Plating Metals with Lead.

The method of lead plating depends upon the use of a hydrogen flame for covering the clean surface of metals with lead or some alloy thereof. It owed its origin to the fact that in some printing processes the printed fabrics are run through hot or cold sulphuric acid, and it was found that no metal was sufficiently indifferent to hot and cold acid, with the changes of temperature, for making the necessary rolls of sufficient strength, combined with lightness.

Among many other combinations experimented with was that of covering iron homogeneously and to any desired thickness with lead, and this actually succeeded. The metal to be covered is pickeled and cleansed in dilute sulphuric acid, then rinsed with water, painted over with soldering acid (zinc dissolved in hydrochloric acid), and tinned. Hard lead was then put on the perfectly clean surface, or a good, pure alloy, just as may be preferred, and heated with the hydrogen flame. The surface is then worked over by hand or mechanically.

Rolls made in this way have a clear metallic ring when struck, from which we may conclude that there is an intimate union of the two metals. The structure of the lead coating suffers no change in boiling sulphuric acid of 60° B., and is absolutely tight.—*Polytechniker.*

What Paint Best Protects Iron?

Among the things that require the most protective paint for iron are carriages, farm wagons, plows, and agricultural implements, from which fact it seems feasible that manufacturers of the like ought to be able to give the best information required. Any mineral paint would answer the purpose much better, and I maintain that the paint that most effectually protects iron is red lead. Not in color is it as well suited; but that is only a secondary consideration, and easily overcome by painting it over with any color desired. It contains the following advantages for the preservation of the iron, which is the main object to be gained:

1. Dries easily with raw linseed oil, without an oil-destroying drier.

2. After drying, it remains elastic, giving way both to the extension and contraction of the iron, without causing the paint to crack.

3. It imparts no oxygen to iron, even when constantly exposed to damp—a fact to which all farm wagon makers can testify.

4. It hardens, where it has been spread thickly, without shriveling, forming the toughest and most perfect insoluble combination of all paints. As proof of this assertion, it is used by calico printers for red figure prints, holding out against soap and water; by gas pipe fitters, as the best paint to resist ammonia and tar; by the English iron ship builders, for painting the hulls of iron ships, namely, two coats of red lead and two of zinc white; by wagon and plow makers, for painting wagon gears and plows; by knowing carpenters, for painting wood that comes in contact with damp brick in walls, as it preserves wood from rot, insects, etc.

For those among us who are uninstructed how to mix pure red lead for paint, it should be made known that pure red lead powder, after being slightly pressed down with the finger, shows no lead crystals. When they are visible, it is merely partly converted, and not first quality. It should be ground in pure, old linseed oil, and if possible used up the same day, to prevent it combining with the oil before it is applied, losing in quality. No drier is necessary, as in the course of a few days the oil forms a perfect, hard combination with the lead. American linseed oil is as good as any imported, where the manufacturer has given it age, and not subjected it to heat, as is the custom, by steaming it in a cistern to qualify it quickly for the market. It deteriorates in quality when heated above 160° F. This red lead paint spreads very easily over a surface, and the best of finish can be made with it, even by a novice in painting.—*Louis Matern, in Carriage Monthly.*

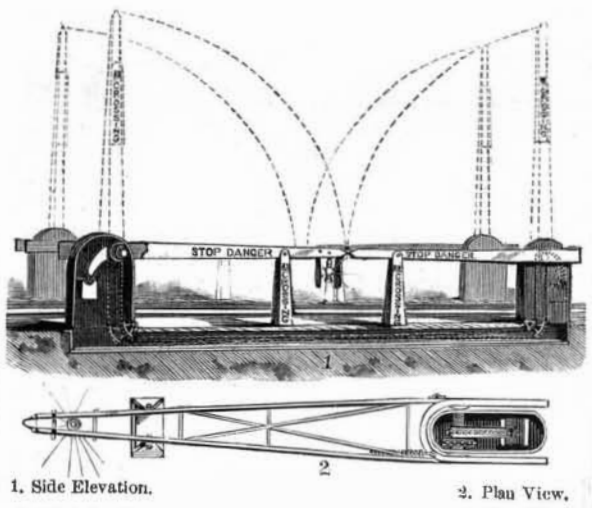
Anti-torpedo Ship.

