given rise is the successful attempt to photograph the interior of a coal-mine in Pennsylvania. The mine selected for the experiment was the Kohinoor colliery at Shenandoah, operated by the Philadelphia coal and iron company, from whose representatives all necessary facilities were obtained.

The experiment was conceived of, and successfully carried out, by Mr. James Temple Brown, who was sent out from the metallurgical department of the National museum to collect specimens illustrative of the coal industry. An attempt was first made to photograph by the aid of magnesium light, but the results proved unsatisfactory. The Arnoux electric-light company then volunteered to supply an electric plant, and to erect and take charge of it gratuitously. The five negatives obtained by the use of this light were highly satisfactory, and show some features of coal-mines which probably have not hitherto been seen by scientific men, nor, indeed, by miners themselves, whose feeble lamps give them only a glimpse of the immediate surroundings.

The photographs will be enlarged, and exhibited at the New Orleans exposition. Whatever credit attaches to this somewhat novel undertaking is due primarily to the generous encouragement of the director of the museum, and to the thoughtfulness and energy of Mr. Brown. The representatives of the Philadelphia coal and iron company very kindly gave the matter their personal attention, and the photographer employed for the work labored enthusiastically for the results obtained.

F. W. TRUE.

U. S. National Museum, Sept. 5.

ELECTRICAL TESTING ESTABLISHMENTS.

THE *Electrical review* seconds the suggestion of the *Engineer*, that an 'electrical testing establishment' be founded in England, where any ambitious inventor may find the apparatus and conveniences which he may need for a proper testing and perfecting of his ideas. The *Review* calls attention to the impossibility of a poor man, however ingenious he may be, being able to work upon any improvement in cable telegraphy, as at least an artificial cable must be at his command, — a necessity which would cost him several thousand dollars. In the same way with experiments on electric lamps: the cost of the necessary plant is very considerable, and the amount required for supplies to be used in constant trials is by no means to be neglected.

The founding of such an establishment for the aid of inventors has been suggested by several of the successful members of the class in America, but has not, we believe, been carried out. There would, at the start, be the difficulty of deciding as to the worthiness of any scheme which might be brought forward for development. The inventor is necessarily an enthusiast, and an extremely fickle being, who would come in one morning all aglow for a new form to be given the carbon filament in an incandescent lamp, and the next would have nothing of lamps, but would earnestly urge some peculiar construction of telephone-cable to get rid of the 'cross-talk.' This constant jumping, accompanied by the necessary amount of perseverance, leads him finally to some goal, but at the same time makes him an obnoxious companion to the steady-going workman who must needs follow him, nothing being more discouraging to an artificer than to see the results of his one day's work overthrown on the next.

It may be urged, that the man with capacity for improving the methods of the world's work will sooner or later, but surely, push himself forward into a position where he can help himself through a connection with some rich telegraph, electric-light, or manufacturing company, where his powers will have full play, and his suggestions be listened to and put in effect. It should also be considered whether, in establishing any 'helping-hand' arrangement, the principal or only result would be to assist those for a time who give promise of valuable development, but who are lacking in the strong fibre necessary for successful accomplishment. Notwithstanding all objections, it may appear to some that the possibility of enabling some one worthy man to bring his work to perfection ten, twenty, or thirty years before he could if left to his own unaided resources, would justify the expenditure of considerable sums on what would be found to be the chaff of inventions. What the result might be, is very difficult to say. There might be some very successful work done in such a laboratory, properly guarded, and where the applicants were kept as constantly as might be to their purpose: there certainly would be a vast number of cranks knocking at the door.

The editorial in the *Electrical review* brought

out a response from one of the 'electrical schools' of England, which shows the result of the trial of such a method of aiding inventors, although a free use of the laboratories could not be offered. In this reply it is stated that the school has for several years openly offered the facilities of its laboratories to any inventor who may come forward, and wish such facilities to aid him in perfecting his work; and that as yet they have received two applications, both of which were withdrawn on account of the remuneration which the school felt called upon to ask. One of the applicants was a cable company, and considered five shillings a day too much for the use of the very extensive apparatus required; and the other looked upon five pounds as excessive for the use of power and a dynamo, with skilled superintendence and advice.

As the most feasible solution, for the present, of the question, how to advance the uses of electricity, many of our large telegraph, telephone, and electric-light companies have established testing-laboratories for the use of their employees, and give regular employment to professional inventors whose researches are directed by the officers of the company; but little is done in these laboratories to promote research by persons not connected with the companies themselves. Our universities and technological schools, in many cases, possess well-equipped physical laboratories, containing electrical testing-apparatus for the use of the students. These laboratories exist for the purpose of promoting research, and might, under suitable restrictions, be thrown open to inventors as well as to students.

However the difficulty is to be met, it is undoubtedly the case, that research looking to the utilization of electricity as a motive power and as a source of light is fettered and hindered by the expense of the apparatus required. If a special laboratory, to be under the direction of suitable persons, could be established in this country for the promotion of electrical research, especially for research in those branches that necessitate the employment of expensive apparatus, invention in these branches would be stimulated, and the whole community would be the gainer. In France the profits of the late International electrical exhibition have been devoted to the establishment of an electrical laboratory. Perhaps the managers of the forthcoming electrical exhibition in Philadelphia may take the hint.

AMERICAN APPLIANCES FOR DEEP-SEA INVESTIGATION. — TRAWLS AND TANGLES.

Beam-trawls.

THE beam-trawls designed for zoölogical collecting have usually been patterned closely after those employed by the English fishermen, and in this form are well adapted for moderate depths of water. In fact, the only objection to their use in great depths is their liability to capsize while being lowered, often causing them to land upon the bottom wrong side up. They were first employed on this coast by the fish-commission in 1871; and the earliest records of their use by the English, in deep water at least, are given in the Challenger narrative (beginning in 1873), no reference being made to the subject of beam-trawls in the account of the voyages of the Lightning and Porcupine. In all the exploring-work of the fish-commission, the beam-trawls have been used quite as frequently as the dredges; the trawling-results being far richer as to the larger forms of life, and including immense numbers of fishes which could never be obtained by the dredge, and would otherwise have remained undiscovered.

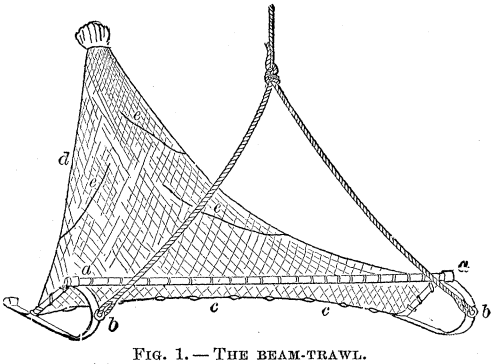

FIG. 1. — THE BEAM-TRAWL.

As is known to most naturalists, the beam-trawl (fig. 1) consists of a large, tapering, bag-like net, which is dragged over the bottom, mouth forwards, to entrap such fish as live close to the ground. The mouth is held open