Correspondence

Steam Rams.

MESSRS. EDITORS :—Mr. Ellet, civil engineer, has brought this important element of nautical aggression before the public so fully as to require little or nothing to be added to his views on the subject. It is the object of this article to furnish an example of the destructive force exerted by a light North river steamer, as illustrated in a remarkable way by the steamboat *Empire*, of Troy, in the year 1842. This vessel arrived early at the city of New York in a spring morning, when the river was obscured by a fog which lay some thirty feet high over the river. She had for the trip a new pilot, not well acquainted with the wharves in the upper part of the town. A new pier had been just completed of such length that the only vessel attached to it, and lying at its extreme end, seemed to be at anchor in the stream, leaving plenty of room for the boat to pass between it and the shore. Deceived by this appearance the new pilot headed the boat for the mid space between the vessel and shore, in consequence of which she struck the wharf fairly with the whole power of her engines, forcing the bow of the boat first through the timber facing of the wharf, logs of 18 inches square, then through solid stone filling 8½ feet, and then through earth and rubbish 17 feet further, making a triangular chasm of 12 feet wide at the logs, 27 feet long and 7 feet deep. The only injury sustained by the boat was the breakage of one of her oblique hog braces and a slight leak at the stern. Now, when the light weight and slight build of this vessel are considered, and the moderate impelling power compared with that employed for heavy vessels, there is here abundant evidence that in the momentum of vessels constructed for war there is a terrible element of destruction still dormant, yet to be employed in naval warfare. It seems to me that no vessel now existing would stand the blow given to the New York wharf by the *Empire* without being sunk at once. What could resist the momentum of a vessel of twice the weight and six times the propelling force of the *Empire*, fitted with a steel-ax prow and an iron fortified bow? Would the iron-mailed *Warrior* ever enter the harbor of New York if met head to head by such an antagonist passing through the water at a rate of 18 to 20 miles the hour?

The writer is disposed to think that for the harbor of New York the money expended upon a pair of iron rams, of 2,000 tuns each, would be more available for its defense than double the money on casemated forts.

New York, Nov. 6, 1861.

[The above is useful information, and our naval authorities may well profit by the suggestions of our correspondent. But it should never be forgotten that the efficiency of such rams must be in proportion to their mass and the power of their engines. If the huge *Warrior*, moving at the rate of 16½ knots per hour, were to strike such a boat as the *Empire*, armed with a steel bow, she would cleave through her almost as easily as pass through the foam of a sea wave.—EDS.

The Principle of the Barometer.

MESSRS. EDITORS :—If I hold a pint vessel bottom up under water how heavy a weight would it take to force out the water, the weight forming a lid at the bottom, and thus causing the vessel to be empty while it is still under the water? N. A.

[It will depend upon the size of your vessel and the depth to which it is placed under the water. If your vessel is an inch square, (or, in scientific language, if the cross section of your vessel has one square inch of area,) if it is placed under water to the depth of 33 feet, it will require a weight of 15 lbs. to sustain the pressure of the water. If it is placed under the water 2 feet it will take about 1 lb. If the area is double, the weight must be double, and so on.—EDS.

THE latest news from Europe states that the cotton market is dull, that the prices have slightly declined, and the Indian cotton crop is reported to be large.

The New Metals—Rubidium and Cæsium.

We find in the last number of the *American Journal of Photography* the following description, by Prof. Joy, of the new metals discovered by Bunsen and Kirchoff, of Germany. The description was given at a meeting of the Photographical Society, of which Prof. Joy is Vice President :—

Rubidium and cæsium resemble potassium so closely that they cannot be distinguished from it by the usual reagents, or before the blowpipe. Their presence in minute quantities can only be recognized by aid of the spectroscope.

Rubidium is so named from *rubidus*, dark red, that being the color of the spectral lines which fall outside of Fraunhofer's line, A, and are therefore difficult of detection, excepting with nicely adjusted instruments. Traces of rubidum are to be found in a majority of mineral waters. Bunsenfound the largest quantity in lepidolite, or lithia mica, from Rogena in Moravia. Three hundred pounds of the mineral yielded two ounces of the oxide of rubidium.

