


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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WOOD GREEN PUMPING STATION.

situate at

WEDNESBURY in the COUNTY OF STAFFORD.

S U M M A R Y.

No. 1 Steam Engine.	Power per day.	4,000,000 gallons.
No. 1 Electrically Driven Pump.	ditto.	1,584,000 "
No. 2 ditto	ditto	1,872,000 "
No. 3 ditto	ditto	1,872,000 "

Total Engine Power at Station is equivalent
to 9,328,000 gallons per 24 hours.

Steam Engine	Total Specified Head.	334.515 feet
Electrically Driven Pumps.	ditto.	357.585 "

C O S T S.

	£.	s.	d.
Land and Law Charges. ...	200.	0.	0.
Old Engine and Boiler Houses. ...	9,730.	0.	0.
5 Cottages. ...	1,496.	4.	0.
New Engine and Boiler Houses. ...	3,203.	7.	5.
Steam Engine and Boilers.(2) ...	8,222.	9.	8.
Electrically Driven Pumps. ...	6,364.	12.	1.
Foundations for Pumps. ...	813.	6.	3.
Venturi Tube and Recorders. ...	478.	13.	6.
Main, Connections &c. ...	720.	13.	6.
	<u>231,229.</u>	<u>6.</u>	<u>5.</u>
		<u>172.</u>	<u>0.</u>
		<u>0.</u>	<u>0.</u>

PUMPING STATION COMMENCED. ... 1871.
 ditto COMPLETED. ... 1921.

WOOD GREEN P.S.

L A N D.

Land.	Date purchased.	1870.
"	From whom purchased.	R. Jesson.
Area of Land.	... ..	2 Roods, 28 poles.
Level of E.H.F. above O.D.		413.86 feet.

CONTRACTORS:-

BUILDINGS.

No. 3 Engine (Repair Shop) Boiler Houses.	Parkes & Son, 1871.
Old Nos 1 & 2 Engine House. ...	J. Garlick 1876.
5 Cottages.	Parkes & Son, 1871.
New Engine and Boiler Houses. ...	Geo. Law. 1910.

ENGINES.

No. 1 Engine & Boilers.	Galloways Ltd. 1910 - 12.
Duplicate Plants, Electrically Driven Pumps.	Sulzer Bros. 1920.
Venturi Meter & Recorder.	G. Kent Ltd., 1920.

C O S T S.

	<u>£.</u>	<u>s.</u>	<u>d.</u>
Land & Law Charges.	200.	0.	0.
Old Engine and Boiler Houses.	9,730.	0.	0.
5 Cottages.	1,496.	4.	0.
New Engine & Boiler Houses.	<u>3,203.</u>	<u>7.</u>	<u>5.</u>
Carried forward.	£14,629.	11.	5.

WOOD GREEN P.S.

279

	<u>£.</u>	<u>s.</u>	<u>d.</u>
Brought forward.	14,629.	11.	5.
No. 1 Engine & Boilers.	8,150.	2.	5.
Electrically Driven Pumps.	5,813.	13.	3.

Details of cost of some of the principal items included in the total, £5,813. 13. 2. for Electrically Driven Pumps.

	£.	s.	d.
3 Sulzer Pumps, Couplings and Bedplate.	1,440.	0.	0.
3 - 200 H.P. Motors.	1,079.	6.	6.
3 Switch Gears.	272.	14.	0.
3 Starters.	211.	19.	0.
Supplying and Erecting Cables.	957.	0.	0.
22", 20", 18", 10" & 4" Sluice Valves.	531.	12.	0.
Cast Iron Suction and Delivery Pipes.	1,273.	2.	9.
Foundations for above Pumps and Transformer House.	813.	6.	3.
Venturi Meter Tube & Recorder, also erecting of same.	478.	13.	6.
Main Connections &c.	720.	13.	6.
<u>TOTAL COST.</u>	<u>230,606.</u>	<u>0.</u>	<u>4.</u>
<u>ELECTRIC WATER LEVEL INDICATOR</u>	<u>172.</u>	<u>0.</u>	<u>0.</u>

PARTICULARS OF BUILDINGS.

OLD ENGINE HOUSES.

Nos. 1 & 2 (Stores) Internal dimensions.	51 feet long.
ditto.	33 feet - 2 ins. wide.
<u>NO. 3 (REPAIR SHOP.)</u>	
Internal dimensions.	51 ft. - 6 ins. long
ditto.	20 feet wide.

OLD BOILER HOUSE (METER SHOP.)