A singular type of invulnerable war vessel has lately been offered to the notice of the British Admiralty by Sir Edward Reed. He proposes making a convex decked vessel to contain engines and battery, as also men's quarters, stores, magazine, etc., to be supported by a lower portion, which is a cellular boat composed entirely of small air tight and water tight compartments, which will not allow the vessel to sink in consequence of a local injury; and if the lower portion is entirely destroyed by a torpedo the upper portion is expected to become a sea-serviceable raft. The contour of the armored deck is expected to deflect hostile shell and shot, and the under or boat portion is to be only the buoyant means of ready movement; but the upper portion in itself is expected to float if not to readily maneuver, even if the lower portion should be destroyed.

NEW RAILROAD SIGNAL.

A novel and very simple railroad signal and gate is shown in the annexed engravings. By means of this apparatus a train moving along on the track will automatically, by means of pneumatic pressure in suitably arranged pipes, announce its approach to stations or crossings, far in advance both by visible and audible signals, thus informing passengers at stations to be in readiness for the train and notifying travelers on the highway to clear the track.

This apparatus also divides the track into sections or blocks of any desired length, signals being placed at each end of the block, so that a train on entering will automatically move a signal to indicate "danger" to any train following on the same track, until the first train has passed through the "block," and will then actuate a second mechanism, which sets another danger signal and communicates



1. Side Elevation. 2. Plan View.

1. Side Elevation. 2. Plan View.

McLEOD'S RAILROAD GATE.

back to the first signal and moves it to indicate "safety;" and it can be arranged to communicate forward by the same mechanism and set an advance signal, and by interlapping them so as to have the train act upon the second or third signal away, and always leave the nearest signal set to indicate danger, any part of the track can in this way be positively and effectually guarded without any additional expense, manual attendance, or electrical appliance.

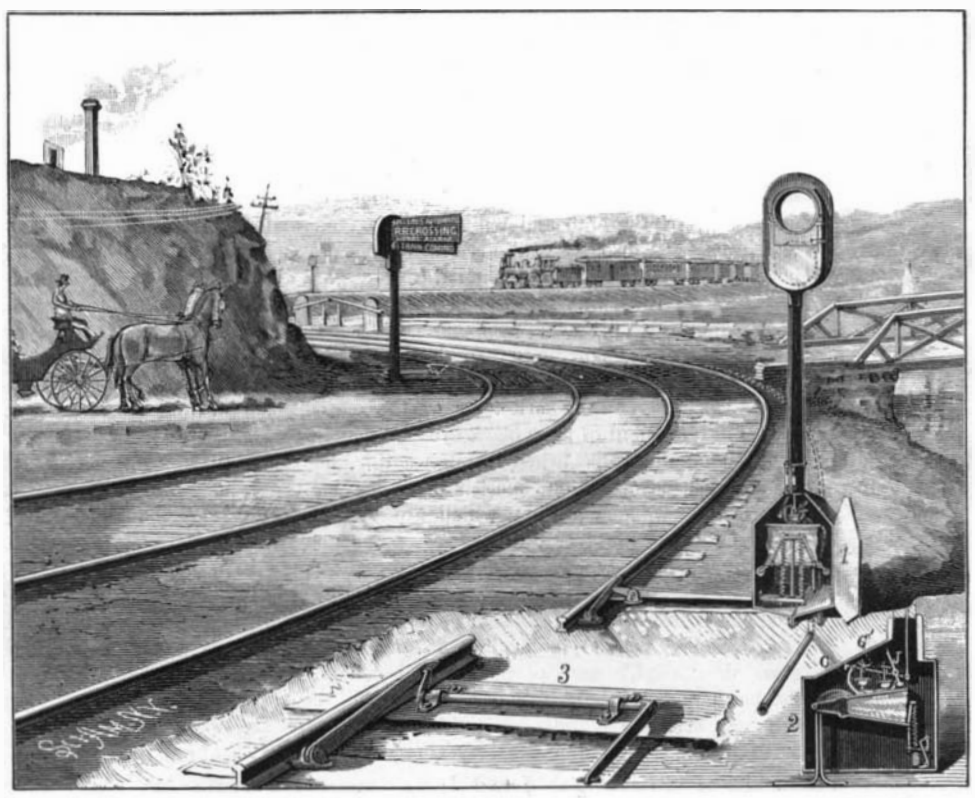
The inventor also combines with the switch a device whereby an engineer will be informed before reaching the switch whether or not it is in condition for his train to pass. These improvements are calculated to add materially to the safety of railroad travel, and will permit of largely increased travel on the same track, and add greatly to the revenue of railroads.

