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, NOVEMBER 20, 1897.

Contents.

(Illustrated articles are marked with an asterisk.)

TABLE OF CONTENTS OF

Scientific American Supplement

No. 1142.

For the Week Ending November 20, 1897.

Price 10 cents. For sale by all newsdealers.

IS THE BEET SUGAR INDUSTRY DESIRABLE?

In a recent issue of the Forum, Mr. Edwin F. Atkins, the able economist and statistician, has published an article which seems to be in the nature of a protest against the introduction and extension of the beet root industry in this country. Mr. Atkins' article comes at a time when much earnest thought is being given to the production of this staple. It is only within the last month that the establishment of a large plant for treating this product has been opened in this State, the first we believe that has been established in the East. A number of such plants have been established in various parts of the West, and several of them have been described in detail in the SCIENTIFIC AMERICAN.

Mr. Atkins' protest, if such it may be called, for the questions he propounds are put rather in the interrogative form than as a positive assertion of fact, may be divided naturally into three principal parts. He begins by pointing out that most of the advocates of the beet root industry base their arguments upon the fact that our imports of foreign sugars amount to $80,000,000 annually. It is the aim of our economists to try and save the country the burden of having to pay out this large sum. Mr. Atkins goes on to show that the crops of Germany, Austria, France, Russia, Belgium and Netherlands combined exceed some 2,300,000 tons, but that this enormous production is the result of an artificial stimulation, which in the way of bounties has imposed a heavy burden upon the governments of these countries. These products are sold at a price less than the average cost of production, only the best equipped and most favorably located factories being able to make any profit upon their capital and operating expenses. He then asks whether it is wise for us to enter into competition with these countries. We can hardly look at this matter in this faint-hearted light. We believe that although in certain localities the price obtained may not exceed the cost of production, it should be borne in mind that protected by our high tariff the American producer can look to a margin of profit which does not exist in the case of his foreign brother, and that therefore, assuming he may be able to produce at the same cost as the European farmer, he may be still able to sell at the current market price and yet make a comfortable profit over the cost of production. This we can readily follow without touching upon that vexed question of federal or state bounties.

The question of revenue is next taken up, and it is pointed out that under normal conditions, Uncle Sam derives about $50,000,000 of revenue from the sugar tax, taking last year's importation of 1,450,000 tons as a basis of computation. It is then asked, what is going to become of Uncle Sam if this large revenue should be cut off? Our understanding of the objects and aims of our system of import duties is not that they are imposed with the object of hindering or curbing the development of any established industry or product, but rather of fostering such enterprises. We cannot see, therefore, how such an argument can be allowed to stand in the way of our internal development. It might be stated, with equal propriety, that it is a disadvantage for our people to grow wool or produce wines because of the enormous revenues which the government would receive in case all such articles had to be imported from abroad.

The third argument advanced by Mr. Atkins touches the question of the mode of payment of these large indebtednesses. He goes on to show that these sugars are not paid for in cash, but with our own commodities, which are sent in enormous quantities in exchange therefor. He publishes a table in which he shows that to the fifteen countries furnishing us with sugar valued at $82,554,183 we have exported merchandise reaching the enormous sum of $219,708,653, the major part of which exports were agricultural products.

About twenty-five per cent of the total imports from the countries mentioned consisted of sugar. He then states that these countries would be involved in ruin were it not for this export trade, and that they would not be able to pay us for such purchases as they might wish to make, and that the European countries, not being able to sell us sugar, would turn their attention largely to the production of the agricultural products they are now taking from us. It seems as if it were a somewhat false position for us to assume, that we must curtail our home productions and industries in order to maintain foreign trade relations. Were such a theory carried to its legitimate practical conclusion, we should ever be on our guard in developing our home industries for fear that by so doing we should jeopardize the market for the exportation of our own products. On general principles there is no more reason why we should take measures to prevent the production of the beet root than we should to prevent the establishment of woolen or cotton mills, through fear that by so doing we should not be able to hold our export trade with some foreign nation with whom we now have reciprocal trade relations.

