

## Sugar Manufacture.

When a lump of the old-fashioned brown sugar was melted a ruddy liquor was wont to show itself, which children were told was blood, which, "with dead man's bones," was used to make sugar. Some children of a larger growth probably retain some such idea, and look upon the manufacture of sugar as being to a certain extent one of those things that *Punch* classifies as "better left unsaid."

It is not an easy matter for a person to gain admittance to a sugar refinery, and the more intelligent he is, the more difficult is the feat. Free-Masonry or the mystic rites of the Romans are scarcely more difficult to penetrate, or possessed of more interest than the process of sugar refining; but we propose to describe the process, not from books, but from practical study, not entering, however, into special details.

It is not so long ago that the process of extracting sugar from the cane was carried on at the plantations in a wasteful, unscientific manner. Of recent years, however, an improvement has taken place until many plantations send out what is called their "raw sugar" in a condition fit to be used by the consumer, which accounts for the necessity under which Government was placed, in the recent revision of the sugar duties, of imposing a duty upon raw sugar above a certain standard.

To see the ordinary raw sugar which arrives in hogheads or bags of coarse fibre, one would not be tempted to use it for food. It is frequently nearly black and full of sand, sticks and other accidental impurities, to get rid of which is the first duty of the refiner. This is accomplished by "melting" the sugar in a large reservoir, by means of water heated by a steam coil. The "melting" or "blow-up" tank of one of our city refineries has a capacity of ten tons. It is necessary that the water should not boil, else it "inverts" the sugar, destroying its crystallizing power, and in order to preserve an equal temperature throughout the vat, a kind of revolving fan keeps the liquor in constant motion. The lighter impurities rise to the surface and are skimmed off while the heavier sink to the bottom. The specific gravity of the liquor is brought to 1.23 or 27 Beaume degrees, corresponding to about 48.6 per cent of sugar.

If this mixing tank is not at the top of the refinery, the solution is pumped from it to that story that all subsequent movements may be caused by gravity, thus saving further pumping. In the solution a large quantity of impurities remains, on account of their fineness. The next operation is to get rid of these, which is done by passing the warm liquid through the "Bag Filters." Each filtering machine contains about one hundred of these bags, which are about six feet long and made of twilled cotton. Each bag is encased in a sheath of strong, open material, which keeps them in shape when filled with liquor. To percolate the filter is to imagine that a family of giants has hung up its stockings for Santa Claus. Each bag is attached to a short pipe or funnel, which has exit from a shallow pan at the top of the filter, into which the solution is run at a temperature of about 180 degrees.

The syrup that has run through the bag filters emerges transparent and free from solid impurities, but it is still dark in color.

To clarify it, it is then run through "the dead men's bones," though, to speak the truth, it is rather the bones of horses, and especially of cattle, which have entered into rest, that are used for the purpose. Almost any day in the week a cart with a grisly load may be seen passing under the gateway of one or other of our local refineries. Sometimes a grinning skull mounts guard upon the load, but sentineled or not the bones have all one fate. They are placed in closed retorts and exposed to strong, continuous heat, which

drives off all their gasses and leaves bone charcoal behind. This was found to possess the property of absorbing the coloring matters of syrup by Figuier about 1807, and after being ground down to the consistency of saw dust, is used for that purpose in refining.

The "char," as it is called, consists chiefly of phosphate of lime, but owes its activity to the intermixture of about 11 per cent. of carbon. It is packed into very large receptacles of cast iron, perhaps sixteen feet high and ten feet in diameter, and through it the syrup is run from the bag filters, the solution which comes through being led into different vats according to its color, the earlier filtrates being practically colorless.

A full-sized refinery, such as the Redpath, will have as much as 600 tons of this bone charcoal in use at one time, and it was found by Dumont in 1828 that the char could be used over and over again by returning it to the retorts for "revivification."

The colorless syrup has next to go to the "vacuum pan." Syrup containing 91 per cent of sugar does not boil under 300 degrees under ordinary circumstances, and as such temperature long continued would "invert" the sugar, forming large quantities of non-crystallizable "glucose." The vacuum pan was introduced by Howard in 1812, whereby the atmospheric pressure is so reduced that the syrup can be boiled at about half the temperature, which rarely rises, even at the last, at about 180°. Great skill is required in this operation since the size and firmness of the sugar crystals depends upon properly regulating the temperature and supply of liquor. The vacuum pan is essentially a retort from which the air is exhausted, and which enables the water to be driven off the sugar at a low temperature. There is, of course, an apparatus for condensing the steam, so that the vacuum may be maintained.

