

TREMENDOUS POWER OF NEWEST SUPERDREADNOUGHT

Battleship Pennsylvania to Show an Advance Over All Previous Vessels of Her Class and to Cost \$15,000,000

THIRTY thousand tons of concentrated activity and the power to give and to take blows of appalling force—such, in brief, are the essential elements of the latest American superdreadnought, the Pennsylvania, just authorized by Congress. This ship is to be the equal of the best of her class building or planned for any other navy.

Thirty thousand tons is a weight utterly beyond the comprehension of most people. The heaviest freight train ever hauled in this country, apart from the locomotive and the tender, consisted of 120 steel cars, and these carried a total burden of 6,000 tons of coal. Just fancy 600 cars filled with the materials that make up a modern battleship and you will have some conception of the magnitude of the Pennsylvania.

But when the extraordinary freight train carries an example made probably less than twenty miles an hour, this seagoing monster, five times as heavy as the load of freight, is to forge her way against wind and wave at a speed of fully twenty-five knots an hour. Converted into miles as landmen understand the term, this means that the Pennsylvania when going full tilt would mean to take a blow from her enemy amounting to the destructive energy of more than 800,000 foot-pounds, or substantially a duplication of the combined power to do damage of all of her biggest guns at the instant of simultaneous firing.

Moving at a speed of 30 knots would require twenty-five times the power with which it is built, and keeping this thought in mind you will have a more appreciative grasp of the responsibility resting upon the men on the bridge. It takes a quick and cool head and the steadiest of nerves to guide these floating fortresses when maneuvering in intricate situations in the open sea. Bringing in this sort into a crowded harbor while maintaining prescribed distances and lines of formation calls for skill and perfect organization in every contributing department affecting the mobility of the great steel defenders of the nation.

The biggest American dreadnoughts now being built are the Oklahoma and the Nevada; the Pennsylvania will represent an increase in size of no less than 2,000 tons. With this added material at their disposal the designers plan to make substantial advances in several directions over the two ships just mentioned. The Pennsylvania will not only be speedier, but it is expected that she will have a larger measure of armor protection and at the same time be able to deliver heavier blows.

Of course, the admiral in command takes a good deal of this for granted, and there his understanding of the problem ends. For such is not the hardness of the task imposed upon the experts of the Navy Department. It will be some months before the ultimate details of this monster craft are fully settled, even though the principal characteristics have already been agreed upon. The constant effort to excel, and superiority in a battleship consists of many things skilfully combined to yield an effective balance of military qualifications. In other words, these ships are really compromises, the ideal or maximum virtue of each characteristic being reduced in order that all of the desired elements may be raised to the highest standard consistent with the state of the art and the controlling needs of the day.

There is probably no creation of the technic arts so complex as a modern battleship, and the average visitor sees but the surface of things when he goes aboard one of the latest sea fighters. It may be the part of wisdom to limit the public's understanding in this manner, but at the same time it keeps the taxpayer from realizing why these vessels must of necessity cost many millions, and this in turn has its drawbacks when Congress is asked to provide properly for the maintenance of the navy.

As has been said, it takes months to plan properly a dreadnought. It requires some years of labor to build the craft so that she may be fit for peace service in the battle line for quite a decade. But have any idea of just how long these ships are expected to stand before the attack of a thoroughly prepared antagonist of the class first? Don't be shocked, because the truth is no secret; it is the common understanding among naval men that the next great naval battle will be won or lost inside of fifteen or twenty minutes after the action begins.

This is not because these armored predecessors can't endure as much as their predecessors are, in fact, better able to withstand blows than the commissioned ships of ten years ago, but the whole theory of battle practice and concentration of gunfire has undergone a revolution. In other words, battleships are now being built for a supreme effort and a short one in the hour of actual combat.

The Oklahoma and Nevada are 575 feet long—more than a tenth of a mile—and the Pennsylvania will exceed this by fifty feet. The added length has a great deal to do with insuring the higher speed of the Pennsylvania without calling for a corresponding increase of propulsive power. The model experimental tank in Washington has been instrumented in bringing to light some very important information regarding the relation between the form of a ship and greater speed for a fixed horse-power. Naval Constructor D. W. Taylor has recently brought this matter strikingly to the attention of the public.

