A Sunken Continent in the Pacific.

The fact is quite generally conceded among scientists that the probabilities are strongly in favor of the supposition that there formerly existed a large island, of continental dimensions, between the West Indies and the western coast of Africa. This continent is supposed to be the "Atlantis" of the ancients, whose recent discoveries point to the further probability that there also once existed a similar continental area of land in the Pacific Ocean, between the west coast of South America and the present Australian continent, as it is sometimes called.

At a recent meeting of the Academy of Sciences of San Francisco, Captain Churchill read a very interesting paper in relation to this matter. His paper referred especially to the gigantic sculptured figures still to be seen upon Easter Island, and evidently the work of a different race than that which now inhabits the island, and one much more numerous, since the works referred to are on too large a scale to have been constructed except by many hands. He argued that a vast continent once existed where there is now nothing but a waste of ocean, dotted with countless isles and islets of varying size and character, the majority showing in their formation the traces of that former volcanic action which either upheaved them from the depths of the sea or shattered and sunk the continent of which they are now the only vestige. Easter Island, it is believed, was once the home of a population numbering many thousands, of whom scarcely any now remain. Besides dwelling upon the sculptured figures to be found there, Captain Churchill laid much stress upon the hieroglyphic tablets of wood discovered upon Easter Island, and which are the only instance of a written language in Oceanica. He thought sufficient attention had not been given them.

From other sources we learn that a German government vessel recently visited that island, and made a large collection of prehistoric remains, and made copious notes of other matters of scientific interest. The German government, it is understood, are making preparations to send another expedition to Easter Island with a corps of scientists and engineers to sketch the island, surveying the ground, and to make plans and sections of the prehistoric buildings and ruins.

Our own government has also taken steps to secure some of these valuable remains representing the prehistoric and known races of this hemisphere. Instructions have already been sent to Admiral Upshur, in command of the South Pacific squadron, to send one of his vessels on a cruise in the direction of Easter Island, and to make such explorations, collections, and reports as he may think important in the interests of his government. The Government of France is also turning its attention to this island, with a view to the establishment of a protectorate.

It is reported in the accounts given by the German vessel that the island, which is small, is strewn with large stone images and sculptured tablets. The inhabitants of the island know nothing about the remains, and even tradition gives no account of a people living there when their ancestors arrived.—*The Jewelers' Journal.*

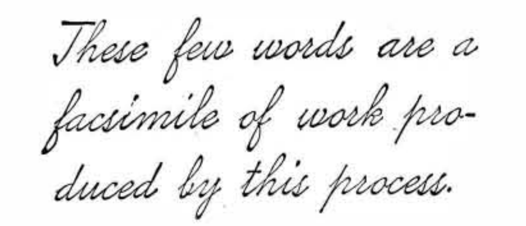
Launch of the Mersey.

The first of a new class of British "protected corvettes" intended to act as swift cruisers, was recently successfully launched from the Royal Dockyard at Chatham.

Designed as an armed cruiser for service in which her usefulness and her own safety upon occasion will depend upon her speed and ability to maneuver rapidly, the Mersey is fitted rather for attack than defense. Although she might not be able to do much mischief to a fort or a first-class ironclad, her armament, including two 8 in. and ten 6 in. breechloading guns, torpedoes, and ram, would make her a formidable opponent for any unarmored ship. The guns will be disposed so as to give the power of firing with the greatest possible effect while maneuvering. The two large guns are to be pivoted, one on the forecastle and one on the poop. On either side, fore and aft of amidships, are two projections or sponsons, and in each of these one of the 6 in. guns is to be placed, the others, three on a side, between the sponsons, increasing the effectiveness of her broadside fire. Long ports in the forward sponsons permit the guns to be trained 4° across the bow and to an angle of 60° abaft, giving a lateral range of 154°, while they may also be fired with a depression of 7° or at an elevation of 20°. The after sponsons admit of an equal range of fire. These guns carry their own shields for the protection of the gunners. She is also to carry one 9 pounder and one 7 pounder boat and field gun, a 1 in. Nordenfelt, and two 0·45 in. Gardner guns. Whitehead torpedoes will be carried, and provision is made for discharging them either above or below water on each broadside. Except for the steel faced armor, 9 in. thick, protecting the conning tower, and the steel protective deck plating, 2 in. thick where it is horizontal and 3 in. thick where it slopes downward across the coal compartments at the sides, the Mersey is unarmored. The authorized complement of coal is 500 tons. Her engines, of the horizontal compound pattern, are to be of 6,000 indicated horse power. She is provided with twin screw propellers, and it is anticipated that her speed will be 18 to 19 knots an hour. The principal dimensions of the ship are: Length between perpendiculars, 300 ft.; extreme breadth, 46 ft.; mean draught of water, 17 ft. 9 in.; load draught amidships, 19 ft.; load displacement, 3,600 tons. Her crew will number 300 officers and men.

