OUR NAVY AND THE KINDS OF VESSELS THAT ARE FIGHTING FOR US.

READ THIS AND YOU WILL UNDERSTAND THE DIFFERENCES BETWEEN BATTLE-SHIPS, CRUISERS, MONITORS AND THE "UNTRIED WONDERS" OF THE SEA.

IT is a question, in spite of the familiarity of the public with the technical phraseology of the warship, whether the average reader has a very accurate idea of the distinctions between the various classes of ships and between the various elements from the combination of which these ships derive their distinctive class characteristics.

He is told that the Indiana is a battle-ship, the Brooklyn an armored cruiser, the Columbia a protected cruiser, and the Puritan a monitor. But it is probable that he has only a vague idea as to what qualities it is that mark the distinction, or why the distinction should need to exist at all.

These diagrams and a perspective drawing which show the constructive features of the several types of warship have been prepared to answer these questions.

In diagrams 1 to 3 the armor is indicated by full black lines or by shading, the approximate thickness of the armor being shown by the thickness of the lines and the depth of the shading. The fine line represents the unarmored portions or the ordinary plating of the ships. In the perspective view the armor is shown by full lines and shading and the ordinary ship plating by dotted lines.

When the naval architect sits down at his desk to design a warship of a certain size he knows that there is one element of the vessel which is fixed and unalterable, and that is her displacement. By displacement is meant the actual weight of the ship, which is, of course, exactly equal to the weight of water which she displaces. This total weight is the capital with which the architect has to work, and he uses his judgment in distributing it among the various elements which go to make up the ship. Part is allotted to the hull, part to the motive power, part to the armor protection, part to the fuel, stores, furnishing and general equipment.

It is evident that the allotment of weights is a matter of compromise—whatever excess is given to one element must be taken from another, else the ship will exceed the given displacement. Among the elements above mentioned there are some, such as the weight of hull, provisions, stores and furnishings, which for a given size of ship will not vary greatly. There are other elements, such as guns, armor, engines and fuel supply which may vary considerably in different ships, according to the type of vessel that is produced.

If, for instance, the architect is designing an extremely fast ship of type No. 1, which has a speed of twenty-three knots, he will have to allot such a large amount of weight to the motive power that he will only be able to give the ship very slight armor protection and a comparatively light battery of guns. If he wishes to produce a fast ship that shall be more heavily armed and armored he has to be content with less speed, say twenty or twenty-one knots, as in No. 2, and the weight so saved on the motive power appears in the shape of a side belt of armor at the water line, more complete protection for the guns in the shape of barbettes and turrets and considerably heavier armament. If, again, he desires to produce a ship capable of contending with the most powerful ships in line of battle, as in No. 3, he is content with much lower speed, say sixteen or seventeen knots an hour, and he increases the power of his guns until they weigh over sixty tons apiece, and protects them with great redoubts and turrets of steel one and a half feet thick, besides protecting his water line in the region of the engines and boilers with a belt of steel of the same dimensions.

The swift and lightly armed and armored ship is known as a protected cruiser; the less speedy but more heavily armed and armored ship belongs to the armored cruiser type, and the slowest ship, with its capacity for taking and giving the heaviest blows that modern guns can inflict, is known as a battle-ship.

In the construction of a warship the two qualities of attack and defense have to be supplied. The offensive powers are furnished by the guns, torpedoes, etc.

Now it can readily be understood that all this amount of heavy armor and guns adds greatly to the weight of the ship, and for this reason, in spite of her smaller engine power, a first-class battle-ship rarely displaces less than 10,000 tons, and in some foreign navies the displacement runs up to nearly 16,000 tons. This will be understood by reference to the perspective view, where the armored portions of the ship are indicated by full lines and shading, the ordinary shell plating being dotted.

It will be seen that all that part of the ship lying below the water line is shut in by a continuous roof of steel which is three inches in thickness forward and aft of the bulkheads. Over the central armored citadel it is two and three-quarter inches thick. All the plating indicated by dotted lines might be shot away without the "vitals" suffering injury or the ship being sunk. The reader will see that it is its loftier sides and the extra deck and freeboard which they provide which constitute practically the difference between a battle-ship and a monitor.

