Correspondence.

Is the Entrance to New York Harbor too Shallow for the Steamship of the Future?

To the Editor of the Scientific American:

The nature of what has been said and published on this subject is certainly discouraging; and in the practice of constructing steam vessels about ten times the length of their beam, with depth not much less than the latter, we have certainly approached the limit of dimensions in transatlantic ships.

But there is still some hope of an early disposition on the part of marine architects to abandon the elongated clipper ship system, or, rather, the steam sea serpent that rolls seas over and under, and, while preserving length, adopt a greater beam with much less depth, and propel with twin screws. By this improvement a vessel would run much more evenly, vary less in her draught from consumption of fuel on a voyage, and, properly powered, make much better speed and uniformity of time between ports.

In the construction of vessels the fact appears to be overlooked that buoyancy increases more rapidly than dimensions, or, in other words, weight in the vessel diminishes in a greater ratio to that of the water displaced. Hence steamers constructed according to practice, unless well balasted, become top heavy and great rollers in a rough sea, or, when loaded down, if of a large class, expensive to drive through the increased resistance of deeper water. Considering the traffic that vessels of the desired improvement in form would stimulate, through greater comfort in their movements, and the economy it would afford to ocean travel. I would suggest, for an example of what might be, the monster Great Eastern, which is 690 feet long and 82 feet beam (neither dimensions so far being too great for the present day), but with a vertical measurement of only 35 to 40 feet, thus reducing her draught of water to 18 or 20 feet, and supplied with twin propellers with power due to her capacity. I say thus improved, and past experience as to steamer time, who can doubt her passages being made between Liverpool and New York in about six days, and with marked regularity?

It is the pitching or plunging of a vessel at sea that greatly retards her speed. The writer has been out in that great ship twice, on one passage encountering severe weather and heavy seas, in the worst of which, owing to great length, her pitching did not exceed five degrees; but with her heavy, wide, and eighth of a mile long iron deck, her great lofty paddle boxes, spars, and ordinary heavy deck hamper nearly sixty feet above her keel, or more than thirty feet above water level, she became famed for rolling, the extent of which Mr. Russell of the *Times* (London) very aptly called "a grand swing"—the weight of her cargo, coals, and machinery, affording but a small extent of ballast for so tall, top-heavy a bulk.

Steam has long since deprived the stately masts and sails of their original poetry, and the decks of the kind of vessel that should make up a ferry between New York and Europe should not be encumbered with the expensive resistance they greatly make to high speed, and this in addition to the cost of seamen to work them; and this is leaving out of count the costly equipment. And as to the question of their utility in case of broken machinery, it is but fair to say that if the action of the latter is properly regulated in speed, that is, the steam power automatically supplied to the engine exactly or coincidently with the varying dip of the propeller in rough seas, and "racing" of the engines prevented, all of which is carefully looked after by companies whose steamers are intelligently engineered, there is no more reason for broken screw shafts or other parts of a ship's machinery failing, but even less—the screw shafting of ships being made of superior strength—than there is of any similar parts of the same in factories, rolling mills, or the engines of your printing presses, to any of which serious damage rarely occurs; and a second propeller on a ship will always afford a superior means of speedily making port to the uncertain wind.

Let us, then, discourage the further construction of the present system of great steam sea serpents, and urge the early forthcoming of vessels of such self-ballasting form, which, though they may be of twenty thousand tons capacity, will find plenty of water off Sandy Hook for passage at almost any time of tide; and though there may be no objection to confining the construction of vessels for our inland waters or coasting service to domestic manufacture, depend upon it, when we become favored with a government that will afford us the privilege enjoyed by other nations, or, shall we say, representatives in Congress who cannot be bought by the European steam liners (for it is not fair to charge Mr. Roach with the entire extinction of our foreign commerce), that is, of building vessels that are to compete in the oceanic race where they can be procured the cheapest. This at any rate will not discourage domestic competition nor subsidizing by our government, and we may then through some means possess at an early day steamers that will sweep the present elongated clipper ships from the transatlantic service as successfully as the Donald McKay clipper sailing ships drove the old blunt hulks out of existence. But, any way, ships are not articles of ordinary human consumption, and should not be taxed; the interests of commerce only should shape their existence and ends.

