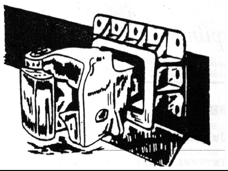
THE COUPLING



The Official News Letter of the Johannesburg Live Steam Club

Volume 1, Issue 2 MARCH1999

From the Editor

Keith Bradley
Editor and Secretary

Autumn greetings, fellow live steamers. Yes autumn is upon us and the year is a ¼ complete, sigh… how time flies when you're having fun. Well only a short while until the dreaded Y2K, millennium bug or what ever you wish to call it strikes, one thing is for sure, we who drive livesteam locomotives do not have to worry…or do we?

Well at 12:01am on the 22nd of August this year we might have a taste of the chaos the bug might bring. The Global Positioning System (GPS) used by many all over the world, but primarily for military, naval and airborne navigation, runs out of digits to count the date and will revert back to the date when the GPS system was first implemented,

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INSIDE THIS ISSUE

STOP PRESS…STOP PRESS

The weekend of the night run coincides with the annual LUISTO-LAND festival, arrangements have been made for us to use the rowing boat club entrance for JLSC members to gain access to the track.

REMEMBER, the family day on the 25th of April has been replaced by the night run and roof wetting party scheduled for the evening of 24th April

Where in the world is ING. D. L. Porta?

Well I suppose that the question one really should ask is, Who on earth is ING. D. L. Porta?

Ing. Livio Dante Porta was born in Argentina in 1922 and graduated from collage in 1948. Involved in Steam Railway operations from an early age, he was a colleague and student of Chapelon and he has continued to advance steam locomotive design to the present day.

He is known for his innovation of the KLYPOR and LEMPOR exhaust systems but is probably better known for his development of the *Gas Producer Combustion System (GPCS).*

In 1948 Porta performed his first locomotive conversion on a meter gauge 4-6-2. He modified the locomotive to a fully streamlined 4-8-0 wheel arrangement, added compound cylinders, higher superheat, re-heat between the high pressure and low pressure cylinders, an early form of the GPCS, a Kylchap exhaust system and other advancements. Major components were fabricated using welded mild steel reducing fabrication difficulty compared to pouring large castings. While the engine was a great

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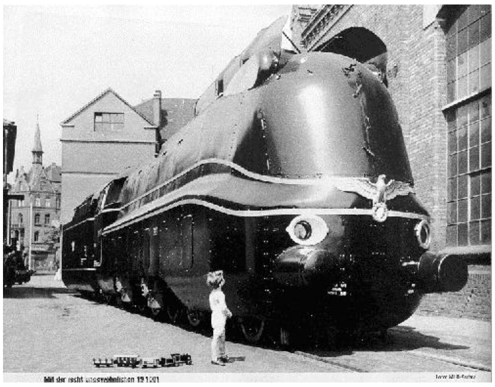
January 6, 1980. What's this got to do with livesteam and our hobby you say? Well apart from the odd cruise missile that might have lost its way and ends up chasing your loco round the track, or a plane attempting to land on the club's station at Wemmer Pan due to failure of its GPS guidance system, absolutely nothing! Just the assurance that us, with our 19th Century Technology, will not have to worry about losing our way, Our means of transport will always be on the right track.

Oops, forgot to tell you that most of the railways now use the highly accurate (+/- 1-millisecond) GPS clocks in their computer

FORGOTTEN EXPERIMENT: THE V-8 STEAM LOCOMOTIVE

Continued from Feb.

By James D. Hefner



The Henschel V-8 steam locomotive appears to have been an attempt to exceed the speed limit set by a conventional steam locomotive. Built in accordance to the plans of Richard Roosen, it was delivered to the *Deutche Reichsbahn* on July 7, 1941. It has a Mikado wheel arrangement (2-8-2), which was used by passenger and light freight locomotives. (The book incorrectly states that it was a 4-6-2.) However, instead of the conventional horizontal arrangement of 2-3 horizontal cylinders driving the wheels through driving and connecting rods, the V-8 steam locomotive used 8 cylinders arranged in 4 pairs. The angle between each pair of cylinders was 90 degrees, and they were mounted

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DID YOU KNOW?

