Scientific American.

ESTABLISHED 1845

MUNN & CO., - - - EDITORS AND PROPRIETORS.

PUBLISHED WEEKLY AT

No. 361 BROADWAY, - - NEW YORK.

TERMS FOR THE SCIENTIFIC AMERICAN.
(Established 1845.)

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, postage prepaid. £0 16s. 5d. 4.00
Remit by postal or express money order, or by bank draft or check.
MUNN & CO., 361 Broadway, corner Franklin Street, New York.

The Scientific American Supplement
(Established 1876)

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, or £1 4s. 8d., to foreign countries belonging to the Postal Union. Single copies 10 cents. Sold by all newsdealers throughout the country. See prospectus, last page.

Combined Rates.—The SCIENTIFIC AMERICAN and SUPPLEMENT will be sent for one year, to one address in U. S., Canada or Mexico, on receipt of *seven dollars*. To foreign countries, *eight dollars and fifty cents a year*, or £1 14s. 11d., postage prepaid.

Building Edition of Scientific American.
(Established 1885.)

THE BUILDING EDITION OF THE SCIENTIFIC AMERICAN is a large and splendidly illustrated periodical, issued monthly, containing floor plans and perspective views pertaining to modern architecture. Each number is illustrated with beautiful plates, showing desirable dwellings, public buildings and architectural work in great variety. To architects, builders, and all who contemplate building this work is invaluable.

Single copies 25 cents. By mail, to any part of the United States, Canada or Mexico, $2.50 a year. To foreign countries, $3.00 a year, or £0 12s. 4d. Combined rate for BUILDING EDITION with SCIENTIFIC AMERICAN, to one address, $5.00 a year. To foreign countries, $6.50 a year, or £1 6s. 9d. Combined rate for BUILDING EDITION, SCIENTIFIC AMERICAN, and SUPPLEMENT, $9.00 a year. To foreign countries, $11.00 a year, or £2 5s. 2d., postage prepaid.

Export Edition of the Scientific American
(Established 1878)

with which is incorporated "LA AMERICA CIENTIFICA E INDUSTRIAL," or Spanish edition of the SCIENTIFIC AMERICAN, published monthly, uniform in size and typography with the SCIENTIFIC AMERICAN. Every number contains about 100 pages, profusely illustrated. It is the finest scientific industrial export paper published. It circulates throughout Cuba, the West Indies, Mexico, Central and South America, Spain and Spanish possessions—wherever the Spanish language is spoken. THE SCIENTIFIC AMERICAN EXPORT EDITION has a large guaranteed circulation in all commercial places throughout the world. $3.00 a year, or £0 12s. 4d., postpaid to any part of the world. Single copies, 25 cents.

MUNN & CO., Publishers, 361 Broadway, New York.

☞ 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.

☞ Readers are specially requested to notify the publishers in case of any failure, delay, or irregularity in receipt of papers.

NEW YORK, SATURDAY, MAY 15, 1897.

Contents.

(Illustrated articles are marked with an asterisk.)

TABLE OF CONTENTS OF

Scientific American Supplement

No. 1115.

For the Week Ending May 15, 1897.

Price 10 cents. For sale by all newsdealers.

THE UNITED STATES AND THE PARIS EXPOSITION.

It is to be hoped that Congress will take early action as the result of the President's message urging it to make provision for our adequate representation at the Paris exposition in 1900. The message recommends that such timely provision be made that our inventors and producers may have adequate opportunity to "fortify the important positions they have won in the world's competitive fields of discovery and industry."

