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THE PROSPECTS OF TRADE.

On all sides the business outlook is of the most cheering character. The statistics of the Treasury Department show that during the nine months ending with September the total exports of breadstuffs was in round numbers nearly \$209,000,000, or over \$30,000,000 more than during the corresponding period last year. The exports of domestic provisions during the same period approached \$104,000,000, against \$82,000,000 for the same months last year. The total exports of domestic manufactures and merchandise of all sorts during the first eight months of the current year exceed those of the same period last year by more than twenty per cent; and the general conditions of trade during the latter part of the year—for which the full statistics are not at hand—certainly indicate no falling off in the ratio of increase. The increase in the value of goods imported this year is greater than the increase in exports; while the steady inflow of gold from Europe is proof enough of the healthful condition of our foreign trade as a whole.

Our domestic trade was never being prosecuted with greater vigor, confidence, and profit. The great lines of communication are taxed to the uttermost to handle the merchandise now in motion. The trunk lines of railway report their western bound freights to be from 25 to 40 per cent greater than this time last year, while the eastward movement is fully 10 per cent above that of the corresponding period in 1879, with the heaviest parts of this year's crop yet to be moved. The coastwise trade is likewise reported as considerably in excess of last year's.

Not less cheering are the reports from manufacturing centers, East, West, and South. The mills and factories are running full time and full handed, and critical observers note as a source of special gratification that at no time since the war has there been so great a demand for tools and machinery required in extending old established works and for equipping new ones. The manufacturers of tools, machinery, and other appliances for manufacturing are crowded with orders, indicating not merely a present active demand for manufactured products for general consumption, but a confident expectation on the part of producers of increasing demands in future.

Even so conservative an authority as the United States Economist does not hesitate to say, what we had the pleasure of asserting more than a year ago, that the country has entered upon a period of productive energy and prosperity such as it has never seen before. In the words of our contemporary, the best ten years in all the history of this country are now before us. During the coming decade we shall enjoy a period unexampled prosperity, a prosperity whose foundations are as real and whose basis is as broad as the unequalled products of our fields, flocks, factories, and mines.

With our currency on a specie basis, with our population steadily increasing through the active toilers of foreign immigration, with vast areas of rich virgin soil being constantly added to our productive growth, with all our vast industries in successful operation, with the balance of trade in our favor, with peace at home and abroad, with labor steadily employed and wages good, with the wealth of the nation rapidly augmenting, there is no bar in the way of our commercial advancement. All obstructions are happily removed, and taking care of home wants and developments, let the business men of this country reach out for the commerce of the world.

As we remarked in a recent issue of the SCIENTIFIC AMERICAN the closing years of this century should see, and certainly promise to see, as rapid a progress toward American commercial supremacy as the two decades just past have seen in the development of our agricultural and mechanical supremacy, with a collateral progress in our industrial affairs that the boldest scarcely dream of now.

PROPOSED PALM OIL INDUSTRY.

Mr. Edward S. Morris, of Philadelphia, suggests that something profitable might be done in this country in the extraction of palm oil by means of naphtha. While in Hamburg, Germany, lately, he found three factories running night and day extracting oil from palm kernels, and tried to gain admission to them. He was not admitted, the Germans thinking that Americans know quite enough, and that we will soon undersell them under every business head. He learned, however, that the oil was extracted from the kernels by naphtha, and not by hydraulic pressure. Most of the oil thus made goes to France, where it is refined and made into a fine table oil. Labor is so cheap in Germany that they can afford to throw the meal away after extracting the oil. If the oil was obtained by pressure, then the meal or cake would have the same market value as linseed cake, as food for cattle.

At Liverpool he learned that palm oil and palm kernels formed about two-fifths of the entire tonnage of more than twenty steamers trading along the African coast to and from Liverpool. The exportation of palm kernels from Africa began only a few years since. They now have a regular market value and a ready sale in England, where the oil is mostly purchased by soap makers and perfumers. There the oil is extracted by pressure, and the cake or meal finds a ready sale, being free from the odor of naphtha.