The largest Beyer-Garratt ever built by the Beyer Peacock works was for Russian, a 4-8-2 + 2-8-4.

Tractive Effort:	89 200 lbs.
Weight:	262.2 tons
Gauge::	5 ft
Chimney height:	17 ft 1 7/8 in
Length over buffers:	107 ft 9 ½ in
Width o/running boards:	10 ft 6 in
Boiler diameter:	7 ft 7 in
Grate area:	85.5 sq. ft.
Thickness of bar frames:	5 in

H.W. Garratt born June 8th, 1864 provisionally patented the Garratt scheme on the 26 July 1907, and the complete specification was deposited at the patent office in January 1908.

Notes from the General Meeting of March

The majority of the evening was taken up with a risk assessment exercise run by Jim Taylor of the CSIR, who kindly came at the invitation of John Bradley.

The whole purpose of the analysis was not to tell the club what we must do, but to rather as to what we the members could do to make our club safer as a whole, both for the members and the public.

Unfortunately some of the members seemed to take it as a direct attack on them and did nothing but voice criticism, both for the speaker and other members. However after a slow start some areas of the general track grounds where earmarked and given thought to what could go wrong, what would be the consequences be to public and what we as members could do to reduce the risk.

But unfortunately time ran out and we could not complete the exercise. Given the scale of the risk assessment, it was suggested that we as members attempt to do the risk assessment program ourselves and draw our own conclusions.

The Editors comment.
It is my opinion that if we let ourselves become too complacent as regards to safety at our track, we could leave ourselves open to public liability lawsuits. If we do not try to regulate ourselves, we might find that government and/or municipal regulations could be passed that would make it difficult, if not impossible to run our locomotives. (This has happened, both America and Australia have had similar problems in certain states)

CALENDAR OF EVENTS

EVENT: CLUB MEETINGS

PLACE: W. H. COETZER SCHOOL
TIME: LAST TUESDAY OF THE MONTH @ 20H00
Monthly Gathering of Members.

EVENT: CLUB FAMILY DAYS

PLACE: THE TRACK, WEMMER PAN
TIME: LAST SUNDAY OF THE MONTH. 12H00 TO 17H00
Fun and Family day at the track grounds.

EVENT: CLUB WORKS DAY

PLACE: THE TRACK, WEMMER PAN
TIME: SATURDAY AFTER THE GENERAL MEETING 10H00 TO 15H00
Track maintenance and construction for the 1999 and 2000 steam meetings.

EVENT: SUNDAY PUBLIC RUNNING DAYS

PLACE: THE TRACK, WEMMER PAN
TIME: EVERY SUNDAY FROM 15H00 TO 17H00, WEATHER PERMITTING.
Public passenger haulage also, members and friends.

EVENT: NIGHT RUN, ROOF WETTING AND BRAAI

PLACE: THE TRACK, WEMMER PAN
TIME: SATURDAY 24 APRIL 99
ROOF WETTING PARTY FOR THE GROUND LEVEL STATION.

LONG-RANGE PLANNING

EVENT: GAUTENG STEAM-UP, CARS IT THE PARK

PLACE: THE STATION, WEMMER PAN
TIME: WEEKEND 5 AND 6 JUNE 1999.

