


S. S. W. W.

DESCRIPTION OF PUMPING STATIONS
1921.

VOL. I

FRED. J. DIXON, M. INST. C.E.
ENGINEER.

SOUTH STAFFORDSHIRE WATERWORKS COMPANY.

PUMPING STATIONS.

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SPRINGS MIRE PUMPING STATION

229

situate at

SPRINGS MIRE near DUDLEY

S U M M A R Y
- - - - -

Total Engine Power at Station is
equal to 8,000,000 gallons per 24
hours

No.1. Engine Power per 24 hours	...	2,000,000	galls.
No.2. do do	...	2,000,000	"
No.3. do do	...	4,000,000	"

TOTAL SPECIFIED HEAD

Nos. 1 and 2 Engines	...	161	Feet
No. 3 "	...	175.5	"

C O S T S

		<u>£.</u>	<u>8.</u>	<u>d.</u>
Land and Law Charges	...	857.	8.	9.
Engine & Boiler Houses	...	6,196.	17.	11.
Nos 1 & 2 Engines & 2 Boilers.		6,349.	14.	1.
No.3. Engine and 1 Boiler	...	2,951.	13.	0.
Sundries	..	2,224.	11.	1.
<u>TOTAL COST -</u>		<u>£ 18,580.</u>	<u>4.</u>	<u>10.</u>

Pumping Station Commenced - 1896

" " Completed - 1908

LAND (Area 1 ac., 2 rds., 21 pls., 3 yds.)

Purchased from the Earl of
Dudley in June, 1896.

NOTE:- The land includes that
occupied by the Reservoir as
well as Pumping Station.

Level of E.H.F. above O.D. ... 600.75 Feet

CONTRACTORS.

BUILDINGS.

Engine & Boiler Houses.	H. Lovatt, Erected	1900 - 1901
No. 3. Engine House, and Boiler House Extension.	J. Dallow & Sons. Erected	1906 - 1907

ENGINES

Horizontal Engines Nos 1 and 2	Main Con - tractors. Pawcett, Preston & Co.	
Engines Nos. 1 & 2	do	1901 - 1903
Boilers Nos 1 & 2	H & T Danks, Sub-Contractors.	1901 - 1903
Steel Chimney Stack	Westwood & Wright, B.H.	

CENTRIFUGAL PLANT.

Main Contractors,	Mather & Platt.	
High Speed Engine (No. 3.)	Bellis & Morcom. (Sub- Contractors).	
Centrifugal Pump	Mather & Platt	1907 - 1908
Boiler No. 3.	Edwin Danks & Co. (Sub - Contractors)	
Venturi Meter & Recorder	Geo. Kent Ltd., London.	

C O S T S

	£.	s.	d.
<u>LAND.</u>			
Land and Law Charges ...	857.	8.	9.
<u>BUILDINGS.</u>			
Engine and Boiler Houses ...	6,196.	17.	11.
(Including No.3.Engine House and Boiler House Extension)			
<u>NOTE:- The Steel Boiler House Chimney cost £285.</u>			
<u>ENGINES & 2 BOILERS</u>			
1 and 2 Engines and 2 Boilers,	6,349.	14.	1.
<u>CENTRIFUGAL PLANT (No.3.Engine)</u>			
Engine, Pump and 1 Boiler,	2,951.	13.	0.
<u>SUNDRIES. (mainly as under) ...</u>			
Main Connections,	£1,235.	0.0.	
Boundary Wall,	706.	0.0.	
Excavations,	210.	0.0	
	<u>£2,151.</u>	<u>0.0.</u>	
TOTAL COST -	£ 18,580.	4.	10.

