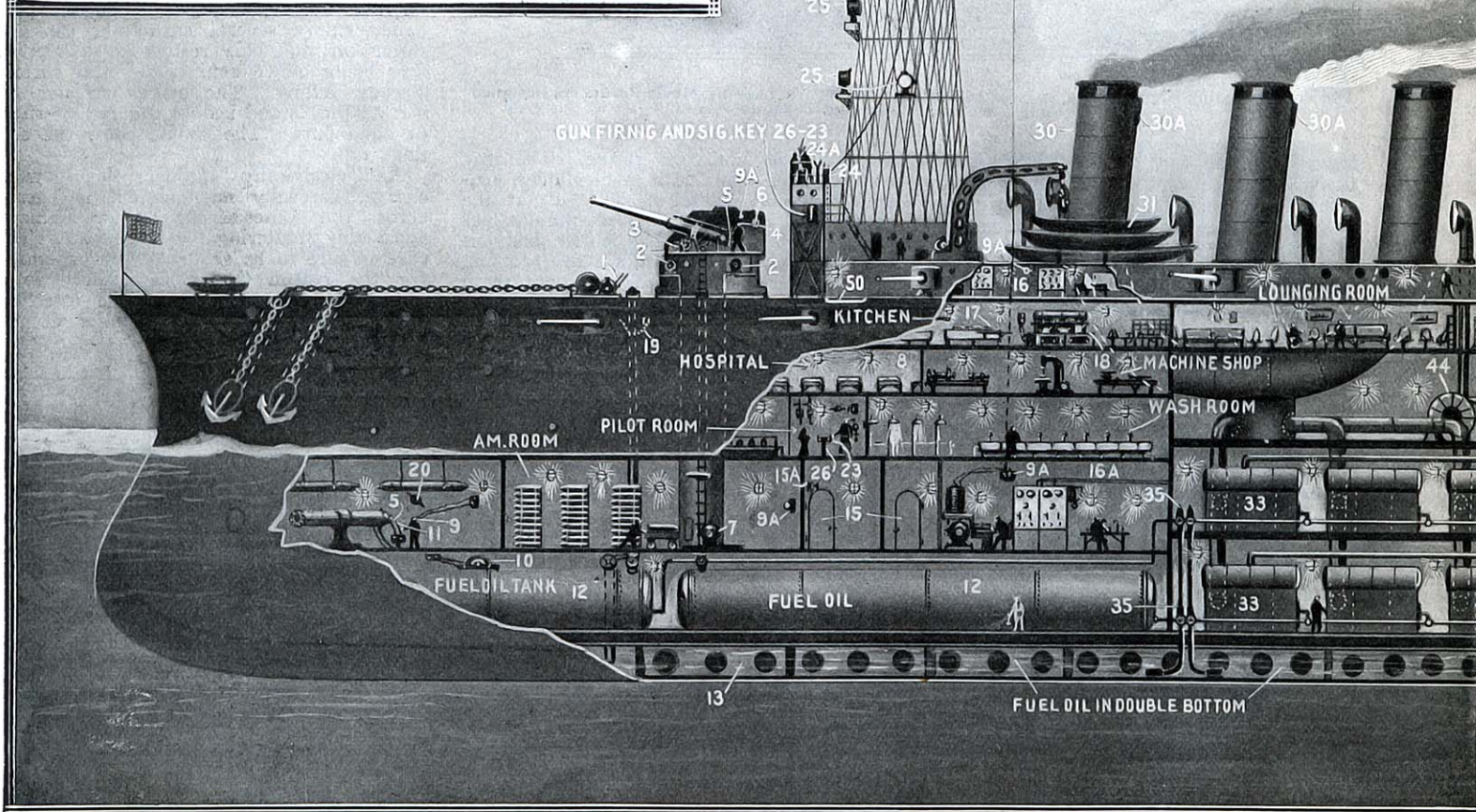


## LEGEND: ELECTRIC BATTLESHIP

1—Motor-driven anchor hoists. 2—Heavy gun turret turning motors. 3—Motor-driven gun elevating mechanism. 4—Telephone from gunner to range finders 27A and bridge. 5—Electric firing device on all guns. All guns may be fired simultaneously from bridge. 6—Electric buzzer signal for timing gun firing. 7—Ammunition hoist motor. 8—Electric lights throughout ship. 9—Telephone from bridge. 9A—Loud-speaking telephone from gun turrets to ammunition rooms, etc. Similar service throughout vessel. 10—Electric submarine telegraph. 11—Submerged torpedo tubes fore and 'aft. 12—Fuel oil tanks for boilers. 13—Fuel oil stored in double bottom of hull. 14—Ammunition rooms serving turret guns. 15—Electrically closed doors operated from and annunciated at the bridge. 15A—Warning whistle for doors 15. 15B—General alarm bells scattered throughout ship for "Battle" muster. 16—Radio room for general use. 16A—"Battle" radio room; absolutely sound proof. 17—Motor-driven culinary apparatus in kitchen. 18—Electric stoves for cooking. 19—Cable connection for electrically firing guns from bridge. 20—Buzzer signal for timing secondary guns. 21—Motor-operated cranes for lowering boats. 22—Wireless aerial "lead-in" cable. 