Believing that the industry might be profitably introduced here and the importation of palm kernels made a useful adjunct to the trade of American vessels visiting the African coast, Mr. Morris brought home three tons of the kernels purchased in Liverpool. He sent samples to several parties

likely to have facilities for extracting the oil, but found no one ready to undertake the work. He is still confident that the industry could easily be established here, and that it would pay. Seeing, however, that we have only begun to utilize the equally valuable oil of our enormous yield of cotton seed, there does not seem to be much probability of any rapid increase in the importation of African palm kernels for their oil. It might be a profitable thing to do, nevertheless. The objection to the naphtha process, that it leaves an odor of naphtha about the oil cake, is, we are inclined to think, unfounded in fact. At any rate, the taint must be rapidly dissipated on the exposure of the meal to free currents of air.

THE EFFECT OF FORESTS UPON RAINFALL.

The effect of clearing land of its trees, according to the opinion of many meteorologists, engineers, and other scientific students of the subject, is to diminish the average rainfall of the country thus cleared, to lessen the outflow of the rivers, and also to cause such concentration of the amount of rain and snow within short periods as to increase the danger of floods to a marked extent. This theory was formulated most fully in 1873 by Sir Gustav Wex, chief engineer of the improvements in the Danube River at Vienna, who supported his opinion by very ample calculations as to the decrease in the volume of water discharged by the five principal rivers of Central Europe. Since that time many opinions have been expressed by experts, some affirming, others denying, the correctness of Sir Gustav's theory; some have claimed that the fact of such a decrease in the discharge of the rivers cited has not been satisfactorily established; while others, admitting that the decrease has gone on, deny that this fact is sufficient to prove the accuracy of all, or even any of Sir Gustav's conclusions. The latter has, therefore, recently published a second treatise, in which he says that for six years he has shunned neither labor nor expense in obtaining as many and as reliable technical hydraulic measurements and data of different streams as possible; and he has come to the conclusion that his theory has been proven to be correct.

Sir Gustav gives voluminous tabular exhibits of observations taken on a number of large rivers, extending over periods of more than 100 years in some cases, and in nearly every case it is found that the river surface has been lowered to a marked degree. The rivers cited are the Upper and Lower Rhine, the Danube, the Elbe, the Vistula, the Oder, the Moselle, the Main, the Theiss, the Tiber, the Po, the Seine, the Glommen (in Norway) and the Mississippi. In reply to the objection that the lowering of a river's surface may be due to the deepening of its channel, and not to the decrease in the volume of water discharged, Sir Gustav admits that the channel beds are sometimes raised and sometimes lowered; "but," he says, "if from the numerous gauge readings submitted by me are eliminated those which were taken on stretches of the stream in which changes in the bed of the river took place, we will still find some rivers or stretches of stream which lie either in a natural unchangeable bed, or which have been improved from time immemorial and are in permanent condition. The most scrupulous expert must admit that on such rivers and stretches we can justly assume that the decrease in their stages—i. e., the sinking of their surface, indicates a decrease in their volume of water, since it would be impossible to explain the phenomenon in any other way."

Sir Gustav claims that the destruction of forests, necessarily coincident with the advance of civilized habitations into new countries, not only diminishes the aggregate amount of rainfall, but it increases the tendency of floods. This is, of course, equivalent to saying that the rainfall (which word includes all atmospheric aqueous deposit, such as rain, snow, hail, dew, etc.) is concentrated into briefer spaces of time during the year, instead of being equally distributed; and as this concentration must have a detrimental influence upon agriculture, the importance of the subject extends beyond its effect upon rivers alone, which is the only point of view taken by Sir Gustav Wex. It therefore deserves double attention in this country, where droughts are so often such serious causes of crop failures.

The observations of the Mississippi recorded by Sir Gustav were made at Natchez, Miss., and extended over a period of 11½ years. They showed a mean annual fall of seven-tenths of an inch in the surface level of the water, while the highest stages averaged nine hundredths of an inch higher each year, and the lowest stages thirty-nine hundredths of an inch lower each year.

THE BRUNTON TUNNELING MACHINE.

The Society of Associated Coal Miners, of the Bouchès du Rhône, in the south of France, have long had in view the cutting of a tunnel nearly ten miles long between their mines in the basin of Fuveau and the sea. During the last three years they have made many experiments with machinery intended for tunneling, at an aggregate expense of about \$40,000. There are serious objections to the use of explosives for removing the rock, and recently they have made some trials with the tunneling machine of J. Dickinson Brunton, invented for the purpose of cutting the tunnel beneath the Channel. The machine consists of revolving cutting disks placed at different angles, and so directed as to remove the rock in considerable quantities directly without the use of explosives. Mr. Brunton estimated that in a tunnel of 7½ feet in diameter, he could progress at the rate of about two feet an hour through calcareous rock.

