RECENT INVENTIONS.

An improved grub and stump puller has been patented by Mr. Joseph J. Marshall, of Pulaski, Tenn. This invention consists in a novel construction and arrangement with relation to each other of the arms which form the jaws, whereby lightness, strength, and efficiency are obtained.

Mr. Edwin A. Roth, of Philadelphia, Pa., has patented an improved milk cooling apparatus, in which the suspended vessel used for containing the ice is provided with a flexible drain pipe, which admits of using the ice receptacle as a cream receptacle.

An improved holding tool has been patented by Mr. John S. Birch, of Orange, N. J. The invention consists in constructing the holding tool with the case in the shape of a tube flattened upon two or four sides to give a side support to the jaws; also, in forming grooves in the sides of the jaws and in the inner surface of the sides of the end of the case to prevent the jaws from slipping when under strain.

An improvement in the class of devices known as "self-acting car couplers" has been patented by Mr. Charles J. R. Ballard, of Watertown, N. Y. The invention consists, essentially, of a pair of double hooks or links crossed and pivoted together at their centers, with a coiled spring between them, so that they will open and admit a coupling pin and then close upon it and hold it firmly in their jaws.

An improved apparatus for receiving and recording votes has been patented by Mr. Richard S. Conover, of Sayreville, N. J. The inventor states that by means of this invention election frauds will be prevented and the number of votes cast will be strictly controlled and quickly counted.

An improved ore concentrator for washing the impurities out of ore and depositing the ore in suitable receptacles, has been patented by Mr. John McColl, of South Ryegate, Vt. The invention consists in the combination, with two or more endless carriers provided with transverse riffles, of a hinged platform provided with amalgamated copper plates and perforated iron plates, upon which platform the crushed ore or pulp is fed, whereby the particles of ore drop through the perforations in the iron plates, the gold being held by the amalgamated copper plates of the platform and amalgamated copper rollers pivoted below the platform. From the platform the particles of ore drop upon the upper endless carrier, are then washed off on to the lower carrier, and are then washed off from that, whereby the dirt and impurities are carried away by the waste water, and the particles of metal are deposited in suitable receptacles.

Mr. John Sandles, of Hinsdale, Ill., has patented an improvement in washing machines, which consists of a circular plunger made to nearly fit the tub, and provided on its under side with several circular cups, that are so fastened to it that they can revolve in a horizontal plane.

An improved machine for mixing materials for making soap has been patented by Messrs. William Cornwall, Sr., William Cornwall, Jr., and Aaron W. Cornwall, of Louisville, Ky. This invention relates to an improvement in machines for mixing fats and alkalies for making soap, and also for mixing various other substances which are plastic or liquid. The improvement consists in the construction and arrangement of the rotating arms of the mixer proper. The arms are each made of two flat blades or paddles, which are set at an angle to each other, and connected so as to extend radially from the rotating shaft. The corresponding paddles of adjacent or neighboring arms are also set at opposite inclinations to the plane of rotation.

Messrs. William Burkart, of Smithville, Ind., and John M. Burkart, of Canton, Kan., have patented an attachment for organs, pianos, and other similar musical instruments, by which the leaves of music can be turned without the necessity of removing the hands from the key board. The invention consists of a plate to be applied to the music rest, fixed fingers to hold the covers, open movable fingers to grasp the leaves, levers for operating the movable fingers, cords running from the levers to a knee lever under the key board, and tension devices for regulating the movement of the levers, all arranged so that by pressing against the knee lever the leaves of music are successively turned.

Mr. John S. Affleck, of 16 South William St., New York city, has patented an improved packing ring for boiler tubes, which is so constructed that it will adjust itself to any imperfections in its seat, and will melt should the boiler become unduly heated. This ring is especially applicable to the class of boilers made wholly of tubes and joined at the ends by connectors. With this packing, should the water get low in the boiler, and the boiler become unduly heated, the packing rings will melt and allow steam to escape and give warning before the overheating has reached a dangerous point.