THE CYCLOSTYLE.

The cyclostyle is one of the latest of the several processes which have been invented for reproducing manuscripts and drawings. In it, the stencil has met with



a new application, and one which produces excellent results. The apparatus consists in a plain walnut board provided with a zinc writing tablet. A double frame, also of walnut, fits snugly around the zinc, having its under frame hinged to the board at one

Fig. 1.

side. The upper frame being removed, a sheet of thin waxed paper is placed on the tablet, as indicated in Fig. 1. The frame is then replaced and locked to the underneath one, as shown in Fig. 2. In this manner the paper is securely fastened in the frame, the same

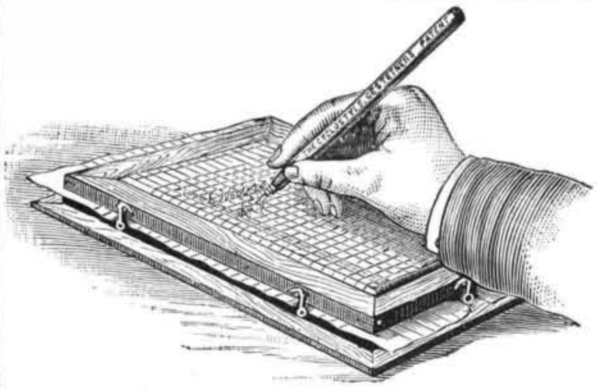


Fig. 2.

as in an ordinary drawing board, and the instrument is ready for use. The cyclostyle pen consists of a tiny wheel made of an alloy of iridium and palladium, and having sharp cutting edges on its circumference. This is pivoted to a steel bar attached to a wooden handle.

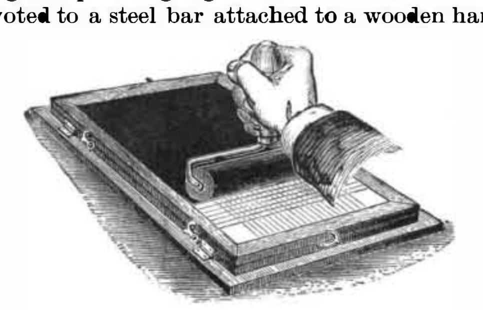


Fig. 3.

The pen is used just the same as the ordinary form, except that slightly great pressure is exerted. As it passes over the surface of the waxed paper, the little wheel revolves, turning in the direction of the writing, and leaves a series of minute perforations, so close to-

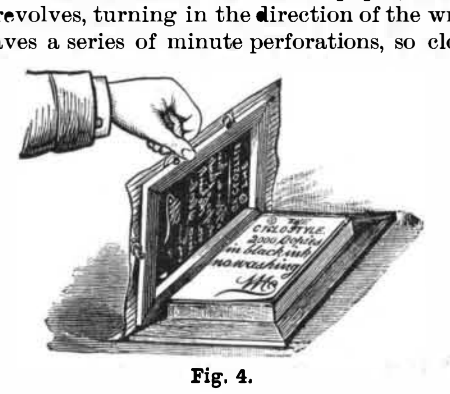


Fig. 4.

gether that the line traced appears continuous. When the writing is completed, a piece of ordinary writing paper, preferably unglazed, is placed under the waxed paper and on the zinc tablet. An inking roller is then passed over the waxed paper, as represented in Fig. 3. A quickly drying printer's ink is used. On lifting the frame, a clear and exact reproduction of the writing is found on the sheet underneath, as shown in Fig. 4. This copy has the decided advantage of being in black ink, and possessed therefore of all the appearance of a written letter. As many as two thousand copies can be obtained from the one writing, and at a rate of from four to five hundred an hour. The new process has met with a very favorable reception. It is already in use by several government departments and by many firms and corporations. At the office of the Cyclostyle Company, 152 Broadway, quite an interesting scrap book is on exhibition, illustrating a great variety of manuscripts and sketches reproduced by this process.

Native Mercury in Louisiana.

Native mercury has been recently discovered in a locality where its presence has hitherto been unsuspected. At "Cedar Grove" plantation, in Jefferson Parish, Louisiana, on the west bank of the Mississippi, ten miles above New Orleans, native mercury occurs in small globules disseminated through the alluvial soil. These globules vary in size from a microscopic pellet to a BB shot used for sporting purposes. They seem to be thoroughly admixed in the soil, and although more abundant within a limited area, are found for a distance of 1,200 feet. Beyond this distance, the limited time at my disposal did not allow me to investigate, but the appearance of the soil seems to indicate that the metal is gathered around a certain center, and gradually disappears as the distance from this center increases.

