

settle in forms of wood named *jalots*. The tallow then takes the form of cone-shaped loaves. By this process they withdraw about 88 to 100 per cent. of useful matter, already white, purified from all organic bodies not belonging to it, leaving a little glycerine, which it is necessary to get rid of altogether. This object they obtain by saponification, that is to say, by the combination of the fat acids of the tallow with a basis. The tallow coming out of the melting-house in a state of stearine, the margarate and oleate of glycerine are collected in gigantic vats, capable of containing 10,000 kilogrammes of matter, and are put in fusion by means of an injection of vapour, admitted by a serpentine pipe at the bottom of the vat. They add lime, dissolved in water, which soon seizes on the acids, forms stearate, margarate, and oleate of lime. All the glycerine is racked and poured into the Seine, for they have not yet learned how to utilise it economically. The soap obtained by this operation is of a greyish white, and of great hardness. In order to separate the fat acids from it, they pound it, and throw it into great vats, lined with lead, where is already to be found the quantity of sulphuric acid necessary to neutralise the lime; a pipe heats this medley by an injection of vapour, and soon a sulphate of lime is formed, drawn by its weight to the bottom of the vat, whilst the stearic, margaric, and oleic acids remain on the surface, presenting the appearance of a pretty thick liquid, of a reddish colour, and of a disagreeable smell. A series of canals, of a calculated inclination, conduct into little flat reservoirs, made of iron plates and disposed on props, one beyond the other. The liquid fills the superior reservoir, that which flows falls into the immediately inferior scale, then into the third, and so on in continuation. In cooling, the matter coagulates, and, drawn from the mould, forms a large square of four centimètres in thickness, by fifty-eight in length and thirty-five in breadth. From these squares it is now necessary to withdraw the oleic acid that they contain. Chemistry is not competent to perform this task; mechanism can succeed, thanks to the hydraulic press. But it is not one simple pressure which can obtain this result; two, three, and even four, are necessary. The first is a cold pressure. The tablets, placed horizontally, enveloped in coarse woollen stuff, horse hair, or even ordinary hair, called *maltils*, and separated by plates of iron, are piled up under an ordinary hydraulic press, and compressed as much as possible. A great part of the oleic acid contained between the crystals of the two other acids passes off in a reddish-brown liquid, and descends to the cellars, where we shall find it by-and-by. The cakes, now flattened, still contain a large quantity of the proscribed liquid, as one can judge by the large red spots which mottle them. They then submit them to a final pressure, which should entirely purify them. This pressure, which is accompanied by heat, is effected by means of ingenious machinery, brought to perfection by M. Galabrun. The tablets are placed vertically between horse-hair *étreindelle* covered with a printer's blanket, separated from each other by one of plated iron, composed of two plates supported by props, leaving between them sufficient space for an injection of vapour, which maintains them at about 80°. The hydraulic pressure is made horizontally, and,

thanks to the clever invention of M. Galabrun, the vapour continues to penetrate between the plates by pipes, made of caoutchouc.

The oleic acid squeezed out runs into the inferior part of the preparation, and goes to find that which has deposited itself there in escaping from the cold presses. There they make it pass through felt filters, in which it still leaves a good part of the stearic and margaric acids, which again undergo pressure. The oleic acid, disembarassed of the useful matters which it contained, is casked, given up to commerce, or employed in the manufacture of soft soap; for the Clichy manufactory, like almost all others, possesses an important soap-making department. The tablets of stearic and margaric acids, freed by the hot pressure of the greater part of the oleic acid, are afterwards employed in making wax candles. The first kinds for commerce are made thus. At Clichy the loaves undergo a second hot pressure, and they then obtain the stearic acid almost pure, of a beautiful white, translucent, and deprived of odour, of a pretty good resistance to fusion, presenting, in fact, all the qualities which in commerce have given it the name of *extra-double*. In coming out of the presses, the stearic acid is purified by several washings in water, at first acidulated, to purge from all foreign matter, and particularly from the oxide of iron by oxalic acid, to take away every trace of lime, then clarified *à l'albumine*. Thus purified, it crystallises with an excessive rapidity, which would present a great difficulty in the making of the wax candle if it were not remedied. Formerly, they added in the coppers a small quantity of arsenic acid, which prevented, it is true, the crystallisation, but was decidedly injurious to the consumer. In a great many stearine manufactories they employ the old candle-moulds, slightly warmed, before pouring in the liquid stearic acid. At Clichy they make use of apparatus by means of which they can easily make 40,000 wax candles per day. These apparatus have the advantage of being heated and cooled at will, of being made use of by women and children, and owe their rapidity of execution to the clever mechanism which supplies them with a series of wicks without end. In coming out of the mould, the wax candles are exposed to the air on frames of lattice-work; there they undergo the discolouring influence of light, and become of an absolute whiteness. After forty-eight or sixty hours of exposure, according to the season, they bring them to the cutting-machines. An endless chain, composed of parallel stuffs, receives each wax candle at the moment in which, escaping from the notches of the cylinder, it is cut by a circular saw, warmed by friction against two corks, which press it lightly. During their passage on the endless chain, a brush, animated by a to-and-fro movement, washes and rubs the candles, on which fall some drops of water charged with carbonate of soda; from thence they pass over the polisher, a machine in which the brushes are replaced by plugs of flannel, which gently polish the cylindrical surface, and give it an agreeable brightness. The wax candles are then finished; but their fate varies according to their degree of perfection. Those which contain any defect whatever are broken and again melted down; those which satisfy in every way the experienced eye of the persons charged with the examination of