He has assumed a displacement of 15,000 tons, a beam of 100 feet, a draught of 25 feet and 20,000 horse-power. The various models tried by him ranged proportionately in their reduced representation from 675 feet to 800 feet for full sized vessels. A battleship 500 feet long driven by 20,000 horse-power would make a speed of 21 knots, while a ship of the same displacement, the same horse-power, but with a longer hull, would make 28 knots. To the layman this might seem to mean that all the naval architect had to do was to lengthen his ship in order to get more speed out of her. This is true, but the fighting ship is not for speed alone, and this armor that may be in itself a smaller target for the enemy to fire at, and this of prime importance at modern battle ranges. But this is not the only objection to length. The ship of the battle line today must carry armor over an extensive portion of her body exposed to gunfire, and this armor must be of such

thickness that it will turn aside at long range the biggest projectiles that do not strike at an advantageous angle. Now, if the ship is long enough for the greatest maximum economical speed for the engine power available and there is the desired thickness and area of armor defence, then something has to be sacrificed in the way of the number of guns, the size of the guns, the quantity of ammunition or the fuel capacity vital to the radius of action of the craft.

Naval Constructor Taylor's models showed that a ship 650 feet long could be driven at the rate of 25 knots an hour on

yards, thanks to the development of the telescopic sight and the modern method of aiming by which the gun is kept all the while bearing upon the far away target.

A rival ship to have any advantage at that distance by reason of speed must be able to go from eight to twelve knots faster than her opponent. While it is said that the latest British battleship is to do twenty-nine knots—existing British and German battle cruisers already have this speed still the American naval authorities have chosen the lower rate. The economies effected by the lower speed and the shorter ship are to be utilized in other important directions.

How truly the matter of the defence is a compromise in the most formidable of modern battleships can be realized best if the powers of attack of the latest types of naval ordnance are considered. The United States set the pace for the mari-

crease the thickness of the armor in some measure on the Pennsylvania and at the same time to carry this defence further below the water line. Isn't it perfectly plain that if the attack at 10,000 yards is so superior to the resistance of the sheltering steel the winning ship will be the craft which hits first and offends within the initial minutes of the battle?

It is utterly impossible to reduce to simple terms and expressions of common understanding the capacity of modern armor to withstand tremendous blows. It does not mean anything to the layman to talk about foot tons, which is the product of mass moved one foot in a second of time, and to tell him that the 11 inch guns hurl their 1,400 pound shells at the instant they leave the muzzle with pent up energy equal to more than 65,000 foot tons; but perhaps it will help if it is said that that is the equivalent of the

and we know how long that running action lasted. The big guns scored relatively less frequently than the smaller.

All of this is reversed to-day. The largest guns are more deadly accurate in their shooting, and it is upon these that the navy depends to batter an enemy into surrender or into flight long before the lesser ordnance can be used effectively. It has been proved by trials at Indian Head that the 11 inch gun is superior in precision to the 12-inch gun, notwithstanding the greater weight of the larger weapon and the added problems of its mechanical control.

Something else was found out during the battle practice against the San Marcos; it was discovered that so precise was the attack of commonion guns fired simultaneously from the same turret that their two shots struck the target within a very

small margin.

To Carry 14 Inch Rifles and Have a Speed of 25 Knots—Fifteen Minutes May Decide Next Naval Battle

rifles, and these wonderful weapons will be mounted so that all of them can be fired on either broadside. It has not yet been definitely settled whether these guns will be mounted in six turrets, two rifles in each, or in four turrets with a triple arrangement of the weapons in each of these armored housings.

The triple gun turret is gaining recognition abroad, and this arrangement of the main battery was approved for two of the turrets on the Oklahoma and the Nevada. It sounds somewhat like putting too many eggs in one basket, and this probably would be the case if these

progress and without parade. The general public has but little realized these astounding advances, but they have completely revolutionized the powers of attack and the tactics of the next great naval battle.

