

Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT

No. 361 BROADWAY, NEW YORK.

O. D. MUNN.

A. E. BEACH.

TERMS FOR THE SCIENTIFIC AMERICAN.

One copy, one year, for the U. S., Canada or Mexico... \$3 00
One copy, six months, for the U. S., Canada or Mexico... 1 50
One copy, one year, to any foreign country belonging to Postal Union... 4 00

Remit by postal or express money order, or by bank draft or check.
MUNN & CO., 361 Broadway, corner of Franklin Street, 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, uniform in size with SCIENTIFIC AMERICAN. Terms of subscription for SUPPLEMENT, \$5.00 a year, for the U. S., Canada or Mexico. \$6.00 a year to foreign countries belonging to the Postal Union. Single copies, 1 cent.

Building Edition.

THE ARCHITECTS AND BUILDERS EDITION OF THE SCIENTIFIC AMERICAN is a large and splendid illustrated periodical, issued monthly, containing floor plans, perspective views, and sheets of constructive details, pertaining to modern architecture.

Spanish Edition of the Scientific American.

LA AMERICA CIENTIFICA E INDUSTRIAL (Spanish trade edition of the SCIENTIFIC AMERICAN) is published monthly, uniform in size and typography with the SCIENTIFIC AMERICAN.

The safest way to remit is by postal order, express money order, draft or bank check. Make all remittances payable to order of MUNN & CO.

NEW YORK, SATURDAY, FEBRUARY 4, 1893.

Contents.

(Illustrated articles are marked with an asterisk.)

Table listing various articles such as 'Agricultural devices, recently patented', 'Armadillos and aard-varks', 'Balloon, a great military', etc., with corresponding page numbers.

TABLE OF CONTENTS OF SCIENTIFIC AMERICAN SUPPLEMENT No. 892.

For the Week Ending February 4, 1893. Price 10 cents. For sale by all newsdealers.

Table listing contents of the supplement by page number, including sections like 'I. ANTHROPOLOGY', 'II. BIOGRAPHY', 'III. CHEMISTRY', etc.

ANOTHER BILL TO DISCOURAGE THE INVENTOR AND FAVOR THE INFRINGER.

A bill has lately been introduced in Congress by Mr. Tillman, of South Carolina, providing that no patent shall, by reason of a broad or dominating claim or otherwise, prevent the practice or use of any patented actual improvement in the invention forming its subject matter...

The law as it stands awards to the original and first inventor the exclusive right to make use and sell his invention for the short period of seventeen years.

The proposed law takes this right away from the inventor and bestows it upon the court, thus making the court in the first instance a party to the control and management of the patent.

Of all the schemes to emasculate the patent laws, the foregoing plan of giving encouragement and support to infringers by legal enactment is the worst and most absurd. It remains to be seen whether Congress will sanction such an act of folly.

THE EXCLUSION OF CHINESE.

On January 18 of the present year, at Duluth, Minn., Judge R. R. Nelson, of the United States Court, rendered a decision in the case of a Chinaman who was brought before him on habeas corpus proceedings in a suit under the Chinese Exclusion Act.

The Chinese Exclusion Act has recently been attracting much attention and criticism on account of the radical measures embodied in it. It forms Chapter 60 of the laws passed by the 52d Congress, and is dated May, 1892.

These are the main provisions of this act, one which makes the breathing of the air of the United States a crime if perpetrated by a Chinese. The exclusion or restriction of a tide of immigration from the Orient, with its hundreds of millions of aliens, may be necessary.

Our nation of sixty millions of people is threatened by another problem in the race question. Already the existence among us of some eight millions of negroes is regarded by political economists as the basis of a very difficult problem, which is far from solution.

culty that they simply desire to send in floods of temporary residents, with almost limitless sources of supply of new immigrants to crowd out our own people from many avenues of trade and labor.

If a permanent population of eight millions of negroes, not re-enforced by immigration, is enough to constitute a difficulty for political economists to dispose of, what may we not be confronted with in a floating population of indefinite capability of extension.

A year's imprisonment is the measure of the criminality of simple residence. This is certainly a measure unworthy of a civilized people. It fairly savors of ferocity to imprison for so long a period one whose offense is mere existence.

