Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT

No. 361 BROADWAY, NEW YORK.

O. D. MUNN. A. E. BEACH.

TERMS FOR THE SCIENTIFIC AMERICAN.

One copy, one year, postage included.......................$3 00
One copy, six months, postage included......................1 50

Clubs.—One extra copy of THE SCIENTIFIC AMERICAN will be supplied gratis for every club of five subscribers at $3.00 each; additional copies at same proportionate rate. Postage prepaid.

Remit by postal or express money order. Address
MUNN & CO., 361 Broadway, corner of Franklin Street, New York.

The Scientific American Supplement

is a distinct paper from the SCIENTIFIC AMERICAN. THE SUPPLEMENT is issued weekly. Every number contains 16 octavo pages, uniform in size with SCIENTIFIC AMERICAN. Terms of subscription for SUPPLEMENT, $5.00 a year, postage paid, to subscribers. Single copies, 10 cents. Sold by all newsdealers throughout the country.

Combined Rates.—The SCIENTIFIC AMERICAN and SUPPLEMENT will be sent for one year, postage free, on receipt of *seven dollars*. Both papers to one address or different addresses as desired.

The safest way to remit is by draft, postal order, express money order, or registered letter.

Address MUNN & CO., 361 Broadway, corner of Franklin Street, New York.

Scientific American Export Edition.

The SCIENTIFIC AMERICAN Export Edition is a large and splendid periodical, issued once a month. Each number contains about one hundred large quarto pages, profusely illustrated, embracing: (1.) Most of the plates and pages of the four preceding weekly issues of the SCIENTIFIC AMERICAN, with its splendid engravings and valuable information; (2.) Commercial, trade, and manufacturing announcements of leading houses. Terms for Export Edition, $5.00 a year, sent prepaid to any part of the world. Single copies, 50 cents. ☞ Manufacturers and others who desire to secure foreign trade may have large and handsomely displayed announcements published in this edition at a very moderate cost.

The SCIENTIFIC AMERICAN Export Edition has a large guaranteed circulation in all commercial places throughout the world. Address MUNN & CO., 361 Broadway, corner of Franklin Street, New York.

NEW YORK, SATURDAY, NOVEMBER 27, 1886.

Contents.

(Illustrated articles are marked with an asterisk.)

TABLE OF CONTENTS OF

SCIENTIFIC AMERICAN SUPPLEMENT

No. 569.

For the Week Ending November 27, 1886.

Price 10 cents. For sale by all newsdealers.

THE DYNAMITE CRUISER.

The report that the contract had been let for building a cruiser specially designed and fitted for armament with Lieut. Zalinski's dynamite throwing gun has been contradicted as premature; but it is admitted that such a cruiser is to be built upon plans practically identical with those stated in the above mentioned report, namely, length 230 ft., beam 26 ft., draught 7½ ft., estimated horse power 3,200, highest speed 20 knots. Under the supposition that this speed of 20 knots was intended to be a sustained speed, several critics have privately expressed their belief that no such vessel could be constructed; for they say that, inasmuch as the great 8,000 ton steamers are barely able to make 18 to 19 knots in crossing the Atlantic, with a developed 12,500 horse power, a small steamer, such as is above outlined, cannot be given the machinery to make 20 knots.

There is a certain axiomatic character to these criticisms; but the critics probably make a serious mistake in assuming that the speed of 20 knots is to be the craft's capacity for any great length of time. If she had a normal speed of fifteen or sixteen knots, which could be driven up by forced draught for even an hour or less to 20 knots, she would fulfill all the conditions necessary to success. For, under the lower rate of speed, she could overhaul almost any cruising fleet, or even any single cruiser, when making an ordinary service passage from one port to another. Then, not until the two craft were so close to each other as to recognize each other as enemies would the 20 knot speed be called for. It is not likely that a combat between an ironclad and a light unarmored cruiser could last long. Either the latter would soon plant a dynamite shell or two in her heavy antagonist and finish her, or else she would be sunk by the ironclad's heavy fire.

As regards the battery to be given to the dynamite gun cruiser, it is natural that so untried an experiment should produce a good deal of divergence of opinion. In its favor it is said that the acknowledged success of the gun on shore can undoubtedly be repeated at sea. Its accuracy, lightness, and inexpensiveness, coupled with the terrific effect of its projectile charged with dynamite, are all cited as advantages which make such a gun especially desirable for a nation like ours, which does not wish to spend large sums on heavy ironclads and expensive guns. Assuming, therefore, that a cruiser can be built, having high normal speed and the capability of increase for short periods to a unique speed; that she can carry all the air compressing machinery, etc., for her dynamite guns, without depriving her of coal carrying capacity; that she can work her guns as effectively at sea as they have been worked on land; that the long tubes will not be so affected by the constant tremor and vibration of a screw steamer at sea as to be thrown out of line or "buckled"—assuming these things, there is good reason to expect good results from this cruiser when built.

But it is urged that the experiment is not beginning right; that the conditions in the proposed experimental cruiser are not at all likely to be the same as they would be in a war ship intended for service cruising. In the first place, there is certainly an awkward uncertainty as to the position the two guns will occupy. It is evident that as each gun cannot be less than 60 ft. in length (possibly even 80 ft. may be requisite), the guns cannot be mounted in broadside on a craft having only 26 ft. as her greatest beam. Thence it follows that only a certain fore and aft style of mounting can be used, and that the guns can be fixed only in a limited arc on each side of the bow and stern. Granting four points on each side of the keel forward and aft, each gun would cover eight points only, leaving sixteen points in which the vessel could not fire at an enemy at all. Clearly such a limitation of her fighting powers would detract seriously from her efficiency, and it ought not to be permitted if it can be avoided.

