The Garrett Stationary Engine

There are times when the Sandstone Heritage Collection turns up an item that was placed in storage many years ago and inadvertently forgotten! Recently a visitor to Sandstone was being shown around the shed containing our unrestored 2ft gauge locomotives and rolling stock when they came across an open "B" wagon containing a large amount of machinery, some large, and some small, but obviously one machine. A later visit to the main steam shed and the wagon shed next door revealed a boiler which was certainly not from a locomotive. On one of the sections was the name Garrett and not a misspelling of Garratt as in the locomotive type!

The crankshaft of the Garrett in the "B "wagon.

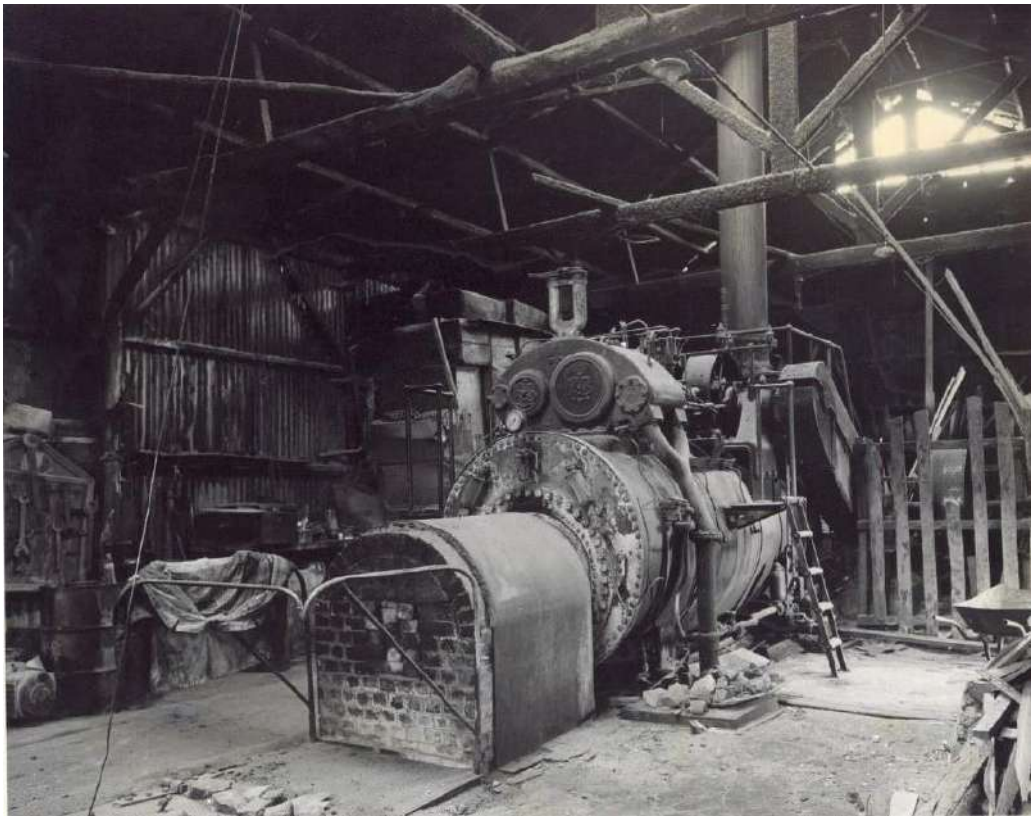
The Garrett boiler at Sandstone

After a quick inspection of the asset register the machine was identified as a Garrett stationary engine purchased from a sugar estate at Xinavane in Mozambique around 2003. This estate is some 80 kms north of Maputo on the Incomati River. The estate is still there today as a joint venture rehabilitation project for the sugar industry in Mozambique by the Mozambican Government and South African company, Tongaat-Hulett.
The asset register showed the unit to purportedly be from 1907 which was to prove to be a red herring!
Richard Garrett & Sons was a manufacturer of agricultural machinery, steam engines and trolleybuses. Their factory was Leiston Works, in Leiston, Suffolk, England. The company was founded by Richard Garrett in 1778.The company was active under its original ownership between 1778 and 1932. The majority of the steam engines produced by Garrett were portable engines – combined with their fixed steam engines and semi-portables, they represented 89% of the works' output.
The company joined the Agricultural & General Engineers (AGE) combine in 1919, and the combine entered receivership in 1932. The Company was purchased by Beyer, Peacock & Company in 1932 after the collapse of AGE. The business continued as Richard Garrett Engineering Works until the works finally closed in 1981.
Today, part of the old works is preserved as The Long Shop Museum. This museum was to prove invaluable in identifying the unit. The museum features the history of Richard Garrett & Sons although the records of the company are held in the Suffolk Archives Records Office.
The first issue in identifying the unit was to find a serial number and we contacted Derek Rayner from Old Glory magazine in the UK to assist. He put us on to Mick Walters whose father-in-law was the late Bob Whitehead, who wrote all the authoritative books about Garrett engines. Mick informed us that Garrett did not use conventional works plates and often just stamped the unit number on one of the castings of an engine. Given the number of pieces in the railway wagon it took us some time to discover the elusive number 34451 stamped into the main body of the engine.