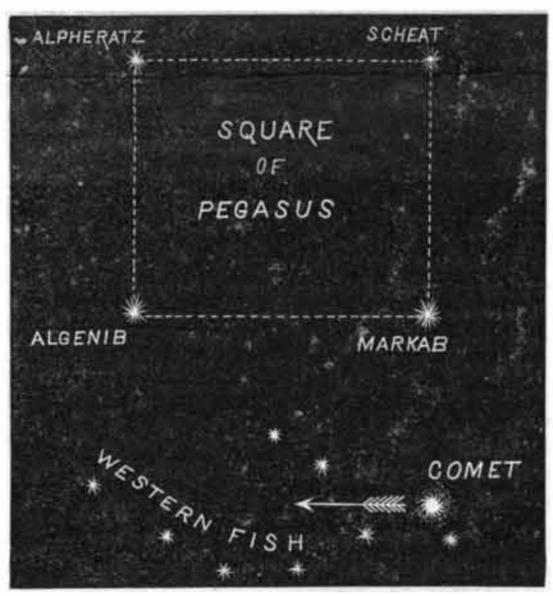
T. SILVER.

[FOR THE SCIENTIFIC AMERICAN.]

Encke's Comet.

An observation of Encke's comet was obtained by me last night with the nine inch reflector. It was a faint and difficult object as seen through slight haze. Its form was irregular, slightly elongated north and south, and with small central condensation. At the time of my observation it was in the upper part of the head of the Western Fish—Piscis Occidentalis—or just above the star Beta of that constellation.

For the benefit of those who would like to pick up this interesting comet, I append a small chart of the stars in its vicinity. The Square of Pegasus may be readily found high up in the southwest in early evening, and as will be seen by the chart the stars Scheat and Markab point very nearly to the comet's present position. It is moving very slowly indeed eastward, or very slightly north of east, as indicated by the arrow; and as it will not move out of this constellation for several weeks, there will be no trouble in finding it



with adequate telescopic power. After a while the comet will move more rapidly and grow much brighter so as to be visible in quite small telescopes.

This is the shortest periodic comet known, making its revolution about the sun in about three and one-third years. It was first seen on its present return to visibility by Professor Young, of Princeton—probably with the magnificent 23 inch equatorial of that observatory.

WILLIAM R. BROOKS.

Red House Observatory, Phelps, N. Y., Jan. 5, 1885.

English and Foreign Labor Compared.

Mr. J. S. Jeans, the Secretary of the Iron and Steel Institute, lately read a paper on the comparative efficiency and earnings of labor at home and abroad. The author furnished a number of interesting tables, designed to show the proportions of the population of each country engaged in agricultural, industrial, commercial, and professional pursuits respectively. Taking his figures from the census reports of 1881, he computed that the fourteen million people belonging to the wage earning class in the United Kingdom in that year had earned a total sum of over £580,000,000, the average being about £42 per head, which was an increase of 10 per cent on the sum computed by Mr. Leone Levi to represent the average earnings of the working classes of this country in 1867. A large number of details were given respecting the earnings of the working classes abroad in comparison with those of the United Kingdom, and the conclusion come to on an analysis of official returns as to the wages for each of the leading countries of the world was that in the United Kingdom the average wages paid were 45 per cent under those of the United States, 42 per cent above those of Germany, and 58 per cent above those of France.

It was also shown that between 1850 and 1883 the average earnings paid in a large number of leading industries in the United Kingdom had increased to the extent of 40 per cent, while in France during the same interval the average increase of wages was 53 per cent in Paris and 65 per cent in this country. In the United States within a much shorter interval, viz., between 1860 and 1883, the increase of wages had been practically identical with that in the United Kingdom for the longer interval stated, viz., 40 per cent. A comparison was made of the proportions of wage earning families and children relatively to the whole population in the leading industrial countries of the world, showing that women were more largely employed in Austria and France than in any other country, and that the largest number of juvenile workers was to be found in the United States. The largest population engaged in manufactures is to be found in the United Kingdom, where it numbers 23 per cent of the whole population, against only 13 per cent in Prussia, 12 per cent in France, and 7½ per cent in the United States. With respect to the efficiency of labor the author showed from statistics of work done in cotton factories, in mineral industries, in bricklaying, and earthwork, and other occupations, that English labor was considerably more efficient than that of any other country with regard to the quantity produced in a given time.