DETAIL OF TENDER for

<u>CENTRIFUGAL PLANT.</u>	£.	s.	d.
Mather & Platt's 3 Chamber Pump,	1,070.	0.	0.
Oil Separator, Pump and Tank,	77.	10.	0.
Morris & Bastert's 3 Ton Crane,	53.	16.	3.
Condenser & Edward's Air Pump,	298.	0.	0.
Feed Pumps, Tank and Feed Pipes,	194.	0.	0.
Steam Pipes and Steam Dryer,	140.	0.	0.
Venturi Meter and Recorder,	279.	0.	0.
	<u>£ 2,112.</u>	<u>6.</u>	<u>3.</u>

Springs Mire is a Re-pumping Station for re-pumping a portion of the water from Ashwood and Hinksford into Shavers End Reservoir and the higher parts of Dudley.

PARTICULARS OF NOS. 1 AND 2 ENGINES

Builders Order No. - 90.

DESCRIPTION OF ENGINE HOUSE.

Internal Dimensions, Length	...	62 Feet.
do Width	...	36 "
Height to top of Wall Plate	...	23 "
Depth of Foundations	...	8 "

DESCRIPTION OF BOILER HOUSE

Internal dimensions, Length	...	60 "
Width	...	35 "

STEEL CHIMNEY STACK

Internal diameter	...	3 Ft - 9 Ins
Height	...	100 Feet
Top Section .. (in 6 tiers $\frac{1}{4}$ in. thick)		26 Ft - 8 Ins Long
Middle " (in 6 " $\frac{5}{16}$ " ")		46 Ft - 8 Ins "
Bottom " (in 6 " $\frac{3}{8}$ " ")		26 Ft - 8 Ins "
	tapering from 3Ft - 9 Ins at top to 7 Ft 6 Ins diameter at bottom of Section.	

ENGINES

Horizontal Compound Tandem Rotary

Surface Condensing.

CAPACITY OF ENGINE.

Each engine is capable of pumping a net quantity per 24 hours (at a speed of 180 ft. per minute) of 2,000,000 gallons

Speed per minute ... 22 $\frac{1}{2}$ revs.

SPECIFIED HEAD

Delivery Pressure 70 lbs per sq. inch	=	161 Feet
Pump Horse Power at 22½ revs.	...	67.5.
Diameter of Steam Cylinders, H.P.,	...	15 Ins
ditto L.P.	...	31 "
Stroke of Engine	...	4 Feet
Cylinders Steam Jacketted.		

PISTON RINGS.

H.P. Pistons fitted with -

Buckley's type, No.2.Rings.

L.P. Pistons with -

Mather & Platts Rings and Springs.

Diameter of Piston Rods, H.P. Front end,	4½	Ins.
ditto Centre,	3½	"
ditto Back End, L.P.,	2½	"

PISTON ROD PACKINGS.

U.S. Metallic Packing Co. Ltd.,
Bradford,.

No.1.Engine - H.P. Packings,	Makers Nos.	83340 - 41
L.P. "	do	83342 - 43
No.2.Engine - H.P. "	do	81029 - 30
L.P. "	do	81031 - 32

ENGINE VALVE GEAR

Ordinary Slide Valves fitted with

Meyer Cut off. Adjustable by hand.

Diameter of Connecting Rod, Crank pin,	6	Ins.
ditto Crosshead "	5½	"
" Crank Shaft Bearings	...	9 "

AIR PUMP.

Vertical Single-Acting driven from
Crank Shaft.

Diameter	...	...	12	Ins.
Stroke	...	...	15	"

Valves - India Rubber.

Diameter, Foot Valve	...	...	9	"
" Bucket "	...	...	10	"
" Head "	...	...	11	"
" Bucket Rod	...	...	2	"
" Inlet	...	...	5	"
" Outlet	...	...	3	"

FORCE PUMPS.

Double-Acting Piston Pump driven
by L.P. Piston Tail Rod.

Diameter, F.P. Piston	...	...	16	Ins.
Stroke do	...	...	4	Feet
Diameter do Rod (Front end)	...	...	2 $\frac{1}{4}$	Ins.
Gallons discharged per double stroke,	...	...	69.1	
Multiplier given to Foreman	...	...	69	

FORCE PUMP VALVES

Cast Iron Double Beat with

Gutta-percha Beats.

