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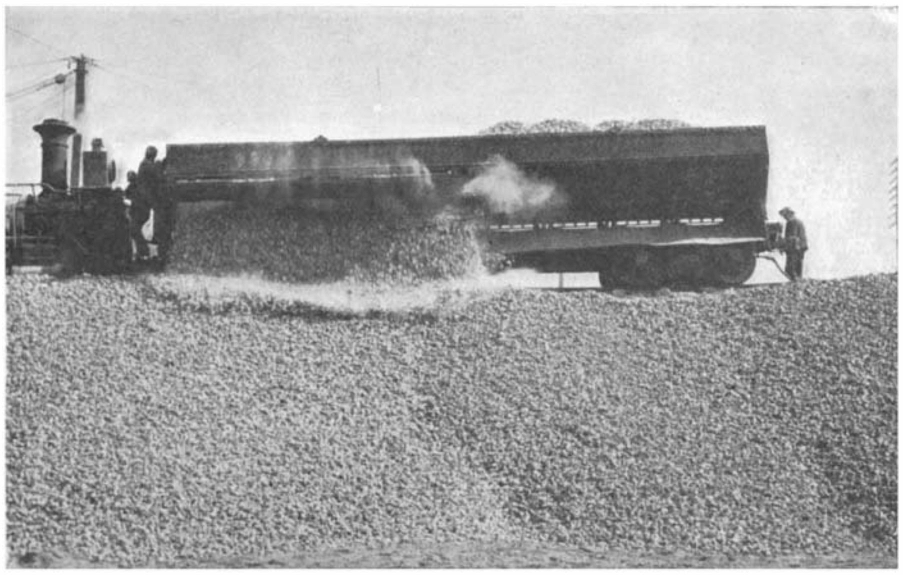
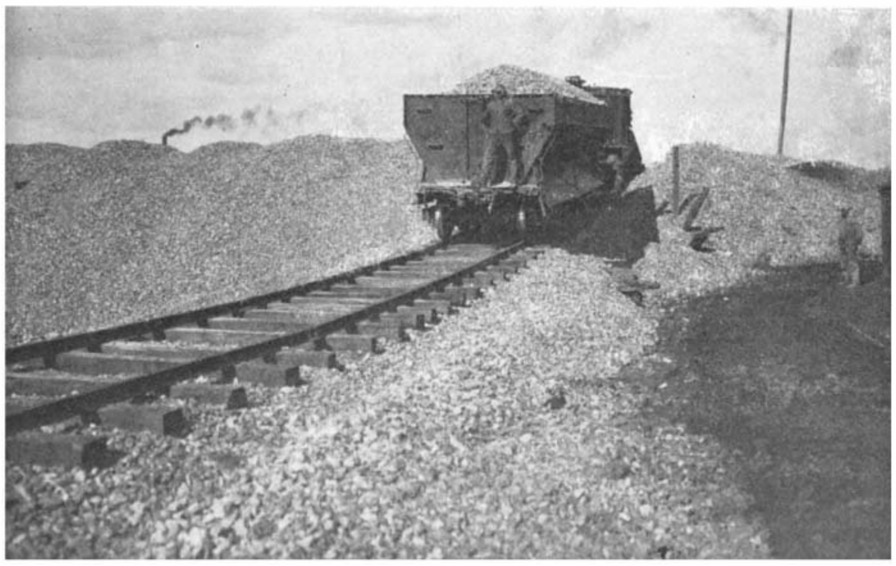
HANDLING EXCAVATED MATERIAL AT JEROME PARK RESERVOIR.

In a recent article describing the important work now being done in creating a reservoir on the site of the old Jerome race course, it was shown that the site of the reservoir is a natural depression in a high ridge of land which runs in a general north and south direction between the valleys in which are located the New York and Putnam and the Harlem Railroads. Although the site is naturally adapted for the excavation of an artificial basin, there is, nevertheless, a huge amount of material to be taken out before the reservoir will reach its designed capacity of 1,850,000,000 gallons. The completed reservoir will have a length in a north and south direction of a little over a mile, and a greatest width of half a mile, its area being 229 acres. As the whole of the bottom is being excavated to a uniform depth of 26½ feet, and the natural basin itself is filled with some stretches of high ground which rise considerably above the described high-water level of the reservoir, it can be understood that the total amount of material to be taken out reaches a very high figure; in fact, the estimated excavation at the present writing is a little under 7,000,000 cubic yards. The excavated material, however, occupies considerably more space than it did in the solid mass, the increase in the case of excavated rock being from 80 to 100 per cent. Hence it follows that the contractors, at the time the

(Continued on page 6.)



