A, under the control of the tongue, A, the opposite wheels, after leaving the rail, F, travel obliquely over the plate which supports the guard rail, D.

Should the main rail portion, *b*, of the frog become worn to such an extent as to require renewing, the tongue, A, becomes available. In this event the switch lever is to be turned into a perpendicular position, and the inner face or edge of the tongue establishes communication between the two ends of the main rail, B, as shown in Fig. 3, the rail, *b*, of the frog being out of use.

With this position of the frog the switch is misplaced for the turnout in both directions, and should a car upon the turnout accidentally approach the switch, its wheels upon the side next the frog will successively enter the groove, *c*, ascend its inclined bottom, and ride upon the top of the tongue, G, and will traverse the latter until they drop between the tongue and the outer rail or guard, *a*, and will, by the latter, conjointly with the tongue, be diverted into the groove, *d*, ascend the inclined bottom of the latter, and ride upon the top of the block, *e*, and traverse the latter, while at the same time the wheels upon the oppositely side of the car, in succession, leave the point of the rail, F, traverse the base plate until they run against the guard, D, and will by the latter be diverted to the main rail, *c*, the opposite wheels, at the same time and by the same means, leaving the block, *e*, and taking to the main rail, B, thus safely leading the car from the turnout to the main track.

It will thus be seen that the continuity of one rail of the main line is never ruptured or interfered with.

Figs. 5, 6, and 7 represent an improved railway crossing by the same inventor. The novelty lies in the peculiar construction of the cruciform chairs which support the tracks at their intersection and receive the bed timbers. The crossing shown in the engraving consists of two single lines crossing each other at right angles, but the device is applicable to two or more tracks crossing each other obliquely, and is capable of being applied to either horse or steam railways.

The chair, A, which supports the tracks at the point of intersection, is shown in detail in Fig. 6. It consists of a flat plate in the form of a Maltese cross, having ribs, B, for confining the ends of the several tracks, and provided with a ledge for separating the ends of the rails of one track, forming a flangeway for the car wheels. The cross-shaped casting has pendent ears, *c*, for embracing the timbers, as shown in the engraving.

This device renders what is usually the most unreliable part of the road as strong, durable, and reliable as other portions.

Further information in regard to these inventions may be obtained by addressing the Carey Switch Company, 25 State street, Boston, Mass.

THE GRANNY WHALE.

BY A. W. ROBERTS.

"The granny whale," "long-tailed unicorn fish," "file fish," "old wife," "trigger fish," and "fool fish," are the common and local names given to a variety of fish ranging from Cape Cod to Florida, and known to naturalists all the world over as the *Alutera cuspidata*, but from its supposed resemblance in outline to a whale, and its generally very aged and infirm look, suggests the possibility of its being the great-grandparent of all fish. An adult specimen, when taken from the water, conveys the idea of its being but a mere framework of bones, enveloped in a loose-fitting, baggy, moth and tan blotched skin. Its grinning, gumless teeth, and the feeble resistance it offers when handled, suggested to the fishers of Long Island the name of "old wife," the mother of all fish. It obtains the names of unicorn fish and trigger fish from the fact of its having a prominent movable spine situated on the forward part of the dorsal ridge, which is suggestive of a unicorn's

horn or a trigger handle. The name file fish was given to this fish on account of its skin being covered with minute but very keen asperities, suggestive of a fine file, emery paper, or shagreen. From the fact that it is exceedingly awkward in the water, often standing on its head with its unwieldy tail pointing directly upward, and at other times assuming an upside-down position, and the ludicrous attempts it makes at rapid swimming, together with the mean-

the foot of 85th street, East River, they having been attracted there by the immense quantity of tubularia growing on the timbers of the bath. I fed these young aluteras on clams at first, some of which remaining in the tank uneaten, I threw into the tank a couple of handfuls of *Buccinum* snails to clean up the uneaten food. Much to my surprise the young file fish set upon the snails, rapidly biting off their proboscis. This fact led me to establish a tank with

deep sand bottom, in which was thickly planted numerous small soft clams. When these had become thoroughly established I moved all the young file fish into the clam tank, the result being that in less than an hour's time not a single clam was left with a perfect siphon. Tubularians and other zoophytes are the favorite food of the file fish, they being furnished with teeth closely resembling the rodent quadrupeds', there being a provision for adding fresh substance to the tooth as fast as it is worn away.

