

EDWARD BURGESS AND HIS ACHIEVEMENTS.

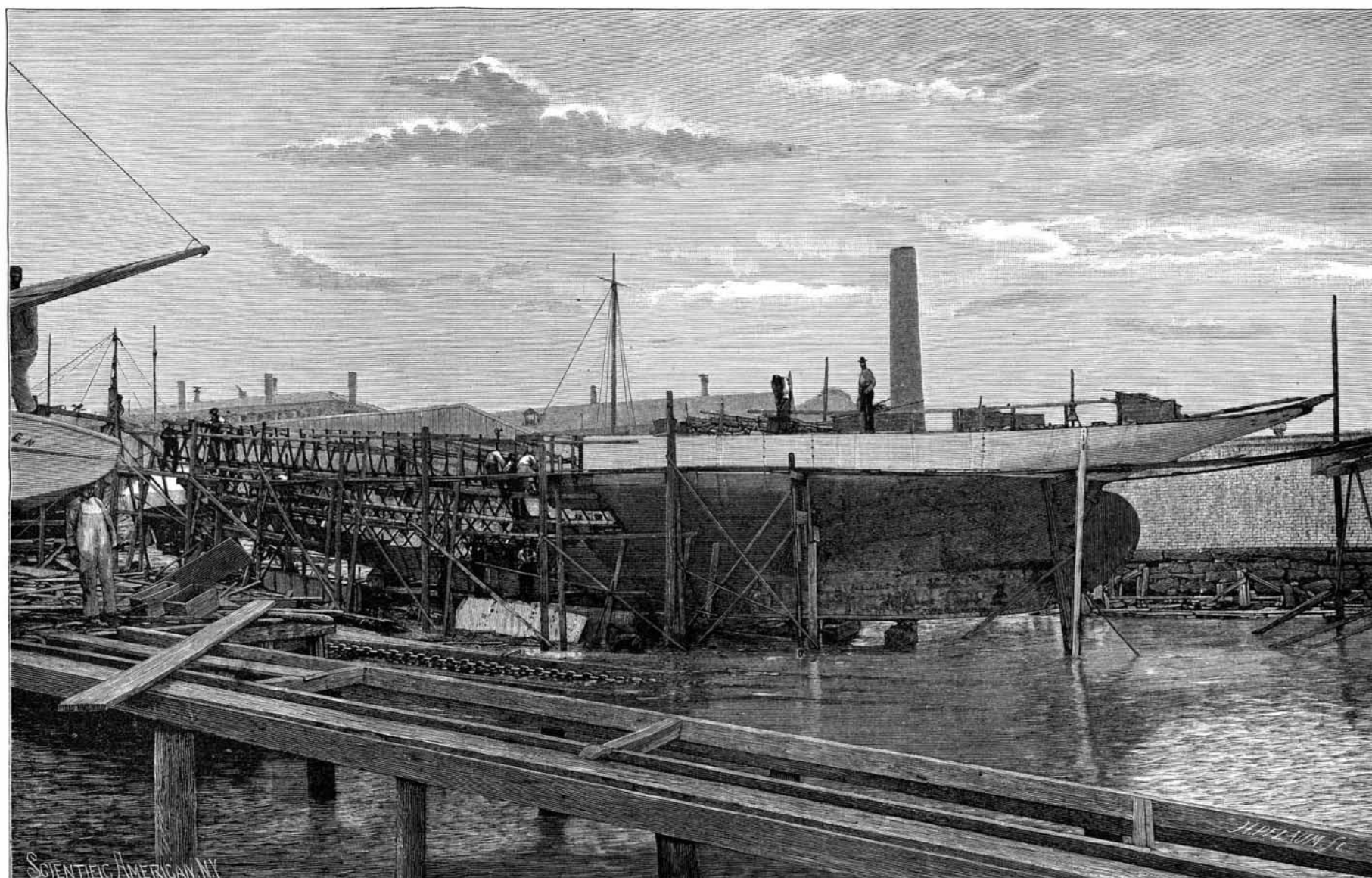
The name of the yacht *Volunteer*, which proved the victor in the hard-fought contest for the America's cup in the fall of 1887, will always call up pleasant recollections in the minds of those who take an interest in sailing craft, although just now such memories are tinged with sorrow on account of the recent sudden death of her noted designer, Edward Burgess, which took place in Boston, July 12, of typhoid fever.