This brings us to the consideration of the monitor type. Take away from a battle-ship all that portion which is shown in our drawing in dotted lines above the water line; lower the barbettes until they rise only a few feet above the steel deck, and we have a ship of the general monitor type. The monitor is distinguished by very low freeboard—only a few inches in the extreme type—the absence of a heavy secondary battery and the possession of a main armament of heavy guns. Such a ship labors heavily in bad weather and is not intended for service at any distance from the coasts. To make a seagoing vessel out of her it would be necessary to add one, or even two decks, placing the guns well up above the water, after which changes she would be no longer monitor, but seagoing battle-ship.

In the cruiser type the protective deck does not extend across the ship at one level, but curves down to meet the hull at a point several feet below the water line. This sloping portion is made thicker than the flat portion, as in diagram No. II, where the deck is three inches thick on the flat and six inches on the slopes. In the case of the armored cruisers, a belt of vertical armor is carried at the water line and in all cruisers the V-shaped space between belt and sloping deck is filled in with coal or with some form of water-excluding material, such as cornpith cellulose.

In diagram II, which represents the fine armored cruiser Brooklyn, it will be seen that before it could reach the engine-room a shell would have to pass through three inches of vertical steel, about six feet of coal and six inches of inclined armor—a total resistance equal to fourteen or fifteen inches of solid steel. The guns and turning gear are protected by five and one-half inch steel turrets and eight-inch barbettes. The barbettes, it will be seen, do not extend continuously down to the armored deck, as in the battle-ship, for this would require a greater weight of armor than can be allowed. Consequently, the architect is only able to furnish the guns with a small armor-plated tube for protecting the ammunition in its passage from the magazines to the barbettes.

In the protected cruiser the side armor at the water line disappears altogether, and dependence is placed entirely upon the sloping sides of the protective deck, the water excluding cellulose and the 6 or 8 feet of coal which is stowed in the bunkers in the wake of the engines and boilers. The barbettes, turrets and armored ammunition tubes of the armored cruiser disappear, and their place is taken by comparatively light shields and casements of four-inch steel which serve to protect the gun crews.

It will be seen from the above description that each class of vessel is only fitted to engage ships of its own type. The protected cruiser Columbia (No. 1) might, with her light 6 and 4 inch guns, hammer away all day at the Indiana (No. 3) without being able to do much more than knock the paint off the latter's 18-inch armor, whereas one well directed shot from the 13-inch guns of the Indiana would be sufficient to sink or disable the Columbia. The Brooklyn would fare better, and at close range her 8-inch guns might happen to penetrate the belt or turret armor of the Indiana, but the issue of the duel would never be in doubt for an instant. A Columbia or a Brooklyn would show its heels to an Indiana or Massachusetts, and their great speed would give them the option of refusing or accepting battle with almost any craft that is afloat upon the seas today.

It should be mentioned, in conclusion, that the dividing line in the classification of warships are somewhat flexible. We may find a battle-ship like the 12,320-ton Yashima (Japanese), with a trial speed of 19½ knots. On the other hand, we see cruisers like the Viscaya (Spanish), with a 12-inch belt and carrying heavy guns of 11-inch caliber.

