Iron Ore.

Census Bulletin 113, in relation to iron ore, prepared by Mr. John Birkinbine, special agent, under the supervision of Dr. David T. Day, special agent in charge of the Division of Mines and Mining of the Census Office, shows the quantity of iron ore produced in the United States during the year 1889 to be 14,518.041 long tons, valued at $33,351,978, an average of $2.30 per ton. The total product reported in 1880 was 7,120,362 long tons, valued at $23,156,957. Of the twenty-six States and two Territories producing iron ore in 1889 the four leading ones are as follows: Michigan, 5,856.169 tons; Alabama, 1,570,319 tons; Pennsylvania, 1,560,234 tons; and New York, 1,247,537 tons, aggregating 10,234,259 tons, or 70·49 per cent of the total product. The number of employes engaged in mining iron ore was 37,707, who were paid in wages $13,880,108. The capital invested was $109,766,199, distributed as follows: Land, $78,474,881; buildings, fixtures, etc., $7,673,520; tools, implements, etc., $8,045,545; cash and stock on hand, $15,572,253. The report shows a remarkable increase in production and activity. The average wages paid to laborers in 1889 was $1.29 per day; to boys, 62 cents.

In the total cost of producing iron ore Alabama is the only State which averages less than $1 per ton, viz., 82 cents. Next in order of low cost come Texas, $1.05; Tennessee, $1.08; Pennsylvania, $1.10; Georgia and North Carolina, $1.14. In Colorado, for reasons before given, the cost of producing one long ton of ore, $3.49, is greater than in any other State.

Probably in no country has the transportation of iron ore assumed such proportions as in the United States.

To get facilities for cheaply handling Lake Superior ores the railroads which penetrate the various districts have constructed expensive terminal facilities, generally consisting of one or more docks, with the railroad tracks elevated from thirty-five to forty-seven and one-half feet above the water level, the sides of the docks being fitted with pockets, into which the ore from the cars is dumped by means of drop bottoms. From these pockets the ore is loaded into vessels by iron chutes, which are let down into the vessel's hold. In this manner the ore is never handled from the time it leaves the mine until it is shoveled into buckets when the vessel is being discharged at lower lake ports, and no manual labor is necessary other than poking the ore with poles from the cars into the bin and from the bin into the chutes, and in some cases but little of this is required.

The total investment for docks especially built and equipped for handling and shipping iron ore approximated $4,000,000 in the year 1889.

The largest of the receiving ore docks is at Fairport, Ohio, which has a frontage one mile in length, with room for stocking ore extending back 180 to 350 feet in width. The two docks at Cleveland are one-half mile in length, with a storage capacity of 350 feet wide. The capacity of the three docks named will reach from 1,000,000 to 1,500,000 long tons each, as the ore is stored from 25 to 50 feet in height.

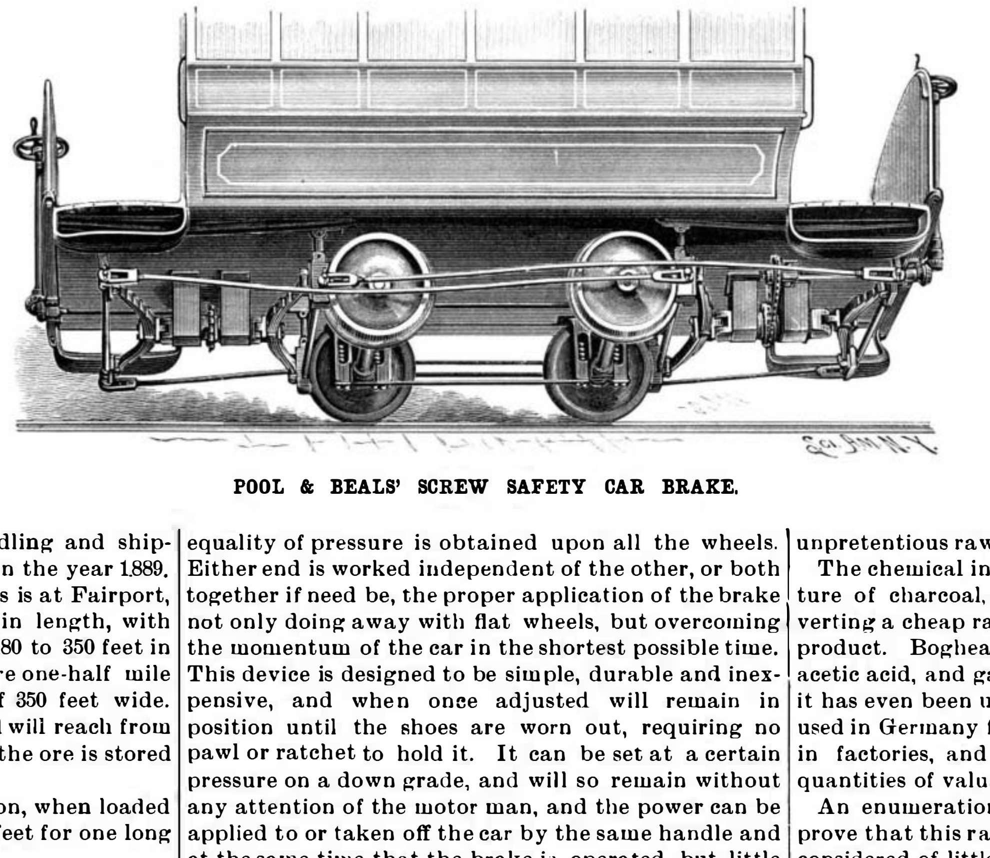
The ore from the Lake Superior region, when loaded into cars, occupies from 10 to 16 cubic feet for one long ton.