The fact that American yachtsmen had been so long successful in holding, against all foreign competitors, a cup first won many years ago in a royal regatta, a prize offered by Queen Victoria, attracted general attention to the race between the *Thistle* and the *Volunteer* on that occasion, and the lines and sailing qualities of the two vessels were everywhere discussed. The *Volunteer*, however, was specially built for this race, her measurements not being decided upon until those of the *Thistle* were known, and she has since proved to be altogether too large for a sloop rig, as was expected would be the case when she was built. It takes too large a crew to handle such a sloop for cruising purposes, the schooner rig being better for vessels of such size. The *Mayflower*, which won the preceding race with the English yacht *Galatea*, was afterward

room, and small sails, appeared the outside ballast, shapely hull, and large sail spreads which distinguish the fleet in this country to-day. Mr. Burgess set a pace in the development of the American model which he only could hold until within the last two or three years. He made bold strides in the way of utilizing power in the hull to carry canvas, and always maintained that a roomy boat, wide enough to give comfort, able deck room and sails to drive her, is a much better type of yacht than a narrow, deep vessel with a small spread of canvas. Until convinced two years ago that in the smaller classes a keel boat gives greater opportunities for speed, he advocated center-board boats on account of the shallow water in American harbors, but as racing has been narrowing down to a contest of science for a margin of seconds, Mr. Burgess has merely tried to embody in his designs the features shown by the experience of himself and others to produce speed. He did not, however, give his yachts the extreme keel characteristic of English cutters, and perhaps the best evidence of his success is found in the partial adoption by many English yacht builders of the ideas developed in the building of the Burgess yachts. It was especially noted that the *Thistle*, in the famous races four years ago, had a breadth of beam quite unusual for an Eng-

Discouragement of Inventors.

Paul and Wyatt, says S. N. D. North, in the *Popular Science Monthly*, taught the world how to spin a hundred or more threads at one operation; but years elapsed after these early inventions before they came into general use. Paul worked his own machines for many years; but when he died they were broken up and sold, and the world continued to spin on the foot wheel. The tardy realization of the value of these inventions was due primarily to the opposition of the hand operatives to the introduction of anything in the nature of improved machinery. The guilds were strong, and determined in their refusal to operate or tolerate new devices for dispensing with hand labor. Poor John Kay, after inventing his fly shuttle, was compelled to close his mill at Leeds by the riotous hostility of the hand weavers. Learning that he was also engaged in devising machinery for spinning, a mob broke into his house, destroyed everything it contained, and would have killed the inventor himself had not friends smuggled him away in a wool sheet. We need not be surprised at the blind brutality of these ignorant workmen. They looked upon the inventor as an enemy, planning to take the bread from their mouths. But what shall we say of the



LENGTHENING THE VOLUNTEER, DESIGNED BY THE LATE EDWARD BURGESS.

changed to a schooner rig; but in her new rig she is by no means as fast a vessel as she formerly was. General Paine, the owner of the *Volunteer*, decided, therefore, upon making a radical innovation in changing the vessel to a schooner, and is taking the rather unusual plan of adding to her length by building in amidships an additional section of twenty feet, thereby lengthening her hull to this extent. Our illustration represents the manner in which the work was carried on at a Boston yard, the lines of the vessel forward and aft and her nominal draught remaining unchanged. The *Volunteer* is steel built, and her original measurements were: 106'23 feet; length on water line, 85'88 feet; breadth of beam, 23'16 feet; depth of hold, 10'90 feet; tons measurement, 209'9. For the photograph from which our engraving is made we are indebted to Mr. N. L. Stebbins, of Boston, Mass.

