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THE SUGAR INDUSTRY IN THE UNITED STATES.

There is every indication that during the next few years the beet sugar industry is destined to occupy a very prominent place among the great industrial and commercial questions of this country. The present unsatisfactory condition of agriculture, our present enormous and ever increasing imports of one of the staple products of agriculture, and the legislation by which the present government is seeking to assist the one and reduce the other, render the question of beet farming and beet sugar manufacture a subject of vital concern to every citizen who has the interests of his country deeply at heart.

The statistics of the sugar industry for the year 1896 show that the total consumption of sugar in the United States amounted to 2,093,819 tons, equal to a per capita consumption of 63 pounds. Of this amount 1,739,313 tons were imported from abroad and 354,506 tons represent domestic production—that is to say, for one ton of sugar manufactured in the United States we brought in five tons from other countries. The statistics of the past sixteen years show that the total consumption during that period was 25,182,649 tons, of which 2,673,000 tons, or only one-tenth, was produced in the United States. During this period we paid out for this imported sugar about fifteen hundred million dollars, or in other words we have paid to foreign countries an average yearly tribute for the pastsixteen years of about one hundred million dollars. These figures become yet more significant when it is remembered that sugar has declined in value during this period from 7·58 cents to 2·92 cents per pound and that our per capita consumption is from two to three times as much as that of other sugar-producing countries. Of the 1,739,313 tons imported into this country over one-fourth, or 500,000 tons, came here in the shape of brown or raw German beet sugar. This, and indeed all the imported raw sugar, whether from cane or beets, is purchased by the American Sugar Refining Company and other firms of less note, who refine it and put it on the market as standard granulated sugar.

Of the two sources of sugar, sugar cane and sugar beets, the former is the older and better known. It is said that it was the blockade of France during the Napoleonic wars that turned the attention of the French people to the culture of the sugar beet, and that to this emergency Europe owes its present sugar beet industry. Be that as it may, the growth of the industry has been steady, and in recent years truly phenomenal. Germany, which in 1884 produced 1,147,000 tons of beet sugar, in 1894 produced 1,800,000 tons, an increase of 57 per cent. Austria-Hungary in the same decade raised her production from 653,000 tons to 1,050,000 tons, a gain of 61 per cent, and in France the increase has been from 303.000 tons to 814,000 tons, a gain of 163 per cent—the increase for the whole of Europe during the same period being 78 per cent, and the production reaching the great total of 4,792,000 tons.

The question naturally arises: Is there any difficulty of soil or climate which at once renders us dependent upon these countries for our own supply and prevents us from taking part in this vast and profitable industry? To which it must be answered that no such difficulties exist, inasmuch as there is a broad belt of country reaching in a continuous line from the Atlantic to the Pacific, several hundred miles wide and over three thousand miles long, which is admirably suited to the growth and harvesting of the sugar-producing root. It has been found that beets grow best in a temperate climate, and the richest and most reliable crops are obtained in regions where the average temperature during the months of June, July and August is about 70 degrees Fahrenheit. Very valuable information on this subject has lately been given in pamphlet form by Prof. H. W. Wiley, Chief of the Division of Chemistry in the United States Department of Agriculture. It is shown that the sugar beet belt, following the isothermal line of 70 degrees Fahrenheit, commences near the city of New York, passes up the Hudson River to Albany and then turns to the left, following the southern shore line of Lake Erie. It then swings up into Michigan, passing to the south of Lansing; and curving to the south through Chicago, it passes up through northeastern Illinois and southwestern Wisconsin into Minnesota. Here it turns due west and runs into central South Dakota, where it takes a sudden turn to the south, passing in a general southerly direction through western Nebraska and eastern Colorado and New Mexico to near the southern boundary of the latter State. Here it curves broadly to the west, passing through Arizona to its western boundary, where it runs north again in a long and narrow loop through Utah and Idaho, the northern turn of which is near Boise City, Idaho. It returns thence through Utah and southeastern Nevada to southern California, where it runs north in another long loop whose northern extremity is to the south of Mount Shasta, the line finally terminating at the Mexican border. Now, while the sugar beet belt is theoretically supposed to extend for one hundred miles on each side of this line, experimental work has shown that sugar beets can be raised successfully in many localities which lie well outside of this limit. Mr. Herbert Myrick, who should speak with authority, draws the northern boundary of the belt from Troy, N. Y., through Lake Ontario, central Michigan, central Wisconsin and Minnesota, northern North Dakota and Montana, terminating it at the western end of the border line between the latter State and Canada, thus including the whole of Washington and Oregon. The same authority draws the southern boundary of the belt through Virginia, Tennessee, western Kentucky, southern Illinois, central Missouri, southwestern Kansas, and western Texas to the Mexican line. If the mean between the two hundred mile strip and the broader belt above indicated be taken as representing the area over which the sugar beet crop can be successfully raised, it is evident that the United States could not only supply the $100,000,000 worth of product which is now brought in from abroad, but could take a leading position in supplying the markets of the world.

