The Drag Scraper Bucket Excavator.

A 2-yard Page & Schnable bucket excavator was used on a 40-foot boom, with the usual cable and chain attachments. Second readings were as follows:—

Time of day.	Began.	Time elapsed for each item in secs.
4:22:05	Hoisting full bucket	5
4:22:10	Swinging to embankment	5
4:22:15	Dumping	5
4:22:20	Swinging back	5
4:22:25	Lowering to trench	5
4:22:30	Digging	15
4:22:45	Hoisting full bucket	5
4:22:50	Swinging to embankment	7
4:22:57	Dumping	5
4:23:02	Swinging back	3
4:23:05	Lowering	5
4:23:10	Digging	15
4:23:25	Hoisting full bucket	—
		—

Total for two round trips being, seconds.... 80

or 40 per round trip on the average

It is thus seen that 38 per cent. of the entire time of this machine is expended in the "digging" movement. The sand on the job was what might be called "perfectly wet"; that is, the voids were perfectly filled with water. Its weight, therefore, can be taken as about 33 per cent. greater than dry sand, or about 120 pounds per cubic foot; thus the 2-yard bucket when full must contain about 2 x 27 x 120 pounds, or about three tons of sand. This fact will assist us in understanding the slowness of the "digging" operation.

It mut be borne in mind that this scraper is only doing the surface or preliminary excavation, running about ten yards per lineal foot. Also, that the material is practically quicksand, and that it would be useless to try to dig lower than the water-level at this stage of the work. It was a matter of considerable interest to note that some of the excavated material was dumped exactly straight ahead in the path of the machine, so the excavator was building its own roadbed over the swamps in front with the material that it excavated behind.

Scraper Bucket Costs.

The cost per day for excavating the 600 yards at the rate of 60 lineal feet per day is as follows:—

One engineer	$ 5 00
One fireman	3 00
Three laborers	6 00
Coal	6 25
Total	$20 25

which, divided by 600, gives the cost of this trench excavation at about 3½ cents per cubic yard, not figuring superintendence and depreciation.

The machine, it should be remembered, is not trying to make a record, but it is working fast enough to keep ahead of the deeper excavation and the brick work. Although its average is 60 feet per day, of 600 yards per day, it has excavated 850 yards in one day.

The entire machine is pulled ahead by simply lowering the bucket and letting it get a good "bite" on the ground ahead; then by winding up on the "digging" cable, the whole apparatus will move forward on its rollers. These rollers are then checked behind by pieces of angle iron, so that in the regular process of digging there will be no retrograde movement.

Cost of Work for Daily Progress of Sixty Feet.

Cost of driving and pulling sheeting and setting braces (nine hours):—	
Four men setting braces at $2.25	$ 9 00
Three men driving sheeting at $2.50	7 50
Four men pulling sheeting at $2.50	10 00
One carpenter	3 00
	$29 50
Cost of pumping and changing piping system, day and night:—	
Fuel for twenty-four hours	$10 00
Twelve pipe linemen at $2.25	27 00
Six firemen at $3	18 00
Two superintendents at $3	6 00
Total for three big pumps	$61 00
Cost of keeping out back-water, night and day:—	
Fuel for twenty-four hours	$ 2 50
Two firemen at $3	6 00
Total	$ 8 50
Cost of clearing timber (nine hours):—	
Two men at $2	$ 4 00
Total cost of handling earth and trench expense per day:—	
Bucket excavator (day only, including fuel)	$20 25
Pumping out trench and changing pipes (twenty-four hours)	61 00
One hundred and forty shovellers, day only, at $2.15	301 00
Back-filling, day only	20 25
Sheeting and bracing, day only	29 50
Three water boys at $1	3 00
Total	$435 00
Cost of laying brick, daily:—	
Five men mixing cement mortar at $2.50	$12 50
Five men carrying cement mortar at $2.50	12 50
Three men lowering cement mortar at $2.25	6 75
Six brick masons (5,000 brick each daily) at $10	60 00
Three brick tenders at $3.75	11 25
Fifteen brick handlers, average $2.50	37 50
Twenty-six men on industrial railway at $2	52 00
Three teamsters at $2.50	7 50
Three teams at $9	27 00
Three form setters at $3.25	9 75
Three water boys at $1	3 00
Total for labor	$239 75
Thirty thousand brick daily at $6.50	$195 00
Thirty barrels Portland cement at $1.75	52 50
Thirty barrels Utica hydraulic at $1	30 00
	277 50
Total cost 30,000 brick daily	$517 25
Grand total costs per day (approximate):—	
Brick work	$517 25
Earth handling and trench expense	435 00
Pumping out finished sewer	8 50
Clearing timber	4 00
Superintendence and organization	50 00
Repairs, estimated losses and depreciation	40 00
Grand total	$1,054 75

The cost of occasional railroad trestles and unforeseen accidents cannot be included in the above. Credit must be given to the contractor for many low costs under these conditions and for good management of labor, and care to provide against accidents in the treacherous sands bordering Lake Michigan.

The parties engaged are as follows: A P. Melton, city engineer of Gary, Indiana; Alvord & Burdick, consulting engineers and designers; W. F. Sargent, their local representative; E. M. Scheflow, engineer of construction for Green & Sons; R. Shackleton, superintendent.

—Notwithstanding the fact that the steel plant of the Dominion Iron & Steel Company had been closed down for some days in the earlier part of last month, the working month practically commencing on the 6th. During July over 22,000 tons of steel were turned out, the whole of which was converted into rails, wire rods, billets, etc., to fill orders, and the shipments reached the handsome total of 23,332 tons.