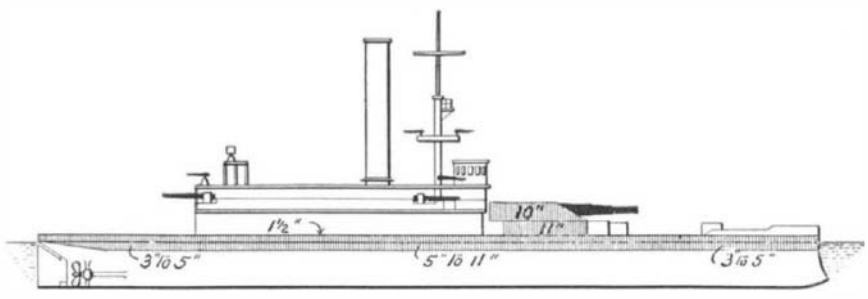
long enough to bring the muzzle of the gun almost flush with the side of the ship. This arrangement does away with the inconvenience of dismounting the guns to avoid obstructions or to guard them against the stress of heavy weather. Each of these guns is sheltered behind a heavy port shield, and there is a splinter bulkhead of 2½-inch nickel steel between each gun and its neighbor on either side. The twelve 14-pounders, sheltered by local armor of 2-inch steel and by shields, are to be mounted eight on the gun deck well forward and aft, and four up in the superstructure on the main deck, aft of the amidship 8-inch turrets. The twelve 3-pounders are to be mounted on the bridges and on the superstructure deck, while the 1-pounders, automatic and otherwise, and the Gatlings, are to be placed in the tops and in the boats. The submerged torpedo-tubes, of which there are two, are to be placed one on each side, well forward, and the operator is to control his tube from an armored station on the deck above, sufficiently sheltered to be proof against 6-pounder fire.

The main engines will be of the four-cylinder triple-expansion type, driving twin screws, capable of developing 19,000 indicated horse power, and designed to drive the ship at 19 knots. The steam pressure will be 250 pounds, and the cylinders will be: H. P. 35 inches, I. P. 57 inches, and two L. P. each of 66 inches dia. by 4 feet stroke. Number of revolutions a minute, 120. There will be twenty-four boilers of the straight water-tube type, placed in six water-tight compartments. They will have quite 1,280 square feet of grate and 55,000 square feet of heating surface. The air pressure in the ash-pits will not exceed one inch of water. Each ship will be fitted as a flagship and accommodations will be provided for 37 officers and 668 seamen and marines; a total complement of 705 persons.

The stem is carried well forward below the water and formed into a powerful ram. The maximum beam is 50 feet; and the draught upon the normal displacement of 3,235 tons is 12½ feet. Upon this displacement the ship carries, closely stowed in the bunkers, 400 tons of coal.

The hull is of steel, unsheathed, with an inner bottom reaching up to the armor shelf and ranging fore and aft throughout nearly the whole length of the ship. This intramural space is extensively subdivided into water-tight compartments, and, like the large, main compartments of the ship proper, it is under the control of a pumping plant of large capacity.



Gun and Armor Plan; "Arkansas" Class. "Arkansas," "Wyoming," "Connecticut," and "Florida."

The hull is protected by a continuous band of armor, extending from the main deck line down to a depth of 30 inches below the waterline amidships. This armor has a maximum thickness of 11 inches at the deck line throughout the region occupied by the engines, the boilers, and the magazines, tapering thence to the armor shelf well below water. Forward and abaft the "vital" space the armor is graduated by easy steps till it terminates at the bow and the stern in thicknesses of five inches. The protective deck, or more properly speaking the main deck, is composed of two thicknesses of ¾-inch plating, of which the upper course is of nickel steel. This is sufficient defense against the acute angle at which most plunging shots would have to strike.

