thing but Gulf weed, the branches and leaves of which were, however, evidently knit together, and not merely balled into a roundish mass; for, though some of the leaves and branches hung loose from the rest, it became at once visible that the bulk of the ball was held together, by threads trending in every direction among the sea weeds, as if a couple of handfuls of branches of sargassum had been rolled up together with elastic threads trending in every direction. Put back into a large bowl of water, it became apparent that this mass of sea weeds was a nest, the central part of which was more closely bound up together in the form of a ball, with several loose branches, extending in various directions, by which the whole was kept floating.

A more careful examination very soon revealed the fact that the elastic threads which hold the Gulf weed together were beaded at intervals, sometimes two or three beads being close together, or a bunch of them hanging from the same cluster of threads; or they were, more rarely, scattered at a greater distance one from the other. Nowhere was there much regularity observable in the distribution of the beads, and they were found scattered throughout the whole ball of sea weeds pretty uniformly. The beads themselves were about the size of an ordinary pin's head. We had, no doubt, a nest before us, of the most curious kind; full of eggs too, the eggs scattered throughout the mass of the nest and not placed together in a cavity of the whole structure. What animal could have built this singular nest, was the next question. It did not take much time to ascertain the class of the animal kingdom to which it belongs. A common pocket lens at once revealed two large eyes upon the side of the head, and a tail bent over the back of the body, as the embryo uniformly appears in ordinary fishes shortly before the period of hatching. The many empty egg cases observed in the nest gave promise of an early opportunity of seeing some embryos freeing themselves from their envelopes.

THE EGGS HATCH OUT.

Meanwhile, a number of these eggs with live embryos were cut out of the nest and placed in separate glass jars to multiply the chances of preserving them, while the nest as a whole was secured in alcohol, as a memorial of our unexpected discovery. The next day I found two embryos in one of my glass jars; they occasionally moved in jerks, and then rested for a long while motionless upon the bottom of the jar. On the third day I had over a dozen of these young fishes in my rack, the oldest of which begin to be more active and promise to afford further opportunities for study. The pigment cells of a young *chironectes pictus* proved identical with our little embryos. It thus stands as a well authenticated fact that the common pelagic *chironectes* of the Atlantic (named *chironectes pictus* by Cuvier), builds a nest for its eggs in which the progeny is wrapped up with the materials of which the nest itself is composed; and as these materials are living Gulf weed, the fish cradle, rocking upon the deep ocean, is carried along as an undying arbor, affording at the same time protection and afterward food for its living freight.

This marvelous story acquires additional interest if we now take into consideration what are the characteristic peculiarities of the *chironectes*. As its name indicates, it has fins like hands; that is to say, the pectoral fins are supported by a kind of prolonged, wristlike appendages, and the rays of the ventrals are not unlike rude fingers. With these limbs these fishes have long been known to attach themselves to sea weed, and rather to walk than to swim in their natural element. But now that we have become acquainted with their mode of reproduction, it may fairly be asked if the most important use to which their peculiarly constructed fins are put is not probably in building their nests.

LOISEAU'S COMPRESSED FUEL.

HALL OF THE FRANKLIN INSTITUTE, PHILADELPHIA, DECEMBER 19, 1870.

The committee on science and the arts, constituted by the Franklin Institute, to whom was referred for examination specimens of artificial fuel, prepared by Mr. E. F. Loiseau, of Philadelphia, have made the following report:

That they have made trials of the samples produced from anthracite and from bituminous coal.

The mode of manufacture, as related by Mr. Loiseau, is as follows:

1. Anthracite small coal and dust were mixed with (7) seven per cent of clay, and compressed into cylindrical molds about 4½ inches in diameter and 4 inches deep, or else into spherical masses about 3 inches in diameter.

2. The molded masses are placed for a few minutes in a bath of benzine, in which rosin had been dissolved, and from which they are removed, and dried by an exposure to a current of air.

The object of coating them with a film of rosin is to prevent the absorption of moisture and consequent softening of the clay; the solution in benzine penetrates the mass of coal and clay to a depth of about ¼ inch, and so efficiently closes the crevices, that samples immersed in water for twelve hours were found dry in the interior when broken up for examination.

Both the anthracite and bituminous fuels were burned in a furnace measuring 9 inches in diameter and 7 inches in depth; each variety of fuel burned freely, and was completely ashed, but the intensity of the combustion was less than that produced by anthracite or bituminous coals of small size, burned in the same furnace. These comparisons were made with a moderate and also with a strong draft.

The average amount of ash obtained from the anthracite artificial fuel was 16 per cent, and, from the bituminous artificial, was 18·5 per cent.

The heating powers, as obtained from trials in Thompson's apparatus, are as follows:

One pound of anthracite fuel, in each of four experiments, gave the results 4·30, 85·0, 7·86, and 6·76 lbs. of water evaporated, being an average of 6·85.; while one pound of bituminous artificial fuel, in each of four experiments, evaporated 9·35, 11·11, 12·88, and 10·61 lbs., averaging 10·99. The anthracite average is 7·40 lbs. of water. The average of bituminous is 14·88 lbs. of water.