It is certainly advisable that action should be taken during the present session, inasmuch as a delay of a whole year, at a time when other nations are making such special efforts is liable to result, among other disadvantages, in our securing an insufficient allotment of space. No one who is unacquainted with such work can appreciate the great amount of labor and time that is necessary in organizing a great national display of the kind that we ought to make at the French capital. The forthcoming exhibition will be a great opportunity for America. We have made great advances in the years that have intervened since the great French exposition of 1889. In a single decade we have started new industries and so developed them that we hold a leading position where but a few years ago we were not represented. In older industries, such as the manufacture of steel, we lead the world; and invention has never been so fruitful in our midst as in this closing decade of the century. The outside world is cognizant of these facts in a vague way, and the forthcoming exposition will give us an opportunity to demonstrate our advancement in a concrete and practical form.

SHADE TREES FOR THE STREETS OF NEW YORK.

We note that the Tree Planting Association has opened offices at Nos. 64 and 66 White Street, New York City. Its aim is to beautify the city by encouraging the planting of shade trees on each side of the streets, and it is endeavoring to start the movement by persuading property holders on Fifth Avenue to plant trees in front of their houses. The aims of the association are in every way praiseworthy, and there is no conceivable way in which the "wilderness of streets" which is found in many parts of the metropolis could be so cheaply beautified and relieved of its monotony as by lining the curb of the sidewalks with suitable shade trees. Many of the side streets which lead up to Central Park on the east and west are rendered extremely handsome by the costly and artistic houses which they contain; but they all have a certain air of coldness or formality which would be largely dispelled by the presence of an avenue of trees.

BRITISH INTEREST IN THE NICARAGUA CANAL.

The editor of Engineering, who is well known for his fairminded and courteous attitude toward this country in everything relating to American engineering and industry, states that it is a mistake to suppose that Great Britain has any desire to build and own the Nicaragua Canal because of its strategic value. He is of the opinion that the conditions are entirely different from those relating to the Suez Canal, where England's aim is simply to maintain neutrality. As a matter of fact, the strategic route to the East, where the United States is never likely to be a hostile power, does not lie through the Suez Canal, nor would it lie through the Nicaragua Canal. As a mere strategic route in time of war the Nicaragua Canal would never be worth the vast sum of money that it would cost; for it would be entirely in foreign territory, and would be "at the mercy of a small hostile republic or of a collier blocking the waterway."

THE MISSISSIPPI FLOODS.

The calamitous floods which have again laid waste the lower Mississippi Valley have brought forth a vast amount of correspondence and suggestion as to the best way to control the great river and keep it within its banks. As is usual, the majority of the critics betray a complete ignorance of the magnitude of the problem and the cost of carrying it out in its entirety. One of the leading morning papers of New York has criticised the methods of the engineers to the extent of stating that the crevasses which have been formed in the embankments prove that as a system of protection the levees are a failure; and the writer goes on to condemn the whole system as such, and characterizes the outlay as a waste of public money. The obvious reply to such critics is to ask them what they would substitute in place of levees and revetment. As a matter of fact, the present methods are the result of long experience and a careful study of the problem by skilled engineers. The problem of the control of rivers which are subject to heavy floods is at any time extremely perplexing, and it is rendered doubly so in the case of the Mississippi on account of the enormous amount of silt which it carries down. Wherever the river broadens out into shoals, and the rapidity of its flow, and therefore its transporting power, is reduced, this silt is deposited and the available depth between the banks is reduced. The only possible way to prevent an overflow at the next flood is to scour out this deposited silt, or to raise the height of the adjoining banks, or both. This can be accomplished by building wing dams, cut-offs, etc., and protecting the banks by revetment and building artificial levees. The work of this kind which has been already carried out has rendered effective service, not merely in the Mississippi Valley, but along the course of other rivers that are subject to overflow. Because at certain points it has failed to stand the supreme test of the past few weeks, it is folly to condemn the whole system for all time. Compared with the whole scheme of improvement aimed at by the Mississippi River Commission, the work which has been done thus far has been fragmentary, and, to a certain extent, experimental, and it is absurd to condemn it for lack of efficiency at this early stage of the work. Works of this kind, whether for the control of rivers or the regulation of tidal harbors, cannot be expected to show their full efficiency until considerable sections of the work have been brought to completion.

