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## Investigation with rock drills

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T 326

INVESTIGATION WITH ROCK DRILLS

By

Jirso Castillon

MSM  
HISTORICAL  
COLLECTION

A  
THESIS

Submitted to the Faculty of the  
SCHOOL OF MINES AND METALLURGY OF THE UNIVERSITY OF MISSOURI

In partial fulfillment of the work required for the

D E G R E E O F  
BACHELOR OF SCIENCE IN MINE ENGINEERING

Rolla, Mo.

I 9 I 4

Approved by

C. P. Forbes

Professor of Mining

17334

The object of this thesis is to investigate the different shapes of bits in rock drilling,

My intention at first was to run more extensive tests on bits, but due to the large amount of work necessary in rigging up the apparatus, and the maintenance of same, I found it necessary to reduce my work to two bits, which I name Flat and Regular, the Flat Bit being an invention of Professor C. R. Forbes, and the Regular Bit being the common one used by the Leyner Company.

I regret being unable to give more complete data in regard to the drills, but hope to point out fields for future work since with the increased facilities now at hand such as compressed-air sharpeners, the new compressor, and indoor place for work, so that this work may be more satisfactorily carried out.

This work was carried out in granite blocks 4' x 5' from Southeast Missouri. All drilling was done in the same block, using a drilling frame with rectangular vertical column.

I used a Leyner Drill Number Seven, the diameter of the cylinder being 2.5 inches, the length of the stroke 2.75 inches, the feed 30in., and the weight 125 lbs. The steel used was the regular Leyner cylindrical type, hand sharpened and tempered in oil.

SCREEN ANALYSIS

No.	Thru 0 On 20	Thru 20 On 40	Thru 40 On 100	Thru 100 On ----	Total Wt. Sample.
5	13.5gram.	30 gram.	48gram.	91gram.	182.5gram.
7	23.5 "	8.3 "	112.5"	192 "	411.0 "
8	6.0 "	21.5 "	61.5"	128.5 "	217.5 "
9	8.5 "	12.5 "	71.5"	120.0 "	212.0 "
10	9.0 "	18.5 "	26.0"	49.0 "	102.5 "
11	10.5 "	31.0 "	46.0"	69.0 "	156.5 "
12	8.5 "	23.0 "	32.5"	72.5 "	136.5 "
14	9.5 "	21.5 "	32.5"	102.5 "	166.0 "

These samples were taken by means of holding a "T" tube or a pan against the rock and catching all the cuttings or most of them. We then placed the cuttings in a warm place to thoroughly evaporate the water from them, then screened and weighed them, giving me the above data.

May 10, 1913.

No. of Bit "F- I" with cutting edge of 0.125 in.

Leyner Drill.

Dip of hole, 20°

Gauge of Bit, 2 in.

Dist. Drilled.	Time Drill. in min.	Speed in min.	Total Dist. Drld.	Air Press. in lbs	DEPTH OF HOLE		No. of Sample
					Start	End	
4 1/4 "	1	3 "	12 5/8 "	75	5 1/2 "	8 1/2 "	5
1 1/8 "	1	2	----	67	1 7/8 "	3 7/8 "	---
3 1/8 "	1	2 5/8 "	----	72	3 7/8 "	6 1/2 "	---
5 3/4 "	1	3 1/2 "	----	84	10 "	13 3/8 "	7
25 1/4 "	---	4 1/2 "	29 3/4 "	100	1 1/8 "	5 "	---
29 3/4 "	1	3 1/4 "	33 "	100	5 "	8 7/8 "	---
33 "	---	3 3/8 "	33 "	100	5 "	8 7/8 "	---
33 "	---	3 "	33 "	100	8 "	9 1/4 "	---
33 3/8 "	---	13 "	15 "	75	13 "	3 "	---
		2--	34--		2--	4--	
		16	16		16	8	

May 17, 1913.

No. of bit "F--2"

Leyner Drill.

Dip of hole, 20°

Gauge of bit, 2 in.

Dist. Drld.	Time Drill. in min.	Speed in min.	Total Dist. Drld.	Air Press. in lbs.	DEPTH OF HOLE		No. of Sample
					Start	End	
---	1	5" 4- 8	----	85	3" 24- 8	19 $\frac{3}{4}$ "	6
7" 11-- 16	---	5" 3- 8	1" 15-- 16	90	3" 13- 8	17"	---
1" 15-- 16	---	5" 4-- 8	11" 19-- 16	93	17"	21-- 8	---
11" 19-- 16	2	10 $\frac{1}{2}$ "	3" 30-- 16	98	5" 21-- 8	1" 32- 8	---
3" 30-- 16	---	$\frac{1}{2}$ "	11" 30-- 16	100	9 $\frac{1}{4}$ "	9 $\frac{3}{4}$ "	---
11" 30-- 16	1	3"	11" 33-- 16	100	9 $\frac{3}{4}$ "	12 $\frac{3}{4}$ "	9
11" 33-- 16	1	7" 2- 8	9" 36-- 16	100	12 $\frac{3}{4}$ "	5" 15- 8	---
9" 36-- 16	---	1" 6-- 8	11" 42-- 16	100	5" 15-- 8	21 $\frac{3}{4}$ "	---

May 12, 1913/

No. Of bit, "R-2".