In operation the tread of the forward car wheel, passing over the incline bar shown at 3, depresses it, and throws up the actuating lever, which, at the bellows, is caught and held up by a catch lever, compressing the spring which yields to that sudden action, and, gradually pressing against the movable portion of the bellows, forces the air to the expansion valves and sets the signals. Experiments have shown that in about one second after the actuating lever is held up, the air moves the valve about one-third of a mile away, and in three seconds the gong is sounded and visible signals given, which so continues until the train passes by and stops it. In case of a train stopping before it reaches the signal, it is so arranged as to automatically stop itself in three minutes. The catch lever will hold up the actuating lever until the air is forced from the bellows, the movable portion of which will automatically disengage the levers and allow it to reset in about one minute. Thus the catch lever holds the incline bar below the contact of the following wheels, and also at the signal the lever is so connected with the weight, that when it is wound up it will hold the incline bar below the contact of following wheels until the weight runs down again, thus averting all unnecessary wearing of the signal mechanism.

An automatic crossing gate, devised by the same inventor, shown in Fig. 4, is operated on the same principle as the signal. An air switch signal has also been devised which is attachable to all switches and draw-bridges, so arranged by means of a double air action as to insure its operation, and when the main track is switched to the right, it will display a right hand danger signal about one-quarter of a mile each way, to notify any approaching engineer, and *vice versa*, left hand. It is also applicable for yards and stations, to signal coming and going trains.

All the mechanism of this apparatus is as simple as the striking side of an ordinary clock. We are informed that a man with one blow of his breath through the pipe can set the signals one-third of a mile away. The apparatus works the same in all kinds of weather and by all kinds of trains. We understand it has been tested three winters on the railroad, and has proved entirely successful.

Further information in regard to this apparatus may be obtained by addressing to McLeod Air Railroad Signal Company, 4 Pemberton Square, Boston, Mass.



2. Bellows Box. McLEOD'S AIR RAILROAD SIGNAL. 3. Signal Levers.

Horn from Sea Weed.

Under the generic term, "sea weed," the sea beaches offer to use as fertilizers a number of distinct vegetable productions, and two of them, at least, are recognized as materials for food. The *Rhodomenia palmata*, or dulse, is frequently sold on the streets of our seaside cities, taking the place of the school girl's chewing gum, while the *Chondus crispus*, known commercially as "Irish moss," is a favorite for the preparation of jellies and blanc mange. Now, it is claimed, that by experiment the *Zostera marina*, or "wrack," can be made to yield by treatment with mineral acids, a substance resembling horn, capable of being manufactured into forms, and of receiving color from pigments. This substance is called "algin," from *algæ*, the generic name of one common species of sea weed. The crude material can be obtained in large quantities on all exposed shores, and its preparation for ultimate manufacture is a cheap process.

Ambulance Stations for the New York and Brooklyn Bridge.

