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## CLASSES OF IRON-CLAD WAR VESSELS.

The construction of mail-clad war vessels is a subject which has engaged the attention of the leading naval powers of Europe for the past seven years, and it is now a topic for intense thought among war people. It has been stated that the combat between the *Monitor* and *Merrimac* first settled the question practically with our government naval authorities respecting the superiority of mail-clad over wooden vessels. This may be so, but, in our opinion, it was just as clearly determined by our river iron-plated gunboats in the attack on Forts Henry and Donelson. In Europe this question was practically settled during the Crimean war by the successful attack by the French plated gunboats on the Fortress of Kinburn, and the result of this action has led to the construction of powerful iron-clad vessels by both France and England. As a large sum has lately been appropriated for the construction of a number of mail-clad vessels for our navy, indubitable evidence is thus afforded that we, with all the other leading naval powers, have concluded to build none but iron-clad war vessels hereafter. But as in the days of old, when different armies went forth to battle, in coats composed of scale and chain armor, and plates riveted together in various forms, so now there are as many different plans, not only proposed, but actually carried out into practice in the construction of armor-clad war vessels. First, there is the system of covering wooden frigates, like *La Gloire*, with thick iron plates; second, the construction of frigates, like the *Warrior*, with an inner skin of iron plates, a backing of wood planking, and 4½-inch outside plates. In almost every other respect, excepting the iron plating, these two classes are similar in construction and form to old razeed wooden steam frigates; hence they constitute one class, to which the new frigate *Kensington*, now building in Philadelphia, belongs. A third class is that of the celebrated Stevens Battery, which has water-tight compartments that are capable of being filled with water, to sink her nearly to the water's edge during an engagement. It was planned chiefly for effective harbor defense. Fourth, the system of the *Monitor*, the chief feature of which is the revolving iron gun tower placed amid ships—also intended principally as a floating batteryfor harbordefense. Fifth, the system exemplified in the *Galena*, now building at Greenpoint, with overlapping rail plates secured to oak planking. It is intended for a shell-proof gunboat, and is otherwise of the *La Gloire* class, adapted for sea as well as harbor duty. The sixth is the plan of Capt. Coles, of the British navy, which is similar to that of the *Monitor*, having revolving gun turrets placed amidships, combined with an iron hull of light draft and good model, and is adapted for sea voyages as well as harbor defense. Seventh, the system adopted for our Western river paddle-wheel gunboats, embracing iron plates of moderate thickness secured to wooden frames. Eighth, the system of angulated iron plating adopted for the *Merrimac*, and intended to deflect the shot. This has been called "Jones's angulated-plate system," but it is rather a mode of arranging the plates than a distinct system, as it has been applied to our Western gunboats, and may be used on almost every plated vessel.

The brief analysis thus presented of several orders of iron-clad vessels teaches us that no particular system has been fixed upon as best adapted for all purposes of warfare, or for such general service as the old wooden vessels. As regards our river gunboats, experience alone can determine how to build them in the best manner for their peculiar duties, but an iron-clad war vessel for sea service, according to our notion, should not only be as impenetrable to shot as it is possible to make it, but it should also be a good sea boat, possess a high speed, and be as well adapted for offense as defense. Some of the foregoing systems do not embrace all these qualities, but it is possible that some one system may be devised and compounded out of the whole, so as to produce superior war vessels to any that have yet been built or proposed.

## SHOT AND GUNS—PENETRATION AND CONSTRUCTION OF WAR VESSELS.

It has been said that the genius of man will always be capable of inventing offensive weapons, such as more powerful guns, or peculiar shot, to nullify all the benefits proposed for iron-plated vessels. Thus it is said that flat-headed steel bolts have perforated the thickest iron plates yet made for war vessels; and wrought iron round shot fired from 68 pounders have achieved like results. It is also evident that the Secretary of our navy believes that very large shot, such as that fired from 20-inch guns, will be able to crush in the sides of iron-plated frigates as he has recommended several guns of this caliber to be cast. It is not, however, from shot that the greatest danger is to be apprehended, but from shells, and it is well known that plates of three inches in thickness can resist these; hence the necessity for and the utility of iron-plated vessels. We are also skeptical respecting flat-headed steel bolts and wrought-iron round shot penetrating a properly constructed iron-plated ship. The plates which have been penetrated with such shot were not properly backed up, and to this important feature the attention of our naval authorities should be specially directed. The character of the material which should be used for backing plates, and the requisite thickness of it, are just as important considerations in the construction of mail-clad vessels, as the quality and thickness of the iron plates. The resistance to penetration increases with the thickness of the material, and to penetrate any body, the whole of the material in the line of the direction of the shot must be displaced. We have perforated an unsupported sheet of iron with a leaden bullet, but the same sheet, when firmly supported on a five-inch oak plank was only indented with a similar charge and bullet.

