when oxygen goes to one plate, and produces a thin coat of peroxide of lead, and hydrogen goes to the other plate.) The second advantage claimed is that the battery has a storage capacity much greater than that of Planté; the proportion, according to M. Reynier, being, as deduced from numerous experiments, forty times greater with equal weights of batteries. The first advantage claimed may be readily conceded, and it is one of considerable practical importance and value. The second cannot be admitted, as will be seen from what follows. M. Hospitalier and myself were very desirous to subject the Faure battery to precisely the same tests that we have made with the Planté battery.

"To do this we first addressed ourselves to the proprietors of the invention, who replied that they could not intrust us with the apparatus; that they would not object to trials, but only after some time. Since this communication we have heard nothing from them. In the absence of direct data we will reason on the figures supplied, and the experiments made by the proprietors of the Faure battery before the public. It has been said and repeated officially that in a Faure battery weighing 165 lb., there could be stored up a quantity of electricity able to produce an effort equal to one horse power, for one hour, or 3·28 foot-pounds per second and per pound of battery. We have only seen the apparatus producing power, on one occasion, at the Société d'Encouragement. Then it was far from giving this result; the battery weighed 326 lb., but instead of giving 1,070 foot pounds per second it only gave 339 foot pounds. The apparatus might have been working under unfavorable conditions; it might have been doing far less than its maximum. We do not wish to draw any deductions from this experiment, which was, however, a very unfortunate one, and we will for the moment accept the 3·28 foot pounds per pound of battery. We ought here to examine what is the duty of the apparatus. In reference to this M. Reynier made before the different societies an algebraical calculation which is published in the Transactions of the Academy. This calculation was met—at the Société de Physique—by many reasonable objections, the principal one being that it was useless, the only conclusion M. Reynier having drawn from it being that the more slowly the battery was discharged the better results that it gave, but no algebra was required to prove this. It is a general characteristic of the Planté secondary and of some primary batteries, as well as of dynamo machines. By using the battery very slowly, therefore, its duty is claimed to be 80 per cent, and as this proportion may be true of the Faure as well as of some other batteries, we will accept it. Admitting then this 80 per cent, 11,800 foot pounds of actual work per pound weight of battery would represent 14,750 foot pounds stored up within the battery. This figure is, up to a certain point, confirmed by an experiment made at the Société de Physique, where eight batteries, maintained, at a red heat during one hour and forty minutes, a platinum wire 13 feet long and 0·048 inch diameter. M. Reynier calculated that the total calorific work (interior and exterior) was equal to 253 foot pounds per second, or 1,518,000 foot pounds in all. According to M. Reynier, the weight of the batteries was 123 lb., so that the power stored up was equal to 12,341 foot pounds per pound of battery. There must have been a slight error here, because, as we have already seen, the useful weight of each battery cannot at the lowest estimate be less than 176 lb., giving a total of 140·8 lb., or 10,840 foot pounds per pound. According to the careful experiments we have made the useful storing power of the Planté secondary battery is 11,350 foot pounds per pound of battery, so that according to the different weights taken, the ratio of the latter to the former is 1·30, 1·08, or 0·95. This is a very long way off the forty times of M. Reynier. That gentleman, informed of this great difference, objected that the Planté battery we had employed must have been an exceptionally good one; those from which he had deduced his comparison had been furnished to him by M. Breguet. If this was the case these Planté cells did but little credit to the renowned maker who supplied. Besides, as a matter of fact, the batteries we experimented with were taken from those made by M. Planté for sale for medical and other purposes. Moreover it must be remembered that there are at present no Faure batteries made for sale, the ones already produced having been made by M. Faure's own hands or under his directions, and it is only just to institute a comparison between the Faure battery made by M. Faure, and the Planté battery made by M. Planté.

"The results we have given cannot be far from the exact truth; *a priori* there can be no reason why a battery in which the red lead is spread by hand, should be, weight for weight, superior to an apparatus in which the peroxide is furnished gradually by electricity, and experiments entirely confirm this deduction. The Faure battery is better adapted for industrial purposes, it has more solidity, and can, moreover, be made of larger dimensions; but these advantages might be obtained with the Planté battery if desired; the Faure cell does not require a preliminary electrical process to render it fit to receive the charge, which is a very great advantage, and besides it offers greater resistance for an equal surface, while it is less liable to damage than the other apparatus. But although the Planté battery has been in existence since twenty years, no one has ever suggested its employment as a means of producing power and light, and for several very good reasons, of which we will mention only one—that of transport—which has been treated in the company's prospectus as a detail of insignificance, and referred to only as it were in an excess of scrupulous minuteness.