We believe it is to our advantage to produce as much as possible of the various articles which it is now necessary for us to import from abroad, and we believe that any system of restriction in order to maintain foreign trade relations would be distinctly a retrograde movement and harmful to our industrial development.

Mr. Atkins, we think, is somewhat inconsistent in his following inquiry: What would be the gain to American farmers should they produce beets at the sacrifice of their market for wheat, grain and other products? With wheat selling at $1 a bushel, he believes that Europe will probably decrease its sugar sowings and increase its sowings of the wheat which had been neglected. He points out that with a policy of extreme protection, it will probably react upon us abroad another year, especially in view of the present high prices, and that the production of grain may be excessive at a time when our producers will be most in need of a foreign market. From our point of view, this states the very reason why it is possible, and even probable, that we should forward as much as possible the growth of the beet. If it is believed that Europe shall be induced to extend her planting of cereals and decrease her sugar growth, certainly this is the time for us to choose to take a step in the direction of establishing ourselves more firmly in the production of the sugar beet.

In another column may be found an account by an expert on the present growth and condition of the beet sugar industry in the United States.

THE APPLICATION OF ELECTRICITY TO STEAM RAILROADS.

One of the most important papers that has recently appeared on the subject of electrical traction was read by Colonel N. H. Heft, chief of the electrical department of the New York, New Haven and Hartford Railroad, at the convention of the American Street Railway Association at Niagara. Our readers will remember that the author of the paper has had charge of the costly experimental work which the New Haven Railroad Company has been carrying out to determine the applicability of electric traction to standard steam railroads. The roadbed, equipment and power plant of the new system was very fully described and illustrated in two articles in the SCIENTIFIC AMERICAN of June 12 and 26. Briefly stated, the experiments consisted in the electrical equipment of seven miles of track between Nantasket Junction and Pemberton, where the overhead trolley was used; and later the equipment with the third-rail system of three and a half miles on the Plymouth Division, and twelve and a half miles on a line running from Berlin to Hartford. The last of these lines (from Berlin to Hartford) has now been running for half a year, and in the paper read at the convention Colonel Heft was able to give the results of what is undoubtedly the most important and reliable test of electrical traction on steam railroads that has yet been made.

The paper, which is too lengthy for reproduction in the columns of the SCIENTIFIC AMERICAN, will be found in the current issue of the SUPPLEMENT. We give, however, some of the more important facts which were mentioned by the author. In the first place, the company are more than ever convinced of the importance to any transportation agency working in a thickly populated territory of uniform fares and a frequent and regular train service—one which requires no printed schedule. On the Nantasket Beach line, before the advent of electricity, the fare for a certain distance was twenty-eight cents; when it was electrically equipped, a half-hourly service was given and the fare was cut down to ten cents. The result has been that the first summer, 1895, showed an increase of 92·6 per cent in the number of passengers carried: the following summer showed an increase of 45·1 per cent over 1895, and the summer just passed showed an increase of 300 per cent over the number carried in the last year of steam traction.

The line between New Britain and Hartford, 9·3 miles in length, runs in direct competition with a trolley line between the same points. The time by the latter is fifty-five minutes and the fare fifteen cents as against less than twenty minutes by the third-rail line and a fare of ten cents The trains were run on a half-hourly schedule, and the sound financial policy of the reduction of the fare from twenty-three cents to ten cents is shown by the fact that during the three summer months 400 per cent more passengers were carried than during the corresponding months of last year, when steam was yet in use on this line.

In the matter of practical operation the electric motor has again demonstrated its special adaptability to a service in which stops are frequent and rapid accelerating power is at a premium. On the Nantasket Beach line, 10·6 miles in length, there are no less than seventeen stations, the average distance between which is about 0·6 of a mile, yet the whole distance is run at an average speed of 24·6 miles per hour, including the sixteen stops—a feat that is entirely beyond the power of steam locomotives. The 9·3 miles between Hartford and New Britain were covered regularly by motor cars with two trailers in from 18 to 20 minutes at an average speed of about 30 miles per hour, and with a special high geared motor a maximum speed of over