The Piece Dyer's Troubles.

In woolen piece dyeing numerous mishaps occur, for which the dyer is generally held responsible, and which often cause most serious troubles, litigation, loss of time, work, money, and patronage, unless he can positively lay the fault at somebody else's door. If in weaving the yarn is not kept uniformly moist, the natural consequence is, that the tissue is not evenly close in all its portions, wet yarn working in closer than dry, and this is the reason why some parts of the piece absorb more dyestuff, that is, appear darker than others; the pieces show various shades of color. From the same cause arise fusty stains, while the pieces are piled upon one another in drying.

Silver stains, blue or white coloring upon the cut, dark clouds, are liberally charged to the dyer. They are caused by soap contained in the material, which was imperfectly washed before being brought to the dyehouse. Fulled goods being not unfrequently rinsed in calcareous water, a lime soap is formed in the fiber, which resists any dyestuff. This is particularly the case with thin goods, as with heavy goods the greater quantity of alkalies contained in them is apt to neutralize the effect of the lime salts. When the lime soap is once formed by the use of hard water, a perfect dye is rendered impossible; still the dyer is blamed for not boiling the goods long enough in the bath, as if that could have remedied a fault in the goods which he has no means to discover beforehand. He can however use precautions, which may be unnecessary in some instances, but will aways place him on the safe side, and ought not, therefore, to be neglected in any case. They consist simply in running the tissues, before dyeing, in hot water to remove any traces of soap which may have been left in it by neglect in previous manipulations.

If the dye does not turn out level, however, the dyer cannot always shirk the responsibility, as the fault is often his own. Saving of time and labor is saving of money, but injudiciously applied that rule works the other way. To produce a good, level dye no solids whatever, either mordants or dyestuffs, ought to be thrown into the bath, but must be added after completely dissolving them separately. No general rule is more frequently failed against, and no surveillance can be too strict in this respect.

Probably every dyer who has tried to make work short by sewing many pieces together and running them at an increased speed, has made the experience that the goods looked cloudy. Notwithstanding their expeditiousness, the material had a too long time to lie doubled up. For dark colors it is not advisable to run more than one hundred yards at a time. Another often neglected precaution is, to let the pieces cool down in the tub before reeling up. If lifted while hot, and allowed to lie for any length of time, creases and fold marks are produced which are hard to remove. With some colors, particularly those dyed upon chrome mordant, this precaution is absolutely indispensable, as they are apt to deepen and become uneven, if the pieces are reeled up while hot.

Upon vat blue or green pieces, white, yellow, or light blue sparks make sometimes their appearance, for which the dyer is almost always called to account, though the fault lies in the raw material, and can be only charged, if to anybody, to the wool sorter. They are caused by diseased or dead wool, whose presence can be detected at the first run in the vat or dye tub, as only the top end of the hair absorbs the dyestuff, while the lower part remains colorless or turns yellow, as is the case with green.

That aniline dyestuffs must be added to the bath gradually, is a rule known to every dyer; it is even more strictly to be observed in piece dyeing than in yarn dyeing.—*Textile Colorist.*

A Young Hero.

Although only thirteen years of age, Elmer Dwyer, of Lynn, Mass., is a hero, having recently saved two lads from drowning at the risk of his own life. The rescued lads broke through the ice into the deepest part of a pond. Dwyer, hearing the cries of the drowning lads, ran for assistance, and finding no one at hand, took a ladder from a yard near by, and, after several heroic attempts, succeeded in placing it on the treacherous ice. He then crawled on the ladder to the drowning boys, and by almost supernatural power succeeded in getting them on to it and thence to the shore in safety. The rescuer is a lad of slight strength and not very good health, and in his bold act was wet through to the skin.

What Fossils Teach.

