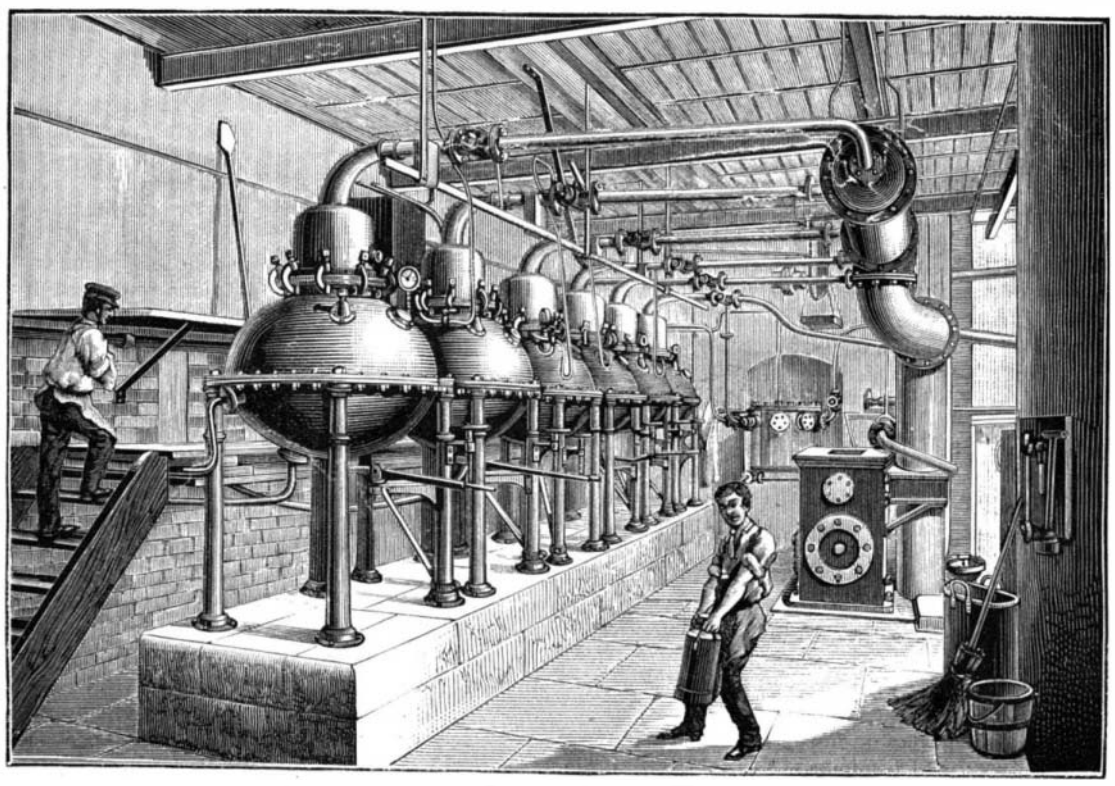
MANUFACTURE OF CONDENSED MILK IN SWITZERLAND.

Switzerland, says *La Nature*, to which we are indebted for the accompanying engraving and article, stands at the head of the condensed milk industry. The milk manufactured in this country is unsurpassed. Although other countries may produce milk which produces better butter, as for example Normandy and Holland, none of them can rival Switzerland in the delicious flavor, the delicate aroma, and excellence of quality of condensed milk. This is due, no doubt, to the richness of the flora of that country.



THE SWISS METHOD OF CONDENSING MILK.

The milk industry, which during the past few years has developed abnormally in Switzerland, is conducted principally by three companies or firms—the Anglo-Swiss Company, with factories at Cham and Guin; the Lapp Factory, at Epagny; the Henri Nestle Company, with factories at Vevey, Bercher and Payerne.

The milk export (and here the amount of export is equal to the amount manufactured, as the home consumption is very slight) has increased, according to the figures of the federal bureau of customs, in 1887 to 111,312 metric quintals, or 494,720 cases of 48 boxes each, in 1888 to 117,700 metric quintals, or 520,000 cases, which represent the milk of 15,000 cows and of 250 villages. In 1888 the export of Swiss cheese amounted to 238,390 metric quintals, which represented a value of 30,450,000 francs. We mention these figures to let every one comprehend the importance of this new industry, whose exports are already one-half as great as the much older industry of cheese making.