The experiments by the French company were made in a mine at Gardanne, where a tunnel 800 meters (or half a mile) long had already been pierced. The motive power was at a distance of one-quarter of a mile from the mouth of the tunnel, and the power was conveyed to the Brunton machine by an endless chain.

The first trials were devoted to determining the best form for the cutting disks, and, although the life-time of those first used was only during one foot of advance, the form was so improved upon that they finally lasted during a progress of fifteen feet. It was then found that the machine did not work in a straight line, but would vary its direction and seriously strain the machinery. This was overcome by using the spirit level and other means of rectification. The improved machine was then tried for effectiveness, and, although its progress was satisfactory, it hardly came up to the sanguine anticipations of the inventor. In the best trials the progress made varied between $4\frac{3}{4}$ inches and $6\frac{1}{2}$ inches per hour. It was evident that the motive power transmitted was insufficient. Investigations upon this point brought out that of the 51 horse power of the original motor, only 12.4 horse power were transmitted to the tunneling machine, leaving a net loss of 38.6 horse power. Unquestionably if this large loss can be avoided the progress of the machine through the rock will even surpass the expectations of Mr. Brunton.

INFECTED CIGARS.

The occurrence of occasional cases of syphilitic sore mouth, among cigar smokers unwilling to admit any other source of contagion than the cigars they use, gives rise from time to time to sensational and possibly alarming newspaper reports of cigar smokers' perils. Several articles of this character are now before us. To one who does not smoke cigars the alleged perils from syphilitic taint seem to be grossly exaggerated, for two reasons: cigar smoking is extremely common among respectable people, on the one hand, and, on the other, the disease in question (syphilitic sore mouth) is by no means common among such people; while the probability that the relatively few victims who charge cigars with their misfortune may have been infected in some other way is certainly not small. The assertions of sensational reporters refute themselves by trying to prove too much.

Nevertheless it must be admitted that the indiscriminate smoking of cigars without the intervention of a holder is not a nice practice, especially when we take into account the large number of cigars made by untidy people in untidy tenement houses, and the disgusting practice which is said to prevail in them of finishing the cigar "with a lick."

It is asserted that over five hundred syphilitics are or lately were engaged in cigar making in this city; and the fact is notorious that the tenement houses in which cigar making is largely carried on shelter some of the lowest, filthiest, and most commonly tainted classes in the world. The thought of putting into one's mouth an article possibly handled by such people is certainly not a pleasant one. It is on the score of cleanliness, therefore, quite as much as on that of sanitary precaution, that the cigar holder should be used by all who smoke cigars, unless they know positively who made the cigars they smoke, and have confidence in the cleanly conditions of their manufacture.

The case reported in the London *Lancet* by Dr. Mannsell, of Liverpool, is enough to show that the danger of syphilitic infection by cigars is not wholly imaginary, although there is nothing in the report to show that such infection actually occurred. The case was that of a young girl with a syphilitic sore on her lip; and after describing it, Dr. Mannsell says:

"Independent altogether of the further progress of the case, or of the question as to how she became possessed of the sore, the interest of the case (and a melancholy one it is for smokers), centers in the occupation by means of which the girl got her living, for she had been pursuing it for a period of three weeks with this sore on her lip. She was employed in a cigar factory, where her work consisted in rolling the outer leaf around the bulk of the cigar, and when she came to finish off the end which is put into the mouth, the custom was to bite off the superfluous material with the teeth, making the ends to 'stick with a lick.' The girl naively supposed that some poison had got from the tobacco into a small crack of the lip. But how much poison is it possible got from the lip among the tobacco? She estimated the number of cigars got through in one day at twenty dozen."

There might not have been any serious peril in the act, still we doubt if any prudent person would choose to put into his mouth any one of the three or four hundred dozen cigars which this unfortunate girl had licked to a finish while her lip was sore.

The cases mentioned by Dr. L. D. Bulkley, of this city, in his paper on this subject read before the American Dermatological Association, seem to carry the possibility of syphilitic infection through cigars a long way toward positive proof; far enough, at any rate, to make the use of cigar holders not an unwise or unnecessary precaution on the part of cigar smokers. While we know that reputable American cigar makers are careful to prevent the untidy practice which seems to have been followed in the English factory mentioned by Dr. Mannsell, and require their finishers to follow more cleanly methods, there remains the unpleasant fact that tenement house workers are not under supervision, and are not by nature or habit inclined to be fastidious in

their own tastes or scrupulous with regard to the tastes of others.