In a recent lecture Dr. P. H. Carpenter, of Eton Cóllege, mentioned the case of Greenland as an illustration of the manner in which the earth's history is read from fossils, those remains of by-gone life which in the middle ages were regarded as "sports of nature." Fossils of four climates, all warmer than the present icy one, are found in that country. Remains of the oak and the maple tell us that the climate was once very similar to that of England to-day, and the coal, found lower down, shows that something approaching tropical heat prevailed at an earlier period. The fossils of certain sea creatures appear on the land, and that Greenland once lay beneath the sea and that its water was temperate, while the coral, obtained still lower down, must have grown when the waters were still warmer.

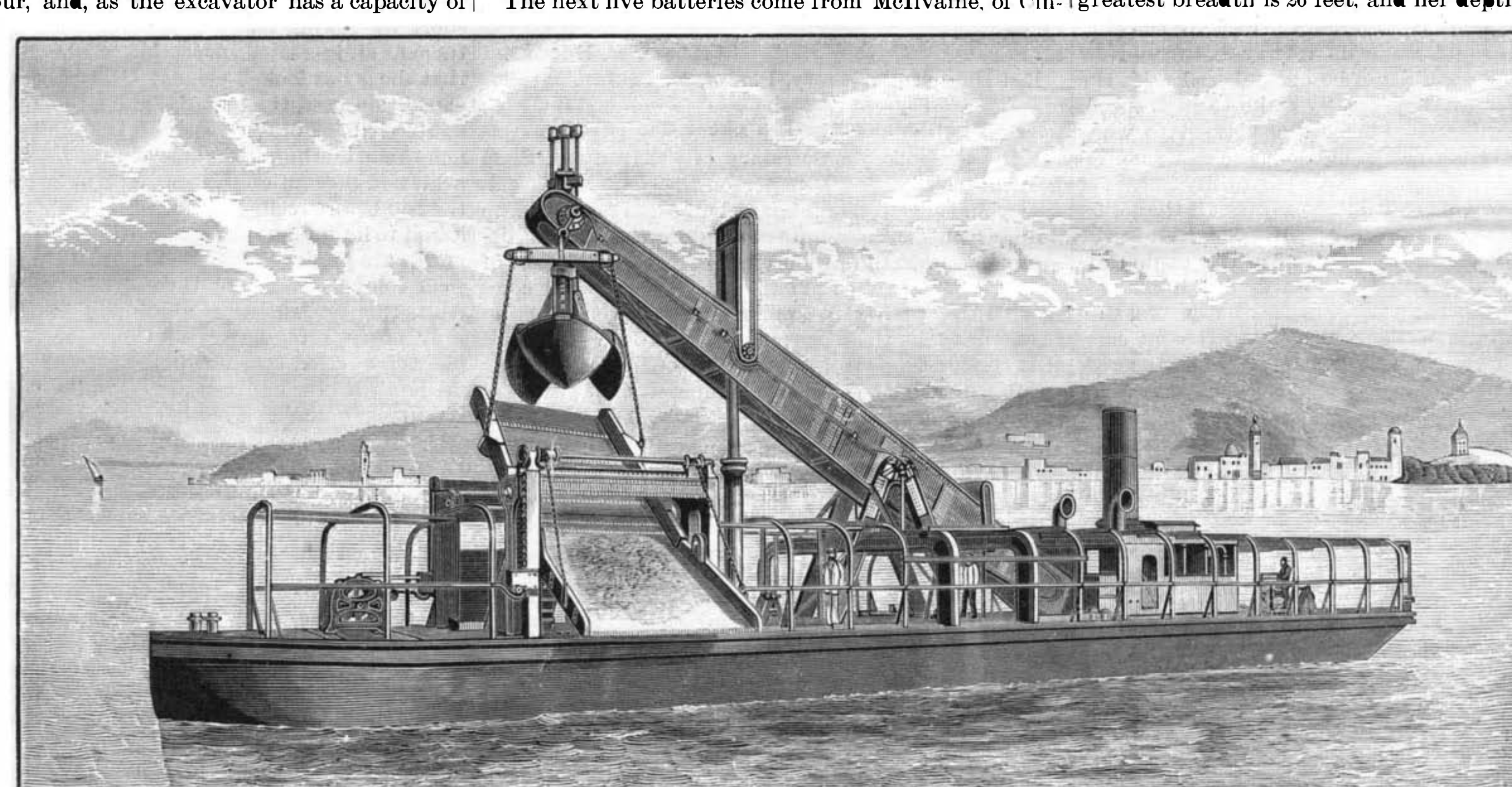
IMPROVED DREDGER.

