Train the Boys for Business.

There is one element in the home instruction of boys to which, says a Boston paper, too little attention has been given, and that is the cultivation of habits of punctuality, system, order, and responsibility. In too many households boys from twelve to seventeen years are too much administered to by loving mothers or other female members of the family. Boys' lives during those years are the halcyon days of their existence. Up in the morning just in season for break ast; nothing to do but to start off early enough not to be late; looking upon an errand as taking so much time and memory away from enjoyment; little thought of personal appearance except when reminded by mother to "spruce up" a little; finding his wardrobe always where mother puts it—in fact, having nothing to do but enjoy himself.

Thus his life goes on until school ends. Then he is ready for business. He goes into an office where everything is system, order, precision. He is expected to keep things neat and orderly, sometimes kindle fires, file letters, do errands—in short, become a part of a nicely regulated machine, where everything moves in systematic grooves, and each one is responsible for correctness in his department, and where, in place of ministers to his comfort, he finds task masters, more or less lenient, to be sure, and everything in marked contrast to his previous life.

In many instances the change is too great. Errors become numerous; blunders, overlooked at first, get to be a matter of serious moment; then patience is overtasked, and the boy is told his services are no longer wanted. This is his first blow, and sometimes he never rallies from it. Then comes the surprise to the parents, who too often never know the real cause, nor where they have failed in the training of their children.

What is wanted is for every boy to have something special to do; to have some duty at a definite hour, and to learn to watch for that time to come; to be answerable for a certain portion of the routine of the household; to be trained to anticipate the time when he may enter the ranks of business, and be fortified with habits of energy, accuracy, and application, often of more importance than superficial book learning.

The Emery Mines of Chester Co., Pa.

In his communication, printed in our issue of November 2, W. J. L. spoke of the emery mines near Unionville, Chester Co., Pa., as having been abandoned for lack of mineral of marketable purity. Mr. Isaac J. Conner writes that the mines in question "have never been abandoned, only at short intervals, for the last nine or ten years," and that there are at present three different parties actually engaged in mining the mineral in that locality. The purity of the emery of Chester Co., Pa., is, he claims, unsurpassed. It was there, on the premises of Messrs. Chandler & Ball, four or five years ago, that the largest and best mass of emery ever found on the continent was discovered—a solid block weighing about two hundred tons.

A NEW SQUARING SHEAR.

The operation of squaring a sheet of metal when performed by means of ordinary shears requires four movements of the sheet and a careful adjustment of the metal to the gauges. The accompanying engraving represents the new power shear manufactured by the Stiles & Parker Press Company, of Middletown, Conn., by which this operation is facilitated and rendered accurate.

This shear has two blades, each 22 inches long, set at right angles one with the other, and moving in unison, so that a sheet of tin can, with one motion, be squared on two sides, or the whole sheet squared in two motions. As will be seen by the engraving, there are suitable front gauges as well as independent back gauges, one for each blade.

The gauge on one blade can be set to cut a different width from the other, so that a part of a sheet of metal can be cut up into a certain width for one article, and the remainder into a different width for another article, resulting in the saving of stock.

The frame that holds the upper blades is carried down uniformly, by three pitmans, located one at the extreme end of each blade, thus securing a perfectly smooth cut.

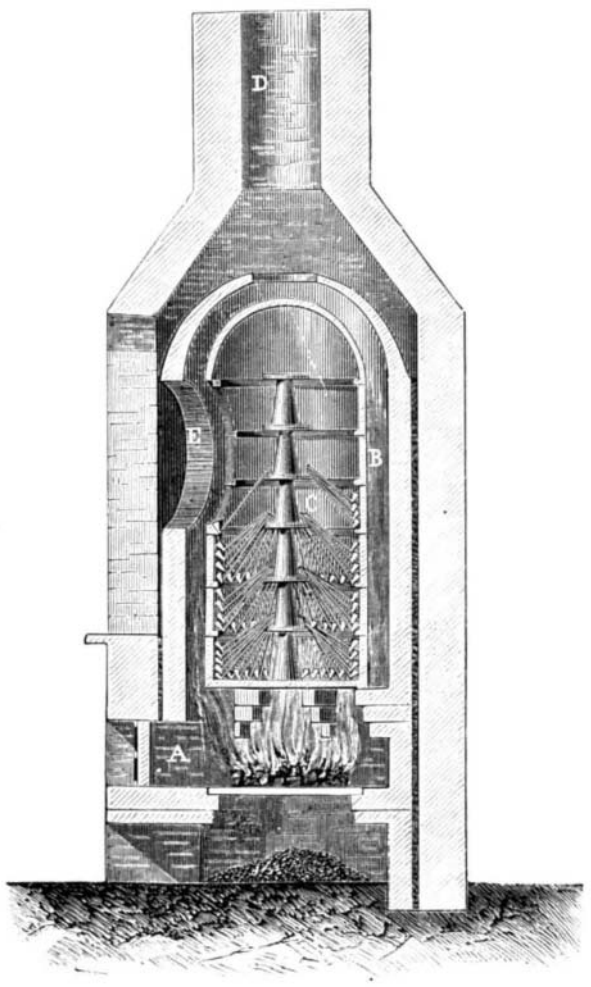
The shear has the patent gib arrangement which this firm have applied to their presses. It is also provided with an automatic stop motion which leaves the blades wide open.

