

OUR NEW NAVY.

When a maritime nation, once known for its prowess on the high seas, suffers its fleet to fall into a decline, refusing either to re-enforce or improve it for nearly a quarter of a century, the result of its first efforts to build and equip a fleet after new and improved designs may not improperly be called a new navy. It is this nucleus of a new navy, this first endeavor to construct ships worthy to bear aloft our glorious ensign, that we illustrate in this number.

In the old-time war fleet the ability to fight its way up to close quarters with the enemy, and even to haul up alongside and lay him aboard, was a necessary attribute. Recent improvements in heavy rifled ordnance has changed this; the art of attack has advanced beyond that of defense, and the big rifle being able to pierce the heaviest armor that can be floated, modern naval warfare has been reduced to a pounding match at long range, in which the result depends on the relative skill of the competing gunners, or to the destructive powers of other implements and engines of war, according to the conditions under which the combat is waged. Thus the fleet of to-day consists of the heavily-armed war ship, which may also be a ram, that is to say, fitted with a steel spur projecting under the water in front of her forefoot; the commerce destroyer, a swift, light-armed vessel; the floating battery, intended for harbor defense; the torpedo boat, and the torpedo catcher, intended to beat off the torpedo boat, or frustrate its attempts to come up and discharge projectiles. In our illustration we show the four new steel cruisers, Chicago, Atlanta, Charleston, and Baltimore; the dispatch boat Dolphin; a torpedo boat; and last, but by no means least, the dynamite cruiser.

It is not our purpose to enter here into a discussion of the merits and defects of these vessels, or to compare their powers with those of the European fleets, confining ourselves as closely as possible to a mechanical description of them as they are. All were built from designs furnished by a board of naval experts, be it said containing some of the best talent in a navy by no means deficient in that respect. These four vessels are constructed of steel, made in this country, having a tensile strength of about 60,000 pounds to the square inch, and a ductility in eight inches of quite 25 per cent. Here are the dimensions of the Atlanta:

Length between perpendiculars.....	270 feet.
Length on water line.....	276 "
Length over all.....	288 "
Depth from garboard strake to underside of super-structure deck.....	34 "
Height of main deck port sill from load water line.....	11 "
Freeboard at extremities of superstructure.....	9 "
Breadth, extreme.....	42 "
Draught at load water line, mean.....	16 " 10 in.
Displacement at water line.....	3,000 tons.
Area of plain sail.....	10,400 sq. feet.
Complement of men.....	230
Battery—four 8 inch and six 6 inch B. L. R.	
Indicated horse power.....	3,500
Sea speed.....	13 knots.
Capacity of coal bunkers.....	580 tons.

Eight transverse bulkheads extend up to the main deck, there being thus nine main compartments, the engines taking up one. Throughout the space occupied by the machinery there are longitudinal bulkheads on each side, which are filled with coal lying eight feet thick as side protection to the engines above the water line, and five feet thick below the water line. These coal bunkers have a possible capacity of nearly 800 tons; the ship having the power to steam 2,500 miles under full head and about 5,300 slowed down. In all, the Atlanta has seventy-three water-tight compartments. The pumping power of the pumps, steam and circular, is together 2,500 tons per hour; and should any compartment be shot through, the whole of this great suction power could be concentrated to keep it free of water. Then there are hand pumps that can be connected with any one of the seventy-three water-tight compartments. Over the machinery there is a steel deck 1½ inches thick. The ship has a double bottom and a bilge keel. Her outside plating is 23 pounds to the square foot. The engine is of the three cylinder compound horizontal order, of 3,500 H. P. indicated, having one 54 inch high pressure cylinder and two low pressure cylinders, 74 inches in diameter. The shaft is 16 inches at the main journals, and of steel; the screw 17 feet in diameter, with a mean pitch of 20 feet. There are eight horizontal return tubular steel boilers apportioned into two sets by a water-tight bulkhead. Naval Constructor Bowles thus describes the battery of the Atlanta:

"Outside the forward port angle and the after starboard angle of the superstructure, an 8 inch long rifled gun will be mounted in a barbette about 3 feet high, built of 2 inch steel plates. The forward gun has a train from 40° abaft the beam on the port side, sweeping the whole deck forward to 30° abaft the beam on the starboard side. Similarly for the after gun. Within the superstructure six 6 inch B. L. R. will be mounted, two on each broadside, with a train of 60° before and abaft the beam; one, forward in the starboard angle of the superstructure, may fight either through a forward or a broadside port, giving a total train of from 20° across the bow to 60° abaft the beam. The remaining gun is similarly mounted on the port side aft."