The machinery equipment of the various docks differs greatly, but five general types may be mentioned: (1) swing-boom derricks, operated either with engines placed on them or driven by wire rope from engines at a distance, the mast being either stationary or carried on trolleys; the iron buckets being lowered into the holds of vessels, where the navvies shovel the ore into them, the steam machinery raising the buckets and swinging the boom to the point where the ore is to be deposited; (2) a similar arrangement of swing-boom derricks, which discharge into hoppers and from these into tram cars, which carry the ore from the ore dock to stock piles located at a considerable distance from the water; (3) an A frame which lifts with the buckets and discharges them into tram cars, that run to the stock pile or dump into pockets and thence into cars; (4) aprons which project over the holds of vessels; the buckets traveling up the incline of this apparatus are dumped into tram cars, which run by gravity, discharge, and return automatically; (5) booms or aprons upon which the buckets are carried, and continue their journey either over cables or on trussed bridges, the buckets dumping automatically at the point desired and returning to the hold without detaching from the machinery.

These dock equipments have been put up at great expense, some of the docks costing, equipped, over $800,000, and by them it has been possible to handle quantities of ore which could not be moved in any other way, while the cost of such handling has been reduced to a minimum. The expense of shoveling the ore into buckets in the holds of vessels varies from 10 to 15 cents per long ton, while with the improved apparatus at some of the docks this ore is lifted from the vessel, carried back 350 feet, and dumped at a total cost, including the labor, wear and tear, interest, and fuel account, of from three-fourths to one and one-half cents per ton. With twenty-one men in the hold of a vessel carrying 2,000 long tons of iron ore, the entire cargo has been stocked in seventeen hours. Other instances are mentioned where with twenty-eight men 2,200 long tons were similarly handled in fifteen hours, and 2,100 long tons were handled by eighteen men in seventeen hours. In using these improved apparatus in loading from stock piles to railroad cars it is not uncommon to have a gang of men shoveling into buckets and load the ore on cars at the rate of eight or nine tons per man per hour.

AN IMPROVED SCREW SAFETY CAR BRAKE.

The accompanying illustration represents this improvement as applied to a four-wheel electric motor car, giving all the space between the wheels for motors. It is a patented invention of Messrs. A. B. Pool and J. J. Beals, of Boston, Mass., and affords a new departure from the old system of dead leverage, substituting therefor a live spring pressure. A right and left screw with traveling nuts thereon is hung to the car as shown, to which is attached two half elliptic springs at either end of the nuts, the springs having friction rolls at their ends and being pivoted to the nuts so as to conform to any position of the brake beams. Opposite the springs are placed sub-beams, to which draught rods are attached connecting with the brake beams. Sprocket wheels are placed at the center of the screws and are connected with corresponding wheels hung to the car by chain belts, the wheels having a shaft connection geared to the operating rod, by the working of which the springs are spread and a perfect



POOL & BEALS' SCREW SAFETY CAR BRAKE.

equality of pressure is obtained upon all the wheels. Either end is worked independent of the other, or both together if need be, the proper application of the brake not only doing away with flat wheels, but overcoming the momentum of the car in the shortest possible time. This device is designed to be simple, durable and inexpensive, and when once adjusted will remain in position until the shoes are worn out, requiring no pawl or ratchet to hold it. It can be set at a certain pressure on a down grade, and will so remain without any attention of the motor man, and the power can be applied to or taken off the car by the same handle and at the same time that the brake is operated, but little power being required to do the work. The inventors have perfected this system for application not only to any kind of street car, but, by a simple method of air pressure, to steam trains as well. It is expected that the system will soon be given a practical demonstration on the West End Railway, Boston.

For further information relative to this improvement address the inventors, No. 16 Hanover Street, Boston, Mass.

The Uses of Peat.

