

stage the steam engine, as represented by those of the turbine type, is far in advance of the steam generator, judged on a basis of power for weight. It now remains for someone to make as big a reduction in boiler weights as Mr. Parsons has in engine weights. This will probably come in the direction of the rapid generation of steam in boilers of small capacity, of the kind used by Serpollet in his steam carriage, or that exhibited by De Laval at the Stockholm Exhibition, which is credited with carrying a pressure of 3,000 pounds to the square inch. The difficulty, of course, in the case of steam pressure running into the thousands would be the high temperature it would carry. A small and compact boiler capable of instantly generating 1,000 pound steam from small quantities of water supplied to it as required would be the logical counterpart of the turbine running at 2,000 revolutions per minute and expanding the steam to zero, which is what the Parsons triple expansion turbine now accomplishes.

WARNING TO INVENTORS.

As the new amendments to the patent law go into effect on January 1, 1898, it is well that inventors, both here and abroad, should bear in mind several of the very important changes which may seriously affect their rights.

1. Under the new law a patent cannot be obtained for any invention which has been patented or described in any printed publication in this or any other country more than two years prior to the application.

2. No patent shall be refused nor shall any patent be declared invalid by reason of its first having been patented in a foreign country, unless the said application was filed more than seven months prior to the application in this country.

3. The application must be completed and prepared for examination within one year after the filing of said application. In default thereof it shall be regarded as abandoned.

4. An interference will not be declared between an original application and a patent issued more than two years prior to the date of filing the said application.

In view of these changes in our patent practice, it is desirable that those who are interested and who will be affected by the laws as above mentioned should file their United States applications before January 1.

We have a number of times called attention to these impending changes, but they are of such great importance, particularly those mentioned in paragraphs 1 and 2, that we take this occasion to again call attention to these points.

It should at the same time be borne in mind that the term of the United States patent will not be shortened by the prior filing or issuing of a foreign patent for the same invention. It is possible, therefore, for the American inventor now to proceed with foreign applications without waiting for his United States patent to be issued.

LIEUTENANT PEARY IN ENGLAND.

Lieut. Peary has arrived in England, and before he sailed he stated that after delivering a lecture before the Royal Geographical Society on December 6, and later before the Scottish Geographical Society at Edinburgh, he would go to Dundee, Peterhead and Aberdeen to look over the whaling fleets there and pick out a vessel from 300 to 500 tons register for his next expedition to the Arctic regions. We have already outlined Lieut. Peary's plan of campaign.

Speaking of the doubt that Nansen had thrown upon the genuineness of the meteorite which Mr. Peary recently brought from the Arctic region, the Lieutenant said: "Nansen spoke hastily on his arrival, but when he found he was wrong he frankly and courteously admitted his error. The impression has gone abroad that there is some feeling over the matter between Nansen and myself, but that is not true. I have the utmost admiration for Nansen and the magnificent work he has done." On the afternoon of December 8 Lieut. and Mrs. Peary paid a visit to the British Museum, where they were met by the Director Sir William Fowler and Curator Fletcher, of the Mineralogical Department. Mr. Fletcher examined a specimen of the Cape York meteorite discovered and brought to New York by Lieut. Peary, and unhesitatingly declared it was certainly of meteoric origin. He added that no specimen in the British Museum had meteoric characteristics more sharply or more clearly shown than those of the Cape York meteorite. The opinion of Mr. Fletcher, who is an expert, has so thoroughly convinced Dr. J. Scott Keltie, Secretary of the Royal Geographical Society, that it is considered by him to have settled the controversy as to the Cape York meteorite.

Mr. Peary complained in London of Captain Sverdrup's unfairness in going to Smith Sound next summer, but a dispatch from Christiania states that Capt. Sverdrup wrote to Mr. Peary some time ago that he did not aim to reach the Pole, but only intended to explore Greenland and to make a study of the ice. He imagines that Lieut. Peary cannot have received his letter.