The Atlanta has made a trifle over 16 knots under favoring conditions.

The twin screw steamer Chicago, like the Atlanta, is an unarmored coal-protected steel cruiser. Here are her dimensions:

Length between perpendiculars.....	315 ft.
Length on water line.....	325 ft.
Length over all.....	334 ft. 4 in.
Depth, garboard strake to underside of spar deck.....	34 ft. 9 in.
Height of gun deck port sill from load waterline.....	10 ft.
Height of spar deck port sill from load water line.....	18 ft. 6 in.
Breadth, extreme.....	48 ft. 2½ in.
Draught of water at load line, mean.....	19 ft.
Displacement.....	4,500 tons.
Area of plain sail.....	14,880 sq. ft.
Complement of men.....	300
Battery—four 8 inch long breech loaders in half turrets, eight 6 inch and two 5 inch on gun deck.	
Indicated horse power.....	5,000
Sea speed.....	14 knots.
Capacity of coal bunkers.....	940 tons.

The outside plating is ⅜ of an inch in thickness, weighing 23 pounds to the square foot, having a double plate at the water line reaching to within 70 feet of the stern, and a great steel spur forward for ramming. She can go 3,000 miles at a speed of 15 knots, and twice that at reduced speed.

In her battery there are four 8 inch rifles, each of 12 tons, the same being mounted on the spar deck in projecting half turrets, the trunnions being about 20 feet above the water line. Added to this there are six 6 inch breech loading rifles, each of four tons, mounted on the gun deck in broadside. In recessed ports aft are two 5 inch guns. A secondary battery of rapid-firing six pounders completes her armament.

The principal features of the dispatch boat Dolphin are:

Length between perpendiculars.....	240 feet.
Length, extreme.....	256 5 "
Breadth, moulded.....	31 85 "
Breadth, extreme.....	32 "
Depth from top of floors to top of main deck beams.....	18 25 "
Depth from base line to top of main deck beams.....	20 07 "
Top of main deck at side above load water line.....	6 28 "
Mean draught.....	14 25 "
Displacement at mean draught.....	1,485 tons.
Complement of men.....	80
Battery—one 6 inch pivot, four revolving cannon.	
Indicated horse power.....	2,300
Speed.....	15 knots.
Capacity of coal bunkers.....	310 tons.

Her armament consists of one 6 inch breech loading rifle set on a shifting pivot and four 47 mm. revolving guns. The Boston is a sister ship of the Atlanta, and similar to her in dimensions and armament. The torpedo boat shown in the illustration is said to have made 19 knots along the measured mile. She is intended to run upon the enemy at nightfall, in thick weather, or when the smoke of battle conceals her movements, either strike him with a spar torpedo, or direct upon him torpedoes of the Whitehead type when close aboard.

The most interesting of all, because of its novelty and the terrible weapon it wields, is the dynamite cruiser. She is fitted with a gun sixty feet long, in reality a brass tube from which is impelled by means of compressed air charges of explosive gelatine. This is an American invention, and of its utility an authority says:

"The torpedo shells projected by the pneumatic torpedo gun can attain the range of two miles in about twenty-two seconds, and they can be directed at the enemy much more accurately than appears possible with the others. If missing the target, the only expenditure is the shell and its charge, and a large number can be showered upon the enemy in a short period of time. A much larger number can be stored and carried than of other torpedoes. As an auxiliary arm, placed for defense of harbors and fortifications, they can be brought into use at the time when the enemy's fleet come to closer quarters, that is, within its effective range of, at present, two miles. It is hardly questioned that the course of an action may bring the combatants to such close quarters. In addition to this, these torpedo shell-projecting machines may be placed on board of swift-moving boats, which could approach a beleaguering fleet within a mile and deliver a most damaging fire. Where the enemy has succeeded in removing existing torpedo obstructions, these machines can shower its pathway with torpedoes which, when the depth is suitable—say 50 or 60 feet, or less—can be arranged to explode either directly upon reaching the bottom, or at any desired interval.

Fire and Water Proof Paper.

A paper that resists the action of both fire and water has, it is said, been recently invented in Germany by a Herr Ladewigg. The manufacture is accomplished by mixing 25 parts of asbestos fiber with from 25 to 30 parts of aluminum sulphate, and the mixture is moistened with chloride of zinc and thoroughly washed in water. It is then treated with a solution of 1 part of resin soap in 8 to 10 parts of a solution of pure aluminum sulphate, after which it is manufactured into paper like ordinary pulp.