The apparent center lies about 300 feet from the Mississippi River in an orange orchard, where, also, a number of live oaks are in luxuriant growth. The presence of this mercury has been noticed for a number of years, during the operations of plowing and ditching, but has never, to the writer's knowledge, been officially reported to the scientific world.

The writer took two negro men, with spades, to the locality, and obtained several specimens of the soil, one to five feet below the surface. He also washed out on the spot, from a small wash tub full of earth, about two or three ounces of the native element. An analysis of two triturated specimens of the half dried earth was made with the following results:

1. Weight of soil,	500 grms.	Wt. Hg,	1·4652 grms.		p. c.	0·0029+
2. " "	500 "	"	1·4687 "			0·0029+
Total,	1 kilo.	Total,	2·9339	"	mean, p. c.	0·002934

Giving a mean percentage of mercury of 0·002934 per cent. The soil is all alluvial, and for a depth of 25 feet is as follows:

1. Surface, mercury bearing stratum, six feet thick. A sandy soil containing blue clay and a vegetable mould.
2. Stratum of blue clay 6½ feet thick.
3. Similar stratum to surface, but containing no mercury, six feet thick.
4. Stratum of blue clay 6½+ feet thick.

It is not known how much deeper the fourth stratum extends. In none but the upper stratum of alluvial soil does mercury occur in sufficient quantity to be perceptible to the naked eye.

The large quantity of mercury, the great area over which it is scattered, the situation *above* the most frequented resort of commerce, the protection from overflowing by levees, and the absence of any appearance or history of any large cargo of mercury being wrecked in that vicinity, make it extremely improbable that such results could have been effected by the agency of man.—*E. Wilkinson, American Journal of Science.*

French and English Timber Flooring.

We can and do frame floors most effectively by carpentry alone, whereas the French do the work in framing their floors so badly that no important bearing is, or indeed may be, trusted by them to the framed joint, dog-nailed stirrup straps of iron being always brought in aid. But the common practice with us, who can and do frame floors well, is to use single or unframed floors, which carry the weight and the vibration to which floors are exposed into the walls over voids as well as over solids; while, on the other hand, the French almost invariably frame their floors to or upon girders, by means of which the floors are brought to bear upon the solids of the walls. The walls are thus not only less exposed to vibratory action, but are both tied together and strutted apart with better effect by the stout girders stiffened by joists than by joists which themselves require some foreign aid to stiffen them. Moreover, single floors of joists, unless trimmed at frequent intervals—when, indeed, they may be termed half-framed—require, or are thought to require, plates of timber laid along the inside faces of outer walls and upon internal walls, and thus tend to the injury of the walls by introducing timber, that bane of brick and stone walls, into their structure, so as to render the timber a part of the structure. This defect is avoided by our neighbors, who exclude all timber, except the bearing ends of girders, from their walls, and who use framed floors.—*Professor Hosking.*

Explosions from Non-explosive Liquids.

In a lecture before the Royal Institute (London), on the 13th of March, by Sir Frederick Abel, C.B., after giving an account of a large number of explosions on shipboard and elsewhere resulting from the escape of the vapors of inflammable non-explosive liquids, the lecturer proceeded to state the cause of many accidents, and suggested the remedies for them, which are substantially as follows:

If a partially filled lamp were carried or rapidly moved, a mixture of oil vapor and air might be caused to escape from the lamp in close proximity to the flame, and becoming ignited might produce the explosion of the mixture in the reservoir. This escape might occur through the burner itself if the wick did not fit the holder properly, or through openings which exist in some lamps in the metal work close to the burner, of sufficient size to allow flame to pass through them readily. A sudden cooling of the lamp by its exposure to a draught or by its being blown upon, as, for instance, in adopting the common practice of blowing down the chimney to extinguish the flame, might give rise to an inrush of air, and the flame might be at the same time drawn or forced into the reservoir. If the quantity of oil in the reservoir were but small, and the air space large, an explosion would obviously exert greater violence than if these conditions were reversed. If the wick were lowered very much, or if for some other reason the flame were burning very low, the lamp would be liable to become much heated, and the tendency to the production of an explosion would be increased. Oils of high flashing point were more liable to cause heating of the lamp in consequence of the higher temperature developed by the combustion and the comparative slowness with which a heavy oil was conveyed by the wick to the flame. It therefore followed that safety in the use of mineral oil lamps was not to be secured simply by the employment of oils of very high flashing point (or low volatility), and that the use of very heavy oils might even give rise to dangers which were small, if not entirely absent, with oils of comparatively low flashing point. The character of the wick very materially affected not only the burning quality of the lamp, but also its safety. A loosely plaited wick of long staple cotton would draw up the oil to the flame regularly and freely, while, if the wick were very tightly plaited and made of short staple cotton, it would be of inferior capillary power, the oil would be less copiously drawn up, and undue charring of the wick—with considerable heating of the lamp—might ensue. If the wick were damp when taken into use, or if the oil contained moisture, the capillary action of the wick would be impaired; and long continued use of the wick would be liable to result in its becoming choked with impurities, held in suspension in the oil strained through it. Many lamps were so designed as to facilitate the production of explosion, openings or channels being provided through which the flame might pass into the oil reservoir.