EVENT: HOBBIES AND CRAFTS FAIR

PLACE: TRANSPORT MUESEM, WEMMER PAN
TIME: WEEKEND, 2 AND 3 OCTOBER 1999

EVENT: MEMBER WORKSHOP VISITS

PLACE: CONSENTING MEMBER'S WORKSHOPS
TIME: TO BE ADVISED
Monthly visits to some consenting member's workshops will be arranged

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success, track conditions in Argentina were not really suited for it and it saw limited use. However, it clearly showed that Porta knew what he was doing and he was soon commissioned to perform modifications to other engines. His next project in the early 1950's was the modernisation of a fleet of 2-6-2T's used in commuter service. With relatively minor modifications, he increased the output of these engines dramatically. He later more-extensively modified one of the engines, enabling it to outperform far larger 4-6-2's in passenger service. Unfortunately, the diesel was already making inroads in Argentina and no further locomotives were modernised. About this time (1957), Porta was given the opportunity to take over the coal-hauling Rio Turbio Railway as general manager. This proved to be a fertile ground for Porta's work.

These 2' 5-1/2" gauge 2-10-2s were built in the 50's and 1960's by Mitsubishi Heavy Industries of Japan for service on the Rio Turbio Railway in Argentina, at the southern tip of South America. The first batch of engines, present when Porta arrived, proved highly capable and quickly displaced older 2-8-2's. However, Porta soon set about the systematic modification of these engines to improve their efficiency, power, and availability. So successful were these modifications that when additional engines were ordered in the 1960's, these refinements and others were incorporated in their construction. As a result of these developments, the Rio Turbio 2-10-2's were one of the most efficient groups of steam locomotives ever operated. Tests document that the engines routinely achieved 12% efficiency, nearly equalling Chapelon's famed 4-8-0's, and could attain up to 15% efficiency under controlled conditions. Furthermore, their routine day-to-day efficiency, including idle time, was much higher than that attained by previous engines.

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TITANIC FACTS

Here are a few facts (engineering and trivia) about the SS Titanic.

- Overall length 882 ft 8 in
- Breadth 92 ft
- Motive power was provided by two, four cylinder triple expansion and one turbine engines.
- The cylinder diameters where as follows HP – 54", MP – 84" and two LP of 97" and a stroke of 75"
- Layout of the cylinders where as follows FWD LP, HP, MP, AFT LP
- The crank and thrust shafts where 27" in diameter
- The reciprocating engines had an output of 15 000hp each.
- The turbine which used the exhaust steam from the LP cylinders had an output power of 16 000hp (1000hp MORE than the triples)
- The total boiler output power was 51 000 Hp
- Normal coal consumption was 825 tons per day
- The number of boilers was 24 double ended and 5 single ended
- Each boiler was 15' 9" in diameter and either 20 ft long for the double ended or 11' 9" for the single ended
- Total number of boiler furnaces was 159
- Boiler pressure was 215 psi
- The two outer propellers where 23 ft 6 in in diameter, the center or turbine driven one was 17 ft in diameter.
- 14 000 gallons of fresh drinking water was used every 24 hours.
- Titanic had the first 'ship board' swimming pool.
- The Titanic and it's sister ship the Olympic cost R30, 000,000 for the pair (it would cost about R 2,512,000,000 at today's prices just to build the Titanic)
- Over 3 million rivets where used in the construction of the ship
- The palm trees surrounding the Veranda Café where real palm trees.

Finally the Titanic had an onboard Turkish bath, Gymnasium and a Squash court

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These engines feature gas producer fireboxes, Kylpor exhaust systems, and massive 6-axle tenders, which contain mostly coal. Auxiliary tenders provide ample water capacity for extended runs. Aside from the major modifications to these engines, Porta developed numerous detail design improvements on these engines.

To be continued

The Gas Producer System

Normal coal-fired steam locomotives burn coal on a (relatively) flat grate, usually consisting of cast iron segments, which can be rocked back-and-forth with a mechanism to shake the ash down into the ash pan. Air holes are provided in the grates, which allow most of the air required to burn the coal to come up through the coal bed. Locomotives typically generated much more steam for a given physical size boiler than a stationary boiler would (for example, a power plant boiler). They accomplish this by using a power draft-inducing mechanism (the smokestack and nozzle) which draws huge amounts of air through the grate to allow coal to be burned very rapidly.