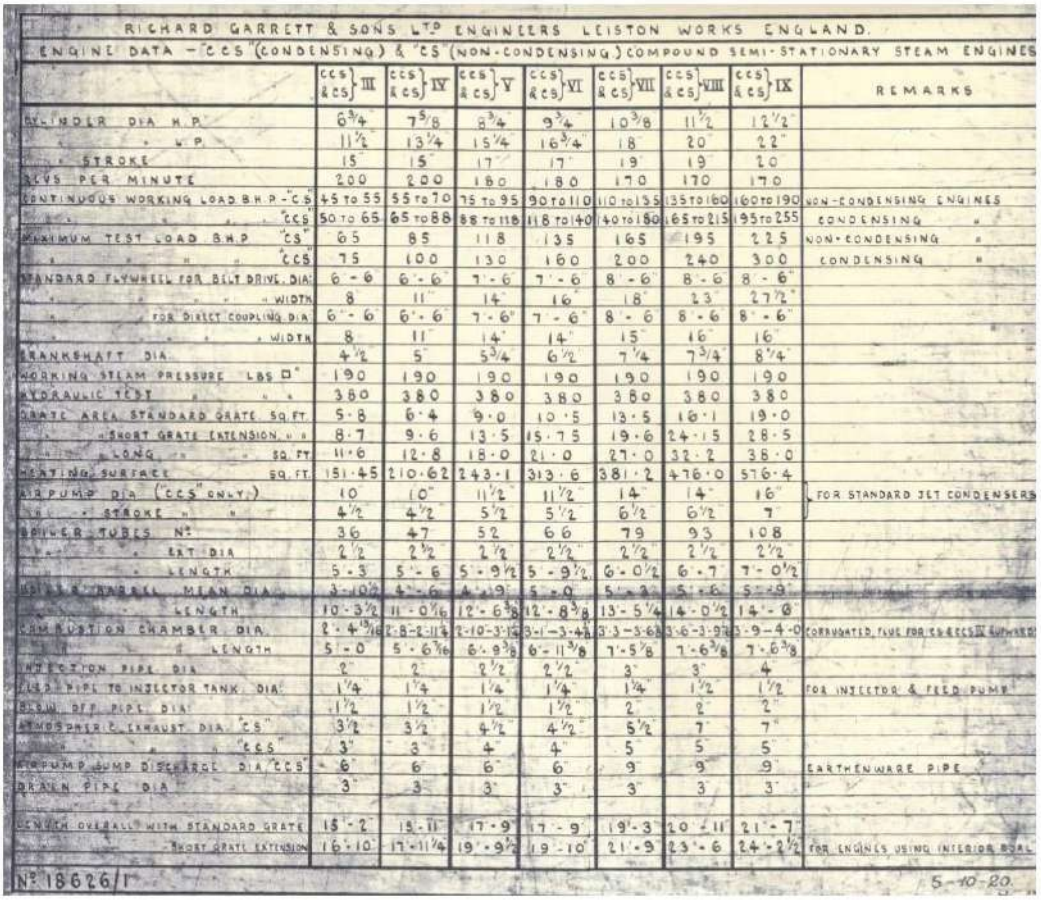
The elusive serial number! 34451.

