BATTLESHIPS NOS. 5 AND 6.

On November 30, bids were opened at the Navy Department for the construction of two new battleships authorized by act of the last Congress, and prospectively, at least, our line of battle is thus augmented to six first-class ships of this type and of American design—the Texas, a second-class battleship, being from English plans.

In the Kearsarge, a namesake of the historic craft, and her sister ship, No. 6, as yet unnamed, we have the highest examples of their type. Their general dimensions and principal features are: Length on load water line, 368 feet; beam, extreme, 72 feet 2·5 inches; freeboard forward, 14 feet 3·0 inches; freeboard aft, 12 feet 3·0 inches; normal displacement, 11,500 tons; corresponding draught, 23 feet 6·0 inches; indicated horse power, estimated, 10,000; corresponding speed, 16 knots; coal supply on normal displacement, 410 tons; coal supply at 25 foot draught, 1,210 tons. Batteries: Main, four 13 inch breech loading rifles, four 8 inch breech loading rifles; secondary, fourteen 5 inch rapid fire breech loading rifles; auxiliary, twenty 6 pounder rapid firers, six 1 pounder rapid firers, four machine guns. The torpedo tubes, of which there are five, will be disposed one in the stem and two on each broadside amidships, and all will be of the above water type; the bow tube firing directly ahead and the broadside tubes discharging through an arc of fifty degrees toward the end of the ship nearest them.

The character of our coast and the generally shallow waters about many of our wealthiest seaports made a comparatively light draught an indispensable prerequisite in these new ships; in fact, the secretary insisted that they should draw less water than any other first-class battleship either here or abroad. The largest of European ships of this sort usually draw about 28 feet when fully laden, and our own Iowa and Indiana class draw something over 24 feet under normal conditions. The Kearsarge and No. 6, however, with all weights on board ready for sea and with 410 tons of coal in their bunkers, will draw but 23½ feet of water, and with 1,210 tons of coal dumped loosely into their bunkers, without packing or further handling, will have an even keel draught of 25 feet.

The general practice abroad of recent years, regarding the size of big guns, has been to restrict their heaviest armaments to calibers not exceeding 12 inches, apportioning the weight thus saved among more rapid fire guns or a wider or heavier distribution of armor protection. This matter was pretty thoroughly discussed anent the new ships, the Chief of Ordnance holding that the 13 inch gun would make our ships many degrees superior to our European neighbors, in fact, preponderously so; and, housed in two double-decked turrets, the four 13 inch and four 8 inch rifles would be more effective and better protected than could be the other guns in separate turrets of independent action, and this scheme was adopted.

The double-decked turret is essentially novel. Resting upon the protective deck, 3 feet 6 inches above the water line, the barbettes of 15 inch steel rise up to a height of three feet above the main deck, and within the protection of these heavy walls the turning, loading and other vital mechanisms of the guns and turrets are worked in comparative security. The turrets for the 13 inch guns will be as thick as their supporting barbettes, except where augmented two inches about the ports through which the guns peer out. The turrets for the 8 inch guns, rigidly fixed to the more ponderous one below and incapable of independent lateral movement, are 9 inches thick generally, except for a similar thickening of 2 inches about the face. The primary features of advantage possessed by this uncommon type of turret are the concentration of motive mechanisms and the unusual protection given the ammunition hoists for the 8 inch guns above.

