

# THE EXTRACTION OF THE SALTS OF SODIUM AND POTASSIUM FROM THE MOTHER LYE OF THE MEDITERRANEAN SALT PITS.

As is well known large quantities of salt are obtained in the southern part of France on the coast of the Mediterranean by conducting sea water into large basins and permitting the water to be evaporated by the heat of the sun; and it would seem as though salt could be obtained for such a low price by this method that it would not pay to utilize the residuum, but our modern economists do not believe in waste, and therefore extract as nearly as possible every particle. After the crystallization of all the chloride of sodium (common salt), the mother lye is evaporated in the open air until its density is about 32° Baumé, and is then conducted into other evaporating basins, where it abandons its mixed salts, consisting of sulphate of magnesium and chloride of sodium. After this crystallization the density of the mother lye is 35° B., and it is then conducted into large basins or reservoirs, where it remains through the winter, during which time the greater part of the sulphate of magnesium crystallizes.

The aqueous solutions, after these several crystallizations, contain almost exclusively potassic salts. To obtain the latter the solution is boiled, then mixed with a concentrated solution of chloride of magnesium, whereby a fresh quantity of mixed salts containing all the sulphate of magnesium is precipitated. The liquid is then poured off, and by cooling abandons the chloride of potassium and chloride of magnesium. To isolate the chloride of potassium it is sufficient to leave the salt in moist air and then wash it in cold water, which draws out all the chloride of magnesium. The chloride of potassium is clarified and dried, and is now ready for the industries.

In order to obtain the sulphate of soda the mixed salts, consisting of a mixture of chloride of sodium and sulphate of magnesium, are dissolved in water, and this solution is cooled by means of a powerful Carré refrigerating machine, represented in the engraving, which we take from *La Nature*. By this process chloride of magnesium and hydrated sulphate of soda of 50 per cent are obtained. But as yet this salt is not a merchantable product, and is therefore heated to about 50°-60° C., and then mixed with 20-30 per cent of mixed salts, containing from 8 to 10 parts of chloride of sodium. At about 33° C. it forms a precipitate containing anhydrous sulphate of soda. In the Carré apparatus, A is the furnace, B the receptacle for the ammonia solution, C a rectifying device for retaining the vapor of the water, D D a worm for condensing the ammonia gases, E E a regulator for receiving the liquid ammonia and admitting it into the refrigerator, G, in which the temperature is decreased considerably by the change of the liquid ammonia to a gas. The solution of mixed salts enters in the refrigerator, G, circulates around the tubes of the same, and deposits the sulphate of soda, and in flowing through the tank, M,

reduces the temperature of the liquid in the same. H H are tubes for conveying the ammonia gas to the absorption cylinder, X, where it is mixed with the exhausted solution of the receptacle, B. I I are tubes for conducting the exhausted liquid from the bottom of the receptacle, B, to the worms, J, K, in which the liquid is saturated with ammonia and cooled, and is then conveyed to the rectifier, C, by the tubes, N N.

## Surface Tension of Mercury.

The following pretty experiment, devised by Mr. R. H. Ridout, illustrates the surface tension of mercury. A shallow tray, six inches by three, is supported on three leveling

inches, with a stroke of 3 feet 3 inches. The propellers themselves are of manganese bronze, thus securing strength and lightness; and, with the view of obtaining the greatest possible power, steel has been largely used in the construction of the engines and boilers, which will be the most powerful in the world for their weight. The indicated horse power is 10,500, and the vessel is expected to make 14 knots an hour. The launch of the *Livadia* was the one great event at Glasgow.

## NEW INVENTIONS.

An improved carriage pole foot, which is so arranged that it can be adjusted to different widths, has been patented by Mr. Henry Tine, of Danbury, Conn. The invention consists in combining a slotted pole foot and lugged guide plate with a screw bolt having a long head.

An improvement in distributing the wires of underground telegraphs has been patented by Mr. Mackintosh, of New York city. This invention relates to the leading of telegraph wires into buildings in such a manner that the wires cannot be seen from the street. The invention is an improvement upon patents for underground telegraph lines that were granted to the same inventor January 20, 1874, and January 16, 1877, and numbered 146,695 and 186,355, respectively; and it consists in leading telegraph wires or cable through suitable underground tubes or conduits to a pole or other device erected within the square inclosed by blocks of houses, and in leading the wires from the pole into the rears of the houses.

