tion of the steady-going manufacturers, who stood by, did not take out licences, and exclaimed, "I told you so." Mr. Bessemer was not discouraged by temporary failure, for he saw a large reward before him if he did succeed. He set to work, and spent three years and £10,000 in amending the defects of his process. But by the time he had to a great extent succeeded, the faith of the trade had been so completely destroyed that no one would work his patents. This led the Bessemer Company to erect steel-works in Sheffield. They were able to use Mr. Mushet's large batch of manganese patents, because confidence in the improvement of the manufacture of iron had sunk so low, that it was not thought worth while to pay the £50 stamp due on them at the end of three years. The Bessemer Steel-Works "have become a school where dozens of practical steel-makers have received their lessons in the new art." The Bessemer cast-steel plates made for ships plates is of a very tough and ductile quality, and double the strength of the iron plates usually employed in ship-building. One Liverpool firm has constructed 31,510 tons of shipping, wholly or partially built of steel. Of these 38 vessels are propelled by steam. Beside these, the principal masts and spars of 18 sailing vessels have been made wholly of steel. A steel vessel of 1000 tons would weigh 250 tons less than one of the same tonnage of iron, and have that advantage in more tonnage, or less immersion. Two steel paddle-wheel steamers, launched at Liverpool by James Quigley and Co., on the 13th of August, for the Liverpool and Dublin service, will draw from three to four feet less water than the iron steamers of the same line, and thus be able to leave the ports at all states of the tide, and not require a tidal train in connexion with them. Reference was also made to the importance of this new material when applied to iron-plated ships of war. A plain steel axle was exhibited, that scarcely showed any wear, after having run 112,500 miles. Steel rails were tried against iron at the Chalk Farm Bridge of the Camden station, at which point there is a narrow throat from which converges the whole system of rails employed at the London termini of that station. At this spot two steel rails and two iron rails were fixed on the 2nd of May, 1862, precisely opposite each other. The result, up to July, 1865, has proved that steel will wear out at least twenty iron rails; and there is no doubt that all companies that can afford the cost will renew their roads with steel rails.

The following figures show the progress of steel manufacture consequent on the Bessemer patents. In 1851, the entire production of steel of all kinds in Sheffield was 35,000 tons annually, of which 18,000 were cast steel—equal to about 346 tons per week. A monster ingot weighing 24 cwt., exhibited at the Exhibition of 1861, was supposed to be the largest mass of steel ever manufactured in England. The Bessemer apparatus at the works of John Brown and Co., Sheffield, is capable of producing every four hours a mass of cast steel weighing 24 tons! There are now seventeen extensive Bessemer Steel-Works in Great Britian. One, the "Barrow," can turn out 1200 tons of finished steel per week; and when their new converting-house is finished will be capable of producing 2400 tons of cast steel per week. The average price of cast steel has been reduced at least £20 per ton below the average price at which it was sold in 1851. "With the present means of production, therefore, a saving of upwards of six millions per annum may be effected in Great Britain alone, *and this is the infant state of the Bessemer steel manufacture.*" In answer to a question from Mr. Bramwell, Mr Bessemer stated that he had been able to produce his steel with one class of iron only found in this country—the *hematite*. The bulk of the iron was too much impregnated with phosphorus and sulphur. Hematite is obtained almost entirely from Cumberland, from the Forest of Dean, and Exmoor, where extensive veins still remain unworked.—*British Journal of Gas Lighting, &c.*

Concentration of Sirup by Freezing.

ARTIFICIAL refrigeration is evidently destined to receive most important industrial applications. Already, in the paraffine-oil manufacture, and in the ingenious process by which M. Balard and M. Merie obtain chloride of potassium from sea water it renders most valuable service, and now M. Alvaro Reynoso, of Havana, is applying it to the concentration of sirups. In face of the well-known fact that water in freezing becomes completely separated from whatever it may have previously held in solution, and of the successful working of the process by which Carré and others produce any desired degree of cold, by mechanical means, at a scarcely appreciable cost, one wonders that no one should have thought before of applying artificial cold to the extraction of sugar from sirups, especially when it is remembered how injurious the action of heat is apt to be. However, M. Reynoso has conceived the idea at last, and is devoting himself energetically to its realization. He is in England just now, testing the respective merits of the various cold-producing appliances in use here. He has found that a sirup marking only 6 deg. of Beaumé's saccharometer becomes converted by congelation into ice, and a sirup of 30 deg. Should it be found that the cold does not injure the sirup, we may look to see great changes in the processes of the sugar manufacture.—*Mechanics' Magazine.*

Water Power in Warehouses.

We have on several occasions alluded to the application of turbines to hoisting purposes in Manchester and other Lancashire towns, which have the advantage of a high-pressure water service; and Mr. Pearce, of Bradford, has now adopted another very ingenious arrangement in the shape of a water-engine, which was put down by Messrs. Ramsbottom & Co., of Blackburn. The engine is supplied with water from the corporation mains on a pressure of 60 or 70 lbs. to the square inch. The water enters a pair of water engines, each of which possesses a pair of cylinders and pistons. The cylinders oscillate upon trunnions, and the effect of this oscillation is to reverse the valvular arrangement, thereby causing a continuous rotatory motion which puts the hoist in action. The engine has been applied with success to printing machines, to a mortar grinding machine, and other apparatus requiring a motive power on a small scale. The experiments made on this occasion were quite satis-