TRANSPORTATION OF GRAIN IN THE UNITED STATES.

(*Continued from page* 258.)

acre. Rye with 27,140,000 bushels and barley with 58,800,000 complete the great grain crops giving a grand total of 2,498,793,000 bushels from 139,589,286 acres.

Much of this is exported either as grain or as flour. We will take 1890 as before. Of wheat as grain, 49,271,580 bushels were exported, representing about one-eighth of the crop. This is supplemented by an exportation in the same year of 11,319,450 barrels of wheat flour. Of corn 86,817,220 bushels and of oats 12,207,359 bushels were exported. There were smaller exports of rye and barley and of rye flour, while 14,725,268 lb. of bread exported represent a quantity of flour of different grades.

The total exports reduced to a bushel basis covering flour and meal and all cereals was 203,220,344 bushels, which is less than one tenth of the crop.

Thus it is evident that America, while fond of considering herself the world's granary, is far busier feeding herself than in feeding others.

These exports are of domestic produce, but there was an export also of foreign grain, aggregating 654,225 bushels. While thus pouring out her surplus products, America also imported 11,795,548 bushels of grain, including 9,375,407 bushels of barley alone.

The business done in exports at the different seaports is interesting. Reducing flour and meal of all kinds to the bushel standard, we have for the following ports in 1890:

Name of City.	Bushels of grain of all kinds exported.	Name of City.	Bushels of grain of all kinds exported.
New York	64,324,034	Montreal	13,168,963
Philadelphia	21,346,268	New Orleans	13,951,463
Boston	12,165,965	Baltimore	36,207,554

What is ultimately done with the grain received at any given city is not easily determined, except in the case of seaboard cities. In the case of New York, 122,013,670 bushels, on the basis of the last table, were received, indicating that a little over one-half the receipts was exported to foreign countries from this center.

At seven Atlantic seaboard ports, 280,149,420 bushels were received, an excess of about 77,000,000 bushels over the total exports.

The year 1890 by no means represents a good crop. The comparison with other years is given here.

Year.	Crop of all grains in bushels.	Acreage.	Year.	Crop of all grains in bushels.	Acreage.
1880	2,703,575,966	120,103,484	1886	2,830,710,000	140,941,741
1881	2,056,543,370	122,559,255	1887	2,649,613,000	140,910,809
1882	2,682,375,143	125,721,423	1888	3,197,692,000	145,368,370
1883	2,621,650,135	129,776,207	1889	3,449,667,000	149,265,826
1884	2,981,764,000	135,413,363	1890	2,498,793,000	139,589,286
1885	3,002,813,000	134,961,686			

What the production and acreage of the present year will be cannot be yet definitely stated. It is certain that it will be very large. One very curious thing to notice in the last table is the almost unbroken increase of acreage, with attendant fluctuations in crops. Thus 1887 shows an increase in acreage of about 11,000,000 acres over 1883, but with a very slight increase in production.

The fluctuation in yield per acre is shown in the following table for the same years. This fluctuation is at the root of the above difference in proportion of area cultivated to crop produced.

Year.	Bushels per Acre of Wheat.	Corn.	Oats.	Rye.	Barley.	Year.	Bushels per Acre of Wheat.	Corn.	Oats.	Rye.	Barley.
1880	13·1	27·6	25·8	13 9	24·5	1886	12·4	22·0	26·4	11·5	22·4
1881	10·2	18 6	24 7	11·6	20·9	1887	12·1	20·1	25·4	10 1	19·6
1882	13·6	24·6	26·4	13·4	21·5	1888	11·1	26·2	25·9	12·0	21·3
1883	11 6	22 7	28 1	12·1	21 1	1889	12·9	27·0	27·4	11·9	22 2
1884	13 0	25·8	27·4	12 2	23·5	1890	11·1	20·7	19 8	11·8	21·0
1885	10·4	26·5	27·6	10 2	21·4						

As regards transportation by different methods, New York offers as great a variety as any city. It receives grain, flour, and meal by canal, by vessels coastwise, and by rail. For 1890 the following were the receipts:

By Canal. Bushels.	By Vessels, Coastwise. Bushels.	By Rail. Bushels.
30,185,400	1,609,551	90,218,719

This shows that the slowly moving canal boat is a very large factor in the transport question even at the present day. In grain alone the canal figures to still greater advantage as follows:

By Canal. Bushels.	By Vessels, Coastwise. Bushels.	By Rail. Bushels.
30,185,400	846,440	63,938,068

For the fiscal year July 1, 1890, to June 30, 1891, the aggregate value of cereals exported was $152,425,224, at an average rate of 66·2 cents per bushel. Wheat and flour represented $102,312,074 of this amount.