Having no personal knowledge of the comfort to be derived from sucking the end of a roll of tobacco, we are obviously incompetent to advise smokers in this matter; nevertheless we may be allowed to submit the opinion that while the risk of syphilitic taint from infected cigars is extremely small there is still a risk, which the cigar holder is calculated to obviate. If we had to smoke cigars we should prefer to use a holder.

Transit Across the Brooklyn Bridge.

At a recent meeting of the trustees of the Brooklyn Bridge, a resolution was offered providing for the appointment of a committee to consider the question of the means of transportation over the bridge. This enormous and enormously costly structure being nothing more than the greatest railway bridge of its sort in the world, it is time, the editor of the *Sun* properly says, for its managers to begin the discussion of the methods of conveying freight and passengers across it.

We were promised last spring that the bridge should be completed by the next Fourth of July, but there have been delays which may put off its opening several months later. At any rate, the structure is now receiving its finishing touches, and we begin to get some idea of what it will be when it is done. Standing on the elevated railroad station on the east side of Chatham street, near the City Hall, a clear view is from tower to tower and over the approaches may at last be obtained.

No one who takes the pains to look at that view can fail to be impressed with the magnitude of the work. It is indeed a stupendous structure as we see it, and yet much of its heaviest and most costly work, that spent on the foundations, is beyond the sight. And all this labor and expense have been laid out on the building of a single railway bridge between New York and Brooklyn; on what in all probability will practically prove to be only a connecting link between the elevated railway systems of the two cities.

The bridge will unquestionably be used by a large share of the people who travel to and from Brooklyn and New York, and for them will prove of great convenience; but it will be only one line of communication. If the wants of the people of Brooklyn were thoroughly satisfied, we should need not one bridge, but several. With but one existing, the ferries will continue to be used by a great proportion of the travelers, and perhaps very generally by the wagons going to and coming from Brooklyn. Loads drawn by horses are likely to cross chiefly by ferryboat as now, and people who live near the ferry landings on the other side and are employed near those in this city, will find it more convenient to use the old method of communication.

But for people living on the outskirts of Brooklyn, or who have occasion to use the rapid transit on the other side of the river, steam locomotion across the bridge will be a great gain. We may expect, therefore, that the opening of the bridge for use will be followed by the extension of the population of Brooklyn and the steady advance of the limits of that city. It will have an effect analogous to that produced on our upper wards by the establishment of rapid transit.

It is probable that large locomotives, traveling at a high rate of speed, will be used to carry over passengers. The project of drawing the cars with cables is not favorably received by engineers, and the superior advantages of employing locomotives are urged. The bridge can sustain them in entire safety, and greater speed will be obtained by their use.

How to Have Ice Next Summer.

A great many people do without ice in the summer—though the ponds and streams at their doors furnish an abundant supply every winter—simply because they imagine that an expensive icehouse is needed to hold the ice. A gentleman who once labored under the same delusion, describes in the *Tribune* the experience by which he was led to store his summer supply of ice successfully, without an icehouse, after paying dearly in disappointment, loss of ice, and loss of money, through having "too much icehouse." He was convinced of his error by the circumstance that the more pains he took with his icehouse the more rapidly his ice melted, while a neighbor who had no icehouse at all always had plenty of ice. The practice of the latter was simply to pile his ice in a square body under a cowshed having a northern exposure, the first layer of ice being raised above the ground so as to secure good drainage, and the whole covered thickly with sawdust. Boards set on end around the ice pile served to keep the sawdust in place. The gentleman referred to says:

A pile of ice six feet high, eight feet wide, and eight feet long will make three hundred and eighty-four cubic feet. And this is enough for the use of an ordinary family for the table and to cool the cream, etc. Six team loads fill an icehouse which contains about four hundred cubic feet. The blocks should be cut as smooth as possible and square, so they will fit closely, and then ice must be chopped up fine and crowded in between the pieces so as to make a solid mass. The closer the ice is packed, and the more solid the mass is united together, the better it will keep. When an icehouse is too close, there is a great deal of condensation, which makes the whole contents wet and dripping, and causes the ice to melt rapidly. The air must be kept as dry as possible, one secret of keeping ice being plenty of ventilation. The more ice there is in a pile the better it will keep. A small quantity must be covered deeper and

thicker than a large mass. A large mass will almost keep itself. It does not require the protection of sawdust, but straw or a double wall of boards will be ample. Every person who makes butter ought to have ice. It will more than pay for use in the dairy, and then for the family it is a luxury every provident man should supply.