Already many murmurs of dissatisfaction are making themselves heard. It is felt that the Chinese government may yet adopt retaliatory measures which will make themselves felt upon American residents of China.

Juster methods of treatment. The limitation of the numbers coming here could be otherwise brought about. A poll tax could be levied on every Chinese entering the country.

Gobelins Tapestry.

A report of the United States consul general in Paris on French tapestries gives some interesting information in regard to the famous Gobelins factory. It was founded in 1607 by Henri IV., in the scarlet dye works originally established in the fifteenth century by Jehan Gobelins.

A special account of the method of making the tapestry, by Mr. Debray, an expert, is also given in the report. This gentleman says that the value of Gobelins is on the average 3,000 francs to 4,000 francs per square meter, while that of the Beauvais tapestry is as much as 7,000 francs.

A Luminous Fungus.

The Union Medicale for December 27, 1892, gives a short account, from the Revue Scientifique, of the Pleurotus lux, a fungus that takes its specific name from its property of glowing in the dark.

[SPECIAL CORRESPONDENCE OF THE SCIENTIFIC AMERICAN.]

The World's Columbian Exposition.

THE PRESENT CONDITION AND PROSPECTS OF THE GREAT ENTERPRISE—INTERESTING NOTES AND PARTICULARS.

CHICAGO, February 1, 1893.

It has been officially announced from the time of the organization of the World's Columbian Exposition that the formal opening to the public would be on May 1. This date is now three months off, and such an immense amount of work remains to be done that the question arises as to the ability of the Exposition management possibly to come up to time in accomplishing this work. Cold weather has practically prevented outdoor work for some weeks past, and but little work is carried on on the exterior of the buildings. Much important work is still to be done in completing the layout of the grounds. Walks and drives are to be made and hardened, much turfing to be done, flower beds laid out, and other such work done that requires time.

More important than these, however, is the question of installing exhibits. The amount of space to be devoted to exhibition purposes is a little over 3,500,000 square feet. Nearly 1,500,000 square feet of this has been assigned to foreign countries. The Manufactures and Liberal Arts Building, the Palace of Mechanic Arts, the Transportation Building, the Mining Building and others still have some space to spare. Many applications for space in these buildings are on hand and have not yet had assignments made, so that space is by no means begging. In the Electricity Building more than twice the available space has been applied for. Last week a little gain was made, as the allotments made to Mexico, Australia, Canada, Italy and several other nations had not been accepted; so, by the expiration of the time in which acceptances were to be made, the space has reverted to the use of the department to distribute to other exhibitors.

Of the 3,500,000 feet of space to be devoted to exhibition purposes, not a single exhibit is in place in the more important buildings, and with but two exceptions the buildings themselves are not completed. The status of these buildings is as follows:

Manufacturers and Liberal Arts or Main Building.—So far as the exterior is concerned work is completed, but in the interior a large area is yet unpainted. Three railway tracks extend the whole length of the building from south to north for the purpose of unloading exhibits, and quite a number of boxes of exhibits are scattered about. The floor plan is all marked out, but work has not been begun on installing an exhibit. With nearly 800,000 feet of space to be covered with exhibits, three months seems a remarkably short time in which to accomplish all the necessary work.

Palace of Mechanic Arts, or Machinery Hall.—Prospects are rather less encouraging for the prompt completion of the exhibit in this building than in any other. Several weeks' work remain to be done to finish the exterior of the building. Work on the interior is greatly behind, and much remains to be done before it can be painted. Huge pieces of machinery are scattered about—part of a dynamo here, a fly wheel there, and parts of engines hither and yon. The foundations for the heavy installations are all completed, and most of the flooring is laid. The three electric traveling cranes are in place, and are quite invaluable in expediting things, especially in placing the engines and other heavy machines on their foundations. Three railway tracks enter the building at the west end, and as exhibits are unloaded they are speedily removed by use of the cranes. Half a dozen of the fifty or more engines of the great power plant are in place; but these are by no means ready to put into operation. A few of the boilers are ready for use; in fact, some of them have already been fired up, but most of the batteries are not completed, and work has not been begun on some of the installations, not a brick being laid, or even the preliminary work of clearing away the ground begun. A temporary electric plant occupies space where part of the engine plant is to be, and temporary circuits are stretched from this plant through the building. Among the eminent names in the mechanical world that are conspicuously lettered on the exterior of this building is that of Siemens. It would be an unfortunate blunder not to have this spelling corrected before the Fair opens.