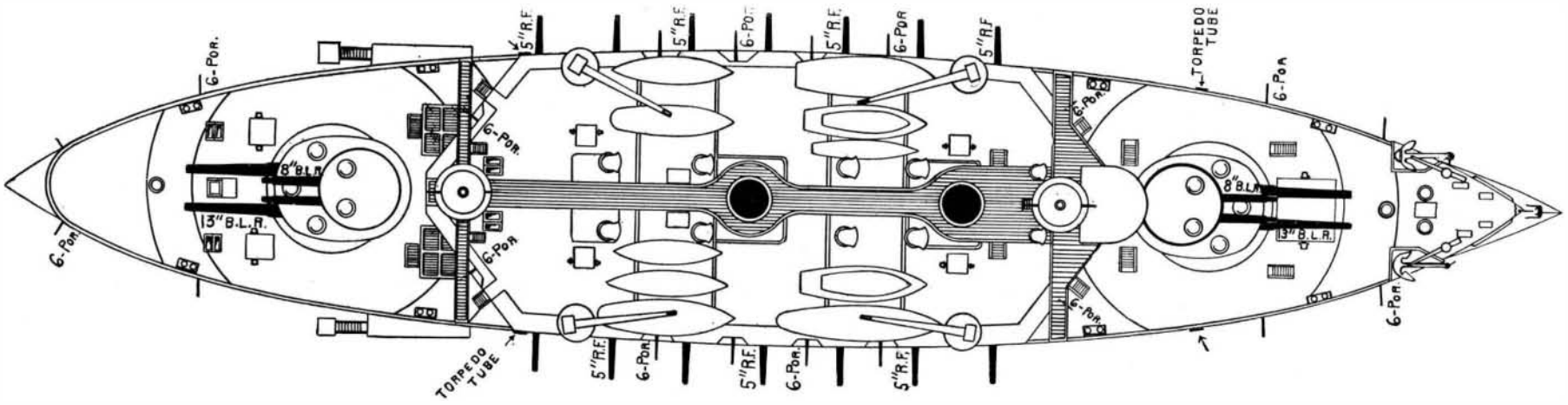
The guns in the turrets fire each through an arc of 270°, and in that have a pretty effectual sweep. In the broadside batteries of 5 inch rapid fire guns, seven on each side, firing through an arc of 90°, these vessels are unique, and may be said to bear directly the impress of lessons learned in the late Chino-Japanese conflicts, the 2 inch steel splinter bulkhead between each gun station and the side protection of 6 inches of solid steel armor being features of unusual safeguard for the rapid fire guns of any ships of this description. The battery above, of 6 pounder rapid fire guns, and the distribution of others of similar caliber on the berth deck forward and aft, give promise of very effective service against torpedo boat attack, while the 1 pounders and Gatlings in the tops will sweep the decks and other exposed positions of an enemy.

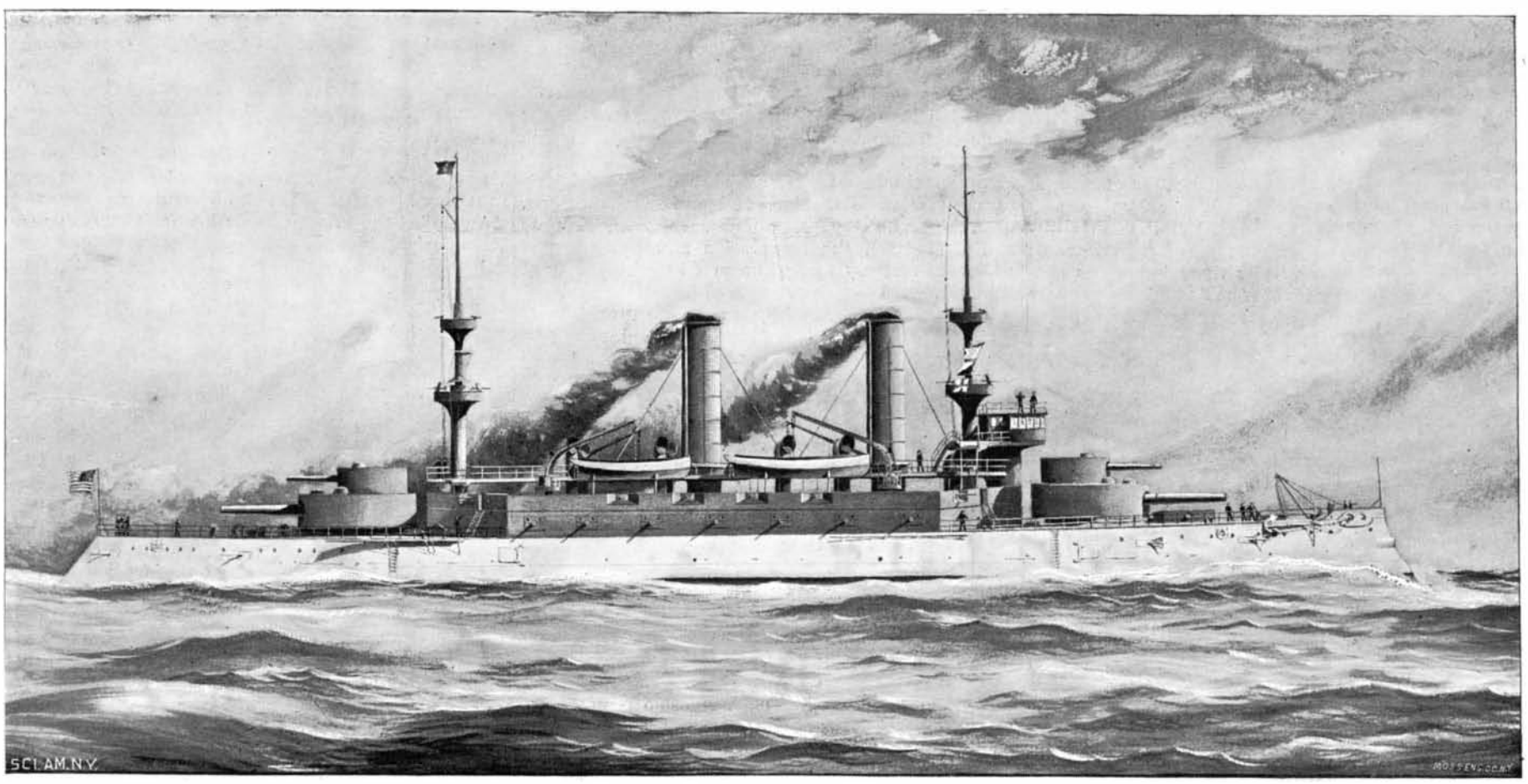
Offensively, the ships are extremely formidable, and defensively are exceptional in the thickness and distribution of armor protection about the guns and vital parts.