THE MERITS OF THE WATER TUBE BOILER.

The points of advantage which the water tube boiler possesses over those of the Scotch type were briefly summed up by Rear Admiral Fitzgerald in a paper before the Institution of Naval Architects. The admiral is recognized as one of the most advanced and practical officers of the English navy, and his paper gave the good points of the boiler from the standpoint of the man who has to fight the ship. The type of boiler upon which the observations were based was the Belleville, and the experience was that gained on the Powerful and Terrible and on the smaller range of experiments carried out on two or three gunboats. The points of superiority are: 1. Ability to raise steam rapidly. The Sharpshooter, a gunboat of 735 tons displacement, has raised steam in twenty minutes from "fires out" and cold water. She would have taken from two to three hours with her old boilers. 2. Ability to make large and rapid increase of speed, and also large and rapid reductions without blowing off. With a Scotch boiler a ship has to be worked up gradually to full speed; but with water tube boilers even a large ship can start off almost like a torpedo boat. 3. Comparative safety. The risk from scalding in the event of a shell penetrating the boiler room is far less. Each of the water tube boilers of the Powerful holds only a ton of water; but each boiler of the Majestic holds 22 tons. 4. Facility for examination, cleaning, and repairs. Unlike the Scotch boilers, these can be cooled with great rapidity without any danger of injury, in order that they may be examined, cleaned, and if necessary, repaired. In the Scotch boiler such rapid cooling would involve leaky seams and tube plates. 5. Saving of weight. The weight of the boilers, uptakes, etc., of the Powerful for 25,000 horse power, with natural draught, is only 1,164 tons. If she had been fitted with Scotch boilers, it would have been about 1,862 tons—a saving of nearly 700 tons, or about 40 per cent.

THE AMERICAN LOCOMOTIVE EXPORT TRADE.

There is perhaps no branch of foreign trade in which the United States have won a more speedy recognition than in the locomotive industry. It is not many years ago that the foreign locomotive trade was almost entirely in the hands of European manufacturers, and the American locomotive was an unknown quantity outside of the United States. The causes were not far to seek. In the first place, the large colonial interests of the European nations brought them into close contact with foreign states and peoples, who had the opportunity to see the European locomotive at work, as it were, at their very doors. On the other hand, the development of the railroad system of this country was so extraordinarily rapid, and produced such an enormous demand for locomotives, that our manufacturers were fully occupied in supplying the home market. Of late years, however, the rate of railroad construction has been steadily reduced; the older roads have become thoroughly equipped with modern and more powerful locomotives and the demand for new stock has shown a relative decline.

One natural result of this has been to cause our builders to give increasing attention to the foreign market, and a very successful attempt has been made to introduce the American locomotive in those countries which have hitherto been exclusively controlled by European builders. Our success has been greatly assisted by the fact that the American built machine is specially adapted to the requirements of foreign railroads. It is strong in those points in which the other type is weak. The European locomotive has always suffered from a certain rigidity which, while it has no particularly bad effect on the comparatively level and straight lines which are found on the railways of the old world, has proved to be positively disastrous when these machines came to be run on the sharp curves and more or less loosely constructed tracks of some of the foreign and colonial railways.

Now, it is a fortunate fact that the circumstances which caused the earlier roads of the United States to be built on a rather rough and ready plan, with light rails, sharp curves, and heavy grades, produced a type

of locomotive specially adapted to meet these conditions—a type with such marked characteristics and with such all around efficiency that it is known the world over as distinctively the American locomotive. The merit of the type consists in the simplicity and accessibility of its parts, its great flexibility, by which it is enabled to adjust itself to the unevenness of the track, its large boiler power, and lastly, the large hauling power which it has always shown.

Now it can be seen that these qualities are admirably adapted to the requirements of foreign railroads, and our locomotives have always secured favorable comment from those companies which have used them side by side with locomotives of European design, and they have never, as far as we know, failed to obtain a secure hold on the trade.