23—Electric steering and propulsion controllers on bridge—duplicated in emergency pilot room at 26 also in conning tower. 24—Keyboard for signaling by Ardois lamps 29. 24A—Electric wig-wag signal semaphore. 25—Electric search-lights scattered about vessel. 26—Control keyboard for electrically firing all guns in salvos, etc., from bridge conning tower, or below decks.



## Uncle Sam's New 40-mile an Hour "Electric" Battle-Cruiser

By H. Winfield Secor and Arthur C. Doyle\*

The most wonderful fighting ship ever built by any nation is about to be constructed for the U. S. Navy. It will speed over the seas at over forty miles an hour. The armament will be of the best, the main battery comprising eight 16-inch guns of the highest power, besides numerous smaller calibre guns. The electric power plant driving the propellers will develop 175,000 H.P., sufficient to operate all the New York Subways.

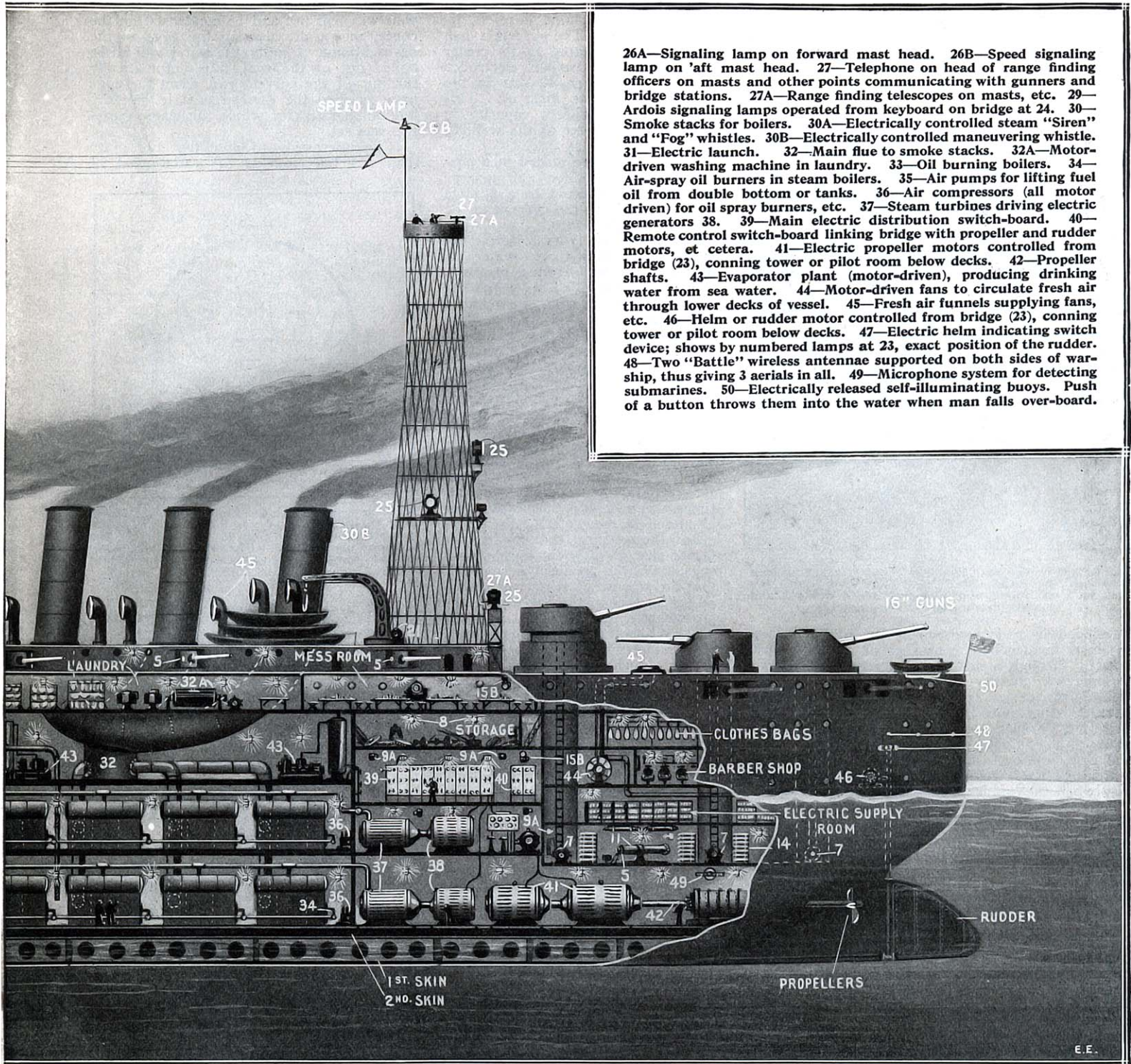
WHILE the foreign powers are busily engaged in a titanic struggle for the supremacy of Europe, Uncle Sam's naval engineers have been also busily engaged, though in a somewhat different way. The results of their calculations and researches have brought forth plans for one of the mightiest fighting craft ever dreamed of, even by naval constructors. In short, these new ships, four of which have been authorized to be laid down

