

Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PU LISHED WEEKLY AT NO. 37 PARK ROW, NEW YORK.

O. D. MUNN.

A. E. BEACH.

TERMS FOR THE SCIENTIFIC AMERICAN.

One copy, one year, postage included. \$3 20 One copy, six months, postage included. 1 60

Subs.—One extra copy of THE SCIENTIFIC AMERICAN will be supplied gratis for every club of five subscribers at \$3.20 each; additional copies at same proportionate rate. Postage prepaid.

Single copies of any desired number of the SUPPLEMENT sent to one address on receipt of 10 cents. Remit by postal order. Address MUNN & CO., 37 Park Row New York.

The Scientific American Supplement

is a distinct paper from THE SCIENTIFIC AMERICAN. THE SUPPLEMENT is issued weekly. Every number contains 16 octavo pages, with handsome cover uniform in size with THE SCIENTIFIC AMERICAN. Terms of subscription for SUPPLEMENT, \$5.00 a year, postage paid, to subscribers. Single copies 10 cents. Sold by all news dealers throughout the country.

Combined Rates.—THE SCIENTIFIC AMERICAN and SUPPLEMENT will be sent for one year, postage free, on receipt of seven dollars. Both papers to one address or different addresses, as desired. The safest way to remit is by draft, postal order, or registered letter. Address MUNN & CO., 37 Park Row, N. Y.

Scientific American Export Edition.

THE SCIENTIFIC AMERICAN Export Edition is a large and splendid periodical, issued once a month. Each number contains about one hundred large quarto pages, profusely illustrated, embracing: (1.) Most of the plates and pages of the four preceding weekly issues of THE SCIENTIFIC AMERICAN, with its splendid engravings and valuable information; (2.) Commercial, trade, and manufacturing announcements of leading houses, terms for export edition, \$3.00 a year, sent prepaid to any part of the world. Single copies 50 cents. Manufacturers and others who desire to secure foreign trade may have large and handsomely displayed announcements published in this edition at a very moderate cost.

The SCIENTIFIC AMERICAN Export Edition has a large guaranteed circulation in all commercial places throughout the world. Address MUNN & CO., 37 Park Row, New York.

VOL. XLL, No. 14. [NEW SERIES.] Thirty-fifth Year.

NEW YORK, SATURDAY, OCTOBER 4, 1879.

Contents.

(Illustrated articles are marked with an asterisk.)

Table listing various articles such as American Gynecological Society, Magnetism experiments, Manganese bronze, etc., with page numbers.

TABLE OF CONTENTS OF

THE SCIENTIFIC AMERICAN SUPPLEMENT, No. 196,

For the Week ending October 4, 1879.

Price 10 cents. For sale by all newsdealers.

Table listing contents of the supplement, including Engineering and Mechanics, Technology, Electricity, Chemistry, Natural History, etc., with brief descriptions of each article.

THE GRAIN TRADE OF NEW YORK.

One cannot cross either of our river ferries, still less circumnavigate the city or take a few hours' sail up the Hudson, without being amazed at the movement of breadstuffs visible on all sides. On the Hudson River Railroad, and all the other iron thoroughfares converging upon this city, long trains of grain cars are almost constantly in sight, while on the river vast rafts of grain laden canal boats more than rival the railway trains in carrying capacity.

Not unfrequently four or five ocean steamers, and a fleet of other shipping, may be seen about the great railroad elevators at 65th street, receiving cargoes of grain and cattle. At each of the piers of the numerous European steamship lines, floating elevators are busy transferring grain from canal boats; others are at work in midstream alongside ocean steamers and sailing ships at anchor; and at the extensive warehouses along the shores, permanent or floating elevators are similarly engaged in the rapid handling of the staff of life, brought to their doors either in canal boats and barges, or in cars floated, on boats made for the purpose, from the piers of the Erie and other railways.