But even with these improvements and the employment of the telescopic sight the effectiveness of these guns in action depends upon the proper control of their fire and the correct determination of the range of the enemy. This duty devolves upon the spotters in the tower of the masts, and for this reason the survival of the mast is vital to the efficiency of the dreadnought. The longer the mast can survive against the fire of the foe the more likely the guns are to hit hard and often instead of wasting their direful energy in harmlessly plugging away at the distant sea. This is the reason for being of the cage masts and the recent firing against a mast of this sort demonstrated that it will take a good deal of hitting before it will collapse and fall.

From their positions aloft the spotters watch the splash of the first of the range finding shots and immediately notify the various gun stations that the elevation was too high or too low by signalling the estimated degree of correct aiming. Being a civilian you probably have never been in the top of a battleship when firing a salvo, and therefore cannot realize something of the task which confronts the spotter. The vibration of a thunderous discharge of this sort is sufficient to whip the tops of the cage masts with a violent motion and the spotter has to be as agile as a cat to keep his footing and to hold his glasses at the same time bearing upon the flight and splash of the hurtling shell. As one young officer picturesquely put it, "Oh, we just take a grip with our teeth and toenails and hope not to be tossed overboard."

There was a time only a few years back when the torpedo was looked upon with kindly professional indulgence by the average naval officer. He did not consider the weapon a serious menace because of its erratic movements when once cast overboard toward the target. Apart from this its maximum effective range did not materially exceed 1,500 yards. All this has changed now.

The precision of travel has been immensely improved, and what is equally important, the battle range for these steel fish has jumped to 5,000 yards, and now equal reliability of run is promised for double this distance. With the time honored explosive head of gunmetal this would be had enough for the defence, but there is a still more potent means of sub-surface attack in the form of the gun torpedo, a weapon that discharges a shell loaded with a high explosive at such velocity that it can easily break its way through torpedo nets and penetrate several inches of hardened armor. In other words it can carry its message of destruction into the very vitals of a ship and there burst with all of its powers to do harm undiminished.

This explains the large battery of 5 inch rapid fire guns which the Pennsylvania will carry; they will be needed to hold the seagoing torpedo boats, the destroyers—at long range so that they cannot launch their torpedoes with a good chance of reaching the mark. These 5 inch guns can penetrate three inches of Krupp armor at a distance of 5,000 yards, and this is more than ample to annihilate any of the existing types of speedy, sleeking destroyers.