We then made contact with Fraser Hale of the Long Shop Museum in Leiston in Suffolk in the UK who was able to identify the machine according to the manufacturing lists. He identified 34451 as a Mark IV CCS (compound condensing semi-stationary) engine that left the factory on 28 April 1924. It was sold to Incomati Estates, and was delivered via Delagoa Bay (now Maputo), Mozambique.
The CCS engines were given codenames of famous British Admirals (Mark VI's were Nelson, for example). The Mark IV was 'Frobisher' and they ranged in power from 88 – 100 BHP.
This was certainly valuable information and the purchaser, Incomati Estates, aligned with the modern day sugar estate on the same site. It was also clear that we had the incorrect date of 1907 on our asset register. Mr Hale was also able to send us the specification sheets for the unit as well as a picture of a similar engine in the Museum today plus a picture of a Mark IV on test at Garrett's factory in 1912.

The Garrett MkIV CCS at The Long Shop Museum at Leiston in Suffolk, England.
(Photograph courtesy of The Long Shop Museum)



A similar Mark IV CCS on test at Richard Garrett and Sons factory in 1912.
(Photograph courtesy of The Long Shop Museum)



RICHARD GARRETT & SONS LTD ENGINEERS LEISTON WORKS ENGLAND.

ENGINE DATA – "CCS" (CONDENSING) & "CS" (NON-CONDENSING) COMPOUND SEMI-STATIONARY STEAM ENGINES

	CCS & CS III	CCS & CS IV	CCS & CS V	CCS & CS VI	CCS & CS VII	CCS & CS VIII	CCS & CS IX	REMARKS
CYLINDER DIA H.P.	6 3/4	7 5/8	8 3/4	9 3/4	10 3/8	11 1/2	12 1/2	
" " L.P.	11 1/2	13 1/4	15 1/4	16 3/4	18	20	22	
" STROKE	15	15	17	17	19	19	20	
REVS PER MINUTE	200	200	180	180	170	170	170	
CONTINUOUS WORKING LOAD B.H.P. "CS"	45 to 55	55 to 70	75 to 95	90 to 110	110 to 135	135 to 160	160 to 190	NON-CONDENSING ENGINES
" " " "CCS"	50 to 65	65 to 88	88 to 118	118 to 140	140 to 180	165 to 215	195 to 255	CONDENSING "
MAXIMUM TEST LOAD B.H.P "CS"	65	85	118	135	165	195	225	NON-CONDENSING "
" " " "CCS"	75	100	130	160	200	240	300	CONDENSING "
STANDARD FLYWHEEL FOR BELT DRIVE. DIA	6 - 6	6 - 6	7 - 6	7 - 6	8 - 6	8 - 6	8 - 6	
" " " " WIDTH	8	11	14	16	18	23	27 1/2	
" " FOR DIRECT COUPLING DIA	6 - 6	6 - 6	7 - 6	7 - 6	8 - 6	8 - 6	8 - 6	
" " " " WIDTH	8	11	14	14	15	16	16	
CRANKSHAFT DIA	4 1/2	5	5 3/4	6 1/2	7 1/4	7 3/4	8 1/4	
WORKING STEAM PRESSURE LBS □"	190	190	190	190	190	190	190	
HYDRAULIC TEST " " "	380	380	380	380	380	380	380	
GRATE AREA STANDARD GRATE SQ FT	5·8	6·4	9·0	10·5	13·5	16·1	19·0	
" "SHORT GRATE EXTENSION " "	8·7	9·6	13·5	15·75	19·6	24·15	28·5	
" "LONG " " SQ FT	11·6	12·8	18·0	21·0	27·0	32·2	38·0	
HEATING SURFACE SQ FT	151·45	210·62	243·1	313·6	381·2	476·0	576·4	
AIRPUMP DIA ("CCS" ONLY)	10	10"	11 1/2	11 1/2	14	14	16	FOR STANDARD JET CONDENSERS
" " STROKE " "	4 1/2	4 1/2	5 1/2	5 1/2	6 1/2	6 1/2	7	
BOILER TUBES No.	36	47	52	66	79	93	108	
" " EXT DIA	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	
" " LENGTH	5 - 3	5 - 6	5 - 9 1/2	5 - 9 1/2	6 - 0 1/2	6 - 7	7 - 0 1/2	
BOILER BARREL MEAN DIA	3 - 10 1/2	4 - 6	4 - 9	5 - 0	5 - 2	5 - 6	5 - 9	
" " LENGTH	10 - 3 1/2	11 - 0 1/16	12 - 6 3/8	12 - 8 3/8	13 - 5 1/4	14 - 0 1/2	14 - 8	
COMBUSTION CHAMBER DIA	2 - 4 13/16	2 - 8 - 2 - 11 1/4	2 - 10 - 3 - 1 3/8	3 - 1 - 3 - 4 1/2	3 - 3 - 3 - 6 3/8	3 - 6 - 3 - 9 1/2	3 - 9 - 4 - 0	CORRUGATED FLUE FOR CS & CCS III SUPPLIED
" " LENGTH	5 - 0	5 - 6 7/16	6 - 9 3/8	6 - 11 3/8	7 - 5 3/8	7 - 6 3/8	7 - 6 3/8	
INJECTION PIPE DIA	2"	2"	2 1/2	2 1/2	3"	3"	4	
FEED PIPE TO INJECTOR TANK DIA	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/2	1 1/2	FOR INJECTOR & FEED PUMP
BLOW OFF PIPE DIA	1 1/2	1 1/2	1 1/2	1 1/2	2"	2"	2"	
ATMOSPHERIC EXHAUST DIA "CS"	3 1/2	3 1/2	4 1/2	4 1/2	5 1/2	7	7	
" " " "CCS"	3"	3	4	4	5	5	5	
AIRPUMP DUMP DISCHARGE DIA "CCS"	6"	6	6	6	9	9	9	EARTHENWARE PIPE
DRAIN PIPE DIA	3"	3	3	3	3	3	3	
LENGTH OVERALL WITH STANDARD GRATE	15 - 2	15 - 11	17 - 9	17 - 9	19 - 3	20 - 11	21 - 7	
"SHORT GRATE EXTENSION	16 - 10	17 - 11 1/4	19 - 9 1/2	19 - 10	21 - 9	23 - 6	24 - 2 1/2	FOR ENGINES USING INTERIOR BOAL