Condensed milk is manufactured as follows: The milk, as soon as drawn, is taken by the farmers to the dairies, which are established in each village or group of villages. The dairies are run by a syndicate with which the manufacturers deal, and establish the fixed prices. Here the milk is cooled. On reaching the factory the milk is warmed for the first time in a water bath, and a second time in copper vessels, where the temperature reaches 80° C. It is then sweetened by adding the best quality of sugar in the proportion of 13 to 100 in weight, the sugar being forced into vacuum pans by means of a pump. These vacuum pans are for condensing the milk, and are similar to those for condensing the juice of the beet root, having a double bottom and spiral pans in which the steam circulates. The water contained in the milk is removed in the form of vapor by means of a jet which is connected with the top of the vacuum pan and which is operated by means of a pneumatic pump. When the milk has been sufficiently condensed it is removed from the vacuum pans and cooled in vessels placed in reservoirs of running cold water. It is only necessary now to pack the milk into tin boxes cylindrical in shape, and hermetically sealed, the box and contents weighing one English pound, and being in condition for shipment to any part of the world.

In the preparation of the condensed milk it may be observed that the milk, as taken directly from the cow, has on the one hand simply been deprived of the water it contained, while on the other hand the only addition consisted of pure sugar, which is designed to preserve the milk better. It contains all the elements of the fresh milk, which has practically undergone no modification, the boiling of the milk under slight pressure having never passed 80° C. It can be affirmed, therefore, that the condensed milk possesses all the nutritive qualities of fresh milk. The following analyses, one by Prof. Soxlet, of the University of Vienna, and the other by Mr. Otto Hehner, the distinguished chemist of St. Thomas' Hospital, London, show the chemical composition of the Swiss milks:

	Milk Nestle.			Milk of the Anglo-Suisse Co.		
	Dr. Hehner.	Dr. Hehner.	Soxlet.	Dr. Hehner.	Dr. Hehner.	Soxlet.
Water	23 59	25 04	25 28	24 21	26 44	24 70
Fatty matter	11 58	11 12	8 62	9 95	10 52	6 02
Caseine	9 60	8 18	10 25	8 72	8 22	9 77
Sugar	53 21	53 78	53 82	55 18	52 86	57 40
Salt	2 02	1 88	2 03	1 94	1 96	2 11
	100 00	100 00	100 00	100 00	100 00	100 00

These analyses are confirmed by analyses by Dr. Brunner, Professor of Chemistry at the University of Lausanne, and Dr. Christen, of Paris.

The problem of preserving milk is solved. The milk may be preserved for several months, and the flavor is very agreeable. We do not need to mention the various uses to which it may be put, nor how extensively it is used in all extensive communities, on board ship, in our colonies, and in all countries where fresh milk cannot be obtained.