Internal dimensions.	...	...	54 feet - 10 Ins. long.
ditto.	...	...	46 " 2 " wide.

NEW ENGINE HOUSE.

Internal dimensions.	...	...	41 feet long.
ditto.	...	...	39 feet - 9 ins. wide.
Height to top of Wall Plate	...	...	31 "
Depth of foundations.	...	...	17 "
Boiler House, internal dimensions	...	...	52 " - 6 Ins. long.
ditto.	...	...	25 " - 1 " wide.

This Station is a re-pumping Station. The Plant draws its water from the Lichfield main at a pressure of about 15 lbs. per square inch and delivers the same into the Dudley main at about 170 lbs. per square inch.

PARTICULARS OF NO. 1 ENGINE.

Engine Builders Order No.	6940.
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TYPE OF ENGINE.

Inverted Triple Expansion Surface
Condensing Rotative Type with
Flywheel at L.P. Cylinder end of
Engine.

ENGINE CAPACITY.

Net quantity per 24 hours at 200 feet per minute. 4,000,000 galls

SPECIFIED HEAD.

Maximum delivery pressure per square inch.	160 lbs.
Minimum Suction ditto.	15 lbs.
Total Specified Head in feet.	334.515
Revolutions of engine per minute.	25
Pump Horse Power at 25 revolutions.	281.5.

PARTICULARS OF NO. 1 ENGINE (cont.)STEAM CYLINDERS.

Diameter of Steam Cylinders,	H.P.	...	20 $\frac{1}{2}$ Inches
"	"	"	I.P.
"	"	"	...
"	"	"	32 "
"	"	"	L.P.
"	"	"	...
"	"	"	50 "
Stroke of Engine.	...	...	4 feet.

Steam Cylinders are not jacketted.

Diameter of all Piston Rods. 4 $\frac{1}{2}$ Inches.

Type of Piston Rod Packings. Metallic.

Makers name. The United
Metallic
Packing Co.,
Bradford.

Maker's number on H.P. Rod Packing.

ditto I.P. ditto.

ditto L.P. ditto.

TYPE OF ENGINE VALVE GEAR.

The valve gear is of the Corliss type of the Reynolds design, actuated by eccentrics and rods. The Trip gear on Steam Valves is provided with noiseless dash pots.

TYPE OF PISTON RING.

Mather & Platt's packing rings and springs.

PACKING OF VALVE SPINDLES.

Maker's name. ... The United States Metallic
Packing Co., Bradford.

Maker's number on Packings.

H.P. Steam.	...	69068-0
H.P. Exhaust	...	69070-1
I.P. Steam	...	69072-3
I.P. Exhaust.	...	69074-5
L.P. Steam.	...	69076-7
L.P. Exhaust.	...	69078-9.

TYPE OF AIR PUMP.Independent Steam Driven, Edward's Type.

Diameter of Air Pump Bucket.	...	12 inches.
Stroke.	...	8 "
Number of Valves on head plate.	...	6
Diameter of Valve Guards.	...	3½ inches.
Type of Valves.		Kinghorn Metallic. 3 ply.
Diameter of Bucket Rod.	...	1¾ inches.
Metal ditto.	...	Muntz's Metal Co.
Diameter of Steam Cylinder.	...	5 inches.
Stroke of Engine	...	8 inches.
Diameter of Piston Rod.	...	1¾ "
" " Piston Valve.	...	2 inches.
" " " " Spindle.		¾ inch.
" " Inlet to Pump	...	4½ inches.
" " Outlet from Pump	...	3½ "
" " Steam Inlet.	...	1½ "
" " Exhaust Outlet.	...	1½ "
Maker's name.		Edward's Air Pump Syndicate Ltd.

TYPE OF FORCE PUMPS.

Three single-acting plunger type placed directly
under Steam Cylinders.

Diameter of Plungers.	...	17 inches.
Stroke.	...	4 feet
Capacity of One Plunger.	...	39.3 gallons.
" " Three Plungers.	...	117.9 gallons.
Multiplier given to Foreman.	...	118 "

TYPE OF FORCE PUMP VALVES.

Valves of the Multi-annular type placed
in annular speed round pump plungers.

FORCE PUMP VALVES (continued)

Total number of Suction Valves.	...	45
" " " Delivery Valves.	...	45
Metal of Valves.	...	Phosphor Bronze.
Diameter of Screwed Seats..	...	6 inches over. threads.
Depth.	...	2 1/4 inches.
Lift of Valves.	...	11/16 inch.
Area through seat of one valve.	...	15.6 square inches
" " one Valve.	...	15.78 " "

TYPE OF CONDENSER.