Mr. Richard B. Lanum, of Circleville, Ohio, has patented a grave torpedo which is so arranged that if placed in a grave it will explode if any attempt be made to rob the grave.

Mr. Frank L. Sheldon, of Rahway, N. J., has patented a fishing basket which is so constructed that it may be readily folded into small compass for convenience in carriage.

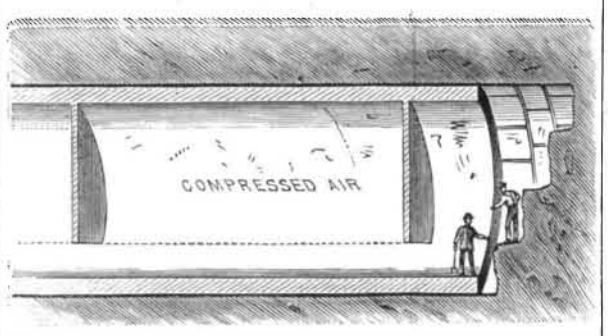
VON HEEREN proposes a method of cooling hot journals by a mixture of sulphur and oil or grease. The fine metal dust formed when a journal runs hot, and which strongly acts upon both journals and bearing, forms a sulphide of sulphur. This compound, which grows soft and greasy, does not cause any appreciable amount of friction. It has been very successfully used by the steamers of the North German Lloyds.

A SAFETY APPLIANCE FOR THE HUDSON RIVER TUNNEL.

BY P. H. VANDER WEYDE.

Allow me to suggest a safety appliance which is adapted to be used as soon as the connection of the Hudson River Tunnel with the vertical shaft is completed by help of the coffer dam at present in course of construction; then all danger from the rear will have ceased, and only a break in soft soil when reached by the tunnel head has to be feared. My project will prevent the air from escaping and the whole tunnel to be filled with water and mud, even if the whole head caved in suddenly.

My plan consists simply in a plain movable solid circular shield or partition, to be placed against the top and sides of the tunnel, and closing it except three or four feet from the bottom, where the men can pass under it. It is made to fit well, while the joint with the wall is kept air-tight by mud or clay. This partition is advanced from time to time, and kept as close to the men as convenient to them. When a caving in of the tunnel head takes place and water gains access in great quantity, while the air escapes at the top, this partition will prevent the rest of the air in the tunnel from being lost, and allow only that to escape which is between it and the tunnel head, while all the rest of the air will be kept back, as the water or mud will not be able to rise above the dotted



line shown in our figure. In case of such a calamity the men have only to pass under the partition to have the upper part of their bodies in the air, so that they cannot be drowned nor suffocated in the mud, while the compressed air will keep this down to the dotted line.

According to incomplete theory there would be no tendency to displacement of such a partition, as the pressure is always equal on both sides, whether it be water or mud on one side and compressed air on the other. We suggest however, that the pressure of the water on one side, being variable with the tides, and the perhaps still greater variability of the air pressure on the other side which it is practically impossible to keep up to the same standard, especially when a break occurs, would make it necessary to keep this screen or shield well braced, so to as be secure against its displacement in case of an emergency, as this would diminish its protective capacity by allowing air to escape toward the break.

Inventors and the War Office.

