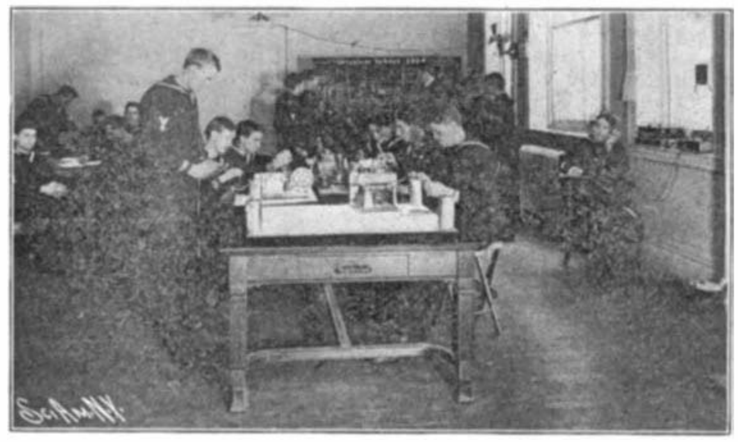
THE NAVY WIRELESS SCHOOL.

BY WALTER L. BEASLEY.

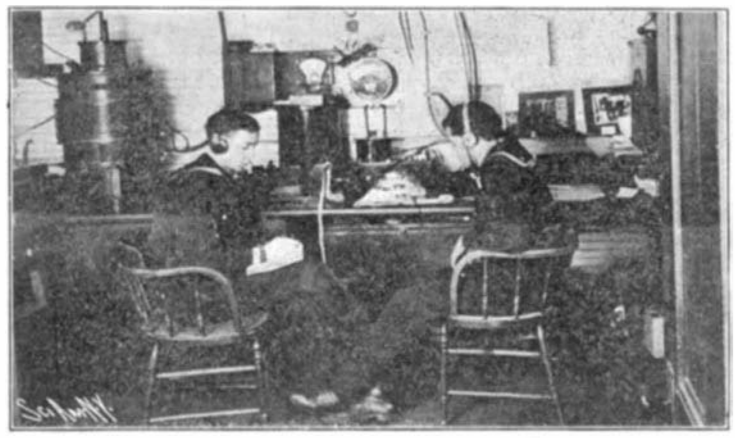
The latest department of instruction in the United States navy is the wireless school in the Brooklyn navy yard. The practical training of young sailor electricians for this new and important branch of the service is the outcome of the rapid development and the extensive application to be made by the navy of this subtle system of communication, both on battleships and coast stations.

The wireless school is quartered in the second story of the Bureau of Equipment building in the Brooklyn navy yard, and is housed on board the receiving ship "Hancock." Lieut. W. A. Edgar, U. S. N., is executive officer of the electrical and wireless school. Chief Electrician Bean, in charge of the navy yard wireless station, is the main instructor, and Chief Electrician Delany is assistant. The class now being drilled have come up from the electrical class located below, where for three months they have been put through a course of electricity in general, which is especially applicable to ship and station requirements, where they are destined to be sent for future duty. In the general electrical class, actual work is given in the handling of electrical machinery, dynamos, and the manipulating of the electrical switchboard, which regulates the interior communication of a modern battleship. A facsimile of those used on a man-of-war is installed in the room, and sections are daily drilled in the operating of the numerous switches, etc. After twelve weeks' preliminary work in general electrical school, they receive their finishing touches by going through a month's practical instruction in the wireless class. After completing four months of thorough and systematic instruction, having obtained in this interval a fair knowledge of adjusting and manipulating the apparatus, they are prepared to graduate. An interesting and picturesque sight is afforded by a peep into Uncle Sam's wireless schoolroom. Passing down the long corridor of the Equipment Building, one hears a series of loud buzzing sounds. On entering the spacious classroom, the visitor is plunged into a veritable beehive community of bustle and sound. Seated around three tables are some twenty-five bright-appearing young sailors, each deeply absorbed in mastering the wireless process. For a limited time each boy is drilled at the sending key; the remainder at the table with pen and paper are engaged in receiving and translating the sounds of the buzzer, the key of the latter being connected to a small battery. The wireless navy code alphabet is made up of a series of dots and dashes of relative length. These are indicated by buzzes received in the ear 'phone, which must be accurately learned by the beginner. They are also printed by the automatic Morse recorder on a tape line. Receiving by ear is, however, the most speedy, and the method generally employed in active service by operators on ship and shore stations.

