

cottage to the most complicated and powerful engine, would be all but useless, the value of oil is incalculable; and a few words on its manufacture and the process of refining it cannot be uninteresting. To furnish these we were favoured with a visit to the extensive works of Messrs. Pinchin and Johnson, who have two sets of premises, one for the manufacture of oil, called Albert Works, on the Middlesex bank of the Thames, near Hammersmith, the other for refining purposes, in Cable street, St. George's-in-the-East. The oils they manufacture are rape and linseed only, but their refining operations extend to the animal as well as the vegetable oils. The Albert Works have a river frontage of about 200 feet, and recede from the bank about the same distance, thus covering an area of more than three-quarters of an acre. The building consists of four storeys; the manufacture is carried on in the lowest, the upper ones being used as storage for the grain, which is hoisted from the barges by means of cranes worked by steam power. The first object which arrests the visitor's attention is the engine, which is a small but beautiful piece of machinery of forty-five horse-power. With the exception of the workmen's meal-times and Sundays, it is always at work night and day. From the engine-room the visitor is conducted to the manufactory, where, as soon as he can recover from the irritation in the eyes produced by the volatile oil escaping from the heated and bruised seed; the whole process presents itself before him.

The grain is received from the upper floor into a *hopper*, in which is a screen, the agitating of which removes all foreign substances and suffers the seed alone to pass through its meshes. This falls between two faced, hollow, iron cylindrical rollers, which are heated by steam, which as they revolve crush, or, as it is termed, *open the grain*. Thus opened it is thrown on to a *steel plate* fixed on a bed of solid masonry, which is constantly traversed by a pair of edge-runners weighing from eight to nine tons and travelling at the rate of sixteen revolutions per minute. They revolve in a strong framework attached to a vertical axis, which also, by means of a large cog wheel at the top, which engages a wheel upon the main shaft, revolves slowly. A double motion is thus given to the grinders or edge runners, one on their own axis and one on the iron plate, which we may consider the nether millstone. A raised border or rim prevents the seed from escaping from the plate, and the paste is brought regularly under the stones by means of rakes or sweeps attached to the vertical framework and revolving with the runners on the surface of the plate. When the grain has been sufficiently ground, the paste is brought to an open portion of the rim, and falls over into perforated troughs placed to receive it. Through the perforations a considerable quantity of oil oozes, and this, being considered purer than that which is obtained by expression, is conveyed to a cistern set apart for the purpose. The paste is next put into a jacketed kettle, that is, one surrounded by a hollow chamber into which steam is injected for the purpose of heating it. Within this kettle is an agitator or stirrer, so that all the paste is in turn brought to the heated surface and raised to an even temperature. Having remained in the kettle six minutes, it is collected in woollen bags

about eighteen inches long and six inches wide, each bag is placed between four layers of press hairs (a kind of horse-hair mat), and eight of them being thus prepared, they are ranged in two perpendicular rows between four grooved shelves of a hydraulic press. The pumps worked by the steam-engine are set in motion and a pressure of four hundred tons is speedily realized. The oil being expressed, runs into an underground tank, the bags are then withdrawn, and on being removed the residue presents itself in the form of what is known as linseed cake. These cakes are placed in a rack to cool, when they become so hard as not to be easily broken; they are then orderly stacked, and from time to time sent away in waggons or barges to supply the cattle-food market, for which purpose the cake is in great request.

A quarter of linseed which only undergoes one pressure yields an average of one hundred and twenty pounds of oil and thirty-five cakes of nutritious food, each weighing eight pounds, or an aggregate of two hundred-weight and a half. Rape seed which is twice ground and pressed yields per quarter from eighty to ninety pounds of oil at the first, and from sixty to seventy at the second pressure. Of these two kinds of oil-producing seeds upwards of six hundred thousand quarters are annually imported, and this mill alone works up thirty-five thousand quarters per annum. Calcutta, Bombay, and Kurrachee are the great emporia for these seeds; and it is a remarkable fact that, whereas the last-named place, when it fell into the hands of the British in 1839, consisted of only about fifty wretched huts inhabited by fishermen, it is now a thriving port and one of the principal outlets for the oil-producing seeds of India.

After the oil has remained a few days in the receiving cistern the parenchymous matter subsides; it is then pumped into vats for a second settling, after which it is barrelled and conveyed to the Refinery. This is situated about a quarter of a mile down the Blackwall line, of which property it occupies nine arches in its rear. The premises are very large, and are used not only for refining vegetable but also animal oils. The casks of unrefined oil are hoisted to the upper floor by means of a crane worked by steam. Along this floor a large vat, capable of holding ten tons, is extended. It is lined with copper; is fitted with a horizontal agitator or fan; and is called the reception vat. Into this receptacle five tons of rape oil are decanted, an equal quantity of water is added, and the whole treated by chemical process. The agitator is set in motion, and after four or five hours the oil becomes thoroughly washed, its impurities having been removed. The agitation is then stopped and the water and bleaching ingredients are allowed to subside. The oil is next drawn off into the boiling vat on the next storey. This vat also is lined with copper, fitted with fans or agitators and a coiled perforated tube; steam is admitted into the tube until a uniform temperature of 212 deg. is obtained. It is kept in this condition and continually agitated for about four hours, when all impurities having been thrown off it is allowed to cool, assisted by the fans, which bring every portion in turn into contact with the air. At the end of eight or ten hours, it is sufficiently cool to be drawn off into the filters, which are in the lower