\* (Formerly Chief Electrician U.S. Navy).

next year, will resemble huge blast furnaces gone to sea. From their six massive smoke stacks there will belch forth reeling black smoke from 175,000 H.P. in boilers. These ships will be designed with special regard to the shape and finish of the hull, which will have a length of nearly 900 feet. The beam of the vessel will be 97 feet, and their full load displacement about 40,000 tons. These marvelous ships, the greatest of their kind ever designed, are scheduled to attain a speed of 35 knots with full equipment aboard. And the naval ex-

perts are in hopes that they will tear through the sea at 38 knots or more, stripped. This velocity of travel is equivalent to about 42 land miles per hour.

These latest bull-dogs of the sea will be electrically driven and their boilers will be of the oil-burning type. It has been specified that they shall be so equipped that they can steam along without giving off any smoke from their stacks, when it is desired to conceal their movements. They are to be so arranged that when desirable, for maneuvers, heavy banks of thick, black



26A—Signaling lamp on forward mast head. 26B—Speed signaling lamp on aft mast head. 27—Telephone on head of range finding officers on masts and other points communicating with gunners and bridge stations. 27A—Range finding telescopes on masts, etc. 29—Ardois signaling lamps operated from keyboard on bridge at 24. 30—Smoke stacks for boilers. 30A—Electrically controlled steam “Siren” and “Fog” whistles. 30B—Electrically controlled maneuvering whistle. 31—Electric launch. 32—Main flue to smoke stacks. 32A—Motor-driven washing machine in laundry. 33—Oil burning boilers. 34—Air-spray oil burners in steam boilers. 35—Air pumps for lifting fuel oil from double bottom or tanks. 36—Air compressors (all motor driven) for oil spray burners, etc. 37—Steam turbines driving electric generators 38. 39—Main electric distribution switch-board. 40—Remote control switch-board linking bridge with propeller and rudder motors, et cetera. 41—Electric propeller motors controlled from bridge (23), conning tower or pilot room below decks. 42—Propeller shafts. 43—Evaporator plant (motor-driven), producing drinking water from sea water. 44—Motor-driven fans to circulate fresh air through lower decks of vessel. 45—Fresh air funnels supplying fans, etc. 46—Helm or rudder motor controlled from bridge (23), conning tower or pilot room below decks. 47—Electric helm indicating switch device; shows by numbered lamps at 23, exact position of the rudder. 48—Two “Battle” wireless antennae supported on both sides of war-ship, thus giving 3 aerials in all. 49—Microphone system for detecting submarines. 50—Electrically released self-illuminating buoys. Push of a button throws them into the water when man falls over-board.

smoke can be rolled out of their stacks, forming a veritable cloud bank or screen to conceal the operations of other war vessels behind them.