Quicklime a Wood Preservative.

The *Builder* states that M. Lostal, a French railway contractor, recommends quicklime as a preservative for timber. He puts the sleepers into pits, and covers them with quicklime, which is slowly slaked with water. Timber for mines must be left for eight days before it is completely impregnated. It becomes extremely hard and tough, and is said never to rot. Beech wood, prepared in the same manner, has been used in several ironworks for hammers and other tools, and is reputed to be as hard as iron, without the loss of the elasticity peculiar to it. According to the *Kurze Berichte*, lime slaked in a solution of chloride of calcium is used at Strasburg as a fireproof and weatherproof coating for wood.

CLAY PIPES AND THEIR MANUFACTURE.

Tobacco and the pipe are articles the habitual use of which has become general all over the globe, in imitation of the former inhabitants of America. Among the branches of industry which have been a consequence of the introduction of tobacco, the manufacture of pipes has become of considerable importance. Immense quantities of wood,



PIPE-MAKER'S OVEN.

meerschaum, china clay, and pipe clay are annually converted into pipes, principally in England, France, Germany, and Austria; a smaller quantity being produced in Holland and Turkey. Wooden, china, and meerschaum pipes are made mostly in Germany and Austria, and among clay pipe producers England takes the first rank. Although the value of clay pipes is comparatively small, the enormous quantity in which they are made makes them an important product of industry to England.

The principal pipe factories are located in Dorsetshire and Devonshire, where a pure variety of potter's clay is found in great abundance. It resembles kaolin in its character, although it contains a little less silica, and remains quite porous after baking. The clay is first freed of all impurities by levigation, and then undergoes repeatedly a process of kneading and curing in open tanks, exposed to the air, in much the same way as clay for other purposes is treated. After it has acquired the desired plasticity, it is divided into masses of about 50 lbs. each, which are then given to the formers.

The first step in making a pipe is the formation of the stem in a metal mould. A small lump of clay is left attached to the rod, of which the cup is afterward formed. The rod is then pierced throughout its length with an oiled brass rod. Holding the pipe by the free end of the stem, the operator now imparts to the cup its external form by means of a copper mould, in which if ornamental pipes are to be made are engraved the designs. It is provided with a spring to open it automatically. The pipe then passes to a third operator, who forms the inside of the cup with his fingers and establishes communication between the cup and the stem by piercing the separating wall with the brass rod. The pipe is now put aside to dry in the sun, after which it is ready for the oven. Three men finish from 600 to 700 pipes a day.

The accompanying engraving represents an oven used by English pipemakers. The fire, A, is located centrally in the oven. The heated gases circulate through the space, B, formed by the walls of the oven and by the muffle, C, which receives the pipes. The latter are introduced through the door, E, and arranged in the position indicated by the engraving, on shelves made of biscuit. An oven of this kind usually contains 2,000 pipes. The pipes are generally baked for eight or nine hours.

Ordinary pipes receive no glazing of any kind, while some of the better class are painted and glazed. They are very porous, hence their tendency to adhere to the lips. To overcome this the mouth ends are dipped in water containing a little pipe clay in suspension, and polished. By this means the pores of the clay are stopped. Pipes of better quality are covered with a mixture of soap, wax, and gum, and then polished.

Difficulty is occasionally experienced in holding the pipes in proper position in the oven. Some manufacturers fill the oven with fine sand after the pipes are in position. The sand fills all interstices and supports the pipes.

