DESCRIPTION OF THE FORT WORTH PLANT,

TRINITY DIVISION, GENERAL PORTLAND CEMENT COMPANY

by C. E. Caron

DESCRIPTION OF THE FORT WORTH PLANT,

TRINITY DIVISION, GENERAL PORTLAND CEMENT COMPANY

By C. E. Caron*

The Fort Worth Plant is located due north of the city of Fort Worth on the edge of but outside of the city limits. This plant was built in 1924 with one kiln in operation and a second kiln was added in 1929. In 1940, these two kilns were combined to make one long kiln which is now the present No. 1 kiln. In 1947, a second long kiln similar in length has just been installed.

The rock quarry, which adjoins the plant site is operated by removing the top limestone for the calcareous materials and the shale immediately underlying this limestone is used for the argillaceous material. The limestone is quarried after being blasted with dynamite loaded in well drill holes, which have been drilled with a Bucyrus-Erie, Model 27T, electric blast hole drill. This drill is mounted on full caterpillar traction and mounts a one-piece all steel 40 ft. high derrick.

The rock is excavated by a Bucyrus-Erie electric shovel, Model 50-B, equipped with a two yard capacity bucket. The rock is loaded on to a ten yard Western wheeled scraper quarry car which transports it over a Woodford haulage system to the crusher. This system is further described in another paper being presented at this meeting.

The rock, on reaching the crusher department, is dumped on to a Stephens Adamson steel apron conveyor which is driven by a 10 h.p. motor and driven at a maximum speed of 19 ft. per minute. This rock is fed to a No. 7 Mammoth Williams hammer mill equipped with 24 manganese hammers weighing 105 pounds each. This mill is driven by a 250 h.p. motor direct connected with a pin and belt type coupling.

The crushed rock is delivered to a Link Belt inclined elevator equipped with 9" x 14" x 24" buckets and this elevator discharges on to a 36 in. rubber covered belt conveyor which carries the rock to the rock department of the main storage building. Excavated shale is handled in the same manner as the rock and when it reaches the storage building, the crushed shale is stored in a different department set aside for shale storage.

The storage building which runs north and south adjacent to the mill building is 73 ft. wide by 360 ft. long. This storage building is equipped with a six ton Sheppard-Niles overhead crane with a three cubic yard Hayward clamshell bucket. This overhead crane handles shale and rock to the raw mill storage bins as well as clinker and gypsum to the finish mill storage bins.

The raw mill department consists of two 8' x 30' Traylor - three compartment grinding mills and each of these mills is driven by a 700 h.p.

---

*General Superintendent, Trinity Division, General Portland Cement Company, Dallas, Texas.

General Electric synchronous motor, 180 r.p.m., direct connected to the mill pinion shaft. Slurry delivered from these mills is pumped to the raw mill mix tanks for correction and blending and is then pumped to storage tanks or the kiln feed tanks. The slurry pumps installed consist of Morris, Wilfley and Worthington pumps of various sizes. Most of the blending is done by circulating with these pumps.

Kiln feed is delivered by pumps from the kiln feed tanks to feeders set at approximately the same elevation directly behind and above each kiln feed end. No. 1 kiln is 425 ft. long - 11 ft. 3 in. diameter at each end with an intermediate 10 ft. diameter section. Feed for No. 1 kiln is controlled by means of a Ferris Wheel type feeder connected through a shaft extension and driven by a chain and sprocket attached to the outside of the kiln shell. Thus, the amount of feed entering the kiln is controlled by the speed of the kiln.

No. 1 kiln is equipped with F. L. Smidth chain section and on the discharge end it is equipped with a Vanderwerp recuperator. Clinker discharges from this recuperator section to a drag chain cooler with a double wind box. The coarse clinkers are conveyed by a drag chain over a grate section and the fine clinkers, which fall through the grates, are dragged to the discharge end by a smaller drag chain. No. 1 kiln is driven by a 125 h.p. motor through a gear and pinion open drive reduction.

No. 2 kiln, which has just been recently installed, is 426 ft. long, 12 ft. in diameter on each end and has an 11 ft. intermediate section. This kiln is likewise equipped with F. L. Smidth chain section and is fed through a F. L. Smidth feeder driven by a D.C. motor which is synchronized with the motor on the kiln drive. The feed to the kiln is thus controlled by the speed of operation of the kiln itself. This kiln is equipped with ten Unax coolers - each cooler being 5 ft. in diameter and 26 ft. long. The cooled clinker is discharged into a drag chain conveyor which drags the clinker forward to a cross-drag conveyor which is used for commonly transporting the clinker from both kilns to the clinker storage.

Both kilns are fired with natural gas approximately 1000 b.t.u. content induced into the kiln under so-called high pressure with the approximate tip pressure of 70 pounds per square inch. No. 1 kiln is equipped with No. 48 F. L. Smidth draft fan driven by a 100 h.p. motor, and No. 2 kiln has a No. 54 F. L. Smidth draft fan driven by a 150 h.p. motor. Exit gases from the kilns are conveyed from the draft fans through an underground concrete duct approximately 175 ft. to a stack chamber which is connected to the single kiln stack. Exit temperatures of the gases are slightly lower on No. 2 kiln than they are on No. 1 kiln.