Enclosed type with tubes expanded into tube plates. The Suction from the Lichfield main passes through the condenser on the outside of tubes.

Cooling Surface	...	562
Number of ordinary brass tubes.	...	308
Diameter of ordinary brass tubes.	...	1 inch external.
Length " " "	...	1 feet - 10 1/2 inches.
Thickness " " "	...	19 B.W.G.
Number of Stay Brass Tubes.	...	13
Diameter of Stay Brass Tubes.	...	1 1/16 inch external
Length " " "	...	7 feet, 0 1/2 inch.
Thickness " " "	...	3/16 inch.
Pitch of all Tubes.	...	1 3/4 inches.
Diameter of Rolled Brass Tube Plates.	...	3 feet - 10 1/2 inches.
Thickness " " "	...	1 inch.
Distance apart over Tube Plates.	...	6 feet - 10 1/2 inches.
Diameter of Exhaust inlet.	...	10 inches.
" " " Outlet.	...	6 "
" " Openings for Cooling Water	...	22 " diameter.
Size of Injection Valve fitted to Condenser.	...	4 inches diameter.

TYPE OF SUCTION AIR VESSEL.

		Cast Iron.
Total height inside.	....	15 feet - 6 $\frac{1}{2}$ inches.
Diameter inside.	....	5 feet - 6 "
Height above Inlet Branch.	....	9 feet - 5 "
Thickness of Metal.	....	1 $\frac{5}{8}$ inch.
Working pressure per square inch as specified.	....	50 lbs.
Height above Outlet Branch.		13 feet - 5 inches.
Capacity above " "	....	296 cubic feet.
Total capacity.	....	344 cubic feet.
Diameter of Branches.	....	22 inches.

TYPE OF DELIVERY AIR VESSEL.

		Mild Steel
Total height inside.	....	14 feet - 9 inches.
Diameter inside.	....	4 feet.
Height above Outlet Branch.	....	12 feet.
Thickness of Metal.	....	7/16 inch.
Working pressure per square inch.	....	160 lbs.
Capacity above Outlet Branch.	....	148 cubic feet.
Total Capacity.	....	185 cubic feet.
Diameter of Branches.	....	20 inches diameter.
Test Pressure per square inch.	....	320 lbs.

FLYWHEEL.

Diameter of Flywheel.	....	16 feet.
Width of Rim.	....	14 inches.
Depth of Rim.	....	16 inches.
Inside diameter of boss.	....	13 inches.
Wheels are in halves, with	....	6 arms.
Diameter of 3 Crank Shaft Bearings.	....	10 $\frac{1}{2}$ inches diameter.
" of 2 Flywheel Bearings.	....	11" inches.
Diameter of Crank Pins.	....	10 $\frac{1}{2}$ "

WOOD GREEN P.S.

Diameter of Crosshead Pins.	....	6 inches.
Length of Connecting Rods between centres.	....	8 feet.

OIL SEPARATOR ON EDUCTION PIPE.

Type.	Vertical & Cylindrical
Maker's name.	Baker Oil Separator Co. Hanslet, Leeds.
Diameter of Separator.	....	3 feet - 6 inches.
Length ditto	....	5 " 6 "
Diameter of Inlet & Outlet.	....	10 inches.
Capacity of Separator (lbs. of Steam per hour)	....	6,000

OIL PUMP FOR SEPARATOR.

This Pump was supplied by David Bridge & Co.,
Engineers, Castleton,
MANCHESTER.

The Pump is driven off the Edwards Air Pump.

Diameter of Plunger.	....	1 $\frac{3}{4}$ inches.
Stroke of Pump.	3 $\frac{1}{4}$ "

OIL TANK FOR SEPARATOR.

Size of Galvanized Tank.	2' - 9" x 1' 9" x 2' 6"
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FEED WATER PUMPS.

Number of pumps at Station.	2.
Type.	"Tipton", Vertical. Lee, Howl & Co., Tipton.
Diameter of Steam Cylinders.	....	4 $\frac{1}{2}$ inches.
" " Water Pistons.	....	3 "
Stroke of Pumps.	....	12 "
Capacity in Gallons per hour.	....	550.
Diameter of Suction and Delivery Pipes.	....	2 inches.

WOOD GREEN P.S.FEED PUMPS (cont.)

Diameter of Steam Inlets.	....	$\frac{3}{4}$ inch.
" " Exhaust Outlets.	....	1 "
Packings on Piston Rods.	....	U.S. Metallic.