It was astonishing how rapidly the largest masses of tubularia were mowed down close to the base by the sharp teeth of the file fish. These fish have the power of rapidly changing colors to a remarkable extent, so that when placed in a dark tank they become almost entirely black, and in a tank thoroughly illuminated with sunlight they assume a light yellowish color.

Shower of Water Beetles.

The people of Owensville, Mount Sterling, Sharpsburg, and intermediate places in Kentucky, were recently astounded by a veritable shower of large brown, oval-shaped beetles, measuring about one and a half inches in length by half or three-quarters of an inch in breadth. They proved to be

the well known water beetle (*Dytiscus reseli*). Whether they were migrating or had been swept into the air by a whirlwind, does not appear.

Fasting Horses.

To determine the capacity of horses to undergo the privations incident to a state of siege, a series of experiments were made with these animals in Paris, some years ago.

The experiments proved (1) that a horse can hold out for twenty-five days without any solid nourishment, provided it is supplied with sufficient and good drinking water. (2) A horse can barely hold out for five days without water. (3) If a horse is well fed for ten days, but insufficiently provided with water throughout the same period, it will not outlive the eleventh day. One horse, from which water had been entirely withheld for three days, drank on the fourth day sixty liters of water within three minutes. A horse which received no solid nourishment for twelve days was nevertheless in a condition, on the twelfth day of its fast, to draw a load of 279 kilos.

Two Patriarchal Apple Trees.

In Skowhegan, Me., are two russet apple trees; the oldest was planted in 1762. The tree is seven feet from the ground to the branches, five in number, all of which are very large and average 35 feet in length, covering a space of ground 63 feet in diameter. In these branches a playhouse for children has been built for half a century or more. Anywhere from the ground to the branches it measures 13½ feet. The tree is more than 4½ feet in diameter, and it has been a good bearer—

from twenty-five to thirty-five bushels of apples having been picked from it each year. But the frost and rain have made a seam in the branches, and recently one of them has broken, but the other four are green and bring forth their fruit in due season. The other tree, forty-eight years younger, is a sprout of the old tree. It stands thirty-two feet from the old tree, and bears the same kind of apples, is three feet in diameter, and perfect in every way. This farm was deeded to the grandfather of Coburn Ireland in 1760, has passed

RAILWAY CROSSING.

ingless expression of its bulging eyes, and its generally eccentric appearance, have caused it to be dubbed the fool-fish, for it is truly a burlesque on all fishes.

There are now on exhibition at the Aquarium several unusually fine living specimens of this fish, measuring from fifteen to twenty inches in length, which were captured by W. I. De Nyse, of Gravesend Bay, L. I.

The young of the alutera is described by De Kay as a

THE GRANNY WHALE.—(*Alutera cuspidata*.)

separate variety under the common name of the long-tailed unicorn fish, and the adult he names the orange file fish. In local color and markings the young of the alutera are very different from adults, they having longitudinal markings of a rich purplish-black and brown, extending from the nose to the tail, while the adults are of a general dingy orange color with markings of light brown in blotches.

In a tank at the Aquarium I placed some fifteen specimens of young alutera that were taken at the swimming baths at

from father to son until 1876, and then passed into the hands of Daniel H. Gould, the present owner.—*Boston Transcript.*

The Pine Tree Passing Away.