"In order to furnish a force equal to one horse power during ten hours, ten batteries weighing 165 lb. each must be employed. This is throwing out of consideration the fact that a part of the charge only can be utilized on account of the fall of the potential below the necessary point, which would take at least 25 per cent off its utility. Making no allowance, however, for this, 1,650 lb. would have to be carried twice, that is to say, 1½ tons of battery would be transported daily, besides all other expenses, for a charge of 10 francs a day; we leave the reader to draw his own conclusion. In fact, to maintain that this mode of electrical distribution is more economical than by wires, where they can be used, is to maintain that the present system of distribution of water involves the sinking of an enormous capital in buried pipes, that in these pipes there is always a considerable loss, and that it would be cheaper to substitute a house-to-house system of water transport by means of improved barrels. But this is a point we do not press; it belongs to commerce, not to science, and this journal has nothing to do with money interests. But science suffers much from enterprises of this kind, it scares away confidence from serious undertakings, and exaggerated promises unfulfilled create the utmost distrust in subsequent undertakings of a cognate nature; the public not having obtained what they looked for turn away and refuse to have anything to do with more modest but useful applications which are offered to them. Will it not be thus with the Faure apparatus? The experiences obtained have much interest. The inventor mentions in his patents various special applications, especially for tramways, for which the battery may have a useful future. But why does not the inventor confine himself within the limits of possibility?

"Whatever future may be in store for it, we are at least indebted to it for having drawn special attention to the study of electrical accumulators. Since the announcement of the Faure battery, we know of four others in course of development, all of them of novelty and interest, and all promising a useful though less ambitious future.

"M. Reynier, at the last séance of the Société de Physique, remarked sadly that he did not ignore the relative imperfection of the apparatus he represented, but both M. Faure and himself had been unable to complete them themselves before bringing them before the public, and he trusted soon to be able to show far better results than those given up to the present time. It is an unfortunate position for a man of science to find himself exhibiting and praising without restriction an apparatus of which he sees and acknowledges the shortcomings; it is, in fact, a false position, and one which he would do better to avoid."

Roofing Slates.

Ten years ago the roofing slate industry in this country was not considered of sufficient importance to receive even a bare mention among the "special industries" of the census reports. Last year the capital invested in the manufacture of roofing slates in this country amounted to more than $8,000,000. Over 3,000 men were directly employed producing 600,000 "squares," or sufficient to cover 60,000,000 square feet. The quantity produced in the several States having slate quarries was:

Maine, 60,000 squares; Vermont, 130,000 squares; Pennsylvania, 320,000 squares; New York, 10,000 squares; Virginia and Maryland, 20,000 squares; other localities, 60,000 squares.

The Pennsylvania quarries, which produce more than half the slate turned out during the year, have been worked about 15 years. The largest quarry was opened in 1865. It contains 60 acres, gives employment to 200 men, and produces 40,000 squares a year. The most durable slates are those from Southern Pennsylvania (Peach Bottom) and the Maine slates. The latter rival the best slates of Wales. The dark blue or blue-black slates are most durable. The fancy colored slates—green, purple, red, variegated, etc.—do not hold their color. Red slate is most expensive: during the past season from $7 to $9 per square. The Peach Bottom slates have ranged from $5.50 to $6 50; Maine slate, $5.50 to $7.75; common Pennsylvania, $4.50 to $5.25; Vermont purple, $5 to $5.50; green and variegated, $3.50 to $4.50.

Elastic Adhesive Plaster.

Dr. W. P. Morgan, in a communication to the *Boston Medical and Surgical Journal*, states that he has been trying to obtain an elastic adhesive plaster, that when attached to the skin it should yield to the movement of the muscles and parts beneath it without the sensation of stiffness or an uncomfortable wrinkling.

Not being able to obtain an article of this description, I procured some India-rubber, and giving it a coat of plaster, such as is recommended in Griffith's Formulary under the name of Boynton's adhesive plaster (lead plaster one pound, rosin six drachms), I found the material I wished. After using it as a simple covering for cases of psoriasis, intertrigo, etc., I extended its use to incised wounds, abscesses, etc., and found it invaluable.

