor can be seen. These were huge and half sunk into the ground. It would have been belt



Everything about the Gardner HF13 engine is big, note the two foot diameter flywheel seen through the Gardner flywheel spokes



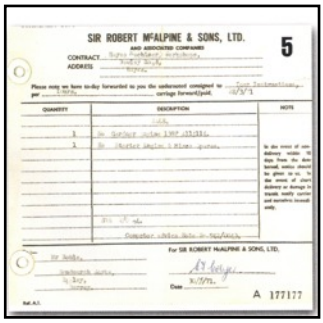
We are all ready to remove the flywheel and crankshaft; It weighed 5 ½ tons

driven, via a cone clutch, once the Gardner was running.
On Sunday we arrived with the lorry, and with the assistance of the McAlpine crane operator, safely loaded various parts across a rail-track and onto the lorry. The crane had a weigh gauge fitted which recorded the flywheel and crankshaft a 5 1/2 tons! (Photo 4) shows us all loaded and ready to leave. We received a phone

All loaded and ready for home

call the following week from Sir Bill McAlpine, thanking us for our interest and efforts, and trusted that he would see the engine running in the future. An Advice Note was later received in the post. (Photo 5)
Back home, the engine was completely dismantled, notes made of parts requiring repair and attention, all parts hammer gunned and pressure washed and given two

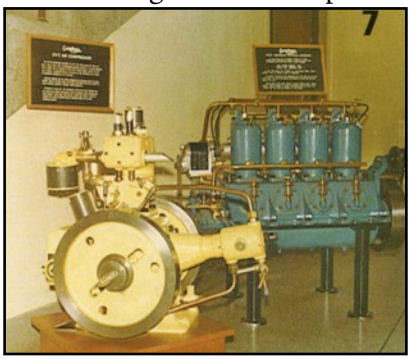
coats of primer. All bright parts were coated with a preservative, and then everything put away in the store for safekeeping whilst we finished the Tangye, and thought about what we were going to actually do with this unit. The cost of the unit, excluding dismantling and transport costs, was the scrap price of £12.10s.0d a ton, which for 12 1/2 tons shipping weight, worked out at £156.5s.0d, which in 1971, was a lot of pocket money! In 1973 I had the opportunity to visit the Gardner Works (Photo 6) where just inside the front door was a small collection of Gardner engines. These included an OVC compressor unit, (Photo 7) one of which was supplied as original equipment in 1941 with the 13HF sin 51758. This engine, and most of the others are now located in the Anson Engine Museum, Poynton, Cheshire.


SIR ROBERT McALPINE & SONS, LTD.
AND ASSOCIATED COMPANIES
5
A 177177

Advice Notice

The front of the Gardner works in 1973

I enjoyed the tour of the factory, which in those days, was in full production. I was in the company of a Mr Coleman,who was more than helpful in supplying instruction books, drawings and site assembly information for the HF range of engines. He even showed me the original Test Report carried out by a Mr G Clarke on the 8th February 1941.



An OVC compresser unit such as this was originally supplied with Gardner HF13 s/n 51758

We now had the engine, the information and the enthusiasm, but what do you do with 12 tons of single cylinder open crank diesel engine?

During the early 1970s our company expanded rapidly into the Industrial Plant business, which necessitated enlarging the premises and building new workshops, and with planned Open Days, Manufacturers' Exhibitions and Customer Visits, it was considered to be a good idea that some of our vintage equipment on display at these events would give an added interest. We were therefore, given a corner of the yard in which to set up our large stationary engines, and as the building work developed