The *Handels Museum* publishes an extract from an article by Dr. Leo Pribyl, who maintains that peat is a valuable raw material, the uses of which, except as fuel and litter, are as yet very limited. The fiber is unsurpassed as a packing material for use in the case of breakable merchandise, being much superior to straw, hay, etc., owing to its greater elasticity and dryness. In the case of consignments consisting of liquids, it possesses the advantage of being peculiarly adapted for absorbing any of the contents which may have escaped through breakage, and thus preventing damage which might result to other consignments through damp. In the shape of dust and litter it is especially adapted for preserving perishable articles. Meat when packed in it will keep fresh for weeks, and will eventually dry up, the moisture being absorbed by the peat. In this way fresh sea fish has been sent from Trieste to Copenhagen, and has reached its destination in perfect condition. Peat is also successfully used for preserving fresh fruit; even grapes may be made to retain their fresh appearance for months, and, owing to the high prices of this fruit in spring and summer, would amply repay the trifling expense incurred by the use of peat dust. Experiments have shown equally satisfactory results in the case of pears, apples, plums, etc., as also in the case of cabbage, turnips, and potatoes, peat packing having the advantage, not observable with other packing materials, of preventing the sprouting of potatoes in spring. The question as to the best method of preserving eggs for the winter months is an important one, and still remains without any satisfactory answer. Possibly the preservative qualities of peat might here again be illustrated, and a satisfactory solution of this important question be arrived at.

It has been found a drawback in the use of artificial saline manure that in wet weather it forms itself into hard lumps, which cannot be scattered by the manure-spreading machines, a difficulty which may be obviated by the use of a small quantity (2·5 percent has been found to be sufficient in the case of kainite) of peat dust with the manuring salt.

As a substitute for ashes and straw in filling up the partition walls of cellars and ice houses, broken peat is most suitable, as the effect of moisture on the ashes or straw is such as to render their immediate removal a necessary condition for the continued use of such places. Ice has been preserved for eight days in a cement barrel when covered with dry peat litter. Two pieces of ice were exposed to the sun's rays in Braunschweig; one of them was covered with wood shavings and the other with a layer of equal depth of peat litter. The former had thawed in 72 hours, when it was found that the latter was still almost entire. From this it is seen that peat is a bad conductor of heat, and is consequently well adapted for isolating purposes.

Peat dust has been recommended as an excellent ingredient for use in the manufacture of light, porous bricks, being mixed with the clay previously to baking. Bricks of this kind are much sought after in certain branches of architecture. But still further industrial uses are found for peat. The peat bogs of Northern Germany and of Sweden are being worked by joint stock companies, with a view to obtaining the elastic fiber, which, when free from dust, is used for weaving into carpets and other textile fabrics. Considerable capital is invested in these undertakings in Oldenburg and Sweden. The paper industry, too, in the manufacture of peat cellulose, has shown a decided preference for this tender and pliant fiber, so that it may be justly said that at the present time the supply of good peat is inadequate to meet the demand, considering the varied uses of this unpretentious raw material.

The chemical industry is using peat in the manufacture of charcoal, peat coke, peat gas, etc., thus converting a cheap raw material into a valuable industrial product. Boghead naphtha, tar, solar oil, paraffine, acetic acid, and gas have been produced from peat, and it has even been used in tanning. It has been for years used in Germany for absorbing waste liquids and refuse in factories, and in this way has furnished large quantities of valuable manure in certain districts.

An enumeration of the manifold uses of peat will prove that this raw material, which has hitherto been considered of little importance, and which nature has provided in such abundance, even if it be in many districts partially distributed, is destined not only to benefit agriculture by its valuable properties and chemical composition, but to lay the foundation of a flourishing and widespread industry. A new era has been entered upon in the sanitation of towns by using peat, and it is to be hoped that advantage will be taken of the undoubted benefit arising from its use, both as regards the health of urban populations and the promotion of agricultural interests by the supply of large quantities of manure. In this way extensive and unproductive tracts of bog land would be converted into valuable properties, and a flourishing industry would provide work and wages for thousands of hands.—*Jour. Soc. Chem. Industry.*

A PATENTED process for obtaining cellulose and oxalic acid from the vegetable fibers contained in wood, which is the invention of M. Liefchutz, consists in reacting on wood with dilute nitric acid, in the presence of sulphuric acid, separating the intermediate product from the acid liquor, which contains in solution the oxalic acid formed, and subjecting the intermediate product to a further treatment to remove the remaining incrusting matters from the cellulose. As to the acid liquor, it is set aside and subsequently treated in a process for recovering the oxalic acid. The oxalic acid dissolved in the weak nitric acid can be obtained direct in the crystalline form, by repeatedly using the separated acid liquors for the treatment of fresh wood. —*Bull. Fab. Papier.*