In response to our inquiry we are informed by a leading firm in this country that while for the past two or three years the export trade in the aggregate has not been as large as in the few years preceding, there are signs that it is again on the increase. This falling off was not due so much to any relative decline in this trade as compared with the export trade of the country in general, but is attributed to the general depression which has marked the trade of the world at large. As a matter of fact American locomotive builders are just now receiving inquiries from more foreign countries than ever before in the history of the trade.

THE TRAGEDY AT THE CHARITY BAZAR, PARIS.

There have been few catastrophes of late years that have been more shocking than the burning of the Charity Bazar building in Paris, by which nearly one hundred and fifty people, most of them ladies of high social position, were burned to death in the space of a few minutes before the eyes of a multitude of people who were powerless to help them.

The Grand Bazar de Charité is held by the chief charitable institutions of the city, which unite every year for the purpose of selling articles for the relief of the poor. The Bazar was held under the patronage of the leaders of society, and many of the stall holders were ladies of rank. The temporary building in which it took place was a one-story affair 200 feet wide by 300 feet long, and the interior had been laid out to represent a street in mediæval Paris. The booths were representations of the ancient shops and house fronts, and they were made of linen painted over with turpentine and filled between the surfaces with papier maché. This material was old, having been used in the previous year in the neighboring Palace of Industry, and it had just been repainted. The building itself was of the flimsiest description, and highly inflammable. The walls consisted of ¾ inch boarding, and the roof apparently was covered with tarred felt and was carried upon vertical posts. The wooden floor was a few feet above the ground, and there was only one exit that seems to have been at all familiar to the ill-fated crowd of 1,500 souls within.

All things considered, it would be difficult to imagine a more fatal "fire trap" than this, and as the sequel showed, it was to prove terribly effective. The fire is supposed to have been caused by the illuminating lamp of a kinematograph, and it spread with unusual rapidity, a New York lady, who was rescued, describing the flames as traveling along the flimsy roof with a rapidity "just like that which one would see if a sheet of paper were to be saturated with petroleum and then ignited." The same eye witness says the ceiling, being in flames, kept constantly dropping in small pieces, and these burning pieces falling on the ladies' hats and shoulders enveloped them in flames. Not only was this so, but the falling pieces of burning ceiling ignited the sides of the bazar, and soon a screaming crowd of women was running like so many poor creatures in a burning cage, with fire descending on them and fire on all sides of them like great walls of flame.

There was the usual crush at the entrance, and when the building was yet partly filled, the burning ceiling fell bodily in upon the huddled mass and brought them speedier death.

The tragedy has taught the world another lesson as to the frightful risk that is run whenever these temporary matchbox buildings are put up for bazar or exhibition purposes. This structure was undoubtedly more dangerous, and built with less regard to fire risk, than the average building of the kind; but it is certain that even in such costly erections as are put up for the international expositions, the dangers of a conflagration are exceedingly great. We all remember in what a short space of time the cold storage building at the Chicago Exposition was swept out of existence, and not all the costly steel and stucco work of the other World's Fair buildings saved them from being wiped out with equal suddenness.

Of course, it would be impossible for such a building as the Charity Bazar building in Paris to be put up in a city like New York as long as the building laws were literally interpreted and rigidly enforced; but, unfortunately, there is always a disposition to leniency when the question comes up of erecting the large shed structures which are used for skating rinks, bazars or for charitable purposes. The fact that a building is to be temporary does not diminish the risk of its daily use, and should never be allowed to affect the question of its being made reasonably fireproof, with ample means of exit in cases of emergency.

THE NEW TWIN SCREW PASSENGER SHIPS OF THE NORTH GERMAN LLOYD COMPANY.

