with a spider web of guys and hoist ropes, unload baled or loose hay with magical speed, either from street or boat. The operation is quick and noiseless. A platform twenty feet wide projects from the third floor into the hay room Here are located the hay cutter, and elevators to carry cut hay into the bin constructed for it on this floor. The second floor of the machinery department contains the latest improved machinery for car construction. Above it on the third floor the cars are painted and prepared for use. The cars come on tracks from the car house over the bridge, and are hoisted and lowered from story to story by means of an immense elevator in the southwest corner of the machinery building.

The milling department, with its paraphernalia of mill bins, scales, shafting, etc., stands on a floor over the storage bins, and is a model. Through the wall of this room a door opens into the cut hay bin; near this, in the floor, a trap door, being raised, discovers a cavernous space, with glimpses of shafts and arms. Into this the cut hay, meal, and bran, are drawn in proportions, motion is given, and, in a few minutes, the bottom falls, the mass is taken by an elevator and thrown into a car on the milling floor, thoroughly prepared for the horses. The whole operation is so simple, so easy, and out of sight, and the feed is mixed so thoroughly, that it is most interesting to witness. The whole of this work has been done under the supervision and direction of the president of the company, Mr. Henry Hurt. How well it has been done a visit will show.

The mechanical portion of the work was designed and constructed by Messrs. Ferrell & Mucklé, of the Enterprise Hydraulic Works, Philadelphia.

Correspondence.

The Devil's Darning Needle.

To the Editor of the Scientific American:

The *Diapheromera femorata* described in a recent number of the SCIENTIFIC AMERICAN, by our distinguished entomologist, Professor Riley, is found in Iowa, but never, so far as known, so abundantly as to materially damage trees or shrubs. It is locally known as the "devil's darning needle." The time of its first appearance in the spring seems to be variable. Evidently quite young individuals, light green in color, and from three eighths to one half inch in length, have been first seen by the writer on July 3 in one case, on June 22 in another, and on May 25 in a third.

A single observation would indicate that the adult individuals may sometimes survive the winter, and may be partially aquatic in habit. About the first week in April, 1878 (the exact date not being recorded), the writer saw an adult male of the species swimming freely in a pool of water situated in a meadow, fully a quarter of a mile from the nearest grove. It swam almost wholly submerged, seeming perfectly at home in the water, and in no way disposed to leave it. The preceding winter was unusually mild.

A precisely similar case in every particular was reported to the writer about five years previously; but he was strongly inclined to doubt the statement until confirmed by his own observation. Yours truly,

W. J. MCGEE.

Farley, Iowa, July 21, 1879.

Effect of Exposure on Anthracite Coal.

To the Editor of the Scientific American:

"F. G." asks, "Is there any truth in the assertion that anthracite coal loses its heating qualities after being exposed to the air for any length of time?" to which you give a dogmatic No." I have handled, in all capacities, except as a hand laborer underground, for over 41 years, anthracite coal. With this experience, I can assure you that your answer needs modification. Anthracite coal, kept in a reasonably dry atmosphere in the dark, and not subject to violent changes in the temperature, your "No" is correct, as the deterioration would be imperceptible. But change the status. Place anthracite coal in the weather, exposed to storms of rain and snow, and to sunshine, water, heat, and cold, the deterioration is great, not less than ten per cent per annum for the first five years. WM. LILLY.

Mauch Chunk, Pa.

The Pearl Fisheries of Ohio.

About twenty years ago pearls were discovered in the Little Miami River, Warren County, Ohio, and since then the search for them has been one of the recognized industries of the region. The Cincinnati *Commercial* says that the mussels which furnish the pearls are found in beds anywhere from the banks to the middle of the river, and are generally discovered by the feet of the pearl fisher. About fifty men and boys are engaged in this work. They wade into the river from depths reaching from the knees to the neck.

With their feet they feel the shells, and raise them by their toes to a height where the hands can reach them without stooping so as to bring the head under water. Miniature canoes, tied to the shore and floating out, are used to deposit the shells. When a bushel or more have been collected the fisher goes to the shore, and sitting down on the grass, in some cool shade, he opens the shells with a large knife.

The pearls are found between a slight membrane that lines the shell and the shell itself—a translucent web of texture between a cobweb and a film of mica. Occasionally the pearl is embedded in the shell so firmly that only an expert lapidary could safely detach it. This is rare. The number of pearls found in a single shell at the Miami fisheries rarely exceeds three, and on an average only one shell out of one hundred and fifty has any pearls at all. It is a common experience to bring to shore bushels of shells with never a pearl. One may work for days with no reward; again, he may make from five to one hundred dollars in a single day. The uncertainty is probably half the fascination of the work to the peculiar class of men and boys who prosecute it.