Several millions of dollars' worth of clay pipes are annually manufactured in England

Fortifying the Sub-Treasury.

The great amount of bullion which is concentrated at the Sub-Treasury, in this city, has suggested to the officials the desirability of strengthening the vaults, and taking other means of protecting the vast treasures within the building. To this end Mr. George L. Damon, of Boston, has been selected by Secretary Sherman to do the job.

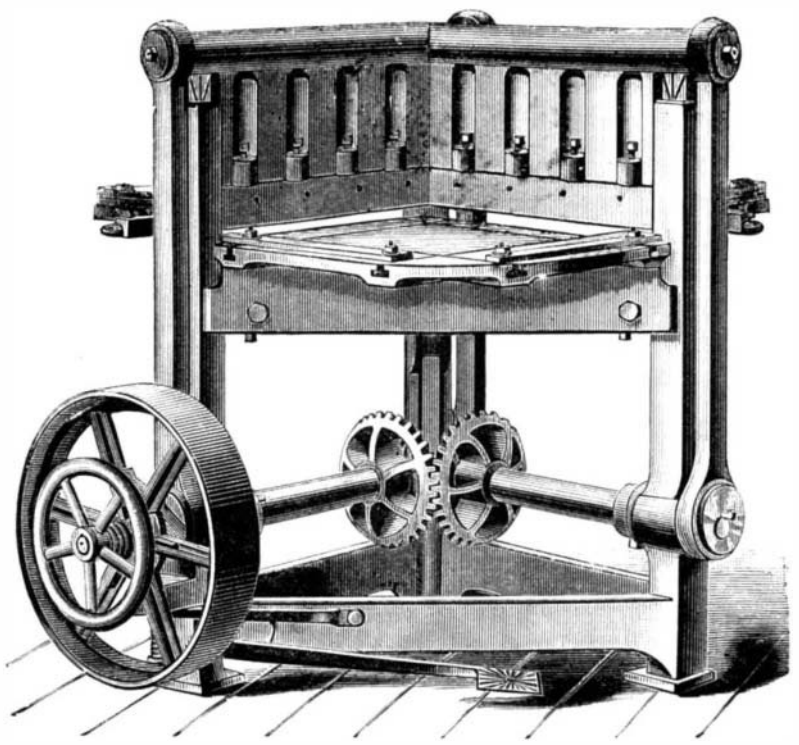
The improvements will consist of steel gratings, iron bars to the windows of the three floors, wrought iron doors with loopholes, and three steel turrets similarly perforated to be placed on the roof. The center turret is to be octagonal in shape, and will occupy a commanding position in order to enable marksmen to sweep the roofs and the streets below in case of an attack by an armed mob. It is also understood that the Assay Office will be similarly protected, and in addition will be supplied with a Gatling gun. These precautions were first suggested at the time of the great railroad strike two years ago.

Machinery for the Manufacture of Toys.

Toy making by hand cannot bear high wages for labor nor high prices for wood. Hence the most important centers of the toy industry were established on the high mountains of Germany and Switzerland, where forests abound and the population were willing to work long hours for small pay. What can be done in the way of cheap production is illustrated at Leiffen, in Saxony, in a manner almost terrible. For making 180 toy kitchen utensils, as they are usually furnished to this country, *three* cents are paid. Sixty small boxes for packing these toys are paid for with from ten to fifteen cents. The making of wooden toys is almost the sole industry in many parts of central Europe, and the united labor of all, from the grandchild to the grandfather, formerly sufficed to obtain for the toiling families only a bare subsistence.

Here, one would think, if anywhere, the introduction of machinery would prove disastrous to hand labor. With the machinery now employed one man, working one machine ten hours a day, can turn out an amount of work which was formerly accomplished by a whole family working from eighteen to twenty hours a day for several weeks; and during recent years such machinery has been widely and rapidly introduced in the toy-making regions.