Number of Suction Valves	...	...	2	
" Delivery "	...	...	2	
Diameter of Seat of Suction Valves,	...	...	25	Ins.
ditto Delivery "	...	...	26 $\frac{3}{4}$	"
Free lift of Valves as shown on) drawing. )	...	...	1 $\frac{1}{4}$	"

FLYWHEELS (CAST IRON).

Diameter of each wheel	...	18 Feet
Width of Rim	...	7 Ins
wheel made in	...	4 Segments.
Diameter, inside of Boss	...	13 Ins.

CONDENSER.

Enclosed type with tubes expanded
into tube plates with water of
main passing on outside of tubes,

Cooling Surface	...	164.5 Sq. Ft.
Number of ordinary Tubes	...	70
Length	do	6 Ft - 1½ Ins.
Thickness	do	15 I.W.G.
Pitch	do	2⅞ Ins.
Number of Stay Tubes	...	0
Diameter of Tube Plates	...	3 Ft. - 2¼ Ins
Thickness	do	⅝ In. Steel) Plate)
Distance apart over Tube Plates .		6 Ft - 1½ Ins.
Diameter, Exhaust Inlet	...	6½ Ins.
" Outlet	...	5 "

DELIVERY AIR VESSEL. (MILD STEEL)

Total height, inside	...	18 Ft - 9 Ins.
Diameter	"	2 Ft - 11¼ "
Height above branches	...	17 Ft - 5 "
Capacity	do	120 Cu. Ft.
Thickness of Metal	...	⅜ In.
Working pressure per sq. inch	...	70 Lbs.
Total capacity	...	128 Cu. Ft.
Test pressure per sq. inch	...	140 Lbs.

FEED PUMPS ON MAIN ENGINE

These, working off same crosshead as Air Pump are now disused. Independent Feed Pumps in Boiler House take the place of the plunger type Feed Pumps.

STEAM SEPARATOR ON MAIN RANGE IN ENGINE HOUSE.

Made by

Designed by South Staffordshire Waterworks Company.

Diameter	...	...	10 $\frac{1}{2}$ Ins.
Length	...	...	3 Ft - 1 $\frac{3}{4}$ Ins.
Diameter of Inlet	...	...	4 $\frac{1}{2}$ Ins.

GREASE EXTRACTOR.

This is now disused as it was made and fixed to act in conjunction with the disused Feed Pumps on Main Engine. The Air Pump Water of both engines discharged into Extractor, whereas it now runs to waste.

AIR COMPRESSOR.

Made by - The Westinghouse Brake Co., London.

Makers No. on Name Plate 48102.

Number of London Works, 17221.

Single Stage type. Class F.

Size - 6"/6 $\frac{1}{2}$ "

Diameter, Steam Cylinder	...	6	Ins.
" Air do	...	6 $\frac{1}{2}$	"
Stroke of Compressor	...	9	"
Diameter, Steam Inlet	...	$\frac{5}{4}$	"

AIR COMPRESSOR continued

Diameter of Exhaust	...	1	Inch
" Air Delivery	...	$\frac{3}{4}$	"

MAIN BRAKE

Fixed in the Steam Main and controlled by the pressure on the Delivery Main. A Piston actuated by the main pressure pushes against a strong spring and holds the throttle valve of the brake open. If the main bursts, the spring closes the throttle valve, shutting off the steam and also destroying the vacuum.

AIR CHARGER ON AIR VESSEL.

Maker's name:- Gilbert Lewis,
Engineer, Manchester.

Type - Wipperman & Lewis.

Diameter of Delivery Pipe	...	$\frac{3}{4}$	Inch
" Suction Pipe	...	2	"

OVERHEAD TRAVELLING CRANE.

Name on Crane Girders - Dorman, Long & Co.,
Middlesbro'

Load	...	10	Tons.
Span	...	36	Ft - 9 Ins.

STEAM BOILERS. (NOS 1 & 2)

Lancashire Type made by -

H & T Danks, Metherton.