Placing one end of the strip of the plaster upon one lip of the wound, and then stretching the rubber and fastening the other end to the opposite lip of the wound, I had perfect apposition of the severed parts, the elastic rubber acting continually to draw and keep the parts together. When I have been unable to get the sheets of rubber, I have used the broad letter bands (sold by stationers) by giving them a coat of the plaster.

Correspondence.

Iridium.—A Letter from Mr. Holland.

We have received from Mr. John Holland, of Cincinnati, a small section of a small bar of iridium, cast by his new process, which we lately described in the SCIENTIFIC AMERICAN. Here is a metal that looks to the eye like polished steel, but is heavier and harder than steel, will not rust, and is not affected by the ordinary magnet. It seems destined to occupy in the near future a very important place in the arts. Mr. Holland writes us as follows:

To the Editor of the Scientific American:

As you considered my discovery of a cheap and effectual manner of melting iridium worthy of several editorial notices in my old favorite paper, the SCIENTIFIC AMERICAN (I have been a subscriber for it since 1858), I take the liberty of presenting you with a specimen of the metal, which please accept with my compliments. This specimen I broke off from a bar 12 inches long, which was cast in an open ingot. The ore was Russian, which I find softer and less refractory than the California iridium; still I have melted all kinds of the ore, and made it run about as free as silver. I use a common draught furnace and a Hessian crucible.

I will add that I have spent over $10,000 in money and been twenty years experimenting almost daily on this metal trying to melt and mould it. I now feel thankful that I have lived to accomplish it in a thorough and practical manner. The quantity of the ore is quite large in Russia and in California.

I hope soon to see it extensively used in the mechanical arts. It is very hard, will not oxidize, and is not magnetic.

I have kept one piece of it, 8 dwts. in weight, on the negative pole of a dynamo-electric machine for five weeks. There was no loss in weight, and had it not met with an accident by falling while hot it seemed likely to last for a long time. The light produced was white in color, and as the iridium is a good conductor of electricity the light was fully one-third stronger than the lamp made with both poles of carbon.

Thanking you for your kindly notices, I beg to say that I feel more satisfaction in the realization of the benefits this metal will be to the mechanical world than for any money I may make by it.

JOHN HOLLAND.

Cincinnati, June 18, 1881.

The Pursuit and Destruction of Icebergs.

To the Editor of the Scientific American:

From accumulated observations during many years past there is reason to anticipate an unusually heavy flow of icebergs along and obstructing the steamship commercial zone of the Atlantic Ocean as the summer advances. During the last year, 1880, the iceberg drift was reputed to have been almost unprecedented, and in repeated instances marine disasters have been attributed to that cause. The severity of the recent winter throughout the high northern latitudes would seem to strengthen the apprehension of their impending recurrence. Recently in connection with the subject of Arctic exploration, I have suggested that when a ship becomes beset by ice floes and icebergs, torpedoes should be employed, charged with dynamite and other explosives, and in cases of urgency the artesian auger resorted to for the purpose of rending and demolishing formidable icebergs to, set ships free from their fatal embrace.

Considering the transcendent importance of a safe route of ocean transit, it would seem expedient that the great commercial powers should co-operate in the employment of explosives and every other resource of modern engineering to free the ocean of these leviathans of the Arctic zones. The pursuit would, perhaps, prove a pleasant recreation, stimulating the ambition of the gallant sons of the sea.

June 17, 1881. DANIEL RUGGLES.

Three Horses Abreast.

The American Express Company has introduced into New York the system of harnessing three horses abreast, after the fashion of the London omnibuses. The change has been made on two of the wagons for an experiment, with very satisfactory results. The wagons are supplied with two poles instead of one, and each of the three horses is attached to a separate whiffletree. This is found to be a decided improvement over the system sometimes used of putting one horse in shafts and another at each side. The harnessing is practically the same as with two horses, with two poles instead of one. The experiment is tried upon the wagons that deliver goods in the upper part of the city, not only because the loads are frequently too heavy for two horses, but to enable the drivers to make up for lost time with an increased rate of speed, when from any cause they are delayed at the start.

Alligator Leather.

The rapid increase in the demand for alligator leather in Europe makes it possible that alligator farming may become an important industry in our Southern swamps. The foreign demand already amounts to many thousand hides a year. The tanning of alligator hides began about twenty years ago. At first Louisiana furnished the skins and New Orleans was the center of the traffic. The general slaughter of alligators soon made them scarce in that State and now Florida is the chief source of supply. The tanning is done here at the North.