A soil, loamy and not too stiff, abundant sunshine, a moderate amount of moisture and favorable weather during the period of ripening and harvesting are the elements which constitute a good sugar beet country, and whenever these have been present the experiments which have been made in beet culture have met with encouraging success. To render the cultivation of beets profitable, however, it is necessary that the beet farm should be within easy reach of a beet factory, for it is evident that the amount of profit realized by the farmer will vary, other things being equal, as the distance which his crop has to be hauled. In the present issue we give a detailed description of one of the large and successful establishments which have served to demonstrate that our soil, climate and methods are adapted to the production of beet sugar on a large scale. This factory began operations in 1891, when 1,800 acres of beets were grown, which yielded 7·26 tons of beets to the acre, the farmers being paid $3.90 per ton for the crop and the average return per acre being $28.37. In 1895, the acreage under cultivation had increased to 7,528, and the yield had increased from 7·26 tons to 11·03 tons to the acre, the farmers receiving on an average $4.35 per ton for their crop, the average return being $47.98 per acre. During this period, moreover, the average percentage of sugar in the beets had increased from 13 to 15 per cent. The cost of raising the beets in the Chino Valley is about $30 per acre, most of this being due to labor, which would leave a profit in 1895 of $18 per acre to the planter. This agrees fairly well with Prof. Wiley's estimate of a net profit of from $8 to $15 per acre as an average, the California district being peculiarly favorable to a large and reliable crop.

Altogether it must be admitted that the possibilities of this new industry, both for the farmer and the capitalist, are great and not easily overestimated. If the cultivation of the sugar beet and the manufacture of beet sugar can be once widely and firmly established, our farmers will be largely delivered from the anxiety and risks which attach to a "one crop" country, and the country itself will be keeping at home a sum of money equal to the value of our whole export of wheat and flour.

JEOPARDIZING TRADE MARK PROPERTY.

It is strange that a very considerable number of business men should, through carelessness or ignorance, seriously jeopardize this species of property. One of the greatest dangers is unwittingly to give an otherwise valid trade mark a descriptive significance. This occurs when the trade mark is a word which, though it be fanciful in itself, takes on a descriptive value so as directly to convey a meaning descriptive of the goods, their quality, grade, nature or character. This is most likely to occur when the owner has different trade marks for different grades of goods. If such marks do, in fact, designate different grades of goods, they have lost their office as trade marks and may become public property. But this danger may be present with respect to a sole trade mark, as for example: The name "Excelsior" is an ideal trade mark, yet there is the fibered material, akin to shavings, which, as a stuffing for mattresses and upholstery, is much sought after, and this material being properly described as excelsior, the name is free to the public. This because the originator failed to assert his trade mark rights, and, indeed, gave the descriptive quality to the name. He should have registered the trade mark in the Patent Office, marked the name "Trade mark," and should not have described his goods merely as excelsior.

Another result of not registering, but relying merely on common law protection: We have in mind one or two notable trade marks lost to the originator by failure to register. It will answer to call one the Lion brand. The originator thought a red lion very proper. The trade mark was not registered, and so it came to pass that ingenious imitations in different parts of our enterprising country eventually became as numerous as the great Barnacle family and more discriminating, until, like old country inns, we had the blue lion and the white lion and lions piebald; lions rampant and lions courant; lions passant and lions couchant and their kindred. To the complaint of the originator, it

was asserted that his trade mark was distinctly a red lion, and that he was trying to broaden it to take in other men's property. Testimony pro and con was as plentiful as at a modern trial for heresy and equally as determinate. The originator could have cleared the air had he registered before others adopted resembling marks, and had defined the one essential feature of the lion, with or without improvements on nature and with or without reference to posture.