From the after barbette forward to the stem the water line region will be protected by a belt of armor 7½ feet wide, 4 feet of it being below water at normal draught. From the after barbette to the forward barbette this belt will have a maximum thickness of 16½ inches, tapering to 9½ inches at the edge below water, and from the forward barbette to the stem this armor will gradually diminish to 4 inches. At each end of the thickest part of this belt there will be an athwartship bulkhead, 10 inches thick forward and 12 inches thick aft, to oppose an enemy's raking fire. On top of the four walls thus formed will rest a flat steel protective deck 2¾ inches thick, completely roofing over and compassing the spaces occupied by the "vitals," as the engines, boilers, and magazines are called. Forward and aft of the boiler, engine and magazine spaces, this protective deck will slant to below the water line at the extremities, backing up the ram bow, and will be increased to 3 and 5 inches on the sloping sides of these parts of this armor deck.

A complete belt of corn pith cellulose will be worked fro n stem to stern, augmenting the protection of many feet of coal, and the 6 inches of armor extending from the top of the water-line belt up to the main deck and running in a fore and aft direction from barbette to barbette. A double bottom, reaching from the keel up to the lower edge of the armor belt, 4 feet below the water line, will protect the vessel from injury in grounding and minor damage from torpedoes.

Within this heavy steel box of Harveyized material, below the water and beneath many feet of coal, are the two sets of triple-expansion engines, one on each shaft, having cylinders of 33½ inch, 51 inch and 78 inch diameters, and a common stroke of 48 inches, which will drive the twin screws, while the five boil-





OUR NEW BATTLESHIPS NOS. 5 AND 6.

ers—three double ended and two single ended—having a total grate surface of 685 square feet and a heating surface of half an acre—in four separate watertight compartments, will supply, at a working pressure 180 pounds, the steam needful to revolve the 16 foot propellers 120 times a minute when making the maximum contract speed of 16 knots an hour. Large fans will induce the needful forced draught, and pumps of thousands of gallons minute capacity will induce a circulation of water, feed the boilers, and clear the bilges.