What has happened? The starvation of the poor hand-worker? That ought to be the result, if the socialist's objections to machinery were true; but such is not the result. On the contrary, the condition of the toy makers has been directly improved by the influence of machinery. In this way: The cost of toys, small as it used to be, has been enormously reduced, and the market for toys correspondingly widened. And though machinery now does the larger part of the work, the amount of work to be done has been so increased that the demand for handwork, in putting the parts of the toys together and the like, has been largely augmented. The result is the employment, at fair wages, of all the population, including aged people, cripples, and children, who otherwise would have nothing to do. Besides, the multiplication of factories has brought the scattered peasants together, schools have



STILES' NEW POWER SQUARING SHEAR.

been established, and artistic taste has been developed in a way to make the work done of greater value and more attractive, with a corresponding increase in the value of labor. From Nurnberg alone there are now sent out some 23,000 tons of toys, the price lists of which number 16,000 different designs. Since the introduction of steam machinery into the toy industry of this place the annual product has increased twenty-fold. At Sonneberg, in Thuringia, not long ago a small hamlet, but now quite a city, the annual production of toys amounts to some $10,000,000.

THE NEW WOODRUFF SCIENTIFIC EXPEDITION.

Bacon's ideal college was surrounded by a park, which should contain the "raw materials" of all knowledge. The tendency of education in recent years has been to make Bacon's ideal real. Witness the splendid grounds, museums, libraries, and in many cases elaborate workshops, attached to our representative institutions of learning. But the world cannot be brought within the compass of a park. The raw materials of knowledge are not all transportable. Consequently, he who would study man and nature at their best, in the fullness of life and activity, must pursue the quest of knowledge the world over. Accordingly Mr. Woodruff would outdo Bacon, make the whole world his park of learning, and carry his college around the globe.

That an enterprise so novel and radical in character should meet with many obstacles, is not to be wondered at, nor that it should have taken nearly three years for its managers to reach a point at which they could say "we are ready." It is to be hoped that no lack of candidates will prevent the sailing of the expedition so liberally planned and fitted out. The accompanying engraving shows the steamer General Werder, selected for the voyage, and certified by the United States Navy Department as suitable in all respects for the purposes of the expedition.

The Director wishes it to be distinctly understood that the expedition is neither a money making speculation, nor yet a visionary philanthropic scheme; but an educational enterprise of great magnitude and importance, conducted on sound and legitimate business principles. The managers have no other pecuniary interest in the expedition than to make it self-sustaining. It is expressly provided by Act of Congress that no mercantile or commercial venture shall enter into the plan of the voyage. The financial basis of the enterprise is perfectly sound. Every possible assurance of the fulfillment of their contract is given by the managers, who are bound, by every provision that could be reasonably required, to the exact terms of the agreement between themselves and the patrons and trustees of the expedition.

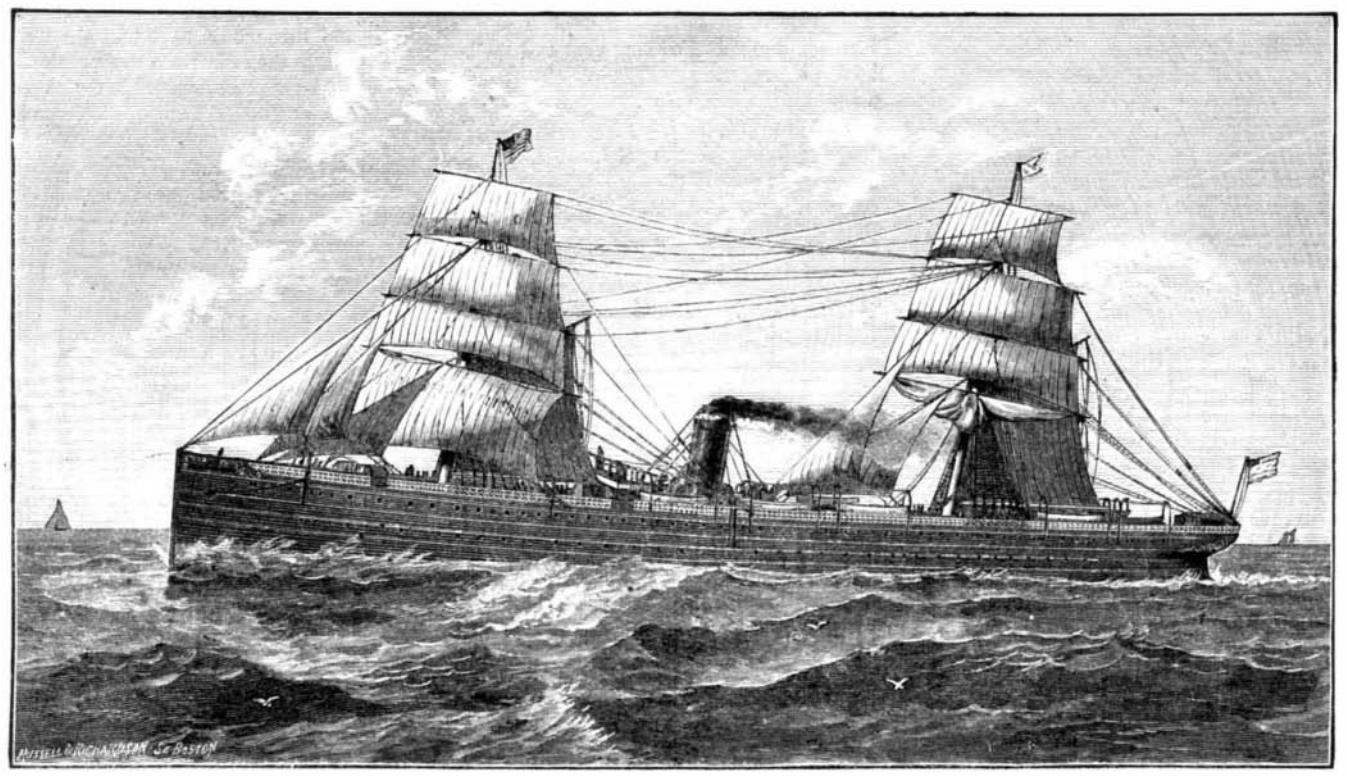
The collegiate department is to be under the control of President W. S. Clark, LL.D., of Amherst, Mass. The ship will be commanded by Commander A. P. Cooke, United States Navy; while the financial affairs of the expedition are intrusted to Drexel, Morgan & Co., bankers of this city.