While this allowed locomotives to produce ample power, it was not very efficient. The main reason for this is the velocity of the air, which comes up through the fire. As the lumps of coal on the fire burn, they shrink in size. Eventually, they become sufficiently small that the force of the airstream lifts them off of the firebed, carrying them through the firebox, into the flues and eventually out of the smokestack where they are discharged as cinders. In a locomotive operating at high power output, more than 50% of the coal that was fed into the firebox could be ejected from the stack in this way before it could be completely burned. This effect was somewhat worse on stoker-fired engines as the coal was ground up in the stoker and blown into the firebox with steam jets. Many particles would be caught in the airstream without ever landing on the firebed. This represented a tremendous loss of efficiency in the boiler.

Besides the efficiency loss, this carryover of unburned coal causes several problems. The coal particles acts much like sandblast grit as they fly through the boiler at high velocity. These causes wears on the surfaces in the boiler, including the rear tube sheet, rear tube ends, superheater ends,

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on alternating ends of each of the four driving axles. They appeared to be coupled directly to the end of each axle. Gearing may have been used to work the valves. It would seem to have made sense to couple and balance the entire drive train through a set of connecting rods; however, no connecting rods are visible. The engine also has the conventional German streamlining and markings, and bears the Number 19.1001.

Alexander Zeilmaker translated the following from an article in *Modell Eisen Bahner*[**]:

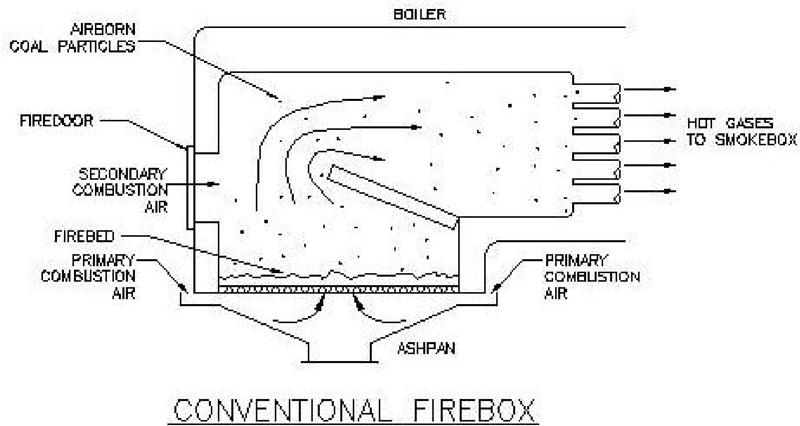
> "...After some troubles in the beginning the machine proved to run very smooth. According to Richard Roosen the machine ran up to 125 mph on a test stand during a rev-test. During brake-test runs the machine made about 117 mph, running very quiet. This resulted from the new traction concept, and it's streamlining also had it's influence on the speed. The combination of streamlining and engine arrangement kept big promises for the future, but due to the war they weren't fulfilled."

Sith Sastrasinh continues the story[***]:

> "In October 1944 locomotive 19.1001 was heavily damaged during an air raid on Hamburg. It was transferred to RAW Braunschweig and remained there until the end of the war. In August 1945 the locomotive was brought back to Henschel where the 757th Railway Shop Battalion of the U.S. Army was stationed. It was repaired and, after one test run between Kassel and Wabern, was shipped to the U.S. in October 1945. In the U.S. it was sent to Fort Monroe in Virginia together "captured" German railway material. There, certainly representatives from U.S. government and industries inspected it in March 1946. It was then moved to Fort Patrick Henry where various components (injector, air pump, lubrication system, etc.) were tested. The locomotive was moved to Fort Eustis in 1950. If I understand correctly (my German is worse than lousy), there was a possibility that the locomotive could be brought back to Germany. The cost of shipment ($15000) and the prospect that the DB could not get much use out of it forestalled this option, however. Locomotive 19.1001 was finally scrapped at Fort Eustis in 1952. The priority of the DB in the early 1950's was certainly not preservation."

and internal parts of the smokebox. The cinders, if of sufficient size, can ignite line-side fires along the railroad tracks. A conventional steam locomotive firebox is shown on figure 1.