Clinker is delivered by means of the cross-drag chain mentioned above which travels approximately 60 ft. per minute at right angles to the cooler and discharges into a clinker elevator. This elevator discharges clinker into the clinker storage through a sealed steel hopper on which is mounted a Sly dust collector.

Clinker from this storage is handled by the overhead crane to the feed bins in the finish mills which are located on the east wall of the storage building.

Gypsum is delivered to the plant in box cars and unloaded by means of a conveyor over the west wall of the storage building to the gypsum storage and is then handled from there to the feed bins over the finish mills. We have two systems operating in the finish mill which are separate and distinct.

Number one system consists of a Hercules mill driven by a 350 h.p. motor, which preliminary grinds clinker for three tube mills. In connection with the Hercules mill, we have installed a closed circuit screen separator system which consists of two 8 ft. x 5 ft. hummer vibrating screens. These screens each consist of two sections 4 ft. x 5 ft. equipped with V-50 vibrators. The screened materials from these separators go to the tube mill bins ready for tube mill feed; the proportion of gypsum was added at the Hercules mill feed table. The three tube mills converting this preliminary material into cement consists of the following: Two - 7 ft. X 26 ft. Traylor compartment mills now operated as tube mills. These mills are driven by 500 h.p. General Electric synchronous motors, 180 r.p.m. direct connected to the mill pinion shafts. One - 8 ft. X 30 ft. Traylor three compartment mill now operated as a tube mill driven by 700 h.p. synchronous motor, 180 r.p.m., direct connected to the mill pinion shaft. The output of these tube mills is conveyed by a screw conveyor and elevator to a 24 in. wide by 396 ft. rubber covered conveyor belt. This conveyor belt carries this cement to the top of the silos where it is distributed by a screw conveyor to any of the six silos at the No. 1 storage or any of the four silos in the No. 2 storage.

The other finish mill system consists of one F. L. Smidth Unidan mill, 8 ft. X 40 ft., which is divided into four compartments. This mill is driven by a 1000 H.P. Westinghouse synchronous motor, 180 r.p.m., direct connected to the mill pinion shaft. The mill is constructed with a center discharge through peripheral openings, material being discharged from compartment No. 2 and compartment No. 4, which are the two center compartments. The main feed enters the mill at compartment No. 1 and discharges after passing through compartment No. 2 to an elevator which carries the material to a 16 ft. Sturtevant air separator. The rejects from the air separator are discharged to a screw conveyor which distributes the material in optional percentages to either end of the mill. The discharge from No. 4 compartment likewise goes into the same elevator and conveyed to the separator in the same manner. The fines from the separator go direct to an 8 in. Fuller-Kinyon pump which conveys the material to the top of the silos for distribution to any storage desired.

Power is purchased from the Texas Electric Service Company and is delivered at 13,000 volts to the plant site where it is stepped down to 2300 volts at the power company's transformer station. Power is delivered to an incoming panel which is a part of our central switch board located in our power house. This Westinghouse switchboard is complete with instruments and controls for each department. Power is measured on the totalizing panel by a graphic watt hour meter. Each individual panel likewise is equipped with a watt hour meter for recording the amount of power consumed either instantaneously or continuously. Located, also, in the power house is the motor generator set for the electric haulage system, a motor generator set for the Unidan mill excitation and a motor generator set for switchboard control and other synchronous motor excitation. Water pumps and an air compressor are also installed in the power house building.

We have two packing houses, one located at the north end of each storage unit. No. 1 silo storage unit contains six concrete silos 32 ft. diameter, 80 ft. high with all interstices closed for individual storage of cement in small amounts. No. 2 storage unit consists of four concrete silos 32 ft. diameter, 92 ft. high with all interstices enclosed.

Cement is drawn from storage at the bottom of these silos and conveyed by elevator and conveyor to the packing bins located in the respective packing houses. In No. 1 packing house there are four 3-tube Bates packers and one common 30 in. belt conveyor that conveys cement from the packer discharge in bags to the loading platform on the east side of the storage.

No. 2 packing house is equipped with three 4-spout Bates packers and these packers discharge onto a 30 in. conveyor belt and this output is conveyed to the loading platform on the east side of the packing house. Bulk cement is loaded in hopper cars or box cars and dropped by gravity to a track scale south of both packing houses. One railroad serves the plant and enters the property on the northeast corner. Empty cars are spotted on an incline entering track and handled by gravity past the packing house on to a loaded car storage at the south end of the plant.

One large building houses the machine shop with adjoining storeroom on the ground floor and the plant office and laboratory is located on the second floor of this same building.

The central washhouse, containing bath rooms, lockers and toilets is located on the south of the plant property. Water is secured from a deep artesian well and during the right season considerable water is obtained from a natural lake which stores up ground drainage water.

October 6, 1947