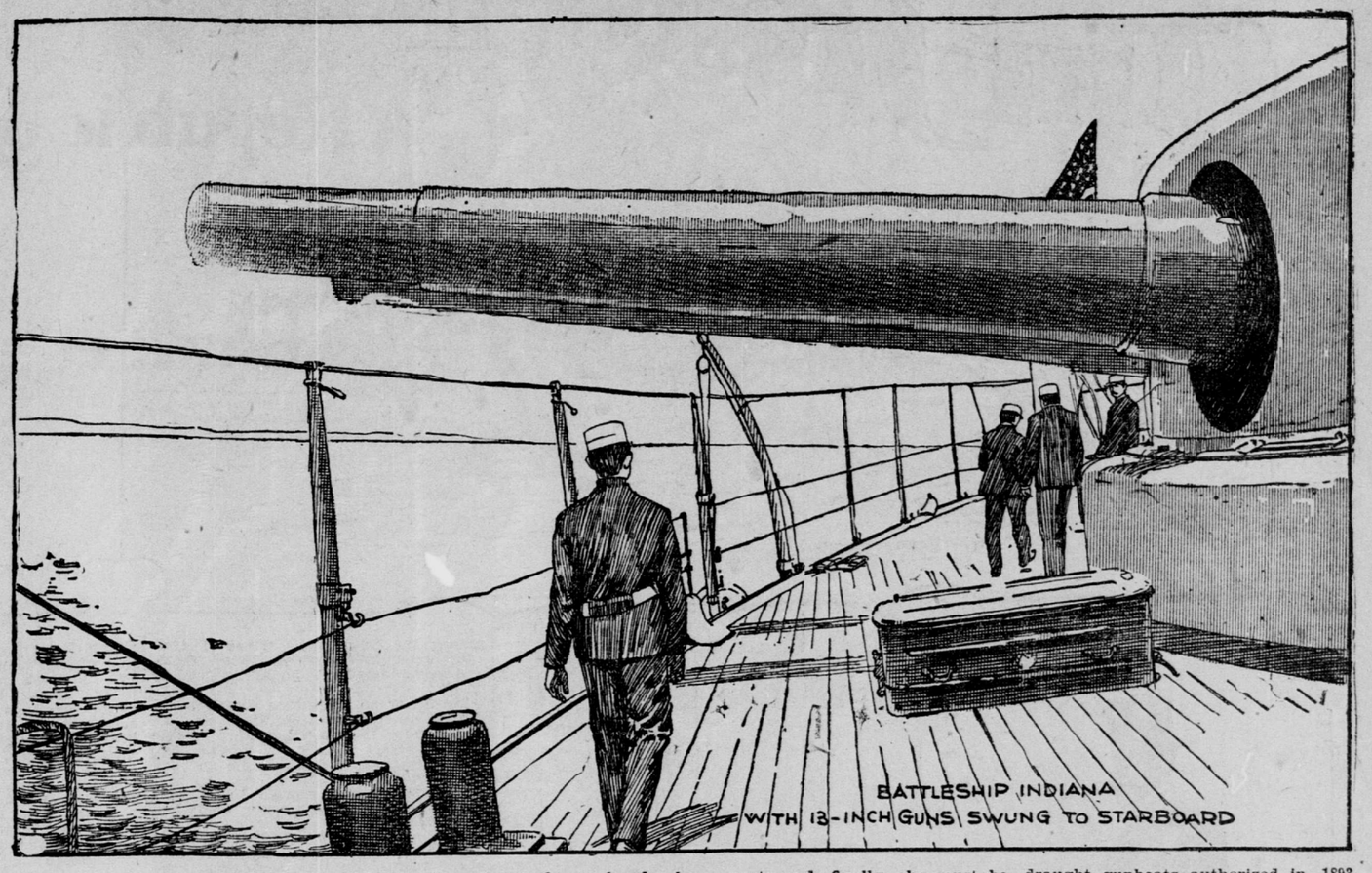
The battle-ship and the cruiser of a modern navy hold the same mutual relation as the three-decker and the swift frigate in the days of the sailing ship. When a fleet set sail in the olden days to find the enemy and bring him to battle upon the high seas, the heavy and somewhat slow line-of-battle ships kept together in a methodical formation, while the frigates cruised at a distance of several miles, where they could report the first appearance of the enemy and signal to the main fleet his position and maneuvers. When the main fleet had been brought within striking distance, the brunt of the battle fell upon the three-deckers.

To-day the swift protected cruiser will perform the same duties for the heavily armored and more cumbrous battle-ships. When the attack takes place it will be the battle-ships and armored cruisers that will decide the issue. Hence the battle-ships will constitute a nation's main line of offense and defense upon the sea. A cruiser will avoid engagement with a battle-ship—it will be no disgrace to her if she shows it a clean pair of heels, trusting to her great speed for safety; for she could neither hope to pierce the armor nor resist the great guns of the heavier ship.