Therefore, register all your trade marks, register each distinct feature of each mark separately, and do not make a trade mark describe the goods to which it is applied, or the object is defeated.

THE LATEST PERFORMANCE OF THE TURBINIA.

It was only a few years ago that we were looking forward to the day when some naval architect and engineer would give us a vessel capable of steaming at a speed of twenty miles an hour. So swift has been the development of marine engineering that to-day there exists a bona fide steam vessel that has been run at just double that speed, or, to be exact, at the rate of 40⅛ miles per hour. At the time of our last notice of this phenomenal little craft, we were informed by Mr. Parsons, the designer of her engines, that the turbines had never demonstrated their actual power, for the reason that the main steam pipe had proved to be too small to supply steam as fast as the turbines could take it.

Judging from reports in the English technical press, this defect has evidently been made good and the motive power tuned up to working pitch; for it seems from the statement of Sir George Baden Powell, who was on board the Turbinia as she steamed down the lines of the fleet at Spithead, that she reached a speed of 34 knots. In a letter to Engineering, Mr. Parsons states that during a recent trial the turbines indicated 2,400 horse power and gave the boat a speed of 35 knots an hour. This is equivalent to 40⅛ miles an hour, or well up to the speed of the average passenger train. As a mere question of speed, this is a phenomenal performance, and it is not likely that it will ever be reached by a boat driven with an engine of the reciprocating type; but the wonder of it is increased when Mr. Parsons goes on to say that it was done on an expenditure of 14 pounds of steam per indicated horse power. When we bear in mind that the best type of Corliss compound engine working under favorable conditions will consume not less than 18 pounds of steam per indicated horse power, the high economy of the compound turbine will be appreciated.

At the same time it must be admitted that one could wish for more exact details of these runs. The speed is given in round numbers that suggest rather careless or crude timing. Sir William White, chief constructor of the British navy, has suggested that some builder of torpedo boats, like Yarrow or Thornycroft, should first run a boat with a set of his own engines and then substitute a set of Parsons turbines, with a view to determining their relative efficiency. Such an experiment, if carried out at considerable length, would settle the question as to the economy and practicability of the turbine for this class of service.

PNEUMATIC TUBE MAIL SERVICE FOR NEW YORK CITY.

Some thirty years ago the late Alfred E. Beach, of the SCIENTIFIC AMERICAN, exhibited in this city a working plant for the carriage of mail matter rapidly from branch stations to a central office by means of pneumatic tubes. He also experimented successfully on the idea of conveying loose letters in a smooth tube by a strong current of air, regarding it as an improvement over the old plan of having separate cars. The idea is in practical use to-day in the many mail chutes found in tall buildings, where gravity supplants air as a propelling force. Now, a generation after, a similar system is to be carried out in this city, permission having been granted by the Legislature to the United States postal authorities to lay pneumatic tubes in our streets connecting the General Post Office with a branch post office in the Produce Exchange building, in lower Broadway, and by a route west from the Post Office, through Mail Street and Park Place, thence south through Church Street, Greenwich and Whitehall Streets.

Another line, the longest and most extensive, is to connect the large branch Post Office H, Forty-third Street and Lexington Avenue, with the General Post Office, having loops entering the intermediate Branch Stations, D, F, and Madison Square.

Another projected line is from the General Post Office via the Brooklyn Bridge to the Brooklyn Central Post Office.

The distribution of local mails will thus be rapidly effected and much time saved by these proposed facilities, creating a service that will be appreciated by the public. Contracts have been awarded for the construction and equipment of the tubes, and the work of laying them is to be begun early the coming fall.

A. B. Fry, Chief Engineer of the Treasury Department, has prepared and finished the plans for the new system. It is similar to the pneumatic tube service used by the Western Union Telegraph Company in dispatching messages from its branch offices to the main office. Two tubes eight inches interior diameter will be laid parallel with each other, one for sending, the other for returning to the General Post Office. They will be perfectly smooth inside. A pressure of air will be maintained at the end of the line by a suitable air compressor sufficient to cause the carrier to travel through the tube at the rate of thirty miles an hour. On long lines reinforcing air compressing stations are arranged to keep up the pressure, much on the same plan as is used in caissons, etc. The carrier, after being loaded with letters, is put into the tube much in the same way as a bullet is loaded into a gun. The air pressure then propels it forward at a good speed. It is surrounded with rings of packing saturated with vaseline and fits the tube tightly, to prevent the air from passing by.

