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PLANT NO. 3

(RICHARD CITY, TENN.)

of

PENNSYLVANIA-DIXIE CEMENT CORPORATION

by

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LIDHARY

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PENNSYLVANIA-DIXIE CEMENT CORPORATION

by C. Edson Hardy*

Construction on this plant was started by the Hunt Engineering Company in 1906 and it was one of the typical plants constructed by the Nicholson interests during this period. The first cement was produced in 1907. It was a semi-wet plant with single stage grinding in both the Raw and Finish Grinding departments. Twenty-two 30" old style Griffin Mills were driven from a common line shaft in the Raw Mill and 26 units were similarly driven in the finish Mill. Burning was accomplished in ten 8 feet by 110 feet kilns. Improved Griffin Mills subsequently replaced the old style and you will still find 18 of these units doing the preliminary grinding in the Finish Mill. Shortly after the first world war, modernization of this plant was initiated and covered the reconstruction of the entire plant from the Quarry thru the Kiln department. Turbo-Generators, Machine Shop, Store Room, Electrical Repair Shop, Substation and a combined Office-Laboratory-Service Building were included in this program. This work was discontinued about 1927 and neither the Finish Mill nor the Cement Storage were rehabilitated due to the so-called business recession of the 1930's followed by the second world war.

Stone and shale are quarried in an open hillside quarry, this material being loaded in 10 ton side dump standard gage steel cars by one of four steam shovels which include one Marion No. 36 Caterpillar type full revolving, with a 1 1/4 yard bucket; two No. 60 Marion railroad type shovels equipped with $2\frac{1}{2}$ yard buckets and one No. 125 Marion Caterpillar full revolving shovel equipped with a four yard bucket.

Haulage is accomplished with three 35 ton standard gage Porter steam locomotives.

The stone and shale are dumped directly into a 42" Allis Chalmers gyratory primary crusher which is followed by a 6' x 18' revolving screen. The oversize from the screen discharges to a 30" x 72" double roll Allis Chalmers crusher. Two inclined belt conveyors, a 24" and a 30" take the screen undersize and the roll product respectively to the Raw Storage. A longitudinal reversable 24" belt conveyor permits distribution of both stone and shale to either end of the storage, a cross wall separating the two ingredients. Two tunnels under the storage, each containing a 24" belt conveyor permit reclaiming by gravity although a Shephard bridge crane serves the entire storage for reclaiming material that would not be otherwise available.

* Superintendent, Southern Division Pennsylvania-Dixie Cement Corporation Each tunnel belt is fed by two table feeders, one for shale and one for stone, and discharges to a Pennsylvania SXT 13 hammer mill which is installed directly over a No. 106 Smidth Kominuter. Each of the two Kominuters operate in closed circuit with two Jeffrey 4' x 7' vibrating screens equipped with toncap screens having a clear opening of about .06 inches. The undersize from the screens goes to a catenary trough feeding three 7' x 26' Smidth tube mills which discharge to a 2,000 bbl. concrete blending basin.

The slurry entering this basin is continuously sampled and composite samples are analyzed every two hours, correction being made as indicated by adjusting the table feeders in the storage tunnels. Eight concrete storage tanks, each containing 800 bbls. are filled in turn from the blending basin and analyzed for chemical composition. These tanks are then transferred in proper proportion to obtain a correct feed to a rectangular concrete feed tank containing 6,000 bbls. and served by a Smidth traveling agitator.

Slurry is fed to the two kilns with Smidth scoop feeders from a constant level tank. The kilns have five tires, are 11 feet and 3 inches and 10' 0" in diameter and as originally installed were 343' - 9" in length and each was equipped with double drum Smidth Unax coolers consisting of 16 inside and 16 outside drums. Internal Zonax coolers were subsequently installed to control the autoclave expansion. Both the Unax and Zonax coolers were replaced with Fuller grate coolers in 1946, the kilns being shortened some 3 feet at this time.

Kennedy-Van Saun air swept coal grinding ball mills were installed simultaneously with the grate coolers. New coal handling facilities including a track hopper and Jeffrey coal crusher were also a part of this improvement.

Clinker is conveyed to 11-16' O" diameter by 20' O" steel tanks, each of which feeds two Griffin Mills. There are 18 - 30" improved Griffin Mills, each group of six being driven from a common line shaft which is in turn belt driven from a 300 H.P. Supersynchronous 2200 Volt three bearing G.E. motor with Smidth Lenix snub pulley. The Griffin Mills discharge thru suitable conveyors to four tube mills, three of which are 6' - 6" x 18' O" with 250 H.P. motors, the fourth being a 7' x 22' mill driven by a 300 H.P. motor. Two 16' O" Bradley separators permit closed circuit operation of the tube mills for producing Type III cement. Open circuit grinding is normally used for Type I and IA cement.

Cement is delivered to rectangular flat bottom storage bins thru a Robinson cement pump with a 16" longitudinal screw conveyor accomplishing the final conveying operation. Reclaiming is done with the conventional scoop drag (kitch in Lehigh Valley terminology) which discharges to a floor screw conveyor in front of the bins. A Hough Payloader, powered with a gasoline engine, has proven very useful for cleaning the flat bottom bins.

Conveying to the Packing Bins is done in the usual manner. All package loading is done by two 4-tube Modern packers, each discharging to a link belt conveyor running parallel to the loading tracks. Bulk is loaded directly from the same screw conveyor supplying the Packing Bins

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and a track scale is so located as to permit weighing during the loading operation.

No outside power was available at the time this plant was built and the entire plant was equipped with 240 Volt D.C. motors supplied from steam engine generators. Two direct current turbo-generators, one high and one low pressure, were installed in 1920 and in 1923, the original small Heine boilers of which there were ten, were replaced with three 700 H.P. B&W boilers equipped with Westinghouse underfeed stokers. In 1925, a favorable contract was negotiated with the Tennessee Power Company and all power has been purchased since June of that year. All large D.C. motors were replaced at that time with 2200 Volt A.C. motors, most of them being Supersynchronous. Three 500 H.P. M.G. sets supplied direct current for the many small motors which were not replaced. Thru the years, replacement of D.C. motors has continued and our entire D.C. load is now handled by one M.G. set.

The installation of Ore & Sand storage tanks equipped with Jeffrey waytrols is currently under way which will permit more accurate proportioning of these ingredients in making Type II composition.

Rebuilding of our Finish Mill will likely be prosecuted in the near future and some equipment has already been ordered.

A Bucyrus $2\frac{1}{2}$ yard Diesel Shovel is also on order for delivery in early 1949, and replacement of our present rail haulage in the quarry with trucks is also being given serious consideration.

Additional packing facilities are also necessary to permit us to meet our maximum shipping schedules without resorting to afternoon and night loading which is now in effect.