

THE ENGINES AT MILL CLOSE MINE - 1920 TO 1939

by Peter Naylor

Doug Nash's "Anecdotes on Mill Close Mine" (1978) prompted me to gather together the information I had accumulated on the engines at this mine during its later years of operation. This knowledge has been gathered over many years by discussion with numerous ex-Mill Close miners and surface workers. The names of most of these men are long forgotten, and many are now dead. Unfortunately the engines at this mine do not appear to have been fully recorded and documented. A few of the larger (and more glamorous) engines are remembered, usually with affection. The smaller engines were frequently forgotten, and these were just as important to the mining operation as the larger ones. As the reader will see there are many gaps. If these can be filled, the author would be grateful for further information, together with any corrections to any errors.

Of interest is the fact that most of the manufacturers referred to are still in business, although in some cases, they no longer make the equipment listed.

PUMPING ENGINES

There were five of these, two of which were electrically driven for standby duties.

Names:	"Jumbo"	"Alice"	"Baby"	2 Standby
Type:	Cornish Single Acting			Centrifugal
Siting:	Warren Carr Shaft	Shaft 50 yards N. of Warren Carr Shaft		Lees Shaft
Make:	Harvey & Co., Hayle, Cornwall	Thornewill & Wareham, Burton-on-Trent	Mather & Platt Ltd., Manchester	
Date:	1875	1851	1860	pre 1922
Indicated H.P.:	277	129	62	
Strokes per minute:	6	6	6	1800 galls./min.
Bore (inches diameter):	80	60	50	10" delivery
Stroke (inches):	120	96	96	12" suction
Prime mover:	steam at 80 p.s.i.g.			electricity: 440 V, 3 phase

In the 1920s the electric pumps were used as a standby for "Jumbo". "Alice" and "Baby" were duplicate, both being in use only on the failure of "Jumbo". Later, in 1932, the roles were reversed, when larger electric pumps were installed. "Jumbo" was scrapped a year later. Nellie Kirkham (1968) referred to "Jumbo" as working at 5 strokes per minute, using steam at 23 p.s.i.g., all three engines lifting 1800 gallons per minute. This was in the 1880s. Either the steam pressure was later uprated to 80 p.s.i.g., or was reduced before being fed to the cylinder. All three Cornish engines were pumping 3000 gallons per minute in the 1930s (according to Miss Kirkham). This could only be achieved with the same engines by increasing the steam pressure and thus the number of strokes per minute, or to increase the number of pumps below ground, or a combination of all these factors. The maximum speed of "Jumbo" was 8 strokes per minute. Miss Kirkham (1963) referred to a 50" Cornish engine being installed at Watts Shaft, Old Mill Close Mine, by Mr. E.M. Wass shortly after he took the title in 1859. This engine was moved in 1896 to Mill Close Mine and shared the same shaft as an engine moved from Wakebridge Mine, Crich in 1839. This former engine was "Baby", the latter "Alice". "Alice" was probably the "larger engine" for which Thornewill and Wareham were paid £1610.

WINDING ENGINES

There were three winding engines, one, a Capstan Engine, used exclusively for raising and lowering pump lifts, etc. All the winding engines were made by Thornewill and Wareham of Burton-on-Trent.

Siting:	Lees Shaft	Warren Carr Shaft	Capstan Engine
Bore (inches diameter):	14	12	12
Stroke (inches):	26	24	24
Reduction gear to drum:	3.5:1	4:1	20:1
Drum diameter (inches):	72	72	42
Cable diameter (inches):	$\frac{1}{2}$	$\frac{1}{2}$	$1\frac{1}{2}$

The Capstan Engine could be used on either the Lees or the Warren Carr Shaft. The Capstan at the Old Mill Close Mine, Watts Shaft, was manual.

COMPRESSED AIR GENERATION

There were two steam driven compressors, one (Schram) was a standby to the principal one (Bellis & Morcom). Both were piped to a reservoir or receiver, size unknown.

Make:	Bellis & Morcom	Richard Schram & Co.
Configuration:	Vertical	Horizontal
Type:	Double Acting	Single Stage
Capacity (cubic ft. per min. free air):	500	300
Supply air pressure (p.s.i.g.):	80	60
Steam pressure (p.s.i.g.):	120	80
Steam cylinder diameter (inches):		16
Air cylinder diameter (inches):		14
Stroke of steam cylinder (inches):		24

ELECTRICITY GENERATION

During the 1920s the mine generated its own electricity, connecting to the National Grid in the 1930s. During this period there were two generators:

Maker:	W.H. Allen & Co.	Br. Westinghouse Mfg. Co.
Type:	D.C. Dynamo	A.C. Alternator
Amperes:	150	164 per terminal
Volts:	110	440 (3 phase)
Speed (r.p.m.):	650	500
Steam engine type:	double acting single cylinder horizontal	high speed two cylinders vertical by Bellis & Morcom

The dynamo supplied current for lighting, recharging accumulators and the aerial ropeway. The alternator supplied current to the centrifugal pumps in Lees Shaft.

DRESSING

All ore dressing, rock crushing, etc., was by machines driven by two steam engines.