The general arrangement of the electrical and other equipment upon these wonderful examples of modern naval architecture, is shown in our accompanying wash-drawing. Some idea of the vast size of the power plant, or, rather, the vast amount of energy required to be developed by the power plant, may be had by comparing it for the moment with the horse-power developed by such a central station as that supplying electric power to the City of New York. When these monster craft develop 175,000 H.P. they will then be producing 25,000 H.P. more than the grand total put out by the Fifty-ninth Street Power Station of the New York Edison Company, this station operating the whole New York Subway system.

The General Electric Company will install the turbo-electric generating equipment as well as the electric motors, which are di-

**Do you know what happens on a modern fighting ship when the enemy is spotted? The multifarious rôles played by electricity in locating the enemy war-vessel, and in firing the guns, propelling and steering the ship, also many other highly interesting but generally unknown features are explained in this specially prepared and timely article.**

rectly connected to the propellers. The electric generating equipment will comprise 4-35,000 kilowatt turbo-generators. These

gigantic dynamos, together with their driving turbines, measure 50 feet, 7 inches long by 22 feet wide and 15 feet high. They will be placed on two decks, as shown in the accompanying illustration, according to the present plans. The relatively small space thus occupied by this monster power plant becomes evident when compared to the space that would be occupied by the reciprocating steam engine, used on most of the ocean-going vessels.

Another important item is the fuel to be used under the boilers. This will be petroleum or other oil of similar thermal value. And besides that carried as reserve, in tanks, a large portion of the oil fuel will be stored between the two steel skins of the double bottom of the hull. The very latest type of specially designed and extremely compact water-tube boilers will be fitted with highly efficient, compressed air  
(Continued on page 533)

**WIRELESS AND AEROPLANES AID EUROPEAN "GUN-SPOTTERS."**

(Continued from page 469)

a hill is a common occurrence on many of the battle fronts of Europe, and it is one of the standard exercises proscribed for the artillerymen of the United States Army.

As aeroplane radio sets have been greatly improved since the start of the present European war, it is now feasible for aeroplanes to maintain reliable radiocommunication over distances of forty to fifty miles. Some of these wireless sets operate on batteries, but the majority of them are designed to be excited from a small dynamo driven by the aeroplane engine. Aeroplane radio sets of American design are being turned out which do not weigh above fifteen to twenty pounds. Specially designed receiving sets are supplied for aviators, combining a leather helmet with the sensitive telephone receivers in-built to form an integral part of the entire head-gear. The antenna on aeroplanes has to be especially well insulated and many freak arrangements of the aerial conductors are to be seen. A single wire depending downward from an automatic take-up reel is extensively favored. In other cases the antenna is spread over the length and breadth of the machine, and suitably supported so as to be clear of grounding on the metal parts of the aeroplane frame and engine.

**LIGHTNING MADE TO ORDER.**

(Continued from page 474)

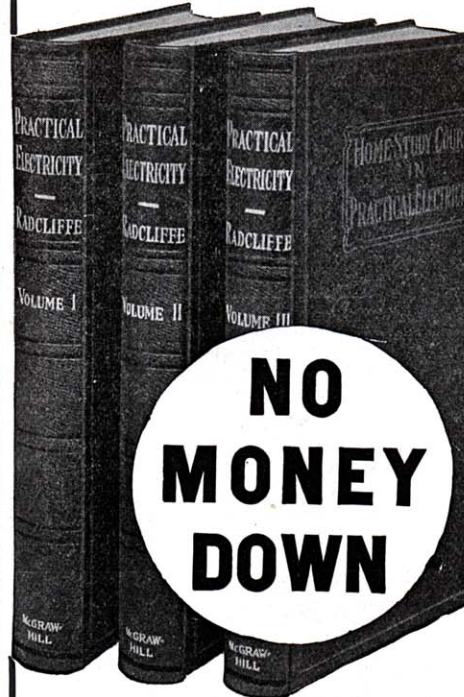
volts and a frequency of one hundred thousand per second! The flame-like discharge measures sixty-five feet across. This experiment was performed for the purpose of showing how the nitrogen of the atmosphere could be made to combine with the oxygen. The large wire cage measured 20 feet in diameter and 30 feet in height. This is not the actual coil which is excited by the primary of the Tesla transformer, but a separate helix which is attuned to a certain frequency of the secondary of the transformer. This is apparent by noting the large circular fence-like wall in the rear, which measures 60 feet in diameter and which is wound full with heavy copper wire.

