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\$3.00 A YEAR.
WEEKLY.

U. S. COAST LINE OF BATTLE SHIPS.

The unnamed battle ships, Nos. 1 and 2, are now in course of construction at the Cramp shipyard in Philadelphia. The contract calls for their completion by Nov. 30, 1893.

These vessels are being built under authority conferred by the act of Congress making appropriation for the naval service, approved June 30, 1890.

PRINCIPAL DIMENSIONS.

Length on load line.....	348 ft.
Breadth, extreme.....	69 ft. 3 in.
Draught of water (level keel).....	24 ft.
Displacement.....	10,200 tons.
Maximum speed.....	16.2 knots.
Sustained sea speed.....	15.0 knots.

These vessels are to be built of steel; to have a double bottom for the distance of 196 feet, extending the length covered by the machinery and magazine spaces; all the vital portions to be amply protected; and every feature being provided to enable them to cope successfully with vessels of the heaviest armor and armament.

The forward and after turrets for the 13 inch guns mark the extremities of obstructions upon the main deck; from these points forward and aft to the ends of the vessel respectively, no further obstacles present themselves to an uninterrupted fire; means having been taken to remove or turn down any erections which might obviate this end.

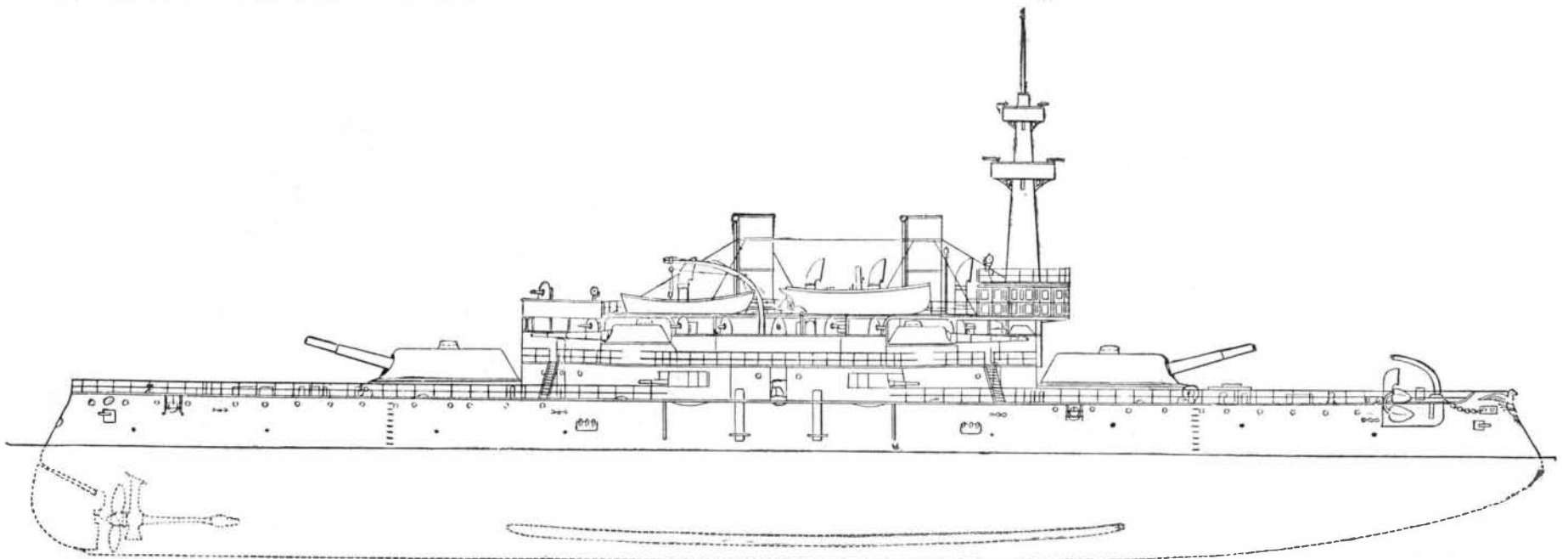
Between the turrets for the 13 inch guns there is a

superstructure in which are placed the 6 inch guns; and above, or upon the deck erected thereon, are placed the 8 inch guns.