Diameter	...	6	Ft - 6 Ins.
Length	...	26	Feet
Thickness of Shell Plate	...	$\frac{5}{16}$	Inch.
" End Plates	...	$\frac{1}{2}$	"

STEAM BOILERS continued

Diameter of Internal Flues	...	2 Ft - 6 Ins.
ditto (Front End)	...	
ditto (Back End)	...	2 Ft - 1 In.

THICKNESS OF FLUES.

Front End Section	...	$\frac{9}{16}$ In.
Intermediate "	...	$\frac{1}{4}$ In.
Back End "	...	$\frac{9}{16}$ In.
Diameter of Manhole (Circular)	...	16 In.
Steam pressure per sq. inch	...	130 lbs.
Total heating surface ..	...	740 Sq. Ft.

MOUNTINGS ON EACH BOILER

All fittings to be Hopkinson's own
make, as per specification dated
30th October, 1900.

One Steam Junction Valve, Figure 1000,	6 In. dia.
One Patent Compound High Pressure and Low Water Safety Valve loaded to 130 lbs per square inch. Fig. 10.	
One Duplex Dead Weight Safety Valve loaded to blow off at 130 lbs. per square inch. Figure 22.	2 $\frac{1}{2}$ In. dia.
One Cast Iron Anti-Priming Pipe, under- neath Steam Junction Valve.	
One Check Feed Valve, Figure 1320.	2 $\frac{1}{2}$ In. dia.
One Gunmetal Blow off Cock (of the Parallel Slide Type) Figure 2540.	2 $\frac{1}{2}$ In. dia.
Two sets of Patent Absolute Automatic Gunmetal Water Gauges. Figure 6440 (Also Shields for water gauges Class "A").	$\frac{3}{4}$ In. dia.
One brass engraved working level pointer.	
One Bourdon Pressure Gauge, Fig. 4010.	10 In. dia.

ECONOMISERMade by E. Green & Sons, Wakefield.Maker's Number - 7606

Number of Tubes	...	...	48
Diameter of Steam Cylinder in <u>ECONOMISER ENGINE</u>	...	...	3 $\frac{1}{2}$ Ins.
Diameter of Steam Inlet	...	...	$\frac{1}{2}$ "
" Exhaust Outlet	...	...	$\frac{3}{4}$ "
Stroke of Engine	...	...	6 "

NO. 3. BOILER

This Boiler was installed at the
same time as the Centrifugal Plant.
Of the Lancashire type, and made by
E. Danks & Co. Ltd., of Oldbury.

Maker's Order No. 4963.

Diameter of Boiler	...	...	7 Feet
Length	...	...	23 "
Thickness of Shell Plate	...	...	$\frac{5}{8}$ In.
" End Plates	...	...	$\frac{3}{8}$ "
Diameter of Internal Flues, Front End,			2 Ft - 9 Ins
ditto Back "			2 Ft - 3 Ins
Thickness of Flues, Front End Section,			$\frac{9}{16}$ In.
ditto Intermediate "			$\frac{15}{32}$ "
ditto Back End "			$\frac{9}{16}$ "
Manhole - McNeil Type -	...	...	16 In X 12 I
Total Heating Surface	...	...	713 Sq. Ft.
Steam pressure per sq. inch	...	...	130 Lbs.

MOUNTINGS.

One Steam Junction Valve	...	6 In. dia.
One Compound Safety Valve. High Pressure and Low Water Type.		
One Dead Weight Safety Valve	...	2 " "
One Blow Off Valve	...	2½ " "
One Anti-Priming Pipe	...	
One Check Feed Valve	...	2½ " "
Two sets of Water gauges, same as those on Nos 1 and 2 Boilers .		¾ " "
<u>BOILER FEED PUMPS</u>	...	2

1ST PUMP

Double Ram Steam Pump, made by,
Joseph Evans & Son, Wolverhampton.
Maker's number on Pump, 12775

Diameter of Rams	...	3 Ins.
Stroke	...	5 "
Diameter, Steam Cylinders,	...	5 "
" Suction	...	2½ "
" Delivery ..	...	2½ "
" Steam Inlet	...	1½ "
" Exhaust Outlets	...	1 "
Gallons of water raised per hour		1460

2ND PUMP.