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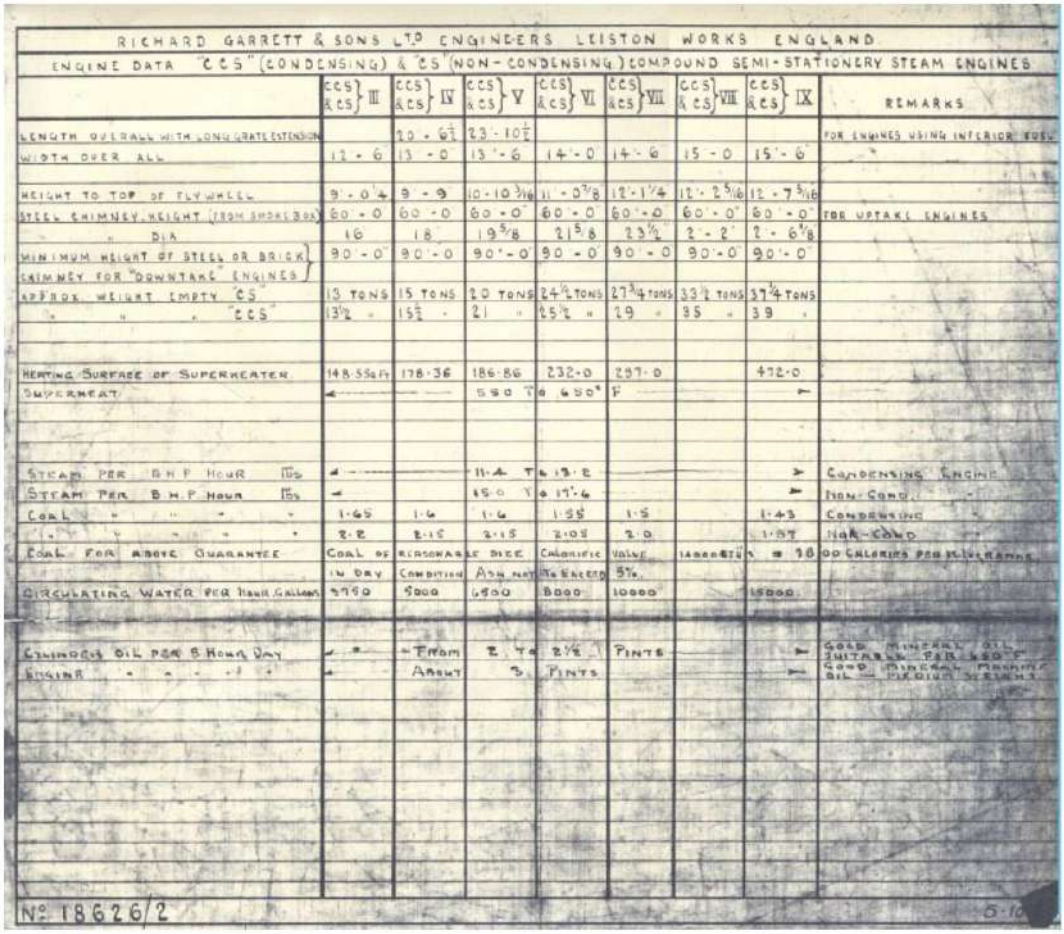