About a year ago a wealthy banker of Waynesville, Mr. J. H. Harris, began to purchase the pearls, which had previously been bought by New York and European dealers chiefly, and has since made a large and fine collection. Mention is made of one fine specimen, the Everhart pearl, found in the Miami and sold to Messrs. Tiffany & Co., in New York, for $900. The Tiffanies sold it to a party in France for $1,000, bought it back for $1,500, and made a final sale of it for $2,800.

The season of the pearl fisheries of the Little Miami lasts only from June till October, as it is necessarily dependent upon the warmth of the water. The fisher works about six or seven hours per day, seldom remaining longer than two hours, consecutively, in the water. It would seem as if the work would be very unhealthy, leading to malaria and all its attendant train of low fevers and vital exhaustion, but it was not spoken of particularly in that way.

There are pearls found in other parts of Ohio, but are of the milk-white, owing to the lack of the calcareous deposit that abounds in Warren County. The pearls of the Little Miami region are of a soft, sky-blue, pink, golden tinged, and iron color, with specimens that show a pure type of each, and others that are blendings of all. The colors, of course, are not solid, but exquisite tints and shades, changing with the angle of refracted light. The size ranges from that of a mustard seed to the size of a bullet.

Many of the old Indian mounds that have been opened contain pearls, showing how ancient their existence is. These pearls in the mounds lie as if they had been strung, but they crumble at a touch.

Recently a pearl of the most extraordinary beauty and brilliancy was accidentally found on the Waynesville side of the river by Morton L. Roberts, a little lad of eleven years, the son of Mr. J. A. G. Roberts, of the Adams Express Company, of Cincinnati. Morton was visiting some relatives there, and went down to get mussel shells to border a flower bed for his aunt. There were a quantity of these that had been looked over by fishers and thrown aside, and it was in one of these that the observing eye of the little boy detected the gem that promises to be a very valuable one. It is said to be the largest pearl ever taken from this region, and perfect in its symmetry. It has the brilliancy of the purest and most intense tints of the opal. It seems to rest in an aureole of colors, so delicate, yet so glowing, as to suggest to one a dream of color. The pearl will undoubtedly prove one of very rare value. Its weight is six carats.

Rules of the National Board of Health.

The National Board of Health, which was created by a recent act of Congress, with full authority to take charge of all places in the United States in which infectious and contagious diseases may appear, have issued the following rules and regulations to be enforced during the existence of yellow fever:

Every train leaving an infected city, town, or other place, shall be inspected by a competent medical man, who shall give to the conductor of said train a certificate of the results of his inspection. It shall also be his duty to furnish certificates to each passenger, and no passenger shall be permitted to leave an infected place without such certificate. No person having fever shall be allowed to take passage on such train. All cars leaving such place shall be thoroughly cleansed and fumigated with sulphurous acid gas, by burning 18 ounces of sulphur for every 1,000 cubic feet of space, and closing up the car tight for six hours prior to date of leaving. No upholstered car shall be allowed to leave a dangerously infected place. All baggage shall be thoroughly disinfected at the station before leaving. At a point not less than five miles, and as near this point as possible from the point of departure from a dangerously infected place, there shall be an entire transfer of passengers and baggage to other cars, which cars shall never enter an infected district. This transfer shall be made in the open air, under the supervision of a medical officer, and as far from a habitation as possible, and no person with fever shall be allowed to proceed, but shall return to the point of departure, or be treated in hospital at or near the place of transfer. No sleeping car shall be allowed to leave a dangerously infected place, nor shall any sleeping car approach nearer such place than the point of transfer. Any passenger car leaving such infected place shall be thorcughly ventilated during its passage to the place of transfer, by having the windows of the cars open during such passage.

In cases of suspected infection of a passenger in a sleeping car, such car, including all the upholstery, cushions, curtains, mattresses, etc., shall be thoroughly disinfected, under the supervision of a medical officer, and shall be exposed to the open air for at least 20 days, before being again used.

All freight shall be transferred at a point not exceeding 50 miles from the point of departure, and the cars from which such freight has been transferred shall not proceed further on the road, but shall be returned to the point of departure. The freight cars, after unloading, shall be thoroughly cleansed by scrubbing, fumigation, disinfection, and ventilation.