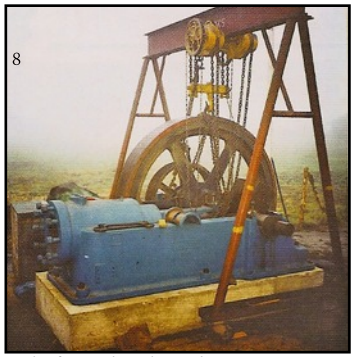
we were able to put a concrete base down as per the installation drawings we had obtained from Gardner & Sons. This was not too difficult, but being aware that the Company only leased the premises, we thought it would be a good idea to ensure that the Gardner could be moved if necessary! To this end we built a large steel frame out of second-hand 9in by 3in RSJs to go at the bottom of the excavation, which had lifting eyes on the corners. As this was the first installation of this nature that we had attempted, instead of holding-down bolts being secured by the concrete, we attached 2in tubes to the steel frame with captive bolts coming up through the tube, which gave us a small amount of movement / adjustment should this be required. Once in position these would be grouted in the tubes to prevent any movement. On a bright and sunny Saturday morning in 1974 we poured 16 cu. yds of Ready-Mix into the excavation on top of the frame, boxed up the up-stands for the engine base and outrigger bearing, which was all vibrated down with reinforcing mats through the structure. This was then left to harden off for two years! When we dismantled the engine we made a list of obvious faults, which were :-

- Lift on camshaft.
- Fuel injection equipment required reconditioning.
- Central main bearing top-half loose in the housing.
- Serious water leak on the return pipe fittings at the bottom of the cylinder head.
- Exhaust valve stem worn in housing.

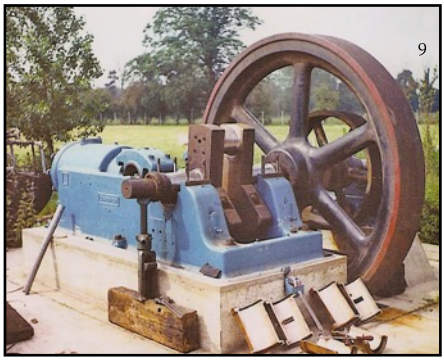
Whilst the engine had been in storage we machined new split bronze bearings for the camshaft and inspected the fuel injection equipment; this was badly worn. The engine will run on heavy oil if an exhaust fuel heater is used and is fitted with a paraffin pot in the fuel system to thin the oil down when shutting down, to enable the next start to be manageable. McAlpine had run the engine on old sump oil from the Plant Yard, and the fuel tank, with a fine gauze filter, had been set up on the wall. However, this had been punctured in the course of time and the bottom of the fuel tank had 4 to 5 inches of metallic sludge in it, which had obviously entered the fuel system and caused serious wear on the components. The pump and injector were professionally overhauled and brought back to specification. When we dismantled the engine for ease of transport we had attempted to remove the pulley and flywheel from the crankshaft, but despite our best efforts neither key could be moved. Before reassembly of the engine we tried again with specially made drifts to fit the keyway, to drive the keys

out, but they would not budge, and having taken advice from people who had handled items of this size we were advised to leave well enough alone if the keys and key ways had grown together. Had we got the keys out we would probably never get a satisfactory fit without machining. This decision obviously made the main bearing fitting a very prolonged operation.

n 1976 we commenced reassembly, with the scraping-in of the main bearings being the first job. The loose centre main top shell remains a mystery, as by measuring up and securing two thin strips of gauge plate to the edges of the top bearing we were able to bring it back to correct diameter, and a clamp with the cap ready for scraping. We worked on this project on Sunday mornings, starting at 8am with the following procedure; removing the sheets, rig the gantry, (Photo 8) remove the lift caps and blue the shaft (5.5 tons) lower the shaft and refit the caps

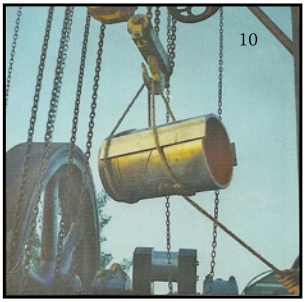


The first task each Sunday morning was rigging up the gantry

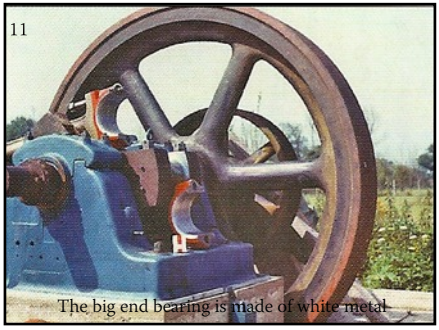


Having started scraping the bearings on the second Sunday in January,we finally finished the job on Easter Sunday