Agricultural Building.—Work is completed on this building, both exterior and interior, and considerable work has already been done preparatory to installing the exhibits of Illinois, Wisconsin, and New Jersey.

Electricity Building.—This building is completed so far as work on it is concerned, and the Bell Telephone Company and the Western Electric Company have the structures to accommodate their exhibits well toward completion. The former occupies a commanding position directly in front of the main entrance at the south end of the building, and gives promise of being very complete. It occupies a space 100 feet long by 75 feet wide, and is raised four feet above the floor of the building, broad stairways leading up to it at each end. A railway track has been laid the entire length of this

building on the east and also on the west side, so that with two large temporary electric elevators, just completed, exhibits should be speedily handled and installed.

The Mining Building was completed, so far as the structure was concerned, months ago; but the interior is yet to be painted and the first step toward installing exhibits is not as yet taken. A railway track has been laid through the center of the building preliminary to this.

The Transportation Building is completed; but the work of painting the interior is not quite finished. Tracks for the exhibition cars are all laid, and the electric transfer table is already in operation.

Previous to the dedicatory exercises, last autumn, 8,000 men were employed inside the Fair Grounds. With such a force buildings sprang up almost in a day and slabs of staff were put in place with marvelous rapidity. Need for more such rapid work is now at hand, and it is to be hoped work may be pushed with the vigor that it was then. The facilities are at hand, so far as the Exposition is concerned, for completing its part of the work in time if the vigorous effort of last autumn is again resorted to; and if exhibitors are prompt in doing their share the Exposition may open May 1 in a satisfactory state of completion. But with all the delays incident to having so many interests work promptly and in harmony, the prospects are not as satisfactory to the friends of the Exposition as it is wished they were.

Invitations have just been received in Chicago from the Westinghouse Electric and Manufacturing Company, asking an inspection of some of the electrical apparatus which is to form part of the incandescent lighting plant at the Fair, and which is now exhibited at this company's shops, previous to its being shipped to Chicago. The feature of particular interest at this display is one of the 10,000 light dynamos direct coupled to a 1,000 horse power Westinghouse compound engine. The maximum capacity of each of these dynamos is placed at 15,000 sixteen candle power lamps. The weight of each dynamo is 150,000 pounds. The armature alone weighs about 42,000 pounds. The minimum number of lamps called for by the contract between the Exposition and the Westinghouse Company is 92,000 of sixteen candle power, but the company officially announces in its circular that the plant to be installed will be prepared to run 130,000 lamps. The display in Pittsburg also includes the first public test of the new stopper incandescent lamps, which are to be used in the Fair installation. It is believed that the daily renewals of lamps when the exposition is well under way will be about 1,000 lamps. In order to make a practical exhibit of incandescent lamp making, the company proposes to have as part of its display sufficient facilities to make all their renewals by renewing the carbon burners of the burned-out lamps. As the current from the large generators will be multiphase, the new Tesla motors will be operated by it in addition to the lighting in the Electricity Building. Another prominent feature of this company's exhibit is announced to be the latest development in long distance transmission of electricity.

So much has been published in the daily press regarding extortionate prices that are to be charged for board and lodging during the holding of the Fair that the Exposition management has taken official action on the subject. Major Kasson, of the Bureau of Public Comfort, has had a canvass made of the city and has established an official directory of desirable rooms and suites of rooms. The bureau offers to sell rental certificates against these rooms, guaranteeing a reasonable and specified price, ranging from \$1 upward. In this way intending visitors can select in advance rooms to suit their purses and their convenience, as the directory includes rooms from Lincoln Park on the north to Seventy-third Street on the south. Inside the Fair Grounds ample facilities have been provided for feeding the crowds, as 150,000 or more square feet of space have been reserved for restaurant purposes. It is intended to have these accommodations sufficient to provide for 75,000 people, and on special days nearly as many more. Restaurants will be provided in each of the large buildings and in all parts of the grounds.