The magnitude of this grain trade of New York may be judged from a few statistics. During the week ending September 6, the receipts at this port were: Flour, 112,124 barrels; wheat, 2,271,492 bushels; corn, 1,327,014 bushels; oats, 279,355 bushels; rye, 139,886 bushels; barley, 1,100 bushels—about as much as was received at all the other seaboard ports together. During the same week the exports of breadstuffs from New York included 113,224 barrels of flour, 2,519,409 bushels of wheat, 914,623 bushels of corn, 2,996 bushels of oats, 103,701 bushels of rye. At the last date named, September 6, the amount of grain in our city granaries and afloat in our harbor embraced in round numbers, 3,750,100 bushels of wheat, 3,100,000 bushels of corn, 810,000 bushels of oats, 160,000 bushels of rye, and 26,000 bushels of barley. The grain of all sorts in store at New York was 6,332,035 bushels. The storage capacity of the port is about 12,000,000 bushels, but the present active demand for grain for foreign shipment, due to the general deficiency of European crops, prevents any large accumulation here. Indeed, the bulk of shipping devoted to the transportation of grain from this to foreign ports is at this season something unprecedented in the history of the world.

During the year 1878 the receipts of grain alone at this port were, by canal; 63,663,049 bushels; by vessels coastwise, 1,090,236 bushels; by rail, 63,960,486 bushels—a total of 128,613,771 bushels. Changing flour and meal to their equivalents in bushels, the receipts of grain, flour, and meal were, during the year, 152,862,170 bushels. During the same period the export of cereals from New York amounted to 107,819,044 bushels, the exports from all the other Atlantic ports together (including Montreal) being 104,678,137 bushels—evidence enough that our city still holds the lion's share of this trade. To describe in detail the manner in which the grain trade is conducted here would require a volume. A rough outline of it will have to answer.

As already indicated, the vast stream of life-sustaining wealth flows to us through channels of two distinct sorts—by water and by rail. The inflow coastwise is too small, relatively speaking, to demand especial notice. The Erie canal, with the Hudson river on one side and the railways on the other—chiefly the New York Central and Hudson River Railroad, the Erie road and the Pennsylvania Central—divide the traffic about equally. And the grain received by each route has, speaking generally, its particular treatment. That which comes by rail is graded according to rules agreed upon by the New York Produce Exchange, and is sold by grade, the identity of the grain being lost. The grain received by water, on the contrary, is chiefly handled without grading, the identity of lots being preserved. In the latter case the consignee receives the identical grain shipped to him, say from Buffalo or any point farther West; in the former, he receives not the grain billed to him, but a certificate for so many bushels of wheat, corn, or other grain of a specified grade, his particular shipment being, for economy in warehousing and handling, mixed with other receipts of the corresponding kind and grade after it has been officially inspected, graded, and weighed. The quantity of grain represented by each certificate is limited to 8,000 bushels, except for oats, for which the certificates are not to exceed 10,000 bushels each. These certificates, which are dated and numbered consecutively, state in detail the kind, grade, and quantity of grain represented by them, and are furnished to the consignee before noon of the same day, at which time the business of the Produce Exchange begins. On the floor of the Exchange all ungraded grain is sold by sample, the various samples being exhibited on their proper tables, in small paper boxes duly labeled, the amount of the lot, and the place where it is stored or afloat, being fully set

down. The graded grain is represented by type samples, so that dealers can see exactly what their certificates call for. A buyer purchases for exportation from various sellers, say, 100,000 bushels of No. 1 white winter wheat, or any other of the dozen different grades of winter wheat. He handles no grain, but receives instead certificates representing that amount of grain of the specified kind. On the presentation of such certificates to the railway company or companies issuing them, freight and accrued charges being paid, the companies deliver the grain out of their general stock of that grade, at such point in the harbor as may be designated.

A vast amount of loading is done at the elevators at 65th street and North River. A larger amount is transferred by floating elevators, which draw up alongside the great steamers as they lie in their accustomed slips, receiving or discharging their freight. Our illustration gives a general view of an elevator of this sort, of which a fleet of twenty or more are constantly employed in our harbor. There are besides numerous stationary elevators belonging to large grain dealing firms, at the lower end of New York island and along the Brooklyn shore; and the Erie Railroad Company are building at the Jersey City terminus of that road an elevator which promises to more than rival those of the New York Central.

