

not space here to treat of the costly alterations made on the ship, but will do so on another occasion—suffice it now to say that this vessel, by the time the present repairs are done, will have cost the treasury some two and one half million for construction, repairs and alterations.

*California, Illinois, Guerriere*, modified *Wampanoags*, constructed of green timber, rotten to be broken up, *Antietam, Java, New York, and Pennsylvania*, same as last, keels laid 1863; still on the stocks—(two, we think, with live oak frame,) *Delaware*, same, in use as floating hospital. Quarantine, N. Y. All this class had Isherwood (60 x 36) engines made for them, and piled in the Navy yards now condemned.

*Susquehanna*, old paddle vessel some 22 years old, is now being "repaired" into a screw; and is, we believe, to be fitted with an Isherwood engine.

*Lancaster, Brooklyn, Pensacola, Hartford, Richmond*, all built before the war 1853-60, machinery built by private establishments, probably the best vessels in the wooden Navy, but they are fast becoming, if not already, obsolete, and are not fitted to engage modern vessels of same displacement.

*Albany, Congress, Severn and Worcester*, modified *Wampanoags*, built of white oak, rotten and worthless, not worth repairing, have Isherwood (60 x 36) engines.

*Powhattan*, old paddle vessel, some 22 years old.

*Saranac*, old paddle vessel, some 20 years old.

*Alaska, Benicia, Omaha and Plymouth*, built in 1868 of white oak, and by this time must be pretty rotten, they are equipped with Isherwood engines, and some of them with Martin patent boilers, etc. They are small vessels, length between perpendiculars 250 feet 6 inch, beam extreme 38 feet, depth of hold 19 feet, 7 inch.

*Lackawanna, Ticonderoga, Canadigua, Monongahela and Shennandoah*: dimensions, length 236 feet, breadth 38 feet, 4 inch, depth 10 feet 3 inch; built in 1862-3. Isherwood machinery. One or two have live oak frames. A good deal has been done to improve them, but they are very poor concerns for vessels of war. Their boilers are well above the water line, so that one shot striking the side anywhere abreast of the long length, fore and aft, occupied by the boilers would scald every body on watch in the steam department, and destroy the motive power.

3RD RATES.—*Juniata and Ossipee*, small sloops built 1862-3; Isherwood machinery; Martin's patent boilers well above water line; can neither sail nor steam as vessels of this size (1,900 tons displacement) ought to. They are said to be poor sea boats; in a late gale the *Ossipee* lost all her boats.

*Quinnidaugh and Swatara*, gun boats with white oak frames, the machinery of former condemned and put in scrap heap; are being repaired with live oak frames and "increased dimensions." *Swatara* had Isherwood machinery, it has been "repaired" into "compound." As the latter is the first vessel sent to sea with "naval compound machinery," her late voyage to Bahia has been looked at with interest. It is reported that under steam in the calm belts "with fires under six boilers, and with an average speed of 6½ knots, she consumed about 15 tons of coal in 24 hours (!) The temperature in the engine and fire rooms cannot well be kept below 130 deg." "Her average speed under sail any one day was 8½ knots. She does not stand up well under canvas."

*Galena*, an old broadside iron clad built in 1861-2; white oak frames; armor stripped

off and hull "repaired" with live oak frames and "increased dimensions."

*Vandalia and Marion*, old sailing vessels built about 25 years ago, being repaired with "increased dimensions" and fitted with a screw and compound engines.

*Iroquois and Wyoming* built before the war, with machinery by private builders, but with "Martin's patent boilers" above the water line, probably as good as any medium wooden vessels in the Navy, but for the small dimensions (only 1,500 tons displacement) they can scarcely cope with modern sloops now used for the same general naval purposes.

*Wachusett, Mohican and Tuscarora*, built in 1861-2, and copied from the last.

*Nantasket and Resaca*, condemned and to be broken up.

*Narragansett*, (1,100 tons displacement) a sloop, not a redeeming feature, built before the war.

*Ashuelot and Monocacy*, two old paddle steamers built in 1863, now in Asiatic station, and reported to be unseaworthy to be sent home.

*Nipsic*, (worthless, but a new one is being "repaired" to take her place), *Saco, Nyack and Shawmut*, gun boats with three guns, built during the war; Isherwood machinery; boilers well above water line.

*Yantic*, same, with engine by private builder.

*Kansas*, same, fitted with machinery captured in blockade runner; when new first under steam.

*Michigan*, iron paddle vessel on Lake Erie, about 25 years old.

