

# SCIENTIFIC AMERICAN

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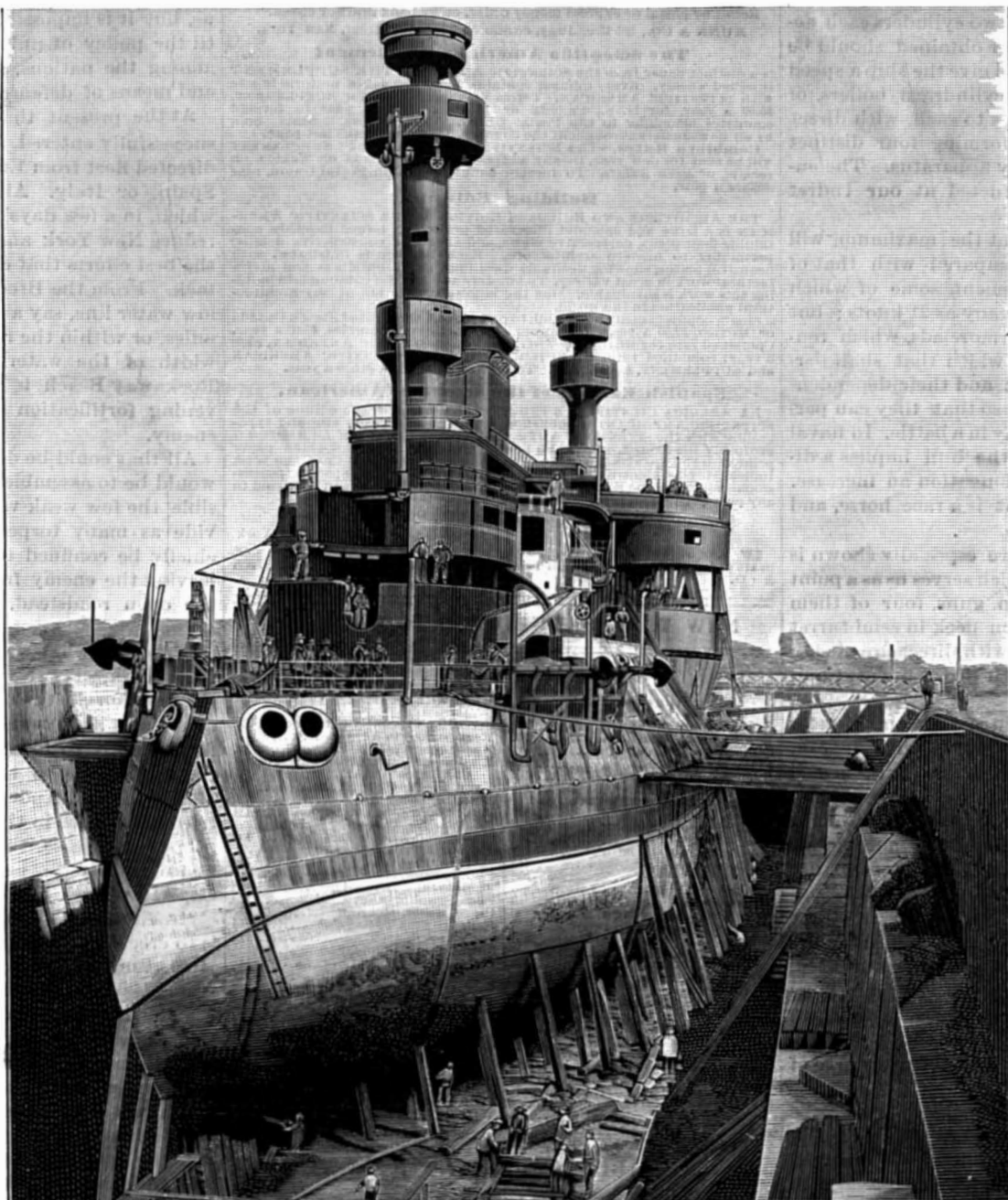
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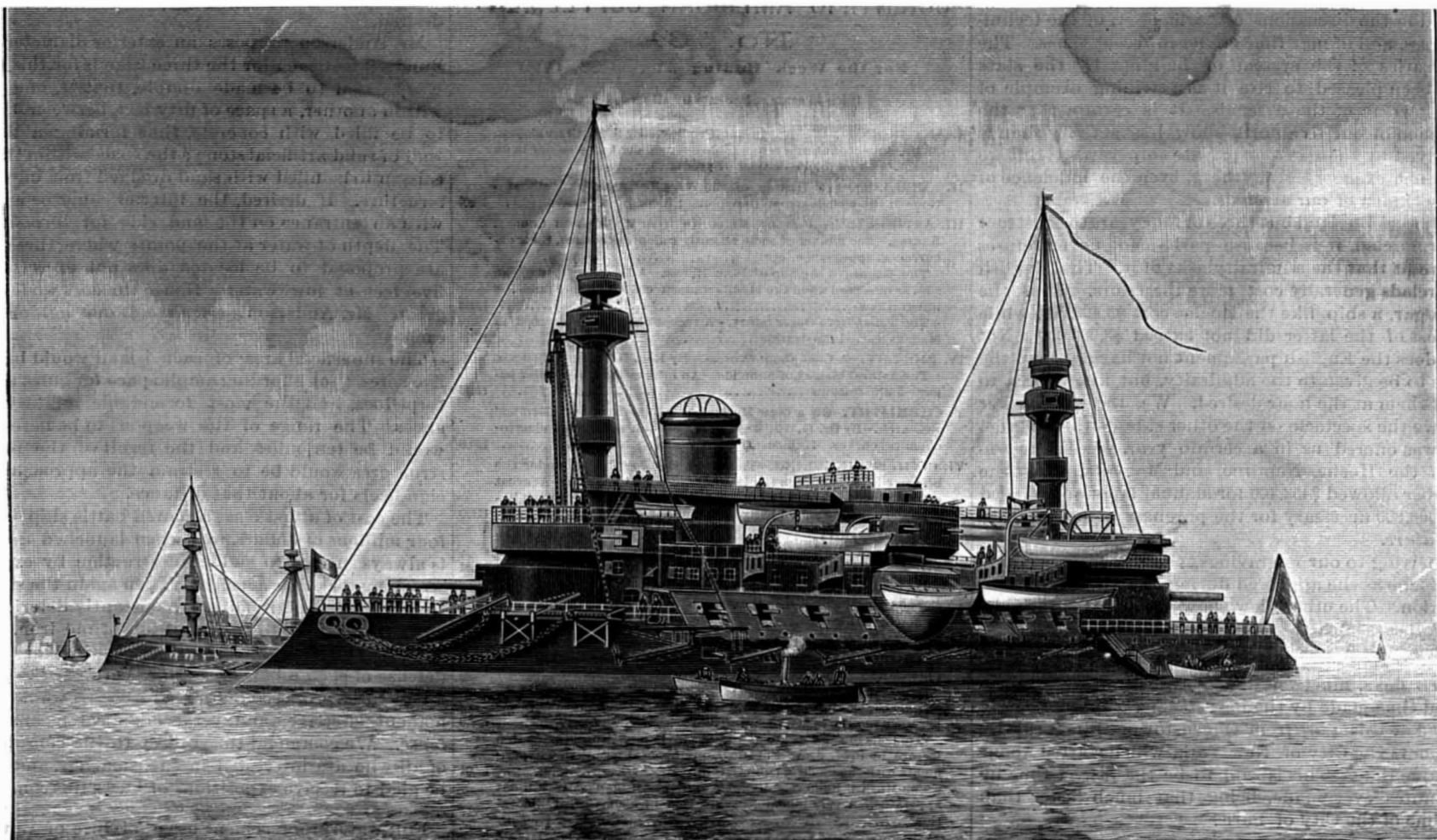
## THE NEW FRENCH ARMORED WAR SHIP HOCHE.