The speed at which grain is transferred at these elevators is amazing to one not familiar with their management. A shaft inclosing an endless chain of buckets is thrust into a laden car or canal boat, and instantly the grain begins to travel up the long incline to be delivered on the opposite side at a rate often exceeding fifty bushels of wheat a minute, or a larger quantity of lighter grain.

The report of the Produce Exchange for 1878 shows the authorized charges for handling grain at this port to be, per bushel: weighing, 1/2 cent; elevating from canal boats, 1/2 cent; for delivering on board single deck ocean vessels, including trimming, \$7 a thousand bushels; ditto, double-decked ocean vessels, \$8; on ocean vessels in bags, \$6.25; on coastwise vessels, \$2.50. The expenses on grain to shippers by rail from the interior are: for inspection, 25 cents a car; elevation, 1/2 cent a bushel; half weighing, 1/4 cent a bushel; storage, 1/4 cent a bushel. At the New York Central elevator the charge for bulking grain with storage (10 days) is 1/4 cent a bushel. The Erie and the Pennsylvania Central Companies charge, for holding grain on storage in lighters, 1/4 cent a bushel for each ten days. The charge for delivering afloat ungraded grain in railroad lighters, including elevation from boats, ranges from 3 cents to 1 1/2 cents a bushel, according to the bulk of the lots handled. The authorized charge for towing laden canal boats about the harbor ranges from \$5 to \$11, according to distance. The freight tariff from the great grain distributing point of the West, Chicago, varies with the season, the style of carriage, the degree of competition between the railways, or between water and rail carriage. In the winter, when the lakes, the Erie canal, and the Hudson River are closed, the rate rises as high as 25 cents a bushel. On the opening of the water routes the rates fall, dropping at midsummer as low as 8 or 9 cents by rail and 6 cents by water. The average rate by water during 1878 was 7 1/4 cents; by all rail routes, 12 cents. As an important link in the water route, the Erie canal is of infinite importance. The existing railways alone would be incompetent to do the carrying required at the time required (assuming the foreign demand unimpaired); besides, by having the monopoly, their rates would not only be made higher than now obtains, but possibly so high as either to destroy the possibility of our competing in price with Russian wheat in Liverpool, or to make competition possible only at the sacrifice of all profit to our wheat growers. It is worth noting in this connection that during the present year the average cost of transporting wheat from Northern Minnesota to New York—26 cents a bushel—is less than was the cost of the carriage of wheat by lake and canal from Chicago twelve years ago.

FORMER EXTENSION NORTHWARD OF SOUTH AMERICA.

In his report to the Superintendent of the Coast Survey, describing the past winter's dredging operations of the Coast Survey steamer Blake, Professor A. Agassiz shows that the soundings taken, together with those previously known, make it possible to trace with tolerable accuracy the outline of the land masses which anciently united the West India Islands with the continents. After describing the geography of the 100-fathom line, Prof. Agassiz says that, on examining the 500-fathom line, Jamaica is found to be the northern spit of a gigantic promontory which once extended toward Hayti from the mainland, reaching from Costa Rica to the northern part of the Mosquito coast, and leaving but a comparatively narrow passage between it and the 500-fathom line encircling Hayti, Porto Rico, and the Virgin Islands, in one gigantic island. The passage between Cuba and Jamaica has a depth of 3,000 fathoms, and that between Hayti and Cuba is not less than 873 fathoms, the latter being probably an arm of the Atlantic.

The 500-fathom line connects, as a gigantic island, the banks uniting Anguilla to St. Bartholomew, Saba Bank, the one connecting St. Eustatius to Nevis, Barbuda to Antigua, and from thence extends south so as to include Guadeloupe, Marie-Galante, and Dominica. This 500-fathom line thus forms one gigantic island of the northern islands, extending from Saba Bank to Santa Cruz, and leaving but a narrow channel between it and the eastern end of the 500-fathom line running round Santa Cruz. As Santa Cruz is separated