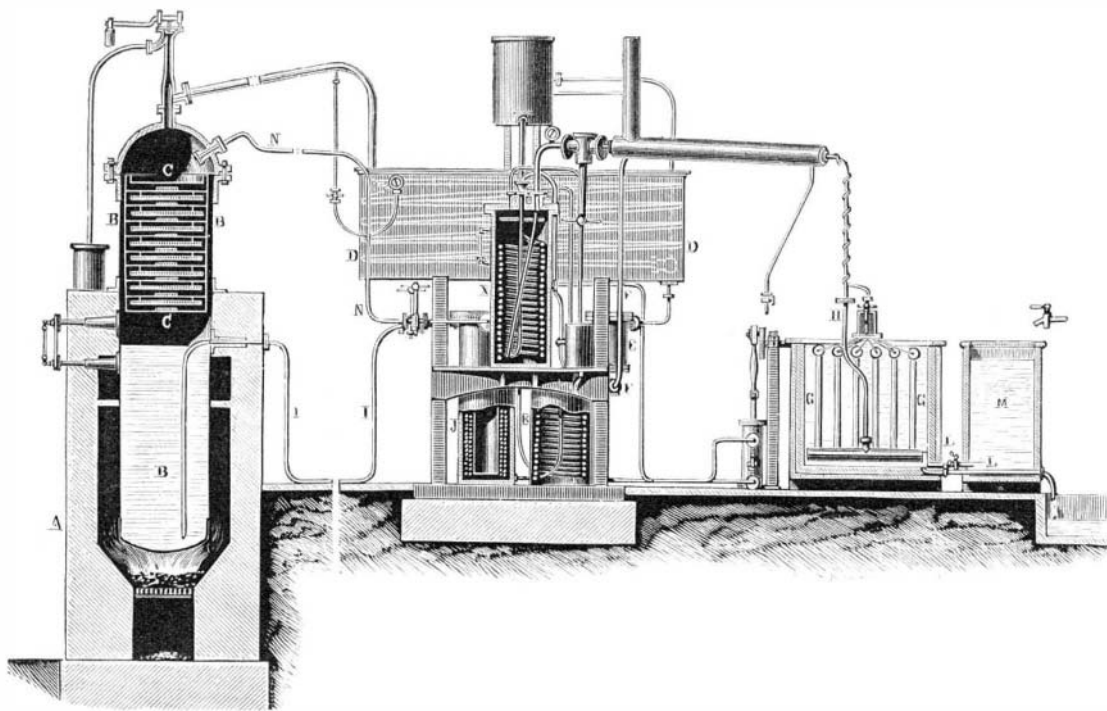
An improved beehive has been patented by Mr. Samuel Moore, of New Salem, Ill. The object of this invention is to provide a beehive with means whereby it may be thoroughly ventilated, and the bees thus always kept in a healthy and vigorous condition.

Mr. John M. Miller, of Huntsville, Ill., has patented an improved carpet stretcher, which consists in a novel arrangement of a stretching bar, a lever, and a pawl, by means of which a person can readily stretch a carpet and retain it under tension as long as may be required.

A bracket especially designed for dentists' use, which may be readily adjusted in a horizontal or vertical position, has been patented by Mr. Charles E. Kells, Jr., of New Orleans, La. The invention consists of a tube containing a spring-actuated longitudinally-moving ratchet, said tube being secured upon a plate which is pivoted to the end of two parallel arms, whose other ends are pivoted to a plate that is designed to be fixed to the wall of a room.

Messrs. Ebenezer Hathaway and Thomas H. Myers, of Hume, Ill., have patented a self-coupling coupler, by the use of which the necessity of going between the cars for the purpose of uncoupling will be avoided.

Mr. John J. Towle, of Dixfield, Me., has patented a combined foot warmer and lantern, which may be fixed in the bottom of a vehicle for the purpose of warming the feet of the occupants and for throwing light upon the road.