A correspondent of the *Cincinnati Gazette*, writing from Alpena, Mich., says:

Alpena is one of the many Michigan towns that are springing up along the lake shore at the mouths of rivers whose tributaries flow through the great pine forests of the State. Every river throughout the constantly receding timber belt of Michigan, now reaching from the Saginaw Valley to the Straits of Mackinaw, sufficiently large to float a raft of logs, becomes a highway between the lumber camps, wherein motley crews of men, gathered for a few winter months from all nations of the world, rob the forests of their precious pine. The time is near when the pine hoarded by nature for ages within the bosom of her forests will be exhausted; when the rough woodsman will have departed to other lands; when the saw mills, now bustling with life, will stand silent and deserted. What is to be the future of this region when that time shall arrive? Is it to remain a useless waste, awaiting the slow restoration of its forests? It is certain that the agricultural value of the land, stripped of its pine is proving to be much greater than was formerly supposed. Clearings are being made, and good crops of wheat, oats, hay, and potatoes raised. A tide of emigration in this way is following the woodchoppers, and converting the mutilated forests into prosperous farms. When the terrible forest fires of Michigan swept over ten thousand acres of pine land along the Lake Huron coast, south of Saginaw Bay, and destroyed whole towns, many lives, and millions of dollars' worth of property, the lumbering interests were utterly destroyed. Not a single mill, I am told, in all that region has since been built. It was thought the fire had ruined the future of the burned district, and that it would be henceforth valueless. These fires occurred the year of the Chicago fire, just nine years ago, and to-day this burnt district is said to be the finest farming region of the State.

The destruction of the pineries of Michigan, Wisconsin, and Minnesota is a matter of importance. How long will the forests of these three States, that contain the chief stores of pine timber on this continent east of the Rocky Mountains, continue to supply the enormous drains being made upon them? One example will show how rapid is the process of destruction. The Saginaw Valley formerly contained the largest and finest pine forests in the State of Michigan. Mill after mill was built along the banks of the river, until their united capacity reached six hundred million feet of lumber per year. To supply these mills the pine in the Saginaw Valley has been already in great part exhausted, and mill owners are obliged to bring logs from other rivers, often as far as one hundred and fifty miles distant, to supplement the stock of the Saginaw River. The output on that river has reached its climax. No more new saw mills are built or old ones replaced. The business must gradually diminish in volume until the Saginaw Valley, now the greatest lumber district in the world, shall hear the buzz of the saw no more.

Talking to a gentleman of Alpena, who has witnessed the growth of the lumbering business of that place almost from its commencement, and whose business for years has kept him accurately posted as to the quantity and location of the pine in the Alpena district, he said that, dividing the number of millions of feet of pine timber tributary to the Alpena river by the annual capacity of the Alpena mills, it gave them fifteen years' supply. These figures agree very closely with those given me a few weeks ago by the president of the largest logging company on the Mississippi River, operating in the Wisconsin pineries, a region that had been worked much less extensively than the Michigan pineries. They would last, he said, thirty or forty years. The Minnesota pineries are not so large as either of the others, and will probably not survive them. In from twenty-five to forty years the last tree will be cut, and the entire country from Maine to the Rocky Mountains must learn to live with meager quantities of pine lumber brought at great expense from distant countries.

The pineries cannot be replaced. A full grown tree represents hundreds and hundreds of years of growth. I saw small pines, no larger around than a man's arm, bearing the scars made by the axes of the United States Engineers thirty-five years ago. What ages, then, must be required to produce a tree three or four feet in diameter? When these forests reach the condition of the pineries of Maine and New York, and become extinct, no new ones will take their places. The American of the near future must learn to hew and build without pine, and marvel at the thoughtless recklessness of his ancestors.

Rust-Proof Iron.

Mr. George Bower has invented, and his son has improved, a process for coating iron with an indestructible surface of magnetic oxide, which is said not to be open to the objections to the Barff process.