England is our best customer. The following figures show the distribution of exports from the United States.

	Wheat. Bushels.	Corn. Bushels.		Wheat. Bushels.	Corn. Bushels.
Great Britain	38,240,523	54,601,034	Belgium	3,741,303	4,793,323
Canada	2,270,769	9,365,811	Brazil	1,768,234	
Germany	8,786	11,419,063	Denmark		5,788,733
France	3,846,505	8,481,129	Portugal	2,812,483	20,000

Correspondence.

Cheap Shoes Wanted.

To the Editor of the Scientific American:

Will not some philanthropic genius invent a cheap summer shoe, fit for human beings to wear and leaving the foot in its natural position, with freedom for natural expansion in all directions? Hints might be gathered both from the sandals worn at the birth of the Christian era and the moccasins worn by the American Indians, neither of which would cramp the toes or elevate the heel, and one of which would give free ventilation, which the modern shoe prevents.

R. S.

Casting Bullets for Ready Identification.

To the Editor of the Scientific American:

I have invented an improvement in bullets, the idea being to insert a plug of harder metal to designate and identify the bullet wherever it may be found. Thus if a policeman was to discharge his revolver at a burglar and the night being too dark for recognition, were the burglar to escape with one of the marked bullets in his body, it would serve as an identification. Much speculation is now spent as to size of bullets, etc., when taken from wounded criminals. The cartridge men think it would hardly pay to make special bullets, although the novelty is admitted. I think the idea is too good to lie dormant, and am willing to contribute it to the public through either of your papers, of which I am a subscriber.

The idea would be for the police in each city to have a distinguishing mark, such as the following: +, ■, I, ●, △, and others.

GEO. H. IRELAND.

Springfield, Mass., Sept. 18, 1891.

Interesting Discovery at Wolfville, N. S.

To the Editor of the Scientific American:

At the head of Minas Basin, a few feet above tide water, some very interesting remains have lately been found on the premises of Mr. W. C. Archibald, of the town. The place in question has been a small hill of sand as far back as any of our residents can remember; but within the last twelve years Mr. Archibald has removed about six feet of soil, and in doing so came to traces of building. Recently he has had the place thoroughly dug over, and the following remains have come to light.

1st. A floor of hewn boards, probably hemlock, charred on upper side.

2d. Rough bricks or irregular pieces of clay reddened and hardened by fire.

3d. Charcoal, or charred wood, and sticks which may have been wattles.

4th. Iron implements, as wrought nails, file, knife, and portions of vessels.

5th. Copper coin and gun guard.

6th. Small pieces of crockery, a bowl of clay pipe two inches high, and several stems.

There was evidently a small house here at some remote period, which was burned down and the site of which has since been covered by six feet of sand. The land surrounding this is alluvial, but it is not easy to account for this evidence, or to say whether the remains belong to the Acadian or Norse period.

A. E. COLDWELL.

Acadia College, Wolfville, N. S., Oct. 1, 1891.

English and American High Speed Performances.

Concerning the rapid railway trips lately made in this country, our London contemporary *Engineering* remarks:

There has been a train run in America which has eclipsed the best examples ever yet seen in any part of the world. We pride ourselves on having the finest express service in existence, and no doubt we have, if it be considered as a whole, but our best performances are now equaled in America, and our very finest run, which only a few years ago excited the greatest enthusiasm, has been surpassed. It will be remembered during the race to Edinburgh that on August 13, 1888, the West Coast train ran from London to Edinburgh (400¼ miles) in 7 hours 38 minutes, and on the following day the East Coast train covered its distance (392½ miles) in 7 hours 32 minutes. Again, on the 31st of the month the East Coast did the distance in 7 hours 26¾ minutes. The feat thus performed was 392½ miles in 416¾ minutes of running time, subtracting the 26½ minutes for lunch at York, 2 minutes at Selby, and 1½ minutes at Ferry Hill. The speed, excluding stoppages, was 56·5 miles an hour all the way. Including all the stoppages, except the 26½ minutes for luncheon, it was 56 miles an hour. This was certainly the best run ever made up to that date, but it was not an example of a regular service. The race only lasted about a fortnight, and ever since 8 hours has been the standard time for the journey on both routes, which gives an inclusive speed of 50 miles and a running average of 53½ miles on the longer route. Omitting the luncheon time, the average speed, including all other stops, is 53 miles an hour, or 400¼ miles in 460 minutes.