In order to obtain the new salt, the double chloride of potassium and platinum, rubidium and platinum, and cæsium and platinum were precipitated by means of the bichloride of platinum. The potassio-bichloride of platinum is soluble in nineteen parts of water. The rubidio-bichloride of platinum requires one hundred and fifty-eight parts of water. This afforded a method of separation, by boiling the precipitate in *very little* water and pouring off the dissolved potassium salt for twenty times in succession, a tolerably pure rubidium salt was left as a residue. The atomic weight of rubidium is 85·36 (H = 1).

Caustic rubidia resembles caustic potash ; carbonate of rubidia is insoluble in alcohol ; it can be readily converted into bicarbonate. Nitrate of rubidia varies from nitrate of potassa in crystalline form. Sulphate of rubidia is isomorphous with sulphate of potassa and forms cubic alum with the sulphate of alumina. Chloride of rubidium crystallizes in cubes.

Cæsium appears to be a constant companion of rubidium, and is found in the largest quantity in Durkheimer water.

The three double salts of potassium, rubidium and cæsium were precipitated as before by the bichloride of platinum, and the potassium salt being removed by means of its greater solubility, the chloride of rubidium and cæsium were converted into carbonates and digested in alcohol. The carbonate of cæsia being soluable in alcohol, is in this manner separated from the carbonate of rubidia.

Pure cæsium can probably be obtained in the same manner as sodium and potassium by reduction of the carbonate. The atomic weight of cæsium is 123·4 (H = 1), after gold and iodine, the highest on the list of elements. Caustic cæsia resembles caustic potash ; carbonate of cæsia is soluble in alcohol, in which reaction it differs from the carbonate of rubidia ; nitrate of cæsia is isomorphous with the nitrate of rubidia ; sulphate of cæsia forms alum with the sulphate of alumina. Chloride of cæsium is deliquescent like the chloride of lithium.

USES OF RAWHIDE.—Few persons know the value of rawhide. It seems almost strange to see them sell all of their "deacon" skins for the small sum of thirty or forty cents. Take a strip of well-tanned rawhide, an inch wide, and a horse can hardly break it by pulling back—two of them he cannot break any way. Cut into narrow strips, and shave the hair off with a sharp knife, to use for bag strings ; the strings will outlast two sets of bags. Farmers know how perplexing it is to lend bags and have them returned minus strings. It will outlast hoop iron (common) in any shape, and is stronger. It is good to rap around a broken thill—better than iron. Two sets of rawhide halters will last a man's life time—(if he don't live too long). In some places the Spaniards use rawhide log chains to work cattle with, cut into narrow strips and twisted together hawser fashion. It is good to tie in for a broken link in a trace chain. It can be tanned so that it will be soft and pliable like harness leather. Save a cow and "deaoon's" pelt and try it.—*Country Gentleman.*

REFUSING THE HONORS.—The London *Times* announces that the Queen of England had offered to confer knighthood upon William Fairbairn, late President of the British Association for the Advancement of Science, and that he had declined the honor. Offers of knighthood have been made and refused by several of the distinguished mechanics and men of science in Great Britain. James Watt refused knighthood, as did Robert Stephenson, Michael Faraday, and now William Fairbairn, who, like Faraday, commenced public life as a poor mechanic, and has worked up to the head of his profession, is an honorary member of the Institute of France, Fellow of the Royal Society, an able author on engineering subjects, and is the inventor of the cellular hollow girder system, upon which the Britannia tubular bridge is built. Titles conferred by royalty cannot add to the honors of such a man, and Fairbairn, in all likelihood, looks upon them as mere baubles.

THE Industrial Society of Mulhaus, France, has offered a prize of 17,500 francs (about $3,000) for the invention of a substitute for the white of eggs (albumine) which is much used in printing colors on muslins.

Defects of Bridges—Bad Workmanship.