A Remarkable Petroleum Well.

The Russian paper *Caspian* gives the following interesting details of one of the largest naphtha fountains yet known, which has lately broken out near Baku, and which threatens to inundate all Balakhani. The naphtha, owing to the pressure of the gases which accompany it, rises to a height of 280 feet to 400 feet, and is carried away by the wind to a great distance, falling like fine rain at the more distant parts of the district, but near the fountain coming down in torrents that form rivers and streamlets. Further on it falls like sleet, and settles in a layer on all the buildings in the neighborhood. These naphtha rivers flow for a distance of more than half a mile, and pass through wells, works, reservoirs, and inhabited houses, etc. Unfortunately, all the reservoirs in the neighborhood were full when the fountain broke out, and the oil was thus wasted. Owing to the stillness of the atmosphere, at one time the gases which accompany the naphtha spread in a heavy layer for more than 280 yards, filling the houses and placing their inhabitants in a most dangerous position, especially at night, when fires were lit. The sand and dust thrown up by the fountain form a hill of considerable size, and have buried the boiler house of the mining company's works, and all buildings in close proximity to the fountain. There is no doubt that any exposed flame would set the whole district, from the mining company's works to the Sabouchi railway station, in one blaze. Many efforts have been made to stop the fountain, but all proved unavailing, for after five or six hours the fountain would again burst forth with all its former vigor. For some days the fountain has been left to play without hinderance, and has increased in power. Thanks also to a strong and changing wind, the naphtha has been scattered in every direction, turning the whole district into a petroleum swamp. The naphtha pours from the roofs of the houses, on to which also fall the earth and stones carried up by the oil.

Chicago to Have a Garbage Crematory.

The City Health Department of Chicago is directing considerable attention to the question of getting rid of the city garbage. Health Officer Thompson has, according to the *Industrial World*, been to Des Moines, Iowa, and witnessed the workings of the garbage crematory in that city, of which he says: "The furnace is 18 feet long by 4 feet 6 inches wide, has a capacity of 50 yards of garbage daily, and cost, with the building, about \$1,700. About two feet from the bottom of the furnace is a solid iron plate, and above that, and upon which falls the substance to be burned, is a heavy iron grating. In the center of the furnace is a circular hole, closed by a trap, into which was thrown, while I watched it, two dead horses, seven dogs, eighteen barrels of garbage, three hods of manure, fifteen bushels of rotten eggs, and three barrels of rotten fish. This was all consumed in one hour, with no offensive smell from the combustion and no smoke. The furnace was cold when started.

"There are two fires, one in front and another in the rear. The rear fire was started first. The refuse is dumped upon the grating through the manhole, thus being kept away from the fire, so as not to extinguish it. The heat from the flames in the front and rear rapidly dries the matter, and soon all is burning. The theory of the inventor is that if there were only one fire, the combustion would be offensive. The draught carries the smoke to the rear fire, which consumes the noxious gases and destroys all germs."

The Des Moines crematory is simple, and considered by Mr. Thompson as effective as any that he has examined, and it does not require much labor to attend it or consume much coal to operate it. The authorities of Chicago are bound to erect a garbage-consuming furnace of some kind, and according to Health Officer Thompson's report, the one above described is the one most likely to be tried.

New Invention in Calico Printing.

A correspondent writes to the *British Mercantile Gazette*: "The 'simultaneous' process of color printing promises to entirely revolutionize some classes of calico, velvet, and velveteen printing, and also the printing of advertisements in colors. The novel character of the 'simultaneous' process will be at once understood when I mention that by it, if required, 1,000 shades could be printed off at one impression. Instead of using engraved rollers as in ordinary calico printing, or stones as in the case of colored advertisements, the designs of pictures are 'built up' in a case of solid colors specially prepared, somewhat after the style of mosaic work. A portion is then cut or sliced off about an inch in thickness, and this wrapped round a cylinder, and the composition has only to be kept moist and any number of impressions can be printed off on calico, velvet, or velveteen, the colors being thoroughly 'fast.'"

THE fast locomotives used on the "two hour" trains of the Pennsylvania Railroad Company, between New York and Philadelphia, have 6 ft. 8 in. wheels, 18 in. cylinders, and 24 in. stroke. The engines do a mile in 50 seconds.

