SKATING ON ARTIFICIAL ICE.

It will soon be three years since, under the name of the "Ice Palace," we described an installation designed to permit of skating upon genuine ice in all seasons. The company that undertook to carry out this idea rented the spacious hall of the Plaza de Toros, on Pergolese Street, and we had an opportunity of seeing there, for an instant, the immense arena of 2,000 meters transformed into a sheet of water. But when it was necessary to freeze the latter, and the machines began to work, it was found somewhat late that there were many defects in the installation, and that it was possible to make ice only upon the edges, and even then not in a continuous manner. The directors then, taking a firm resolution, had cartloads of cracked ice brought and packed it in the arena. A few skaters had an opportunity of trying their skill upon it, but in the space of one night all was melted and the enterprise, so to speak, fell into the water. It was a folly, too, to wish to do in a few weeks what required several months of study and labor. But the idea was a good one, and was again taken up. Now skating is (and has been since the first of October) going on day and night at the "North Pole," on Clichy Street. This time the installation has been well conducted. Time has been taken, and everything has been studied and put in place with care. The principle is the same as that employed previously, and our first engraving (Fig. 1) represents the machinery room, very well arranged by Engineer Stoppani. It comprises, to the left, two steam engines of 50 horse power each, of the Corliss type, with Stoppani distributer, which run two double-acting Fixary ice machines. These machines are pumps designed to convert ammoniacal gas into liquid ammonia. To this effect, they in the first place force the gas into the large condensers represented to the right. Here it is cooled by a circulation of water derived from the city mains, and becomes liquefied in the small cylinders seen in the foreground. Thence the ammonia is led into the large reservoirs or refrigeratories that are observed upon a platform in the rear, and expands therein with the production of cold. Having returned to the gaseous state, it is taken up again by the machines, which force it anew into the condensers, and so on indefinitely. It is always the same supply of ammonia that is used. The lowering of the temperature produced by the expansion is utilized for cooling an uncongealable liquid (solution of calcium chloride) which circulates in spirals in the center of the refrigeratories. This liquid, by means of a pump, is forced into the pipes placed upon the floor of the rink.

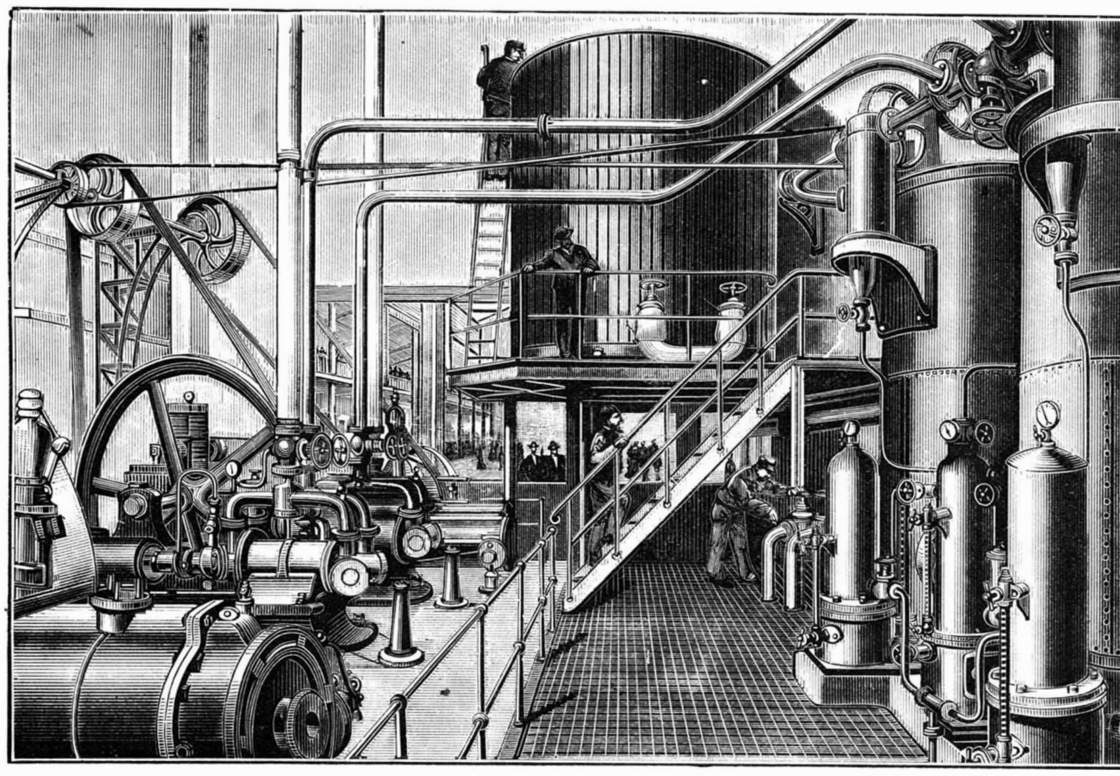

Fig. 1.—MACHINERY HALL OF THE SKATING RINK OF ARTIFICIAL ICE AT PARIS.

