

OUR DEFENCELESS COASTS.

By F. V. Greene, Captain U. S. Engineers.

To the great majority of the American people the experience of Europe is of no value as a guide. It is nothing to us that other nations find it necessary or advisable to pursue certain policies. We believe that we are placed in exceptional circumstances; and we decide and act upon our own judgment of the matter in hand, regardless of the way in which other nations have acted upon a similar matter. Nor can it be denied that there is much to justify this self-confidence. Our political system was devised and adopted, not only without the aid of foreign experience, but in direct opposition and defiance of that experience. Yet it has been successful beyond the wildest dreams of its designers; it might fairly be called the most successful system of modern times, and no surer proof of this could be adduced than the fact that a large number of British statesmen believe that the only remedy for Irish misgovernment lies in grafting some of its most important features upon the venerable constitution of England.

As in politics, so in war. We have thrown aside all the traditions of European governments as to the necessity of maintaining a large army for purposes of defence; we maintain only the merest nucleus of a military organization—a force which, in proportion to the population, is now and always has been utterly insignificant. Yet we have never been beaten in war. In less than one century we prosecuted, with signal success, four wars, one of them being the mightiest conflict—the most far-reaching in its consequences to the human race—of which there is authentic record.

In nothing does this independence of thought, this disregard of precedents and foreign experience, this determination to decide our own questions on our own judgment, show itself more clearly than in the question of the necessity of properly defending our coasts. And we have now to consider whether, in decid-

ing to do absolutely nothing—as we have done in the last ten years, while other nations are spending millions—we maintain a sturdy independence of thought, or whether we display an ignorant arrogance which, like pride, goes before a fall.

The question is not a new one. It was vigorously debated after the War of 1812; and in 1816 a competent board of engineers was appointed, who laid down the fundamental principles on which a system of coast defences suited to our needs should be constructed, and their plans were approved by the President and by Congress. The leading spirit of this board was Captain (afterward General) Joseph G. Totten, of the Corps of Engineers. This eminent officer, whose active service extended over a period of fifty-nine years, not only devised the entire system of defences for the Atlantic coast—and subsequently for the Pacific and the northern frontier—but lived to complete it, nearly thirty years ago, substantially as it is to-day. He served in his youth in the War of 1812, was in his prime the chief engineer of the army in Mexico, and in his old age he approved the plans for the defences of Washington at the outbreak of the great rebellion. He was also the first to make use of iron in fortifications; and his granite forts, with iron shutters for the gun embrasures, built between 1850 and 1860, were the finest models of military engineering of their day.

The question of the necessity of sea-coast defences, or—granted the necessity—the principles on which they should be constructed, was periodically revived in Congress during the fifty years preceding the civil war, and at each period there were corresponding boards of engineers to make their reports to Congress. These were the boards of 1816, 1826, 1836, 1840, 1851, and 1861. The exhaustive reports of these various boards were all written by General Totten, and during his lifetime he spoke with the voice of authority and almost without a

rival. His views and arguments carried conviction both with the executive and legislative branches of the Government. Only twice were they seriously called in question—once, in 1836, by Mr. Poinsett, the Secretary of War, who contended that the enormous size of Fort Monroe, at Hampton Roads, and Fort Adams, at Newport, with a view to their defence against a land siege, was unnecessary, as no nation would have the hardihood to venture to land an army on our coasts large enough to carry on a siege; and once by General Gaines, in 1840, who advocated the abandonment of forts and the substitution of a system of floating batteries combined with seven great lines of railroads, radiating from the “central States of Kentucky and Tennessee” to various points on the sea-board, by which troops could be concentrated at any point which might be threatened. General Gaines was a gallant officer of the War of 1812, but he was regarded as eccentric and visionary—in the slang of to-day, somewhat of a “crank.” The Secretary of War curtly dismissed his project, by reporting to Congress that, “with every respect for the experience of the gallant author, he was constrained to differ from him;” the engineers reported that the proposed railways would cost \$126,000,000, and no further attention was given to the scheme.

In General Totten’s earlier reports he addressed himself not only to the question of location of works, their size, armament, and cost, but also to the broader question of the necessity of coast defences as a matter of public policy. His remarks on this subject are as apposite to-day as when they were written, two generations ago, being eternal principles as unanswerable as the laws of mechanics. Some of them will well bear quoting.

“The United States, separated from the rest of the world by an ocean on one hand, and a vast wilderness on the other, pursuing toward all nations a policy strikingly characterized by its pacific tendency, its impartiality, and justice; contracting no political alliances; confining her intercourse with the rest of the world rigidly to the letter of such temporary arrangements as are dictated by reciprocal commercial inter-

ests—might at first view be regarded as too remote physically, and as politically too insulated, to be endangered by the convulsions which, from time to time, disturb the nations of the earth.”

Yet

“Neither our geographical position, nor our forbearance, nor the equity of our policy, can always avail under the relation in which it is our destiny to stand to the rest of the world. . . . We are admonished by history to bear in mind that war cannot at all times be avoided, however pacific and forbearing our policy; and that nothing will conduce more to an uninterrupted peace than that state of preparation which exposes no weak point to the hostility, and offers no gratification to the cupidity, of the other nations of the earth.”

While these abstract principles are perfectly true and applicable to-day, yet the concrete problem of national defence is a thousand-fold simpler now than it was in the earlier days of our national life. The wants of commerce and private enterprise have developed a system of railroads twenty times more extensive than that projected by General Gaines, the cost of which prevented his project from having any consideration. No nation which has a great army has the mercantile marine for transporting it across the ocean. Before England could raise an army of respectable size, or before any of the continental powers could buy or build the ships to transport their armies, we could raise a force of our own amply sufficient to repel the invaders, and by means of our railroads we could concentrate it at any point on the coast, while the foreign army was being landed. In proof of this we have only to remember that in the Crimean War the maritime resources of England were taxed to the utmost in order to maintain an army abroad which never had an effective strength of 50,000 men; and in 1879, when England prepared to make war on Russia, it required four months to get 60,000 men ready for embarkation, and an additional force of 30,000 men, which were promised in two months more, exhausted her entire strength available for foreign service.