The primary is carefully imbedded in the ground and connected with the regular oscillating circuit, comprising high tension oil condensers and the inductance incorporated in the primary of the Tesla transformer, also a spark discharger. In all these experiments the primary of the low tension transformer was excited with 300 kilowatts of electrical energy.

A very striking experiment showing the emission of an electrical discharge from a large sphere is shown in Fig. 2. The ball has a surface of twenty square feet which represents a large reservoir of electricity. The inverted circular pan underneath with sharp rim has an opening thru which the electricity can escape before filling the reservoir. The quantity of electricity liberated is so enormous that, although most of it escapes thru the rim of the pan or opening provided, the ball of the reservoir is nevertheless alternately emptied and filled to overflowing, as is evident from the discharge escaping on the top of the ball.

The coil shown in Fig. 3 creates an alternative movement of electricity from the earth into a large reservoir and back, at the rate of one hundred thousand pulsations per second. The adjustments were such that the reservoir fills and bursts at each alternation just at the moment when the electrical pressure reaches the maximum. The discharge escapes with a deafening noise, striking an unconnected coil twenty-two feet away, and creating such a disturbance of electricity in the earth, that heavy

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sparks an inch long were drawn from the water main at a distance of three hundred feet from the laboratory.

One very interesting experiment conducted by Dr. Tesla showed how it is possible to tune several coils to different frequencies with respect to the fundamental frequency generated by the main exciting coil. A photograph showing this experiment is reproduced at Fig. 4. The large coil on the right, discharging strongly, is tuned to the fundamental vibration which is fifty thousand cycles per second; the two larger vertical coils to twice that number; the smaller coils, wound with white wire, to four times that number and the remaining small coils to higher harmonics. The vibrations produced by the oscillator were so intense that they affected perceptibly a small coil tuned to the twenty-sixth harmonic above the fundamental.

The scientific world is keeping its eyes peeled for the next epochal movement in the problem of transmitting energy *via wireless*. And the world expects Dr. Nikola Tesla to do this.

**UNCLE SAM'S NEW 40-MILE AN HOUR "ELECTRIC" BATTLE-CRUISER.**

(Continued from page 479)

spray burners, as compared to the bulky Scotch boilers as installed on the Cunard liner, the *Lusitania*. The *Lusitania* developed 70,000 H.P. maximum from her power plant, with a resultant speed of somewhat over 25 knots per hour. This vessel measured 790 feet in length with a 98 foot beam.

Not only have the technicians of Uncle Sam's Naval Construction Board evolved something startling in the form of a wonderfully fast battle-cruiser, but they will carry something entirely new in heavy ordnance.

The big gun armament of these battle-cruisers will comprise eight 16 inch, 45 caliber rifles of a new type but recently developed by the U.S. Navy. It is said to be the most powerful gun in the world, firing a 2,400 pound shell with an initial velocity of 2,600 feet per second, or with an initial energy of 100,000 foot-tons.

Hence, when the officer in command presses an electric button that discharges a salvo from this mighty fighter of the seas, there will be represented a force of 800,000 foot tons, from the big gun battery alone—not to mention the secondary battery of six-inch and smaller caliber rifles, which will line the gun decks of the 900-foot armored hull. Thus, the primary battery of 16-inch rifles will develop sufficient energy to lift 2,000,000 pounds, 800 feet into the air. These large caliber rifles can be made to fire once every minute and faster when necessary. They will have about 25 degrees maximum elevation and a possible fighting range of approximately 30,000 yards.

It has been declared by naval experts that so remarkable is this new 16-inch gun, that under favorable conditions it would be possible to plant successive salvos on an enemy ship with accuracy, at a range of 25,000 yards.

The most important functions cared for by electricity on the modern battle-cruiser or dreadnought of the class above described are partly shown in the accompanying illustration with each particular part numbered, so that those interested can readily locate the most important general features of this truly wonderful craft. The key numbers start with the anchor hoist on the forward deck, just in front of the forward 16-inch gun turret. We will consider here simply a few of the more interesting and vital features involved in

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