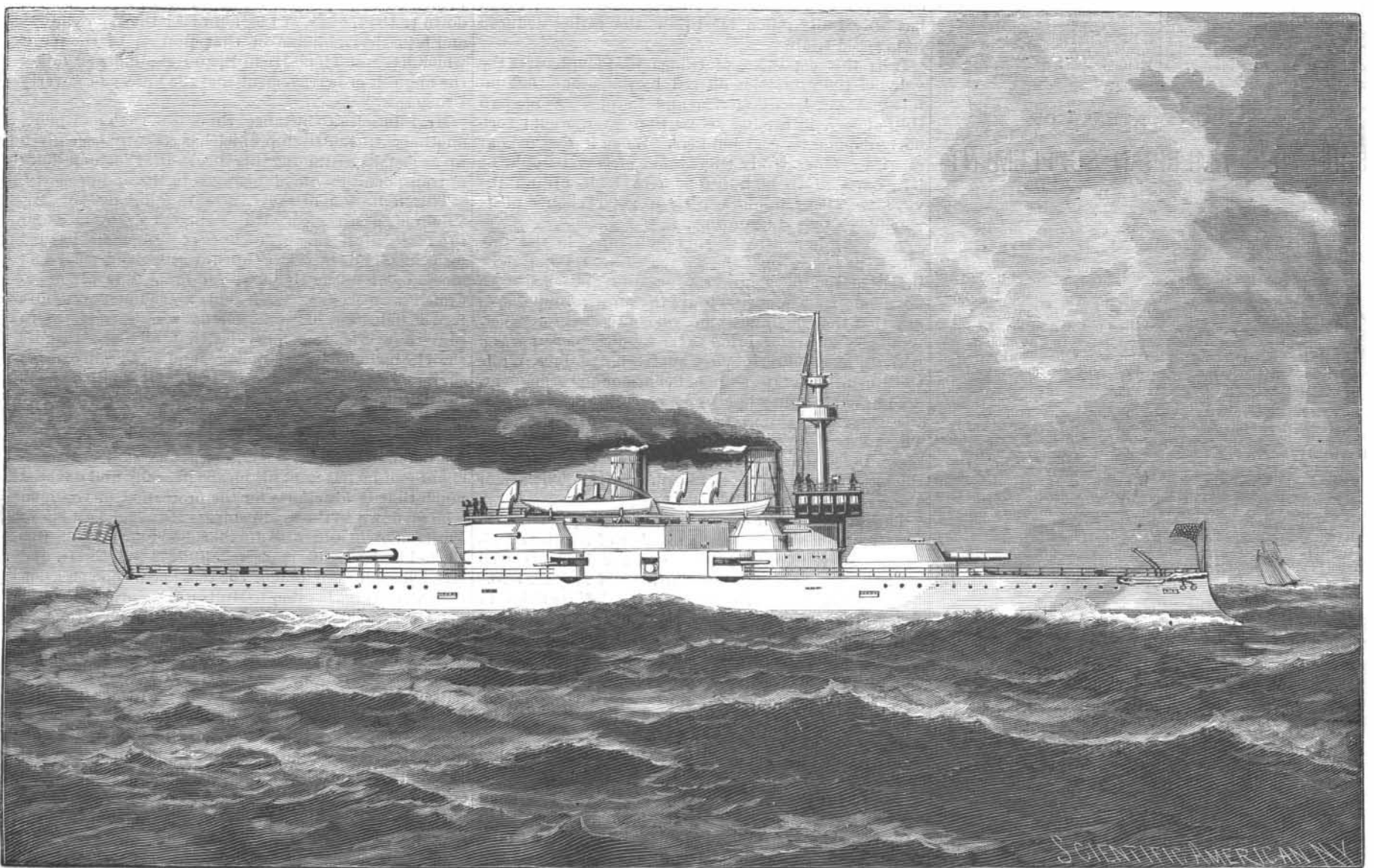
A battery of 6 pounders is arranged along the top of the hammock berthing and bridge, and 1 pounders are placed forward and aft on the berth deck. The double-topped military mast is cone shaped, placed on top of the conning tower just abaft of the forward 13 inch gun turret, two 1 pounders being placed in the lower and two Gatling guns in the upper top respectively.

There are six powerful search lights arranged along the sides, to locate the enemy at night and to guard against small boat attacks under cover of darkness.