All idea, therefore, of any nation at-

tempting the conquest of this country may be rejected as purely chimerical. To attack us with 100,000 men would be but child's play, and to attempt to carry on a war across three thousand miles of ocean, with a nation which has maintained over one million of men under arms, would be the act of a madman. But the very elements of wealth and population which have made an invasion impossible have brought an increase of danger in another direction. They have built up on the shores of the Atlantic and Pacific Oceans and the northern lakes a series of great cities, containing an aggregate population of more than five million souls, and destructible property which is carried on the assessors' books with a valuation of \$4,000,000,000 (and has probably an actual value of nearly twice as much), yielding annually a product in manufactured goods alone valued at over one thousand million dollars.*

Every man, woman, and child in this great population, every dollar in this vast aggregation of wealth, is to-day in danger of destruction by a hostile fleet; for it is certainly a fact that the shells of an enemy's vessels could, in a few weeks, or even days, after declaration of war, reach every portion of it—so utterly defenceless are our harbors against the ships and guns which have been developed in the last twenty years, during which we have done nothing. So that while the idea of invasion and conquest

may now be dismissed as visionary, the problem of national defence has simplified itself to merely protecting life and property against a possible enemy in our sea-board and lake-board cities. It is, in brief, a problem of national insurance on life and property, to provide for just those cases of danger which are specially excepted from all ordinary policies—cases which lie beyond the grasp of private enterprise, and not only fall within the legitimate province of general government, but are expressly provided for in the Constitution, which gives power to Congress to provide for the common defence. The usual annual premium on policies of insurance on life or property, with good risks, is from one to one and a half per cent. One per cent. on the \$4,000,000,000 of destructible property within reach of hostile shells is \$40,000,000. Less than half that amount, viz., \$20,000,000, expended annually for six years, would give us a complete system of insurance—i.e., it would give us harbor defences stronger than any ships which could be brought against them. It is probable that so large a sum could not be judiciously expended in one year, and the expenditure would be less, and the number of years greater; but with \$10,000,000 a year for six years, fully three-fourths of the lives and property on our coasts could be placed out of danger. This amount is about three per cent. of our annual appropriations for the support of the Government and its obligations. During the ten years from 1826 to 1836, with an average total expenditure of \$17,000,000 per annum, the yearly expense for fortifications was about seven hundred and fifty thousand dollars, or four and a half per cent., so that it would be within precedent to spend three per cent. of our revenue for the same purpose now. And while the existence of an overflowing treasury affords no good grounds for lavish and unnecessary expenditure, with its attendant extravagance and demoralization, yet such a condition removes the only possible objection to proper expenditures for worthy objects. We have the ready cash to invest in insurance; and if we fail to make the investment, we incur a risk which no prudent man would

* The principal cities on the sea and lake coasts, with their population, valuation, and manufactured products, are as follows, the figures being taken from the Compendium to the Tenth Census, 1880:

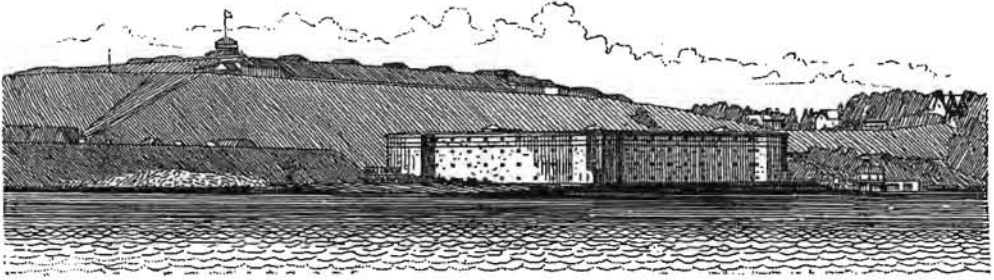
	Popu- lation.	Assessed val- uation of prop- erty.	Annual value of manufact- ured products.
Baltimore.....	332,313	244,044,181	73,417,304
Boston.....	362,899	658,220,621	130,591,903
Brooklyn.....	566,663	244,554,977	177,223,142
Buffalo.....	156,134	318,454,693	42,937,701
Chicago.....	503,185	143,982,393	249,022,945
Cleveland.....	160,146	83,553,139	48,604,059
Detroit.....	116,340	100,206,905	30,181,416
Jersey City.....	120,722	90,371,969	60,479,905
Millwaukee.....	115,687	53,774,086	43,473,812
New Orleans.....	216,090	91,794,350	15,803,696
New York.....	1,206,269	1,094,086,336	472,926,437
Philadelphia.....	347,170	581,729,759	324,342,935
Providence.....	104,557	178,443,469	42,697,512
San Francisco.....	239,959	244,626,760	77,524,399
Washington.....	159,871	99,401,737	11,832,316
Total.....	5,261,175	4,037,034,281	1,102,248,466

for a moment permit in his private business.

It is now necessary to examine the causes which have brought about the present state of affairs, and see how it is that our coasts have come to be in a defenceless condition, what is necessary to put them in a state of defence, and what other nations have been doing while we have been idle.

when the war broke out. The actual expenditures for fortifications, arsenals, and armories have been, in round numbers, as follows :

1794-1812.....	\$3,650,000
1813-1860.....	39,400,000
1861-1875.....	39,550,000
1876-1886.....	4,500,000
	\$87,100,000



Fort Wadsworth, West Side of the Narrows, New York Harbor.

The earlier reports of General Totten, those of 1816 and 1826, contained a complete project for the defence of the Atlantic coast. His later reports contained the plans for the Pacific coast and the lake ports. His first estimates, for the Atlantic coast only, were for \$16,500,000, a sum which, gauged by the annual expenditures then and now, is equivalent to over three hundred million dollars today. The amount was large, but the experience of the War of 1812 was fresh in people's minds, and Congress met the case by appropriating a little more than one million dollars (about seven per cent. of the total revenue) for 1816, and about six hundred thousand dollars per annum for several years afterward. From 1794 to 1820 all appropriations for fortifications were in a lump sum, to be expended at such points as the President might select, but after 1820 specific appropriations were made for each work. In his subsequent reports General Totten's estimates were increased, both on account of enlargement of the projected works, and of new localities to be fortified ; but in his report of 1840 he states the aggregate cost of works, completed and projected, to be about thirty-three million dollars, and this estimate was substantially correct, the works having been nearly completed for about that sum

of which about sixteen million dollars have been expended for arsenals and armories, one-half of it at the great inland arsenal at Rock Island, Ill. The outbreak of the civil war caused a large increase of expenditure, not only for the fortifications of principal cities on the sea-coast, but also of Washington, and this expenditure was kept up after the war until the first Democratic Congress convened, in 1875. Then the money for building forts was stopped entirely, and during the last ten years the appropriations have been limited to from one hundred thousand to two hundred thousand dollars annually for the care of fortifications, and certain sums for the purchase of torpedo materials and experiments with large guns. At the last session of Congress the House proposed a bill of this character, which the Senate amended by carrying the amount to over six million dollars, and between the two no bill of any kind was passed ; so that the fort-keepers and watchmen have at last had to be discharged.

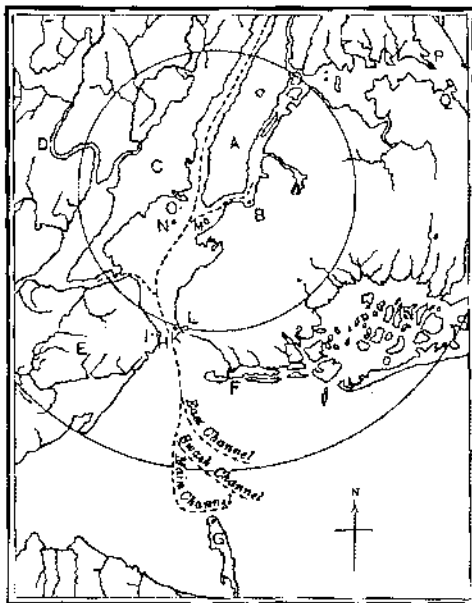
As an illustration of the history of our fortifications, it will be well to take the case of New York, and trace the development of its defensive works. Each of the entrances to New York Harbor contains a point which a moment's glance at the map shows to be specially suited

for fortifications. In the ocean entrance it is the Narrows, and in the sound entrance it is at Throgg's Neck, which might well be called the Eastern Narrows. There are no other points in coming from the sound which are specially adapted for defence; but in the lower bay the main channel runs very close to Sandy Hook, giving an outer line of defence at that point, and there are islands and shoals near the junction of the Hudson and East Rivers, which, before the days of long-range guns, were thought to afford good points for an inner line of defence.