revolve the flywheel, lift the caps, removed the bearing shells 12 in x 8 in bronze, scrape, refit the lower shells, blue the shaft, lower the shaft into position, fit the top shells, pull down the caps, turn the flywheel and start the cycle all over again. By finishing at 1 o'clock, we managed two scrapes per Sunday morning! We started this on the second weekend of January, and only being able to work on dry weekends we did not finish until Easter Sunday. (Photo 9) Having completed the crankshaft to Gardner's clearance specification with the correct alignment of the out-rigger bearing, we replaced the piston (Photo 10) and con-rod assembly, and scraped in the big end 6in x Sin, which is a white metal bearing, (Photo 11) This was followed by the replacement of the cylin-



Replacing the piston

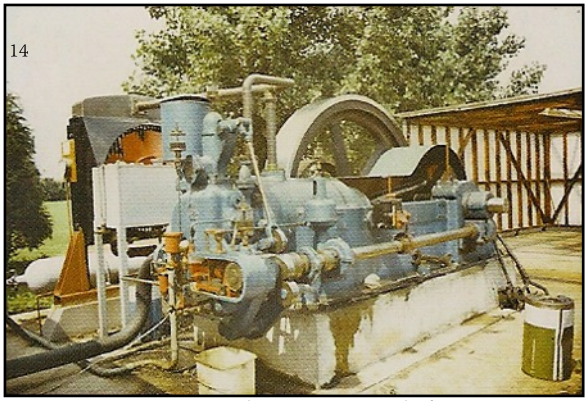


The big end bearing is made of white metal

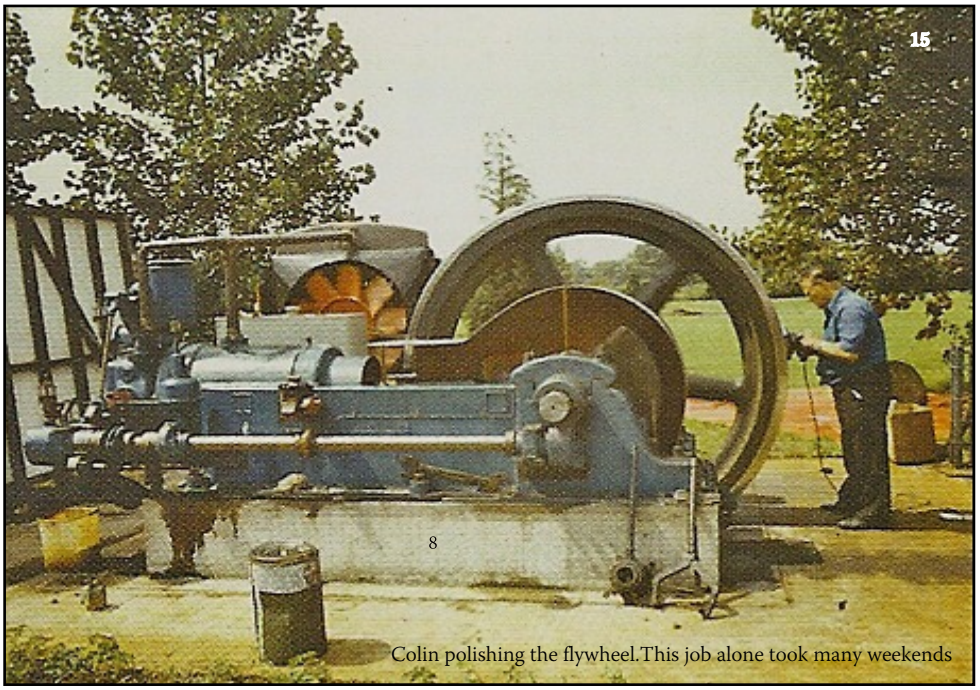
Colin Strong,my co-restorer, getting ready to replace the cylinder head