Class Observing Aerial Wires for Receiving and Sending on a Battleship.



Navy Wireless Class at Work.



Receiving Wireless Messages at Brooklyn Navy Yard.

THE NAVY WIRELESS SCHOOL.

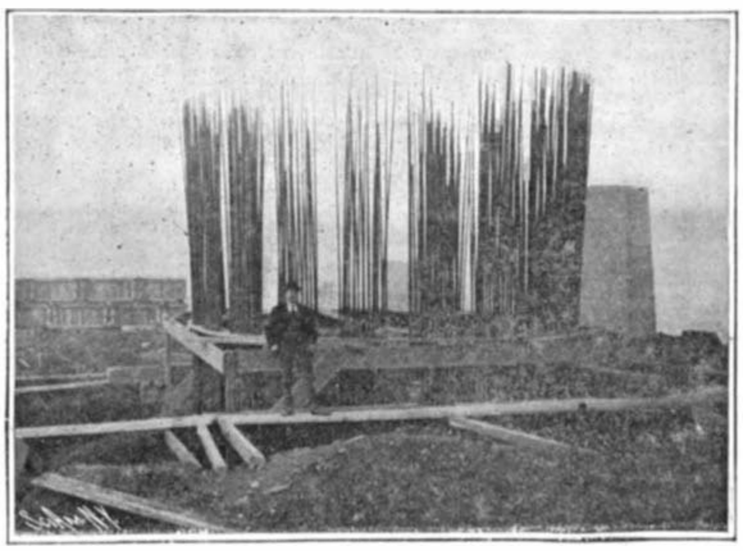
Fridays are examination days, when the instructors test the ability of each individual of the class, and they are marked and rated accordingly. Ten to twelve words per minute is the average sending capacity. Experienced operators send from twelve to fifteen words, and receive as many as thirty. Transmitting is a matter of power. Receiving depends entirely on delicate adjustment of apparatus, as well as a keen-eared operator. Chief Electrician Bean imparts the benefit of his expert experience in the taking apart and putting together of all the main electrical instruments. This is the most vital part of the training of wireless operators, who are destined to be sent, most of them, to remote localities, where they must depend entirely upon their own technical skill in the case, and making repairs of any breakdown of their apparatus, which is most likely to occur. A novel sight to see is a section of the class high aloft on one of the fighting masts of some of the battleships now at the navy yard, being taken up by the wireless officer for an object lesson in examining the method of arranging the aerial wires.

During the thirty-day term, through constant application and daily practice of six hours, and through the scientific and systematic drilling of Chiefs Bean and Delany, the class of wireless aspirants have been so perfected in the art, that they are qualified to graduate, and are competent to enter any ship or shore station of the navy, and to flash a message from one to two hundred miles distance, and receive and translate the same. In order to get a fine body of operators, the government offers liberal pay inducements, including rations, far in excess of the remuneration given to ordinary seamen recruits. The latter receive only $16 per month, while the electrical boy, who enlists and passes the preliminary examination in electricity, is rated as third-class electrician, at $30 per month. Advancement is certain, if accompanied by conscientious and ambitious labor, up to second class, bringing $40, and thence to first class, at $50 per month. The highest rating of chief electrician amounts to $70. The high efficiency of government wireless telegraphs is strikingly illustrated by the Cape Nome and Fort St. Michael stations, which Gen. A. W. Greely, Chief Signal Officer, states transmit 5,000 words easily in an afternoon across the 107 miles of waterway.

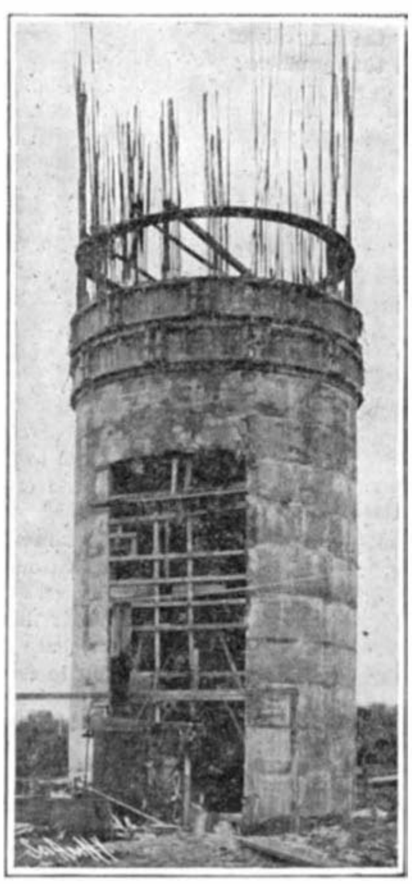
TALLEST CONCRETE CHIMNEY EVER CONSTRUCTED.

