A RADICAL CHANGE IN SUGAR MAKING.

MESSRS. EDITORS:—Suffer me to lead your attention to the inclosed extracts from *Les Mondes*, of Paris, and the *Diario de la Marina*, of Havana, convinced that their perusal will prove interesting, not only to yourselves but also to the enlightened readers of your ably-conducted journal. Mr. Reynoso's discovery has caused a great sensation in this country.

JORGE CRAVE.

Concepcion, August 29, 1865.

The extract from *Les Mondes* we translate, as follows:—

"LAST SESSION OF THE IMPERIAL AND CENTRAL SOCIETY OF AGRICULTURE.—M. Payen, in consequence of the intimate relations of agriculture with the manfacture of sugar, believed it a duty to call, in a special manner, the attention of the Society to the happy thought of M. Alvaro Reynoso, of Havana, a very distinguished pupil of our national schools, of substituting the action of cold for that of heat in the concentration of sugar sirups—either those of the cane or those of the beet.

"At the present time machines for making ice have become very common and very economical. By the combustion of one pound of coal, twelve pounds of water are frozen; while, with the same pound, only six pounds of water, in the average, can be evaporated. The advantage, then, in favor of congelation, is nearly one-half. It has, furthermore, been applied with success to the concentration of sea water, to extract from it the salts of soda, potassa and magnesia which it contains; to the concentration of mineral waters to reduce them to the smallest volume possible without depriving them of their virtue; and even to the purification of sea water in freeing it from all its saline principles and making it potable. The waters of the sea desalted, the salts extracted from sea water, mineral waters concentrated, are far from having the commercial value of sugar, and of being able to bear the cost of a treatment equally expensive.

"The moment, then, was come to think of treating sugar juice by artificial cooling, in place of submitting it to heat which decomposes it, or augments considerably the proportion of uncrystallizable sugar. M. Payen had seen the results of the first experiments made on a small scale by M. Alvaro Reynoso; he was able to state that the sirups marking five to six degrees on the hydrometer of Beaume were converted by congelation, aided by movement, or by a turn of the hand analogous to that employed in obtaining sorbet ices known under the name of *granit*, into a sirup of twenty-five degrees, and water nearly pure from the melting of the ice after the sugar had been separated by the centrifugal machine, or the press.

"The able Havana chemist, who has made a name in the Spanish colonies by the publication of two highly esteemed works—"Progressive Studies on Divers Scientific Matters, Agricultural and Industrial," "Essay on the Culture of the Sugar Cane"—completes at this moment his practical researches on the best mode of the application of cold. At the same time he is preparing some experiments on a large scale. M. Payen undertakes to follow them closely with his illustrious associates of the Academy of Sciences—MM. Dumas, Pelouze and Peligot, and to present, in relation to them, a detailed report to the Society of Agriculture.

"M. Chevreul, in the name of the assembly over which he presides, thanks M. Alvaro Reynoso, for the communication made through the medium so honorable of M. the Perpetual Secretary, and accepts the promise which has just been made in his name."

[As there is a loss of at least 18 per cent in removing the water of cane juice by evaporation, owing to the conversion of a portion of the sugar into grape sugar by heat, if the separation could be effected without the employment of heat, the yield of sugar would be considerably increased. The freezing of water is an act of crystallization, and crystallization is a separating process. If all the water could be removed from cane juice by this process, or sufficient to induce the sugar to granulate, and if the process were a cheap one, it would indeed work a revolution in sugar making; but if the concentration is only to 25°, requiring evaporation for its completion, it is difficult to imagine that it can be economical. The novelty of the suggestion, however, and the high position of M. Payen, who introduces it, warrant us in laying it before our readers.—EDS. SCI. AM.

NOTES ON THE NEW SLOOPS OF WAR.

[For the Scientific American]

