

Looking Down at a Loaded Barge from the Operators' Booth, Showing the Ease with which the Operators Direct the Movement of the Grab Bucket.

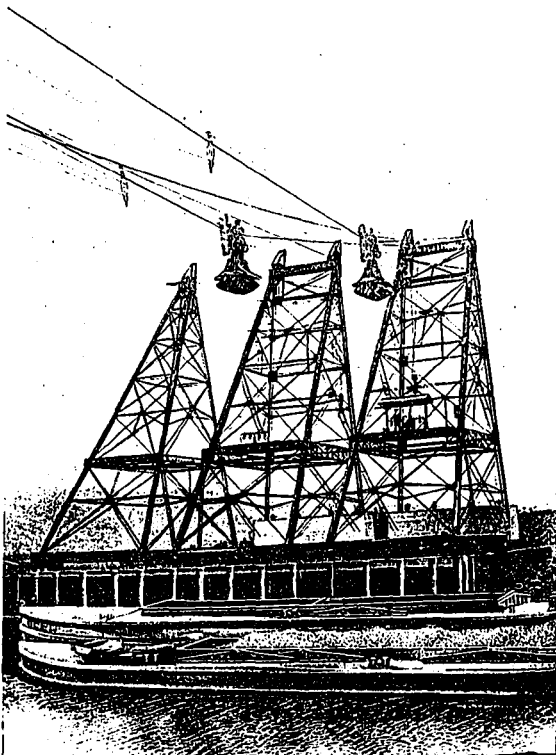
are all mounted on steel towers 85 feet high. The towers are mounted on trucks and travel on tracks, so that each cableway performs the function of a travelling crane. The unloader cableways travel the length of the storage yard. Those for building the locks travel more than 3,000 feet. They are all moved electrically, each pair in uni-

son. From the carriage of each of the five unloader cableways there is suspended an improved special 70 cu. ft. iron-ore type of excavating bucket. Each bucket grabs an average load of 54 cu. ft. The load is hoisted 85 ft., conveyed about 600 ft., dumped on the storage pile, and the carriage and bucket returned. This round trip has been made in 1 minute and 8 seconds. The cableways were guaranteed to handle 50 cu. yds. an hour each. They have carried 90 cu. yds. in an hour, and the average operation up to date is 60 cu. yds. per hour. This ought to be materially increased with practice. The present record is declared to be double that of any cableway previously employed anywhere.

The high speed and consequent increase in the capacity of the cableways is due to the ease with which the operation of the cableways is controlled; the rope-lead that simultaneously raises and traverses the bucket; the high-speed shock-absorber with which the fall-rope carrier is equipped, and a new type of button-stop.

The hoisting and conveying machinery in the head tower is controlled by an operator in the tall tower stationed on an elevated platform commanding a clear view of the bucket at all times and in all positions. He controls two 150-h.p. motors by master controllers of the New York Subway type, and the air brakes by two levers operating magnet valves 800 ft. away. The physical effort of operation is so easy that the operator can comfortably maintain the high speed. In all previous cableways this effort was so fatiguing that, although it was possible to attain a speed of 35 round trips per hour with mechanical levers, this could not be sustained for any length of time.

The rope-lead which simultaneously hoists and traverses the bucket causes the latter to move in a curved line corresponding somewhat to the hypotenuse of a triangle, instead of moving on the vertical and horizontal sides. Considerable increase of speed and diminution of travel is thereby effected. The high-speed shock-absorber with which the fall rope carrier is equipped is the invention of Spencer Miller. It permits the carriage to travel at the unusual speed of 2,500 ft. per minute, more than double the speed of any previous cableway. The button-stop employed has been successfully tested experiment-



A Close View of the Tall Towers of the Unloader Cableways, Showing the Position of the Barges and of the Operators.