Just under the pilot house there will be a conning tower ten inches thick, connected by a complex system of call bells, speaking tubes, mechanical telegraphs, and electrical telltales with every important center in the ship, bringing the captain, in action, in immediate touch with every department essential to complete control and knowledge of his ship's condition.

The least possible amount of wood will be used, light metal work being the general substitute, and where wood material is used and needful, it will be subjected to an electrical fireproofing process of established efficacy. Cork sheeting will cover the metal bulkheads in the staterooms and living spaces, to reduce the possibility of unhealthful condensation. The ships will be lighted by electricity, ventilated by natural and fan-induced ventilation, and pumped and drained in the most approved manner by steam and hand appliances; and every consideration has been studied to make the vessels comfortable and healthful habitations for their flagship complements of 520 persons.

Compared with the old time craft, this complement seems inadequate; but hundreds of mechanical devices and numerous auxiliary engines have lessened the tax upon the muscular energies of the crew, and narrowed their duties to the simple direction of those conveniences which have made manifold the output of every man's efforts and given the vessels possibilities and facilities undreamed of twenty years ago.

With 1,210 tons of coal on board, at a cruising speed of 10 knots, the vessels will be able to cover 6,000 knots, and at a speed of 13 knots will be able to cross the Atlantic and then have coal enough left to travel a thousand knots farther. There will be no speed premiums. A penalty, however, of $100,000 a knot is imposed for failure to reach the contract speed of 16 knots. The cost of these vessels, exclusive of armor and armament, is limited to $4,000,000 each, and the time of construction specified as three years from the time of signing of contract.

Trial of a New Torpedo.

The new Howell torpedo, commonly called the "Baby Howell," was tried officially December 4, at Newport, R. I., before Commodore Sampson, Chief of the Bureau of Ordnance, and Lieuts. Roy C. Smith and Brown, of the Torpedo Board of the navy. Three shots were fired from the testing station of the Hotchkiss Gun Company in the Seaconnet River. For a range of 600 yards, about all the government cares for, an average of between 27 and 28 knots was made, the torpedo being submerged 4½ feet. It appeared to hold this depth throughout its entire run of about 1,100 yards.

Each time the torpedo came to the surface at about the same spot, and the time of the several runs did not vary 3½ seconds. This regularity was as pleasing to the officials as was the speed attained. The projectile, in more favorable weather, has made more than 29 knots, and the company say that they will show 32 for 600 yards, with their regular powder charge of 200 pounds.

ALL the copper tubes in the English torpedo boat destroyers of the reserve fleet at Portsmouth are to be taken out and galvanized steel tubes substituted. The copper fittings have broken down in a number of the boats that have been tested.

THE DE LA VERGNE MOTOR DRAG.

We have given illustrations of several of the horseless vehicles which took part in the Times-Herald motocycle race on November 28, and we now present an engraving of the De la Vergne Refrigerating Machine Company's motor drag, one of which also took part in the race. The De la Vergne machine won the fifth prize in the Paris-Bordeaux race of last June, so that it would undoubtedly have made an excellent showing in the Thanksgiving Day contest, if the rubber tires had not slipped, so that the race was abandoned at Sixteenth Street, Chicago. The horseless carriages of the De la Vergne Company are of two kinds, the hunting traps which are built to accommodate four people and the drags which accommodate six people. These carriages are not on the market at present.

The drag which we illustrate weighs about 1,800 pounds and has three seats. The frame is of iron. Around this the carriage maker has constructed the vehicle. In the drags two gasoline motors, of four horse power each, are used, each motor being distinct. The engines weigh about 375 pounds each. The two cylinders are balanced so that the vibration is noticeable only when standing still. The tank for gasoline is under the front seat, and the carbureter, which is used to prepare the gas, is in the extreme rear of the vehicle. The gasoline tank holds enough for a three days' run. The motor is a modification of the well known Benz motor. The explosion is produced by a spark, the battery being also in the front of the vehicle. The cylinders are cooled by means of water jackets connected with a tank having a capacity of 250 pounds of water, which is sufficient for a run of six hours.