Now let us see what is being done in America. The Royal Blue Limited between Jersey City and Washington makes the run daily at an average speed of 52·8 miles an hour. This is just a trifle better than our West Coast Scotch expresses.

All these good runs have been put into the shade by one on the 14th of September, from New York to East Buffalo, 436⅓ miles in 439¾ minutes. When the news of this came by telegram it was received with incredulity, as the invention of a newspaper reporter, but with the full details before us it is impossible to deny credence to it. The run has certainly been made, and would have fulfilled the plan of its author, Mr. H. Walter Webb, third vice-president of the New York Central and Hudson River Railroad Company, of covering the entire distance at a mile a minute, had there not been 7½ minutes delay for a hot bearing. The following table gives the particulars of the runs:

Miles.		Time.	Speed.
	New York.	7:30 a.m.	Miles.
143	Albany..... arr.	9:50 a.m.	61¼
	dep.	9:53½ a.m.	
291¼	Syracuse... arr.	12:19½ p.m.	61
	dep.	12:22 p.m.	
436⅓	E. Buffalo.	2:50	58⅓

59·52 miles an hour.

From New York to Albany the line follows the windings of the Hudson River, which are very sharp, entailing curves of short radius. The track is practically level, except that a summit of 100 feet is surmounted at one place. The distance is 143 miles, and was covered in 140 minutes, at the rate of about 61¼ miles an hour. Three minutes and a quarter were consumed in changing locomotives, and the next stretch to Syracuse of 148 miles was done in 146 minutes, or at the rate of 61 miles an hour over an undulating country. In 2½ minutes another locomotive was coupled on and the run of 145 miles to East Buffalo was commenced. This was over a level line, and was done in 148 minutes, in which is included a stop of 7½ minutes for a hot bearing. Had it not been for this delay, the splendid run of 145 miles in 140½ minutes would have been made at the rate of 62 miles an hour. As it was, the entire journey only exceeded by 3½ minutes the determined rate of 60 miles an hour for 7 hours 16 minutes, including stoppages.

The train consisted of a locomotive weighing 60 tons and a tender weighing 40 tons, a drawing room car 40 tons, a buffet car 33 tons, and a private car 38 tons, or about 210 tons in all, by no means a light train. The engines had cylinders 19 inches in diameter by 24 inches stroke. The first had 6 feet 6 inches coupled driving wheels, and the other 5 feet 9 inches wheels. The total heating surface of the first engine reached the high total of 1821·5 square feet, and the grate area was 273 square feet. All the tenders were fitted to take up water during transit, and were able to carry 6¾ tons of coal.

It is easy to guess the cause of this feat being attempted. There will be great rivalry among the railways running to Chicago during the exhibition year, and they are already beginning to show the public what they can do. On the line on which the run was made there are four tracks over the first section and six over the remaining sections to Buffalo, so that it offers ample facilities in the way of a clear course for fast traffic. It has a well laid roadbed and easy gradients. The curves are very bad as far as Albany, but American rolling stock is built to follow a sinuous track, and winds its way with comparative ease. If there should be a notable increase of railway speed in America, we shall expect to see further improvements here, and our moderate distances still further decreased.

Floral California.

The Orcutt Seed and Plant Company, San Diego, California, have issued an interesting descriptive list of Californian trees and flowers. The writer thinks that there is perhaps no country in the world where the early spring flowers so change the face of the earth from a desolate waste to a beautiful garden as on the Pacific coast—hills, mesas, mountains and valleys, and the arid plains of the desert, alike quickly responding to the vivifying rain. "California," he says, "has probably already furnished to the horticulturist a greater variety of beautiful flowers and stately trees than any other State in the Union. Yet many others are awaiting the appreciation of man, or wasting their sweetness on the desert air."

Getting Rid of Fleas.

