of defense may cost in comfort if not in cash more than the needed defenses would.

We may take it for granted, therefore, that the American people, now that they are comparatively free from pressing demands upon their thought and means arising from internal complications, and now that they have become pretty generally aroused to a sense of their maritime weakness, will pay to naval affairs henceforth that attention which can mean nothing less than ultimate supremacy in this direction. When the American people make up their minds to do a thing it is done, and usually on a scale that is not niggardly or mean.

At this juncture it is timely, to say the least, to inquire what the rest of the world has been doing in naval matters during the period of our naval quiescence. We shall find, as will be shown elsewhere, that other nations have not been idle; indeed, the past ten or fifteen years have covered a period of greater activity in naval affairs than any corresponding period in the history of navies.

Within this period, as has been so forcibly expressed by Chief Engineer King, in his splendid work on the war ships and navies of the world, "all the navies of Europe have been undergoing reconstruction, while those of Asia and South America have been in great measure created. Never has there been a period in time of peace when such large expenditures were being made for naval purposes as at present, and never a period in the history of steam screw navigation when such radical changes were being effected in the construction of ships of war, in the mechanism of steam propulsion, and in the application of machinery to various purposes on board ship hitherto accomplished by hand. Never before have such vast strides been made in so short a time in the fabrication of great guns for naval warfare, necessitating, of course, the introduction of new mechanical appliances for working them; while the development of torpedo warfare and the newly invented methods of operating those dangerous weapons, promise to add to future maritime contests an element hitherto almost unknown."

In all this activity there has been a large measure of progress; chiefly, however, along lines of improvement first marked out by American inventors; a fact clearly recognized by Mr. King in his concluding chapter on the needs of our navy. The beautiful outlines of American fast sailing vessels were copied in Europe. The first war ship propelled by the screw was built in Philadelphia. Shell fire and subsequently heavy guns were first introduced here. The torpedo is an American invention, and so is the revolving turret for vessels of war. It remained, adds Mr. King, for European naval powers, having large appropriations at command, to develop and expand American inventions. The ideas for the present powerful mastless sea-going armored ships of the English grew out of the visits of our turret vessel Miantonomoh to British ports; and the unarmored fleet of fast ships, of which the Inconstant was the first in Europe, owe their development to the building of the Wampanoag.

It is not to be presumed that an approach has been made to the limit of possible improvement in war vessels and their equipment. And there is every reason to anticipate that when American inventors and shipbuilders again turn their attention to naval problems, the radical and daring novelties which made America the pioneer in the creation and development of the several types of modern war vessels and their equipment in use to-day, will be more than paralleled in the evolution of the war vessel of the future. In any case we shall have the advantage of the knowledge gained during the progress of the costly experiments made in Europe during recent years, both in teaching what to do and what to avoid, and our advancement should be correspondingly sure and rapid.

If we could be certain that our present peaceful career will continue unbroken—as we hope it may—for another score of years, some justification might be found for a continuance of the policy of inaction. Indirectly we cannot fail to be benefited by all the improvements, and the failures as well which Europe is making at such heavy cost in naval construction and armament, provided the improvements are not suddenly turned against us while we are unprepared to meet them. To rest, however, on such a precarious ground for idleness would be sheer foolishness, when we know that our coast defenses are antiquated and practically worthless for protection against a heavily armed and armored foe.

It is true that modern wars are not apt to be suddenly declared, and that much might be done in a few months to put our coast in a fair condition of defense. Still it must be borne in mind that many months are required for the construction of powerful cannon and fortresses, whether fixed or floating; and when the emergency comes we may not be called upon to meet a slow moving and honorable enemy, but a gang of dashing and irresponsible private adventurers, who might sail into any of our sea ports any day with a vessel so strong as to enable them to destroy property or levy tribute to a larger amount than the cost of a great navy.

That there is any need of our emulating England and France and Italy in the construction of enormous sea-going iron clads, costing millions each, is not at all apparent. Indeed it may rather seem that the line of experiment in that direction has already been pushed to the utmost extreme, and that the new conditions of naval warfare, as developed in great guns, torpedoes, and so on, demand a radically new departure in naval architecture. In any case it becomes our national government to make provision for such action in our public and private navy yards as shall invite our ship builders and inventors to show what American genius can do to meet our peculiar needs in this direction.

ELECTRO-BRASS PLATING.