Tacoma, Wash., claims to include among its objects of interest the loftiest concrete chimney in the world. It belongs to the Tacoma Smelter Company, and has just been completed.

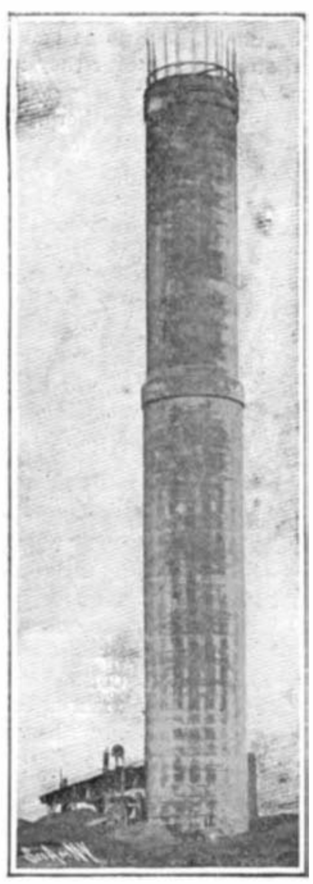
From the base of the foundation to the top of the chimney is 307 feet 6¾ inches, and the cost was $28,000. The stack was built to carry away the poisonous fumes from the smelting works at Tacoma. In its construction 1,225 barrels of cement were used, in addition to which the structure contains 105,000 pounds of T iron, 705 cubic yards of sand, and 231 cubic yards of gravel. Towering more than one hundred yards



Foundation Completed. First Shell in Place.



On February 21, 1905, the Height was 39 Feet.



On March 28, 1905, the Chimney Had Been Built up to 156 Feet.

The Chimney on May 28, 1905. 307 Feet 6¾ Inches.

TALLEST CONCRETE CHIMNEY EVER CONSTRUCTED.

from the earth, and without a single supporting guy, this chimney, because of its relatively narrow base, presents a very striking appearance.

The concrete foundation of the chimney is 36½ feet square and 6 feet thick. For the chimney proper, the mixture was one part cement and three parts sand.

The chimney is constructed in two parts. From the foundation up to a height of 90 feet there are two distinct shells—one built within the other; while for the rest of its height it is built with a single shell.

The purpose of the double shell is to protect the structure from cracks and strains due to extreme variations of temperature. The inner shell, which is separated from the outer one by an air space of five inches, is designed to shield the outer shell from the direct effect of the intense heat at the base of the chimney; while the outer serves as a like protection to the inner shell, by shielding it from cold weather, which might cause it to crack by cooling too suddenly.

The outer shell also takes up the heavy bending stresses caused by wind pressure. Not only are ordinary conditions guarded against, but the chimney is expected to withstand a tornado. Circulation of air between the shells is secured by the provision of small openings at the bottom.

The entire chimney was built in three-foot sections, and an average of three feet a day was made in the construction of the double section, and six feet per day on the single or upper section. Sectional molds were used, and the entire work was handled from the inside, a scaffolding being built up with the chimney. All materials were raised by means of a cable attached to the drum of the engine that operated the concrete mixer.