The whole plan and purpose of the expedition is educational. It involves a voyage around the world, to be performed in sixteen months, devoted to the education of youth and the recreation of tourists. For the students the expedition will constitute a floating college, in which the usual course of instruction will be complemented by object teaching on a grander scale than has ever before been attempted, while to the tourist it offers many advantages for sight seeing.

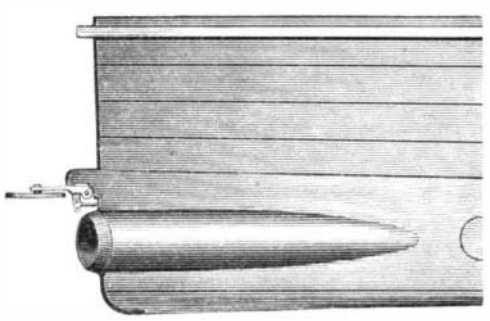
The expedition will visit the principal points of interest on a carefully considered route around the globe. The commerce, manufactures, arts, manners, and customs of the principal nations of the earth may be successively compared, and their elements of strength or weakness be ascertained by actual observation. The geology, geography, zoology, and botany of many foreign countries will be investigated by the scientific corps. Extensive collections in the various departments of natural history will be brought home, which will serve to enrich our National Museum, and may become the basis of important scientific publications. Special attention will be paid to instruction in mathematics, navigation, and practical astronomy. The knowledge to be acquired on this expedition is, in short, equally adapted to the requirements of the professed scientist and the man of business.

The route selected has been decided upon, after mature deliberation, as one most likely to bring the party to the different ports at the most favorable seasons of the year. In planning the course of the vessel, all that careful foresight can provide for has been taken into account, yet it is scarcely to be expected that every step of the projected route can be followed. It is not possible to participate and provide against chance of detention with such certainty as to foresee the precise time of reaching and leaving a given port. It may become necessary to modify the proposed route in some of its details; but the managers give the strongest and most positive assurance that no expense will be spared and that no effort will be wanting to conduct the voyage in good faith according to the letter and the spirit of the programme announced. As already said, the voyage will take about sixteen months, which length of time is deemed sufficient for the full attainment of the objects of the expedition. It is estimated that about three quarters of the time will be spent in port. Numerous inland excursions for study and observation will be made at the expense of the management and under the guidance of the Faculty.