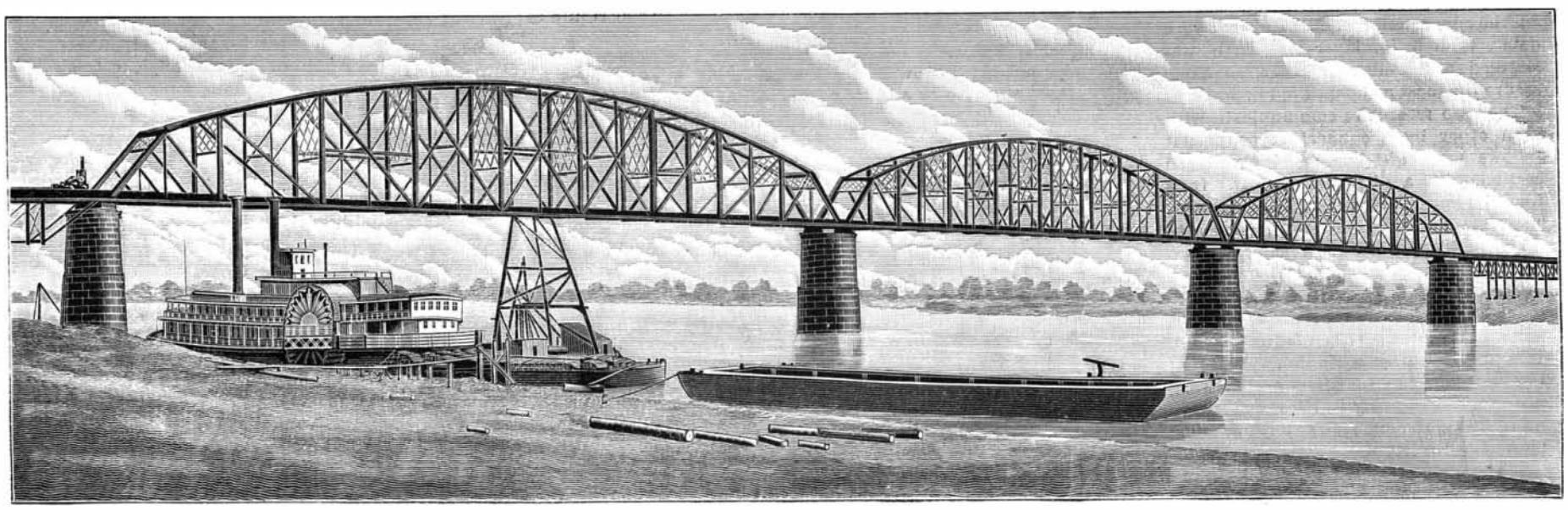
NOTE.—It should be borne in mind that the manufacture of condensed milk was first introduced in America, and was the result of American invention. Mr. Gail Borden, the original inventor of the process of condensing milk *in vacuo*, procured his basic patent in 1856. An enormous industry has been founded upon his patents, and although we do not question that Switzerland may excel in this manufacture in Europe, we believe that the United States, both in respect to volume of manufacture and excellence of quality, distances all competitors.—ED.]

THE NEW MERCHANTS' BRIDGE AT ST. LOUIS.

The accompanying illustration is a reproduction from a photograph of the Merchants' bridge at St. Louis, which was completed and dedicated with considerable ceremony on May 3. The main superstructure of the bridge consists of three spans, each of which is 517 feet 6 inches in length. It is of the Pratt truss form and divided into 18 panels. These trusses are 75 feet high in the center, and are placed 30 feet apart from center to center transversely, thus providing room for two tracks which are placed 12 feet apart. The system of lateral bracing is carried down the post to within 21 feet of the railroad track. The east approach to the bridge consists of 3 deck spans, each 125 feet in length. These rest upon piers composed of 4 cylindrical columns. Beyond this iron work there is about three-fifths of a mile of wooden trestle work. Where the approach passes over the Alton, Big Four, and Wabash railroads, there is a steel span 175 feet in length, resting upon masonry abutments. The trestle work will, doubtless, be filled in at a later period. At the west end the approach also consists of three spans, each 125 feet in length. Beyond this portion of the bridge there is a steel girder spanning one of the streets of the city, and about one-quarter of a mile of trestle work, which also will be filled in to make a solid embankment. The bridge track is laid with steel rails weighing 67 pounds to the yard, secured to the ties by Bush interlocking nuts to prevent the creeping of the rails. The superstructure of the bridge consists of four piers, composed of granite from a point 3 feet below the low water line to 2 feet above the high water line. Above this the material used is limestone, and between the granite and the caissons is the usual crib work, except in the case of the second and third piers, where the masonry had been started from a caisson.

The first soundings for this bridge were made in September and October, 1887, and the report and plans of the engineers, Messrs. Morison & Corthell, were submitted on November 2, 1887. The first caisson started was that for pier No. 4 on the west end. This caisson was built on the site and lowered in position. Work upon it was commenced January 24, 1889, and the pier was completed early in July. The caissons for the piers 1, 2, and 3 were built upon the banks and floated into position. No. 1 was launched April 26 and the pier was finished August 24. Caisson for pier number 2 was launched May 23, and that for number 3 on June 6. The location of pier number 3 is such as to expose it to the strongest current in the river, and the only difficulty of moment experienced in the work upon the substructure was at this point. The caisson was placed in position September 9 and the pier finished November 1. When towed into position the depth of the water at this point was 18 feet, but before the work was completed a rise in the river increased the depth to 42 feet, and the strength of the current was such as to tear away the anchorages twice.

In erecting the superstructure, some very quick work was done. The false work for the west span was begun,



THE NEW MERCHANTS' BRIDGE AT ST. LOUIS.