A five-sided superstructure occupies the central portion of the main deck. In the lower half are quartered some of the officers, and there, too, is the galley, the armory, some wash rooms, and spare space for the housing of part of the crew if so desired. On the next deck above, i. e., the superstructure deck, is placed the major part of the rapid-fire portion of the battery. The hammock berthing is also in the superstructure on that deck, lending a very mild protection to the right upon the fundamental plating. Wherever possible, woodwork is omitted and supplanted by light metal bulwarks, etc., but where wood is found needful for the sake of health and the saving of weight, it is carefully fireproofed.

The ship is propelled by twin screws driven by two triple-expansion engines, placed in one watertight compartment. These engines are of the vertical, inverted-cylinder, direct-acting type, each with a high-pressure cylinder of 17 inches, an intermediate-pressure cylinder of 26¼ inches, and a low-pressure cylinder of 40 inches, the stroke of all pistons being 2 feet. The collective indicated horse power of the propelling and the circulating pump engines will be 2,400 when the main engines are making in the neighborhood of 200 revolutions per minute. Steam is supplied at a working pressure of 250 pounds, by four water-tube boilers, having a total grate surface of quite 200 square feet, and a total heating surface of 8,800 square feet, and capable of supplying all the steam on shipboard when running at full power.

The vessel is lighted by electricity, while the turret mechanisms and all the ammunition hoists will be actuated by the same power. By the adoption of electricity so generally, the presence of long passages of heating steam pipes is obviated, and in this way alone a very considerable reduction of temperature will be effected under service conditions.

The main battery consists of two of the new 40-caliber 12-inch breech-loading rifles, and the secondary battery of four 4-inch rifles, while the auxiliary battery includes three 6-pounders and four automatic 1-pounders.

The 12-inch guns are mounted in a single barbette turret of the balanced type, having an inclined face with a pitch of 42 degrees. The armor for the turret and the barbette is 10 and 11 inches thick and treated by the Krupp process. The four 4-inch guns are mounted on the four principal corners of the superstructure deck, where they will command a wide field of fire. These guns are protected by shields. Three 6-pounders are mounted on the bridge deck, while the 1-pounders are placed on the hammock berthing, amidships, and up in the single top of the military mast. The 12-inch and the 4-inch guns are designed for smokeless powder, the first having a muzzle velocity of 2,800 feet per second and the latter of 2,900 feet per second, the respective muzzle energies being 46,246 and 1,870 foot-tons.