SCIENTIFIC AMERICAN

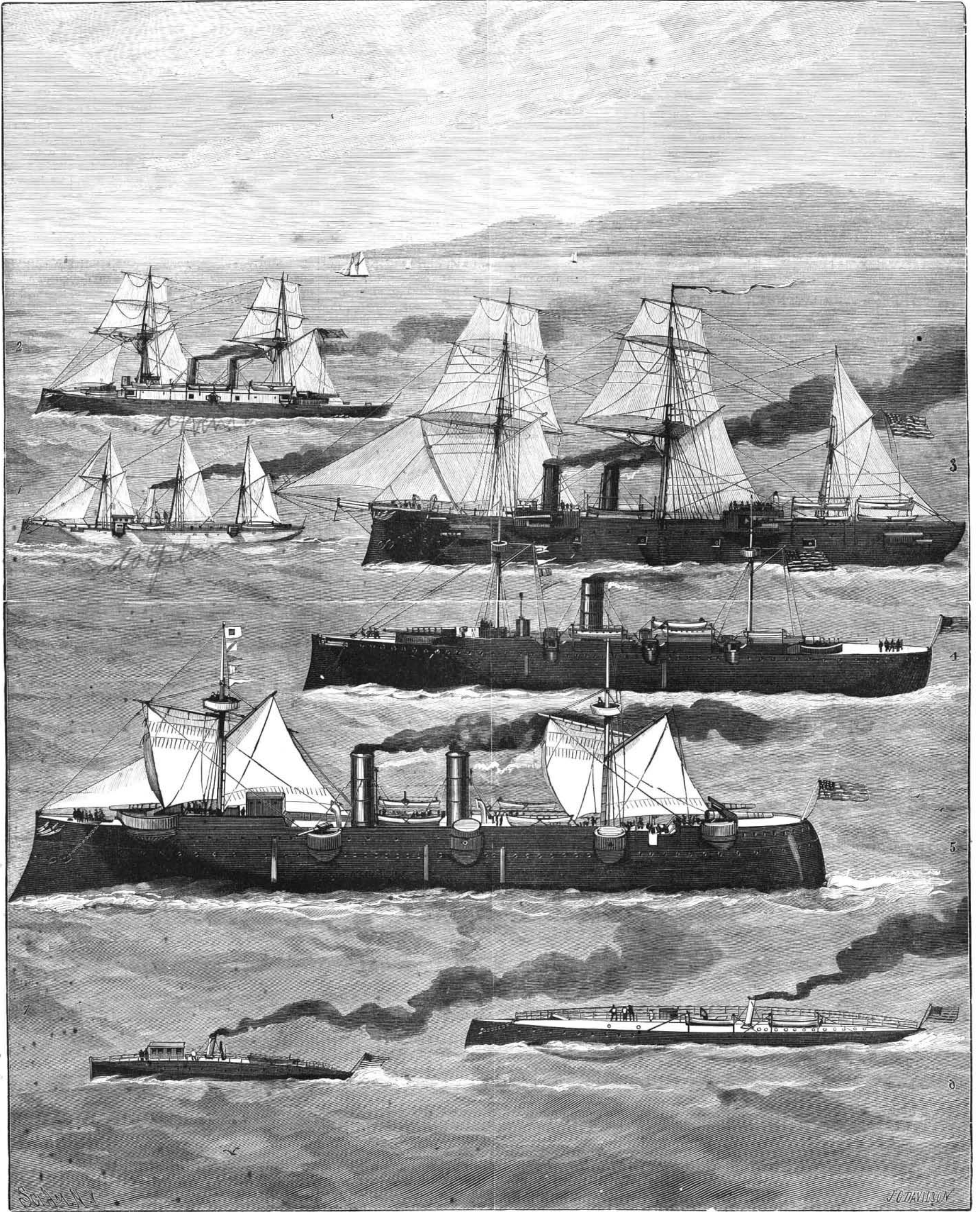
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1. Dolphin—dispatch boat. 2. Atlanta—steel cruiser, sloop of war. 3. Chicago—steel cruiser, frigate of war. 4. Charleston—twin screw steel cruiser. 5. Baltimore—the largest steel cruiser. 6. Dynamite cruiser. 7. Torpedo boat Stiletto.

OUR NEW NAVY—TYPES OF VESSELS NOW FINISHED AND BUILDING.—[See page 324.]