A correspondent of the Washington *Star*, who has been studying the subject of getting rid of fleas, gives this as the result of his investigations: If those who are troubled with this insect will place the common adhesive fly paper on the floors of the rooms infested, with a small piece of fresh meat in the center of each sheet, they will find that the fleas will jump toward the meat and adhere to the paper. I completely rid a badly infested house in two nights by this means.

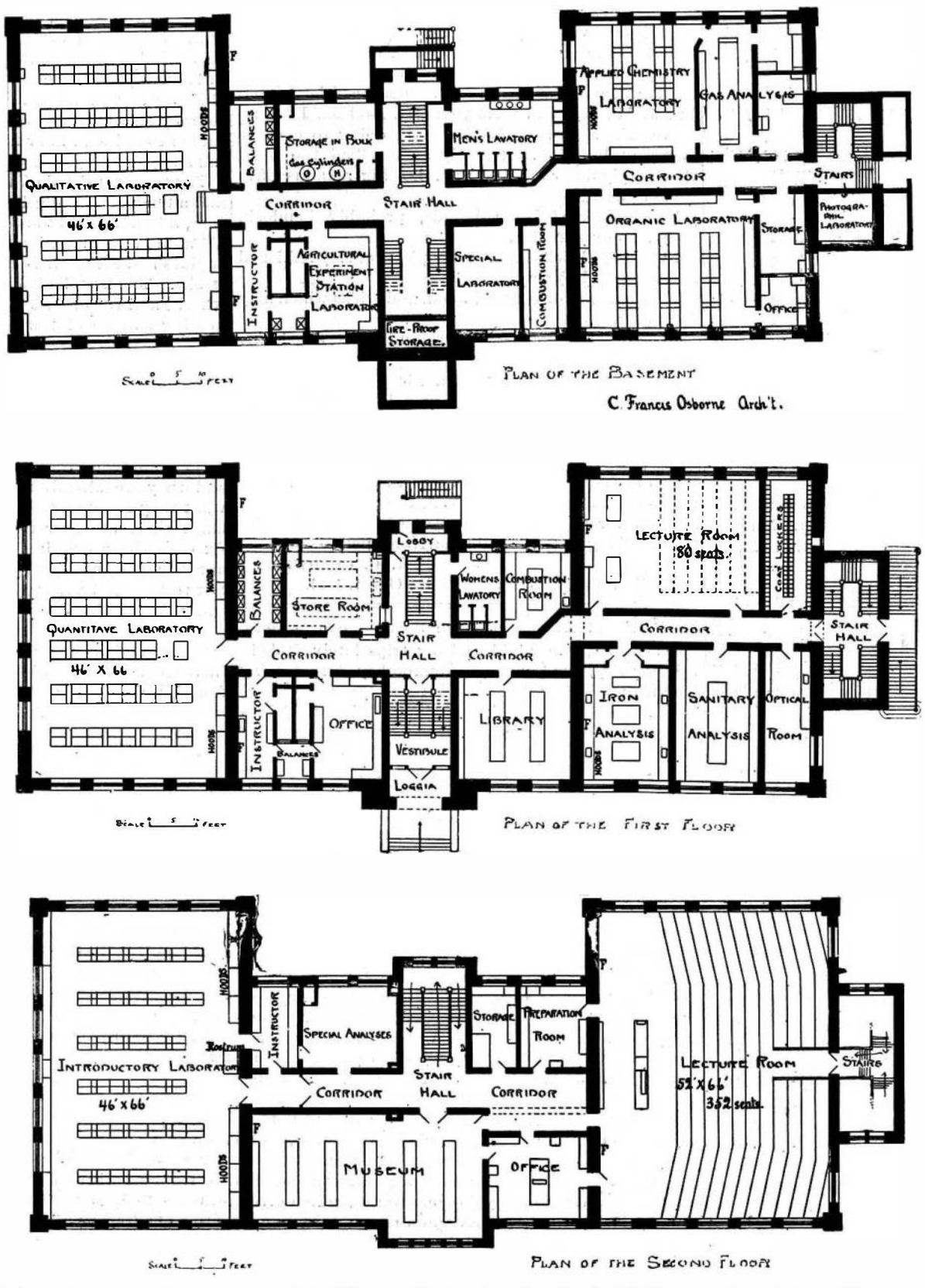
The Lacquer Tree in Germany.