der head, (Photo 12) checking the bump clearance and shimming as required. Refitting of the camshaft with new bearings, setting the timing, bore and bush the exhaust valve-housing, lap in the valves 4 in x 3 1/2 in seats (not done with a suction cap!) Reassemble all the remaining components, pipes and fittings. The engine had originally been cooled by three large tanks on a brick foundation outside the Engine House, but we decided to dispense with this system and use a radiator. On a visit to a scrap yard in Chichester, we came across a huge radiator with a damaged core, which we were told had come out of a Ruston Bucyrus excavator. This looked to be the right size, but the repair to the damaged core would be prohibitive price-wise. On further examination, we saw the oil cooler radiator with vertical finned tubes, behind the main radiator, this was not damaged, so we did a deal, dismantled the radiator, brought the oil cooler radiator to the front of the frame, built a brass header tank and set this up with the fan pulley align er to the crankshaft beyond the drive pulley and drove it with a flat belt around the crankshaft, having filled in the keyway with a metal block, filed down to the correct diameter of the shaft. (Photo 13) Work continued on the project with a mobile shed and lighting to protect our efforts from the elements; we got to the start-up stage in the early 1980s. (Photo 14) At this point we had not set- up the compressor engine for air start, although the cylinder and pipework were in position, but having had previous experience of starting our

The engine is now radiator cooled



The engine is now at the first start up stage



Colin polishing the flywheel.This job alone took many weekends

Tangye engine with a rope around the pulley, we decided to use that method for our initial starting as the Company had suitable four-wheel drive loading shovels with automatic transmission; that would give constant acceleration on the rope whilst the exhaust valve was held open.
So, in 1984, the great day dawned, a 2in rope was wrapped around the Vees in the pulley and the end of the rope attached to a large four-wheel drive loading shovel - this gave us eight revolutions! The vehicle was driven away with the Gardner's exhaust valve open until the rope was clear of the pulley, it was then a matter of drop the exhaust valve and the Gardner 13 HF fired on its first compression stroke, picked up speed until the governor cut in at 240 rpm. There were never two more prouder people than Colin and I, as we stood there and watched the results of our ten years' efforts revolving faultlessly. As the pictures show, at this point all the paintwork was undercoat as we set about the job of polishing the flywheel. This took many more Sundays, but eventually we removed the rust and the machining marks and obtained a polished surface which glinted beautifully in the sun. (Photo 15) We were extremely pleased with out efforts to date, and it only remained now to topcoat the engine, polish the brass and copper-work and set the compressor engine into the system to charge the air-bottles. However, in 1986 disaster struck

To be continued.

Gardner Engine Rally

The 9th engine rally was held over the weekend of 11th-12th June at Bugsworth Basin on the outskirts of Whaley Bridge in the Peak District. With eighteen narrow boats, twelve road vehicles and two stationary's entered the event was well supported. In addition to the entered exhibits we welcomed some local's who turned up on the day. Amongst the vehicle contingent there were a number with engine's mounted on their platforms which made a wonderful sight. It was possible to see the entire range of LW's, there being at least one example of 2,3,4,5,6,8 cylinder versions. In addition there were some L2's a 3T4, a 3J5 and of course the HF13. We also welcomed a small number of vehicles that had been converted to Gardner power, a Rolls Royce a Wolseley 21hp a Nissan Patrol a Landrover and a Morris Commercial Truck all sporting 4LK's. Of the narrowboats ten of the nineteen had 3 LW's, two with 2LW's, one with a 4LW, two with 2L2's and one 4LK..

On the Saturday there were quite a number of visitors milling around viewing the exhibits with the weather being very kind to us, unfortunately on the Sunday we were unlucky to get washed out along with many move events across the country.