On the 15th of July, 1889, the Hoche received her armament at Lorient, where she had just successfully made her preliminary trial trips. The final trials will be made at Brest, as the port of Lorient is not well adapted for operations of this kind on account of the difficulties that its entrance presents.

The Hoche is one of the finest specimens of modern naval architecture, and, we may add, one of the most interesting ones, by reason of the differences between it and our old war ships, and even our most recent vessels. Is that as much as to say that it is the definitive type of the armored? No; for in that incessant transformation of which the Gloire was the origin, in 1859, every new ship is a new work, differing from its predecessors. The marine exposition, although it was very meager, demonstrated this with eloquence. In the pavilion that was devoted to it, there was an exhibition a series of models on a scale of 15 millimeters to the meter, through which the progress made during the last fifteen years could be easily seen. Thus, alongside of the Hoche, put upon the stocks in 1880, there might be seen, for example, the Formidable (launched in 1885) and the Trident (launched in 1876),



and the differences at once attracted attention. The most striking of these are found in the upper works, which, on the Trident and the types of its time, embrace an armored citadel and spacious and tall batteries. Upon the Formidable they perceptibly diminish, and upon the Hoche are reduced to two stories of narrow and light superstructures, containing nothing but rooms that must disappear at the first shot. The armor here is thicker and of less extent. It is reduced to a very strong belt around the load water line, 18 in. amidships, 16 in. forward, and 14 in. aft (9, 9, and 11 in. on the Trident). It rests against a deck protected with 3 in. armor plate situated beneath the load water line, and that renders the submerged part of the ship impenetrable, and affords a sure protection to the motive apparatus and the ammunition. Above the deck, there are turrets for the large guns. The plates of these are 16 in. in thickness. The two vessels have nearly the same length, but are of different widths. The Hoche is 336 ft. in length and 65 in width, and the Trident is 314 ft. in length and 58 in width. The depth at the main deck is 43 ft. on the Hoche and but 35 on the Trident. The draughts of water, center and aft, differ but