4TH RATES.—*Frolic and Gettysburg*, iron paddle vessels captured blockade runners.

*Tallapoosa*, iron paddle vessel, department yacht.

*Wasp*, small paddle vessel with 1 gun.

*Pat's and Despatch*, screw tugs.

We next come to an assortment of wooden sailing vessels. These consist of two old line of battle ships on the stocks; three ships in commission for various purposes; seven receiving ships at Navy yards; and seven laid up in ordinary; one yacht—this, we believe, has been disposed of.

Under the head of iron clads—a class which constitutes the real strength of modern navies—we find fifty one vessels entered on the Register. Of this number the *Albatross, Cohoes, Ellah, Hero, Iris, Klamath, Koka, Minnetruka, Modoc, Napa, Naussett, Nibo, Otsego, Piscataqua, Shawnee, Suncook, Umpqua, Wassuc, Yazoo and Yum*. These are the so called twenty "light draughts" on which some twelve or fifteen millions were squandered. A Congressional investigating committee undertook to find out where the responsibility of these constructions belonged, but, if we may believe their report, this important point eluded discovery. Both the Constructive Bureaus openly declared that they had nothing whatever to do with them except in a ministerial way, the distinguished officers who recommended certain important features maintained a wise silence, and the inventor of the monitor had placed himself on record, in an official communication, as in condemnation of the plan on which they were built, before a rivet had been driven in their construction. They are perfectly worthless, and as the Department has taken steps to dispose of them at almost at any price, they may be dismissed from the register.

We next come to the Passaic class; these consist of the *Comanche* (at San Francisco), *Catskill, Lehigh, Montauk, Nahant, Nantucket* and *Passaic*. These are small vessels of about 1,200 tons displacement; they were

built with great despatch during the early part of the war, during which they did most excellent service; their side armor is made of five one inch plates, and their turrets of eleven plates, each fifteen sixteenths of an inch. Laminated armor was resorted to at this time, 1862, because there were not then a mill in the country that would take an order for rolling plates of greater thickness than one inch. It was adequate to resist the artillery then in use, as is abundantly shown by their numerous scars. It is needless to say that in twelve years—from 1862 to 1874—vast changes has taken place in both armor and guns. Among other important points, it was proved many years ago, that there is no comparison between the resistance offered by a given thickness of armor, composed on one hand by a number of plates bolted together, and on the other by one solid plate; the solid armor presenting many times greater resistance than the laminated. The 7, 8, and 9 inch Woolwich rifle guns, now compose the armament of the second rate British iron clads, and are also to be seen in the batteries of many of their new and swift non armored vessels; guns of equal power made in France, in Sweden, in Russia, and by Krupp, are common in the batteries of every European navy, Spanish included.

The 7 inch gun will easily pass its shell through the armor of all but one of our iron clads, while the 8 and 9 inch can do the same execution on the strongest of them. But the 7, 8, and 9 inch are now looked upon as small affairs; 600 and 700 pounders are now afloat within the turrets of European monitors, in some cases protected by 14 inch solid plates; more monitors like these are in course of construction. It is absurd to speak of this ordnance in connection with any armor in our Navy—one 600 pound shell exploding within a turret or hull would probably decide the issue for the vessel so hit.

With most of these facts before us, the Journal in its issue of Oct. 13, 1866, called the attention of the department to this important matter of armor; and again, after more evidence of the same sort had accumulated, we urged that this matter receive consideration, under date of Feb. 24, '72, and Dec. 27, '73. In the winter of 1873-4, when the department turned over nearly all of the monitors of the Passaic class, on the Atlantic seaboard—seven in all—to iron ship builders on the Delaware and in New York, to have their hulls raised and new decks put on them, omitting the vital point of solid armor, we again placed the subject before our readers at length (March, 7 1874).

The next class of iron clads are those known as the harbor and river monitors, the *Ajax, Canonicus, Manhattan, Mahopac, Srugus*, and *Wyandotte*. These are of some 300 tons greater displacement than the Passaic class; like them they were built during the war. With regard to armor the strictures applied to that class apply with equal force to this, the turrets being made of ten one inch plates, and the side armor of five one inch plates, and "armor stringers" 4 inch thick let into the backing behind them; these stringers are two in number, bars of iron 4 by 6 inches. As the backing in this class is little more than one half the thickness of the former, the resistance is but a trifle greater. A number of these vessels are having the same character of alteration put on them as the others, hence the views expressed respecting them include these also.

It is, however, evident, that if the cost of solid armor of adequate thickness, about