

# “Quarrying with Hammer Drills”

(in Pennsylvania, Ohio, and Texas)

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The article begins:

Machine drills have replaced hand drilling in crushed stone quarries to a very large extent, but there are still many concerns which cling to the old method, or which do not use air or steam drills for all of the purposes to which they might be applied profitably. The development of the hand feed air hammer drill now enables hand drilling to be dispensed with entirely, at a great saving of time, labor and cost of production....”

This article, which begins on the next page,  
is presented on the Stone Quarries and Beyond web site.

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Sullivan "DB-19" hammer drills on a shallow bench, Shenango Limestone Co.

### QUARRYING WITH HAMMER DRILLS

BY WILLIAM MCKEARIN AND R. S. HUTCHISON

Machine drills have replaced hand drilling in crushed stone quarries to a very large extent, but there are still many concerns which cling to the old method, or which do not use air or steam drills for all of the purposes to which they might be applied profitably. The development of the hand feed air hammer drill now enables hand drilling to be dispensed with entirely, at a great saving of time, labor and cost of production.

A quarry which has recently given up hand drilling with agreeably satisfactory results is that of the Shenango Limestone Company at Newcastle, Lawrence County, Pennsylvania, which produces some 300,000 tons of crushed stone per year, for ballast and furnace flux.

Until about a year ago all drilling, both on the benches and in pop-holing, was done by hand on a contract basis. That is, the quarry was split up into sections, each assigned to a separate laborer or contractor. The contractor bought his tools and dynamite from the company, and received a fixed price for the stone

when he had loaded it on the cars ready for the crusher. The stone was hauled at company expense.

This system involved a number of disadvantages. The company found difficulty in securing a regular supply of stone for the crusher, because each man worked as slowly or as fast as he desired, and only when he desired. A very long working face was necessary, to provide a section for each of the large number of men needed on this system. The use of explosives was entrusted to many individuals, thus rendering the liability of accidents a high one.

Trouble also arose when the quarry manager wished to discharge men, in agreeing on the amount and value of the stone already drilled or ready to load.

About a year ago the company experimented with machine drills and, after testing various makes and sizes, purchased a Sullivan "UE-11" 3¼-inch tappet valve tripod drill and Sullivan "DB-19" hand hammer drills, of which it now has eight in use. Drillers are now paid by the



Sullivan rock drill on bench, Shenango Limestone Co.



Block-holing



Sullivan Hammer drill, Shenango Limestone Co.



Waller Bros. Stone Co. McDermott, Ohio



Splitting stone for paving blocks in an Ohio quarry



day, and all loading and firing of holes is done by skilled shooters, also paid by the day. The loading is paid for by the ton. This arrangement places the superintendent in full authority and he is not handicapped, as under the old system.

The tripod machine has drilled as high as 96 feet of 12-foot holes in a ten-hour day, while with the hammer drills, 93 feet is an excellent day's work, and 65 feet a fair average. A good contract

quarryman, drilling by hand, would average eight feet of deep hole per day and ten feet of pop-holes. The output of this plant has been largely increased, and the cost per ton of stone reduced some eight or ten per cent.

#### USES OF HAMMER DRILLS

The Sullivan hammer drills weigh 40 pounds, and have a capacity of five feet in depth. Hollow, one-inch hexagonal

steels are used, sharpened with a six-point "rose" bit. These tools are the ones generally selected for crushing quarry purposes. Holes must often be drilled in places not easy to reach, and for which a heavier tool would be too cumbersome, while smaller sizes have been found wanting in capacity and wearing qualities. Page 537 shows a group of these machines drilling a bench three feet high in the Shenango quarry. These shallow benches, two to five feet in height, must frequently be lifted, on account of variation in stone, of the stratification, or for the purpose of extending track, to secure better loading facilities.

The drills at Newcastle put in holes averaging 18 inches deep, but frequently running up to four or five feet, with speed and economy. Much pop-hole work is done also, in breaking up large fragments, or in freeing pieces which are cracked but still attached to the face. These holes vary from five to eighteen inches in depth. Another application is that of taking up "hog-backs" that interfere with track-laying.