Each carrier can sustain a weight of thirty pounds, though in practice not more than a third of that is required. The carrier itself is an ingenious contrivance, almost three feet long, with an unusually large cylinder. It opens from one end by a curiously constructed lock, riveted to the inside of the door. When fastened, its compartment becomes thoroughly airtight, having no projections beyond the packing rings, which run out about an inch from the cylinder. The carriers will hold about five hundred letters, or considerably more than are now transported in a single vehicle by this method.

In operation the carrier, on reaching the end of the route, is gradually arrested by compression, and, striking a trigger, the door at the end of the tube is opened and the carrier is discharged, or lightly falls upon a flat receiving table. The carrier is then opened, and the packages of mail matter which it contains are assorted, stamped and delivered. Carriers can be dispatched rapidly one after the other, on a headway of but a few seconds.

So much progress has been made in the use of compressed air that it is surprising its application to the propulsion of mail matter is now only about to be accomplished. We shall watch with interest the development of this new agency for the rapid transmission of mails, and are sanguine of its ultimate benefit and success.

THE HEAVENS FOR AUGUST.

BY WILLIAM R. BROOKS, M.A., F.R.A.S.

THE SUN.

The right ascension of the sun on the first of the month is 8 h. 48 m. 20 s.; and its declination north 17 deg. 50 m. 55 s. The right ascension of the sun on the last of the month is 10 h. 40 m. 33 s.; and its declination north 8 deg. 23 m. 4 s.

MERCURY.

Mercury is evening star, reaching its greatest elongation east of the sun on August 26, which will be the best time to look for Mercury. Its elongation amounts to 27 deg. 18 m., and it occurs only four days after the planet is in aphelion.

Mercury is at its descending node on August 12, at 9 hours.

On August 13, at 1 hour, Mercury is in conjunction with Jupiter, when Mercury will be 1 deg. 14 m. south of Jupiter. On August 30, at 1 h. 35 m., Mercury will be in conjunction with the moon, when the planet will be 1 deg. 50 m. north of the moon.

The right ascension of Mercury on the fifteenth of the month is 11 h. 15 m. 23 s.; and its declination north 4 deg. 17 m. 5 s.

VENUS.

Venus is morning star. Having reached its greatest elongation from the sun in July, it is now slowly moving toward the sun, but will remain a conspicuous object in the morning sky for some time.

On August 24, at 1 h. 24 m., Venus is in conjunction with the moon, when the planet will be 2 deg. 31 m. south of the moon.

On the first of the month Venus rises at 1 h. 42 m., and crosses the meridian at 9 o'clock A. M. On the last of the month it rises at 2 h. 13 m., and crosses the meridian at 9 h. 25 A. M.

The right ascension of Venus, on the fifteenth of the month, is 6 h. 51 m. 22 s.; and its declination north 21 deg. 16 m. 10 s.

MARS.

Mars is evening star. On August 1, at 11 h. 15 m., Mars is in conjunction with the moon, when the planet will be 4 deg. 41 m. north of the moon. Also, on August 30, at 2 h. 18 m., Mars will again be in conjunction with the moon, and 5 deg. 32 m. north thereof.

On the first of the month Mars crosses the meridian at 2 h. 23 m., and sets at 8 h. 47 m. P. M. On the last day of the month Mars crosses the meridian at 1 h. 35 m., and sets at 7 h. 35 m. P. M.

The right ascension of Mars on the fifteenth of the month is 11 h. 37 m. 18 s.; and its declination north 3 deg. 16 m. 19 s.

JUPITER.

Jupiter is also evening star, and on account of its rapidly approaching conjunction with the sun, should be looked for soon after sunset.

On August 1, at 5 h. 40 m., Jupiter is in conjunction with the moon, when the planet will be 4 deg. 36 m. north of the moon. Jupiter will be again in conjunction with the moon on August 28 at 11 h. 21 m., with the planet 5 deg. 2 m. north of the moon.