The designer of the *Volunteer*, and also of the two previous successful cup defenders in 1885 and 1886, the *Puritan* and the *Mayflower*, acquired, through these successive victories, an international reputation, and also introduced a new era in yacht designing. Burgess modified the construction which was formerly the distinguishing characteristic of American yachts—a great breadth of beam and light draught, with center board, which caused them to be generally designated by foreigners as “skimming dishes”—giving his new designs more keel, thus making more seaworthy craft, while their lines and proportions were such, as the event proved, to combine the greatest number of advantages. Instead of blunt ends, inside ballast, no shape, no head

lish cutter, and it is now matter of comment that it is not always easy to determine an English from an American built yacht, on account of the modifications which have been made in the construction of the yachts of both nations, largely as the result of the work of Edward Burgess.

Mr. Burgess was born in 1848, and graduated from Harvard in 1871, afterward becoming instructor of entomology in the University and secretary of the Boston Society of Natural History. In 1881 he had to give up work on account of his health and took to yachting, which led to his finally becoming a naval architect and yacht broker. He was a member of the United States Naval Board to award prizes for the designs of cruisers and battle ships in 1887, and in 1888 he was appointed permanent chairman on the Board of Life-Saving Appliances in the United States Life-Saving Service. Mr. Burgess was also the designer of the well-known racers *Sachem*, *Titania*, *Papoose*, *Baboon*, *Nymph*, *Wraith*, *Sprite*, *Saracen*, *Rosalinda*, *Chiquita*, *Marguerite*, and many others, over a hundred in all, including the steam yachts *Shearwater*, *Sapphire*, *Unquewa*, and *Jothiel*, and the well-known flying fishermen *Carrie E.*, *Phillips*, *Nellie*, *Dixon*, and *Fredonia*.

THE whaleback steamer *C. W. Wetmore* left Montreal on July 4 with 90,000 bushels of wheat bound to a channel port for orders. The grain inspector's certificate was granted and her cargo stowed according to the line and rule held where whole cargoes are shipped.

manufacturers who stole the patents of Kay, without recognition of the service his genius had done them? And what shall we say of the government which permitted this man, in his old age, without recompense for inventions which added untold millions to the wealth of his country, to seek refuge from persecution in France, there to die in abject penury?

Influence of Drugs on the Heart.

The temporary expansion and contraction of the heart under the influence of certain drugs formed the subject of a paper read by Professor Germain Sée at the last meeting of the Academy of Medicine, Paris. The professor, in collaboration with Dr. Pignol, gave the following summary: (1) Sparteine is the substance which diminishes most promptly and effectually the volume of the heart. This drug strengthens the cardiac muscles and augments their vital force. (2) Digitalin also contracts the heart, but only when its cavities are already in a state of dilation. (3) Iodide of potassium tends to contract, but to a less degree than sparteine. (4) Antipyrin expands the volume, but without influencing arterial pressure. (5) The action of bromide of potassium may be taken as the opposite of iodide of potassium, but as similar to antipyrin. It dilates the whole organ, the right side being slightly more affected than the left. Certain other drugs have no effective action. Caffeine, says Prof. Sée, has no influence on the cardiac muscles, in spite of certain assertions to the contrary.

Licorice.

BY NICOLAS PIKE.

The order of plants Leguminosæ contains very many of our best known and most useful ones, and in it the wild weed that gives the licorice of commerce. It belongs to the genus *Glycyrrhiza*, though many other plants of near genera have roots that possess similar qualities. Especially is this the case with the *Abrus precatorius* Lin., that grows abundantly in the West Indies, notably in Jamaica, and in the islands of the Indian Ocean. It ranks over old hedges and fences with a strong, twisted, rugged stem; bears an insignificant little flower, that gives a rough pod inclosing the little scarlet seeds tipped with black so well known. When not fully ripe they are pierced and strung together to form necklaces, bracelets, rosaries, etc., frequently mixed with the larger silvery seeds of "Job's tears" (*Coix lachryma*). I have seen many of the colored nuns, or *Sœurs de charité*, counting their beads while patiently watching the couch of sick and dying sailors. The long rosaries were made of the red and white berries and the prayers marked off with sandalwood beads. The roots of the *Abrus* are used by all Creoles for chewing and other purposes in various bronchial ailments. They have the taste of licorice, but do not yield the rich juice of the *Glycyrrhiza*.