Five simple suggestions the lecturer made for lessening the risk of accident which attends the use of petroleum and paraffine oil:

1. The reservoir of the lamp should be of metal, and should have no opening or feeding place in the metal.

2. The wick used should be soft and loosely plaited; it should fill the wick holder, but not so as to be compressed within the latter, and it should always be thoroughly dried before the fire when required for use. The fresh wick should be but little longer than is required to reach to the bottom of the reservoir, and should never be immersed to a less depth than about one-third the total depth of the reservoir.

3. The reservoir of the lamp should always be almost filled before use.

4. If it is desired to lower the flame of the lamp for a time, this should be carefully done, so as not to lower it beneath the metal work more than is absolutely necessary.

5. When the lamp is to be extinguished, and is not provided with an extinguishing apparatus, the flame should be lowered until there is only a flicker; the mouth should then be brought to a level with the top of the chimney, and a sharp puff of breath should be projected across the opening.

Expenses of Business.

A well informed merchant of Boston recently said to a representative of a Boston newspaper that he had been looking back over his accounts, and was surprised to find that since the close of the war there had been a steady increase in the ordinary expenses of carrying on business. That this increase of business expenses extends beyond the merchant to the manufacturer and most other kinds of business is a fact patent to most employers. Mere office work costs a great deal more now than it did in 1865; more clerks are needed, and, on the whole, each of these receive higher pay. Assistance is required in the receiving and delivering departments to an extent and of a character that would not have been dreamed of two decades ago. Then there are a variety of incidental expenses that now enter into the computation. There are telephone charges, printing, the expense of solicitors, the whole making up an amount sufficiently large to eat up all that would have been considered fair profits a quarter of a century ago. It is probable that the experience in different trades varies, and yet we fancy that in most lines of business statements somewhat similar to the above might be made. The tendency, all the time going on, to lessen the hours of service, both in offices and workshops, of itself makes the cost of business proportionately higher. Competition is sharper than it was ten or twenty years ago, and prices are so much reduced in most commodities which enter into the necessities of a household, that mechanics, clerks, and others are enabled to live much better now than it was possible for them to do ten or twenty years ago, when their wages were less and the cost of living was greater.

Remarkable Career of an Adventurer.

News comes from Lima, Peru, of the recent death there of Alfred Paraf, one of the most remarkable swindlers of the age. The story of his life reads more like an extravagant fiction than a sober reality, the truthfulness of which can be attested by many of our best known chemists and keenest business men. Born of a wealthy and highly respectable family of Alsace, and receiving a first-class education, he then took a course of chemistry, for which he seemed specially fond, and was placed in charge of the laboratory of his father's print works in Mulhaus. His inventions of new combinations and improvements on old processes in dyeing and color work showed high talent, but being short of money on a trip to Scotland, he used his abilities to impose upon a Glasgow firm a so-called new color for $20,000. The dye was new and cheap, but not durable, but while the money lasted he lived with great show, and then imposed upon a Paris firm in a similar way, from which he received sufficient to start him on a career in this country. He landed in New York in 1867, 22 years of age, and with his accomplishments and ready tongue, besides a lavish use of money, soon had a wide circle of acquaintances. He professed to have discovered an improved aniline black, with which he traveled through New England, selling licenses in manufacturing towns for two to three thousand dollars each, until he had some sixty thousand dollars, with which he returned to New York and lived for a brief period after his accustomed expensive style. The real owner and patentee of the dye in Europe coming over to enforce his own rights, Paraf had to discover "new colors," one of which, called "cloverine," nearly ended his career by an explosion which occurred in its preparation, but yielded him a good deal of money. The next speculation was on a new method of employing extract of madder, for which, it is said, ex-Gov. Sprague of Rhode Island paid Paraf $75,000, and then invested $300,000 in a plant to utilize the new method, all of which was lost. Paraf subsequently stole the oleomargarine process of Prof. Mege, and formed a stock company of half a million dollars for this new manufacture here, and afterward in San Francisco. It was now about time for the adventurer to disappear, which he did only to be again heard from in Chili, with a scheme for extracting gold from copper ore, and a big joint stock company. The fraud here was discovered in November, 1877, and Paraf but narrowly escaped lynching before he was convicted and sentenced to his first and last term of imprisonment, since which his name has been lost to the public until this announcement of his death calls to mind so many vivid recollections.