CAST IRON SEPARATOR FOR FEED PUMPS.

Diameter of Steam Separator.	....	7 inches.
Length " ditto.	....	21 $\frac{1}{4}$ inches.
Diameter of Inlet.	....	2 $\frac{1}{2}$ inches.
" " Outlet.	....	2 "
Test Pressure per square inch.	....	320 lbs.

FEED WATER TANK.

	....	Cast Iron.
Size of Tank.		4' - 4" x 3' x 4' deep.

A feed water heater of the horizontal "Simplex"

Berryman Heater type is fixed inside tank for the exhaust steam from feed pumps to pass through to waste and also the Exhausts of Air Pump Engine and Westinghouse Pumps.

Maker's name of Feed Heater.	J. Wright & Co., Tipton.
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AIR COMPRESSOR.

Type.	Single-Stage.
Maker's name.	The Westinghouse Brake Co., London.
Size.	....	6/4.
Class.	....	F.
Steam Inlet.	....	$\frac{3}{4}$ "
Exhaust Outlet.	....	1 inch.
Air Delivery.	....	$\frac{3}{4}$ inch.
Maker's number on Compressor.	....	48150.
" " London Works.	....	17269.

OVERHEAD TRAVELLING CRANE.

Maker's name.	.....	R.C.Gibbons & Co., Birmingham.
Load.	.....	10 tons.
Span.	.....	40 feet - 3 inches.
Height from E.H.F. to top of Crane Rail.	.....	26 " 9 "

MAIN BRAKE ON STEAM RANGE.

Diameter of main brake piston.	.....	3 inches.
Outside diameter of Brake Spring.	.....	5 7/16 inch.
Inside ditto.	.....	3 5/16 inch.
Section of Spring.	.....	Rectangular.
Free length of Spring.	.....	25 inches.
Spring 12 inches long when loaded with		918 lbs.
ditto 9 inches	ditto	1,130 "
Diameter of Throttle Valve in Steam Range.	.....	9 1/2 inches.
Size of pressure pipe to main Brake.	.....	1 1/2 inches, diameter.
" " Vacuum Spoiler pipe to Condenser.	.....	3/4 inches diameter.

ENGINE STOP VALVE AT ENGINE.

Diameter of valve.	.....	5 inches.
Type.	.....	Hopkinson's Ferranti Figure 2025.

FEED WELL LUBRICATOR ON ENGINE.

Maker's Name.	.....	The Empire Engineering Co.Ltd.
Type.	.....	2 feeds.
Glasses.	.....	1 1/8 inch diameter x 3 3/8 inches long.

STEAM BOILERS.

Type.	.....	Lancashire.
Number at Station.	.....	2.

STEAM BOILERS (cont.)

Maker's Name.	....	....	Galloways Ltd., Manchester.
Maker's number for No. 1 Boiler.	....	....	12845
ditto No. 2 "	....	....	12846
Diameter of Boilers.	....	....	8'-3" to 8'0".
Length ditto	....	....	30 feet.
Thickness of Shell Plates.	....	....	$\frac{3}{4}$ inch.
" " End "	....	....	$\frac{3}{4}$ "
Diameter of Internal Flues front end	....	....	3 feet - 2 inches.
ditto back "	....	....	2 " 8 "
Thickness of Flues.			
Front End Section.	....	....	$\frac{8}{16}$ inch.
Intermediate Section.	....	....	$\frac{9}{16}$ inch.
Back End.	....	....	$\frac{7}{8}$ inch.
Type of Manhole.	....	....	M.S. Neil,
Size of "	....	....	16 inches x 12 inches
Steam Pressure per square inch.	....	....	160 lbs.
Test ditto.	....	....	260 "

MOUNTINGS ON EACH BOILER.

All of Hopkinson's make, and Specification B.1909.

One Hopkinson-Ferrenti Patent Stop Valve, Figure 2025.	....	....	7 inches diameter.
One Anti Priming pipe for above.	....	....	Figure 9058.
One Figure 7 Patent Dual Safety Valve for high steam and low water.	....	....	Class B.
One Figure 10 Patent "Ipsed" Safety Valve.	....	....	$2\frac{1}{2}$ inches diameter.
One Figure 2540 Bronze Blow off Valve with patent "Oplok" Pinion with box key, Figure 6223.	....	....	$2\frac{1}{2}$ " "
Two $\frac{3}{4}$ " "Absolute" Water Gauges, Figure 6440. Class B.	....	....	$\frac{3}{4}$ inch.
Centres of Top and Bottom.	....	....	18 inches.
One Gunmetal Water Level Pointer.	....	....	Figure 6250
One Figure 4180 Open Faced Dial, Steam Gauge.	....	....	10 inches diameter.