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little—25 and 27 ft. on the Hoche, and 25 and 28 on the Trident. The first displaces 10,581 tons, and the second 8,456. Finally, the Trident is of wood, and the Hoche of iron and steel.

If, now, we descend to the engines, and compare those of the ship of 1876 with those of the armorclad of 1880, the progress is found to be still more perceptible. On the Trident, the engine, with three horizontal cylinders, is of the Wolf system. It is placed in the vessel's axis and actuates one screw. It is of 4,882 H. P., and gives the vessel a speed of 14.17 knots an hour. The evaporatory apparatus consists of eight rectangular boilers of the high type, with four furnaces to each. They are registered at 33 lb. to the square inch.

The Hoche's apparatus consists of two independent compound vertical engines with two cylinders each actuating a screw. The total power obtained should be that of 12,000 horses, which would give the ship a speed of from 16 to 17½ knots. Eight cylindrical boilers, of a special type, with three furnaces to each, with direct flame, registered at 85 lb., and forming four distinct groups, compose the evaporatory apparatus. The engines of both ships were constructed at our Indret works.

A speed of 16 knots, or 17½ at the maximum, will doubtless not appear great if compared with that of steamships of an equal displacement, some of which (like the City of Paris) make as many as 21 knots; but we must not forget the role of armorclads, which renders it obligatory to give them a width that shall permit of the installation of turrets and their dependencies, and to make them shorter,\* so that they can perform their evolutions more rapidly in a battle. In naval construction every widening of the hull implies a diminution in speed, and every elongation an increase. Upon the whole, the packet boat is a race horse, and the armorclad is a draught horse.

But where the dissimilarities are especially shown is in the artillery. The Trident, which serves us as a point of comparison, carries six 10½ in. guns, four of them in the central citadel and two on deck in semi-turret barbettes; two 9½ in. guns, one with direct fire ahead, upon the poop, and the other with direct fire aft; and six 5½ in. guns in battery.

The Hoche has four turrets in a bow and quarter line; two barbettes in the center armed with 10½ in. guns; one in front and one aft, in the axis, armed with 13 in. guns. There are more than eighteen 5½ in. guns in the battery, twelve revolving guns, eight rapid-firing guns, and six tubes for firing automobile torpedoes. It will be seen that the 13 in. guns do not exist upon the Trident.

Upon the ships of the Hoche type, which are three in number (the Magenta, Marceau, and Neptune), the 10½ in. guns are suppressed, and are replaced by 13 in. ones, the field of fire of which is much greater. They throw 770 and 530 lb. projectiles to a distance of 27,230 ft. with a charge of 300 and 330 lb. and with a velocity of 1,820 and 1,800 ft. The 10½ in. guns have a range of but 20,800 ft.

As the Hoche was put on the stocks with its three similars, the latter have not escaped that law of progress of which we have spoken. They have received quite important improvements in detail, especially in their armament. The name of the Hoche has often echoed in the discussions of parliament, of the technical press, and of maritime circles in recent times. The adversaries of the system of building by the state have been pleased to cite it as a striking example of the slowness of the arsenals. It is certain that the workmen of our five ports show less activity than is displayed by those of our private ship yards. But we must not exaggerate anything, even the indolence of the workmen of our arsenals.

If it takes England but three or four years to construct an armorclad, it is because parliament never refuses the credit that the admiralty asks of it. The English armorclads generally cost more than ours. Thus, the Trafalgar, a ship like the Hoche, cost \$3,400,000, while the cost of the latter did not exceed \$3,000,000. Not only does the English parliament not haggle about the funds to be given to the admiralty, but knows how to grant them at the hour desired. We, therefore, never observe the spectacle on the other side of the channel that was offered us in a certain year, precisely *appropos* of the Hoche, Neptune, and Magenta, when the chamber allowed \$453,400 for manual labor and refused the \$906,800 necessary for the purchase of materials.—*La Nature*.

[Referring to our engravings, the upper one shows the Hoche as she appeared during the process of construction. The other view shows the great ship as she now appears afloat.]