There is here a notable difference as compared with the installation previously tried, wherein the ammonia was expanded directly in the pipe, of the rink—an arrangement evidently defective, because of the leakages inevitable in a system of piping several kilometers in length.

The rink (Fig. 2) is 40 meters in length by 18 in width. It consists of a cement and cork floor resting upon a perfectly tight metallic foundation, and upon which is arranged a series of connected iron pipes having a total length of 5,000 meters. Each section derives its supply from two principal conduits, A and B (Fig. 3), into which constantly flows the solution of chloride of calcium cooled to a temperature that varies according to the velocity of the circulation, which can be regulated at will. When the external temperature is not very high and it is merely a question of keeping the ice in condition, a few degrees below zero will suffice, while, on the contrary, when the upper stratum, or even the entire rink, is renewed, it is necessary to descend to 15 or 20 degrees. The surface is renewed every night. After the snow produced by the incisions of the skates has been removed, there is spread over the remaining ice, by means of a pump, a sheet of water that circulates during the entire period of its congelation, in order to give a perfectly even surface. In order to prevent the spirals from producing changes of level through the contractions due to the differences in temperature to which they are submitted, they are composed of pipes that enter each other with friction to a certain length. They thus form slides that allow of a certain play. Moreover, in order that their temperature shall be as uniform as possible, care is taken to frequently change the direction of the current. In this way there is secured a uniform mean temperature in the entire circulation.

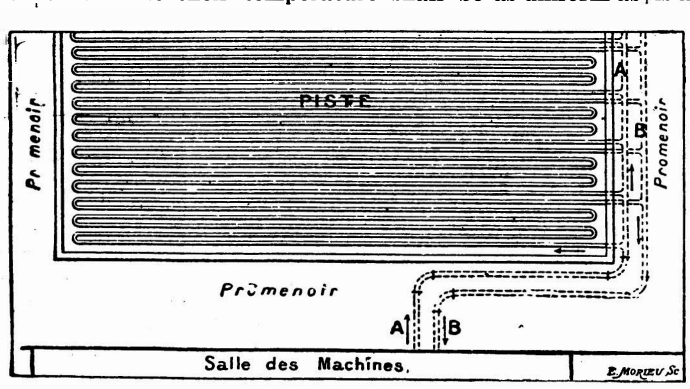

Fig. 3.—PLAN OF CONGELATION PIPING.

A, Pipe through which the freezing liquid enters. B, Pipe through which it makes its exit.

It will be seen that in this installation everything has been studied out and provided for to the least details. So, during the month or more that it has been in operation, nothing wrong has occurred, and the numerous lovers of skating have always been able to pursue their favorite exercise as well as if they were on the lakes of the Bois de Boulogne in midwinter.

A portion of the power of the motors is employed for lighting the hall, which is decorated with winter scenery. But no attempt has been made to push realism farther, and a heating apparatus keeps up a temperature of from 15 to 18 degrees.—*La Nature.*