Contagiousness of Dry Rot.

The parish church of the Holy Trinity in Cork having been found to be in a bad state of repair, and quite deformed from bad and unequal foundations, the parishioners resolved on building a new church; but, through want of funds, not being able to carry their designs into execution, an extensive repair was decided on. The tower was taken down, and one side wall and the end of the church were rebuilt. Immediately under the floor of the church, and open to the burial vaults underneath, longitudinal beams of Irish oak, of from 12 to 14 inches square, had been placed, resting on piers, and forming supports for the joists. Though these oak beams were decayed for an inch deep at their surfaces, sufficient of the timber (as it was thought) remained sound, and it was decided that neither they nor the piers upon which they rested should be removed.

The vaults were arched over, memel joists, 6 inches by 4 inches, were placed on the vaulting, and connected with the old oak beams which rested on the piers; the floors were removed, the old pews replaced, new columns, coated with scagliola, were erected over the galleries, the old ones in the lower tier retained; and the whole repairs having been thus completed, the church was reopened for divine service in April, 1829. In November, 1830 (but eighteen months afterward), the congregation was annoyed by an unpleasant smell, which, on examination, was found to proceed from dry rot of the most alarming nature. On opening the floors under the pews, a most extraordinary appearance presented itself. There were flat fungi of immense size and thickness, some so large as almost to occupy a space equal to the size of a pew, and from 1 to 3 inches thick. In other places fungi appeared growing with the ordinary dry rot, some of an unusual shape, in form like a convolvulus, with stems of from $\frac{1}{4}$ to $\frac{1}{2}$ an inch in diameter.

When first exposed, the whole was of a beautiful buff color, and emitted the usual smell of the dry rot fungus. Whatever may have been the surprise at the rapid growth of the plant, its action on the best memel timber was a source of greater astonishment. I took up, with nearly as much ease as I could a walking cane, that which, eighteen months before, was a sound piece of timber (one of the joists), from 12 to 14 feet long, 6 inches by 4 inches scantling; the form of the timber remained as it came from the saw, but its strength and weight were gone. The timber of the joists and floor over the new brick vaulting was completely affected by the dry rot, which was rapidly spreading to the lower part of the columns under the galleries, so that, at the rate the infection proceeded, the total destruction of the building would soon have been effected. During a great part of the time occupied in the repairs of the church, the weather was very rainy. The arches of the vaults having been turned before the roof was slated, the rain water saturated the partly decayed oak beams, before described. The flooring and joists, composed of fresh timber, were laid on the vaulting before it was dry, coming in contact at the same time with the old oak timber, which was abundantly supplied with the seeds of decay, stimulated by moisture, the bad atmosphere of an ill-contrived burial place, and afterward by heat from the stoves constantly in use. All these circumstances account satisfactorily to my mind for the extraordinary and rapid growth of the fungi.—*Sir Thomas Deane in The Architect.*

Habits of Crabs and Lobsters.

A few evenings since, Professor Bickmore delivered a very interesting lecture at the American Museum of Natural History on the habits of crabs and lobsters. The appendages of the lobster were remarked upon as peculiarly adapted to its natural wants. The two claws or pincers differ the one from the other, a fact which always gives them an ungainly appearance. One of the claws has a series of grinders, and is used as a mill to crush shell fish and other hard substances, while that on the opposite side is provided with a sharp edge, which is used for cutting. The lobster propels itself by means of thin plates attached to the body, which it uses as oars. Its eggs are attached to and carried about on the under side of the body, and to protect them from rocky bottoms the tail of the animal is doubled up under it, completely covering them.

The crab is a higher order of animal than the lobster, the Professor said, and he described a number of different classes of the species. The fiddler crab was so called from the peculiar shape and motion of its claw. It has a set of grinding teeth in the anterior portion of its stomach, and a grinding movement is kept up almost continuously. The eye of the crab was very peculiar, consisting of a series of tubes bound together, each tube representing a single eye. He sees singly by combining the images in his mind after the manner of a mosaic. The long feelers of the crab are designed for reaching into crevices of the rocks after its prey. The giant of all crabs is found in the bay of Yeddo. Its legs are 11 feet long, and it scarcely has body enough to hold them together. The hermit is a queer sort of animal, which takes up its habitation in shells vacated by other animals. If a hermit crab was placed in a tub of water with several shells, it would examine them all, and then select that best adapted to its comfort. If two or three crabs were put among the same shells, they would often fight for the best shell. The hermit often traveled about in conjunction with a polyp as a means of protection from the octopus. The polyp did the fighting, while the hermit carried him about and collected food for both.