There are three species of plants, both wild and cultivated, that yield the licorice that is imported by many tons every year into the United States. They are the *G. glabra*, *G. glandulifera* and *G. echinata*, the latter being considered the best for cultivation. These plants grow wild in all the countries of Europe bordering on the Mediterranean, and their habitat extends through Asia Minor to Central Asia and China. England cultivates it in Surrey and Yorkshire, and the *G. lepidata* is said to be a native of the plains of Missouri and other similar localities in the Southwestern States.

The uses of licorice are varied and numerous. The manufacturers of chewing tobacco consume a great quantity. It serves as a demulcent for coughs and colds, and is an ingredient in many sirups and elixirs, besides having a remarkable effect in masking nauseous medicines. Porter and even ale breweries avail themselves of its saccharine, and the roots are extensively employed by them.

It is imported in different forms; in the roots, also in rolls or sticks of the dried inspissated juice that come packed in sweet bay leaves. The licorice imported into England from Calabria, Sicily, goes by the name of Solazzi or Corigliano juice; that grown in Yorkshire is made into a confection called Pontefract cakes. The roots of the licorice contain a large amount of sweet, mucilaginous juice, that owes its sweetness to a peculiar principle called *glycion* or *glycyrrhizin*, which is present in both roots and leaves. The sugar is said to be not crystallizable, and not susceptible of vinous fermentation.

The cultivation of this plant would have been arduous in former years when there was only hand labor, and money scarce. There is now plenty of the latter article lying idle; agriculture has also made such rapid strides, and the introduction of the wonderful labor saving machines now in use for plowing, etc., would render the successful growth of the plant almost a certainty. It could then be put on the market pure, for even licorice has not escaped in this age of adulteration, as starch, rice and wheat flour, and even wood ashes have been used for this purpose. I have carefully collected every available information on the subject, and its growth and cultivation in Europe. I give it for the benefit of those willing and able to introduce fresh objects of commerce to utilize lands good for no other purpose, and to give profitable employment in the gathering season to numbers of willing but often idle hands.

I will first speak of the licorice a native of Southern Europe. The qualities in different countries vary greatly. It is said that the juice from Turkey and Greece is bitter, of Sicily and Spain sweet and rich, but that of Italy the richest, though less is exported thence. I am not aware of licorice being cultivated in any of these countries, as it is so vigorous and abundant a wild plant, almost too much so in many places. In Spain it grows finest in the rich bottom lands of the great rivers, and the crop depends much on the mildness or severity of the winters. It is of such vigorous growth that other weeds cannot encroach on it and crowd it out, and no parasite or insect pest is known to infest it. It is so tenacious of life that if only a small portion of the root is left in the ground after the collecting season, it shoots up again. There are two kinds of licorice, one sending down a tap root from 3 to 6 feet deep and the other runs underground from 6 inches to 2 or 3 feet. The latter is the most highly prized, from the facility with which it is dug up. Only the roots are used, the tops being burned for fuel. It varies in quantity and quality according to soil in different provinces, changes its color to red, yellow or brown, and the proportions of saccharine and starch vary also. The climate best suited to the growth of licorice is that where oranges and all the citrus family

thrive, as it cannot endure severe ground frosts nor cold high altitudes.