The *American Railway Times* states that the iron railway bridge over Green river, at Greenfield, Mass., which was designed by Herman Haupt, Esq., and built by Mr. E. L. Childs, broke down under the very test which was to prove its capacity for the loads that were to pass over it, and this failure was caused by an infirm casting. "The span of the bridge was 120 feet in the clear. It was divided into three equal spaces and at points of division posts were erected, forming a truss girder system. The depth of the truss was 22 feet ; the supports consisted of ten sets of suspension rods—five on each side—presenting a united cross section of 20.7 square inches, passing from the top ends of one set of posts to the bottom of the next. The rods were connected by passing into cylinders of cast iron (which were hooped with wrought iron bands) and were secured inside by nuts." The greatest strain upon the rods from the maximum load was less than 10,000 lbs to the square inch, and this was not one-sixth of the breaking weight. The cylinders of cast iron were not relied upon to resist any part of the strain ; they were merely connections for the wrought-iron hoops and as supports for the posts, and yet it was one of these cast-iron cylinders which caused the failure. It was found fractured at the edge of one of the hoops. The fracture when examined, exhibited a rusty surface for nearly the whole distance. The casting was defective in a most extraordinary degree, and must have been broken before it was put into the bridge, but it was under one of the hoops and could not be detected. The calculated strength of this bridge was six times greater than any possible load intended for it, and it was designed, not in a parsimonious spirit, but to combine strength and durability, and to have no parts subject to rapid decay exposed to the weather. Mr. Samuel Nott, one of the engineers who examined the bridge, and gave evidence as to the cause of its fall, stated that the accident was caused by a slight mistake made by the blacksmith who did some work on the cylinders. All the important parts of a bridge should be open to full inspection, not only before they are put together, but after the bridge is erected. Such structures should be inspected regularly, because bolts may start and rods may crack by the passage of trains, by frosts and other causes.

Kind Words from our Cotemporaries.

The *Great Western Journal*, published at Grand Rapids, Michigan, s ys as follows, and we thank the editor for his kind remarks :—

"The SCIENTIFIC AMERICAN—A Journal of Practical Information in Art, Science, Mechanics, Agriculture, Chemistry and Manufactures." Such is the title of a weekly publication, of sixteen pages of letter-press, in a form suitable for binding, by MUNN & Co., of New York city, over whose pages we have spent many a pleasant and profitable hour in bygone days, and from whose pages we hope to draw much practical information, for the benefit of all our readers. But our best efforts will fail to give a just appreciation of its real merits, for its beautiful engravings we cannot copy. For reliable information upon all practical subjects we know not its equal. It is a leader in all the great improvements, wonderful discoveries and inventions of this progressive age.

The *Register*, published at Bordentown, N. J., informs its readers that the SCIENTIFIC AMERICAN is worth $10 per annum to any mechanic. We wish there were fifty thousand persons who considered it worth to them even $2 a year. It adds :—

We are in receipt weekly of the SCIENTIFIC AMERICAN, one of the best papers for mechanics, machinists, &c., published in this country. No good mechanic should be without it, and we don't see how any aspiring machinist can get along without it. Every new invention and improvement upon machinery is given in it at the earliest opportunity. It is by studying the principles of mechanism alone that mechanics will rise to any degree of eminence in their profession, and we think the SCIENTIFIC AMERICAN is worth more in one year to a mechanic than $10 worth of instruction from a teacher.

The Pleasures of Business.

It is gratifying to every person to have his labors appreciated and his services acknowledged. It is to us one of the pleasures of our life to receive such expressions of satisfaction as are contained in letters like the following from men for whom we have acted as attorneys in obtaining their patents :—

MESSRS. MUNN & CO.:—I received my patent several days ago. I feel very grateful to you for the interest you manifested in my case, and shall take pleasure in entrusting all future patent business to your care, and cheerfully recommend all inventors to do the same. Feeling myself under many obligations to you for all official favors, I remain your most obedient servant, ISAAC FRELIGH.

Windham, Ohio, Nov. 2, 1861.