Some months ago what were supposed to be ample plans were made for a hospital service at the grounds during the holding of the Fair. The Board of Lady Managers have become interested in the perfecting of these arrangements, particularly as it offered opportunity to show one of the most successful lines of woman's work, and as a result of this interest the hospital service will not only be planned with a view to caring for the ill and the injured, but it will also be made an exhibit. Leading hospitals in the country will join in the effort to carry out this plan. Several of the best trained nurses in Chicago have offered their services to the Exposition management in order that the hopes of what this hospital ought to be may be realized. All the latest devices for hospital use will be shown in actual operation and use in this hospital, while the ambulance service will be made as complete as possible.

The temporary electric circuits that have been used

for supplying current to the various parts of the grounds have been unsightly, as the poles seem to have been set with regard to their being most conspicuous. Now that the subways are all completed and the permanent circuits installed, these poles and the temporary circuits are being removed. Until within a few weeks it has been proposed to string some of the permanent circuits under the elevated tracks of the intramural road, but it has finally been decided that these with all other wires shall go underground.

Dr. Hornsby, who has been secretary of the Department of Electricity since its inception, has been promoted to the position of assistant chief, with increased salary. This is a deserved promotion, as Dr. Hornsby has done practically all the work of the department from the first, the duties of Professor J. P. Barrett, chief of the department, as city electrician of Chicago, having prevented him from giving much direct attention to World's Fair matters.

The American Institute of Electrical Engineers has been assigned a suite of rooms in the gallery at the south end of the Electricity Building, adjoining the offices of the Department of Electricity. With such facilities, the Institute will be able to fittingly accommodate its members and entertain the many eminent electricians who will be in attendance at the Exposition.

Mr. Willis Hawley, of Urbana, Ohio, has been appointed consulting engineer to the Department of Electricity, and has already entered upon his duties. He is to aid Assistant Chief Hornsby, of this department, in taking immediate charge of the work of installing exhibits.

Activity of Three North American Volcanoes.

Padernal Peak, situated in the wilds of Rio Arriba County, New Mexico, is reported as now in a violent state of eruption, and is belching forth sulphurous fumes and lava at intervals of about three hours, each lasting about thirty minutes.

This has been going on since the last week in December. The entire top of the mountain, which was almost square and about a mile in extent, is stated to be blown off, and the lava pouring down the sides has already filled up the valley for about half a mile on each side.

A considerable portion of a ruined city of the ancient cliff dwellers will be covered with the slag should the eruptions continue. Padernal Peak is one of the most prominent landmarks of the Territory. The Mexicans say that it burst forth in violent eruption in 1820 and did not cease for nearly a year afterward. It has lain dormant until the present time.

The rumbling noise and lurid light can be plainly heard and seen at Sierra Amarilla, seventy miles distant, and an army of people from there are now at Ariquin to witness the impressive sight.

An earthquake shock felt at Orizaba, Mexico, recently, greatly frightened the people living in the vicinity of the Orizaba volcano.

The town of Orizaba lies about seventy miles by rail southwest of Vera Cruz and about twenty-five miles south of Mount Orizaba, the snow-clad peak of which is said by some to be 17,380 feet above sea level, and by others to be the highest peak in North America.

The residents of Colima, the capital of the Mexican State of that name on the Pacific coast, also feel a nervous apprehension regarding the volcano of Colima, which, reaching a height of about 12,000 feet, looms skyward about thirty miles northeast of the capital. Every night a lurid light illuminates the sky above the mountain, and it is feared that this portends a serious eruption.

Vegetable Growth in Water Mains.

A vegetable growth in the water mains at St. Paul, Minn., has lately, according to the *Engineering Record*, been the cause of some trouble. The first case was discovered by the superintendent, in one of two service pipes in a single trench supplying a double house. A complaint was made of bad water, which flushing failed to improve. One of the pipes delivered pure water and one supplied a muddy liquid that was of no use. This fact led to the conclusion that one of the services was foul; and the remedy applied on this supposition proved effective. The boiler of a portable engine was connected with the faucet of the kitchen sink from which the muddy water came, and a steam pressure of 70 pounds forced against the 35 pounds water pressure for 30 minutes—thereby driving the water out of the pipe. Since that time the pipe has always delivered clear water, and twelve similar cases have been successfully treated in the same manner. Great care has to be taken that there are no leaks in the service pipes, and that none of the fittings are open during the steaming process.

How to Freeze Water on a Small Scale.