A crab and a cocoanut were held up by the Professor before his audience. The crab, he said, was a palm crab, and lived in cocoanut groves. It tears off the husk with its claws, hammers through the shell, and then lifts out the meat in chunks with its pincers. The palm crab has a special breathing apparatus which enables it to breath out of water. The most peculiar of all the crabs was a certain species which lives in the mountains. The animals keep well out of the way during the daytime, but they are fond of making moonlight excursions in little groups to wet their gills in water. They not infrequently stop at vegetable gardens in their marches, and the damage they do makes the farmers their enemies. The barnacle was said to be of the same general species as the lobster and the crab.

Hardening Plaster.

The author mixes intimately 6 parts of plaster of good quality with one 1 part of fat lime, recently slaked and finely sifted, and uses this mixture like common plaster. He then moistens the object thus formed with a solution of zinc or iron sulphate.—*M. Julhe.*

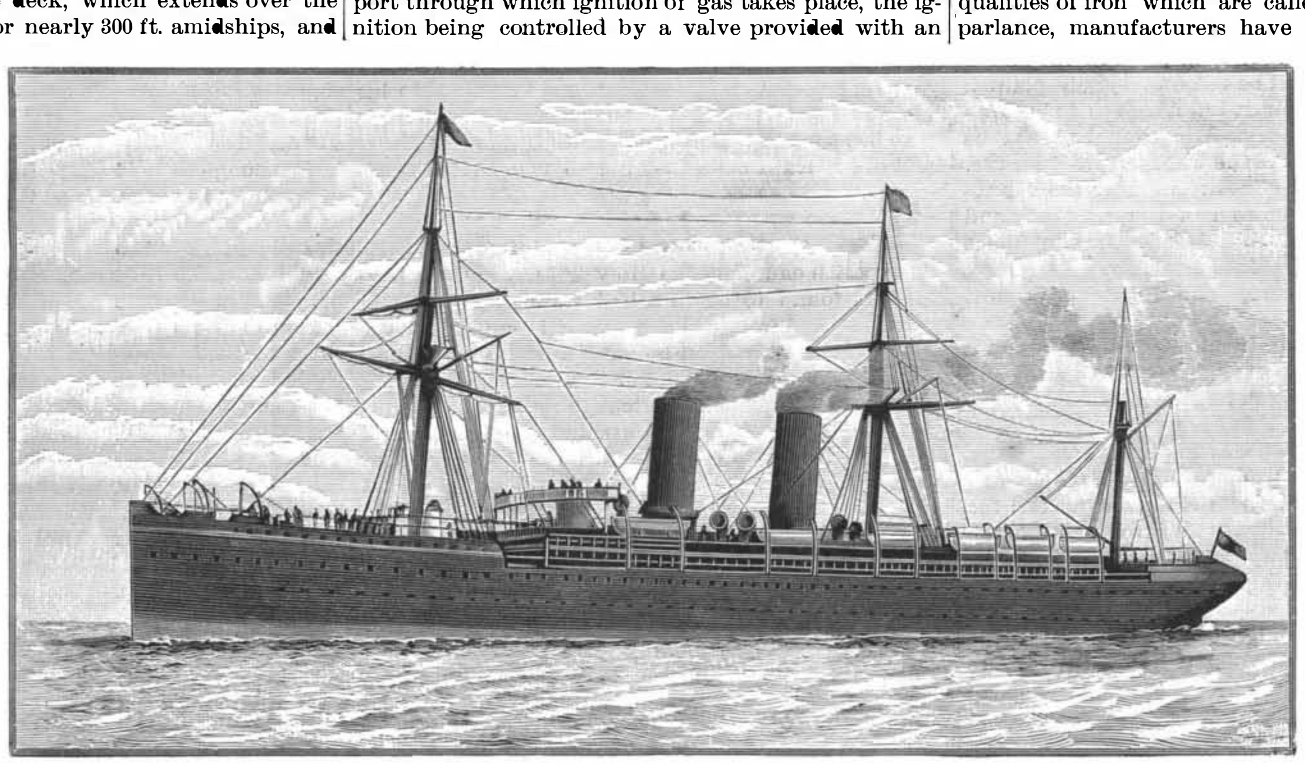
Coignet's Concrete.