In Sicily it grows most luxuriantly in low lands adjacent to streams of water. The valley of the river Simeto is so rich that, with the rudest tools and culture, the peasants have no difficulty in growing cereals and other plants for food. Their principal trouble is keeping down the weeds that spring up so abundantly in the cultivated lands, and the licorice from its pertinacity is most dreaded. A farmer when asked if it grew on his farm replied, "God forbid! for of all wild vegetation, it is most difficult to subdue." A crop can be gathered every three or four years from the same ground, and the digging commences after the autumn rains have set in. Licorice requires the hot sun to perfect its juice, but at the same time it bakes the ground so hard, the task of collecting the deep-set roots would be too laborious and expensive till the earth is well saturated. There are seven manufacturing factories in Catania alone, and they produce from 700,000 to 800,000 lb. annually, and others in various cities of the island. Very little of the root is exported either from Sicily or Italy, only the rolls or sticks made from the inspissated juice. Asia Minor exports largely to the United States, mostly in sailing vessels under the Austrian and Italian flags. A great deal of the trade in this country is in American hands. So long ago as 1885, steam presses were in use there, and from Alexandreth, in Smyrna, 6,000 tons were exported at a value of about \$192,000.

Licorice has been cultivated in England since about the fourteenth century. It is said to have been imported from Germany (a fact I doubt from its climate), and was cultivated in the gardens of the old monasteries. The monks, I presume, introduced this plant as they did so many other useful ones, as it entered very largely into their medicaments. They were in a measure the guardians of the poor in their vicinity in those days, and dispensed medicines for the cure of their bodily ailments, equally with their care for their souls. Licorice has been so successfully cultivated in England that I give the methods employed, as they would, I should think, serve well for our own country.

Mitcham, in Surrey, has been famous for its "herb farms" for over a century, and the air is redolent in summer and autumn with the delicious perfumes of lavender, thyme, rosemary, chamomile, peppermint, and other plants used in medicines or for distillation. The soil is a deep black mould, with some admixture of sand, and considerable licorice has been grown here. The plant is graceful, with feathery pinnate foliage, grows about two to three feet high, and bears small whitish yellow flowers. Since licorice has been imported into England duty free, the crops have been less attended to, as other plants pay better.

Near Pontefract, Yorkshire, it has been long successfully cultivated. The soil is a sandy loam, and has to be of considerable depth to allow the roots to develop well. The beds are prepared by being well trenched, the width of trench and bed averaging three feet, and having the appearance, when finished, of wide celery beds. Commencing early in April or late in March, a top dressing of stable manure is applied and lightly covered over, leaving the trench about six inches below the raised bed. Holes are made with a small spud a few inches apart, and another person follows (often a girl) with a basket of buds and suckers, slips or runners, and they are inserted about four inches below the surface and covered to that depth. This forms a double crop, that is, the buds grow downward, producing the roots, and the suckers form buds for future planting, the width of the beds permitting of cross rows of plants. The buds and suckers are left in the ground for three and a half years, a crop being obtained in the September following the fourth spring. The first manuring is sufficient, the plants being weeded each summer. A hot, dry season is best for them; they need no irrigation even in the hottest weather, and are free from all insect pests.

The trenches are of course idle for two years, as the plant tops do not show much in that time, so potatoes are planted in them the first year. A species called ash potatoes is used, as they have such small tops they do not overshadow the young licorice plants as larger kinds would. The second year a crop of cabbages is grown, but the third year the trenches must lie fallow, as the licorice then shows luxuriant growth, and presents in the summer the appearance of a shrubbery of young ash trees. The grower plants a fresh crop every spring of each year, and in autumn harvests the one of three and one half years' growth.

The only labor required is that the beds be kept clear of weeds in summer, and in November, when the sap is down, the plant tops must be cut off. If the winter proves unusually severe, the tops can be covered with a light layer of earth.

TO GATHER AND PREPARE THE ROOT.

The trench, not the bed, must be dug down to a considerable depth, thus exposing without injuring the roots, and the whole plant is very carefully taken out of the ground. The earth from the second trench is then thrown into the first, and so on to the end of the

field. The roots are then placed in dry cellars after removing the tops and suckers and often covered with sand. The latter serve for the next spring's crop to produce "buds," that is roots in their early stage for another year. When the stored roots are dry, they form the yellow licorice for producing the juice of commerce. A small portion of the top of the root is cut off as being of less value than the rest, and is ground into powder and sold to chemists for various uses. The tops are only good for burning.