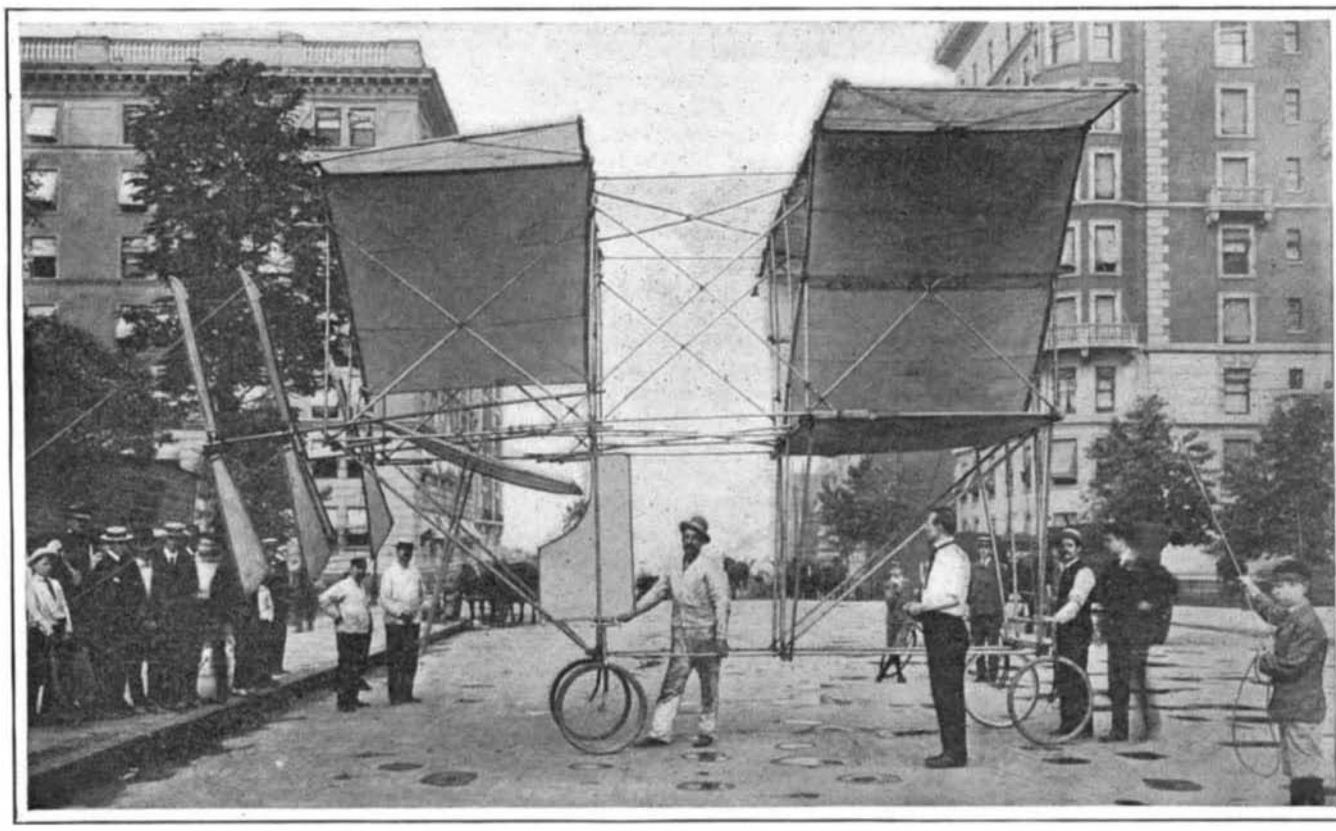
The inside diameter of the chimney is 18 feet, and the outside 21 feet. From base to apex the chimney is reinforced with T iron according to the Weber system.

The bridge built by J. W. Murphy in 1863, over the Lehigh River at Mauch Chunk, for the Lehigh Valley Railroad, was the first pin-connected bridge constructed entirely of wrought iron in its main members; cast iron being used only for joint boxes connecting the compression members. Many bridges of similar construction were built after this, but it was not until after the failure of the Ashtabula Bridge, in 1876, that cast iron was entirely discarded as too unreliable a material to be used in any parts of a railroad bridge.

A NEW AEROPLANE.

BY ISRAEL LUDLOW.

The following points in flying by means of the aeroplane must be cleared, either by study of the past efforts of others, or by personal experiments: The supporting power of the air, the resistance to a forward movement in it, the extent in square feet of the supporting surface, the form of the flying machine, the material of which it is to be built, the power of the motor to be employed, whether propellers or moving wings are to be used, the form of rudders or other expedients for effecting the steering and starting, the maintenance of the equilibrium, and the plan of safely alighting.