The first permanent work to be erected in New York Harbor was on this inner line of defence. This was Castle Williams, the reddish stone tower on Governor's Island, just opposite the Battery, which is a familiar object to everyone who has been on the bay. It was built in 1807-10. In 1812 a somewhat similar structure—Fort Lafayette—was erected on a shoal near the eastern shore of the Narrows. In 1824 the land was purchased on the adjacent shore of Long Island, at New Utrecht Point, and the construction of Fort Hamilton was commenced and rapidly pushed to completion. In 1826 the land was acquired at Throgg's Neck for Fort Schuyler. General Totten had urgently insisted in his earliest reports upon the necessity of fortifying this point, but his views were opposed on the grounds that it was too far distant from the city, and that the difficult navigation of Hell Gate was in itself a sufficient defence on the side of the sound. His views finally prevailed, however, and in 1833 the construction was commenced in earnest. Between 1831 and 1834 Fort Columbus was built—to the south of Castle Williams, on Governor's Island.

In 1841 the old work on Bedlow's Island, on the inner line of defence, was removed, and the existing fort—with in which the Liberty Statue has just been erected—was built in the next few years. At the same time a small work was built on Ellis Island, between Bedlow's Island and the New Jersey shore. In 1846 the fine masonry work at the water's edge on the west side of the Narrows—Fort Wadsworth—was commenced; and in 1850 Battery Hudson,

on the hills behind it. In 1857 steps were taken to build three large and expensive works, to cost between one million and two million dollars each. One of them was on the sound entrance, at Willet's Point, opposite Fort Schuyler; another was at Sandy Hook; and the third was the rebuilding on a larger scale of Fort Tompkins, on the Staten Island hills at the Narrows. But little progress was made on these three works until the outbreak of the civil war, when they were vigorously prosecuted, although the works at Willet's Point and Sandy Hook have never been fully completed. In the early reports of the Board of Engineers there was a project for building works on the Middle Ground and East Bank, between Sandy Hook and Coney Island, but owing to doubts as to the stability of these shoals the project has never been carried out. After the civil war



Sketch Map of New York Harbor.

- | | |
|----------------------|-------------------------------------|
| A. New York. | I. Ft. Tompkins and Batt'y Hudson. |
| B. Brooklyn. | K. Ft. Lafayette. |
| C. Jersey City. | L. Ft. Hamilton. |
| D. Newark. | M. Castle Williams and Ft. Columbus |
| E. Staten Island. | N. Ft. on Bedlow's Island. |
| F. Coney Island. | O. Ft. on Ellis Island. |
| G. Sandy Hook (Ft.). | P. Ft. Schuyler. |
| H. Ft. Wadsworth. | Q. Ft., Willet's Point. |

[The circles are drawn with radii of seven and fourteen miles respectively, and centres at City Hall.]

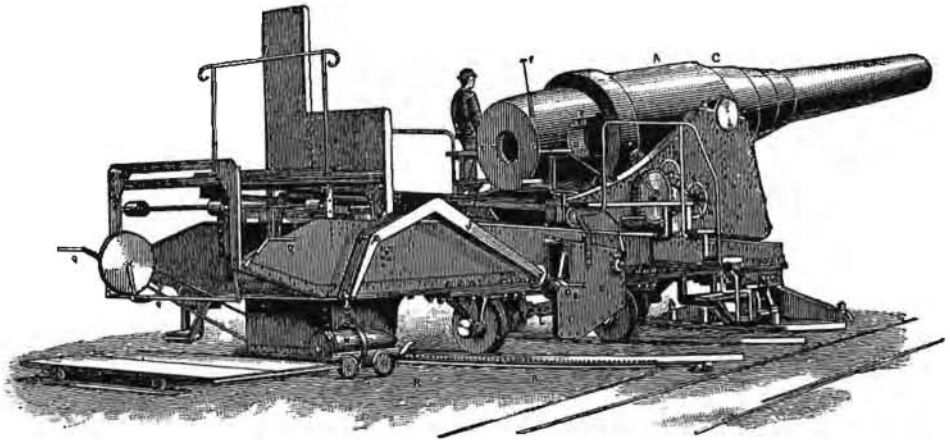
a large amount of work was done in building several lines of earthen batteries on both sides of the Narrows and at

Willet's Point. All work on fortifications, as previously stated, stopped in 1875. The total cost of the works hitherto constructed for the defence of New York is about nine million dollars.

The fortifications of New York illustrate very clearly the progressive changes in the system of defence. The problem has always been to place more, or larger, guns ashore than can be brought against them afloat, and to put them behind walls stronger than the sides of a ship. Prior to 1860 the forts answered these conditions fully. In 1812 navies were composed of wooden sailing-vessels, and the largest of them carried seventy-four small guns. Castle Williams and Fort Lafayette mounted seventy-eight guns each, of a much heavier calibre than those of the ships, and their walls were incomparably superior in strength to the sides of the wooden frigates. With the rapid development, between 1840 and 1860, of steam ships of war, propelled by screws, and carrying guns as large as 9-inch and 11-inch, it was evident that a corresponding increase must be made in the

bore) arranged in several tiers. Fort Wadsworth and the fort near the water at Willet's Point are types of the latter class, and the batteries near Fort Hamilton of the former.

The advent of the civil war brought into practical application two new principles. First, the application of iron armor to vessels, and, second, the use of torpedoes, or submarine explosive mines. Simultaneously with these came a great development in the size and power of guns. The germs of all the modern ideas of guns, armored ships, and torpedoes were found in the war of 1861-65. In guns we produced the 300-pounder rifled Parrotts, and the 15-inch (450-pounder) smooth-bore Rodman. In ships we had the turreted monitors and the broadside armored "New Ironsides." In torpedoes we had the spar torpedo from an open boat, with which Cushing blew up the Albemarle, and the iron powder-kegs, exploded by contact with electricity, with which the Confederates destroyed the monitor Tecumseh and other vessels. But at the close of the war our



Krupp's 40 Centimetre (15 $\frac{3}{4}$ Inch) Rille, Mounted on Sea Coast Carriage.