The process, which is not secret, consists in heating the articles to be coated in a closed chamber by means of carbonic oxide, heated air being made to enter the chamber for the double purpose of burning the gas and for combining with the iron. The excess of air, after burning the carbonic oxide gas, combines with the iron, forming first the magnetic oxide, and then the hydrated sesquioxide, or common iron rust. By shutting off the supply of air until only

enough is admitted to burn the carbonic oxide, the rust is converted into the magnetic oxide. The process is repeated until the film is sufficiently thick for the purpose of protection. When complete the film has a beautiful French gray tint.

The *London Times* states that the application of this invention has been undertaken on a large scale, the chamber where the oxidization is now carried on being large enough to contain about a ton of miscellaneous articles. The value of the invention, and of the method of applying it, is no longer a matter of doubt, the severest tests having been made of the iron coated. The earliest experiments only produced a film that would peel from the metal; but by the new method a coating is made which is inseparable from the metal. Inasmuch as the cost of oxidization is less than that of a coat of paint, it has become evident that the next generation, at least, may be happy with cheap and indestructible iron.

AN EXTRA-SENSITIVE THERMOMETER.

Professor Dufour, of Paris, has devised a small thermometric apparatus, which is so sensitive that it will even denote, by a deflection of the index needle of nearly two inches, the entrance of a person in the room where it is placed. By putting the hand near the bulb the needle is

DUFOUR'S EXTRA-SENSITIVE THERMOMETER.

deflected the whole extent of the graduated arc. This apparatus, which we find described and illustrated in *La Nature*, consists of a bent tube, M, carrying at one end a bulb, B, which is coated externally with lampblack. The tube is filled from M to M with mercury, and is supported by arms pivoting at C on a steel knife blade. Just above the pivot is fixed an index needle which moves across a graduated arc. Beneath the pivot hangs a rod, I, to which is attached by friction a small weight, R, that serves to balance the needle so as to make it point to zero on the arc. When the temperature rises, be it ever so slightly, the heat, being absorbed by the lampblack, dilates the air in the bulb, B, and drives the mercury forward. The center of gravity of the apparatus being displaced, the needle will immediately turn toward the right. When, on the contrary, the temperature decreases the needle will point toward the left. To prevent the instrument tipping over on a sudden and considerable elevation of temperature, two small pins are placed beneath the tube at G G. The hooks seen near the bulb serve to hold substances whose diathermic powers it is desired to ascertain. The heat source is introduced into the aperture in the plate, H H.

Coret's Thermometer.

Coret solders end to end many concentric tubes of different metals, steel and zinc for example. By alternating the joints the differences of dilatation are added, so that the last tube, being connected with a toothed wheel or series of levers, gives a great motion to a needle, sufficient to indicate small fractions of a degree of temperature. The metals being good conductors, the indications are rapid when the metallic mass is placed in contact with any body of which the temperature is desired. The tubes can be concentrated in a space of less than two centimeters (0.79 inch). The thermometer is, therefore, very convenient for medical use.—*Bull. de la Soc. d'Encour.*

Where the Lumber Goes.

Were any illustration needed to exemplify the fact that the demand for lumber and timber product was on the increase, it were only necessary to see the immense quantities which are being shipped daily to the far West, and to examine the order books of our principal yard dealers. Shipments to Nebraska are nothing more than is found in the ordinary course of trade, but these as a rule are to established yards; but when it comes to shipments to points far from the line of roads, and where a large cartage expense is necessarily entailed, we begin to realize that the country is

rapidly settling up, in advance of the building of railroads, which will each month make demand for greater quantities of lumber in the building of houses, barns, granaries, and fences.