Take a concave watch glass, touch the convex side upon water so as to leave a drop hanging on the glass. Pour a little ether into the concave and blow upon it. The rapid evaporation of the ether will render the glass so cold that the drop of water will be frozen.

THE WORLD'S COLUMBIAN EXPOSITION.

THE BRITISH SECTION.

"Westward the course of empire takes its way," as Bishop Berkeley sang a century ago. Never was it truer than to-day, when all our thoughts are turning Chicagoward. So a representative of the *Illustrated London News* sought an opportunity of gaining from Sir Henry Trueman Wood

a few particulars as to the progress of the British Section in the World's Fair, which opens next May.

Sir Henry Trueman Wood, in his business-like office in the Adelphi, has for some time past been "doubling the part," as actors say, of secretary of the Society of Arts and secretary of the commission which is dealing with the various questions in connection with Great Britain and the Chicago Exhibition. His experience of exhibitions has resembled Sam Weller's acquaintance with London in being "extensive and peculiar." He first found scope for his energy and great powers of organization in connection with the Health and the Inventions exhibitions, held respectively in 1884 and 1885. The difficulties attending the Paris Exhibition of 1889, which had been refused official recognition from the British government, only served to call forth the skill of the secretary of the Society of Arts in surmounting them. His services on this occasion were gracefully acknowledged by his creation as an officer of the French Legion of Honor and by knighthood conferred by his sovereign.

"Well, first of all, how much ground will the British section cover?" was the opening for conversation.

"About 500,000 square feet, I expect. Of this space, two-fifths will be occupied by our colonies. This is a decided advance on previous exhibitions, for our maximum has been hitherto 360,000 square feet—at the Paris Exhibition of 1878. By the way, I may tell you that to view every exhibit in the World's Fair one will require to walk fifty miles."

"Then as to the total of British exhibitors?"

"Well, I fancy we shall be represented by six hundred in the industrial sections. In the Fine Art Section there will probably be between eight hundred and nine hundred works, by some three hundred artists. About one thousand applications were received, and every care has been taken to select those exhibits which shall give an adequate and interesting picture of Great Britain's commerce and art. Allotments were made to us in the following departments: Agriculture, Electricity, Fine Arts, Fisheries, Forestry, Live Stock, Machinery, Manufactures and Liberal Arts, Mines and Mining, Transportation, and in the Women's Building."

"Will there be much moving machinery?"

"Three steam engines will be at work, but I think one of the finest exhibits in this department will be Platt's cotton-cleaning machinery. Printing and typesetting will be illustrated, and there will also be shown looms, spinning frames, steam hammers, and the usual miscellaneous machinery."

"Where will the chief British exhibits be on view?"

"In the Manufactures Building, where will be found some fine specimens of such heterogeneous goods as Worcester porcelain, Doulton ware, jewelry, furniture, silks, wall papers, billiard tables, linen and old gold work from Ireland, chemical products, etc., and in the gallery of this section there will be a great attraction in the shape of photographs—oh! yes; the ubiquitous amateur photographer will be represented—news-papers, scientific instruments, and various educational appliances used by the School Board for London and the Science and Art Department."

"How have your appeals for pictures been answered?"