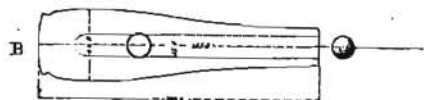
strength of fortifications. This was effected, in part, by earthen batteries, exterior to the fort, where the ground permitted their construction, and in part (where the site was restricted in size) by strong castellated structures of the best granite masonry, with walls eight feet thick, the embrasures (or gun-ports) protected by iron shutters, and the guns (10- and 12-inch smooth-

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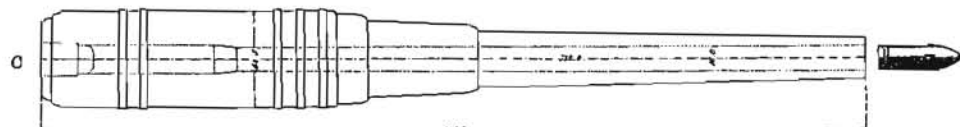
part. We calmly looked on, waiting for the time when it should be demonstrated whether the attacking or resisting forces should prove superior. The struggle virtually culminated, a few years ago, in the 100-ton guns of Krupp and Armstrong. These are colossal steel machines, worked entirely by hydraulic engines, 40 feet long, 6 feet in diameter at the base, carrying a projectile 4 feet long and 17 inches in diameter, weighing 2,200 pounds, and propelled by the explosion of over eight hundred pounds of powder. Its velocity is a mile in three seconds, and its range more than nine miles. At a distance of over half a mile it can penetrate thirty



A.—The 42-pounder of 1812. Length, 10 feet; weight, 4 tons; charge, 10 pounds; projectile, 42 pounds; muzzle energy, 800 foot tons.



B.—The 15-inch Rodman of 1862. Length, 16 feet; weight, 20 tons; charge, 130 pounds; projectile, 450 pounds; muzzle energy, 9,000 foot tons.



C.—The 16-inch Rifle of 1886. Length, 45 feet 6 inches; weight, 115 tons; charge, 800 pounds; projectile, 2,300 pounds; muzzle energy, 55,000 foot tons.

The Great Guns of Different Periods of the Nineteenth Century.

thirty inches of iron, twenty-four feet of concrete masonry, or seventy-five feet of

The engineers, therefore, confined their attention to the development of a torpedo system, and pending the solution of the gun-and-armor problem they built, as a temporary expedient, earthen batteries, and enlarged the ramparts of some of the existing forts, intending to arm them with 12-inch rifled guns and large mortars. The guns, however, were not built, and in 1875 the whole work stopped. Our present stock of heavy ordnance consists of 1518 smooth-bore Rodmans, of various sizes, mostly 10-inch and 15-inch, and 210 8-inch rifles, converted from 10-inch smooth-bores by inserting a steel lining. None of these can properly be called heavy guns, as compared with the modern sea-coast guns of Europe.

Thus we are to-day, in the matter of coast defence, just where we were during the civil war; we are a whole generation behind the other nations of the world, and a generation, too, in which more advance has been made in methods of coast attack than in the whole previous period of the world's history. And this in spite of the fact that we alone of all the nations of the world have a series of great cities on our ocean

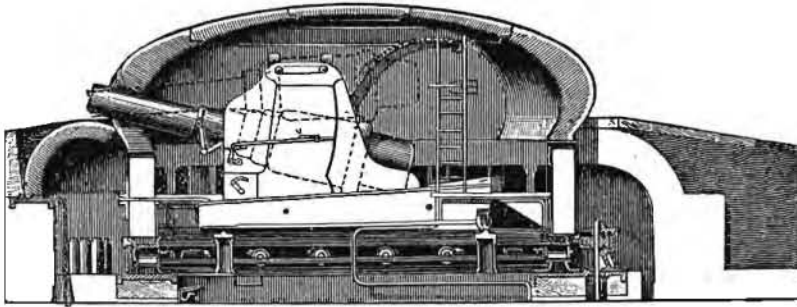
earth. The only form of defence which has successfully resisted it is the Gruson cast-iron dome.

At the beginning of this development of modern great guns, just after the close of the war, our engineers made some experiments with heavy iron shields placed in and around the embrasures of our granite forts, with a view of seeing whether this adaptation would not serve to continue the usefulness of our masonry works. But while the iron shields resisted fairly well the guns of that period, the masonry adjacent to them was soon demolished, and it was evident that our masonry forts were already obsolete.

It is doubtful if all the nations of Europe combined have as many lives and as much property within reach of hostile ironclads as we have, since all their chief cities are inland. Yet we have absolutely no means of defence. There has been no such spectacle in the previous history of the world, as this of a rich and pre-eminently powerful people inviting attack upon life and property—or the payment of enormous ransoms as the price of their safety—by leaving its coasts wholly undefended against the implements of war of the period. Nor can any valid reason be given why we alone of all the world should expect immunity from such attacks.

For nearly an entire generation—ever since 1859—the progress of fortification in Europe has been in the direction of

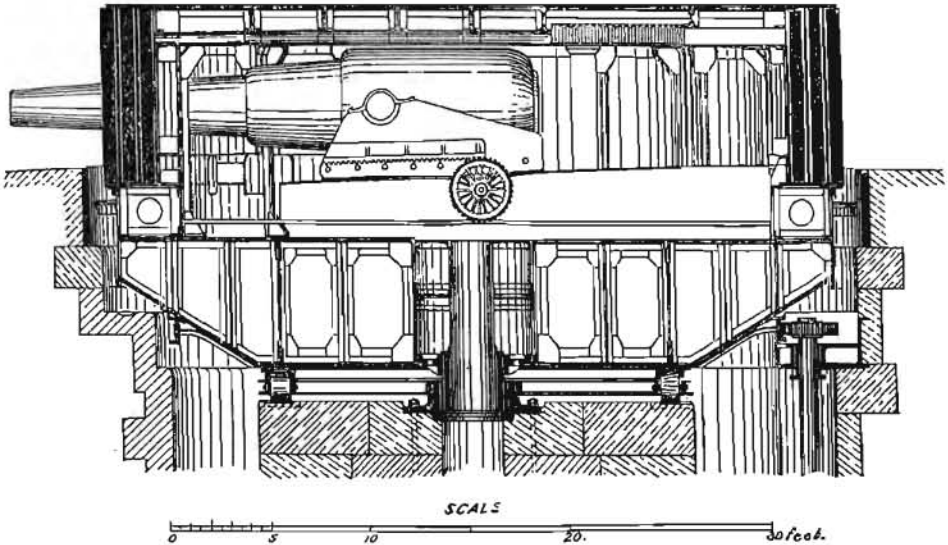
ferent localities—in some places there were circular forts, composed wholly of iron; in others the iron was in the form



Gruson Cupola (Cast Iron), Forming Part of the Defences of Antwerp, Belgium.

the use of some form of iron armor. In this the United States has taken no part. Our forts were among the foremost during the masonry age and the earthen age, but during the iron age we have as yet done nothing. In England the necessity for using iron in fortifications was apparent just as soon as this ma-

terial began to be used in ships, and in 1861 England entered upon the work of rebuilding her forts with iron. It was substantially completed in 1878, at a cost of \$37,000,000, expended on nine harbors, the total population and property within reach of which is far less than at New York alone. The manner in which the iron was used varied at dif-



Wrought Iron Turret, Containing Two 80-ton Guns, Forming Part of the Defences of Dover, England.