There is one experiment that has not yet apparently occurred to the constructor of the so-called dynamite gun, or at least nothing has been done about it practically. If a very high elevation were given to it—say even 60°—the projectiles, instead of striking at a low angle, would fall perhaps a little more nearly vertical than they went up, and would strike the enemy's decks instead of the broadside plating. Inasmuch as the decks are always more vulnerable than the broadside, the effect of the dynamite shell exploding thereon would be more damaging to the ship struck than it would be if the shell exploded against the broadside. Such an unusual elevation would permit the guns to be fired even from the broadside of a narrow craft like the proposed cruiser, while they could equally be fired at low elevations from the bow and stern. Of course such a use of the guns would be practicable only at such close quarters as to expose the craft to machine gun fire, and the game might not be worth the candle; but it would seem to be nearly the only way of utilizing these exceptionally long guns in ships of narrow beam. In narrow channels defended on each side, like the Narrows, this method of using the dynamite guns might be very effective. They could be sunk deep in the ground and protected by earthworks, so that the guns and crews working them would be absolutely safe against the fire of a hostile fleet, while at the same time they could rain down shells upon the channel. Extremely accurate shooting could be secured with the compressed air guns, the effect of the wind being the only element of uncertainty; and twenty-five or thirty of these inexpensive guns, properly placed, ought to be sufficient to close any narrow channel against a hostile fleet.

The government may have adopted plans which will make the experiments on board this proposed cruiser conclusive; and while it seems at present as though she would be far from determining satisfactorily the practicability of using the dynamite-throwing gun at sea, it is well, in view of the importance of the issues at stake, to have the trial made.

TORPEDOES VS. RAMS.

The United States ship Tennessee, the largest in the service, and at present the flagship of the North Atlantic squadron, met with a mishap at the Brooklyn Navy Yard on the 14th inst. A steam cutter of small dimensions bumped against her port bow and opened a hole nearly three feet long. It is thirty years since the Tennessee was launched. While she is one of the most comfortable vessels afloat, it is said she has long outgrown her usefulness for war.

The ease with which the hull of our best war ship may be penetrated presents a striking contrast to that of some of the old iron hulks of the British navy. For example, they lately tried at Portsmouth an experiment to see how big a hole they could knock in the hull of the ironclad Resolute by exploding a first-class torpedo under her bottom.

A 16 in. Whitehead, charged with 93 pounds of guncotton, was lashed to a boom and laid in contact with the port side, amidships. It was about 8 ft. under the surface, and close to the bilge keel. The conditions were entirely in favor of the torpedo, and it was expected that the destruction of the vessel would be both sudden and complete. The result, however, fell very far short of the anticipation. The ship was slightly inclined by the force of the explosion, and then listed a little in the opposite direction. Beyond this and the upheaval of the water, there was nothing to be seen by the spectators. Investigation showed that the bilge keel had been shaken off to the extent of 30 ft., and the plating below much indented. Between the bilge keel and the armor belt the skin plating was forced in between the frames, and three or four strakes had parted in the middle for a length of 8 ft.; some of the butts had been opened, so that gashes 2 in. or 3 in. wide appeared at the junction. Internally, skylights were broken and the coal blown about, but only one compartment was penetrated. The exact amount of damage cannot yet be determined, but it is evident that the ship was not disabled, and could fight her guns perfectly well.

WORK AND HABITS.

If the Knights of Labor can infuse in the mass of the organization the same ideas of personal habits as are voluntarily acted on by the managers, they will do much to improve the status of workingmen, whether laborers or mechanics. There already has been much improvement in this respect, the change being attributable to more intelligent estimates of the value of good habits than those which prevailed a generation ago. It was considered not unusual for a first-class workman to have his periodical sprees, and to be a free liver in the coarser meaning of the term; indeed, the union of loose habits and the reputation for competence to do a good job appeared to be natural and expected. "Blue Mondays" were common, the best workmen not putting in an appearance until Tuesday, requiring a day to get over the weekly debauch. Such men appeared to consider that their skill as mechanics entitled them to a license that was injurious to themselves and harmful to the employer's interests.

But the employers tire of these practices, and the dissipated workman cannot so readily assume on his skill as an excuse for his bad habits; the old notion of the union of drunkenness and duty, of immorality and ability, of high pay and low habits, is exploded. One of the most competent and efficient foundry foremen the writer ever knew lost his place in the establishment where he managed nearly fifty men, and his caste in the community, by his persistent practice of intemperate drinking. Said the manager, shortly after his dismissal: "I hardly know how to fill his place. There are not half a dozen men in the country who are his equals in the mixing of irons, the tempering of sand, and the carefulness of general management. I never lost a casting under him of the value of ten dollars. But I needed him six days in the week, and I paid for his coolness, his judgment, and his full capacity. I do not require my men to become total abstainers, although some might benefit by that method; but I do want their intelligent work."

It may be a necessity that employs unreliable skill and presumptive talent, but employers will apply a remedy as soon as they can. The workman may be