A frame building eight by twelve feet has been constructed on the river side of each tower of the bridge. In these buildings are placed the telephones, which form a part of a very complete system of communication reaching from one end of the structure to the other. The bridge officials are also providing stretchers to be kept at these stations, so that in cases of sunstroke, fainting, or illness from fits of any kind, the patient may be immediately removed by the officers to the buildings and thus receive the necessary attention. Printed directions for treating cases of sunstroke have been obtained from the New York Board of Health, and medicine will be provided at both termina stations and also at the towers. Superintendent Martin, in speaking of this matter, said: "We do not anticipate many sunstrokes on the bridge, as there is a cool breeze up there a good part of the time, but we want to provide for emergencies."

Yellow Pine.

The prejudices against this material for building purposes and inside finishing are disappearing gradually under the necessity for a substitute for the white pine, which is yearly becoming scarcer and dearer. The *Northwestern Lumberman* says that there has been a current belief in the Northern States that yellow pine will not hold paint satisfactorily. It has been thought that any exudation of pitch would stain the paint, and to a certain extent force it off. This idea, however, has been greatly magnified. In sections of the Southern States, where little besides yellow pine is used for building purposes, there is usually heard but little complaint. Occasionally, a builder will put a coat of alcohol over the outside work, which cuts any pitch there may be on the surface, but oftener no special process is employed. The color of yellow pine when left in its natural state or oiled is bright and enlivening. If its brightness is offensive to some tastes it may be modified and sobered by oil, and it will darken with age. By careful culling of the heart from the outer wood very fine effects in shading may be produced.

SHRINKAGE in lumber varies according to the tree from which it is made. Oaks will shrink in drying a half inch to the foot, while the redwoods of California show no perceptible change, and the heavy Eastern or South American woods lose but little.

The Dolphin at the Brighton Aquarium.

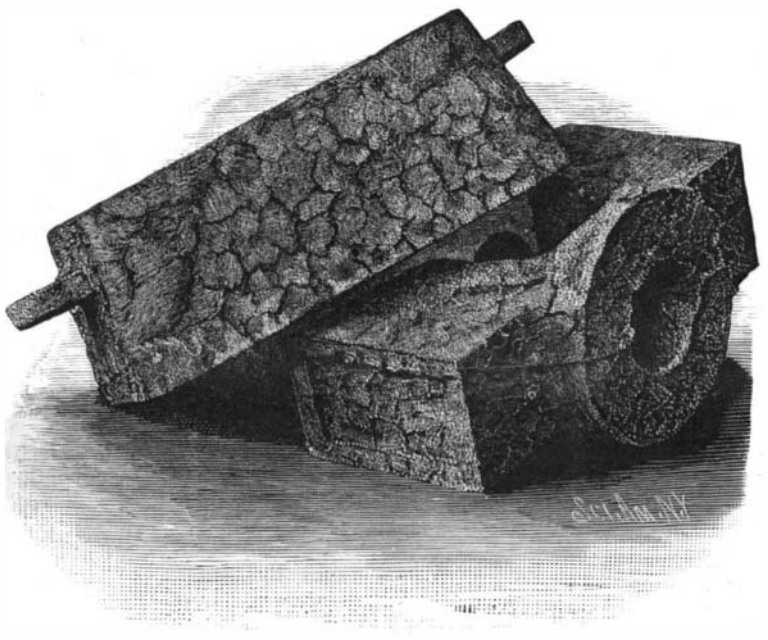
In a letter to the *Brighton Examiner*, Mr. Henry Lee writes as follows: "By the courteous invitation of the authorities of the Brighton Aquarium, I have paid a visit to the dolphin recently placed in one of the large tanks there. It is a full grown specimen of the common dolphin (*Delphinus delphis*), and is about ten feet in length. It was found, early on Saturday morning last, stranded in Selsea Bay, eight miles from any railway station; and by means of much toil, care, and skillful treatment, it was brought safely to Brighton by Mr. Lawler, the curator, after being out of the water for twenty hours. This is the third species of the whales that have been exhibited in this aquarium. The other two have been the common porpoise (*Phocæna communis*) and Risso's grampus (*Grampus riseus*).

