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BY THE CONSOLIDATED CEMENT CORPORATION

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MAY 14 1957

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Presented at Annual Fall Meeting  
GENERAL TECHNICAL COMMITTEE, PORTLAND CEMENT ASSOCIATION  
Sept. 28-Oct. 1, 1953  
Florida

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OPERATION OF THE PAULDING, OHIO QUARRY  
OF THE CONSOLIDATED CEMENT CORPORATION

by  
H. A. Edwall\*

The Ohio quarry of the Consolidated Cement Corporation is located in northwest Ohio midway between the towns of Paulding and Cecil on the Cincinnati Northern Railroad. At this location the Columbus limestone formation is closer to the surface than anywhere else along the railroad. Even so, the overburden at the quarry site is 40 ft. thick.

To dispose of the overburden and to quarry the rock, four principal pieces of equipment are in use: a Marion 7400 dragline, a mobile crushing plant, a belt conveying system, and a loading tippie. The dragline is fitted with a 200-ft. boom, a 10-cu.yd. bucket for stripping, and an 8-cu.yd. bucket for handling rock.

Stripping of clay overburden is conducted annually during December and January with the overburden being cast into the hole from which rock was removed during the previous summer. Rock requirements for a year's operation dictate that a strip approximately 140 ft. wide and 1100 ft. long be stripped each year.

When stripping operations are being conducted, the dragline sets on a hardpan layer 30 ft. below grade elevation and drags down. It is not necessary to blast the top 30 ft. of overburden, but the 10-ft. layer of hardpan must be blasted lightly for easier removal.

The dragline, crusher, and belt conveyor system are located on the hardpan level during rock removal operations. (Fig. 1)

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The top 20 ft. of rock exposed is not suitable for cement manufacture and is sold to a commercial producer. The next 28 ft. is quarried for shipment to the plant located at Cement City, Michigan. Beneath this level only dolomite is to be found.

Since commercial rock is produced, it is necessary to operate the quarry in two benches which must be maintained close together in order that both may be reached with the dragline at the same time. The reach of the dragline also dictates that the faces be held to a length of 150 ft. or less, hence the 140 ft. width of stripping each year.

Blast hole drilling is done with two machines. One is a Joy 58-BH Champion, and the other is a Joy 56-BH. Hughes rotary bits, 6-1/4-in. in diameter are used on both machines, air being used to remove the cuttings. The 58-BH drill averages 19 ft. per hour and the 56-BH drill 9 ft. per hour, including moving time. A churn drill, formerly used, averaged only 4-1/2 ft. per hour. Rotary bit life averages from 700 to 1,000 ft. drilled per bit.

All drilling is done from the top bench with the holes being stemmed with sand from the bottom to the top of the second bench. The first bench is blasted, and when this stone has been removed the sand in the lower portion of the holes is blown out by means of an air lance, and the cement stone is blasted. This method has worked out very well and eliminates setting the drills on the second bench. Blast holes are spaced 15 ft. apart with 12 ft. of burden. It has been found that better breakage results by placing 3-in. wagon drill holes, 8 ft. deep, and loaded with 2-1/2 in. powder, between each of the large blast holes on the second bench of the thick stratum found at this level. A powder factor of 2-1/2 tons of rock per pound of powder is used. Fifty to sixty blast holes, in six rows, are loaded with 60%

extra dynamite for a shot, and are fired by means of millisecond delay caps. Jet shaped charges are used for the small amount of secondary shooting that is necessary.

The mobile crushing plant (Fig. 2), designed to crush 400 tons per hour of stone sized 2x2x3 ft., or equivalent, is mounted on a Rogers Brothers 150-ton capacity trailer. This trailer has 24 solid tire wheels and is 15 ft. wide and 42 ft. long. The crusher feeder is a McLanahan and Stone heavy-duty 60 in. by 10 ft. reciprocating plate feeder, and the crusher is a 36x60 in. McLanahan and Stone single roll. This crusher is set with a 6-in. opening. The crusher discharges onto a 48-in. belt conveyor running parallel to the long axis of the trailer, and on its centerline. This belt discharges onto a 30-in. belt which carries the stone at right angles to the trailer and discharges it onto the ground conveying system. The crushing plant is easily moved by means of an International TD-18 bulldozer.

The ground conveying system (Fig. 3) is composed of two 500-ft. sections (made to be portable for easy removal while stripping), one 100-ft. section pivoted on one end, and one permanently located, inclined section to the loading tipple. These belts have a combined length of nearly 1300 ft. and are all 30 in. wide. Design is conventional as far as drives and idlers are concerned. Speed of the belts is approximately 490 ft. per minute.

