"Channeling Rock Walls for Foundations"

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Ash pit, Northern Ohio Power Co. Channeled wall at left

Beginning the condenser well. First bench. Sullivan Channeler at left

(photo captions) "Ash pit, Northern Ohio Power Co. Channeled wall at left." & "Beginning the condenser well. First bench. Sullivan Channeler at left."

CHANNELING ROCK WALLS FOR FOUNDATIONS

William M. McKearin*

The value of stone channeling machines is widely recognized by quarrymen and by engineers that have rock wall cuts to contend with in building canals, locks, wheelpits, dams, et cetera. One of the advantages of using a channeler is that neither the smooth wall which it cuts, nor the rock behind the wall, are shaken or broken down by explosives.

This advantage is responsible for the more and more frequent adoption of channelers for special purposes. An instance of this sort is described in the present article.

The Northern Ohio Power Company, of Akron, Ohio, is building two electric power generating stations at what is known as the Gorge, at Cuyahoga Falls, about a mile and a half north of Akron. One of these will be a hydraulic station of about 2400 horsepower, the other a steam operated plant with an ultimate output of 26,000 horsepower. The electric power will be used by the Northern Ohio Light and Traction Co. for city and interurban car service, and for commercial purposes.

The steam power plant is being constructed in a hillside, consisting of a solid shale formation, interspersed with thin strata of close-grained sandstone and an occasional layer of flint from eight to twelve inches thick. The side hill was first cut down to the top grade for the foundations. Removal of rock for the walls proper and for the ash pit was begun by hand labor, with picks such as are used in working sandstone.

It was thought advisable not to use explosives, as blasting would have disturbed more rock than necessary, and would undoubtedly have impaired the safety of the foundations. The foundation walls were all excavated by this method, except where the ash pit is situated. This part of the work, which included the pit and its walls, proceeded so slowly, and labor charges ran up so fast, that it became a serious problem. Work was therefore suspended, when the ash pit was about one-half done.

At this point the company secured the services of Mr. J. T. Ross, of Cleveland, as chief engineer, and of Mr. L. Garrett, of Kent, Ohio, as superintendent.

These officials decided that a channeling machine could be used economically under the circumstances. A Sullivan Class "Y" machine was therefore purchased and put to work.

This channeler has a cutting engine seven inches in diameter, operated by steam from a boiler mounted on the frame. The boiler also drives the feed engine, which gives the channeler its travel along the track, and feeds the chopping engine up or down on its standard as the channel deepens or when steel is to be renewed. The bit used in this work consisted of a gang of three steels, 1 x 2¼ inches in size, sharpened with the two outside edges at right angles with the cut and the middle bit at 45 degrees, forming a "Z."

The cut on page 642, at the top, shows the channeling work done in the ash pit. The right hand wall had been completed by hand pick. The left wall, 330 feet long by nine feet deep, was cut by the channeler, and the rock between removed with light charges of explosives.

CONDENSER WELLS

It was also necessary to excavate hot and cold condenser wells for the four turbine units. These wells required a pit 151 feet long, 26 feet deep, and about 8 feet wide at the bottom. The original plan had been to build these walls by tunneling, but the engineers later decided to make the excavation by an open cut,

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Condenser Wells, with Channeler at work

On the third lift, Condenser Wells

(photo captions) "Condenser Wells, with Channeler at work" & "On the third lift, Condenser Wells."

channeling the walls. It was found that the rock was removed much more cheaply than would have been possible by tunneling, that the concrete linings could be placed at less expense, and the whole job handled with greater satisfaction.

The rock was taken out in three lifts or benches of 8½ feet each. The lower cut on page 642 shows the wells after the removal of the first bench, with the channeling machine in the foreground, and in the rear the locomotive crane used for loading spoil and erecting the structural steel framework of the powerhouse.

This top bench was extended 62 feet beyond the wells proper, and about 8 feet deep for the hot well.

Page 644 shows two views of the condenser wells, as the pit deepened.

The men shown at the far end of the cut in the upper picture are drilling blast holes with a steam tripod drill, so that light dynamite charges can be used to break up the rock between the channel cuts without jarring the side walls.

An offset of about one foot was left at the foot of each lift, and this served as an excellent foot for the concrete walls or lining. On top of the third bench is shown the concrete wall separating the hot and cold wells.

In addition to the wells proper, there were various ends and offsets for the turbine connections and short cuts from 8 to 40 feet long by 8½ feet deep which had to be channeled, amounting in all to 12,000 to 15,000 square feet of channel.

The channeler was operated night and day for some time, to expedite the work. The average rate of cutting, taking short as well as long channels into account, was 160 square feet per ten hours; on runs of 36 feet, nine foot channels were bottomed easily in ten hours, or 324 square feet; while 45 square feet have been channeled in 40 minutes of actual running time.