RICHARD GARRETT & SONS LTD ENGINEERS LEISTON WORKS ENGLAND

ENGINE DATA "CCS" (CONDENSING) & "CS" (NON-CONDENSING) COMPOUND SEMI-STATIONERY STEAM ENGINES

	CCS & CS III	CCS & CS IV	CCS & CS V	CCS & CS VI	CCS & CS VII	CCS & CS VIII	CCS & CS IX	REMARKS
LENGTH OVERALL WITH LONG GRATE EXTENSION		20 - 6 1/2	23 - 10 1/2					FOR ENGINES USING INTERIOR BOAL
WIDTH OVER ALL	12 - 6	13 - 0	13 - 6	14 - 0	14 - 6	15 - 0	15 - 6	
HEIGHT TO TOP OF FLYWHEEL	9 - 0 1/4	9 - 9	10 - 10 3/16	11 - 0 3/8	12 - 1 1/4	12 - 2 5/16	12 - 7 5/16	
STEEL CHIMNEY HEIGHT (FROM SMOKE BOX)	60 - 0	60 - 0	60 - 0	60 - 0	60 - 0	60 - 0	60 - 0	FOR UPTAKE ENGINES
" DIA	16	18	19 5/8	21 5/8	23 1/2	2 - 2"	2 - 6 1/8	
MINIMUM HEIGHT OF STEEL OR BRICK CHIMNEY FOR "DOWNTAKE" ENGINES	90 - 0	90 - 0	90 - 0	90 - 0	90 - 0	90 - 0	90 - 0	
APPROX WEIGHT EMPTY "CS"	13 TONS	15 TONS	20 TONS	24 1/2 TONS	27 3/4 TONS	33 1/2 TONS	37 1/4 TONS	
" " " "CCS"	13 1/2 "	15 1/2 "	21 "	25 1/2 "	29 "	35 "	39 "	
HEATING SURFACE OF SUPERHEATER	148·55sq ft	178·36	186·86	232·0	287·0		472·0	
SUPERHEAT	←	———	550 To 650° F				→	
STEAM PER B.H.P HOUR lbs	←	———	11·4 To 13·2				→	CONDENSING ENGINE
STEAM PER B.H.P HOUR lbs	←		15·0 To 17·6				→	NON-COND. "
COAL " " " "	1·65	1·6	1·6	1·55	1·5		1·43	CONDENSING "
" " " "	2·2	2·15	2·15	2·05	2·0		1·87	NON-COND "
COAL FOR ABOVE GUARANTEE	COAL OF REASONABLE SIZE CALORIFIC VALUE 14000 BTU = 7800 CALORIES PER KILOGRAMME							
	IN DRY CONDITION		ASH NOT TO EXCEED 5%					
CIRCULATING WATER PER HOUR GALLONS	3990	5000	6500	8000	10000		15000	
CYLINDER OIL PER 8 HOUR DAY	←	FROM ABOUT	2 To 3	2 1/2 PINTS			→	GOOD MINERAL OIL SUITABLE FOR 450° F
ENGINE " " " "	←		3 PINTS				→	GOOD MINERAL MACHINE OIL — FLASHING 385 DEGS F

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The spec sheets for the Garrett Stationary Engine
(Photographs courtesy of The Long Shop Museum)

A small selection of the numerous parts of the Garrett Stationary Engine after unloading from the “B” wagon.

It is our plan to reassemble the engine and return it to working order and we have made contact with the Suffolk Archives to see if they can provide a set of drawings. We also have yet to identify what it was actually used for in Mozambique. There is more to come on the fascinating story of this machine!