MOUNTINGS ON EACH BOILER (cont.)

One Figure 1361 "Accessible" Check Feed Valve.	...	2 $\frac{1}{2}$ inches diameter
Fusible Plugs in each Boiler.	...	2.
One Asbestos packed Cock & Syphon for Steam Gauge.	...	Figure 4180.

SUPERHEATERS TO BOILERS.

Number of Superheaters.	...	2.
Maker's name.	...	T. Sugden Ltd., London E.C.
Tubes.	...	Solid drawn "U" Shaped Steel Tubes.
Diameter of Tubes (outside)	...	1 $\frac{1}{2}$ inches.
Number of Tubes.	...	40
Diameter of Steam Inlet and Outlet.	...	7 inches.

FITTINGS TO SUPERHEATERS.

Spring loaded Safety Valve Hopkinson's make, Figure 640.	...	1 $\frac{1}{2}$ inches, dia.
One Wrought Steel thermometer pocket.	...	
One Special Solid Glass Thermometer to read up to 600 degs. Faht.	...	

VALVES ON STEAM RANGE IN BOILER HOUSE.

4 - Hopkinson's Ferranti Patent Stop Valves, Figure 2025.	...	7 inches diameter.
Steam Trap of Lancaster & Tonge's, Bucket Type fitted on drains, from Main Steam Boiler Range.	...	1 inch diameter.

AUTOMATIC C.O. 2 RECORDER.

Maker's name.	...	"Auto" Recorder Co Leicester.
Type.	...	Model "A".

LUBRICATORS.

Hunt & Mitton's make of Spring Top
Lubricators are fitted on the following :-

LUBRICATORS (cont.)

Engine Guides.	...	2 inches, diameter.
Four Crank & Crosshead Pins.	...	2½ " diameter.
On Main Bearings.	...	3½ " "
On Eccentric Rods.	...	1½ " "
Total number on engine.	...	41.

VENTURI METER TUBE & RECORDER.

Maker's Name.	...	G. Kent Ltd., London.
Diameter of Venturi Meter Tube fitted with 1912 type combined Recorder.	...	20"
Minimum Registration per hour...		19,000 gallons.
Maximum ditto.	...	270,000 "
Our order number dated 23rd May, 1919.	...	1027.

The official Trial of No.1
Engine took place on 4th April, 1913.

Duration of Trial.	...	6 hours.
Duty per 1,120 lbs. of Steam, (Slip neglected)	...	178,310,345 ft. lbs.
Average I.H.P. throughout trial.	...	306.52
Average P.H.P. throughout trial.	...	288.7
Gross Mechanical Efficiency	...	94.18%
Nett ditto.	...	89.38%
Duty of Engine guaranteed by Contractors.	...	174,000,000 ft. lbs.

PARTICULARS OF DUPLICATE PLANT.

TYPE OF PLANT. Electrically Driven Centrifugal Pumps.

Number of Units at Station. ... 3.

CAPACITY OF PUMPS (GUARANTEE FIGURES.)

No. 1 Pump is capable of pumping against a head of 346 feet when running at 1,465 revolutions per minute - 1,584,000 gallons.

Nos. 2 & 3 Pumps are capable of pumping against a head of 335 feet when running at 1,465 revolutions per minute. = 1,872,000 gallons.

SPECIFIED HEAD.

Maximum delivery pressure per square inch.	... 170 lbs.
Minimum Suction ditto.	... 15 lbs.
Total Specified Head.	... 155 lbs. or 357.58 feet.
Speed of Pumps at full load.	... 1,465 revs per minut
Pump Horse Power of No 1 Pump	... 119
" " of No 2 and 3 Pumps	... 14 each.

TYPE OF PUMPS.

The three Pumps are of Messrs. Sulzer Bros., London, high lift 3 stage Centrifugal type.

NO. 1 PUMP.

Maker's number on Pump.	... 84557.
Diameter of Impellor Wheel.	... 12.8 inch.
" " " Vanes.	... 12.8 "
Size of Diffusers.	... .157" x 1.97 inch.

NOS. 2 & 3 PUMPS.

Maker's number of No. 2 Pump.	... 84558 <u>11</u>
14.	

NOS. 2 & 3 PUMPS (cont.)