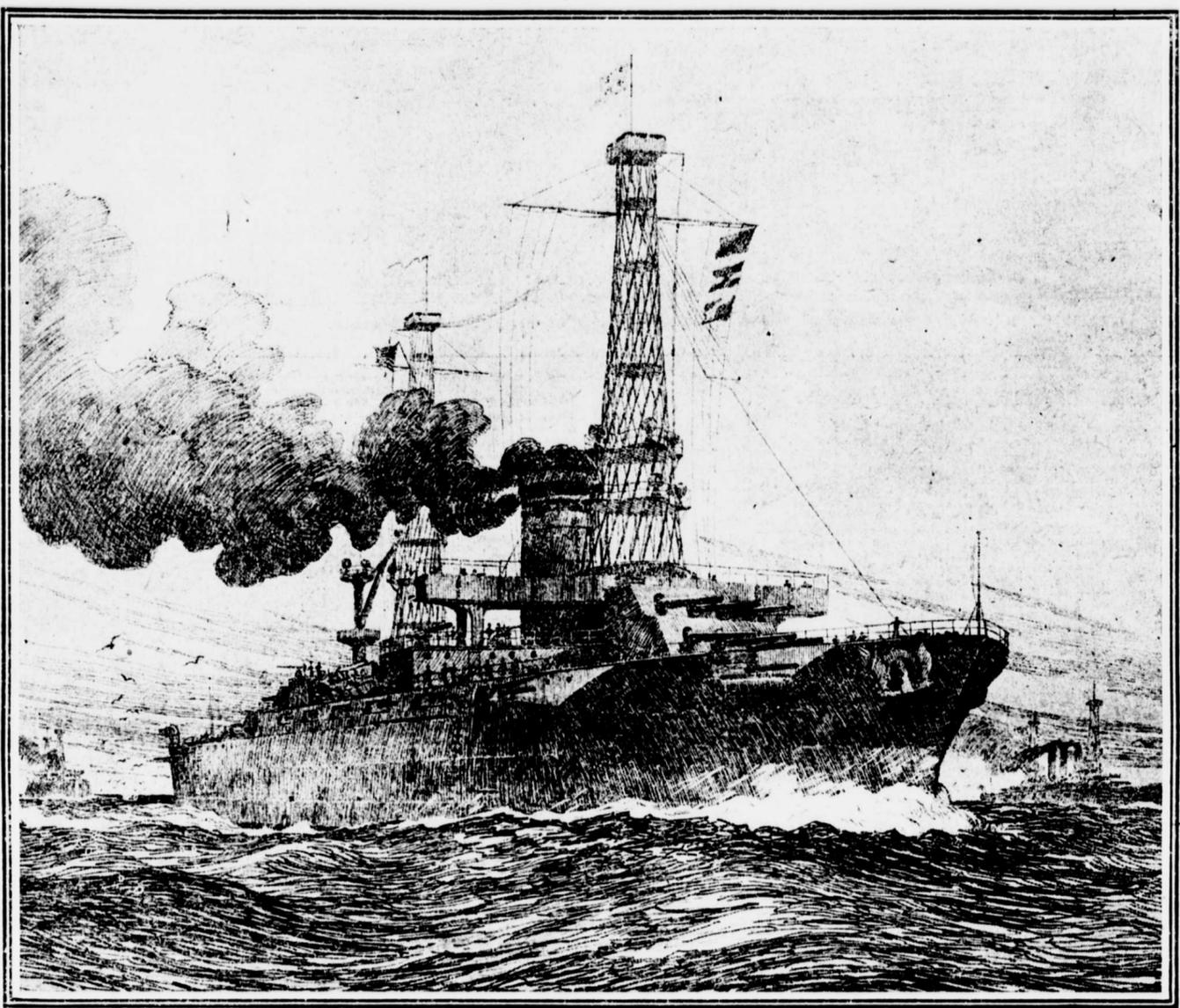
But it would be dangerous to rest the success of the defence entirely upon these rapid fire guns, there must be some passive protection which shall stand between the vitals of a ship and the chance hit of the torpedo. For this purpose the Pennsylvania will have a superior measure of under water armor well inside of her bottom plating. This armor will be of special steel and capable of offering a high degree of opposition even to the projectiles of the gun torpedo, and will be more than necessary to halt the full force of the explosive gases of a warhead charged with gunmetal.

But this sheltering steel means weight, and the problem for the designer is to reduce this to a consistent minimum so that the saving may be utilized in other directions. If you will consider the fighting ship always as an aggregation of skilfully apportioned weight, and that weight a definite maximum, you will get a better idea of the complex task confronting the naval experts. When the metallurgist discovers a way to give a definite defensive value for fewer inches of steel, that will mean a complete upsetting of existing requirements, and the naval architect will have the discovery working for him, because he can then effect economies in weight while guarding the vitals of his ship and with the saving do other things which will add to the military value of his dreadnought.

This has occurred to some extent lately and the best results in this direction have been obtained in treating relatively light rather than the thicker or heavy armor. This advance will be taken advantage of in extending the torpedo defence, strengthening protective decks and giving more secure shelter to the tops of turrets. This last feature, like the covering of the smokestacks and the spotter stations on the masts, is the reluctant recognition of the possible military value of air craft carrying guns or dropping bombs.