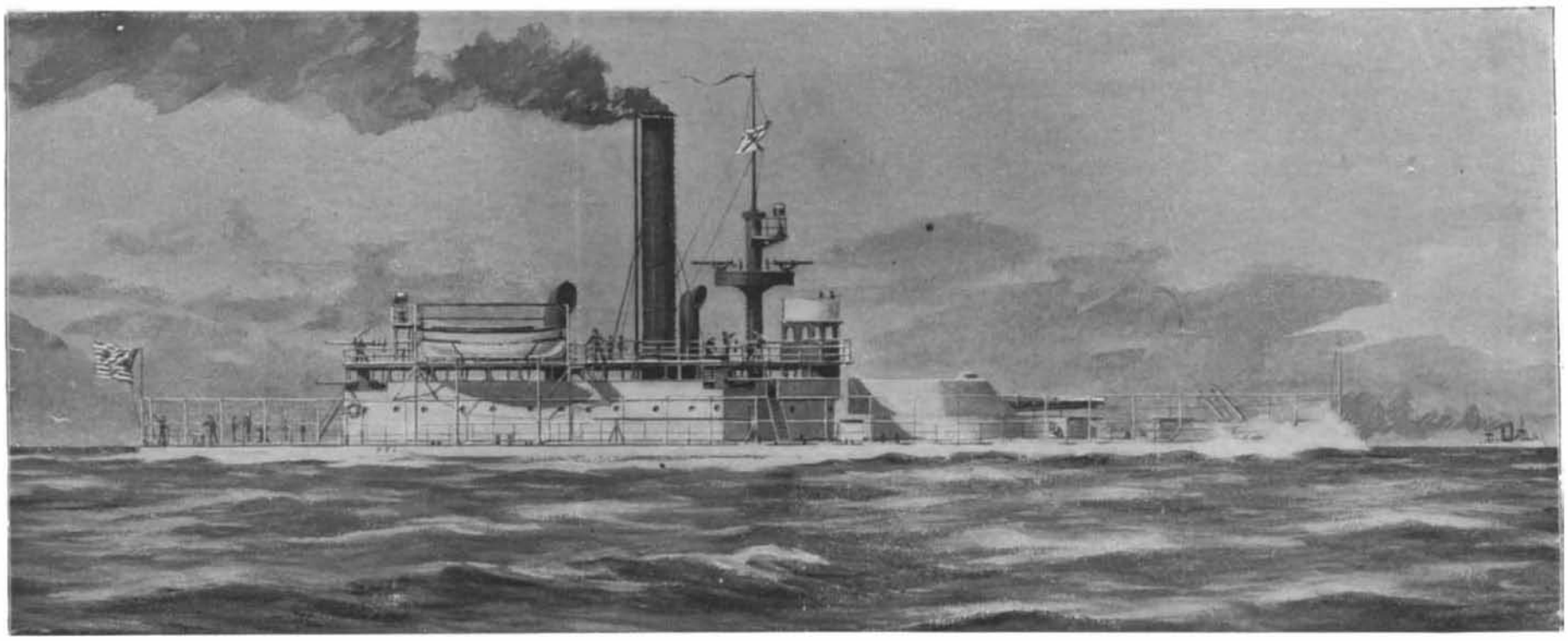
The ship will carry two searchlights, one forward on the mast and the other upon a stand at the after end of the bridge deck. Every modern facility will add to the equipment and finish of the vessel, and ample quarters and bathing facilities will make life reasonably comfortable for the complement of a captain, six other officers, and 130 enlisted men.

Monitors.

"ARKANSAS" CLASS—THE MONITOR "ARKANSAS."

It is safe to say that the four monitors "Arkansas," "Wyoming," "Connecticut" and "Florida," which are now under construction for the United States navy, are the last monitors that will be built for our own or any other navy. In the light of modern developments the type is discredited. Indeed, these four will owe their existence to panic legislation during the late war, due to the fear of bombardment entertained by some of the leading Atlantic cities. The monitor is purely a harbor-defense vessel, and would be practically useless, if not, as Sampson's operations off the northern coasts of Cuba and Porto Rico proved, a positive incumbrance in naval operations on the high seas.

The monitor lacks those prime qualities of a fighting ship—seaworthiness, steadiness as a gun platform, habitability, and mobility. As regards this last, one



Displacement, 3,235 tons. **Speed,** 11.5 knots. **Bunker Capacity,** 400 tons. **Armor:** Belt, 11 inches; turrets, 10 inches; barbettes, 11 inches: deck, 1½ inch. **Armament:** Two 12-inch 40-caliber B. L.; four 4-inch R. F.; three 6-pounders; six 1-pounders two Colts. **Complement,** 137.

HARBOR-DEFENSE MONITOR "ARKANSAS."

battleship, capable of going anywhere and casting loose her guns under any conditions, is worth a fleet of monitors, huddled within a mined and fort-defended harbor, into which an enemy's fleet will in all probability never be so rash as to force an entrance.

The "Arkansas" has a waterline length of 252 feet. gun crews of some of the smaller pieces. On the bridge or uppermost deck are carried the chart-house, the boats, and all of the 6-pounder rifles. This and the deck just below, like the main deck, being exposed to the weather, are not fireproofed; but the berth deck, being under cover, is covered with linoleum placed

These four vessels will be used to a large extent to meet the growing need of proper schools of instruction for the increasing ranks of the naval militia; and it is easy to see how successfully they meet the demand, by covering every practical branch of naval warfare, with the single exception of torpedo duty.