The loading tipple holds approximately 200 tons of rock and this is discharged into railroad hopper cars by means of a Pioneer 48 in. by 12 ft. apron feeder. The commercial rock is merely fed to a surge pile and the producer recovers it through reclaiming tunnels.

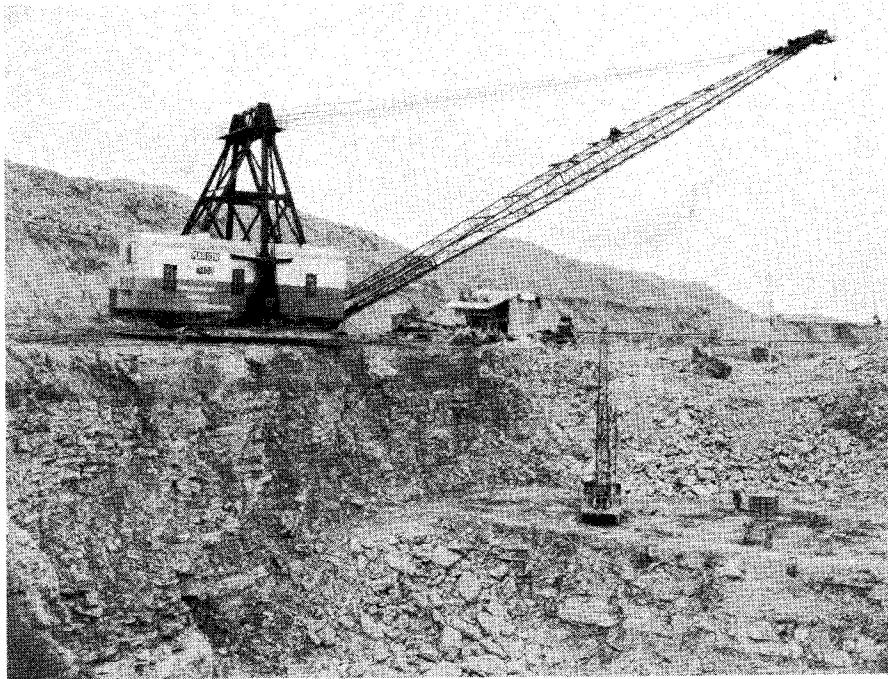


Fig. 1. Dragline on hardpan. Drill on second bench.



Fig. 2. Eight cu.yd. bucket discharging blasted rock into mobile crushing plant.

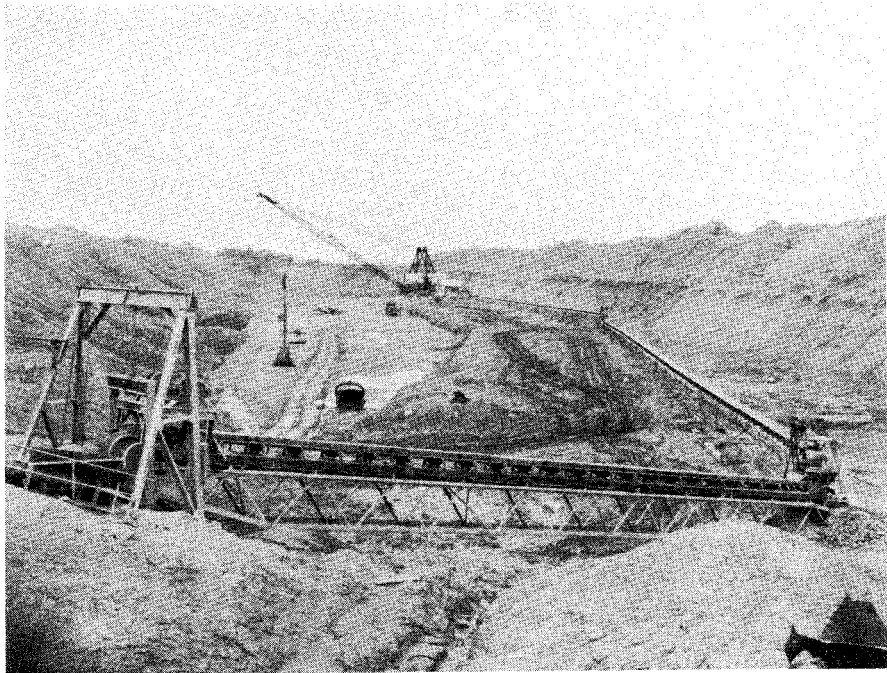


Fig. 3. Ground conveying system. Shows two 500-ft. portable sections.