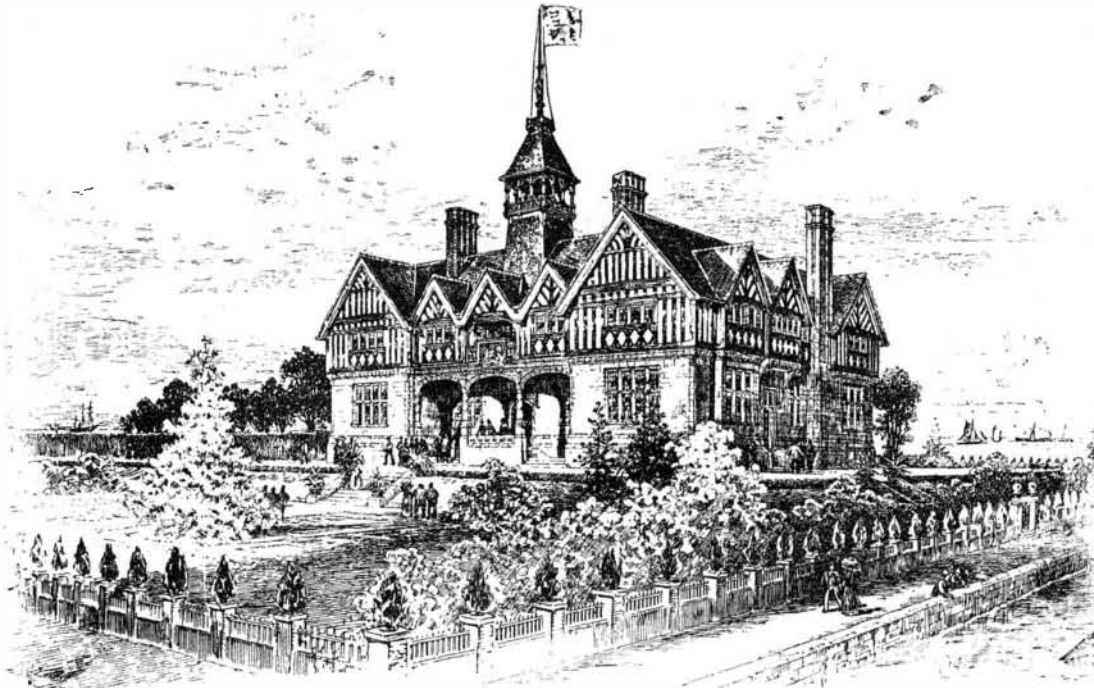
"I attach a good deal of importance to the Fine Art Department. The Americans nowadays are greatly given to French art, and they really appreciate but very little the British school of art, so that this ought

to prove an excellent opportunity for finding a market. The New York dealers, who have the whole control of the market, do not encourage the sale of English pictures, and it is quite a limited number of important canvases by our leading artists which finds its way across the herring pond. Nearly all the Royal Academicians will be represented. Now as to your

to England), and ship models from most of the great firms. This latter exhibit is certain to be popular, judging from the success which the Naval Exhibition attained."

"As to the part which our colonies are going to play, will you give me some details?"

"Canada will hold premier position, showing extensively in the Agricultural, Mining, and Manufactures Buildings. Next to the Dominion comes New South Wales, sending merchandise and timber. They are going to have an enormous trophy representing the silver taken out of the Broken Hill mine. Ceylon will have a great deal of tea, naturally both for show and for sale. Both Ceylon and India intend to have native attendants on the spot to give a local coloring to their tea stalls. You may recollect that India was very late in deciding as to whether it would be represented at the exhibition, and as a result of the government's delay and refusal to take an active part in the matter India was not able to obtain as much space as might have otherwise been the case. However, I think we shall have no reason to be ashamed of her



THE VICTORIA BUILDING—OFFICES OF THE BRITISH SECTION OF THE CHICAGO EXHIBITION.

query about the replies we have received on this subject, I have found in the north of England that the McKinley tariff has left such a sore feeling with many private collectors that they have been very loth to assist the World's Fair in any way."

"As to public galleries; do you get any pictures loaned?"

"No; scarcely any. Now in France or Germany, with just the assent of the government, which is never difficult to obtain on this point, an exhibition may borrow largely from public collections. But the National Gallery and the South Kensington pictures are precluded from being lent. The Queen has graciously

exhibits. Of course, specimens of Indian art, which meet you everywhere, will not be lacking. Finally, the Cape is determined to manifest its importance by showing the various processes connected with diamonds such as the washing and searching in the blue clay for these precious stones. Curiously enough at these exhibitions there is always a profusion of diamonds in every sample of clay!"

"Is Great Britain contributing much to the Electrical Section?"

"Not so much as I could have wished. English electricians have had rather a surfeit of exhibitions lately. The chief exhibit will be a splendid collection of apparatus in use for the purposes of telegraphy by our post office. I may add that there are some specimens of platinum, etc., in the Mining Section. There are, unfortunately, not many exhibits in the Horticultural Department, but we are fairly to the front in the Agricultural Building. Mr. Burdett-Coutts, M.P., is showing a model of his stud farm, which is certain to interest the sportsmen. Then there is a model dairy and a good selection of baking machinery."

"Do you think the early visitors to the World's Fair can be promised a complete exhibition?"