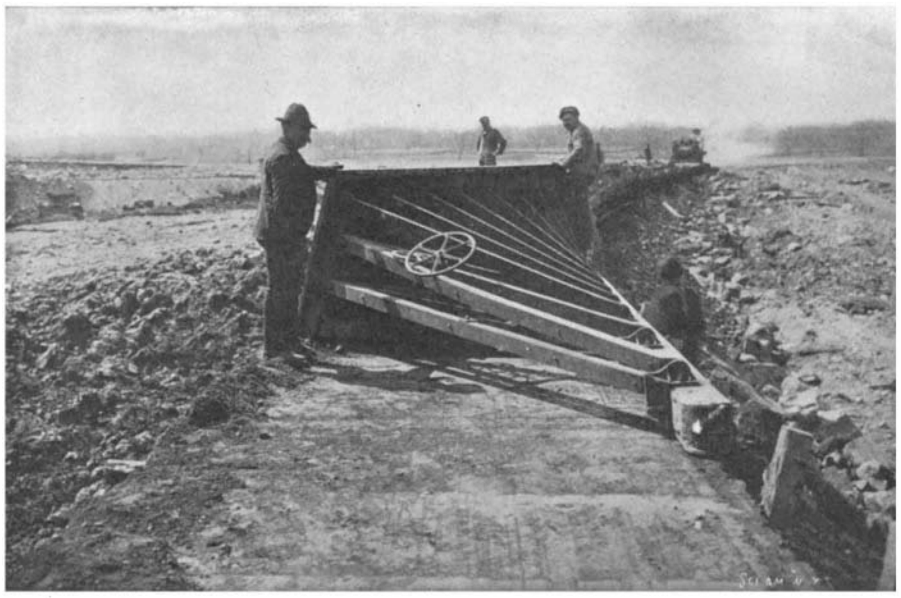
Goodwin Dump Car Unloading Broken Stone.



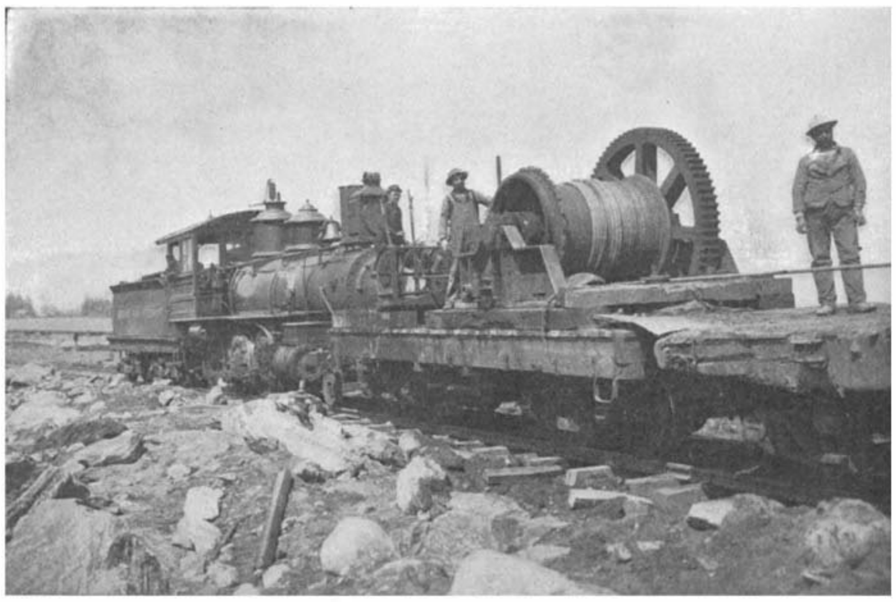
End View of Goodwin Dump Car.

Front View of the Plow, Showing Mold-Board Forcing Load from the Car.

Rear View of the Barnhardt Side Plow.