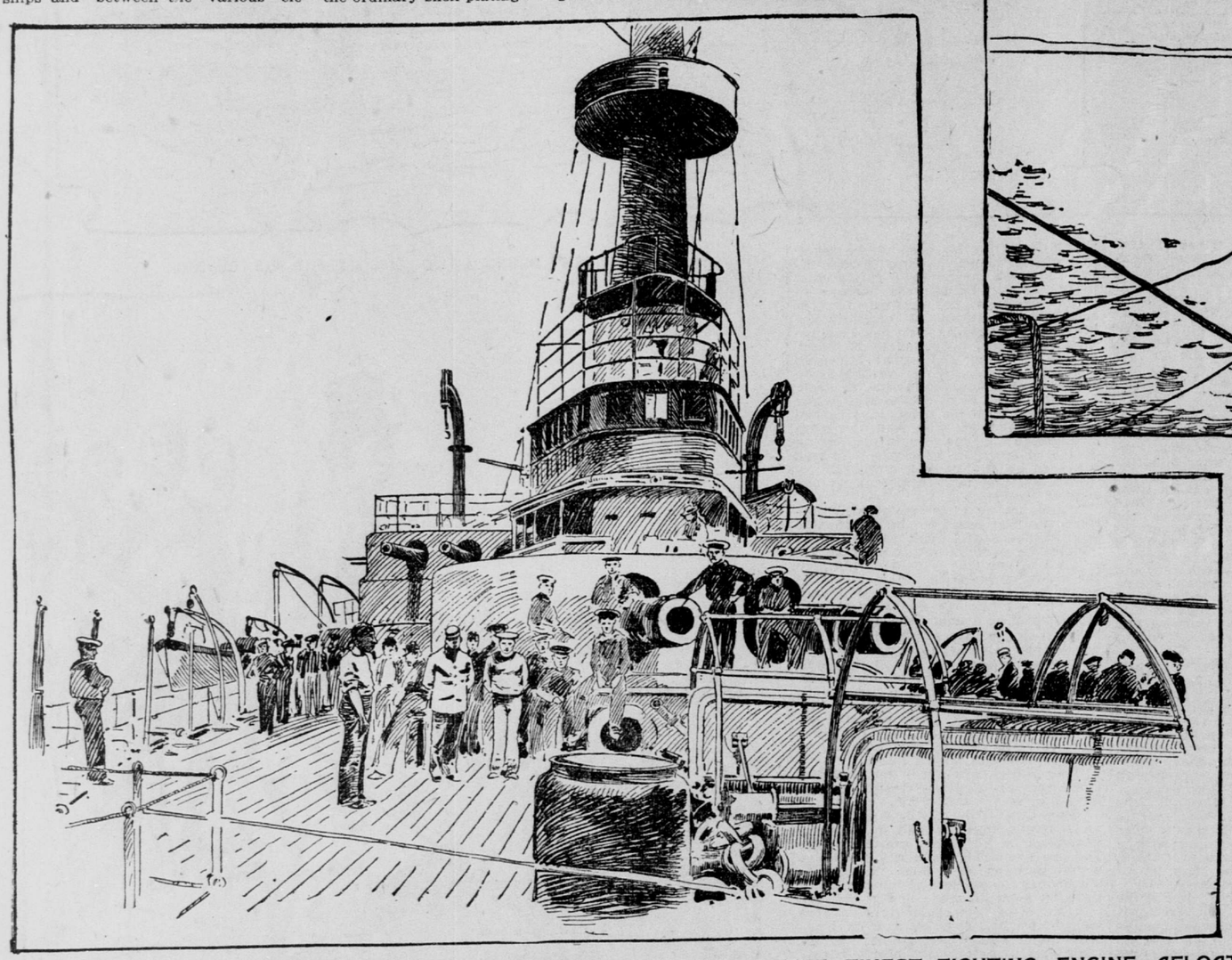
The battle-ship is built to fight. It is designed with this sole object in view, and it must be prepared to fight at any time, and if need be against big odds. It has great offensive power and equally great powers of resistance.

There has been only one great naval fight between modern warships—the battle of the Yalu, between Japanese and Chinese fleets—and the most, by far the most, important fact developed by that engagement was the correctness of the theories upon which modern battle-ships are designed. The brunt of the Japanese attack fell upon two somewhat antiquated battle-ships, the Ting Yuen and Chen Yuen, and for several hours the swift Japanese cruisers circled around these two grim ships of war, pouring in a perfect hail of rapid-fire shells, with occasional shells from their great 66-ton guns; yet the two battle-ships came out of the fight with their armor and big guns practically intact. The same deadly concentration of shell-fire would have sunk a whole fleet of cruisers. Had the Chinese battle-ships been manned by better crews the Yalu would have had another ending.

The new navy of the United States is relatively strong in battle-ships. We have now twelve first-class ships of this type either built, building or authorized. Four, the Indiana, Massachusetts, Oregon and Iowa, are in commission; two, the Kentucky and Kearsarge, are launched; three, the Alabama, Illinois and Wisconsin, are about half completed, and three others are authorized.