The North German Lloyd has built and put into commission, since 1892, twenty-three large transatlantic steamships, and during the present season will place in service between New York and Bremen six magnificent new twin screw ships. One of these, the Kaiser Wilhelm der Grosse, the largest steamship in the world, 649 feet long and with a tonnage of 14,000 and a displacement of 20,000 tons, sails on her initial trip to New York, September 14. The sister ship, Kaiser Friedrich, will be placed on the route shortly after. Four of the six new ships enter what is termed "The Twin Screw Passenger Service of the North German Lloyd." These, the Friedrich der Grosse, Barbarossa, Koenigin Luise and Bremen, are each 10,600 tons register, with 7,000 horse power, and have a total length of 550 feet and a breadth of 60 feet.

The Friedrich der Grosse has already made her initial trip to New York. The Koenigin Luise sails on her first outward passage May 13, the Barbarossa on June 10, and the Bremen on June 24.

Each of these ships has four steel decks in addition to the double bottom covering their entire length. Transversely they are divided into thirteen watertight compartments extending all the way to the upper deck, and it has been satisfactorily demonstrated that two of these may be filled without endangering the safety of the ships. The horse power required to drive the twin screws which propel these ships is generated by two quadruple expansion engines on four cranks, the engines being balanced on the principles of the Schlick patents.

The architecture of the passenger steamships is quite unique, in that a large proportion of the space devoted to passenger accommodations is in a high superstructure amidships, 256 feet in length, and practically containing three stories. This gives the ships a distinguishing appearance from any others now in service, and allows for two spacious promenade decks, one above the other, each extending 256 feet, the full length of the superstructure, with passageways across from one side to the other.

The passenger accommodations on these steamships are very luxurious and complete, the woodwork being in ivory tint and broken with many panels, and the side walls and ceilings containing exquisite examples in modern art done in oil by German artists of recognized reputations. There is a large glass cupola or dome crowning the center of the ceiling of the dining saloons, which insures a flood of soft light. These passenger steamships are enormous freight carriers and are not designed for speed, but to meet the requirements of those who wish to enjoy the ocean voyage and the superior accommodations rather than to merely save time in crossing the ocean in the shortest possible period.

The two monster ships of the fleet, the Kaiser Wilhelm der Grosse and Kaiser Friedrich, have been constructed with reference not only to a large passenger carrying capacity, but for very high speed.

It may be reasonably said that the North German Lloyd has successfully worked out the evolution of an ocean fleet, and its record for new steamships is one of which it may justly be proud.

THE RETURN OF MR. DE WINDT.

Mr. Harry de Windt has recently returned to London from the Siberian shores of Bering Strait. In a short time he will leave England for a lecturing tour in the United States. It is said he was brutally treated by the Tchuktchis at Oumwaidjik. In consequence of this the United States government will, it is said, send a vessel to Oumwaidjik to punish the chief. The Tchuktchis are nominally Russian subjects; the only vessels ever in the neighborhood are American whalers and the United States revenue cutter. Mr. De Windt had an enforced sojourn of two months among the natives. He gave the following information concerning them to a representative of Reuter's agency:

They are physically a far finer race than the Alaskan Eskimo races, and their women are better looking, but the Tchuktchis are wholly devoid of morality, and will barter a wife for a handful of tobacco. Infidelity is no crime among them. They number altogether about 5,000, and along Bering Strait are seven settlements of perhaps 300 each. The others are scattered along the seaboard of the Arctic Ocean, stretching away to the settlement of Nijni Kolymsk. They acknowledge no government and pay no taxes. None of them had ever even heard of the Czar. At a village not ten miles from Oumwaidjik the language was totally different, and the natives of each settlement are unable to understand each other. Oumwaidjik itself is described as one of the most desolate spots in creation. There is not a tree or blade of grass for 400 miles inland, nothing but swamp and rock. The natives died weekly of starvation and scurvy, and often took to devouring raw seaweed. The most weird Tchuktchi ceremony is the "Kamitsk." This is simply the putting to death, with their free consent, of aged or useless members of the community. When a Tchuktchi's powers have decreased to an appreciable extent, a family council is held and a day fixed for the victim's departure for another world. Perhaps the most curious feature is the indifference shown by the doomed one, who takes a lively interest in the proceedings, and often assists in the preparations for his own death. The execution is preceded by a feast where seal and walrus meat are greedily devoured and villainous whisky is consumed.