FIVE days, nineteen hours, five minutes is the reported time made by the new steamer Teutonic, lately arrived at this port from Queenstown. She beat by two hours the City of New York, which started about the same time. This is said to be the fastest time by 13 minutes ever made, being that much faster than the time of the City of Paris.

\* The City of Paris is 580 feet in length.

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SEAPORT DEFENSES.

The exposed and comparatively defenseless condition
of our most important seaboard cities, in respect to
foreign naval attack, has for years been the subject
for talk in Congress, but up to the present time little
of a practical nature has been done in the line of pro-
tection. It is true a few vessels of war have been
ordered and some preliminary steps taken toward the
manufacture of heavy guns for fortifications. But in
regard to the systematic and permanent defense and
safety of such important harbors and cities as Port-
land, Boston, New York, we believe no definite plan
has been fixed upon, no material steps as yet taken.

It is, of course, to be hoped that no foreign nation
will ever have the temerity to make an attack upon
us, but it is impossible to foresee the future; and, un-
til the policy of universal peace becomes established
among the nations, we must not neglect the science
and means of defense.

At the present time most of our harbors might be
successfully entered and cities burned by a skillfully
directed fleet from England, France, Russia, Germany,
Spain, or Italy. All these powers have ships afloat
which, in a few days' time, might reach our shores and
reduce New York and Brooklyn to ashes, in spite of
the best efforts that could be made to beat off an at-
tack. From the Brooklyn Navy Yard to the 24 foot
low water line, say a mile off Coney Island, it is nine
miles, or within the range of modern heavy guns. The
width of the waterway between Sandy Hook and
Rockaway Beach is about eight miles, with no inter-
vening fortification to check the approach of an
enemy.

All that could be done in the event of sudden attack
would be to assemble in the harbor as rapidly as pos-
sible the few weak vessels we have on hand, and pro-
vide as many torpedoes as we could. These would
chiefly be confined to the inner parts of the harbor,
leaving the enemy free to select his own positions in
the open roadstead, and within range of our great
cities.

Obviously what we greatly need for the defense of
New York, likewise for Boston and other cities, is
the erection in the outer roadsteads of the harbors,
out at sea as it were, of suitable fortifications or arti-
ficial islands, so located as to command and protect
the approaches to the harbors. This is a suggestion
of Mr. John F. Anderson, of this city, an engineer of
tried experience in the construction of works such as
proposed. He is the contractor for the new light-
house shortly to be erected upon Diamond Shoal,
Cape Hatteras.

Mr. Anderson's plan for New York harbor defense
is to erect three islands out in the sea, between Sandy
Hook and Rockaway Beach, the islands to be about
two miles distant from each other and from the shores.
For the construction and formation of the fortifica-
tions, Mr. Anderson proposes to adopt the same simple
and effective means he has heretofore used in erecting
lighthouses in exposed situations, namely, construct
on shore a large caisson or cylinder of iron, float it to
the desired spot, fill with concrete and sink it, exca-
vate the bottom through the interior, and continue to
sink the caisson until the required firm foundation is
reached; the walls to be built as far above water as
desired.

Mr. Anderson proposes an exterior diameter of five
hundred feet each for the three islands for this harbor,
the caisson to be made double, that is, one caisson
within another, a space of fifty feet between the two,
to be filled with concrete, thus forming a fifty foot
wall of solid artificial stone; the space within the inner
caisson to be filled with sand dredged from outside the
structure. If desired, the interior could be left open,
with an entrance on the land side for torpedo boats.
The depth of water at the points where these islands
are proposed to be located does not exceed twenty-
five feet at low water. Hence the cost would not be
great. Mr. Anderson's estimate is one million dollars
each.

The superficial area of each island would be about
five acres, thus affording ample space for guns, mortars,
torpedoes, and the most formidable military appli-
ances. The range of the weapons to be here located
would be ten miles, and the result of the proposed
structures would be to restrain the approach of fore-
ign fleets for about that distance.

The cost of a first class armored battle ship is about
four millions of dollars, and when launched the vessel
is always subject to sudden destruction by explosion,
wrecking, or other accident. Then again the ship is in
frequent need of repairs, is constantly deteriorating,
and soon passes into the condition of old iron. More-
over, several such ships would be required for the sure
defense of such a harbor as New York.

But these proposed outer sea fortresses would be per-
manent, effective, and yet economical means of de-
fense. We commend the subject to the consideration
of all who are interested in such matters, and should
be glad to receive expositions of views thereon.

FOR waterproof cement use a mixture of Burgundy
pitch or asphalt and gutta percha melted together.