Unloading at the Dump.



Locomotive and Lidgerwood Hoisting Engine for Pulling Plow Over Train of Flat Cars.

WATER SUPPLY OF NEW YORK—HANDLING EXCAVATED MATERIAL FROM THE JEROME PARK RESERVOIR.

HANDLING EXCAVATED MATERIAL AT JEROME PARK RESERVOIR.

(Continued from first page.)

excavation is completed will have handled about 10,000,000 cubic yards of material, measured at the dump.

It is evident, then, that the question of getting out the rock, sand and earth, is only part of the problem, for this huge quantity has to be carried away and deposited on suitable dumping-grounds. Fortunately, there are within the boundaries of New York city, and within convenient distance of the reservoir, certain low-lying, swampy lands which must be filled in or reclaimed, if they are to be rendered serviceable; and for this work of refilling the Jerome Park material offers an abundant supply. Of 4,000,000 cubic yards which have been taken out to date, about 20 per cent has been used in filling near the Kingsbridge road and in Bronx Park. For the disposal of the other 80 per cent a single line of track has been laid for a distance of 4 miles, through Bedford Park, across the Harlem Railroad tracks, through Bronx Park and down Pelham Bay Parkway to the stretch of tide lands formed by the head waters of Westchester Creek and Westchester Bay, which is known as the Meadows. Commencing where the Parkway leaves the edge of the sloping grounds, this enormous mass of 3,200,000 cubic yards of sand, gravel, hardpan and solid rock has been dumped out upon the tide lands, until now a large proportion of a square mile has been filled in to a depth of 18 to 20 feet.

The illustrations which accompany this article show the modern methods of handling and transporting this material, without which the cost of carrying it away for a distance of 4 miles and dumping it would be vastly increased. At the reservoir the cars are run in trains of from ten to fifteen cars alongside the bluff which is being excavated, and the material is loaded by derricks, if it be rock, or by steam diggers if it be soft or loose material, directly on to the flat-cars. The train-load is then run down to the Meadows, where the engine is uncoupled and a train of empties coupled on, to be taken back to the reservoir. The train-load of material is now unloaded by means of a huge scraper-plow which is known as the Barnhardt Side Plow. The unloading locomotive engine, of which there are several employed at the dump, has coupled in front of it a strongly-built flat-car, upon which is bolted a Lidgerwood hoisting-engine of 180 horse power. The locomotive with its hoisting-engine car is backed down and coupled to the front end of the train-load of material, while at the rear of the train is coupled up the car on which is mounted the massive side plow. The latter is so clearly shown in our illustration that it needs no detailed description. The face of the mold-board is a heavy plate of steel, which extends diagonally across the car, the rear edge of the mold-board projecting slightly beyond the side of the car platform. The line side of the plow consists of a heavy stick of timber which is shod with steel. A 2-inch steel cable extends from the head of the plow across the whole length of the train to the hoisting-engine, and short heavy stakes are set in the stake-pockets on the right-hand side of each car to form an abutment for the line side of the plow, and keep the plow on the cars and up to its work. The mold-board is backed up by a series of vertical oak timbers from which a series of diagonal struts, heavily reinforced with iron, extend to the timber on the land side of the plow. When the train has been run into the desired position, the hoisting engine is started and the whole contents of the train are crowded off the cars, as shown in our illustrations. The saving in time and labor is considerable, as may be judged from the fact that in unloading a train of fifteen cars the services of 150 men are dispensed with, that number being necessary to unload a train with the ordinary laborer's shovel. Moreover, it would take this number of men from fifteen to twenty minutes to do the work which is now accomplished by the plow in five minutes.

Another labor-saving device for the rapid unloading of material, which is also extensively used at Jerome Park Reservoir, is the Goodwin Patent Dump Car, of which we present two views. In cross-section the car is of hopper form. The sloping sides of the car are hinged so as to open outwardly, the hinges being locked by suitable catches. When the dumping-place is reached the catches are released, and the whole contents of the car are immediately discharged, as shown in our snapshot view taken at the instant of unloading.