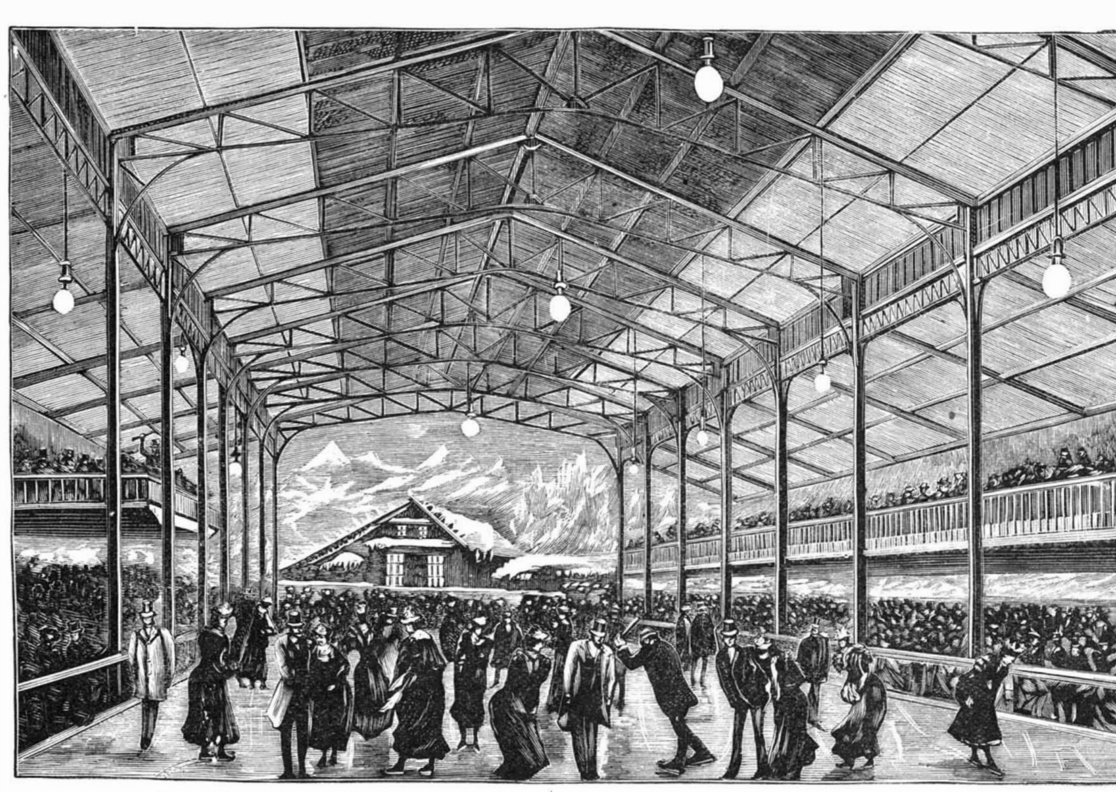

Fig. 2.—SKATING RINK OF ARTIFICIAL ICE AT PARIS

Horse Power of Boilers.

When the horse power of a boiler is referred to, a very vague idea of the real meaning of the term is given. Most people get the impression that when we say a boiler has a certain horse power it means that the engine which it is constructed to supply steam to will exert that power when all the prescribed conditions exist. What the horse power of a boiler really means is a question that is difficult to answer. It is neither logical nor appropriate to express the steam-generating power of a boiler in units of horse power, but it seems to have become a habit which has grown upon mechanics that is hard to break off and discontinue.

The unit of horse power for boilers is not, says a contemporary, fixed except by arbitrary agreement among the parties concerned, the basis differing according to the nature of the work done by the steam. Many boilermakers rate the horse power of the boilers by the number of square feet of heating surface contained in the boiler. Although this rule is followed by many, it is no criterion as between different styles of boilers—a square foot under some circumstances being many times as efficient as in others; but when the average rate of evaporation has been fixed upon by experiments in one boiler, there is no more convenient way of rating others of the same style. But by an outsider no exact rating of a boiler can be made from a knowledge of only its heating surface.

The following rules are observed in a good many boiler shops, and may be useful: For cylinder boilers nine square feet of heating surface per horse power are allowed, for flue boilers twelve square feet, and for tubular boilers fifteen square feet of heating surface per horse power. Hence, if the total heating surface be known, divide it by 9, 12, or 15, according to the type of boiler, and the quotient will be the horse power of the boiler. If a boiler is tested and a statement of its horse power desired, without regard to whether it is to supply its steam to drive an engine or for other purposes, then it is agreed upon by the majority of experts to consider 30 pounds of water per hour, evaporated at 70 pounds pressure from 100 degrees, as a horse power.

A standard was fixed by Watt at one cubic foot of water evaporated per hour from 212 degrees for each horse power. This was at that time the requirement of the best engine in use. Most nations have a standard similar to and generally derived from Watt's "horse power," but owing to different standards of weights and measures these are not identical, though the greatest differences amount to less than 1½ per cent.—*Electrical Age.*

To make glue water proof, dissolve of gum sandarac and mastic each five and one-half drachms in one-half pint of alcohol, and add five and one-half drachms of turpentine. Place the solution in a glue boiler over the fire and gradually stir into it an equal quantity of a strong hot solution of glue and isinglass; strain, while hot, through a cloth. Or to plain glue solution add bichromate of potash; on exposure to the air it becomes waterproof.