A question asked in the House of Commons one evening this week, the reply given to it by Mr. Childers, and a comment on that reply by Colonel W. Hope, appearing in the *Times* recently, give cause for reflection and comment. Mr. O'Shea inquired whether an offer had been lately made by Lieut.-Colonel Hope and General Ripley to supply 200 breech-loading naval guns to the Government, 80 per cent lighter, 60 per cent cheaper, and about ten times stronger than those of the Woolwich pattern, the said guns not to be paid for till they had been found to be in all respects satisfactory to the department; and whether this offer had been refused by General Campbell. Mr. Childers replied that substantially such an offer had been made to his predecessor, that Colonel Hope and General Ripley had been furnished with a copy of the 1869 regulations, drawn up to deal with inventors, and that the gentlemen in question declined to comply with the first condition requiring all inventors to describe their inventions; this refusal disqualifying them from receiving further official attention. Colonel Hope's letter discloses some interesting features of departmental correspondence. He states that in answer to his offer, General Campbell replied in effect: "Before I can come to any decision as to the expediency of considering your application for a grant of money with which to conduct experiments and perfect your inventions, you must tell me all your secrets." Which reply, as Colonel Hope points out, had nothing to do with the proposition made to supply 200 guns, which should be subjected to any conditions of trial and proof that could be desired, and to receive no payment till these guns had been approved by the authorities. No wonder that, under these circumstances, Colonel Hope asks, "Why do officials treat inventors as natural enemies?" We are by no means as sanguine of the invention of Colonel Hope and General Ripley as these two gentlemen naturally are, and we fail to see why they should not have first offered one of their marvelous guns for proof to the department conditionally upon 200 being afterwards ordered, instead of requiring so large a number to be accepted at once. On the other hand we are aware that inventors are not unfrequently, perhaps generally, so great a nuisance to the War Office, that restrictions which must silence a large majority of them at the outset are very necessary. But surely intelligence, and not routine wholly, should guide the heads of the department in dealing with the numerous applications made to them; and an offer, involving nothing but a slight amount of labor in testing and reporting, should not be met by a reply adapted only to silence a needy and pertinacious schemer. The matter will hardly rest where it now is, and the discussion may possibly be of more use to the country than the guns to which it has given rise may be to the service.—*Engineering.*

Correspondence.

A Meteorite in British Columbia.

To the Editor of the Scientific American:

Your number of the 6th of March contains an account of the finding of several meteorites. Last summer, while on a canoe trip with an Indian crew, I visited Chilcat, at the head of Lynn Canal, latitude 59° 14′, longitude 135° 40′, I found a meteorite in possession of an Indian, who gave the following version of finding it:

He was in the interior, on the watershed of the Yukon, fur trading. One day while resting he heard a loud buzzing noise overhead, and immediately afterward, at a short distance, a tree was struck and broken off. On examination he found the meteorite, which he packed to the sea coast. It is used as an anvil, and I should judge it weighs over 40 pounds. From his story it must have been procured about 125 miles inland in British Columbia.

The coastal tribes are the middlemen of the interiors, making annual visits with supplies of powder, balls, blankets, etc., for the purpose of barter. The furs accumulated are sold to the white traders here and at Sitka. They do not permit the interiors to visit the coast, except occasionally a chief in charge, and then he is not permitted to trade with, and in fact not to see, any whites or outside Indians.

W. H. WOODCOCK.

Fort Wrangel, Alaska, July 13, 1880.

A Novel Spray Bath.

To the Editor of the Scientific American:

After two or three hours of fruitless labor, endeavoring to entice the trout with hackles, gnats, coachmen, magpies, butterflies, etc., I gave it up in despair, and, following the example of the trout, sought a secluded, shady nook, where I lay down for a nap, hoping that toward evening success would crown my efforts at fishing.

The spot was a delightful one. At my feet was a lovely ripple, and overhead was dense foliage of cottonwood and willow. The thermometer stood at 102°, and the sky was cloudless and perfectly Italian in its azure, but a light breeze across the rippling water, with the shade above, rendered my situation more than endurable.

I lay on my back, but had barely gotten comfortably fixed when I felt cool particles like water falling on my face. Surprised, I looked carefully through the foliage above me, and wherever the light was favorable saw fine spray falling quite fast through the leaves. For some minutes I watched in wonder, and tried to account for the phenomenon by the combination of the heated air without and the water and shade beneath, affected by the light breeze, causing condensation of the air's moisture, but could not satisfy my mind by this theory.