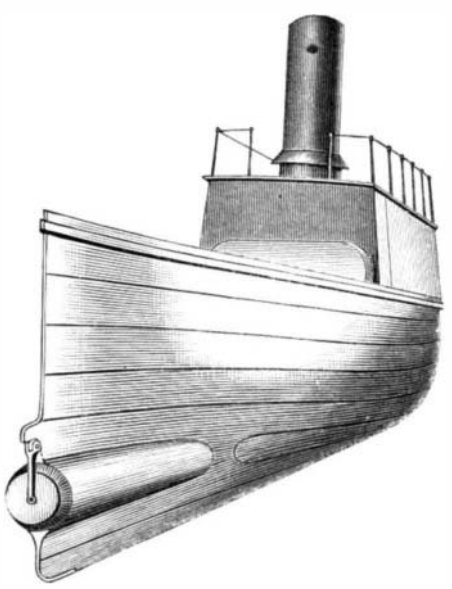
The fee to be paid by students and tourists is fixed at $2,500. Expenses when away from the ship, washing bills, and other personal matters extra. It is proposed that the expedition shall sail May 8th next, and return in September, 1880. The chosen vessel is certified by the Navy Department to be staunch and commodious in every particular. It is 360 feet long, 40 feet beam, 3,000 tons burden, brigrigged, with compound engines of the latest type, and duplicates of all machinery, screw, etc., liable to accidents. It is provided with spacious accommodations, the best ventilation, a full complement of boats, and every modern appliance for health, safety, and comfort.



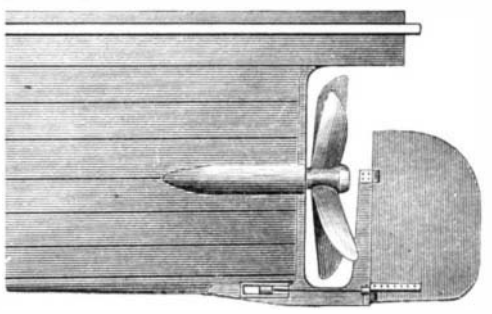
THE STEAMER GENERAL WERDER OF THE NEW WOODRUFF SCIENTIFIC EXPEDITION.



BOW OF THE "DESTROYER."



EXTERIOR OF THE "DESTROYER."



STERN OF THE "DESTROYER."

Recuperating the Brain.

An intelligent writer on this subject thinks the use of stimulants to fortify the exhausted brain an unwise measure. The best possible thing, he says, for a man to do when he feels too weak to carry anything through is to go to bed and sleep as long as he can. This is the only recuperation of the brain power, the only actual recuperation of brain force; because during sleep the brain is in a state of rest, in a condition to receive appropriate particles of nutriment from the blood, which take the place of those which have been consumed by previous labor, since the very act of thinking burns up solid particles, as every turn of the wheel or screw of the steamer is the result of consumption by fire of the fuel in the furnace. The supply of consumed brain substance can only be had from nutritive particles in the blood, which were obtained from the food eaten previously, and the brain is so constituted that it can best receive and appropriate to itself those nutritive particles during the state of rest, of quiet and stillness of sleep.

Large Magnet.

MM. Ducretet et Cie. exhibited at the Paris Exhibition a Faraday electro-magnet, alleged to be the most powerful ever made. The coils have a diameter of 50 centimeters (19·7 inches), and a height of 60 centimeters (23·6 inches). The total weight is 950 kilogrammes (2,193·6 pounds). The helixes are made up of numerous parallel and separately insulated wires in order to facilitate different combinations, both in tension and in quantity.

Correspondence.

Submarine Attack.

To the Editor of the Scientific American:

The excellent engraving of a submerged spar torpedo, inserted in the last issue of the SCIENTIFIC AMERICAN, will no doubt be examined with great interest by the nautical readers of the journal who have studied the subject of national defense against iron clad ships. The similarity of Admiral Porter's device introduced in the torpedo boat Alarm, and that which Mr. Ten Eyck presented to the Navy Department, as he says, 17 years ago, will call forth discussion regarding priority of invention and the relative merits of their systems.

Mr. Ten Eyck, although he declines to exhibit the "manner of working the spar," has shown the detail of the essential parts of his contrivance so clearly that the professional reader can have no difficulty in comprehending the simple and effective character of his manner of working the spar and exploding the torpedo. At the same time the engraving shows with sufficient distinctness that the projecting "snout" which surrounds and protects the spar arrangement is solid, and hence capable of sustaining the concussion with the enemy's ship during attack, unavoidable even at low speed. The snout of Admiral Porter's torpedo boat Alarm, it should be observed, lacks solidity, an important fact pointed out by the SCIENTIFIC AMERICAN of July 19, 1873. The editor, in analyzing the properties of the Alarm, observes: "Although built with a snout, ramming is only a secondary means of attack. In fact, the bow is not a solid piece, but