BATTLESHIP INDIANA WITH 13-INCH GUNS SWUNG TO STARBOARD



FORWARD TURRET OF THE BATTLE-SHIP INDIANA, SAID TO BE THE FINEST FIGHTING ENGINE AFLOAT

A battle-ship, as we have already shown, is essentially a fighting machine, and when the designer has given her sufficient structural and armored protection to enable her to take her place in the first line of battle, his next object is to arm her with as many armor-piercing and rapid-fire guns as the limits of her displacement will allow. Judged by this double standard, the Indiana is without a rival; for it is a fact which has never been disputed that she carries the heaviest armament of any ship afloat to-day. This preponderance of power is due to the eight 8-inch guns which are carried in four turrets flanking the two turrets of the 13-inch guns. They are an entirely novel feature in battle-ship design, and may be called the chief distinctive feature of this ship. The accepted type of battle-ship carries usually a main battery of four heavy guns disposed in two turrets, fore and aft, supplemented by a broadside secondary battery of 5 or 6 inch guns, the first being capable of piercing armor and the latter being used against the lightly armored or unarmored portions of the enemy.

Thus the Camperdown of the British navy, a ship of the same size as the Indiana, and less effectively protected, carries four 67-ton guns of about the same power as the heavy guns of the American ship and a secondary battery of six 6-inch guns. Against this the Indiana carries in addition to her main and secondary batteries the eight 8-inch armor-piercing guns above mentioned—a preponderance of power which should give her the victory in a naval duel.

The cruisers are the light cavalry of the navy. As their name implies, their duty is to cruise the seas, keeping in touch with the enemy's fleets and acting as the "eyes" of the line-of-battle ships. They are also intended for the double duty of attacking an enemy's commerce and defending that of the country whose flag they carry. Fleets of merchant vessels or of transport ships will be "convoyed" by cruisers from port to port. Upon the cruiser will devolve the duty of hunting down, capturing or sinking the armed merchantmen, known as auxiliary cruisers, and the regular cruisers of the enemy, and she must be ready at any time to make a dash at her top-most speed with important naval dispatches.

For these special duties she requires to be a good seaboat with high freeboard adapted for steaming at a high rate of speed in all weathers. She must be furnished with powerful engines, and her lines must be fair and fine; she must have a large coal supply, enabling her to keep to the sea for lengthy periods; she must have ample berthing space for a numerous crew, some of whom will have to be placed aboard her prizes to carry them to a home port; and, finally, she must be armed with a powerful battery of medium caliber guns, to enable her to fight ships of her own class.

The earlier ships of our navy were entirely of the cruiser class, and at the present time these ships constitute the most numerous portion of our fleets.

The monitors of our navy form a connecting link between the early and later systems of armored warship construction. They embody in the original design the lessons which had been learned in the naval operations of the Civil War, and, as their name implies, they are modeled after the plan of Ericsson's famous Monitor. The chief characteristics of this style of ship are moderate speed, low freeboard, making them a difficult object to hit, thick armor, and an armament of a few exceptionally heavy guns. Sitting low in the water, they are not suited for work on the high seas, and their sphere of operations lies within sheltered waters, such as are found in our bays and harbors. This is their proper sphere of action, and to enable them to maneuver in shoal waters they have as little draught as possible.

Strictly speaking, they are floating batteries, and as such they are intended to co-operate with the land batteries in defense of our coasts. But though the monitor is designed especially for harbor defense, it would be quite capable of taking part in a fleet action off the coast in ordinary weather.

By far the most unique ship in our navy, and, indeed, the only craft of its kind in the world, is the armored ram Katahdin. The ram as a weapon of naval warfare is one of the most ancient of which we have any recorded history. It was used with deadly effect in the naval fights of Greece and Rome, and in later times, as at Lissa and during our own Civil War, it proved a terrible engine of destruction.

The value of the ram as attached to the huge and swiftly moving warships of modern navies has yet to be determined, and many authorities claim that the ship which uses the ram is liable to be only less badly strained and shaken up by the shock than her opponent.

The Katahdin, however, was designed for the express purpose of ramming, and her hull has been constructed with a view to her being able to withstand the terrible wrench which a ship that runs its nose at full speed into a moving vessel is certain to suffer.

The Vesuvius, like the Katahdin, is a type of vessel that is only to be found in the United States navy. She was designed for carrying dynamite guns of considerable range and enormous power, and it is upon these that she depends for her offensive power.