The railroads of Africa are of considerable extent. Their total length is 12,498 miles. In Algeria, Tunis, French Sudan, Somaliland, the mileage is 3,428. In British East, South and Central Africa, the Gold Coast and Lagos, the mileage is 3,381. Egypt has 2,036 miles of road; the Transvaal, 1,202; Natal, 736; the Orange Colony, 597; Angola and Mozambique, 585 miles; Congo Free State, 275 miles; German East and West Africa, 186 miles; Erythrea, 16.7 miles.

Automobile News.

Automobile traffic is receiving much attention in Sweden. It is probable that this summer a French company will run cars in the city of Stockholm for public hire, while a syndicate has been formed for the running of combined passenger and goods cars between the Anundsjö railway station and the province of Vesterbotten, in the north of Sweden, the former being open in the summer in order to allow tourists a good view of the fine scenery in these parts. The maximum speed is to be fifteen kilometers an hour.

The various tests for heavy-weight motors have been carried out under the auspices of the Liverpool Self-Propelled Traffic Association, which is the local center of the Automobile Club of Great Britain. The principal trials were hill-climbing, with and without loads and maneuvers at the St. George's Docks. Twelve vehicles entered the competition, the idea of which was to demonstrate that goods could be as easily and as quickly carried by this means as by the railroad. The vehicles ranged in carrying capacity from 1½ to 5 tons, and in speed from 5 to 8 miles per hour. At present the motor car traffic is handicapped by the legislated tare limit of three tons, and with such a low tare it is absolutely impossible to run heavy goods motors at a profit. Attempts are being made to either have this limit removed or to have it increased.

The motor omnibuses in London have been withdrawn from the streets owing to the indifferent support which they received from the public. The vehicles were faster than the horse omnibuses at present in existence. It is intended to retain the vehicles, since it is anticipated that when motor traffic becomes more developed and popular they will be in demand. It is intended to utilize the present storage depot, which is more than adequate to accommodate the omnibuses owned by the company, for the purpose of housing, repairing, and maintaining any type of automobiles, and also to charge electric motors and to supply petrol spirit. It is anticipated that this selling of power will be sufficiently lucrative to support the company until the time arrives when they can place motor omnibuses in the streets and maintain a regular and profitable service.

The Shrinkage of Natural Gas.

The value of the natural gas supply in the West has been such as to convert otherwise unfavorable localities into thriving industrial towns and manufacturing centers, and in some places the gradual exhaustion of the fields of gas has reconverted the communities into deserted towns and villages very much as the exhaustion of gold mines repeatedly did in California and Colorado. It was not many years ago that consumers looked upon the supply of natural gas as something without end or limit, and for decades the gas was foolishly wasted. The notes of warning which were sounded some ten years ago have in recent years been heeded, and in most localities the gas is carefully saved from all waste. But this has not come about until almost too late in some sections, and the pressure is reduced almost to the point where it hardly pays to use it.

Formerly the gas was used freely without any attempt being made to measure it, but to-day consumers have their gas supplied to them through meters, and they pay for the quantity they use. This system has abated the wasteful methods, and it is estimated that one cubic foot to-day accomplishes as much as three cubic feet did before. In lighting purposes the gas is further saved by using the incandescent mantles, which gives a certain light at much less expense than when the gas is burned alone without the mantles. In the distribution of the gas in Pennsylvania there are several other methods for preventing waste, the most important of which is the use of smaller size mains.

The reduction in the pressure of the gas is the first and pretty evident sign that the supply is giving out, and in most of the old gas regions this pressure has decreased marvelously, while in a few new ones, such as in West Virginia, there has so far been no diminution in the pressure. At one of the earliest natural gas regions operated, the State of Pennsylvania shows the greatest evidence of gas exhaustion, and at the same time the companies operating the wells have shown the most desire to economize in the sale and distribution of it. Regions that were formerly dependent upon the gas for fuel and for house heating are gradually abandoning natural gas for these purposes, but it is being employed for other industries in which it pays better. The natural gas engines have greatly multiplied in Pennsylvania, and they are being used more every year. Natural gas engines for pumping wells can be used much more advantageously than steam. This is particularly true where the pipes have to run a long distance. The loss of steam through condensation in passing through a long steam pipe is great, while there is absolutely no loss in conducting the natural gas through the longest pipes. A growing use of the gas is for operating air compressors, and then the rest of the machinery is run by the compressed air. This has been found to be the most economical use of the natural gas engines. Some of the largest iron and steel mills in Pittsburg have natural gas pipes running into them, and certain kinds of machinery are operated entirely by this fuel. There are over 5,000 miles of natural gas pipes in Pennsylvania, and these distribute the fuel to widely separated interests and territories.