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SIDE ELEVATION OF THE SHIP.



THE NEW LINE OF BATTLE SHIPS FOR THE U. S. NAVY.—THE SHIP AT SEA.

U. S. COAST LINE OF BATTLE SHIPS.
(Continued from first page.)

The complement of twelve boats and one balsa are stowed well above the flash of the guns, and are handled by means of powerful cranes.

ARMAMENT.

- Four 13-inch breech-loading rifles.
- Eight 8-inch breech-loading rifles.
- Four 6-inch breech-loading rifles.
- Twenty 6-pounder rapid-fire guns.
- Six 1-pound rapid-fire guns.
- Two Gatling guns.
- Six torpedo tubes.

The four 13-inch and the eight 8-inch guns are mounted in pairs within six Highborn turrets, two of which are erected upon the main deck and the remaining four upon superstructure deck; the former containing the larger and the latter the lesser guns. These turrets are of a type which has been generally adopted by the Navy Department, similar protection to the guns having already been placed upon the monitors Monterey, Puritan, Monadnock, and Amphitrite, and also upon cruisers Nos. 2 and 6.

The 6-inch guns have local protection in addition to splinter bulkheads, shields, and automatic shutters. The turrets are all mounted in redoubts. The 13-inch guns are about 18 feet above the water, and have an arc of fire sweeping across the deck and 45 degrees on both sides back toward the center or body of the ship, making a total arc of fire of 270 degrees for the guns in each of these turrets.

This, as can be seen, gives a converging fire, *i. e.*, the power of training the guns from both ends toward a common point, directly opposite the middle of the ship, and of concentrating the shot within fifty feet in a straight line from the ship's side, in a broadside action.

The 8 inch guns are about 25 feet above the water, and are high enough to fire above the 13 inch gun turret, having an arc of action of 164 deg., being able to fire across the center line of the ship, the projectile crossing the same before reaching the ends of the vessel. The 6 inch guns have a train of 145 deg., and can cross the center line of the ship, extending beyond the hull, within 170 feet from either end of the vessel, showing that the main battery can train within a distance of about 700 feet on either side of the vessel.

The rapid-fire guns are so arranged that a radiating fire of shot around the vessel will destroy any venturesome torpedo boat or other light craft coming within range, and will be particularly effective in forming a destructive fire against the endeavors of the enemy to work such of their larger guns as are only partially protected in action, and whose effectiveness depends very largely upon gaining the initiative.

Torpedo nets are to be carried which will completely incase the vessel, thus precluding the possible effect of torpedo fire from the enemy.

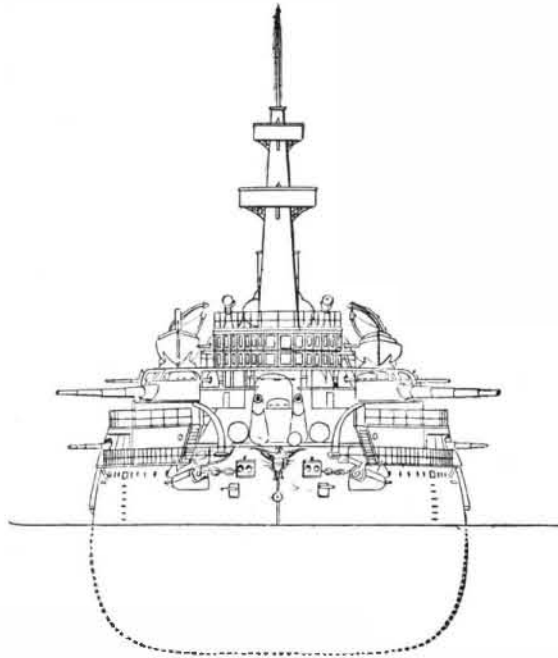
The facilities for handling the ammunition are of the best. Passages connecting with all magazines run the length of the armored inclosure, along which, and near to the armored tubes and passing scuttles, are distributed auxiliary magazines to obviate delay in transmitting ammunition during an engagement.

ARMOR.