The noise of the exhaust is stifled by a muffler, in which is also placed a condenser, which condenses the unburned gas and products of combustion which are expelled at the bottom of the vehicle, thus preventing disagreeable odors. The power from the motors is transmitted to the driving wheels through the medium of belts and chains and sprocket wheels. The power is transmitted to the rear wheels by means of chains and sprocket wheels. Part of the spokes are secured directly to the large sprocket wheels, thus giving great strength. In the smaller vehicle the motocycle is stopped and started by shifting of the belts, which run to a countershaft. In the larger motocycles a friction clutch is used, which also controls the speed. The motor can be stopped, if necessary, by simply turning a lever, and the wagon can be reversed without stopping the engine. The limit of speed is said to be from 3 to 25 miles an hour. A powerful brake of the ordinary kind is provided. The steering wheels are pivoted at the hub, the ordinary fifth wheel is also used; the steering rod runs up to the seat. Equalizing springs serve to hold the steering connections in place and keep the lever steady. The wheels are respectively 36 and 48 inches in diameter, and are fitted with solid rubber tires of the Rubber Tire Wheel Company.

In the improved machine the lamps will be lighted by electricity, which is generated by the motor. James F. Bate, the umpire on the De la Vergne Refrigerating Machine Company's gasoline motor wagon on the day of the race, made the following report:

"Half a gallon of gasoline was used in the trip of the De la Vergne wagon from the starting point to the testing room, at 1557 Wabash Avenue. The start was made at 8:56 o'clock, but the wagon had not gone far before the wheels began to stick in the snow. The stretch from the starting point to Fifty-fifth Street and Michigan Boulevard was especially rough, and several times the Benz motor was unable to drive the wheels forward. The rubber tires slipped in the snow, and before Cottage Grove Avenue was reached Frederick C. Haas, who was operating the machine, decided not to attempt the race. Then the wagon was pushed over the bad stretch of snow-laden road. When the motocycle reached Michigan Avenue, it went along smoothly, but not at a great rate of speed. At sixteenth Street Mr. Haas turned the vehicle from the course and stored it at the testing room. The run was made in one hour and a half."

The De la Vergne Company, of New York City, in addition to making their large refrigerating plants, are now also making the Hornsby-Akroyd oil engine. They regard their motor carriages as experimental at present.

THE DE LA VERGNE MOTOR DRAG.

Destruction of Forests in California.

In the University of California Magazine Mr. Charles H. Shinn, in writing of the lavish way in which the best parts of the California forests have been cleared away, states that in the Comstock mines alone enough timber has been used to build all the houses needed for a city of 50,000 inhabitants. He has seen the bottom of a cañon crowded for miles with the trunks of pines from each one of which a few flume blocks or a log of butt timber had been cut, while the rest was left to decay. Not to mention the thousands of acres of the most magnificent coniferous timber known to man destroyed by fires which have burned out the soil itself into great pits, it is stated that the waste of timber in the redwood districts has been even more appalling than it has been in the Sierras. More than once the world's record for the number of feet cut in a day has been broken by some one of the sawmills of the coast redwoods. So much lumber is still produced by rival mill men that it has not paid for cutting, and some of the large California firms of lumbermen have become bankrupt. Enormous trees that represent from 800 to 1,000 years of symmetrical growth have been sawed up with no profit, or with actual loss, when, if they had been left to stand a few decades longer, the profit might have been a thousand dollars an acre.

At the time of the American occupation of California the forests covered, perhaps, 50,000 square miles. Half of this has been cut over or is inaccessible or consists of species of less value than those which have heretofore been cut. It is often asserted that California still has twenty millions of magnificent forest land, but the truth is that there is left hardly fifteen million acres, and much of this has been cut away.

Gelatin—Its Saline Digestion.

Gelatin is transformable into a kindred substance, gelatose or protogelatose, characterized by want of the property of forming a jelly and of being precipitated by a standard solution of sodium chloride. In cultures of liquefactive microbia it is observed in the first moments that the gelatin is changed into gelatose. Gelatin loses the property of jellifying if left in contact with an alkaline chloride or iodide. With the fluorides, the transformation is only partial. The change may be named saline digestion.—A. Dastre and N. Floresco.