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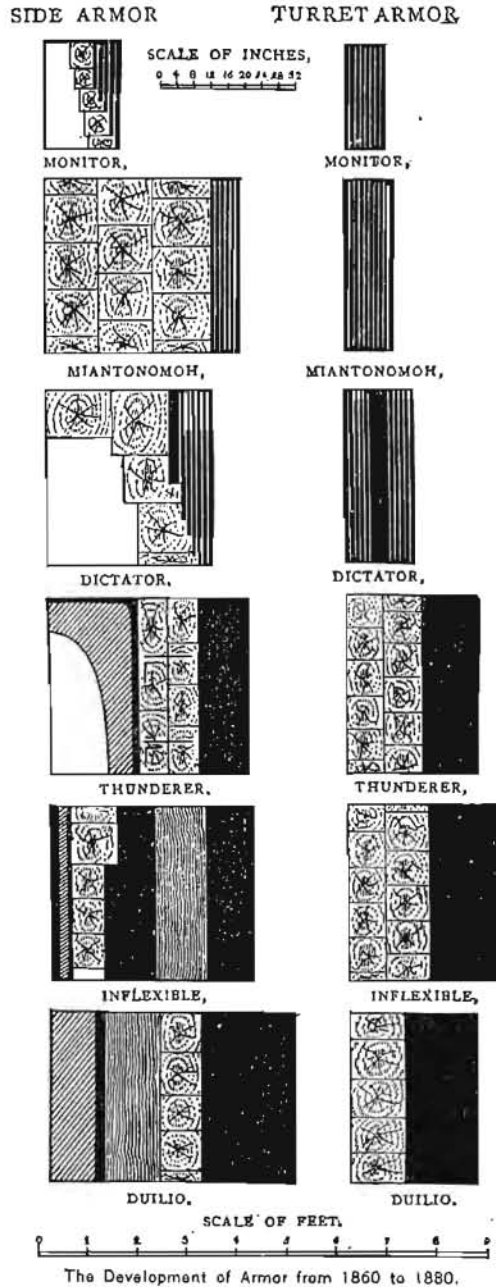
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of large guns which they mount is far superior to the number that could be brought against them afloat, and in connection with torpedoes and iron-clad ships they afford a secure defence.

On the Continent the problem was not taken up until guns had reached a greater development, and then it was solved generally in the direction of using iron alone, in the form of turrets or domes. Some of these were of wrought-iron, some of steel, and some of cast-iron. The latter were the Gruson cupolas, of which 28 have been constructed in various harbors of Germany, Austria, Belgium, and Holland. Recently the Italian Government gave an order for two of these cupolas, to mount two 120-ton Krupp guns each, for the defence of their naval station at Spezzia. The order was conditioned on a test shield, or segment of the cupola, resisting three shots of the Armstrong 100-ton gun—a test which it successfully withstood, although the same gun has pierced every other form of construction yet devised.

It is generally conceded that a complete system of defence must consist of three distinct elements—land forts, torpedoes, and ships or floating batteries. If an undoubted superiority in naval force can be maintained at every port against anything that can be brought against it, the forts and torpedoes could be dispensed with. But this is manifestly impossible. The small extent of coastline in the British Islands, and the proximity of her harbors to each other, enable England to rely much more on her naval force than other nations; but for us, with 3,000 miles of coast on the Atlantic, 1,200 miles on the Pacific, and 2,200 miles on the lakes, the idea of having a great squadron at every port is out of the question. Our main reliance must be on forts and torpedoes. Forts, torpedoes, ships, and guns are thus the four great branches of defensive science, each of them involving a distinct branch of manufacturing industry, and each of them (except torpedoes) requiring large capital and payments for manufactured product commensurate with the millions of property which they are intended to defend. As before stated, since the war we have

contented ourselves with watching other nations, and have done nothing ourselves except accumulate a certain



amount of torpedo material. In forts, we built some earthworks from 1866 to 1875, when the money was withheld and all work stopped. In guns, we converted a few smooth-bores into small rifles of doubtful efficiency. In ships, we patched up or rebuilt, under the

name of repairs, the wooden vessels of the ante-bellum period.

With the incoming of Garfield's administration, in 1881, however, the first signs of change began to be apparent, and since then, though the output as yet is small, we have been incessantly investigating the subject, until we are now possessed of the most complete information, in convenient printed form, concerning guns, armor, ships, and everything relating to the subject of coast defence, and it only remains to act on this information. It will be well to follow these steps in order, so that we may see what progress has been made in study, and what we may hope for in results.

The first subject taken up was ships. In the summer of 1881 a naval advisory board was appointed to state the requirements of a new navy. They reported to the Secretary of the Navy that we needed, for the "present exigencies of the navy," 38 unarmored cruisers, estimated to cost \$26,000,000, and 5 rams and 25 torpedo-boats, estimated to cost \$4,000,000. They stated that heavy iron-clads were needed; but they gave no estimate in regard to them, as that subject was not included within their instructions. At its next session Congress authorized the construction of two cruisers; but no contracts had been made for them when, in the spring of 1883, it authorized the construction of four vessels, three of them to be steel cruisers—two of 3,000 tons and one of 4,500 tons—and one of them a despatch-boat. The armament was to be from eight to twelve rifle-guns for each ship, of calibre from six inches to eight inches. The contracts were signed in July, 1883, and the new navy was begun with the launching of the *Dolphin*. This vessel was completed in the summer of 1885. The *Atlanta*, one of the cruisers, was put in commission in the summer of 1886, and the other two are not yet finished, nearly three years after the passage of the act authorizing their construction. No appropriation for ships was made during the session of 1884, but during the sessions of 1885 and of 1886 authority was given for three more cruisers, two gun-boats, two large armored iron-clads, one torpedo-

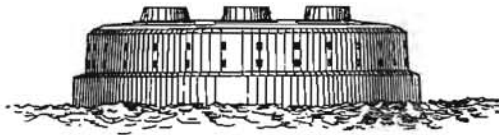
boat, and one pneumatic dynamite-gun ship, and for the completion of five large double-turretted monitors, whose construction was commenced, under the name of repairs, during Grant's administration. These 14 ships, added to the 4 authorized in 1883, make a total of 18 modern vessels for which authority has been granted. This is the outcome of more than five years' consideration of the subject, and the practical result to date is 2 ships in commission, 7 (including the 5 monitors) launched, but not finished; 5 designed, but not contracted for; and 4 not yet designed. The length of time thus consumed shows how large and complicated is the problem, and how many years must elapse between granting authority for ships and seeing them in commission.* As to the value of the ships thus far acquired, the only serious criticism made upon them is in regard to their speed. A cruiser which makes fifteen knots an hour, when the fast passenger steamers, that would be pressed into service in war, make eighteen to nineteen knots on every voyage, is of somewhat doubtful utility. The cruisers recently designed, however, are intended to have a speed of eighteen and nineteen knots. But, except in the matter of speed, all are agreed that the new vessels are well designed and well built, and that they make an excellent beginning for a naval force suited to the requirements of modern times.