	Main Engine	Jig Engine
Make:		Thornewill & Wareham
Type:	horizontal condensing	horizontal non-condensing
Bore (inches):	14	13
Stroke (inches):	30	24
Machinery driven:	20 x 10 Blake Marsden rock breaker (180 rpm)	2 sets Classifying Trommels 1 set of 2 Classifying Trommels 7 No. 5 compartment Hartz plunger jigs (300 rpm) 4 No. Deister concentrating tables 5 No. Wilfley tables

Under normal usage the water used amounted to:

Jigs	21,120	gallons per minute
Wilfley Tables	<u>7,550</u>	" " "
TOTAL	<u>28,670</u>	" " "

The Mill as a whole could handle 72 tons of material per 8-hour shift (9 tons per hour).

WORKSHOPS

Each of the two workshops had a steam engine.

Workshop:	Fitting	Sawmill
Make:		Marshall of Gainsborough
Bore (inches):	4½	10
Stroke (inches):	9	12
Machinery driven:	10 ft lathe (12" centres)	
	16" Shaping machine	

This appears to be the uneconomical use of engines, two driving three machines. There were also a few small electric motors driving, 2 forge fans, a grinding wheel and a drilling machine.

TRANSPORTATION

1. Above Ground

- a) Steam wagons: 1 No. Foden standard pattern, self-tipping, 5 tons capacity
1 No. Robey superheated pattern, 5 tons capacity
- b) Aerial ropeway: made by Bullivants, 3064 feet long, rope speed 450 feet per minute. The ropeway conveyed 10 - 12 tons coal per hour "up", and 20 tons per hour of gravel "down". The rope was wound by a 1613 HP, 110 volt, DC motor by John Davis & Co., Derby.
- c) Incline: which ran from the ore bins at Lees Shaft to the Mill. This was a conventional wagon and rail system, 2 ascending and 2 descending wagons, each having a capacity of 107 cubic feet, the rails having a gauge of 24 inches.
The engine was a Tangye horizontal duplex steam, 4" bore, 8" stroke, driving a 22" diameter drum.

2. Below Ground

There was one electric haulage locomotive, 17" gauge, made by British Electric vehicles Ltd., capable of hauling up to 16 wagons at a time, of particular interest here is that the batteries were made by the D.P. Battery Co., of Bakewell during the early 1920s.

The Foden lorry transported the ore to the smelter at Lea, the aerial ropeway conveyed saleable gangue minerals to Darley Dale station. Calcite was exported this way and it had a ready market.

STEAM GENERATION

Steam was an important prime mover up to the 1950s and was used for driving engines in mills, mines and other commercial undertakings.

As can be seen, Mill Close Mine used many steam-driven engines, these together with steam for heating purposes, created a large demand. All the steam bodies were hand-fired using coal, imported by rail (and aerial ropeway) from the adjoining Notts./Derbys. coalfield. The boilers were brick-set, as were they all at that time, needing tall chimneys to create the necessary draught. One of the two brick chimneys still remains and is a conspicuous local landmark.

Purpose:	Ore Winding	Cornish pumps, Schram compressor Dressing Mill Fitting Shops Saw Mill Dynamo	Alternator Bellis & Morcom Compressors
No. of Boilers:	1	4	2
Type:	Cornish	Galloway	Lancashire
Length (feet):	24	27	30
Diameter (feet):	5	7	8
Working pressure (p.s.i.g.):	40	80	120
Feed Pumps:	1 - Evans Duplex		1 - Evans Duplex 1 - Cameron Duplex 1 - Weir
Evaporation (author's estimate) lb/hr:	2000	4600	5250

A smaller boiler, details unknown, heated the miners' dry or "stripping coe" as it was called at Mill Close Mine. This was possibly a "dairy" type boiler. The Galloway and Lancashire boilers were fitted with a Green's Economiser, and the surviving chimney served these boilers.

ILLUSTRATIONS

There are a few photographs in existence of the engines, especially the beam engines. Some of these have been published as follows:

- a) Bulletin P.D.M.H.S., Vol. 2, Part 2 (1963), Plate 8 facing page 83 shows the cylinder tops and beams of "Alice" to the left and "Baby" to the right. Photograph by the late Mr. E. Brook.
- b) "Derbyshire's Old Lead Mines & Miners" by J.H. Rieuwerts (1972) has:
 - i) a general view of the mine complex with the headstock at Warren Carr Shaft, the two chimneys, bins, etc. being easily discernible. Less easy to identify is the aerial ropeway terminal building between the headstock and smaller chimney.
 - ii) the same photograph as a) above.
 - iii) two photographs of the winding engine at Lees Shaft, one of the winding drum, the other of the engine. The flywheel on the latter had a diameter of 84 inches.

ACKNOWLEDGEMENTS

To all those men, ex-miners and others, who gave freely of their time and memories, too numerous to mention by name, some alas now dead. Particularly to one ex-miner, who during the depression, walked from Middleton-by-Wirksworth to Mill Close Mine and back, every day, for six days a week, and worked an 8 hour shift.

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