Thickness of side belt armor.....	18 in.
" " end diagonal belt.....	14 "
" " 13 in. B. L. R. redoubts.....	17 "
" " " " turrets.....	17 "

Thickness of 8 in. B. L. R. redoubts.....	8 in. and 10 in. resp.
" " " " turrets.....	6 " and 8 1/4 " "
" " " " conning tower.....	10 "
" " " " tube.....	7 "
" " " " casemate.....	5 "
" " " " 6 in. B. L. R. local protection..	5 "
" " " " 20 pdr. local protection.....	2 "
" " " " armor deck.....	2 7/8 in. and 3 in.

The side belt armor is 7 feet 6 inches wide, 3 feet above and 4 feet 6 inches below the water, extending along the sides for 148 feet, then taking a diagonal course inboard at an angle of 45° for a longitudinal distance of 24 feet at each end (making a total broadside armor of 196 feet), passing around and supporting the



FRONT VIEW OF LINE OF BATTLE SHIP.

armor for the 13 inch gun turrets. On top of this side armor is placed a steel deck 2 3/4 inches thick, under which are the magazines and machinery. Above this belt of side armor is placed the casemate with a backing of ten feet of coal. Forward and abaft the redoubts are 3 inch protective decks of steel, which turn down to 4 1/2 feet below the water line, and on top of these decks there is a belt 7 feet high by 6 feet wide, filled with water-excluding material similar to "wood-ite." The steering gear is below this deck protection.

Provision has been made to protect the hull from the blast of the guns by thickening with heavy steel plates where contact necessitates this precaution, and across the decks under the muzzles of the thirteen inch guns, circular flash plates have been provided to prevent the blast from splintering the planking. The hatch coamings, skylights, etc., coming near the blast of the guns are removed in action, and heavy battle plates sunk flush with the deck are substituted to afford the necessary protection.

The side belt, diagonal belt, redoubts and turrets have behind the armor a backing of wood and thick plates backed up again by heavy channel bars.

The machinery is inside of and protected by the armor inclosure, also by 12 feet of coal bunker back of the side armor, and a reserve coal bunker above and under the armor deck; the engines and magazines are

also protected by coal, besides which, there are four thicknesses of skin "penetration" before reaching the engines and fire rooms.

The engines are of the twin-screw, vertical, triple-expansion, inverted cylinder type; diameter of cylinders as follows: High pressure, 34.5"; intermediate, 48"; low pressure, 75"; stroke, 42". There are four double-ended boilers, 18' x 15' in diameter, and two single-ended boilers (donkey), 8 1/2' x 10' in diameter. Each boiler and engine is in a separate water-tight compartment, in order to localize possible injury.