In guns the progress has been of a somewhat similar character. In March, 1881, Congress ordered a board of engineer, ordnance, and artillery officers, to examine into the whole question of guns and projectiles. This was commonly known as the Getty Board, from the name of its senior officer. They examined several hundred designs, out of which they selected a small number as worthy of trial. They also made a thorough examination of the merits of cast-iron, wrought-iron, and steel, as material for guns, and decided in favor of steel—an opinion which is in accord with that of the majority of gun-builders

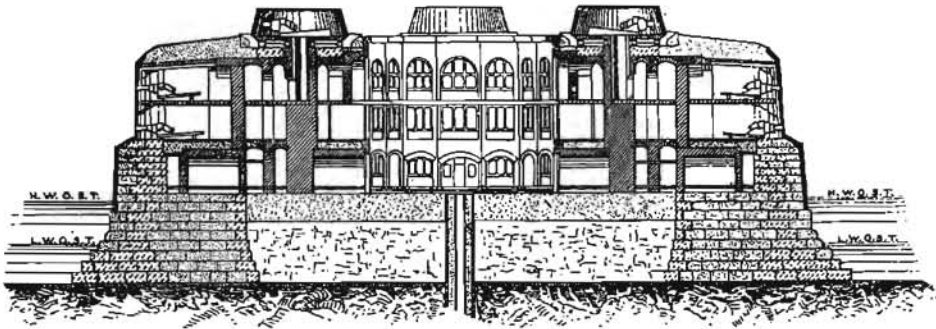
* The *Collingwood*, one of the most recent English iron-clads, was laid down in 1880, launched in 1882, and went into commission in 1886, six years after her construction was begun. She cost about three million five hundred thousand dollars.

throughout the world, although this opinion is by no means unanimous. No immediate action was taken on this report; but at the next session of Congress a select committee was appointed by the Senate, of which Senator Logan was chairman, to examine into the subject of heavy ordnance and projectiles. This committee reported in the winter of 1883, and its report was embodied in legislation which appropriated \$400,000 for heavy guns, and a beginning was thus made with modern ordnance. Under this appropriation contracts were

on our own resources for material of this character was so vital that at the same session of Congress, in 1883, an act had been passed providing for another board, known as the Gun Foundry Board, to report whether we had any arsenals or navy-yards suitable for a gun foundry, or what other method, if any, should be adopted for the manufacture of heavy ordnance. This board met in the spring of 1883, visited all the principal steel factories of the United States and Europe, and made two exhaustive reports in 1884. Their conclusions were that the Govern-



ELEVATION



SECTION

Fort Horse-Sand Forming Part of the Defences of Portsmouth, England.

made for the conversion of fifty 10-inch smooth-bores into 8-inch rifles, and for seven experimental rifled guns of calibres from eight to twelve inches. One of these was wholly of cast-iron, one of cast-iron with a steel tube, one of cast-iron wrapped with steel wire, two of cast-iron banded with steel hoops, and two entirely of steel. Nearly all of them required gun-steel in suitable masses and of the requisite quality, and the question at once arose whether this material could be obtained in this country. Inquiries addressed to the principal steel manufacturers developed the fact that they had not the requisite plant for making such metal, and could not afford to invest in it for such small orders as Congress had then authorized.

The steel had therefore to be imported. But the importance of relying

ment should establish on its own territory a plant for the fabrication of cannon, and should contract with private parties for the delivery of the forged and tempered material, the contracts being of sufficient magnitude to justify the investment of capital in the necessary plant; in other words, that the Government should not establish a gun foundry, but a gun factory, where it would fabricate its own guns, while buying the material from manufacturers. As sites for gun factories they recommended the Washington Navy Yard for the Navy, and the Watervliet Arsenal, at Troy, for the Army, and stated that \$1,000,000 would be required to fit up each of them, and that \$15,000,000 should be appropriated for the purchase of steel for guns. These recommendations, however, were not acted upon at once, and

another select committee of the Senate, with Senator Hawley as chairman, known as the Committee on Ordnance and War Ships, was appointed in the summer of 1884, for the purpose of examining the same subject. They made their report in the winter of 1886; it contained a large amount of information, and confirmed the views and conclusions of the Gun Foundry Board, but made no specific recommendations. Meantime, still another congressional committee had been appointed, composed of members of both Houses, with Mr. Randall as chairman, to investigate the same subject. This also submitted, in the spring of 1886, a report containing considerable information, but no positive plan of action.

While these committees were studying the problem the new cruisers were building, and it was necessary to provide guns for them. The necessary money had been appropriated in 1883, and the size of the guns was fixed at 6-inch and 8-inch rifles. The Navy Department began the construction of thirty of these guns, contracting for a small portion of their steel with the Midvale Steel Works, of Philadelphia, and for the bulk of it with Whitworth, of England. The finishing of the guns was to be done at the Washington Navy Yard. A few of these guns have been finished, and have proved in the highest degree satisfactory at the Annapolis proving-grounds, but none of them are yet on board of ships. It is expected to have the Atlanta's armament of two 8-inch and six 6-inch guns ready during the present winter.

A certain amount of progress had thus been made on the policy outlined by the Gun Foundry Board—viz., to buy steel forgings of private manufacturers, and to build the guns at Government shops—when the bill authorizing the additional cruisers and iron-clads was passed, last July. That bill appropriated \$1,000,000 toward the armament of these vessels, and distinctly authorized the Secretary of the Navy to expend as much of this as he deemed necessary in fitting up one of the navy-yards as a gun factory, provided the gun-steel was purchased from private factories. Under this law the Washing-

ton Navy Yard is now being transformed into a gun shop exclusively, and advertisements have been issued calling on steel manufacturers to submit proposals for furnishing about thirteen hundred tons of gun-steel, in masses from three to twelve tons, suitable for making modern rifled guns from six to twelve inches in calibre and from five to thirty-five tons in weight.