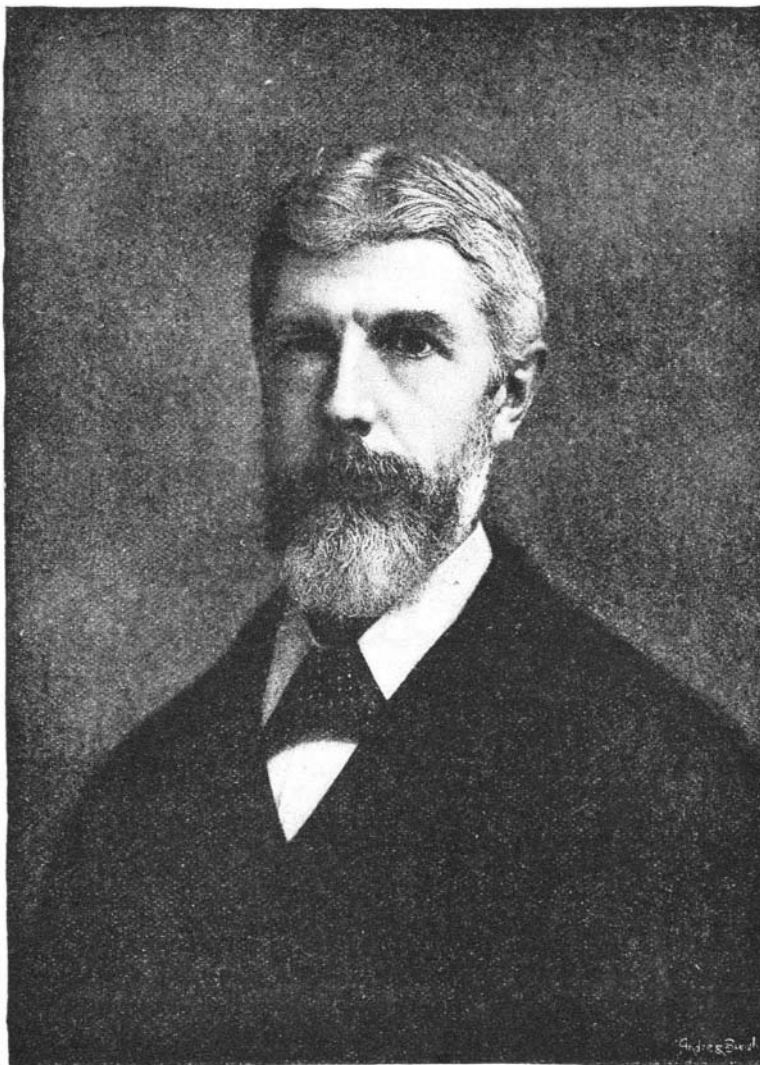
"Yes; I think matters are progressing so favorably that things will be in working order by the date of opening. I will undertake to say that the British Section will be complete and ready on the first of May. We are going to have a 'British House,' called after her Majesty the Queen."

"As to our exhibits—are they already being erected?"

"Many of them are in the United States or en route, but, so far, I believe they are not placed in the grand buildings which will be their home. I was over in Chicago in July, that being the second time I have visited the city on exhibition business, and expect to go on again in February to organize the British exhibits. I shall probably remain until August. There will be a regular staff to undertake official work on the spot, and I trust we may realize a great success."—*Illustrated London News*.

Citric Acid as a Water Purifier.

The well known chemist M. Girard, chief of the Paris Municipal Laboratory, has lately been engaged in making researches concerning the bacilli of cholera and typhoid fever; in so doing he has once more proved the effects of acids in destroying microbes. He finds citric acid to be the most useful and powerful of all. One gramme, he says, added to a quart of tainted water, will effectively destroy all the microbes that may be in it. Consequently he recommends the use of natural lemonade as an excellent beverage at all times, and especially during epidemics. If necessary, a little bicarbonate of soda can be added as a means of neutralizing the acidity of the lemon.



SIR H. TRUEMAN WOOD.

set the example to private collectors by lending us certain pictures." "Will you tell me what are going to be the British contents of the Transportation Gallery?"

"In the first place, there will be engines and carriages from various railway companies. Then there will be cycles, a model of the Forth Bridge, pictures and carriages (and for good vehicles Americans usually come