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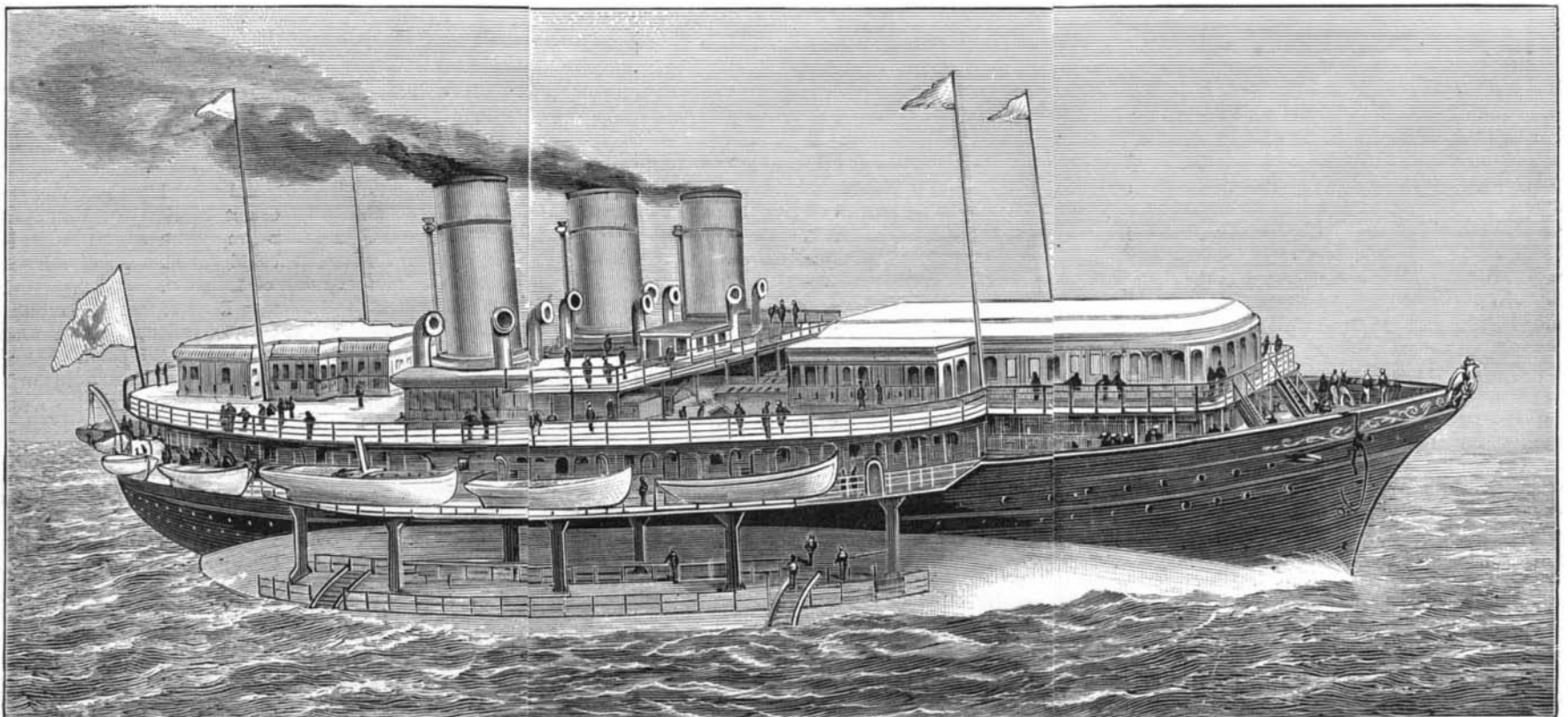
screws, and inclined just so that the mercury does not flow over the lipped edge. If now a small quantity of the liquid be set flowing over the edge it will draw the rest of the liquid over with a siphon-like action. It is difficult, however, to get the surface so clean that no adherent trail should be left, marred the completion of the experiment.

## THE LIVADIA.

The *Livadia*, the new Russian imperial yacht, was launched from the building yard of Messrs. John Elder & Co., Govan, near Glasgow, on July 7.

She is the latest development of ideas that may fairly be said to be revolutionary and subversive of all established principles of shipbuilding, and of which the earlier specimens are found only in the circular ironclads of Admiral Popoff. Speaking roughly, the *Livadia* must be imagined as a broad and shallow oval, half submerged, and carrying on its surface extensive lofty and sumptuous saloons and other apartments. It resembles a vessel of the ordinary kind, reposing upon a white air cushion. Its principal dimensions are: Length, 260 feet; breadth, 150 feet; depth, 50 feet; tonnage, 11,609; and displacement, 4,000.

The propelling power consists of three sets of engines, each having three cylinders, the diameters of which are: for the high pressure, 60 inches, and for the low pressure, 78



THE CZAR'S NEW YACHT LIVADIA.