Maker's number of No. 3 Pump.	...	84558	<u>III</u>
Diameter of Impellor Wheels.	...	13.2	inch.
" " " Vanes.	...	12.8	"
Size of Diffusers.	...	.157"	x 2.68"
Diameter of Suction and Delivery Branches on all Pumps.	...	10	inches.
Diameter of Sluice Valves on all Branches.	...	10	"
" " " " on Inlet Main from Cannock.	...	18	"
Diameter of Sluice Valves on Inlet main from Lichfield.	...	22	"
Diameter of Sluice Valves on delivery main to Dudley.	...	20	"

CONNECTIONS.

The connections are made on the Suction side by 10 inch Branches to the 22 inch main from Lichfield and on the delivery side by 10 inch branches to the 20 inch delivery main to Dudley, delivering through a 20 inch Venturi Meter Tube.

MOTORS.

The pumps are direct driven by motors supplied by the British Thomson Houston Co. Ltd., Rugby.

The Motors are of the B.T.H. Induction Protected slip ring type with two end shield bearings, totally enclosed slip rings fitted with brush raising and short circuiting device and standard bare shaft extension fitted with half coupling, also a set of holding down bolts. The British Thomson Houston requisition No. 10973.

Numbers of Motors (Maker's) Machines Nos.	R 32246 - 7 - 8
" " " Rotors Nos.	R 33879 - 80 - 81.
Type of Induction Motor.	... I.X.O. 96 Form M.

MOTORS (cont.)

Poles.	...	...	...	4.
Brake Horse Power.	...	...	...	200 each.
Revolutions per minute.	...	...	...	1475
Voltage.	...	...	...	200.
Periodicity.	...	...	...	50.
Phase.	...	...	...	2.
Amperage.	...	...	...	440
Approximate efficiency at full load.	...	...	...	89%
ditto	quarter	"	...	89%
ditto	half	"	...	88%
Approximate Power Factor at full load...	...	...	...	89%
ditto	quarter	"	...	86%
ditto	half	"	...	81%

SWITCH GEARS.

3 B.T.H., O.J.2, 500 amp, 2 coil, D.P. Pedestal type equipment, complete, with covers, pedestal, tie rods, ammeter, voltmeter, plug low volt release, time lag, cam lift, lever for withdrawing, 2 Fuse Blocks and links fixings and time lag oil.

One line of each phase goes through switch and the other line straight to motor. The switch is interlocked with the rotor starter, to prevent closing unless starter is in off position.

ELLISON STARTERS.

3 Ellison's type rotor starters, totally enclosed, oil immersed, and arranged for floor mounting with slow motion gear and interlocked with switch gear.

SWITCHBOARD - CABLES AND CONNECTIONS.

The switchboard and cables were supplied and fixed by Messrs. Smith & Bellhouse of Wolverhampton.

SWITCHBOARD.

The switchboard controls the three circuits to the pump motors, the power for the Engineering Workshop and the Lighting.

The Board consists of:-

3 - 500 amp. D.P. Lever Operated Iron Clad Switches.

1 - 150 " D.P. Iron Clad Switch.

1 - 100 " " " "

3 Busbars with interconnections to switches and Isolating Links for the neutral.

The whole is mounted on iron frame work with steel metal covering under the switches and over the Busbars. The covering for the busbars is detachable for inspection and operating purposes.

The Board is fixed to the wall and so arranged that all connections can be made from the front without having to dismantle the frame work or switchgear. The whole apparatus is of substantial construction and in accordance with Home Office Regulations.

CABLES.

The Cables consists of 3 sets of .5, .5, .707 square inch, pipes insulated lead covered 3 core cables, fitted with suitable trifurcating boxes at each end and carried on 3 way porcelain cable cleats attached to the wall and flooring.

Six sets of single rubber insulated cables leading from the trifurcating boxes to the Switchboard at the one end and from the oil circuit breakers to the motors at the other end.

Three sets of Single rubber Insulated Cables from Slip Rings of the Motors to the Rotor Starters with all necessary brackets and supports for Cable and Boxes.

ELECTRIC CURRENT.

The Electric current is obtained from The Midland Electric Corporation for Power Distribution Ltd., and is transformed down at the pumping station in the transformer house to a voltage of 200 per phase in two phase alternate currents of 50 periods per second.

A Power Company's meter for registering the consumption of current is on each phase.

A Lighting Meter is also fixed for registering the current consumed for lighting.

The Electrically driven duplicate Plant first started pumping into the main on the 1st of June, 1920.