The Helena is one of three light-draught gunboats authorized in 1893. The ship was specially designed for service on the rivers of China, and was originally intended for the Asiatic station. With a beam of 40 feet she draws only 9 feet of water. She is driven by twin-screw engines of 1988 indicated horsepower and her twin screws, coupled with her large rudder area, give her excellent turning power, a valuable feature in river work.

While the boat was being planned a Japanese officer happened to see the designs, and he suggested the utility of a conning tower of sufficient elevation to overlook the banks of the Yellow River of China, the Yang-tse-Kiang. These banks are so high that they exclude the view of the country from those on an ordinary ship's deck. The Navy Department acted on the hint.

One of the earliest successful attempts to make use of the torpedo-boat in naval warfare occurred in the Civil War, when the Housatonic was sunk by a rebel craft, which paid for its daring with its own destruction, being sucked into the ghastly hole which it had torn in the man-of-war. This was one of the lessons of the Civil War which was laid to heart by the European nations, and out of this and later successful tests of the torpedo has sprung that vast fleet of miniature craft which forms such a formidable feature of the equipment of the navies of the world. The earlier boats were what is known as spar torpedo-boats, from the fact that the torpedo was carried at the end of a long spar which projected forward from the bow of the boat, the torpedo exploding by contact.

Then came the automobile Whitehead torpedo, with its ability when once discharged to run 600 or 800 yards of its own accord. The size and speed of the torpedo boat were rapidly increased, especially the latter, and the importance of this method of attack was instantly recognized. The torpedo boat of twenty-five years ago with its spar torpedo, was a diminutive affair, having a speed of only twelve or thirteen knots.

In 1877, however, it had grown to have a length of from 85 to 100 feet and a speed of from eighteen to twenty-one knots. As the demand increased the builders paid particular attention to reduction of weight and increase of boiler and engine efficiency, and in 1887 the Ariete, built by Thornycroft for the Spanish Government, astonished the world by running a mile at a speed of twenty-six knots an hour. Five years later the Daring, a 220-ton boat, built by Thornycroft for the British navy, made 28.65 knots an hour, and in 1895 the Sokol, built by Yarrow for the Russian Government, passed the thirty knot limit.

The later torpedo boats are known as destroyers. They are large vessels of 300 to 400 tons displacement and powerful enough to maintain their speed in rough weather, which the torpedo boat cannot do. They have a speed from thirty to thirty-three knots and carry a powerful armanent of rapid-fire guns, the object being to enable them to chase and sink a fleet of torpedo boats and prevent them from attacking the larger ships. At the same time the destroyer carries a full complement of torpedoes and would be capable of sinking battle-ships and cruisers if she could get within torpedo range.

It is greatly to be regretted that in the earlier years of our naval construction we omitted to provide the navy with an adequate torpedo fleet, as we are likely to suffer from lack of them. The defect is being remedied, however, as fast as the boats can be turned out, and the present Congress has recommended the construction of thirty craft of the kind in addition to those already on the stocks.

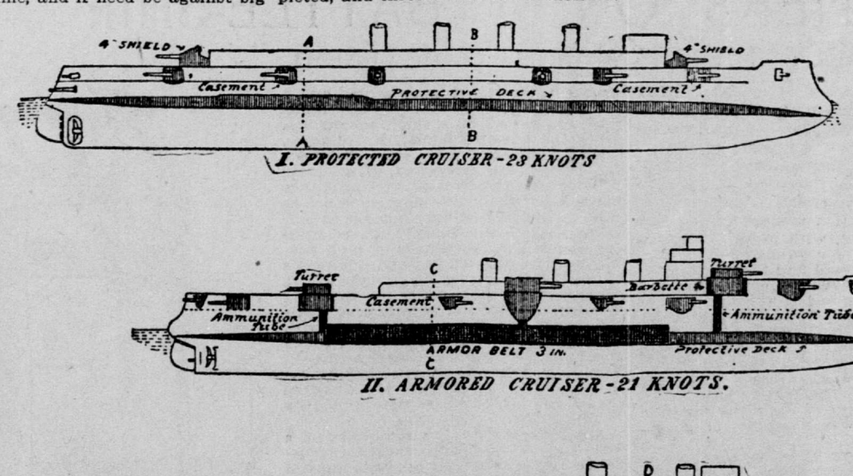
The Bailey is one of three torpedo boat catchers for which provision was made at the last session of Congress. The sum appropriated for each boat was $250,000. In advertising for bids the Navy Department stipulated that a speed of 30 knots per hour would be exacted on the official course.