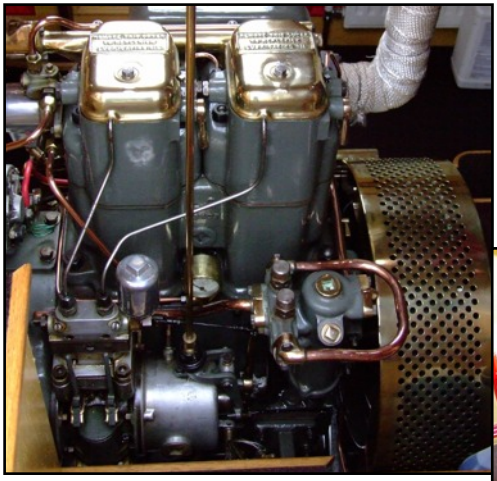
The Saturday evening saw a contingent take over a corner of the Navigation Inn where we were entertained by Bruce Coleman, Bob (Jim) Turnbull and Paul Wallace (who had travelled down from Newcastle for the evening) with surprise guest Joe McCool our membership secretary on the Irish whistle, even the chairman was to be heard rendering a verse or two,thanks to all it was a good night.

The Sunday evening saw the now customary last supper which was served up in the Navigation Inn, where we took over the restaurant, once again we all had a good evening.

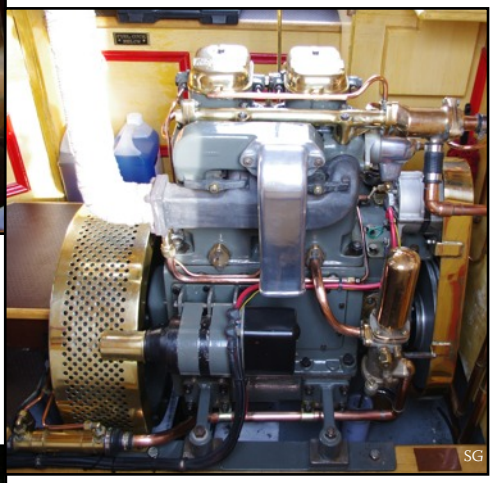
The rally site within the confines of Bugsworth Basin is of great historic value and represents may aspects of our early industrial heritage, it has been restored by the Inland Waterways Preservation Society who administer the site and continue to restore the environs being funded by grants and donations, as we were allowed to use the site free of charge, a collection from attendees was organised which raised a total of £265.00 which was gratefully received.

As at all the rallies all entrants were judged for best in class, this year by a completely independent party the results are published on the next pages along with a selection of photographs.

A big thank you to Mike and Yvonne for the organisation, We now look forward to Wrenbury in 2013



Best In Show
&
Best Marine



John Swann

Frogmore

Best Road Vehicle

Morris Commercial

Peter Freakley

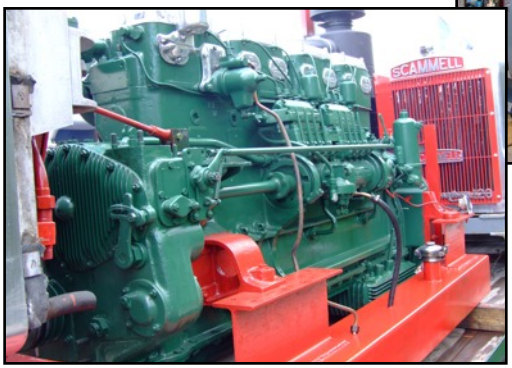
Best Stationary's

John Clarke

2 & 3 LW

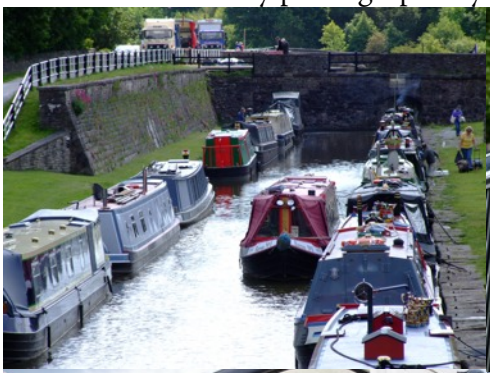
5 LW

8 LX



A miscellany of photographs from the rally at Bugsworth

All rally photographs by C J Wood (unless otherwise credited)



More photographs at
http://www.canalscape.net/Gardner%20Rally%202011/2011%20Gardner%20Rally%20Report.htm#Gardner

GARDNER HEAVY OIL ENGINES

GENERAL DESCRIPTION (*continued*)

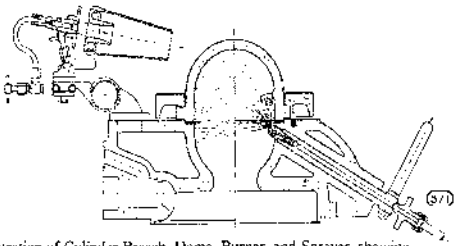


Illustration of Cylinder Breech, Dome, Burner, and Sprayer, showing three different positions of the Spray-form referred to on pages 16 and 17.