Single Ram Pump, made by
J. Cameron Ltd., Salford.
Maker's No. on Pump, 15870.

Diameter of Ram	...	4 Ins.
Stroke	....	6 "
Diameter of Steam Cylinder	...	6 "

Made by Bellis & Morecom Ltd.,

Birmingham.

Maker's No., - 3089

Diameter of Steam Cylinders, H.P.	12	Ins.
ditto L.P.	19	"
Stroke	10	"
Revolutions per minute	390	
Steam pressure at Engine Stop Valve,	120	Lbs.
Brake Horse Power	210	

AIR PUMP. 1

One Steam Driven Single Throw

"Edwards" Air Pump.

Diameter of Bucket	10	Ins.
Stroke	6	"
Diameter, Steam Cylinder	4	"
Speed of Pump .. Revs. per minute,	175	
Diameter of Suction	4	Ins.
" Discharge	3	"
" Steam Inlet	1	"
" Exhaust	1½	"

CONDENSER.

Enclosed type with tubes secured in tube plates by means of screw glands and packing . Water of Suction Main passes through condenser on outside of tubes.

Cooling Surface	470	Sq. Ft.
Number of ordinary Tubes	300	
Length ditto	6 Ft - 2½	Ins.

CONDENSER continued.

Diameter, ordinary Tubes	...	1 In. ext.
Thickness ditto	...	16 L.S.G.
No. of Stay Rods (Rolled Brass)		4
Diameter do	...	1 In.
Pitch of Tubes	...	1½ In.
Diameter of Tube Plates	...	3 Ft - 3 Ins.
Thickness do	...	1½ In.
Distance apart over Tube Plates.		6 Ft - 2½ Ins
Diameter, Exhaust Inlet	...	10 Ins.
" Outlet	...	4 "

OIL SEPARATOR ON EDUCTION PIPE (VERTICAL)

Maker's number on Separator - 548

Made by The Baker Oil Separator Co. Ltd.,

Leads.

Diameter	...	3 Ft - 3 Ins.
Length	...	4 Ft - 6 Ins.
Capacity (Steam dealt with per hour)		5000
Diameter, Steam Exhaust Openings,		10 Ins.

OIL PUMP AND TANK. (Special, run by Belt).

Maker ... as above.

Diameter of Suction Pipe and Discharge Pipe	...	1½ In.
Oil tank for Separator	...	2'-6" X 2'-0" X 2'-6"

HIGH LIFT TURBINE PUMP.

Made by Mather & Platt Ltd.,

Manchester. Maker's Order No.

E.P.41/08. Maker's number of

Pump No. 8. (Special).

HIGH LIFT TURBINE PUMP continued.

Suction Branch	...	...	14 In. dia.
Delivery do	...	...	12 " "
Number of Pump Chambers	...	...	3

STEAM SEPARATOR

Made by Reid & Adie, Abertay Works,

Tayport.

Diameter of Steam Openings	6 Ins.
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OVERHEAD CRANE in ENGINE HOUSE. (S.4.)

Made by H. Morris & Bastert Ltd.,

Loughborough.

Load	...	...	...	3 Tons.
Span	...	...	...	25 Ft - 6 Ins.
Top of Crane Rail to E.H.F.	...	...	...	17 Ft.

VENTURI RECORDER.

Made by Geo. Kent Ltd., London.

Diameter, Venturi Water Meter Tube,	24 Ins.
Minimum Registration per hour, ..	34,000 galls
Maximum ditto ...	450,000 "

NOTE:- This Recorder only registers the quantity of water pumped when the Centrifugal Plant is at work.

All gauges on gauge board in No. 3.

E.H. are of the open dial type. 10 In. dia.

LUBRICATORS.

Sight Feed Lubricator of No. 1. Engine is of C. Winn & Co's make, one pint "Granville" type.

Number on Lubricator ... 5544.