ONE OF THE USEFUL APPLICATIONS OF THE STORAGE BATTERY.

BY WILLIAM BAXTER, JR.

When the storage battery first came prominently before the world, it was thought that its great field of usefulness would be that of the transportation of energy from coal fields and large water power sites to centers of industry. It was also believed that it would enable the electric motor to become a formidable rival of the steam locomotive, not only because it would reduce the cost of hauling a train, but because, in addition, it would remove many of the objectionable features of steam transit, such as smoke, cinders, etc. When put to the test it was found that the batteries, at least as then constructed, could not withstand the hard usage to which they were subjected in railroad work; and as to their value as transferrers of energy from the source of supply to the points of demand, it was found upon investigation that they could not compete with existing methods, even if made sufficiently substantial to endure constant usage with slight deterioration, and so perfect electrically as to have the greatest storage capacity, per unit of weight, consistent with theoretical possibilities. In this latter field they would necessarily fail, because, if made as light as possible, they would weigh at least twelve pounds for each horse power hour capacity, and as good steam engines can develop the same amount of energy from three or four pounds of coal, the weight of batteries to be transported back and forth would be three to four times that of the coal necessary to do the same work. The batteries then made weighed from one hundred and fifty to two hundred pounds per horse power hour capacity, instead of twelve; hence, the difference in weight to be transported under the actual conditions was so great as to render it impossible to accomplish anything practical in that field, even if the energy could be obtained free of cost.

When it was seen that the storage battery could not accomplish anything of a revolutionary character, those interested in its development began to study its adaptability to less pretentious work, and soon realized that it would be decidedly valuable as an adjunct to electric lighting stations, as it would be to these what the gasometer is to a gas distributing system—a reservoir from which the demand of customers could be supplied, should it become necessary at any time to stop the machinery for a few hours. Without the aid of storage batteries, if from any cause the operation of the generators is suspended, the lights will instantly go out and remain out until the generators are set in motion again. After years of persistent and very commendable experimental work, the inventors of storage batteries succeeded in making these devices sufficiently durable to withstand the wear and tear they are subjected to in station work, without unreasonable deterioration. Since that time they have been used to a considerable extent in that field, and within the last two years their use has been increasing at a very rapid rate; in fact, a first class station of to-day would not be considered complete without a storage battery plant.

The first battery plants installed in lighting stations were intended simply as a safeguard, to render it possible to keep up a supply of current in case of accident to the machinery; but it was not long before it was realized that by enlarging the capacity of the batteries, the output of the station could be greatly increased without materially increasing the expense of operation. How this result can be accomplished will be readily understood when it is considered that the demand for light is not uniform throughout the whole twenty-four hours, but varies from little or nothing, during the day and the early hours after midnight, up to the maximum amount between nine and ten in the evening. The station capacity, however, must be sufficient to meet the greatest demand; therefore, during the greater part of the time the machinery is only worked to a fraction of its full capacity. By using storage batteries, the generators can be worked to their full capacity all the time, and when the demand of consumers is small the surplus energy is stored, to be given out when the demand is in excess of the amount developed by the machinery.

From the very fact that the demand for current is variable, it becomes possible for batteries to be used not only to reduce the cost of production and increase the capacity of the station, but also to reduce the cost of line wires. This last result can be accomplished in any case where the station is located at some distance from the district in which the current is distributed. To illustrate this point, suppose the station is located say one mile from the center of the city or town in which the lights are used. If the current runs direct from the generators to the customers' lamps, the line wires must be of sufficient size to carry the maximum supply with a loss of pressure low enough to not interfere with the brilliancy of the light. If the maximum demand lasted for a considerable portion of the day, the full capacity of the line wire would be used to a reasonable extent, but the duration of this maximum demand is seldom over one-half, or, at the most, one hour; therefore, during the rest of the time a large portion of the line capacity may be re-