After enjoying the falling of the cool particles on my face for a while longer, I proceeded to examine the foliage above me. The particles were now clearly seen to be emitted from the leaves and twigs. A closer examination led to the discovery that thickly distributed over these parts were many little insects, and to my great surprise I saw that the particles of spray were ejected by convulsive but quite periodical movements from the anal extremity of the abdomens of these little animals. After careful watching I learned that they each ejected from twenty to thirty particles of water a minute, indicating a wonderful power of drinking the sap from the tree on which they were feeding.

Inclosed are specimens of the insect, which I hope will be recognizable after the long journey; also a twig from the tree on which I found them.

This is not offered as being new to the scientific world, but as entirely so to myself, and as matter which may interest some of the many readers of your valuable paper.

C. A. W.

Lapwai, Idaho, July 17, 1880.

Buttermilk as Summer Food, Drink, and Medicine.

A Detroit physician asserts that for a hot weather drink nothing equals buttermilk. It is, he says, "both drink and food, and for the laborer is the best known. It supports the system, and even in fever will cool the stomach admirably. It is also a most valuable domestic remedy. It will *cure* dysentery as well and more quickly than any other remedy known. Dysentery is really a constipation, and is the opposite of diarrhea. It is inflammation of the bowels with congestion of the 'portal circulation'—the circulation of blood through the bowels and liver. It is a disease always prevalent in the summer and autumn. From considerable observation I feel warranted in saying that buttermilk, drunk moderately, will cure every case of it—certainly when taken in the early stages."

IN coining $20,000,000 in silver and $22,000,000 in gold at the San Francisco Mint, in 1878, there was lost only $29. The carpet, which had been down five years, was taken up last spring, cut up into small pieces, and burned in pans. The *débris* was put through the same process as the mining dust, and there was got from the old carpet $2,500!

The Chicago Case of Skin Grafting.

The remarkable attempt to graft a section of skin from a boy's leg upon the thigh of his sister, described in a late issue of the SCIENTIFIC AMERICAN, unhappily proved a failure. The skin refused to adhere, shriveled, and became dry and hard. The narrow connecting hinge of skin was so sharply folded back that the life of it was destroyed, the circulation being cut off by the pressure which could not be avoided.

The brave boy who had made the sacrifice for his sister's sake was willing to endure another trial, but the physicians decided against it. It was thought best to make the second trial with the skin of a lamb, as soon as the burned child's strength should be sufficiently recruited. The proposed plan of operation is this: A mould of the lamb will be taken in plaster of Paris, so that the animal can be kept perfectly still in juxtaposition to the sufferer. Then the skin of the lamb, closely shorn, will be flayed for the space of 6 inches by 2½, leaving the skin uncut at one end of the strip. Under this loosened strip of skin a piece of soft white silk will be placed to keep the wound clean and facilitate the formation of blood fibers. When the "sprouting" is sufficiently advanced the silk will be removed, and the fibrous inner coating of the lambskin will be applied to the wound of the child, the lamb being bound as the boy was. Great confidence is felt in the success of the new method.

THE ACME CUBE PIPE TONGS.

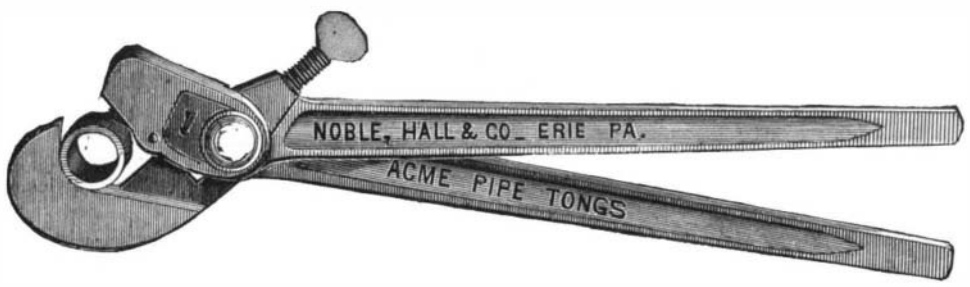
These tongs, which were patented March 18, 1879, are manufactured by Messrs. Noble, Hall & Co., of Erie, Pa. The main features are shown in the engraving.