The 3½ years' sucker, which is gathered with the licorice plant, has now produced "buds," which are reserved with the new suckers for planting. They are either stored in a cellar and covered with rotten dung, or they are made into a mound, outside, and well buried in earth or moist sand, and thus withstand the cold, wet winters of Yorkshire.

There appears to be considerable difficulty in finding out some of the first processes of the manufacture of licorice. Mr. Hilliard, who has the largest factory in Pontefract, courteously shows the place to visitors, with the above reservation.

In Sicily, when the roots are dug up, they are bound in bundles and stored in the factories for some time to season them. When sufficiently cured, men and women cut them into short pieces, and then they are plunged into a vat of water, and thoroughly washed; they are then crushed in a rude mill, which consists of two circular stones of lava, the one horizontal, the other perpendicular over it. Through the center of the upper stone is an axle, to which is attached a mule, which revolves it slowly in a circle. When sufficiently crushed, they are boiled in water for 24 hours, then removed from the kettles and placed in a screw press, and the juice squeezed out into a cistern beneath. It is passed through a sieve and again boiled, and the sediment again pressed, and the whole again filtered. When boiled to a certain consistency, it is placed in pans over a fire, and men stir it till dense enough for paste. It is placed in wooden moulds for cakes, or made into rolls or sticks, which when dried are packed in bay leaves for exportation. When the roots are required, women scrape off the bark, cut it in the desired length, and when dry it is packed in bags, great care being taken they do not mould nor freeze, and they must be free from the least bluish.

In England now the greater part of the juice manufactured is from roots grown in Spain and Sicily, as the English ones are of smaller size. As the passage is so rapid now over the ocean, a package of roots, buds or suckers could be brought as fresh and easily, perhaps more so than from one of our own Western States, and doubtless from the greater heat here they would improve in size. It would not be difficult to procure fresh wild roots and buds direct from Spain. There is direct intercourse with Seville, whence licorice is shipped to England by steamers or by sailing vessels direct to America. An ordinary Wardian case could be sent to Seville and would bring back roots and buds enough to start a licorice farm.

Allowing for the difference of climate in England and the United States, anywhere south of Washington, D. C., ought to produce licorice of fine quality with careful culture. There are plenty of low-lying lands good for nothing else that could be permanently profitable for it, where ground frosts are light. I say ground frosts, because there is no leafage in winter to be injured. The average latitude where licorice flourishes near the Mediterranean is from 36° to 41° N. lat., in Mitcham, Surrey, 57° 30', and in Pontefract, 53°

Chinese Varnish.

The British consul at Hankow, writing of the varnish exported from that city, says he is informed that it is the gum of a tree—the *Rhus vernicifera*. On this tree, before daylight, incisions are made; the gum that runs out is collected in the dark, and strained through a cotton cloth bag, leaving behind a large amount of dirt and refuse. This operation can only be performed in the dark, as light spoils the gum and causes it to cake with all the dirt in it. It cannot be strained in wet weather, as moisture causes it to solidify. When the Chinese use this varnish, they rub it on with a sort of mop, or swab, made of soft waste silk. It should only be used in wet weather, as, if the atmosphere is dry when it is rubbed on, it will always be sticky. As used by the Chinese, the varnish takes about a month to dry and during the time it is drying it is poisonous to the eyes. The consul thinks that this gum may have been one of the ingredients of the celebrated Cremona varnish, and he suggests that it might be worth the while of musical instrument makers to make experiments with it, with a view to producing a varnish that would give a mellow instead of a glassy sound.

Progress of the Manchester Ship Canal.

A short section of the Manchester Canal has been so far completed as to permit the entrance of tide water. This section extends from the river Mersey, at Eastham, to Ellesmere Port. The opening took place June 23 last.