One objection to the frigate class of vessels, like the *Warrior* and *Kensington*, is the great weight of their guns, two sets being required for the two broadsides. One pivot gun answers the purpose of two broadside guns, but then it can only be used on deck, whereas the great benefit of iron plated vessels is the case-mated protection afforded to the gunners. In the revolving gun towers placed amidship, such as that on the *Monitor*, and according to Capt. Cole's system, the advantages of pivot guns with perfect protection for the gunners are secured. This system, or a modification of it, appears to us as deserving more particular attention. Vessels of good model, a moderate draft of water, and possessing good sea-going qualities may be constructed with revolving gun turrets. All the kinds of iron-clad war vessels mentioned may be constructed on the ram principle. The efficiency of a marine ram is in proportion to its mass, its strength of hull and the power of its engines. These three conditions should not be forgotten.

Although the superior crushing power of large shot is well known, several objections may be urged against very large guns, such as their great weight, the Rodman 15-inch gun weighing 25 tuns, while a 68 pounder weighs only five. Large guns also require very large ports, and besides they are not so strong in proportion as smaller guns, and cannot therefore be used with such large charges of powder to give shot a high velocity and great penetrating power. For firing shells, their superiority is unquestioned, but round shells are useless against iron-sides. But is it not possible to make elongated steel shells with flat-fronted solid heads, capable of cutting into and perforating iron-plated vessels? If so, they will prove most destructive missiles. This is a suggestion which we throw out for consideration and experiment. The whole subject is fruitful of thought and investigation for our naval constructors, engineers, inventors, engineers of artillery and manufacturers of iron plating.

That portion of the hull of an iron-clad vessel which lies under the water line, is considered by many persons to be quite vulnerable on account of the comparative thinness of the plating. The blow from a powerful steam ram striking a few feet under the water line, in all likelihood, would sink an iron plated vessel, but we think that no shot will penetrate the hull four feet below the surface—the distance to which the thick plates descend. Torpedoes, submarine guns, &c., have been proposed for operating on war vessels under the water line, but hitherto all such contrivances have been very uncertain in their action. One ingenious and peculiar feature of the *Monitor* deserves praise, we mean her strong and impenetrable guard-rail near the water line. It was this part of her hull, which saved her from being cut down by her giant antagonist, the *Merrimac*.

## CASHMERE SHAWLS—THEIR IMITATION.

A statement has been very widely disseminated that M. Voisin, of France, has lately invented an improved loom in which shawls are woven in such a manner as to rival the famous products of Cashmere. It is stated that this result is obtained by a peculiar interlacing of the threads. With respect to the invention, the Paris correspondent of the London *Photographic News* says:—

This discovery must not be looked upon in the light of an experiment, for no less than 1,650 shawls have been made on the new plan, and worth 350,000 francs, equal in quality and appearance to Cashmere, valued at 1,250,000 francs. We may expect to see in the forthcoming exhibition not only specimens of these shawls, but of other new fabrics produced by the machine of M. Voisin.

Though the cost and fame of the Cashmere shawl are doubtless principally due to the mode of weaving it, they result also, to some extent, from the rare material of which it is made. This is the product of the Cashmere goat, and is much finer and softer than the finest Saxony wool. The goats are raised on the high table lands of Tartary where the cold is very intense, and to protect them against its chilly influence nature has provided them with an outer coat of long silky hair and an under coat of warm soft woolly hair, called *Pashai*; the latter is the material of which the Cashmere shawls are made. It is brought down regularly from the Tartar shepherds to Cashmere by merchants, who sell it to the shawl makers. It is first washed with native soap to free it from grease, then it is dyed the various colors required. The Orientals rival the most civilized nations in the production and combination of colors in shawls. The patterns of these shawls are all first drawn upon paper with great care, and the weaver must work out the design to the best of his ability. The looms used are the common East India kind, and the weavers are all males; each man sits with his little bundles of colored wool wound upon small spindles at his side, and the paper pattern before him with the design drawn in colors. By this he is guided as regards the number of threads of each color to put in. The pattern is woven in strips about eight inches in length and four in width, and a certain number of these are afterward washed, dried, pressed and stitched together by the needle to form a shawl of the required size. The uniting of these several small woven parts is done by females, who acquire such skill in the art that a seam cannot easily be detected, the stitches being the same in form as those produced in the loom. The "shawl darners" of France and Scotland are equally skillful with the needle. They darn the small cuts that are frequently made in new "harness shawls," and none but connoisseurs can detect the work of the needle in them.

In designing patterns and weaving shawls, the French undoubtedly surpass the natives of Cashmere, but unless M. Voisin employs the fine under-wool of the Tartar goat as his shawl material, we do not think he has made a commendable imitation of the Cashmere shawl.

NAMES ON MODELS.—Inventors who send us their models should not fail to put their names upon them, as for the want of this simple precaution we are sometimes unable to find out their origin, which is very perplexing.