The non-uniformity of result is partly due to the imperfect manipulation in mixing the coal and the clay, and partly to the varying amounts of solution of rosin absorbed in the bath to which the material is subjected; the imperfect manipulation can be remedied by the adoption of proper machinery for that part of the process.

The ability of the artificial fuel to bear transportation is less than that of anthracite or good lump bituminous coals, but the structure is firmer than that of many bituminous and semi-bituminous coals that are carried to market. The masses will generally break up with a fall of 3 feet upon a stone pavement, but are strong enough to bear ordinary handling and transportation; and should they become broken, will suffer no damage, unless exposed to wet.

The samples of artificial fuel examined are well adapted for use for purposes in which great intensity of combustion is not desired.

For the production of steam in stationary boilers, and for household purposes, it can be employed equally as well as any ordinary coal; and, whenever the cost of preparation is less than the cost of mining coal, this invention will make available the immense amounts of small coal now allowed to remain useless at the coal mines. It appears to work far better than the balls or bricks of coal dust and clay and lime that came into vogue in this city many years ago, when anthracite was brought to market without preparation by the coal breaker, which had not then been invented; the balls or bricks thus made not having the protection from wet secured by Mr. Loiseau, by his resinous coating.

We consider the method of preparing artificial fuel from waste anthracite and bituminous coals, as presented by Mr. E. F. Loiseau, as ingenious and well adapted to the purpose, and worthy of the attention of those interested in the production of a cheap fuel, adapted to a great variety of uses.

Respectfully submitted.

Charles M. Cresson, William H. Wahl, John Wise. } Sub-Committee.

By order of the Committee,
D. Sheppard Holman,
Actuary.

[The samples of artificial fuel, presented to the Franklin Institute to experiment upon, were simply pressed by hand and could not be made as solid as they will be when pressed by appropriate machinery.

The percentage of ash is larger than in ordinary coal, as the clay is not consumed; but the other advantages of the artificial fuel, in point of durability, cleanliness, and cheapness, more than compensate this small disadvantage.

The cost of manufacture at the mines, including the coal and all the materials, will, it is stated, not exceed one dollar per tun.—EDS.]

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NEW BOOKS AND PUBLICATIONS.

SCIENCE RECORD FOR 1872. Being a Compendium of the Scientific Progress and Discovery of the Past Year. 400 pages, octavo. 100 Engravings, Steel Plate and Wood. Handsomely bound in muslin, $1.50: extra binding, half calf, $2. Munn & Co., Publishers, 37 Park Row, New York, Office of the SCIENTIFIC AMERICAN.

This new and elegant work presents, in convenient form, notices of the leading subjects and events, pertaining to science, that have occupied public attention during the past year. The progress of the more important public works is duly chronicled, with illustrative engravings. The leading discoveries, facts, and improvements, in chemistry, mechanics, engineering, natural history, and the various arts and sciences, are recorded and illustrated. Sketches of prominent scientific men, with illustrations, are given, and among the portraits are those of Faraday, Murchison, Darwin, Agassiz, Huxley, and Herschel. The Mont Cenis tunnel, the Hell Gate works, the Brooklyn suspension bridge, the Hoosac tunnel, the St. Louis bridge, the United States Patent Office, and other works are illustrated. A large amount of useful information, tables, descriptions of improvements, with engravings, are likewise presented. The book is one of much interest and value, and should have a place in every library.

APPLICATIONS FOR EXTENSION OF PATENTS.

SAWING MACHINE.—Harriet L. Low, Galena, Ill., administratrix of Henry H. Low, deceased, has petitioned for an extension of the above patent. Day of hearing, February 28, 1872.

TURNING AND SLIDING TABLE FOR RAILROAD.—William Sellers, Philadelphia, Pa., has petitioned for an extension of the above patent. Day of hearing, March 6, 1872.

COMBINATION OF LEAD PENCIL AND ERASER.—Hymen L. Lipman, Philadelphia, Pa., has petitioned for an extension of the above patent. Day of hearing, March 13, 1872.

MODE OF PROTECTING GILDING ON GLASS.—Peter V. Mathews, Philadelphia, Pa., has petitioned for an extension of the above patent. Day of hearing, April 10, 1872.

Value of Extended Patents.

Did patentees realize the fact that their inventions are likely to be more productive of profit during the seven years of extension than the first full term for which their patents were granted, we think more would avail themselves of the extension privilege. Patents granted prior to 1861 may be extended for seven years, for the benefit of the inventor, or of his heirs in case of the decease of the former, by due application to the Patent Office, ninety days before the termination of the patent. The extended time inures to the benefit of the inventor, the assignees under the first term having no rights under the extension, except by special agreement. The Government fee for an extension is $100, and it is necessary that good professional service be obtained to conduct the business before the Patent Office. Full information as to extensions may be had by addressing

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