The opportunities of observing closely the habits of the cetacea are so rare, and the average duration of their lives in captivity is so brief, that any one who feels interested in the movements, structure, and mode of life of these great sea beasts should not lose a chance of improving his acquaintance with them. In this instance, the difference between this dolphin and the porpoises previously seen in the Brighton tanks should be noted. It is of larger size, weighing about half a ton; its snout, instead of being rounded off like that of the porpoise, is lengthened out in form of a beak, both jaws of which are filled with simple, pinnate teeth; and the dorsal fin rises much higher, and the tail is rather wider across, than in the common porpoise. Those who have not seen one of these creatures under such favorable circumstances, should notice, also, its mode of locomotion. This is effected entirely by an up and down motion of the tail (unlike that of fishes, in which the movement of the tail is from side to side, except in the flat fishes), and the flippers, or "paddles," as they have been called, do not contribute to its progress in any way; they are only used as rudders and poisers. As the water in the tank has been lowered so far as to allow the dolphin to be seen when it rises to the surface of the water, the action of the blow-hole and the absence of all "spouting" should be remarked. In fact, by two minutes' intelligent observation of this interesting animal a grand practical lesson in comparative physiology is to be learned—one a thousand times more impressive than can be obtained from the most careful explanation in print. We have before us a warm-blooded animal of great brain capacity, full of intelligence, breathing atmospheric air by lungs, like ourselves, and the female of which suckles her young one, and attends to it with the greatest maternal affection. This highly organized creature, instead of walking on four legs on land, has to live and move in water; and, so, its shape is adapted to its necessities, and it is made in the external form of a fish. But it has to breathe air through its lungs, and not the oxygen contained in water through gills. If it were to inhale the air in the ordinary way—through its mouth—the water would enter with it, and choke it. To meet this difficulty, its windpipe is carried up to the top of its head, and is fitted with a valve which allows the exhausted air from the lungs to pass out, and fresh air to be drawn in, while it effectually excludes the water.

CURIOUS RESULT OF AN EARTHQUAKE.

The engraving represents the curious effect produced by an earthquake on iron castings poured at the time. The cut, which is about one-sixth the real size of the castings, was taken from a photograph sent us by Mr. F. Gergens, of Yokohama, where the earthquake occurred on June 10, 1883, at 4:30 P. M. Mr. G. attributes the waved surface of the castings to the agitation of the melted iron by the earth vibrations, the waved forms having been fixed by the cooling of the iron.

Two tons of castings made at that time all had the same appearance.



CURIOUS EFFECT PRODUCED ON MELTED IRON BY AN EARTHQUAKE.

Reduction of Ammoniacal Silver Solution by Dextrose.

It is well known that dextrose reduces the alkaline silver solution and deposits the metal in the form of a mirror. The quantity of silver precipitated by a given amount of dextrose has not hitherto been so well known, for where the only object is to get down all the silver, an excess of dextrose was of course employed. If, however, one wishes to utilize this reaction for estimating dextrose, it will be necessary to settle this point. B. Tollens says that since each molecule of sugar reduces 2½ molecules of copper in Fehling's solution, by taking up 2½ atoms of oxygen we should expect it to precipitate 5 or 6 atoms of silver. On the contrary, he found that it reduced at least twice as much. It does, indeed, reduce 12 or 13 atoms and takes up 6 atoms of oxygen; the greater or lesser quantity depending on the excess of silver in solution.