Mail matter and mail bags should be heated to a temperature of 250° Fah., or should be otherwise disinfected before they are sent from infected places.

At some point, not less than 50 miles from the first transfer station, a second complete transfer of passengers and baggage is desirable, and should be provided for by the authorities of the States through which the lines run. If yellow fever infect a place situated upon a line of railroad, trains of all kinds may be permitted to pass through without stopping, at a speed of not less that 10 miles an hour, provided the National Board of Health has not declared it dangerous to do so, and published, through the local health authorities, a special rule forbidding it; but they shall not take on passengers within one mile of such infected place, and all persons taken on shall first obtain the certificate from the local officers set forth herein. No train having a certificate of such inspection, and no passenger having a proper certificate that he was free from disease and that his baggage was properly disinfected, shall be interfered with by any municipal or other local systems of quarantine.

Fortifying the Treasury.

The work of fortifying the Sub-Treasury Buildings, on Wall, Nassau, and Pine streets, New York city, goes on rapidly. The windows of the basement and first floor are being protected by steel bar gratings one and a half inches in diameter, nine feet long at the lower and eleven feet long at the first floor windows, completely covering the same from casing to casing. Each upright bar is pointed at the top; seventeen uprights are fastened to each of the basement windows and held in place by four cross bars. Five cross bars hold in position twenty-one uprights on each first floor window. The cross bars measure three inches, and are one inch thick. Fifty-two windows in the building are thus protected. Each of the cross bars weighs 100 lb., aggregating 25,000 lb., and the uprights average 15 lb. to the foot, making a total weight of over 100,000 lb. of highly tempered steel, strong enough to resist any attempt at removal. This grating, when complete, will not only give protection from without, but allow the windows to remain open for ventilation. An additional quarter inch steel plate is to be affixed to the present iron shutters, which are to be pierced for rifles. The loopholes are to be protected by coverings of steel. The riflemen, thus protected by the shutters, can sweep the streets from the north, west, and south sides of the edifice, they being concealed in a bullet proof fortification. Besides the loopholes for rifles, arrangements have been perfected for throwing hand grenades at a mob from the windows under the eaves of the roof, without exposing the throwers to any danger from the house tops opposite.

The architect of the Treasury Department has added another novel feature of defense. To repel an attack which might be made on the Treasury Building from the roofs of the Assay Office or the adjoining buildings owned by the government on Pine street, there will be three steel turrets built on the roof of the Treasury, in which will be mounted Gatling guns, which will have a clear sweep of every house top within range. It is expected to have the new fortification finished by the 15th of September. It must be remembered that from $150,000,000 to $200,000,000 are constantly in the vaults of the Sub-Treasury; hence the precautions taken by the authorities for the utmost safety of this vast treasure.

The Australian Exhibition.

Mr. O. M. Spencer, United States Consul General at Melbourne, Australia, reports that the relation which exists between the Sydney and Melbourne exhibitors is one of generous rivalry and cordial co-operation. The two cities will soon be connected by railway. There are several lines of steamships now plying regularly between the two places, with low rates for freight. The expense of transferring goods from Sydney to Melbourne will be moderate, including storage. Goods will be received at the latter Exhibition building on the first of June, 1880.

All the usual facilities accorded at previous international fairs in other countries will be liberally afforded at Melbourne. The protection of inventions capable of being patented is fully secured. Should the United States decide not to send out a man-of-war, it is advisable to ship all heavy goods in sailing vessels, via the Cape, not later than February, 1880. Goods from the Pacific slope and parcels of great value and small bulk may be shipped via San Francisco by the Pacific Mail Steamship Company, which runs a monthly line of steamers from San Francisco to Sydney. Show cases, shelving, belting, etc., may be procured in Melbourne at low rates, at the cost of the exhibitors.

A Berlin International Fishery Exhibition.

An international fishery exhibition, to be held in Berlin in April, 1880, promises to bring together displays from all nations. Although the exhibition is limited to a single industry and class of products, considerable variety is given to it by including—besides aquatic animals and fishing gear and craft and machinery used in the manufacture of fishing tackle and nets—models of fishermen's dwellings and costumes, objects and works referring to the history of fisheries, and maps showing the geographical distribution of fish. Exhibitors are to be under no expense except for transportation of exhibits to the Berlin termini and return, and the committee is not indisposed to bear this expense in the case of specially interesting and important objects.