This drawing shows a simplified cross-sectional view of a typical steam locomotive firebox. Most of the air required to burn the coal (about 90%) enters through the ashpan and comes up through the grate. A much smaller amount of air (about 10%) enters the firebox through holes in the firedoor, and sometimes through openings installed in the sides of the firebox (such as over-fire jets).



CONVENTIONAL FIREBOX

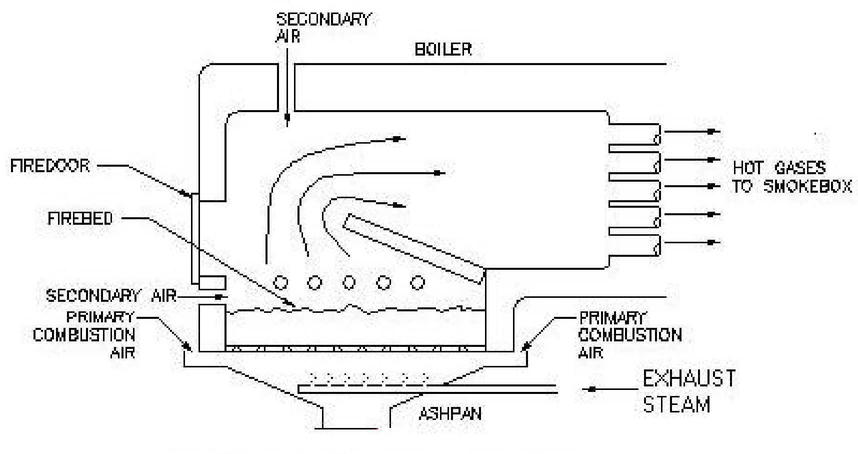
Another problem with conventional coal combustion was clinker formation. All coal contains non-combustible components. Some of these components can melt at the temperatures attained in the coal bed. When this happens, the molten substance flows together to form clinker. Since the clinker can't burn it blocks off a portion of the firebed, reducing the engine's output (sometimes by extreme amounts). The fireman has to attempt to break it up manually using a steel rod and then shake the engine's grates to get the broken pieces to drop into the ash pan. This was a laborious task, especially on a moving train.

A final problem with conventional coal combustion is uneven heating. A good fireman tried to maintain his fire "light, level, and bright". To do this, he had to keep the firebed relatively thin (a few inches thick). Problems with the stoker or with his shovelling technique could cause the fire to be thicker in some areas and too thin in others. This produced uneven heating in the firebox, causing stress on the hot firebox surfaces. Occasionally, the fire could actually burn out in a thin location. This would immediately allow a stream of cold air to come up through the grate causing further firebox stresses. Burning coal (not fresh coal) had to be spread over this spot and then fresh coal added.

All of these problems with conventional coal combustion made the fireman's job difficult, increased maintenance on steam locomotives, and severely limited the efficiency that could be attained.

PORTA's GPCS SYSTEM

The next illustration illustrates the same firebox after conversion to a GPCS configuration. The coal grates are replaced with grates having smaller air openings, so that only about 30% of the air (primary air) required to burn the coal completely, enters through the grates. For proper operation, the grates must fit tightly when closed to prevent uneven airflow up through the firebed. A number of air admission ducts are installed through the walls of the firebox, along the sides, back, top, and/or front. These ducts are sized to admit about 70% of the air (secondary air) required to burn the coal completely. Finally, dispersion tubes are installed below the grates to admit steam to the fire. This steam comes from the exhaust nozzle (3-4% of the exhaust flow from the cylinders) and from various other steam-powered accessories on the locomotive. The steam must be evenly distributed and mixed with the primary air to ensure proper operation. The firebed is maintained much deeper than in a conventional firebox.



GAS PRODUCER FIREBOX

To be continued