On his return from Japan, sixteen years ago, says *Nature*, Prof. Rein, the well known authority on Japanese art and industry, planted in the Botanical Garden at Frankfort some specimens of the lacquer tree (*Rhus vernicifera*), from which the Japanese obtain the juice employed in the production of their famous lacquer work. According to the *Times*, there are now at Frankfort thirty-four healthy specimens of the lacquer tree, 30 feet high and 2 feet in girth a yard from the ground; and the young trees, which have sprung from the original tree's seed, are in a flourishing condition. It seems to be proved, therefore, that the lacquer tree is capable of being cultivated in Europe, and it only remains to be seen whether the juice is affected by the changed conditions. The *Times* says that, to ascertain this, Professor Rein has tapped the Frankfort trees, and has sent some of the juice to Japan, where it will be used by Japanese artists in lacquer work, who will report on its fitness for lacquering. In the meantime, some of the most eminent German chemists are analyzing samples of the juice taken from the trees at Frankfort, and samples of the juice sent from Japan; and should their reports and the reports from Japan be favorable, it is probable that the tree will be largely planted in the public parks and other places in Germany. In course of time a skilled worker in lacquer will be brought over from Japan to teach a selected number of workmen the art of lacquering wood, and in this way it is hoped that a new art and craft may be introduced into Europe. Professor Rein has been conferring with the authorities at Kew as to the results of his experiment.

It would not be a bad idea for our Department of Agriculture to introduce the lacquer tree.

A CORRESPONDENT sends us the following account of a kaolin deposit recently discovered in Marion Co., Ala., which is said to be very heavy, covered in most places by a layer of earth not exceeding 4 or 6 feet in thickness. It is in two mounds or high hills, on either side of the large branch of Bear Creek, which by proper damming will afford ready means for transportation to the nearest railway station, 12 miles northeast, namely, Bear Creek. The specimens of the mineral are said to be remarkable for their purity, lack of sandy or gritty particles, and absence of any veins or stains of iron, which would deteriorate the value and usefulness of the clay. The deposit seems to be of great depth.

CORNELL UNIVERSITY—THE NEW CHEMICAL LABORATORY.



CORNELL UNIVERSITY—PRINCIPAL FLOOR PLANS OF THE NEW CHEMICAL LABORATORY.

THE NEW CHEMICAL LABORATORY OF CORNELL UNIVERSITY.

The growth of Cornell University and the superior facilities which it offers for the instruction of students are exemplified in the new chemical laboratory lately completed, of which we now present a few illustrations, plans, and particulars.

The building was designed by C. Francis Osborne, assistant professor of architecture at the university. It is in the form of an irregular parallelogram, 186 feet in length, 50 feet wide in the main portion and 70 feet in the wings. The edifice is constructed of red brick, with trimmings of Medina sandstone; the roof is of gray slate. Slow-burning construction was employed throughout. Across the main part of the building, dividing each floor into three nearly equal parts, run two flue walls, 3 feet in thickness, marked F F in the plans. These contain a great number of separate air flues leading from the hoods.

The *Qualitative Laboratory* contains 88 work tables, arranged in six double rows. Each table is provided with three drawers and three cupboards below, so that by suitable arrangement of working hours three students may occupy one desk, making it possible to accommodate, in all, 264 students in this laboratory. There is a circular porcelain sink between every two adjoining tables; the waste pipes from these descend vertically through the floor and discharge into troughs on the ceiling of the sub-basement below.

Hoods or fume closets, with sliding glass sashes, extend nearly the whole length of the flue wall on the east side of the room. Several of these hoods are devoted exclusively to the use of hydrogen sulphide, the gas being conveyed by pipes from the sub-basement, where it is made in large, self-regulating generators.

There is a weighing room provided with balances for the use of certain students, who, during part of the year, carry on quantitative work in the qualitative laboratory. Beyond these rooms is situated the chemical laboratory of the United States Agricultural Experiment Station, completely equipped for the various kinds of analyses here performed, especially the estimation of fat, and of nitrogen by the Kjeldahl method.

Oxygen and Hydrogen.—These gases are obtained by the electrolysis of water in twelve pairs of glass cells with electrodes of lead, placed in a trough of water. The current is brought into the building from the electric laboratory, where it is generated by a Siemens dynamo, driven by the water power of the falls in the gorge below the university. This