The rivet or pin has a bearing on each end. This construction gives a firm bearing and avoids the twisting which is usually so destructive to ordinary tongs which has but one bearing, thereby saving the pin from wearing and breaking, besides the bit is held square and in line with pipe, which gives it a good hold or bite.

The check piece on one handle has a recess formed in it for receiving a cube or bit of hardened steel. This bit is held with one of its cutting edges directly or a little above the center of the pipe, whether the pipe is large or small.

It will be noticed that the cube has twelve available cutting or holding edges, so that as one edge becomes dulled by use, the tapering pin, which holds cube in, can be taken out and a sharp edge of cube placed toward pipe for use, until all of the twelve edges have been used. Then when all of the holding edges have been worn, the cube may be sharpened by grinding, and when entirely worn out, can be replaced by a new one at a slight cost. This patent also covers a flat bit, which has only eight holding edges. One of the jaws is made adjustable with a thumb screw, to adapt the tongs to different sized pipes.

This firm also make tongs of the same general character without the adjustable jaw and with flat bit. The manufacturers claim that for strength, durability, cheapness, and lightness, these tongs have no equal in the market. For circulars and prices, address Noble, Hall & Co., Erie, Pa.



THE ACME CUBE PIPE TONGS.

Severe Hail Storms.

Not a summer passes that we do not hear of hailstorms of "unprecedented severity" in many parts of our broad land. This summer is no exception to the rule. Perhaps the most remarkable fall of hail, thus far reported, occurred in Warren County, Mo., July 1. The extent of the storm was about 20 miles by less than 1 mile in width, the heaviest fall of hail covering about 2 square miles. Mr. G. O. Hardeman, of Gray's Summit, assures us that the hail-stones were of various shapes, and ranged in size from that of a hazelnut up to blocks of ice 10½ inches long, 5 inches wide, and ½ inch thick. The hail fell to a depth of 5 or 6 inches on a level, and in places where it was drifted against houses or fences it reached a depth of a foot or more. The damage done was very great, the ice smashing not only windows, but sashes and blinds; and the roofs of all the houses in the path of the storm were so injured that new roofs had to be put on. All growing crops were destroyed, and nearly all the poultry in the region were killed, besides many hogs. The horses, mules, and cattle exposed to the storm were badly bruised; some had their eyes knocked out, and others were so seriously battered as to be unfit for use for several days. Forest trees were greatly injured, the bark being torn from the sides exposed to the storm.

Cast Iron Car Wheels.

Cast iron car wheels, as is generally known, are little used in Europe, and are generally regarded there as very dangerous, and especially unfit for use under passenger cars. We might suppose this opinion to be founded on ignorance, were it not that some cast iron wheels have been used for many years, especially in Austria, there being some Hungarian iron works famous for the "chilling" property of their iron. But as, in spite of this long experience, the opinion prevails there that cast iron wheels are not only inferior, but positively unsafe, so much so that we believe many companies will not permit cars with cast iron wheels to pass over their roads, though loaded with freight for stations on or beyond their lines, it has naturally been supposed in this country that the European chilling iron must be greatly inferior to ours. But it now seems questionable whether the cast iron car wheels in Europe are not quite good and safe. An Austrian engineer, Mr. Emil Stotzer, foreman of the shops of the Empress Elizabeth Railroad at Linz, calls attention to the fact that during the past winter, which in Europe was an exceptionally severe one, while the cases of *tire* breakages amounted to thousands, and not a few accidents were due to this cause, so far as is known there was *not a single case* of the breakage of a cast iron wheel, at least not one which interrupted traffic. In view of this he suggests that the prevailing prejudice against cast iron wheels should be abated, and that a great deal might be gained if at least all the freight cars that have no brakes should be provided with cast iron wheels, but thinks that experiments should be made with cast iron wheels under brakes also. He mentions the use of cast iron wheels under passenger cars in this country, but seems not to understand how general this use is, and that of the 496,718 cars reported by "Poor's Manual" as the stock possessed by our railroads in 1879, probably 495,000 have cast iron wheels.—*Railroad Gazette.*

Pressure of Wind.