Leyner Drill.

Dip of hole, 12<sup>o</sup>  
11"

Gauge of bit 1---.  
16

Dist. Drld.	Time Drill. in min.	Speed in min.	Total Dist. Drld.	Air Press. in lbs.	DEPTH OF HOLE		No. of Sample
					Start	End	
----	----	11" 6--- 16	11" 6--- 16	75	3" 4-- 8	1" 11-- 16	----
11" 6--- 16	1	5" 3-- 16	10 "	75	1" 11-- 16	3" 14-- 8	10
10 "	1	5" 3-- 8	5" 13-- 8	85	3" 14-- 8	18 "	----
5" 13-- 8	-----	5" 9-- 16	15" 22--- 16	72	18 "	5" 27-- 16	----
15" 22--- 16	-----	7" 7-- 16	3" 30-- 8	80	7 <sup>3</sup> / <sub>4</sub> "	3" 15-- 16	----
3" 30-- 8	1	2 <sup>3</sup> / <sub>4</sub> "	1" 33-- 8	72	8 <sup>1</sup> / <sub>2</sub> "	11 <sup>1</sup> / <sub>4</sub> "	----

May 3, 1913.

No. of bit "R-2"

Leyner Drill.

Dip of hole, 20°

17"

Gauge of bit, 1---  
32

Dist. Drld.	Time Drill. in min.	Speed in min.	Total Dist. Drld.	Air Press. in lbs.	DEPTH OF HOLE		No. of Sample
					Start	End	
----	-----	6 $\frac{1}{4}$ "	6 $\frac{1}{4}$ "	92	1" 32-- 8	3" 38-- 8	---
6 $\frac{1}{4}$ ""	2	7" 10-- 8	17 $\frac{1}{4}$ "	92	3" 38-- 8	49 $\frac{1}{4}$ "	8
17 $\frac{1}{4}$ "	-----	2 $\frac{1}{4}$ "	3" 19-- 8	92	49 $\frac{1}{4}$ "	5" 51-- 8	---
3" 19-- 8	-----	1" 4-- 8	23 $\frac{1}{2}$ "	75	7" 31-- 16	35 $\frac{1}{2}$ "	11
35 $\frac{1}{2}$ "	-----	3 "	Struck above hole.	---	----	-----	-----



May 20, 1913.

NO. Of bit, "F-3", with cutting edge  $\frac{1}{16}$  "  $\frac{1}{16}$  ".

Leyner Drill.

Dip of hole,  $12^{\circ}$ .

Gauge of bit,  $1\frac{1}{2}$  ".

Dist. Drld.	Time Drill. in min.	Speed in min.	Total Dist. Drld.	Air Press. in lbs.	DEPTH OF HOLE		No. of Sample.
					Start	End	
$5\frac{8}{16}$	1	$3\frac{1}{16}$	$5\frac{8}{16}$	82	27 "	$30\frac{1}{16}$	----
$3\frac{11}{8}$	----	$7\frac{5}{16}$	----	80	30-- 16	37-- 16	12
$11\frac{18}{16}$	1	$3\frac{1}{8}$	----	82	37-- 16	$40\frac{1}{2}$ "	----
$13\frac{21}{16}$	1	3 "	$13\frac{24}{16}$	95	$40\frac{1}{2}$ "	$43\frac{5}{8}$	-----

May 20, 1913.

No. of bit, "F-4" with a cutting edge of  $\frac{1}{16}$ "

Leyner Drill.

Dip of hole, 18°

Guage of bit,  $1\frac{1}{2}$ ".

Dist. Drld.	Time Drill. in min.	Speed in min.	Total Dist. Drld.	Air Press. in lbs.	DEPTH OF HOLE		No. of Sample.
					Start	End	
$4\frac{1}{4}$ "	1	$3\frac{1}{2}$ "	----	75	7" 47-- 8	3" 51-- 8	----
$7\frac{3}{4}$ "	1	$\frac{5}{8}$ "	$\frac{3}{8}$ 11-- 8	82	3" 51-- 8	55"	14
$\frac{3}{8}$ 11-- 8	----	$\frac{3}{8}$ 1-- 8	----	78	5" 25-- 16	11" 26-- 16	----
$12\frac{3}{4}$ "	1	$\frac{5}{8}$ 3-- 8	----	90	11" 26-- 16	5" 31-- 16	----
9" 22-- 16	1	$\frac{3}{8}$ 3-- 8	15" 25-- 16	100*	5" 31-- 16	11" 34-- 16	----

\*\*\* High pressure broke the bit.

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