Many articles of bronze composition, of zinc, or cheap alloys receive a coating of brass by electric deposition, as a basis for the bronze luster, which is more easily applied and better retained by such a surface. The brass finish is also applied by this method to iron, steel, and composition wire.

The preliminary and finishing operations and the disposition of the baths are the same for brass as for copper deposits. Heat is applied for brass deposits by those who electroplate coils of iron of composition wire, etc., with this alloy. For other articles the baths used are not usually heated. The hot bath is usually contained in an oblong open iron boiler lined with sheet brass, while that for cold plating is generally placed in a wooden tank coated with gutta percha or asphaltum. The anodes are of plate or sheet brass joined together and arranged along the sides, all connected with the last carbon or copper of the same battery. The strength of battery current is regulated by the surface of the articles to be electroplated. The articles are suspended in the usual way—by copper or brass hooks to stout rods of the same metal, all connected with the last zinc of the battery.

THE BRASS BATHS.

Where the ordinary cheap commercial cyanide is employed the following answers very well:

Sulphate of copper	4 oz.
Sulphate of zinc	4 to 5 oz.
Water	1 gall.

Dissolve and precipitate with 30 ounces carbonate of soda; allow to settle, decant the clear liquid, and wash the precipitate several times with fresh water—after as many settlings. Add to the washed precipitates:

Carbonate of soda	15 oz.
Bisulphite of soda	7½ oz.
Water	1 gall.

Stir to effect solution of these last two, then stir in ordinary cyanide of potassium until the liquid becomes clear and colorless. Filter if much iron or iron oxide (derived from impure zinc salt and cyanide) remains suspended in the liquid. An additional half ounce or so of the cyanide improves the conductivity of the solution.

COLD BRASS BATH FOR ALL METALS.

Carbonate of copper (recently prepared)	2	oz.
Carbonate of zinc " "	2	"
Carbonate of soda	4	"
Bisulphite of soda	4	"
Cyanide of potassium (pure)	4	"
Arsenious acid	$\frac{1}{10}$	"
Water	1	gall.

Filter if necessary.

The arsenious acid is added to brighten the deposit—an excess is apt to give the metal a grayish-white color.

MANAGEMENT OF THE BATH.

The losses of the bath are to be repaired by the addition of copper and zinc salts (and arsenious acid) dissolved in fresh cyanide, and water.

The operator determines the requirements from the rapidity of the deposit, its condition, color, and so on.

The difficulty in brass electroplating, especially with small baths, is in keeping the uniformity of the color of the deposit, as the electric current having to decompose two salts, each offering a different resistance, must, according to its intensity, vary the color and composition of the deposit. A feeble current principally decomposes the copper salt and results in a red deposit; while too great intensity in the current decomposes the zinc salt too rapidly and the deposit is a white or bluish-white alloy. If the deposit has an earthy or ocherous appearance, or if the liquid is blue or greenish, the solution is deficient in cyanide. When in proper working order the liquor is colorless. If the coating becomes dull and unequal, a slight addition of arsenious acid will usually improve it.

If the deposit is too red, use more battery power or add more zinc salt; if too white, decrease the current or add more copper salt. The specific gravity of the bath may vary from 5° to 12° Baumé; when it exceeds this latter gravity it should be diluted with fresh water to decrease the electric resistance.

If the brass deposit is irregular, remove the articles from the bath, rinse, scratch-brush, and put again into the bath until the color and thickness of the deposit are satisfactory. Scratch-brush again, and, if necessary, rinse in hot water, dry in warm white wood sawdust, and put in the stove room. The last three operations are indispensable for hollow pieces.

In the disposition of the brass plating bath it is always necessary to have all the articles suspended at about equal distances from the anodes.

The bath may be subdivided by several anodes, forming partitions, so that each loaded rod is between two anodes.

The anodes should always be removed when the bath is not in use.

In order that the brass electroplating of zinc or copper may be lasting the deposit must not be too thin, and must be scratch-brushed, washed in lime water, and dried in the stove room.

Generally ten to twenty-five minutes' exposure in the bath suffices in ordinary practice to throw on a good coating. Cast and wrought iron, lead, and its alloys require a bath richer in the metals than when brass plating zinc or its alloys. The battery power should also be greater. For lead the bath works better warm (at about 90° Fah.). When once placed in the brass bath articles should not be moved about, as there is a tendency under such circumstance to the formation of a red deposit.