THE POSTAL CONGRESS.

The Universal Postal Union of the world holds meetings at intervals of six years. The fifth of these conventions began at Washington, D. C., on May 5. This is the fifth convention which has been held by the Postal Union. It is attended by delegates from more than sixty countries and provinces and it is thought that the three countries which are now out of the pale of the Postal Union may possibly all be admitted to the union before the congress has finished its labors. So much of the business of the world is now done through the medium of the mails that the meetings of the union are of extraordinary importance. It is the first meeting of the kind which has ever been held in America, and the rules and regulations which are made will stay good until the year 1903. The congress is held in the old building of the Corcoran Art Gallery, and the proceedings are conducted in the French language. All of the business to be transacted by the congress will be first considered by committees, which will be five in number. Among the important amendments to existing regulations governing the union which will probably come up is a proposal to raise the limit of weight on letters which may be transmitted to foreign countries for postage equivalent to five cents. The present weight of half an ounce is considered too low, and the limit may be increased to three-quarters or even one ounce. The increase of weight implies greater expense of transportation, but not for handling and for clerical work. The parcels post, money orders, the compensation due the countries over which mails are carried to regions beyond, and the proposed universal international stamp, are other subjects to be discussed at this gathering of delegates. It is also hoped to arrange for the adjustment of rates charged by the different countries on a simple basis and technical matters of special interest to officials superintending the work at the Berne office, which acts as a clearing house for the Universal Postal Union.

AERONAUTICS AT THE TENNESSEE CENTENNIAL EXHIBITION.

The air ship or dirigible balloon has achieved another successful flight, this time in connection with the Centennial Exhibition at Nashville, Tennessee. Prof. N. W. Barnard, director of physical training of the Young Men's Christian Association, Nashville, has been engaged for some time in the construction of an air ship which depends for its buoyancy upon a gas inflated balloon and is driven by a single propeller. The balloon is approximately egg shaped in form, measuring 20 feet in diameter and 46 feet in length, and moves in the direction of its longer axis. The usual basket attachment is replaced by a light framework in which the operator sits and controls the mechanism. This consists of a driving axle and pedals which are geared to a propeller shaft that extends 20 feet in front of the machine and carries a propeller of very light construction. On each side of the body of the ship is arranged a kite-shaped sail about 2 feet wide by 3 feet long; and these are controllable by means of levers placed conveniently to the operator. The ship was started a little before noon and rose to an estimated altitude of about half a mile and moved rapidly to the westward. The descent was made about 12 miles from the Exposition grounds, and Prof. Barnard, who returned the same night to the city, expressed himself as well satisfied with the success of the trial trip.

THE LONGEST BRIDGES.

The longest bridge in the world is that over the Tay, in Scotland, which is 3,200 meters = 9,696 feet long; and the next longest is also in Great Britain, being that over the Firth of Forth, 2,394 meters = 5,552 feet in length. The following table gives, in meters and in feet, the lengths of the principal bridges in various countries:

	Meters.	Feet.
Tay, Great Britain	3,200	9,696
Forth, Great Britain	2,394	5,552
Moerdyck, Holland	1,470	4,820
Volga, Russia	1,438	4,715
Weichsel, Germany	1,325	4,346
Thoen, Germany	1,272	4,172
Grandenz (Elbe), Germany	1,092	3,580
Brooklyn, United States	488	1,601

The greatest single span of the Forth Bridge is 521 meters = 1,725 feet; of the Elbe Bridge, 420 meters = 1,378 feet; of the East River Bridge, 488 meters = 1,610 feet.