The Pennsylvania will probably carry six or eight submerged tubes for the underwater discharge of the biggest of automobile torpedoes. Improvements in the direction of economy have recently been developed in big marine turbine installations and it is believed that machinery of this sort with oil fuel will furnish the motive energy for the Pennsylvania. The public generally does not know it, but the turbine is most economical when run at its highest speed. A naval vessel, unlike a transatlantic liner, does most of its peace time work at a cruising speed of about ten knots. The problem has been to evolve a turbine arrangement which would lend itself to these extremes of service.

The Pennsylvania will cost, exclusive of armor and armament, \$7,425,000. The cost of the guns, torpedoes, ordnance equipment, defensive plating, etc., will increase the total outlay to something less than \$15,000,000. This is a pretty tidy sum for fifteen minutes work in the line of actual combat, but such is the price that must be paid for the efficient defence of our national honor against a modern foe properly prepared and skilful in battle.



THE LATEST OF UNCLE SAM'S PEACE PRESERVERS.

about 60,000 horse-power, and this explains why the compromise figure of 650 feet was chosen for the Pennsylvania. Any foreign vessel having a superiority of speed of two or three knots over this would not have the advantage in actual battle which this apparent greater mobility would seem to imply. This probably strikes the uninitiated layman as paradoxical, but it is really not so.

There is no doubt that superior speed enables a ship either to choose or to refuse battle, but when once within range of a foe's guns a superiority of two or three knots counts for little. This was carefully threshed out by experts at the United States Naval War College some years ago. At that time the battle ranges were in the neighborhood of 2,000 yards. To-day it is expected to engage the enemy at distances between 10,000 and 12,000

yards, thanks to the development of the telescopic sight and the modern method of aiming by which the gun is kept all the while bearing upon the far away target. A rival ship to have any advantage at that distance by reason of speed must be able to go from eight to twelve knots faster than her opponent. While it is said that the latest British battleship is to do twenty-nine knots—existing British and German battle cruisers already have this speed still the American naval authorities have chosen the lower rate. The economies effected by the lower speed and the shorter ship are to be utilized in other important directions.

How truly the matter of the defence is a compromise in the most formidable of modern battleships can be realized best if the powers of attack of the latest types of naval ordnance are considered. The United States set the pace for the mari-

time nations when its ordnance experts developed the present 14 inch rifle. At 10,000 yards this gun will be able to send its armor piercing projectile through nearly sixteen inches of hardened steel. According to the latest information from abroad the British 13.5 inch gun is able to drive its shell through twenty-two inches of Krupp armor at a distance of 5,000 yards. This gun is less powerful than the American 11 inch rifle.

The greatest thickness of armor now carried by battleships built and building is generally twelve inches. This does not compare very favorably with the assaulting power of the gun, and yet it is probably the maximum thickness which can be adopted extensively for the shielding of the most vital parts of the heavy fighting ships. It is said, however, that American naval authorities intend to in-

crease the thickness of the armor in some measure on the Pennsylvania and at the same time to carry this defence further below the water line. Isn't it perfectly plain that if the attack at 10,000 yards is so superior to the resistance of the sheltering steel the winning ship will be the craft which hits first and offends within the initial minutes of the battle?

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energy required to lift the Pennsylvania more than two feet in one second. But while the armor must be able to endure without perforation the attack of a gun of corresponding calibre within some agreed limits of projectile velocity, still this defence is not absolute against the attack of the biggest of guns. All that the modern commander of a dreadnought can hope is that it shall be his good fortune to be ready when his foe rises above the distant ocean rim and in the first few minutes of that angry greeting to crush or cripple his rival's capacity to retiate effectively.

Ten thousand yards, reduced to a landsman's terms, is a little over five and two-thirds miles. In the war with Spain American naval gunners were able to make but a few of their shots tell upon Cervera's ships two thousand yards off,

THE GUNMEN OF NEW YORK SKETCHED FROM LIFE

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and said so to her husband. Since her husband had been brought up to obey her in all things, he made no objection. Guided by a patfinder from the Central Office, the gentleman went forth to find Paul Kelly, his wife in his arm. They entered Lyon's restaurant in the Bowery; the place was crowded. Room was made for them at a table by squeezing in three chairs. The lady looked at her. Across the table, stale and fat and gone to seed, sat an ex-military of the prize-ring. At his elbow was a stocky person with a visage full of wormwood and a chrysanthemum ear. He of the ear was given to misguided volubilities, more apt to stammer than delight.