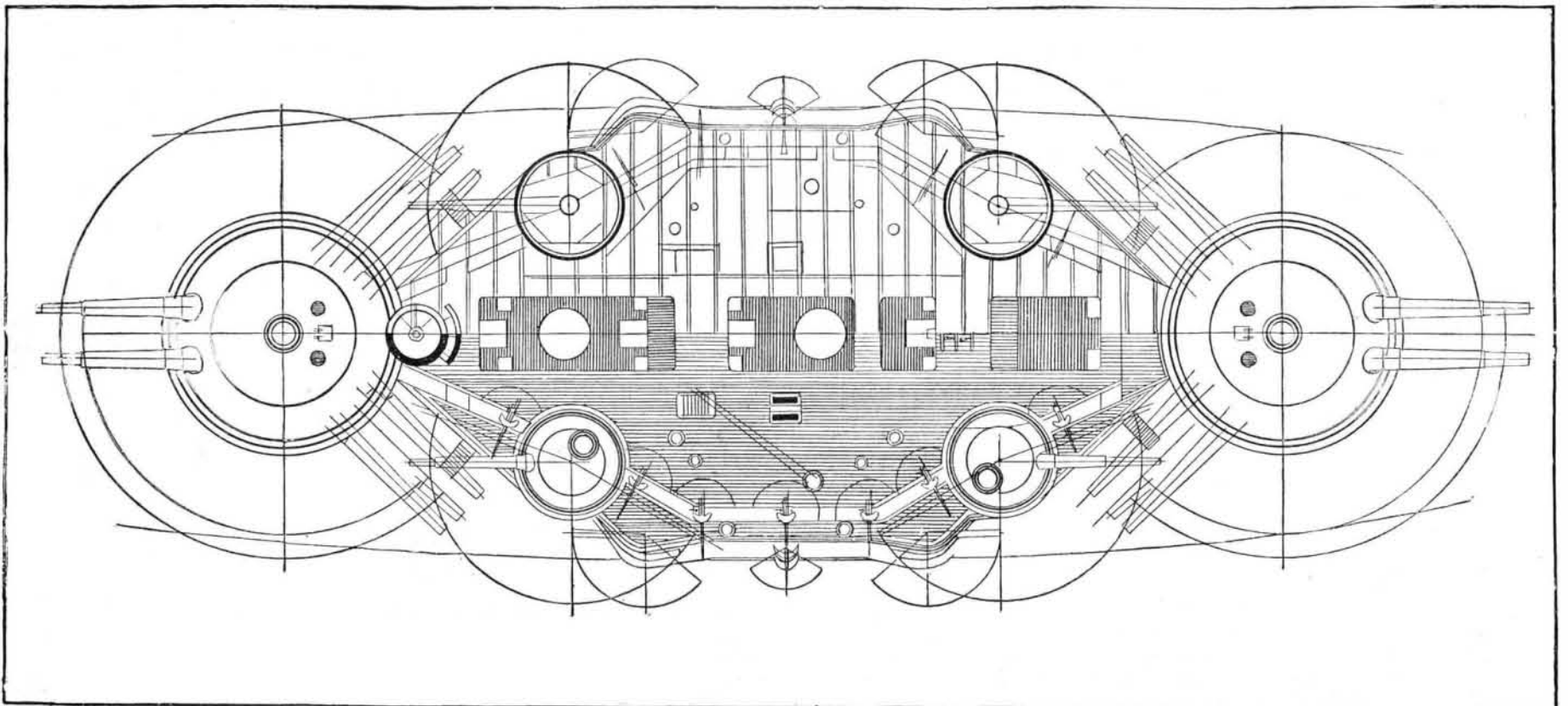
The normal coal supply is 400 tons, but a coal bunker capacity of 1,800 tons is provided. With the bunkers full she can steam at full speed (16 knots) for 10 days, or a radius of action of about 4,000 knots; and going at 10 knot speed this endurance is increased to 60 days, or a radius of action of 15,000 knots.

The vessel is very much "cut up" forward to facilitate maneuvering by offering as little resistance to the water at that point as possible; the ram, accordingly, being at the water line.

The complement consists of 460 persons, officers and men combined. Good quarters and accommodations have been provided, and all the latest sanitary improvements are to be installed to insure efficiency and thoroughness in lighting, ventilating and drainage.

Electric Ship Log.

There have been many attempts to produce a ship's log the recording apparatus of which should be operated by means of electricity. In the opinion of the *London Times*, however, these attempts have all failed in practice, in consequence of the inability to overcome three main difficulties. These are the necessity of having a perfectly water-tight chamber in the log itself, that of having a battery, and of preserving perfect insulation in the connecting towline. These difficulties have been overcome in a very simple and ingenious manner in Granville's electric log, recently shown at Messrs. Elliott Bros., 101 St. Martin's Lane, London. Although it is essentially an electric log, it has no battery whatever, the log, the iron hull of the ship, and the ocean together forming the battery. A portion of the log is made of zinc, which provides one element, while the iron plates of the ship form the other, the sea water constituting the exciting solution. The log is of very simple construction, and has only two moving parts, a revolving head and a small internal worm wheel. The head is connected with the worm wheel gearing, and every sixth revolution of the former is communicated, by means of a spring contact, through the towline to an indicator placed on the bridge or in the chart house of the ship. When the log is in use the sea water has free access to all the working parts, and serves to keep them clean and lubricated. The towline, which is very pliable, is made of a braided tanned netting twine, inside which a number of copper wires are wound spirally and joined together at each end. This line can be handled and coiled by a sailor in the same way as any other line and is readily connected with, or disconnected from, the log. The indicator consists of a small metal circular box, with the necessary internal mechanism and external dials and pointers. The apparatus, after many months' trial at all speeds, has shown itself to be an efficient means of accurately indicating, at any part of the ship where an indicator is fixed, the total distance run, and also, at any time, the rate of speed per hour. One of these logs has been fixed on board the *Orontes*, and it is also in use in the Argentine navy.



DECK PLAN SHOWING ARCS OF ACTION OF GUNS OF NEW LINE OF BATTLE SHIPS.