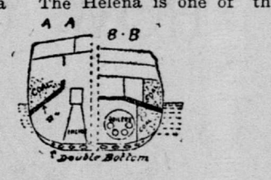
If we except the Porter, which is, strictly speaking, a first-class torpedo boat, the Bailey and her mates are the first torpedo boat destroyers to be built for our navy; and if the expectations of her builders are fulfilled she will be capable of a speed of 33 knots an hour. The principal features of the designs are: Length, 205 feet; beam, 19 feet; depth of hold, 13 feet 5 inches; displacement on trial, 235 tons, and displacement when in commission, 265 tons.

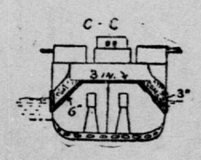
The Bailey, like the Dupont and Porter, will be able to do battle with battle-ships after the fashion of torpedo boats. When thus engaged she will have recourse to her torpedo tubes. But the principal duty of the new craft will be to drive off and annihilate with gun fire the torpedo boat torments of the battle-ships and cruisers. Speed alone will enable the Bailey to do this, and this speed the catcher is expected, by reason of her size, to maintain in a high sea.

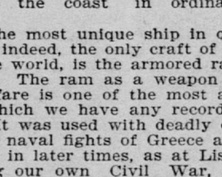
The Bailey is essentially a seagoing vessel. Her bunker capacity is deemed sufficient to enable her to steam three thousand knots at economical speed. In time of war she may be expected to accompany the battle-ship fleet, and to serve both as a scout and defense for the heavier vessels.

It is probable that the introduction of a successful submarine torpedo-boat on the lines of the Holland will mark one of the greatest revolutions that ever occurred in naval warfare, for there is a general belief that a thoroughly efficient under-water warship would have the above-water ship at its mercy. A submarine torpedo-boat, because of its invisibility, is deadly by day and in the open—it will be doubly so by night.

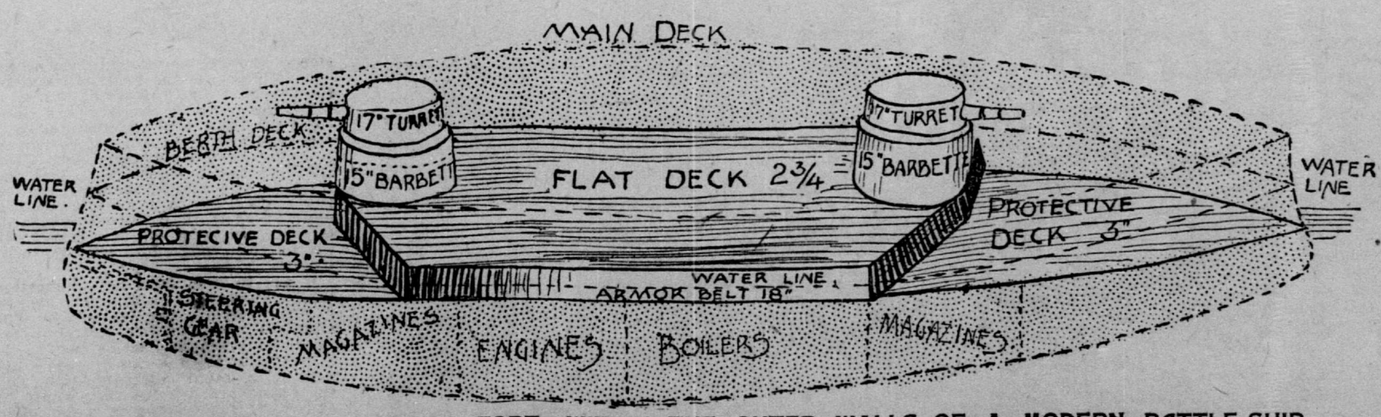








COMPARATIVE ARMOR PROTECTION IN PRINCIPAL TYPES OF MODERN WAR VESSELS.



THE INVULNERABLE FLOATING FORT, WITHIN THE OUTER WALLS OF A MODERN BATTLE-SHIP.

All Parts Above the Water Line, Shown by Dotted Lines and Light Shading, Might Be Shot Away Without Destroying the Fighting Powet of the Ship.