The contracts for the construction of the machinery for these vessels were issued in the year 1863, the price agreed upon being $400,000 for each pair of engines, with boilers, etc., complete. The hulls are being constructed at the national navy yards throughout the country, none being built by private contract. These steamers are rated at "second-class sloops" in the "Navy Register," and will average 225 ft. between perpendiculars; have a breadth of beam of 41 feet, and a burden of 2,000 tuns; they will have two decks, viz., the spar and main decks—the whole of the machinery being below the latter, and, consequently, below the water line. The propelling force will consist of a pair of back-action condensing engines, having cylinders of a diameter of 60 inches, with a stroke of piston of 36 inches. They were designed by the Chief of the Bureau of Steam Engineering, and are creditable specimens of their class. Steam is supplied by four of "Martin's" upright tubular boilers, and two superheating boilers of one furnace each. Total number of furnaces, 30, each one 3 feet by 6 feet 6 inches; total grate surface, 585 square feet; total heating surface, 16,000 square feet. In reviewing the general design and the elaboration of the details of these engines, it is manifest that they are much less open to criticism than were the earlier attempts of the Bureau of Steam Engineering in designing the machinery for its war vessels. The gunboats built in 1861 and 1862, having engines of 30 by 18-inch cylinders, proved so entirely deficient in speed that new boilers, having increased grate and heating surface, in addition to a superheating apparatus, are being built by them, and for the use of these it is hoped a better rate of speed may be obtained; but there are so many defects in the engines as at present arranged that the performances can never be entirely satisfactory. The sloops of war, having engines of 42 inches cylinder and 30 inches stroke of piston, built soon after the gunboats, although an improvement on the last-named vessels, are yet defective in design and detail. In the engines for the vessels which are the subjects of these notes, the slide valves and their working gear have received some valuable modifications. The valves have been made "double ported," thereby giving a quicker opening, and reducing the size and throw of the eccentrics. Steel rollers have been introduced for carrying the weight of, and pressure on, the valves, and a large proportion of the surfaces of the valves has been balanced by "Waddell's" patent balance plate. By means of this arrangement that portion of the inside surface of the valve within the edges of the "balance plate" is open to the same pressure of steam as the back, and is, therefore, "balanced." This plan of relieving the pressure on large slide valves has, for some years, been in successful operation on the Royal Mail steamer *Persia*, of the Cunard line, as well as in the navy. It might be supposed that the use of rollers under the *face* of a slide valve would not be admissible. The inventor of this arrangement designs that the rollers should barely touch when first fitted in, but, as the face of the valve and its seat wears down, the rollers receive a considerable proportion of the unbalanced pressure on the valve, substituting a rolling for a sliding motion. Rollers under the lower edge of the valve are in daily use in the navy, and give entire satisfaction. The reversing gear for these engines is, in some of its details, light and ill-proportioned for the duty it has to perform. The counterbalance introduced will balance the weight of the links only, leaving the power to move the valve (which, in reversing, with the eccentrics in certain positions, will be moved several inches) and the friction of the various journals to be overcome by a small hand wheel on the engine platform, operating through the agency of a worm and wheel. Much difficulty must be experienced in reversing the engines promptly, as it will require for that purpose more operators at the wheel than can reasonably be expected to be in the engine room at any one time. A very good arrangement—one that has been in use in naval steamers, and is in general use on large screw steamers of the merchant marine—is the combination of a steam cylinder with the reversing shaft and arms, for the purpose of raising or lowering the links. Such an apparatus has, for some reason, been omitted in the design of these engines, although its use would certainly facilitate the maneuvering of the engines. It would be noticed by even a casual observer that the main cross-head slides of these engines have unusually large surfaces. So much trouble has been experienced on board of naval steamers, both screw and paddle wheel, from an insufficiency of surface in this very important part, that the value of this increase will be appreciated. As friction is independent of surface at ordinary speeds, the dimensions so often given to main slides could, where practicable, be increased with great advantage, and with this modification one source of delay to the vessel and annoyance to her engineers would be removed. The air and circulating pumps are entirely separate, and each is double-acting. This is manifestly an advantage, as the former plan of combining the two pumps in one, causing one end of the pump to use fresh water and the other end salt, was productive of much trouble, causing both a loss of fresh water and the introduction of salt water in the hot well. The suction valves are unnecessarily large, and the space between the piston at the end of its stroke and the valves is so great (more than the capacity of the pump) that much trouble may be apprehended from the uncertain action of the valves, caused by the vapor inclosed within this space. It is asserted that the momentum which the water acquires in descending from the condenser of the pump will insure a prompt movement in the valves; but this cannot be relied upon when at sea, and it is more advisable to bring the valves as close to the end of the pump barrel as possible. The pump barrels are lined with brass, and the weight of the pistons is borne as usual by lignum-vitæ rings, which are to be recommended for that purpose. A manifest improvement has been made in the reduction of the capacity of the surface condenser to that actually required (about one-third of the heating surface of the boilers), and in passing the refrigerating water but once through the tubes. In some of the gunboats before referred to, the condensers contained twice the number of tubes required; and the refrigerating water, by being twice passed through them, became, some time before it was discharged, so heated as to be of little avail in condensing the steam. The great pressure brought upon the pumps in forcing the refrigerating water to change in direction so often, caused their pistons to leak badly, their valves to pound and wear out very rapidly, and in some instances bursting the bonnets of either the condenser or pumps. The tubes in the condensers for the vessels which are the subject of these notes, lie in the direction of the length of the ship—the exhaust steam entering the condenser by two nozzles in front, and being distributed around and among the tubes by a channel way having a narrow opening extending the whole length of the condenser. By this arrangement the whole of the tubes are made available, which was not the case in the condensers of the gunboats, where there is a difference of many degrees in different parts of the condenser.

The working parts of these engines are very massive, and their dimensions might be reduced with advantage. The metal of the cylinders, channel plate, etc., is also much heavier than is found in ordinary practice.

The boiler power in these ships is ample, and by means of the superheating apparatus attached, a considerable economy of fuel may be expected, besides a more satisfactory action in the engines. There are no blowers supplied, in which omission the good judgment and the experience of the designer may be seen, as it is well known that the duty of a Martin boiler cannot be greatly augmented by the use of a blower, owing to the contracted calorimeter, while the consumption of coal under those circumstances is greatly increased. A steamjet has, however, been applied in each steam chimney, a moderate use of which jet is often found advisable, as it is the speediest way of bringing the fires, when small, to a full action.

The screw propeller for these vessels is of brass, and has four blades, each 27 inches wide, with a pitch at the forward edge of 26 feet, expanding at the after edge to 30 feet. The mean pitch of 28 feet will require the engines to perform 50 revolutions per minute, in order that the vessel may have—in ordinary weather—a speed of 14 miles per hour. This