Nevertheless, the pressure has been steadily decreasing in Pennsylvania, where the value of the product declined from $19,282,375 in 1888 to $6,242,543 in 1897, and even to a much further limit in 1900. But through the economizing of the gas for manufacturing purposes it is possible that the supply will last many years yet in some regions, while in others the life of the wells cannot be estimated at more than five or ten years. New wells are constantly being drilled, but the proportion of paying ones to the unprofitable ones is steadily decreasing, while old wells are being annually abandoned.

In Indiana, where there are nearly 5,000 miles of natural gas pipes, the pressure has declined quite rapidly in some regions in the past ten years. From 1886 to 1897 the pressure fell from 325 pounds to 195 pounds, according to the State Geologist's report, while in 1898 it fell to 181 pounds. When it is understood that practical workers in the field believe that when the pressure gets below 100 pounds to the square inch the majority of the wells cannot be worked profitably, the importance of this steady reduction in the pressure can be appreciated. The natural gas in the Trenton limestone rocks of Indiana is found at a depth of 1,000 feet, and this extreme depth makes the sinking and operation of wells expensive.

In Fairfield County, Ohio, which supplies gas to such cities as Columbus, Lancaster, Athens and Chillicothe, the wells are sunk to an average depth of 2,000 and more feet, and the pressure is 800 pounds to the square inch. This field is comparatively new, and new wells have been rapidly sunk there, and the pressure has not materially declined. In the northwestern part of Ohio, however, the decline in the pressure has been from 450 pounds in 1888 to 30 pounds in 1897. There are about 600 producing wells in this part of the state, and fully half a hundred are abandoned every year, while a large percentage of the new ones drilled do not produce. The condition of the fields is thus far less encouraging than formerly, and in the past decade the value of natural gas in Ohio has declined from a little over five million dollars to less than two millions. As in Pennsylvania, the use of the gas has greatly changed in recent years, and companies are making every effort to economize with it.

The natural gas supply of New York, Illinois, Kansas and Missouri is far less than either of the other states mentioned, but the pressure has also steadily decreased in these portions of the country. The work of sinking new wells in these states has declined because the companies have found less and less profit in the enterprise. Some old gas sections are entirely abandoned, and the wells now in operation hardly supply enough to feed the industries dependent upon the fuel.

In West Virginia and Canada the use of natural gas has increased in recent years, and these two fields have great promises. In 1888 there was hardly a dozen natural gas wells producing in West Virginia, while in 1897 there were over 150, of which 47 had been drilled in the last six months. To-day there are upward of 250 producing wells in the state, with new ones being steadily sunk. The depth of the wells in that state varies from 1,200 to 2,800 feet, and the cost of drilling runs from $1 to $1.50 per foot. The pressure varies fully as much as the depth of the wells. In some of the new wells it has been found to be as high as 1,100 pounds to the square inch, and in other places it rarely reaches 100 pounds. This great difference in the pressure makes the matter of exhaustion very uncertain, but experts believe that with proper care and avoidance of waste the West Virginia gas regions will continue to supply this valuable fuel for many years to come. Certain it is that there is no sign of exhaustion to frighten the owners for the next decade.

Canada is a rich natural gas region which has only been recently tapped, and in the last few years several hundred miles of pipes have been laid to bring the gas into the United States. Like the mineral resources of Canada, the natural gas supply north of us is only poorly understood or measured, and for all that we know there are fields of it sufficient to keep our industries going for half a century. But in this country, especially in the old regions where gas has been used for years, the supply is steadily decreasing, and some industries that were originally built up by the cheap fuel have either changed their location or made preparations to adopt other fuel. At present all efforts are being made to prolong the life of the wells that are already in operation. As the pressure of the gas decreases the wells are apt to fill with water, and this greatly diminishes their usefulness. Trouble of this kind is constant, and a good deal of extra engineering work is required to keep the wells free from the water. G. E. W.