#### OTHER APPLICATIONS

The Holran Stone Company, at Maple Grove, Ohio, employs three Sullivan "DB-19" drills in the quarry, and a Sullivan "DB-15" tool, weighing 25 pounds, for lighter work at the crusher. The stone is loaded at the quarry by a steam shovel, and frequently pieces too large for the crusher are inadvertently placed on the cars. These are removed from the car by a small air hoist, and broken by pop-holes and plug and feather wedges. One man, with one of these tools, can do the work of four or five with sledges.

#### CLEANING OUT HOLES

A valuable feature of the Sullivan hammer drills is brought out at this quarry. The stone is damp, and, particularly at the bottom of the pit, is loose and soggy. With other types of hammer

drills, trouble is experienced in keeping the holes free of mud and cuttings in such rock. The Sullivan drill, however, is fitted with a patented exhaust valve, and an arrangement of ports which permits the runner to force a large or a small part of the exhaust air down the drill steel at will. By pouring a little water down the hole, the mud is kept thin, and readily blown out of the hole.

#### DEEP HOLES IN A TEXAS QUARRY

The deepest drilling done with hand feed hammer drills, so far as information is available, is reported by Risley Bros. & Company, of Jacksboro, Texas. This company's rock is hard limestone, in layers from four to twelve inches thick. A portion of the quarry is worked in eight-foot faces, and here the drilling is done entirely by Sullivan "DB-19" drills, using hollow steels, as shown in the cut on page 540. The rock here is interspersed with shallow mud seams or pockets. The use of the patent exhaust valve referred to above, enables mud and cuttings to be thrown with ease from the eight-foot holes. When the drill strikes a pocket of mud, the steel is caught by a wire hook and held a little above the mud, while with the other hand the drillman keeps the tool running with a light blow, all of the exhaust air being thrown down the steel.

One eight-foot hole which the writer timed was completed in 21 minutes. The following records of block hole work taken from the company's books, are a good indication of the capacity of these tools. They were made with one "DB-19" drill.

Date	No. of Holes	Foot-age	Hours	Av. Depth	Av. ft. per hour
June 2, 1910	73	197	10	2.7	19.7
July 11, 1910	83	130	10	1.5	13.0
July 15, 1910	95	213	10	2.25	21.3
Wk. of Apr. 1, 1911	464	1441	110	3.1	13.0
Wk. of Apr. 8, 1911	428	845	80	1.97	10.6
Wk. of Apr. 15, 1911	461	1443	113	3.13	12.7
Wk. of Apr. 29, 1911	374	1123	103.5	3.0	10.8
Wk. of May 5, 1911	484	1296	110	2.7	11.8

## DRILLING SANDSTONE

Sullivan "DB-19" drills are used at the sandstone quarries of Waller Bros.' Stone Company, McDermott, Ohio, to break the stone into proper sizes, after it has been freed on two sides by a channeling machine. The stone is in horizontal layers from 5 to 24 inches thick, separated by an inch or two of shale. Plug holes from three to eight inches deep are drilled with hollow one-inch bits, and the blocks split with plug and feather wedges. An average rate of progress is 75 feet of hole per hour. In the grindstone quarries, where the stones are cut out round, the hammer drill is used to put in holes two

to five feet deep under the stone proper, to receive a small charge of powder. This work formerly was done by hand, as the holes could not be properly placed with a tripod drill. This company's mill is equipped with machinery of the most modern character, including about eight gang saws, each of which is driven through gearing by an independent motor, thus doing away with all line shafts and belting.

It is hoped that these rather fragmentary notes may be of interest and assistance to quarrymen, in suggesting economies which may be effected under their own working conditions by the use of hammer drills.



Sullivan "DB-19" hand feed hammer drills drilling holes eight feet deep, with hollow steel in quarry of Risley Bros. & Co., Jacksboro, Texas