The conjunction of Mercury and Jupiter on August 13 has already been noted in the section on Mercury.

On the first of the month Jupiter crosses the meridian at 2 h. 12 m., and sets at 8 h. 40 m. P. M. On the last of the month Jupiter crosses the meridian at 37 m. past noon, and sets at 6 h. 58 m. P. M.

The right ascension of Jupiter on the fifteenth of the month is 11 h. 4 m. 42 s.; and its declination north 7 deg. 3 m. 1 s.

SATURN.

Saturn is in the southern evening sky, and, except for its rather low altitude, is in favorable position for telescopic observation. Work, however, should be begun as soon as it is dusk. On August 16 Saturn is in quadrature with the sun, or ninety degrees east thereof.

On August 25, at 7 h., there will be an interesting conjunction of Saturn and Uranus, when Saturn will be 1 deg. 48 m. north of Uranus.

On August 6, at 10 h. 12 m., Saturn is in conjunction with the moon, when the planet will be 7 deg. 13 m. north of the moon.

Saturn crosses the meridian on the first of the month at 6 h. 46 m. P. M., and sets at 11 h. 47 m. P. M. On the last of the month Saturn crosses the meridian at 4 h. 52 m. and sets at 9 h. 50 m. P. M.

The right ascension of Saturn on the fifteenth of the month is 15 h. 30 m. 10 s.; and its declination south 16 deg. 56 m. 59 s.

URANUS.

Uranus is evening star, and, as indicated by its conjunction with Saturn on August 25, will be found in the vicinity of that familiar planet throughout the month.

Should it happen to be cloudy on the evening of conjunction, Uranus may be readily found for several nights, before and after the conjunction, just below Saturn, say about one and three-quarters of a degree, with the aid of a good moderate size telescope. With a power of one hundred diameters and upward, Uranus may be distinguished from a star by its disk. Even with a much lower magnifying power the planet may with certainty be identified by the painstaking observer, if he will make a careful map of the field the first night and compare it on subsequent nights with the telescopic field of stars. A slight motion of one of these objects, among the stars, would prove it to be Uranus. This would certainly prove a most interesting and helpful piece of telescopic work.

On August 17, at 2 h., Uranus is in quadrature with the sun.

The right ascension of Uranus on the fifteenth of the month is 15 h. 31 m. 1 s.; and its declination south 18 deg. 50 m. 28 s.

NEPTUNE

Neptune is in the morning sky. Its right ascension on the first of the month is 5 h. 24 m. 28 s.; and its declination north 21 h. 51 m. 37 s.

Smith Observatory, Geneva, N. Y., July 19, 1897.

OBESITY.

There is certainly no class of disorders, says Dr. J. H. Kellogg, in Modern Medicine, in which the application of pure medicinal agencies is more clearly futile than in the treatment of obesity. In this disease, as has been clearly shown by Oertel and other European investigators, diet, regimen, and the application of physiological remedies are the only means which can be relied upon for tangible and permanent results. In treating this class of patients, I first restrict the diet, both in quantity and in kind. In some instances I allow the patient to eat almost anything he chooses, provided he eats but one thing. I have secured excellent results by placing the patient upon an exclusive diet of grapes, apples, or some other fruit. A diet of kumyzoon, buttermilk, granose, zwieback, gluten biscuits, but one article being taken at a time, has also proved efficient. When a patient takes but one article he soon tires of it, so he is quite certain not to take too much. If bread is permitted, it must be eaten dry only. It is best taken in the form of zwieback or gluten biscuit. The patient is not allowed to take fluids at meal time, but he may drink at other times as much as he likes.

Next to diet, exercise is the most important matter. The patient should exercise to the extent of decided weariness two or three times a day. Before breakfast, or rather before eating, is the best time for exercise. Walking is, as a rule, not sufficiently vigorous work to reduce the flesh appreciably unless the patient has an opportunity to climb hills. Cold baths, electric light baths, Turkish baths, and other eliminative measures used in moderation are useful, but care must be taken in the use of hot baths, or injury will be done. Hot baths should always be followed by a cool spray or shower, and for many persons the cold shower or spray is to be preferred. It is an excellent tonic, and stimulates the oxidation processes.