The hypothesis that 12 atoms of silver are reduced by 1 molecule of dextrose gives rise to this equation:

$$C_6H_{12}O_6+O_6=6CH_2O_2,$$

forming formic acid, and in fact a good deal of this acid is produced. The author also detected oxalic acid when there was an excess of silver, which requires 9 atoms of oxygen, reducing 18 of silver.—*Berichte.*

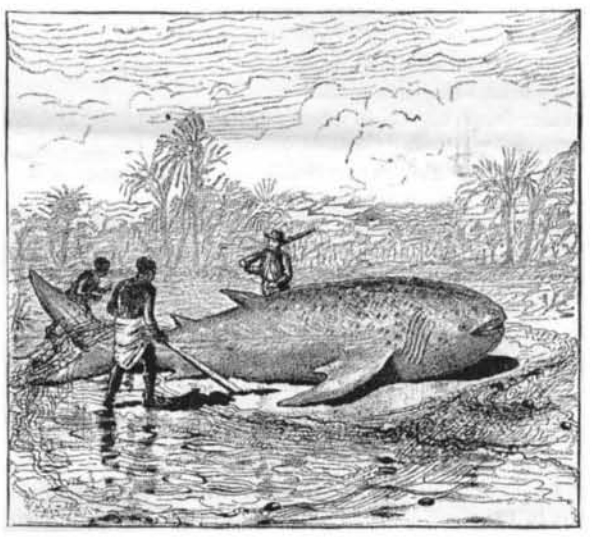
A REMARKABLE SHARK.

To the Editor of the Scientific American:

A perusal of the articles on sharks, appearing in two late numbers of your Export Edition, prompts me to mention a large African shark now in the Colombo Museum, and described per label as follows:

"*Smith's Spotted Shark* (*Rhinodon typicus*, Smith).—An East African shark, never before recorded from Indian Seas. Was caught in a fishing net at Moratuwa, January 5, 1883. Length, 23 feet; girth, 13 ft."

I have verified the above measurements, and can add that the mouth, which (unlike most other sharks') opens on a level with the snout, is 5 feet in circumference, destitute of teeth, but armed with strong cartilaginous bands; and the



EAST AFRICAN SHARK, COLOMBO MUSEUM.

gills, five on a side, behind the shoulders, are each 2 ft. 3 in. long. The color is dark brown, mottled all over the back and sides with spots very like in appearance the mottles on well groomed brown and gray horses.

The monster was, as is set forth above, caught in a net, more properly a seine, called by the Sinhalese *Maha-dthalle* (great net), which, by being run off into the sea a quarter mile or more, then carried along about the same distance parallel with the beach, and again brought to land, incloses many acres of water, at times teeming with fish, which are thus secured in large numbers; and it is a most animating sight, in traveling between Colombo and Kalutara by railroad or coach, to see the thousands of people, men and boys, engaged in this industry, for most of them are nearly amphibious, and while the seine is being laid out the water is alive with dusky human forms, big and small, swimming and disporting about among the fishes they are capturing; and when finally the cast has been made, and the word given to draw in the net, hundreds of willing hands take hold of the long drag ropes, and, to a lively song, march up the beach, drawing in their finny prey.

Ordinarily, a shark of such immense proportions would prove an unwelcome occupant of one of these nets, for he would soon demolish it. Accordingly, the presence of this one inside of their seine must at first have caused the fishermen some perturbation. It seems, however, that he lay nearly motionless on the water, and was easily drawn to the shore, upon reaching which he immediately expired. On examination, its stomach proved to be empty, which fact, together with its great size and easy capture, would indicate that the creature died of extreme old age. It was quite fat, however, and many gallons of oil were tried out of its blubber.

Unlike most fish stories, this one is true; and it also has its sentimental aspect, since the distinguished visitor and subject of it arrived here, probably after an exhausting journey from Africa, simultaneously with Arabi Pasha and his fellow exiles from Egypt, who are now living in Ceylon.