The question of the amount of pressure to be assigned to wind in calculating the stability of structures does not, hitherto, appear to have received in England any satisfactory solution. Recent events have sufficiently demonstrated its importance, and yet we find that the President of the Institute of Civil Engineers and one of the railway inspectors of the Board of Trade are both agreed that no definite rule exists on the subject. These gentlemen, Mr. W. H. Barlow and Colonel Yolland, in their recent report on the loss of the Tay Bridge, say: "In conclusion, we have to state that there is no requirement issued by the Board of Trade respecting wind pressure, and there does not appear to be any understood rule in the engineering profession regarding wind pressure in railway structures; and we therefore recommend that the Board of Trade should take such steps as may be necessary for the establishment of rules for that purpose."

It is perhaps natural that Colonel Yolland and Mr. Barlow should consider that the Board of Trade is the proper authority to decide upon this doubtful point, as to this department has been intrusted the testing of the safety of railway structures, and the strains to which iron and steel may be subjected, before the public are allowed to pass over them. The Board of Trade, moreover, possesses a recognized authority to which all engineers are obliged to defer. However, Mr. Rothery, the other member of the court of inquiry, does not take this view of the matter. His opinion is very clearly expressed in his separate report. Referring to the paragraph in the report of his colleagues quoted above, he says: "I cannot, however, join in that recommendation, for it appears to me that, if there is no understood rule in the engineering profession regarding wind pressure in railway structures, it is for the engineering profession, and not for the Board of Trade, to make them. I will add that, if I rightly understood my colleagues at our last interview, they concurred with me in the conclusions to which I had come, that there might be a maximum wind pressure of from 40 lb. to 50 lb. per square foot, and this not only over a few feet, but over the whole extent of a span of one of the high girders, and I gather as much from their report. And, if so, seeing that it is the practice in France to allow 55 lb. per square foot for wind pressure, and in the United States 50 lb., there seems to be no reason why a similar allowance should not be made in this country."

The question really belongs to the science of meteorology, and can only be settled by the examination of careful observations, taken with accurate instruments, and extending over a series of years. It might be interesting to ascertain upon what grounds the French and American engineers have fixed upon the values they assign to wind pressure; but we think that sufficient data exist in this country to arrive at an independent conclusion.