M. Coignet has, says Captain Fowke, as the result of a series of experiments, given us the recipes for making two kinds of concrete suitable for house building, which he distinguishes by the epithets of economic concrete and hard and solid concrete. The first is composed of sand, gravel, and pebbles, 7 parts; argillaceous earth, 3 parts; quicklime, 1 part. This concrete, he says, properly beaten up and mixed, has given walls nearly as hard as the common soft rubble masonry used in Paris. In price it competes with ordinary pise work, over which, however, it has the advantage of being able to resist moisture. The hard concrete is composed of sand, gravel, and pebbles, 8 parts; common earth, burnt and powdered, 1 part; cinders, powdered, 1 part; unslaked hydraulic lime, 1½ parts. The materials to be perfectly beaten up together. Their mixture gives a concrete which sets almost immediately, and becomes in a few days extremely hard and solid, which property may be still further increased by the addition of a small quantity, say one part, of cement; and the price, depending principally on that of the time and labor, was in Paris, under favorable circumstances, 3½d. to 4d. per cubic foot; with more favorable conditions, 2d. per cubic foot. A house three stories in height, 65 feet by 45 feet, standing on a terrace, having a perpendicular retaining wall 200 feet in length and 20 feet high, has been actually constructed with every part, including foundations, vaults of cellars, retaining wall, all walls, exterior and interior, without exception, of this hard concrete (Beton dur), as well as the cornice, mouldings, string courses, balustrades, and parapets, and without bond iron, lintels, or wood throughout. The use of plaster in the interior is also avoided, as the concrete takes a surface sufficiently fine for papering.

THE NEW CUNARD STEAMSHIP ETRURIA.

In September, 1884, Messrs. John Elder & Co. launched from their yard at Govan the Etruria, a large steel screw steamer for the Cunard Company, to supplement their service of express steamers between Liverpool and New York. The dimensions of the vessel are: Length over all, 520 ft.; breadth, extreme, 57 ft. 3 in.; depth to upper deck, 41 ft., and to promenade deck, 49 ft.; with a gross tonnage of about 8,000 tons. She is entirely built of steel throughout, and is divided into 10 water tight compartments, most of the bulkheads being carried up to the upper deck, and fitted with waterproof and fireproof doors, giving access from one part of the ship to the other. By this arrangement the danger of fire spreading, should it break out in any division of the ship, is removed as far as possible, and greater safety is obtained by being able to isolate any apartment for sanitary purposes, or in case of damage to the hull and the compartment being flooded.

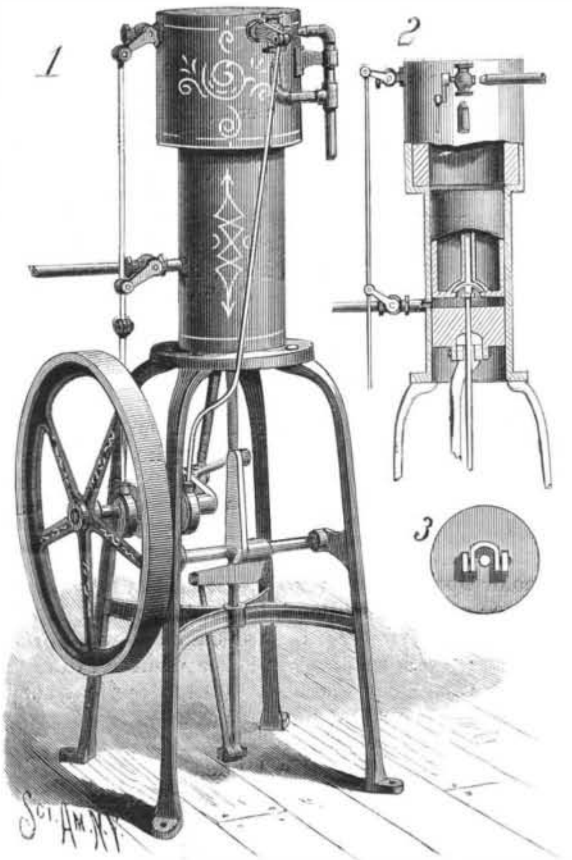
The special care taken in providing for the safety of the ship and the lives on board entitles her to rank as a transport of the highest class, and she is entered on the Admiralty list, being specially constructed for the requirements of the "service" for mercantil. auxiliaries in the time of war. She has five decks in all, including the promenade deck, which extends over the breadth of the vessel for nearly 300 ft. amidships, and would be reserved for the use of first-class passengers. The first-class accommodation forms a special feature, and occupies the whole of the main and lower decks, with the exception of the portion set apart for the use of the crew. Altogether, accommodation can be provided for 720 first-class passengers, the largest part of which is arranged for two-berth staterooms only, which are replete with all fittings usual in the highest class of passenger steamers—a number of the rooms being fitted *en suite* for family use. The engines are made to indicate upward of 14,000 horse power. They are compound, having three inverted cylinders—one high pressure 71 in. in diameter, and two low pressure each 105 in. in diameter. The high pressure cylinder is placed between the two low pressure cylinders, and all are adapted to a stroke of 6 ft. The Etruria reached New York from Liverpool, on her first voyage, on May 4, 1885; on one day during the trip she ran 449 miles. On her trial trip she made 24 miles an hour. Our engraving is from the *Illustrated London News.*



THE NEW CUNARD STEAMER ETRURIA.

AN IMPROVED GAS ENGINE.