The channeler has surpassed the expectations of the engineers in charge of the work in respect to its rapidity and convenience, and has saved the company a considerable sum on its excavation work.

It will be some time before the entire plant is completed, but some power will be turned on in about two weeks.

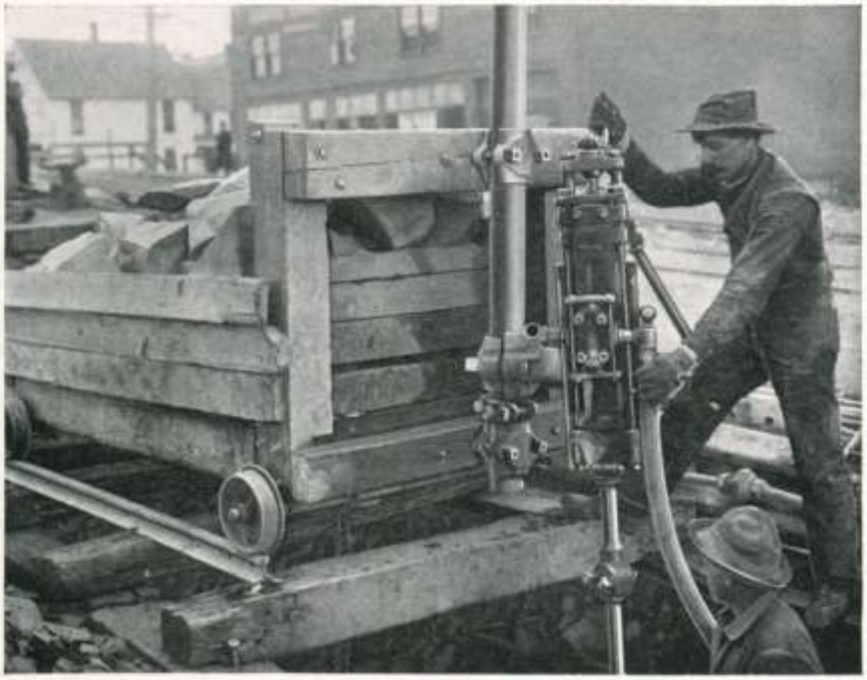
DEVICE FOR DRILLING IN TRENCHES

The Editor: The accompanying illustration (see next page) shows an ingenious mounting for drilling in trenches or for sewer or water mains, used in the City of Spokane, Washington. The rock drill, which is a Sullivan 3⅝-inch machine, class "UH-2," is mounted on the swinging arm by a saddle, in the usual way, while the vertical column is securely bolted at top and bottom to horizontal beams on the car. This car is a heavy hand car similar to those used in railroad work, having corner posts to which are nailed planks, making a box to contain rock or other ballast. The whole car with mounting weighs about 3,000 pounds, and runs upon two light rails loosely spiked to ties which rest upon stringers laid on either side of the trench.

Holes are drilled about 2½ feet apart to the depth of the finished trench and carefully aligned with a plumb bob to the center of the trench. In a 20-foot hole, 50 pounds of 60 per cent dynamite gives good results in this rock. At the place where this picture was taken, 25 pounds of dynamite was used, the holes being about 14 feet deep and two inches in diameter. This makes a trench about two feet wide at the bottom.

The rock is a tough basalt formation common to Spokane and vicinity, and, since it is broken and seamy, the holes fitcher badly. However, the contractor secured good results with the Sullivan 3⅝-inch drill for deep holes, and a Sullivan "UE-2" 3⅛-inch drill for shallow holes.

It is readily seen that this method of mounting has some very decided advan-



Sullivan Drill and home made trench drilling rig

tages over the ordinary tripod mounting, in that it may be moved from hole to hole by simply loosening a clamp or dog clamped to the track, and pushing the car along approximately the distance between holes. The clamp is then secured again and by adjusting the drill on the adjustable arm and swinging the arm to the proper position the drill may be aligned over the holes accurately and very quickly. The car is made so heavy that it is much more solid than the tripod mounting and this facilitates drilling in broken ground. The ties do not interfere with drilling, for if when moving along the location of a hole comes under a tie, the tie is hammered along the stringers out of the way.

A Sullivan Portable Rock Drill with Boiler, in Havana

CHESTER MOTT.

Spokane, Washington, July 3, 1912.

[These drills were operated by steam from a portable boiler on wheels. Special independent outfits, for work of the nature described, have been designed and used with success. Ten of them, equipped with Sullivan "UF-11" (3¼-inch) drills, were used in excavating rock in the sewers of Havana, Cuba. A description of these drills and of their performance was published in MINE AND QUARRY for November, 1911.—ED.]

(photo captions) "Sullivan Drill and home made trench drilling rig" &
"A Sullivan Portable Rock Drill and Boiler, in Havana (Cuba)