The waters of Ceylon abound in fish of great variety, among which are several members of the shark family, notably the white shark (*Squalus carcharias*), saw fish (*S. trestis*), from 12 to 18 ft. long, hammer head (*Zygæna vulgaris*), tope (*S. galens*), blue shark (*S. glaucus*), basking shark (*S. maximus*), the skin of which is used by the Chinese for making shagreen, monkey mouth shark (*Stegostoma tigrina*), tiger shark (*Galeocredo tigrinus*), mud shark (*Rhyncobates ancytortimus*), and at least two varieties of the sword fish (*Histophorus gladius*), all of which are carnivorous, and most of them used for food by the natives. More especially is this the case with respect to the flesh of young sharks, which is commonly given to women, shortly after confinement, under the supposition, true or false, of its conducing to an abundant supply of lacteal nourishment for the infant.

W. MOREY.

Colombo, Ceylon, March 22, 1883.

Should Women Ride like Men?

The above subject having created considerable discussion in the English newspapers, the *Lancet* (London) now takes it up and concludes that it would be as well to leave the determination of the question to those whom it principally concerns. We fancy they have no wish to change the custom. As a matter of fact, although it may not appear to be the case, the writer continues, the seat which a woman enjoys on a side-saddle is fully as secure, and not nearly as irksome, as that which a man has to maintain, unless he simply balances himself and does not gripe the sides of his horse either with the knee or the side of the leg. It is curious to note the different ways in which the legs of men who pass much time in the saddle are affected. Riding with a straight leg and a long stirrup almost invariably produces what are popularly called knocked-knees. Nearly all the mounted soldiers of the British army suffer from this deformity, as any one who will take the trouble to notice the men of the Life Guards and Blues walking may satisfy himself. On the other hand, riding with a short stirrup produces bowed-legs. Jockeys, grooms, and most hunting men who ride very frequently are more or less bow-legged. The long stirrup rider gripes his horse with the knee, while the short stirrup rider gripes him with the inner side of the leg below the knee. This difference of action explains the difference of result. No deformity necessarily follows the use of the side saddle if the precaution be taken with growing girls to change sides on alternate days, riding on the left side one day and the right on the next. The purpose of this change is to counteract the tendency to lean over to the side opposite that on which the leg is swung.

Losses by Fire.

An exchange thinks it is strange how accustomed people will become to the repeated occurrence of events which, if there were but one in a lifetime, or even in a series of years, would create the most intense excitement. Note, as an instance, adds the *Fireman's Journal*, the destruction of property by fire in this country. Think how many men, how much capital, and how great a share of the intelligent thought of the land are kept constantly employed because of this. Every municipality in the land is constantly agitated over the question of fire extinguishment, every property owner over the question of fire insurance, and every builder and property owner over that of fire prevention.

Each in turn gives employment to a vast number of men whose whole thought is engrossed by this annual wiping out of existence of a portion of the wealth of the land, by no means inconsiderable, whether regarded absolutely, or in its relation to the entire production of the year. Thus, since the 1st of January there has been destroyed by fire in this country, $34,960,727 worth of property, and we may reasonably expect that the final showing for the whole year will not be less than $77,334,500 worth.

Bartholdi, the French Sculptor.

Frederic Auguste Bartholdi, the sculptor, who is completing his immense statue of "Liberty enlightening the World" as a present to this country, is about fifty years old. He was a pupil of the famous Ary Scheffer, and was one of the French commissioners at the centennial exhibition at Philadelphia in 1876. He was so well pleased with his visit here that he decided on carrying out his previous intention as to the great statue, and on his return to France instituted a subscription for the construction of the gigantic figure for New York harbor, volunteering his work. And when subscriptions lagged, he pledged his own private fortune to its completion.

In addition to this statue, M. Bartholdi is engaged on the sculpture of a lion, to be cut out of solid rock, on the face of a mountain at Belfort, France, the figure to be eighty feet long and thirty feet high.

VISITORS find in some of the older houses of Nantucket tall Dutch clocks, with holes in the cases where screws had been taken out. This was done in order to banish wicked ornaments of brass and steel.