The woman who wanted to see Paul Kelly looked at the champion gone to sulky seed, listened to the misguided conversation with the chrysanthemum ear and wished she hadn't come. She might have been driven from the field, had it not been for a small, dark personage with black eyes and hollow cheeks who sat next her on her left. His voice was low and not alarming, his manner bland but firm. He took quiet and quieting charge of the other two.

English to all. Purringly polite Chesterfield might have studied him with advantage. The woman who wanted to see Paul Kelly was so taken with the little dark man's easy mastery of the situation that she forgot the object of the expedition. When she was again in the street and had drawn a deep, clear breath or two of long relief she expressed astonishment that one possessed of so much grace and finesse, so full of cultured elegancies should be discovered in such coarse surroundings. "Surely he doesn't belong there," she said. "Who is he?"

"Who is he?" repeated the Central Office delegate in a discouraged tone. "I thought your husband wised you up, that's Paul Kelly." Paul Kelly owned the New Brighton in Great Jones street. One evening as the orchestra was tuning its fiddles for the final waltz a sudden but exhaustive bombardment then and there broke loose. In the hot midst of it some cool hand turned off the lights. They were never again turned on. The guests departed through window and by way of door and did not come back. It was the end of the New Brighton.

As usual, the Central Office is not without its theories. The Central Office is often without the criminal, but never without the explanation. One Mulberry street whisperer declared that it was a war over a woman without saying which woman. Another whisperer insisted that money lay at the roots of the business without saying what money. Still another ran to the effect that it was one of those hit or miss mixups, in their sort extemporaneous, in their up-time inexecutable, the distinguishing mark of which is an utter lack of either rhyme or reason.

One officer with whom I talked pointed to Ellison and Harrington as the principals. Paul Kelly, he said, was drawn into it as an incident to his proprietorship of the New Brighton, while the redoubtable Razor became part of the picture only through his friendship for Ellison. Another officer, contradicting, argued that there had been a feud of long standing between Razor and Paul Kelly; that Ellison was in there in Razor's behalf; and Harrington got killed because he butted in.

About the same time Ellison and Razor down at Nigger Mike's in Pell street were laying their heads together. A bottle of whiskey stood between them, for they required inspiration. There were forty people in the room, some dancing, some drinking, some talking. But no one came near Ellison and Razor, for their manner showed that they did not wish to be disturbed. As the Nailer observed, "They had a hen on," and when gentlemen have a hen on they prefer being quiet.

"I've no use for Paul Kelly," whispered Ellison in response to some remark of Harrington's. "You bet he knows enough not to show his snout along Eighth avenue. He'd get it good if he did."

"Your gatt, Paul, your gatt!" he shouted. The rule in England is to let every man kill his own snake. Harrington's conduct crowded hard upon the gross. It so disgusted Razor that to show Harrington what he thought of it he half turned and laced a bullet through his brain.

"Now you've got something of your own to occupy your mind," quoted Razor. Ellison was too old a practitioner to be drawn aside by the Harrington episode. He devoted himself unswervingly to Paul Kelly. Ellison's first bullet cut a hole through Kelly's coat, and did no further harm. The lights were switched out for the crisis, and what shooting followed came off in the dark.

There was plenty of it. The air seemed soon as full of little yellow spots of flame as an August swamp of brambles. Even so it didn't last. It was as short lived as a city squall at sea. There was one thunder and lightning moment, during which the pistols flashed and roared, and then it was over.

It was fairish pistol practice when you consider conditions. Paul Kelly had three inches in him when four weeks later he asked the coppers to come and get him. He had been up in Harlem somewhere lying low. And you are not to forget Harrington, what he thought of it he half turned and laced a bullet through his brain. The policeman felt his official way into the barroom empty as a drum, dark as the inside of a cow.

French to one man, Italian to another, Harrington saw it coming.