Shipments have been made, during the past week, of fencing for points fifty miles north of the Union Pacific Railroad, three hundred miles west of Omaha. This and other shipments to the same State is to be used in building fences around cattle ranges, at points where, but a few years back, the wild Indian roamed at will in his hunt for the buffalo which abounded upon the broad prairie that is now brought, or rapidly being brought, into subjugation to supply the wants of a numerous population of civilized men. Rapidly as new railroad systems are being created, they do not keep pace with the restless activity and daring enterprise of a people which has spread in a single century from the circumscribed and sparsely settled coast of the Atlantic, with its total population of four millions, to an equally sparse population of fifty millions scattered over a continent capable of sustaining five hundred millions, without crowding and without attaining the density which characterizes the older nations of the world.

The grain crop of the season is unexampled in its abundance, and in many sections but scant provision has been made for its protection pending its sale. Since the harvest has disclosed the extent of the property to be taken care of, the poorer among the farmers having ascertained that they can pay for it, are now looking for the lumber requisite to protect the grain they have raised, and the cry, while imperative, comes from a newly-settled country, as well as from those portions which have been longer under improvement. In this latter, the crop of this year is but supplemental to previous successful ones, and the dug-out in which the emigrant has been content with a simple shelter, must now give way to a comfortable dwelling, while the outdoor stack must be more safely housed in granary or in barn. There is now no endeavor on the part of the dealer in lumber to urge the sale of his stock. It is wanted in almost all localities fully as rapidly as the dealers can obtain it, and in this market the demand is as heavy as the dealers desire to turn over their stocks, and, so far as assortments go, heavier than they can conveniently supply.

The condition of things described above is a full explanation of the immense demand for lumber from the railroads which are extending main lines and building branches in every direction, to accommodate and to extend the area of new settlement, and as well to take advantage of the enterprise, which is the outgrowth of the older and more populous localities. The mills of the Northwest, and as well those upon the lines of travel in the South, have, throughout the entire season, been utterly unable fully to respond to the demands which have been made upon them for railroad timber used in the construction of bridges, culverts, and depots, and with every railroad improvement the march of settlement has ever increased. During the last fiscal year, the government reports show an emigration from foreign lands of nearly five hundred thousand souls, whose demand for lumber, at the general average of five hundred feet to the person per year, will amount to two hundred and fifty million feet. This is in addition to the increase in the demand from the natural increase of our previous population, and, from present indications, will continue through a repetition or continuance of emigration for years to come. Meantime, our leading cities display an increased demand for wood products, in their expansion of growth and manufactures, while the growing population of the prairies and the Western mountains are building villages and creating new cities. Truly, this is a wonderful country, and we cannot but admire the beneficent provisions of nature in the adaptations of timber growth, as well as of minerals, to the sustenance and comfort of the people which is called so speedily to transform its wild and inharmionious elements into elements of grandeur, growth, and development.—*Northwestern Lumberman.*

The Sweet Potato Crop.

The *Tribune* obtains from one of the leading dealers in sweet potatoes in Washington Market, the following information in regard to the sweet potato crop of 1880: There is now no doubt that there will be an abundance of sweet potatoes this year. Along the east shore of Virginia, where most of the stock is now coming from, there was a large amount of ground planted, and the yield has been very good; the quality is excellent. Delaware "sweets" are just beginning to arrive, and there, also, there will be a good crop. It is probable that the crop generally will exceed that of last year. The Delaware tubers are considered the best, and the Virginia stock ranks next. A considerable quantity is raised in New Jersey, but they are of inferior quality, generally small, and cook unsatisfactorily. A large part of the Delaware crop is kiln-dried every year to make them keep late in the winter. The crop is planted at different times, so that it matures about as fast as wanted during the fall. Farmers began digging some time ago, and will continue until November.

The bulk of the crop comes to market in sailing vessels, which hold from 500 to 1,000 barrels each. Large quantities also come by the Old Dominion steamers from Norfolk and Richmond. Others are shipped by railroad by the way of Baltimore. Sweet potatoes are generally packed for shipment in barrels with canvas tops. Holes are cut in the sides to admit the air, as they are more delicate than their Irish cousins and