garded as wasted. The difference between the average and the greatest demand varies within wide limits, in different stations, but in the majority the ratio is not much below one to two. Whatever it may be, however, if the current could be supplied at the average rate, and the excess over the demand when the consumption is small were stored, the amount so stored could be used to supply the deficiency when the demand is large. This is accomplished in many cases at the present time by placing a storage battery plant at the center of the district in which the customers are located. The wires coming from the generating station are so connected with the battery and the distributing mains that, whenever the drain is less than the current coming from the station, the batteries are charged, and when the demand is in excess of the current from the station, the battery feeds into the distributing mains. The current passing from the generating station to the battery station is about ten per cent more than the average demand, so as to cover the loss in the charging and discharging of the batteries.

The saving in wire by this arrangement will run from about twenty-five to seventy-five per cent, depending upon the relation between the average and the maximum current, and also upon the amount of energy that is lost in transmitting the current from the generators to the battery. When the generating station feeds directly into the distributing mains, the loss of energy in transmission is governed by the condition that the pressure of the current must not drop so much as to interfere with the brilliancy of the lights, and therefore the line loss is generally low; but when batteries are used, located at the center of distribution, they regulate the pressure of the current supplied to the lamps; and, therefore, the loss between generator and battery may be made anything desired, without affecting the brilliancy of the lights. If the power is obtained from a waterfall or from coal near a railroad, when it can be obtained at a very low price, it may be more economical to increase the loss of energy between generator and battery, and thus reduce the cost of line wire, but such conditions cannot be taken advantage of if the battery is not used.

FURTHER RECORDS FOR THE KAISER WILHELM DER GROSSE.

The Kaiser Wilhelm der Grosse has added further records to those which she has already placed so rapidly to her credit. As already mentioned in previous issues, she has accomplished the longest all-day run by covering 564 knots within the twenty-four hours, and she now holds the record of an average hourly speed of 22.35 knots for the whole trip across the ocean. This is 0.34 knot faster than the best trip of the Campania. When she left New York on her last passage she passed the Sandy Hook Lightship 4:30 P. M. Six days later she passed the Needles at 3:10 P. M., the total distance covered being 3,065 knots, and the actual time five days, seventeen hours and eight minutes. This is equivalent to a railway speed of 25½ miles per hour; and when we remember that this speed was maintained uninterruptedly for a distance equivalent to 3,524 land miles, we realize that steamship travel is well up to the average performance of the overland trains of but a few years ago.

AN EXCELLENT HOLIDAY GIFT.

As the Christmas season approaches we desire to call the attention of our readers to the appropriateness of our new work, "Magic: Stage Illusions and Scientific Diversions, including Trick Photography," as a holiday gift. It is a large octavo volume of 568 pages, embellished with 420 illustrations, and is tastefully bound in imported cloth stamped with ink of three colors. The book appeals to all classes, and purchasers have the satisfaction of knowing that the profession have indorsed it as "the standard work on magic." The press notices have been quite exceptional. A number of interesting letters have been received from prominent magicians. Our readers hardly need to be informed of the quality of the illusions or the thorough manner in which the tricks are exposed, as excellent examples have been in the SCIENTIFIC AMERICAN since the publication of the book.

SINKING OF THE HAVANA GRAVING DOCK.

In our issue for October 16, 1897, we illustrated the new floating dock for the port of Havana, procured in England at great expense and transported to Cuba with great difficulty. On December 6 the dock began to sink slowly. It is now beneath the waters of the bay. The unexpected disappearance of the dock created great consternation in the navy department and in the palace of the captain-general. The floating dock went down slowly and majestically and no one appears to know what was the matter with it. It is thought by some that the Cuban insurgents did something to it which caused it to sink, but this seems hardly possible, as there was no difficulty in guarding the dock. It is fortunate it went down slowly; for, had it gone down suddenly, there would probably have been great loss of life. Over two hundred men are working to float the dock, but their efforts thus far have been unavailing.