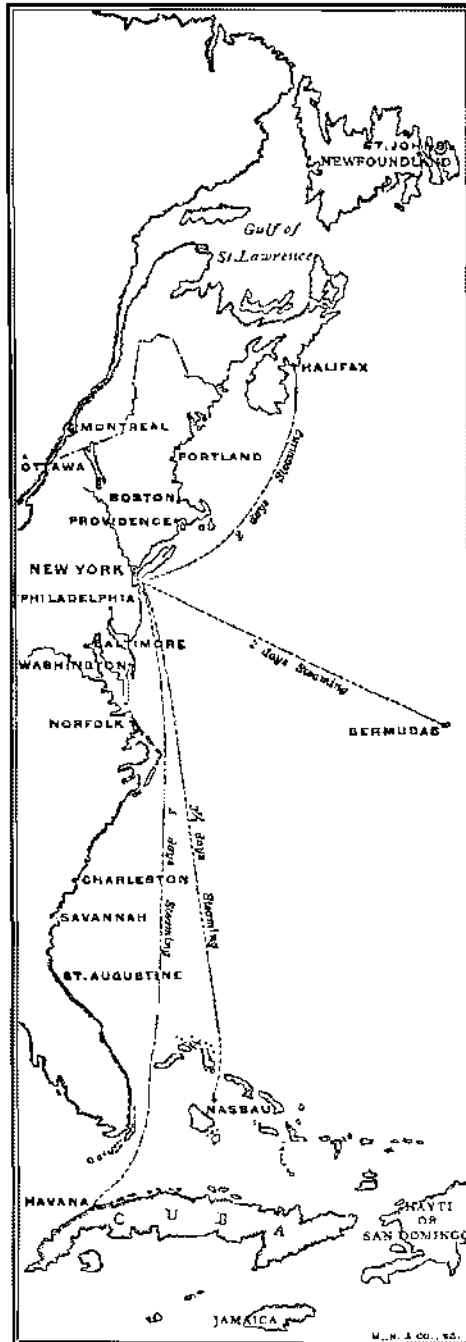
We are thus fairly started, after nearly five years of investigation and discussion, in the business of building modern guns for the Navy. For the Army little has yet been done. The 8-inch and 10-inch steel guns authorized in 1883 are not yet finished, and the experimental guns ordered at the same time are still in the experimental stage, with results not altogether satisfactory. When the fortification bill, appropriating a few hundred thousand dollars for the care of forts and further experiments with guns, reached the Senate, last summer, Senator Hawley offered an amendment appropriating \$6,000,000 for the purchasing of 10,000 tons of gun-steel of domestic manufacture. The Senate adopted this, but the House refused to accept it, and the bill failed altogether—with the understanding that a new conference should be held, after the elections, in the first ten days of this winter's session. It remains to be seen whether the manufacturers will be willing to bid on the comparatively small amount of 1,300 tons authorized for the Navy. Even should they decline it is almost certain that a larger amount will be authorized at the present session, and then the work will begin. It will probably be four years, however, before we can have any guns as large as 10-inch and 12-inch. The bids for the Navy give the manufacturers two years and a half in which to deliver their forgings, and after that the guns are yet to be fabricated.

In the matter of forts, the Engineer Department has, year by year, represented in its annual reports, in the strongest possible language, that our forts are antiquated and our harbors at the mercy of an enemy's fleet. It has tried to dispel the popular fallacy that we can rely on torpedoes alone, by showing that forts and torpedoes are mutually dependent. With forts alone

an armored fleet can run by them, and with torpedoes alone a fleet can pick them up or explode them harmlessly. For the immediate protection of torpedo lines from derangement some of our present small guns and masonry forts or earthworks would still be very useful, provided there are forts and great guns that can keep the hostile iron-clads at a distance. But in our present condition the armored ships, with their 12-inch and 16-inch rifles, can demolish our forts completely, and then take up the torpedoes at their leisure. The lesson of the bombardment of Alexandria—the only instance of the attack of forts by ships since the development of the present types of iron-clads and guns—should not be lost upon us. These fortifications were somewhat inferior in construction, but in their general design and character they were quite similar to ours, and their armament was more powerful than any that we have. The English brought eight iron-clads against them, and in one day's bombardment rendered them useless and caused their evacuation. If our relations with England should become strained on account of the fisheries, the interoceanic canal, or any other question, the same, or a stronger, fleet would naturally rendezvous at Halifax or Bermuda, just as a similar fleet went to Constantinople in 1879, and to Alexandria in 1882. Forty-eight hours would suffice to bring them to New York, where a few days at the most would be necessary to destroy our existing fortifications, a few more to remove the torpedoes that we might meanwhile have placed, and then the city of New York would be at its mercy. Its destruction, or a ransom running into the hundreds of millions, would be the inevitable result, unless we yielded our diplomatic claims—which would not be probable.

All these risks have been set forth year by year in annual reports and messages, and in countless other publications, until the tale has become threadbare; yet, up to this time, the only result has been the well-worn expedient of another board of officers to consider and report. This board was authorized by the act approved March 3, 1885. The

Secretary of War was its chairman, and its members comprised four officers of



Sketch Showing the Cities on the Atlantic Coast and the Proximity of Foreign Naval Stations.

the Army and two of the Navy, who were well known as eminent authorities on this subject, and two civilians, equally well known as metal manufacturers.

Their report was submitted, with remarkable promptness, in January, 1886. It is probably the most exhaustive treatise on coast defence ever made. It not only gives a complete project for the defence of our ports, with estimates of coast, but in the various subreports attached to it are found elaborate descriptions and drawings of modern guns, gun-carriages, ships, torpedoes, and armor—all forming a complete *résumé* of the entire subject at the date of January, 1886. This information could not have been collated in so short a time but for the assistance of the Office of Naval Intelligence in the Navy Department. This office was established a few years ago, for the purpose of collecting, classifying, and indexing information of every kind relating to naval and military affairs. It fulfils the functions of the corresponding bureau in the General Staff Office, in Berlin, whose researches had so marked an influence on the war of 1870. The Washington office is in no way inferior to the one in Berlin, and if we have no guns, or forts, or armored ships, we at least know, in the minutest detail, just what every other nation has, and what can be brought against us.

The fortification board makes its estimate for 27 different ports, of which 11 are considered urgent. For these 11 the total of expense, \$102,970,450, is itemized as follows :

For forts	\$44,444,000
For guns and carriages	30,360,800
For floating batteries	18,875,000
For torpedoes (submarine mines) ..	2,450,650
For torpedo-boats	6,840,000

It repeats the recommendation of the Gun Foundry Board, that the Government buy its steel from private manufacturers and provide its own gun factory. It urges that \$8,000,000 be appropriated for gun-metal, so as to induce the necessary investment of capital for its manufacture ; that \$1,000,000 be voted for the gun factory, and \$12,500,000 for the beginning of forts, guns, carriages, floating batteries, torpedoes, and torpedo-boats. Starting thus with an appropriation for the first year of \$21,500,000, it recommends future appropriations of about nine million dollars annually until the work is completed. This is cer-

tainly a comprehensive scheme, involving a large expenditure ; but it is much more within our present means than was the scheme presented by General Totten in 1826, and adopted by Congress and carried out during the succeeding thirty years.