In brass plating wire the hot bath is usually employed. As before mentioned, the vessel containing the bath usually consists in an oblong open iron boiler, lined with sheet brass anodes, and heated by fire, steam, or hot water. A stout copper or brass rod in the direction of the length of the boiler rests upon the edges, from contact with which it is insulated by pieces of rubber tubing. The rod is connected with the zinc pole of the battery. The binding wires are removed from the coil, the wires loosened, and the ends bent together into a loop. The wire is then dipped into a pickle of dilute sulphuric acid, and hung upon a stout round wooden peg fastened in the wall, so that the coil may be made to rotate easily. After a scrubbing with wet sharp sand and a hard brush the coil is given a primary coating of copper. It is then suspended to the horizontal rod, where only a part of the coil at a time dips into the solution and receives the deposit; the coil is then turned now and then one-half or one-fourth of its circumference. By dipping the coil entirely into the liquid the operation is not so successful.

The wires are washed, dried in sawdust, and then in the stove room, and lastly, passed through a draw plate to give them the fine polish of true brass wires.

The temperature at which the hot bath is commonly used varies between 130° and 140° Fah.

Progress of the Great Bridge Between New York and Brooklyn.

The first shipment of the heavy steel beams for the superstructure of the East River Bridge has been received. Now that the requisite machinery has been made for turning out beams of the required size, the contractors claim to be able to produce them rapidly. The four great cables to be placed under the floor of the bridge from tower to tower, to strengthen the bridge against upward and lateral wind pressures, have also been received. They are regarded as the largest steel wire ropes ever made in this country. These ropes are made in seven strands each.

The central strand has forty-nine No. 11 wires, and the six strands surrounding and enveloping this have nineteen wires each, of Nos. 4, 5, and 7 gauge, making one hundred and sixty-three wires in all. Every wire put into these and all other ropes used in the bridge is tested in strength, elasticity, and tension. The strength must equal 160,000 pounds per square inch cross section. The stretch must be not less than four per cent, and the wire must stand being wound around an iron rod three times its own diameter without showing flaw or fracture.

The great ropes just received are each 1,550 feet in length, 3 inches in diameter, and their aggregate weight is 102,495 pounds.

Death of Henry R. Worthington.

Henry R. Worthington, one of the most prominent hydraulic engineers in this country, died Dec. 17, 1880, in this city, after a very brief illness, at the age of 63 years.

Mr. Worthington was a native of Brooklyn. He engaged in mechanical pursuits at an early age, and became a hydraulic engineer while a very young man. His success in his profession was marked, and he invented a number of important improvements in hydraulic machinery. He constructed the pumping machinery for the waterworks of a great many cities, including that for the new high service works at 97th street and Tenth avenue. He maintained an office at No. 239 Broadway, and was also President of the Nason Manufacturing Company, at No. 71 Beekman street.

He was Vice President of the American Society of Mechanical Engineers, which he assisted to found, and was a member of the Society of Civil Engineers.

The Freight Traffic of the N. Y. Central R. R.

The unprecedented activity of trade this fall is indicated by the unusual traffic of the great lines of railway. During the forepart of December 50 trains, of 38 cars each, passed eastward over the road; a total of 1,900 cars. For the West there was 40 trains, of 45 cars, per day; a total of 1,800 cars. For a week, going East, 13,300 cars; going West, 12,600 cars; a grand total of 25,900 cars. For a month, going East, 57,000 loaded cars; for the West, 54,000; a grand total of 111,000 cars for a month. These statistics are aside from the passenger traffic.

Mount Baker an Active Volcano.

On several occasions during recent years reports have come from Washington Territory that smoke columns and similar indications of volcanic activity had been seen on Mount Baker. A dispatch from Seattle, W. T., dated December 12, says that the mountain was then in eruption, and that a sharp shock of earthquake was felt the evening before.

THE AIR BRAKE PATENTS.—The suit brought by the Westinghouse Company against the Eames Vacuum Brake Company, of Watertown, N. Y., for an alleged infringement of air brake patents, was abandoned December 16, Westinghouse withdrawing the action and paying the costs.

THE ELECTRIC RAILWAY.—Messrs. Siemens and Halske have obtained a concession from the authorities for building an elevated electric railway in Berlin from Lichterfeld to Yeltow.