The engraving herewith represents a dredger, on Messrs. Bruce & Batho's system, lately constructed for use in British Burmah. It is designed to work to a depth of 15 feet, and is of the following general dimensions: Length, 120 feet; breadth, 32 feet; depth, 7 feet; and mean draught, 3 feet. The vessel is propelled by twin screws worked by independent pairs of high pressure engines, supplied by steam from an ordinary marine multitubular boiler, 9 feet in diameter by 9 feet 6 inches long.

The whole of the operations involved in working the excavator are, says *Engineering*, performed by hydraulic power, which is furnished by a pair of direct-acting differential pumping engines with steam cylinders 15 inches in diameter and pumps $4\frac{11}{16}$ inches in diameter, the stroke of both being 18 inches. All the rams are controlled by slide valves placid amidships, so that one man can regulate the whole of the motions without leaving his station. The excavator is mounted on the end of a beam pivoted on frames fixed to the deck. This beam is raised into the position in which it is shown in the engraving by a hydraulic ram about half way between the center and the excavator, and it is caused to descend partly by the weight of the excavator, and partly by a smaller hydraulic ram near the other end. The excavator itself is worked by two rams coupled together by side rods, so that they move in unison. The lower and larger ram is connected by rods to the three segmental scoops, and serves to draw them together when they are receiving a load of soil, shingle, or rock, a pressure of 30 tons being available and amply sufficient for that purpose. The smaller ram opens the excavator when it is raised.

The two hydraulic cylinders with the hemispherical shell, and the casting to which its component parts are attached, are hinged to the beam by a universal joint, through the trunnions of which the pressure water enters. The chute for discharging the spoil is connected to the beam, and follows the excavators ready to receive its load as it falls. The speed of working is about forty lifts an hour, and, as the excavator has a capacity of 160 cubic feet, the work done amounts to 300 tons per hour.

As may be seen from the official reports to the Government of India, the cost of dredging with one of these machines is now only 1d. per cubic yard, while after some years of work the dredger was described as "perfect in every way." The fact that all the working parts are either on board, out of water, or above the material acted upon by the excavator, accounts for the great differences in wear and tear as compared with the bucket and ladder type of dredger.



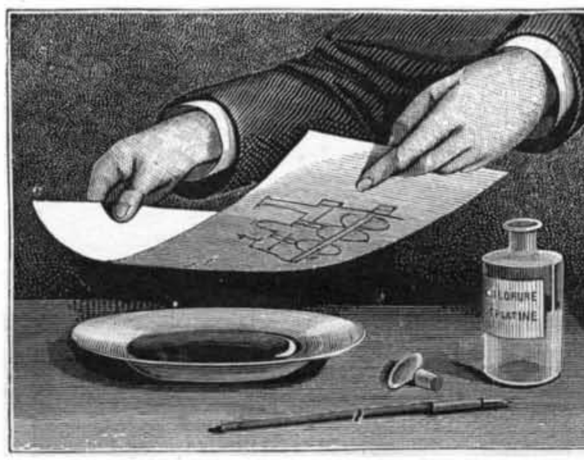
IMPROVED HYDRAULIC DREDGER.

MAGICAL APPARITION OF A DRAWING ON WHITE PAPER.

It is well known that the vapors of mercury are very diffusive in their nature, and some quite singular experiments have been devised based upon this, and upon the fact that the salts of silver and the cholorides of gold, platinum, iridium, and palladium are affected by these mercurial vapors.

If any one, for instance, should write upon a sheet of white paper with chloride of platinum, no mark would be visible, as the liquid is quite colorless. If, however, the same sheet of paper should be held over a little mercury, the metal will be brought out on the paper in dark tints. This magical apparition of a figure or drawing on a sheet of paper which appears to be perfectly white is very astonishing to the spectator.

On the other hand, reversing the experiment, a no less marvelous result is obtained. At first expose the drawing in writing to the gases of mercury; the lines will become charged with mercury, and then by simply bringing the drawing in contact with a sheet of paper previously sensitized with a solution of platinum, the drawing will be reproduced, line for line, on the white paper.