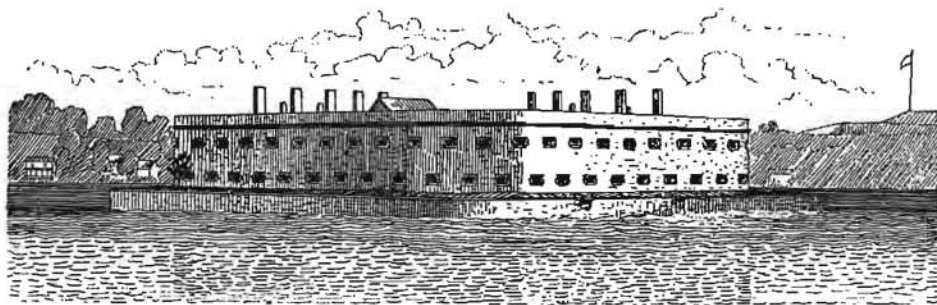
The plan of fortifications proposed by this board consists of forts of three kinds, viz., armored turrets, armored casemates, and barbette batteries of earth and concrete. These forts will carry guns of size proportionate to the importance of the harbor they defend. They range in size from 16-inch (115 tons) to 8-inch (13 tons), and the total number is 581. In addition to these are 724 mortars of 12-inch and 10-inch. Both guns and mortars are to be rifled, and the board emphatically recommends that they be built of steel. In addition to the forts the board recommends auxiliary defences in the shape of submarine mines, torpedo-boats, and floating batteries, according to the necessities of each particular harbor.

To illustrate their plan of defence, it is well to again take the case of New York Harbor. Of ships that can cross the bar at New York, and that carry guns capable of piercing more than 12 inches of armor, England has 74, carrying 352 guns ; France 35, with 100 guns ; Italy 9, with 28 guns ; Russia 24, with 56 guns ; and Germany 22, with 65 guns ; yet of all these there are but 9 vessels, with 22 guns, that can pierce more than 20 inches of armor. To protect the harbor it is proposed to fortify three lines of defence—two for the southern entrance (one being from Sandy Hook to Coney Island, and the other at the Narrows), and one for the eastern entrance (from Throgg's Neck to Willet's Point). Each line would be protected by several groups of torpedoes, and by a fleet of 6 torpedo-boats. At the Narrows, Fort Lafayette would be demolished to give place for two turrets, with walls of steel three feet thick ; opposite them, near Fort Wadsworth, would be two similar turrets, and two more at Sandy Hook. Each of these turrets would carry two 115-ton (16-inch) guns. In or near Fort Hamilton, on one side, and Fort Tompkins, on the other, would be built 10 armored casemates, each holding a

single gun, and 10 earth-and-concrete batteries, also each for a single gun, mounted on a carriage to lower or disappear behind the parapet after each shot. At Sandy Hook would be 17 similar casemates and batteries. These guns would be 12-inch (50 tons) and 10-inch (27 tons). On Coney Island and thence back along the shore to Fort

heavy guns will carry nine or ten miles, it is proposed to have armored floating batteries, carrying the largest guns, to aid in the defence.

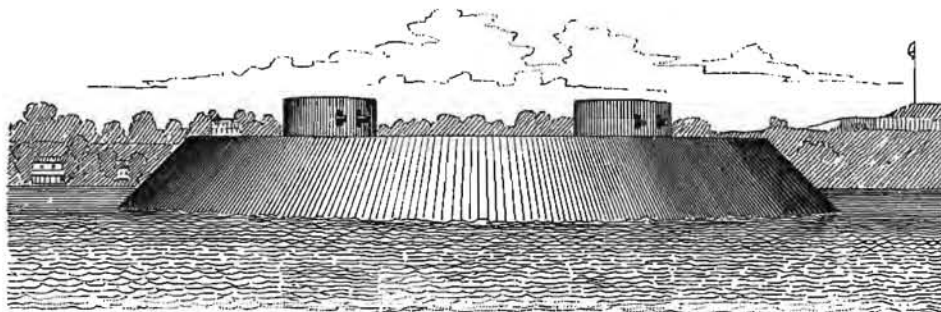
This report, containing, as has been said, a complete plan of defence for all our harbors, was presented to Congress in January, 1886. No action was taken upon it. We have now exhausted our



Fort Lafayette, East Side of the Narrows, New York Harbor.

Hamilton, and on the Staten Island side on the hills above Fort Wadsworth, would be a series of 12-inch rifled mortars, 96 in all. For the eastern entrance the same plan of torpedo-boats and torpedo-boats, steel turrets, armored casemates and barbette batteries, and mortars would be followed. For the entire defence there are 9 turrets, with 18 guns

ingenuity in forming boards to collect information and report. Our information is complete, and it can be kept up to date from month to month by the Office of Naval Intelligence. We have obtained the best attainable expert advice and opinion, and we have a complete plan of defence, based on modern requirements, with full estimates of



Proposed Arrangement of Turrets on the Site of Fort Lafayette, New York Harbor.

of 115 tons, casemates and batteries for 77 slightly smaller guns, 144 mortars, 18 torpedo-boats, and 690 torpedoes. The total cost is estimated at \$8,000,000. (The total value of property protected is nearly two billion dollars, and the cost of protection less than half of one per cent.) In addition to these defences, as there is anchorage- and cruising-ground off Coney Island, which is but seven miles from a portion of Brooklyn, though the

cost. The question now is, Shall forts be built? And the answer to that depends on two factors—one of which is public opinion, and the other is the necessities of partisan politics as interpreted by the leaders in Congress. Mr. Tilden wrote, last June, that he knew that public opinion was overwhelmingly in favor of fortifications, and he based his judgment on the views of over seven hundred newspapers. On the other

hand, Mr. Randall thinks it not good politics for his party to spend large sums on forts—and he is a very shrewd judge of popular opinion.

As for the public at large, it is doubtful if it is as yet actively in favor of forts. The citizens of St. Louis, Cincinnati, and Louisville know very well that no foreign force can directly injure them, and they hardly realize the indirect injury which would result to their trade from a loss of property in New York or other seaports. The vast population of the interior States is much more anxious to see the public money spent for improving their rivers, from which, in spite of the abuses of the river and harbor bills, they see an immediate advantage, than to have it invested in insurance for sea-coast cities. Even on the lakes people do not realize their danger. They have seen comparatively small expenditures in making lake harbors and ports result in building up a commerce which rivals that of the entire sea-coast. They do not realize that while under existing treaties neither England nor the United States can maintain any naval force on the lakes, yet on the outbreak of war England can send through the Welland Canal 111 vessels, with over four hundred guns, while we are absolutely powerless. The Welland Canal can carry vessels of 13 feet draft, the Erie only 7 feet. So long as we

leave the Erie Canal in its present condition we leave it in England's power, on the outbreak of war, to destroy Buffalo, Cleveland, Toledo, Detroit, and a number of smaller cities; and, unless the English vessels could be stopped by torpedoos in the Detroit River, Chicago, and Milwaukee as well. The State of New York spent its money freely to build this canal, and thereby gain the commercial supremacy of the Western Continent. It remains for the General Government to enlarge the work, for the protection of the great States from whose lake-shores the commerce annually passes through it. But it is one thing to spend money for a purpose which yields a quick commercial return; it is another and far harder thing to sink money in insurance which yields no visible return, and against a contingency which millions of people insist on considering too remote to take cognizance of.

The question finally resolves itself to this: Our harbors on the ocean- and lake-shores are defenceless against existing navies. Is it wise to leave them so when we have the means to protect them? It never has been so considered until within the last few years. Who can name any reasons why such a risk is more justifiable now than it has been in the past? Does not the enormous increase in property values render the risk greater now than it ever has been before?

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JANUARY, 1887

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