Pistons.—The pistons are cast from the same metal as the cylinders. Considerations of heat-conduction and lubrication cause them to be of massive design. They are finished and sized on the grinding machine. The finished diameters of the pistons diminish in steps from the front to the back, to allow for varying diametral expansion when at work. The varying diameters, being accurately pre-determined by long experience, completely eliminate all " easing by hand," consequently the life of both piston and cylinder bore is immeasurably prolonged.

The gudgeon pins are of hardened steel, finished and sized by grinding. They are so fixed in the piston as to avoid distortion of the latter.

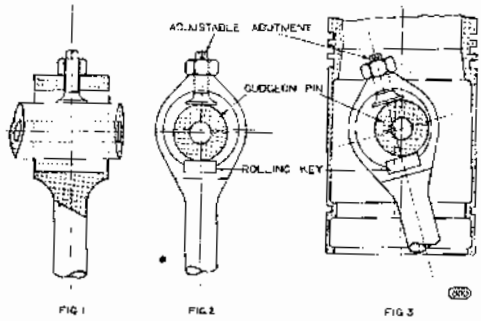
Connecting Rods.—The rods are, of course, made from steel forgings. The big end bearing is a bronze shell in two parts, lined with white metal. The small bearing is of the rolling type and merits the special description given below. The rod is bored throughout its length to carry a central duct for conveying to the rolling bearing the small amount of oil necessary to keep the bearing in condition. The lubrication oil for both ends of the rods is derived from a centrifugal oiler fed by charges of oil measured by the Gardner Multi-Point Lubricator. *See also under " Lubrication."*

It is a well-known characteristic of all two-cycle engines that the pressure of the gudgeon pin on the small end bearing, along the centre line of the connecting rod, acts always in the one sense or direction ; that is, the pressure is never relieved. This fact combined with the relatively small angular oscillation of the rod about the gudgeon pin makes the ordinary type of small end bearing, with rubbing friction, rather sensitive to any shortcomings in lubrication, especially in the larger engines. This led us some two or three years ago to consider the proposition of using some form of rolling bearings in place of rubbing bearings. To this end we constructed a number

GENERAL DESCRIPTION (*continued*)

Connecting Rods (*continued*)

of connecting rods fitted at the small end with roller bearings of our own design and make and put them into regular service in order to test their endurance and general behaviour.



New Rolling Bearing for the small end of the Connecting Rod.

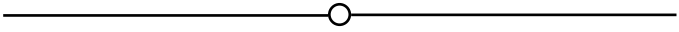
The results demonstrated beyond all doubt the superiority in all respects (except that of the cost of manufacture) of rolling as compared with rubbing in bearings like the gudgeon pin, where the motion is oscillatory, and we had decided to adopt roller bearings for the small end, when we were attracted by the New Rolling Bearings introduced some time ago by the makers of the well-known Kromhout Engine, which bearing is shown in Figs. 1, 2, and 3; this, by reason of its excellent design, simplicity and fewness of parts. The results of the prolonged and severe endurance tests made at our works on T engines fitted with these bearings were so eminently satisfactory, in every respect, that we have for some time past adopted them as our standard small end bearings in our 2-cycle engines. This, of course, by arrangement with the Patentees from whom we hold a Licence to manufacture.