When the sugar has been "boiled to grain" it is transferred to "heaters" where revolving arms keep it in constant agitation while at a heat of about 180 degrees is applied. This hardens the crystals, and they are then placed in centrifugal machines, which have wire sides and revolving at the rate of 1400 revolutions per minute, throw off the 10 or 15 per cent. of syrup hitherto retained by the crystals.

White sugar, granulated as it is called, passes next through a long revolving cylinder with ledges on its inner side which catch up and drop the sugar as they revolve. A high temperature is maintained in this cylinder which thoroughly dries the sugar. Loaf sugar is made by transferring white sugar from the centrifugal machines to moulds and "liquoring" the whole with a saturated syrup which removes the last traces of coloring material.

Such is a brief sketch of the process of sugar refining, an industry which has attained majestic proportions in Canada.—*Trade Review.*

## Indian and Ceylon Teas.

Within the memory of almost the youngest of us China was practically a synonym for tea. But there now seems to be a danger of its losing the application.

For some years the Chinese have been neglecting to pay proper attention to the cultivation of the tea plant; not only have they been sparing in the use of fertilizers but their methods of cultivation, of curing and of transportation are about as antiquated as the tea industry itself. They are now reaping the whirlwind. But not only has there been decadence from within, but there has been competition from without. And the influence of the latter is probably more inimical to the tea industry of China than the other cause combined. This particular competition has arisen in India and Ceylon. There the shrub has been domesticated, and by the aid of modern scientific methods it has so thrived as to completely outstrip its Chinese competitor. It has taken the Indian grower a good many years of perseverance and hard work to attain

to his present enviable position in the market of the world. And he seems likely to hold it.

The consumption of tea in Great Britain, probably stimulated by the low price prevailing, was enormous last year, reaching the total of 207,000,000 pounds, the largest yet attained. The Indian and Ceylon teas appropriated all the increase, the former increasing from 90,000,000 pounds in 1891 to 109,000,000 pounds in 1892 and the latter from 51,000,000 pounds, to 64,000,000 pounds. On the other hand the tea of China consumed in the British market fell from 52,000,000 pounds in 1891 to 34,000,000 in 1892, and that too in a year when the process of substituting the strong teas of India and Ceylon for the weak tea of China was perhaps never more actively in force. Out of every 100 pounds of tea used 53 pounds were grown in India, 31 in Ceylon and only 16 pounds in China.

On the Toronto market much the same state of affairs prevail, the Chinese "is not in it." It is now the proud boast of the British Empire that enough tea is produced within her borders to supply her wants.—*Grocer.*

## British Columbia Timber Trade.

THE COMMERCIAL was pleased to receive a visit last week from H. H. Spicer, the large shingle manufacturer, of Vancouver, British Columbia, who was on his way home from an eastern business trip. Questioned regarding the timber trade in British Columbia, Mr. Spicer placed the capacity of the coast mills of the province roughly at 740,000,000 feet annually, but the annual cut is not anything like this amount, and a large amount of milling capacity is standing idle. Any one of the large mills could cut enough lumber to supply the home trade, and the population east of the mountains is so small that only a limited trade can be done in this direction. The duty prevents business with the States to the south and southeast. The mills have to depend largely upon the export trade to Australia, the west coast of South America and China and Japan, and this export demand has not been nearly great enough to keep the mills going. The two largest mills in the province are closed down entirely. Some lumber has been sent around the Horn to England, and a vessel has recently loaded for Montreal, via the Horn. But the distance is so great that the mills cannot expect much trade from the Atlantic side of the continent, while railway rates across the continent are out of reach for any considerable trade via rail. The completion of a ship canal across the isthmus between North and South America, connecting the Pacific and Atlantic oceans, would, said Mr. Spicer, add millions to the value of British Columbia coast timber, as it would enable British Columbia lumber to compete freely in Atlantic coast markets, both in America and Europe. Notwithstanding the idle capacity, however, new mills are being built, and old ones enlarged.

Mr. Spicer looks for rapid development in the interior of the province this year, and he also hopes for some revival in the lumber trade and other coast industries.

## Silver.

London appears to be responsible for this week's depression of silver prices, which is due to reports that the Indian mints are to be closed to the free coinage of silver. It is intimated that these rumors have only a speculative origin. They, however, caused a decline in the London market quotations for bars, which fell from 38 3/16 l. per ounce to 37 9/16 l., the New York price declining in sympathy from 83 1/2 to 83 1/4 per ounce. The market was otherwise without feature, a limited demand being exhibited for export. A slight recovery marked the close of the week. Silver prices, March 24: London bars, 37 3/4 d., New York bars, 83 1/2.