Electric Light Wires.

We give below a letter from Mr. James Harrison, of the Board of Fire Underwriters, describing a singular accident occasioned by electricity from an electric light wire. In shifting this wire on the top of a building, it was accidentally brought into contact with a small telephone wire that led into an adjacent building, and the electrical charge inflamed the thread covering of the telephone magnets. This is a species of accident that can readily be prevented by covering the electric light wires or the telephone wires with insulating material, or using a return wire on the electric light circuit.

The rapid extension of both the telephone service and the electric light service in cities will probably put an end to any dangers like the above, as it is found that insulation of the wires is necessary to insure the best results, whether for lights or telephones, and covered wires are therefore taking the place of the uncovered wires.

Mining Operations in Great Britain.

The report of the Inspector General of Mines in Great Britain for 1879 has just been published. The number of persons engaged in mining operations in the United Kingdom was 523,870. The total number of serious accidents amounted to 843, and the number of deaths resulting, 1,037, a diminution as compared with 1878 of 39 in the number of accidents and 453 in the number of deaths. There was an average of one accident for every 621 persons employed, and a death for every 505 persons.

In the twelve districts under the Regulation Act of 1872, for the coal mines 476,810 persons were employed in or about the mines, of whom 385,179 were below the surface, and 91,631 above; of those above, 4,842 were women.

The products of the mines for the year were: 133,720,393 tons of coal; 9,387,766 tons of iron ore; 1,455,003 tons of potter's clay; and 803,207 tons of mica. The amount of coal produced was 1,108,330 tons more than in 1878, while the other items were less by the following amounts: iron ore, 1,359,461 tons; potter's clay, 170,583 tons; and mica, 10,055 tons.

Fire Caused by an Electric Light Wire.

To the Editor of the *Scientific American*:

I venture to call your attention to an occurrence which took place at No. 4 Maiden Lane very recently. In the office of Messrs. Silcox & Co., No. 4 Maiden Lane, is a telephone communicating with their factory, No. 14 Maiden Lane. One day, either Monday or Tuesday last, some person on the roof of one of the intervening buildings dropped an electric light wire upon that of the telephone wire of Messrs. Silcox, bringing the two wires in contact. The effect rather astonished the people in the office. Flames burst forth from the telephone instrument on the wall, producing such an intense heat as to entirely destroy the magnets. Can you, through your valuable journal, give us a possible reason for this?

Suppose the same thing should occur at Ridley's, or Lord & Taylor's, or any other establishment having telephones. In most of these establishments there is a large amount of open stock lying and hanging in every direction. It occurs to us that if there is a danger of similar accidents in these stores, it will be apt to throw the *show window* fire traps into the shade.

JAS. HARRISON,
Superintendent Bureau of Surveys, New York Board of Fire Underwriters.

No. 115 Broadway, New York, October 21, 1880.

The Universal Grinder.

Messrs. Newell & Chapin have on exhibition at the Fair of the American Institute, their patent universal grinder. The grinder consists of hard iron or steel disks with beveled edges, locked together upon a shaft composing a cylinder with a series of angular grooves. Upon the sides of the disk are radial cutters or teeth. Another shaft with similar disks is so placed that the disks of one cylinder fit into the spaces between disks on the other. This machine will grind phosphates, barytes, lead plumbago, gold ore, quartz, plaster, shells, bone, wheat, corn, and other materials required by the manufacturer or farmer. The manufacturers exhibit an interesting collection of minerals and cereals ground by these mills, which shows that they are adapted to a wide range of uses.

POLICE TELEPHONES.

Chicago leads the way in adopting telephones for general police uses. Experimental telephonic stations have been established at various points in one important district, and relays of mounted officers are kept in waiting at a central station. Reliable citizens are furnished with keys to the telephone boxes nearest their residence. To prevent false alarms the keys are numbered, and cannot be withdrawn from the lock until released by a key carried by the policeman on that beat. When anything goes wrong in a district, the alarm is sent to the central station, and explanations are given through the telephone. In case of serious disturbance a large bell is sounded, and every officer on post runs to the nearest box to receive orders.