MAGICAL APPARITION OF A DRAWING ON WHITE PAPER.

Drawings made in this way give a charming effect, the tones being very soft and the lines being distinct and clear.—*Le Science and La Nature.*

The Boiler Batteries at New Orleans.

Just outside the Main Building, beyond Machinery Hall, are the monster batteries of boilers that supply the steam power to the stupendous engines of the Exposition.

The first battery is composed of four boilers, 28 feet long, 48 inches in diameter, occupying a frontage of 22 feet, having each two 16 inch flues and of 200 horse power. They were built by William Mitchell, of Louisville.

The next five batteries come from McIlvaine, of Cincinnati. They have each four boilers, 28 feet long, 48 inches in diameter, and occupy a space 22 feet front. Each boiler has two 16 inch flues and a capacity of 200 horse power.

Then follow three batteries of six water-tube boilers, manufactured by Babcock & Wilcox, of New York, and having each 500 horse power.

John Ward, of New Orleans, furnishes the next battery of three boilers. These are 24 feet long, 48 inches in diameter, have each seventeen 6 inch flues and a capacity of 200 horse power.

The American Steam Boiler Company, of Chicago, furnishes a battery of two boilers, 60 inches in diameter, 16 feet long, containing fifty 4 inch tubes; two boilers 54 inches in diameter, 16 feet long, containing fifty-seven 3½ inch tubes; horse power, 500.

The next battery is from William Mitchell, of Louisville, and is an exact duplicate of battery No. 1.

Armstrong Bros., of Springfield, O., have two batteries of four boilers, 28 feet long, 42 inches in diameter, and two 16 inch flues each, and are 200 horse power.

These batteries are so arranged as to be used all together or independently. They all lead into one main steam pipe, 500 feet long and 30 inches in diameter, and built of 5-16 homogeneous steel. The water supply is furnished by a system of duplex pumps that discharge into one main, with branches leading to each battery of boilers. The pressure in the water main is always maintained from 20 to 30 pounds greater than the pressure in the boilers, so as to equalize all frictional resistance in the pipes and bends, and thus insure at all times a constant supply of water to any or all the boilers. Each battery is regulated independently of the others by separate valves in charge of the engineer on watch.

The water supplied is taken up cold by the pumps and discharged into a manifold having a four inch steam pipe connection, and is forced through about 1,200 feet of four inch pipe that is incased in the main exhaust pipe, which is 40 inches in diameter, built of quarter inch iron. The water is thus heated 210° and 212°, at which temperature it is delivered into the boilers. The frontage occupied by the several batteries is 400 feet, and they will have a combined force of 6,000 horse power.

Each battery has its own smoke stack, the draught of each being wholly independent of that of the others. The furnaces employed, and on which most of the boilers sit, are of a style that has been successfully in use for years throughout the Western and Southern States, and which has a record of evaporation of 10 pounds of water per pound of combustible. They are constructed on the regenerative principle, the object sought being complete combustion and the prevention of the smoke nuisance so much complained of in all large cities. The smoke stacks of the different batteries run from 45 to 110 feet in height and from 40 to 60 inches in diameter. The building of most of the furnaces and the supervision of the entire line of boilers is under the general superintendence of Mr. Louis Metesser, of Indianapolis, a gentleman highly qualified by education and experience for the position.—*Times-Democrat.*

Scotch Dredges for the Panama Canal.

A Panama dispatch says: The first of the Scotch dredges for canal work arrived in this bay on November 24, having made the voyage from Scotland in eighty-eight days. The dredge is 170 feet long, her greatest breadth is 26 feet, and her depth 12 feet. She has two compound engines—one for driving the vessel and one for working the dredging machinery. Each engine is 80 horse power, but can be worked up to 400. When clean, she steams eight knots an hour. She is the most powerful vessel of the class yet bought by the canal company, and she will be followed by several others. Their special work will be cutting the main channel in shore, from in front of the anchorage of the steamers at Flamenco to the entrance of the canal at the back of Ancon Mountain. By January it is expected that at least two of them will be at work.