The new Rolling Bearing will be sufficiently well understood from the accompanying illustration, Figs. 1, 2, and 3. As will be seen, it consists of three extremely simple parts: (1) The gudgeon pin which, itself, forms one of the rolling elements; (2) a key or slab housed in the connecting rod; and (3) an adjustable abutment on the upper side of the gudgeon pin, which abutment, however, never comes into contact with the gudgeon pin when the engine is at work. The gudgeon pin is fixed in the piston so that, as the rod oscillates, the key or slab simply rolls (without rubbing) round the fixed gudgeon pin. At a first glance at the illustration, it might appear

To be continued

Letters

From
Jim & Marilyn + 2 cairns Coulthart. N.B. Baron
Greetings Mike
Just a note to say that we enjoyed the Gardner weekend,seeing lots and meeting quite a few people who were all friendly and pleasant to non Gardner owners , We hope N.B Magic providing, to meet you all again in the future



8 Buckstone Circle
Edinburgh

Dear Mike & Yvonne

On behalf of husband and myself I would like to thank you all for your hospitality at Bugsworth Basin. Were made to feel so welcome, also thank the gentleman who helped us out at the top of the road(sorry I didn't catch his name) . Looking forward to catching up with you all in two years time at Wrenbury
Regards
Betty Sandilands
P.S Could you please relay our thanks to the Saturday evening entertainers .

The Inland Waterways Protection Society Limited
Contact: Ian Edgar MBE, Top Lock House, 7 Lime Kiln Lane,
Marple, Stockport, SK6 6BX

Telephone 0161 427 7402, Fax 0161 427 6217
email: ian@theedgars.co.uk

Mike Johnson,
5 The Green,
Wrenbury,
Nantwich,
CW5 8EY

20th June 2011

Dear Mike,

GARDNER ENGINE FORUM AT BUGSWORTH 10-12TH JUNE 2011

Dear Mike,

This is just a short note to thank you and your colleagues for the most generous donation of Cash £235 which you handed to me plus another £30 which you handed to Gordon Anderson as a further later donation. All this has gone in to the general Bugsworth Basin Fund for future maintenance and development.

I am very pleased you all enjoyed your time spent at Bugsworth and I in turn was very pleased that the Basin was left in a pristine and tidy state. That is not always the case and your attention is much appreciated.

Once again many thanks.

Yours sincerely,

Ian Edgar MBE
Chairman, IWPS Ltd.
Hon. Site Manager, Bugsworth Canal basin.

For Sale

4LK parts

2 off	Cylinder Heads complete with valves springs & rockers
4 off	Pistons with con-rods and big end bearings
4 off	Valve push rods
4 off	Injector pipes (Full set)
3 off	Injectors
1 off	Complete injector pump and governor
5 off	Main bearing caps with shells
1 off	Injector bleed back pipe
2 off	Large Gardner name plates
1 off	Air inlet casting (Alloy)
1 off	Oil filter with pressure relief valve
2 off	Oil pipes
	Various cylinder head nuts,bearing cap castle nuts, plus miscellaneous Selection of nuts and screws.
	4LK section drawing (Approx A3 size) on glossy paper
6 off	Brass rally plaques

All items in clean and serviceable condition
£500 the lot. Very realistic bargain
Tele 01562-884454. (Answerphone available) Member 300

Gardner wooden toolboxes

LW sprayer box with sprayer,pricker and syringe

1931 4L2 with electric start new to Walkers of Wigan with Pagefield radiator and cone clutch

Contact Matthew Pratt 01535 632054

6LW with gearbox including Pto for hydraulic pump

Removed from Foden and is in running order

David Atkins 01327 260388

For sale continued :

3LW Marine to be reconditioned by C.M.D Engineering,available with either Gardner 2UC or PRM Gearbox

Contact Mike on 07719034583 E mail mike@ashoredboatmoving.co.uk

62 ft Narrow boat built by Graham Edgson with boatmans cabin powered by a 2Lw in its own engine room

Contact Barry Furby on 07756012064

Welcome to new members

A Hellyar-Brook of Stoke on Trent
LM Armstrong- Jones of Sandy 3 LW
P Bull of Burton on Trent 3 LW
R Barnes of Thames Ditton
P Robinson of Chapel-en-le-frith 8LXB
M Macarthur of Southport 8L3
T Barnes of Poynton
N Laybourne of Dronfield 2 LW
L Hobson of Hartlepool 2 LW
L Walling of Carlile
B Furby of Weston super Mare 2 LW