It is claimed that the gas engine herewith shown saves a great part of the heat which, in the engine of ordinary construction, is taken up by the water in the jacket. It gives power at every stroke, and is thus more efficient than those giving power only at alternate strokes. The engine cylinder is made with an



McDONOUGH'S IMPROVED GAS ENGINE.

open lower end attached to a supporting frame, and is prolonged upward for a distance equal to about two diameters. The upper part is made larger than the lower, so as to form a space for a fire brick lining, shown in the sectional view, Fig. 2. The upper part constitutes the combustion chamber, and by this construction the engine is less expensive to manufacture than if the parts were made separately and bolted together. In the lower part of the main cylinder is an inlet port to admit gas, and in the upper part of the combustion chamber is an exhaust port. The stems of both the valves are connected with the same rod, actuated by an eccentric on the driving shaft, so that both valves will be operated at the same time. The shaft revolves in bearings in the frame, and is provided with a balance wheel to give steadiness of motion to the moving parts.

Near the upper end of the combustion chamber is a port through which ignition of gas takes place, the ignition being controlled by a valve provided with an ignition gas jet and a relighting jet. This valve is operated by an eccentric on the driving shaft, so that it will be opened and closed at each revolution. In the cylinders are two pistons, the upper one being made long, and formed with a central longitudinal perforation, in the lower end of which is a valve opening upward to allow the gas to pass freely upward and prevent its return. The lower end of the piston rod of the long piston is connected with the long arm of an elbow lever operated through a rod connecting its other arm with the crank of the driving shaft. To the shaft is also pivoted the piston rod of the lower piston.

The operation of the engine may be easily understood: When the long piston begins to move away from the other, the gas enters the space between them, and at the same time the spent gas from the previous ignition is driven out through the exhaust port. Then the pistons move toward each other, when the gas, being compressed, opens the valve and passes through the perforation in the long cylinder into the combustion chamber. When the short piston is at the end of its inward stroke, and the long piston is nearly in contact with it, the gas is ignited, and expands, forcing the pistons outward and completing the cycle of movements. By this arrangement the gas is introduced into a cold cylinder, compressed, and then transferred to a hot chamber, where it is fired, expanded, and exhausted at each revolution of the shaft.

This invention has been patented by Mr. Thomas McDonough, of Montclair, N. J.

Separation of Oxygen by Means of Silver.

Troost has recently demonstrated that metallic silver allows oxygen gas to pass through it at a red heat, in a manner similar to the passage of hydrogen through red hot platinum or iron, which was proved some years ago by Deville and Troost. For the experiments a tube of silver was used with a diameter of 1 cm., the thickness of the metal being 1 mm. This was inclosed in a rather larger tube of platinum. When the tubes were heated, and oxygen gas was drawn through the space between the tubes, it was found to pass into the silver tube. The amount passed corresponded to 1·7 liters per hour for every square meter of silver surface. If air were passed between the tubes instead of oxygen, then it was found that practically only oxygen found its way through into the silver tube, as only traces of nitrogen accompanied it. The rate of passage was, however, very much diminished. These experiments were carried on by exhausting the silver tube by means of a Sprengel pump, but it was also found that it was not necessary to thus exhaust, as the simple passage of some other gas through the tube, such as carbon dioxide, was sufficient to cause the transfusion to take place, though at a considerably less rate than exhausting. When a silver tube of less thickness than 1 mm. was used, the rate of transfusion was increased. Various other gases were passed between the tubes, but they only passed through the silver at a very slow rate. It is suggested that this quality of silver, of allowing oxygen to pass with comparative ease, may be some day made use of for isolating the oxygen of the atmosphere, for which purpose a very large surface would be required. Large coils of tubes with thin metal could be used, with either an exhauster or a current of carbon dioxide. If the latter, the carbon dioxide could be absorbed in alkali, leaving free the oxygen.

Steel Numbers.

In lieu of any really definite name for the different qualities of iron which are called "steel" in popular parlance, manufacturers have adopted a system of numbering that gives some notion of the condition of the product by designating the relative amount of carbon that the converted iron has received. It would be better if they would have suggested, also, other materials than carbon; for the best of steel is not only iron with a high and certain amount of carbon, but all steels must contain something besides iron and carbon to be workable and useful.

Soft and low steels are known from 0·10 to 0·76 of carbon; the lower grades are merely purified irons, with none of the qualities of crucible steel; they weld without flux, work soft at high heats, are not burned when approaching the welding heat, and are affected by sudden chilling in a cold bath only as iron would be. As the numbers approach a full per cent of carbon, the steel begins to act like crucible steel; requires a flux for weld, chills and hardens in water, and is capable of being tempered and of receiving a cutting edge. This method of designation is much better than the loose naming of the differing grades "iron" and "steel."