Any one might be led to suppose, from the vagueness of the views expressed on the subject, that there were no records in existence in England on the rate or force of the wind. On turning, however, to the meteorological observations of the Royal Observatory at Greenwich, printed by the Government in a yearly volume with the various other observations, we find most valuable information, both on the daily rate and maximum force of the wind. For the purpose we are dealing with, the maximum force is the quantity required. It is true that, given a certain velocity, it is easy to deduce, by means of a simple formula, the corresponding pressure. A formula used for this purpose on the Continent is: Pressure in kilogrammes per square meter $=\frac{1}{10}$ (meter per second)², which converted into English measures, is: Pressure in lb. per square foot $=\frac{21}{10000}$ (foot per second)². Unfortunately, however, the observations of velocity are only given in the form of the total distance traversed by the wind during the whole of each day, as measured by the revolutions of an anemometer; and this is the only form in which the motion of the wind is recorded in many observations. This would merely enable us to calculate the average wind pressure throughout the day, which is quite a different thing to the maximum pressure. The wind on very stormy days blows frequently in gusts, and what we require to know is the force or pressure of the strongest gust which has occurred as far back as the observations extend. For instance, for determining maxima wind pressures, the observations at the Radcliffe Observatory at Oxford in past years are of little value, as, for example, though on one occasion, April 14, 1867, the wind, as recorded by the anemometer, traveled at the rate of 1,004 miles in the day, which furnishes an extremely high average speed for a whole day, it appears from the Greenwich observations that no unusual pressure occurred on that day. At Greenwich Observatory, fortunately, the maximum pressure each day has been recorded for several years. We have looked through the published records of the Observatory for the years 1865, 1866, 1870, and 1877, the three first being years during which we knew some severe storms had taken place, and the year 1877 being apparently the latest record hitherto published. In the year 1866, the maximum pressure of wind occurred in January, and amounted to 32 lb. per square foot, and in February and December it reached 30 lb. per square foot. It was in the month of January of that year that the London foundered in the Bay of Biscay during a violent storm. The greatest pressure of wind in 1867 occurred on the 8th of February, amounting to 41 lb. on the square foot. This great pressure, however, was nearly reached again on the 12th of March in the same year, when a pressure of 40 lb. was recorded. The maxima pressures in January and October of that year were 35 lb. and 30 lb. respectively. In 1870 four records are given, in different months, of the pressure being more than 30 lb., no actual figure being given; and on three other occasions in that year the pressure reached that amount. The highest pressure in 1877 was 32·6 lb. in the month of November. It is evident from this brief glance at the Greenwich Observatory records that the pressure of 30 lb., adopted by some eminent engineers, is considerably too low to be received as a standard maximum pressure, and that even 40 lb. is insufficient. It is possible that a thorough examination of the whole of the Greenwich observations might indicate a higher maximum even than the one we have given. Also, it must be borne in mind that Greenwich Observatory is not situated near the sea, or in a specially exposed position, so that a maximum recorded there might be exceeded in some other places. In a treatise on "Meteorology," by Dr. Loomis, an American professor, published in New York, the velocity of the most violent hurricane is stated to be 100 miles per hour, with a corresponding pressure of 49 lb. per square foot, which may, perhaps, be the basis upon which American engineers have founded their rule of taking 50 lb. as a maximum. Professor Rankine, however, states, in his "Treatise on Civil Engineering," that the maximum pressure of wind observed in Great Britain amounts to 55 lb. per square foot. The rule followed in Belgium is to assume a wind pressure of 275 kilogrammes per square meter for places on the sea coast, and 176 kilogrammes for places inland; which, converted into English equivalents, amounts to 56 lb. per square foot on coast, and 36 lb. inland. With these facts before us we feel bound to concur in the opinion expressed by Mr. Rothery; and we consider that English engineers should no longer hesitate to accept 55 lb. per square foot as a possible pressure of wind in very exposed situations, and to design structures in future, subject to this consideration, with a proper margin for safety. Also, we hope that all observatories will follow the example of Greenwich, and record daily the maximum pressure, and not merely the average daily velocity, so that a valuable collection of facts relating to the pressure of wind may be constantly accumulated.—*Universal Engineer.*

Deflection of Iron and Steel Rails.

In the *Comptes Rendus* of the Paris Society of Civil Engineers is a paper by M. Tresca, giving the results of some experiments on the deflection of iron and steel rails between the limits of elasticity and rupture. They show that, for these two metals of ordinary commercial character, the coefficient of elasticity is nearly the same, thus confirming certain special experiments in 1857 and 1859 upon Swedish iron, and cementation steel made from such iron. M. Tresca finds that the limit of elasticity for a given bar may be extended in proportion to the strain to which it had been previously submitted, and that the elastic limit may be pushed almost to the point of rupture without the coefficient of elasticity having varied in any perceptible degree. The metal, when it comes from the workshops, is in a state of instability, which disappears only by use; it becomes, by means of the actions to which it is successively submitted in its employment, more homogeneous and more elastic, but at the same time a little more flexible.