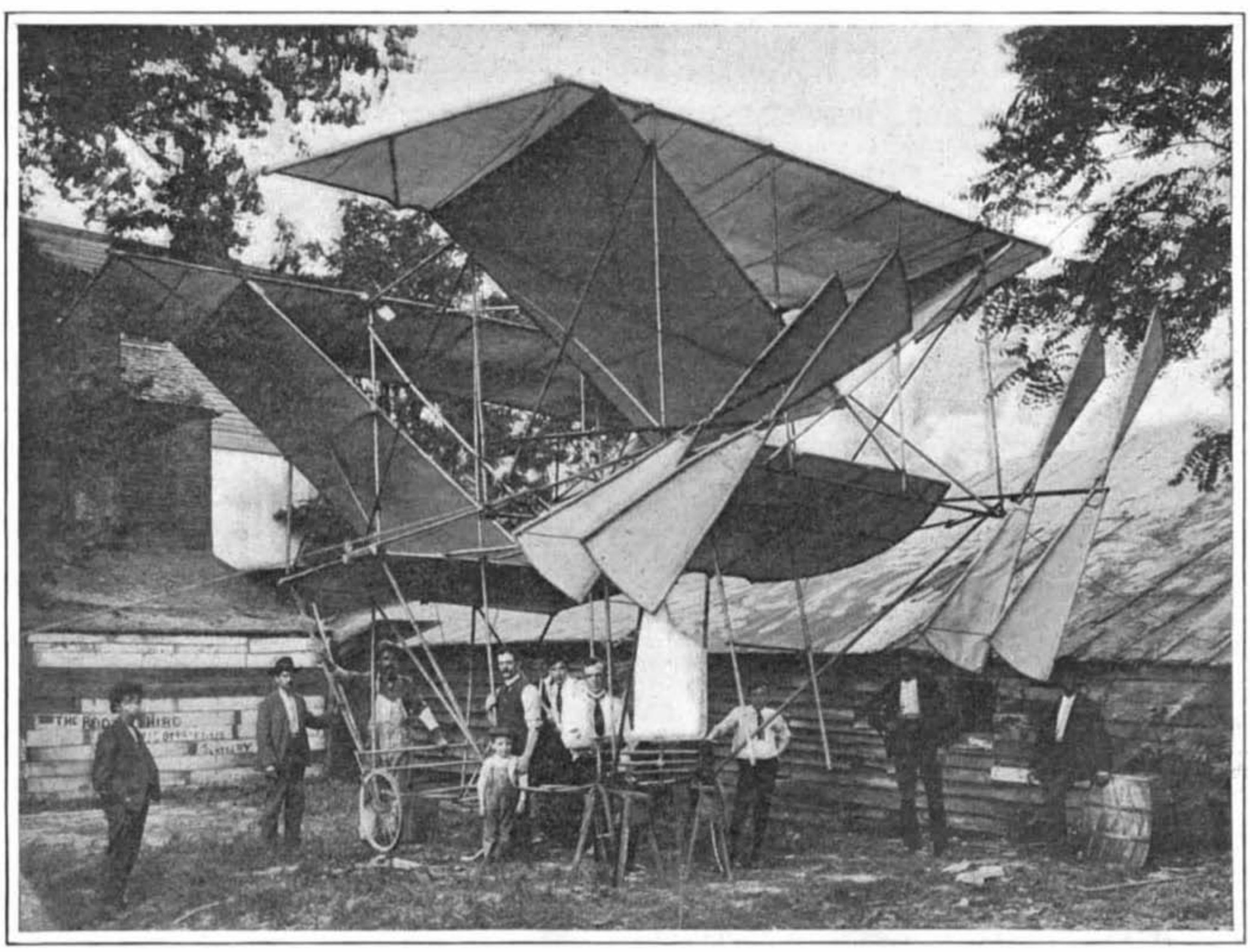
Side View of the Ludlow Aeroplane, Showing Arrangement of Supporting Planes, Rudder, and Propellers.

The supporting power of the air has been determined. Prof. S. P. Langley, of the Smithsonian Institution, Washington, D. C., sustained under favorable conditions by aeroplane a maximum of 200 pounds per horse-power expended. This result was reached by placing the aeroplanes at the end of a long arm revolving about a fixed center. Hiram Maxim, Mr. Hargrave, and others have constructed motors weighing less than 10 pounds for each horse-power developed. Propulsion and lifting power are solved problems, and it is obvious that there is the margin between 10 pounds and 200 pounds to carry the weight of the aviator and the flying machine. Care and attention must therefore be devoted to the general form of the machine, with the object of obtaining automatic equilibrium and safe support.

After numerous experiments with models, many of them on different lines from any previously constructed, and many of them very successful and encouraging, I have begun and nearly completed the construction of a full-size flying machine. It is built on the aeroplane principle, that is, it has no gasbag or balloon to support it, but is supported in air only when in motion, and by the upward reaction of the air upon the underside of thin fixed surfaces or aeroplanes, which are slightly inclined to the line of motion.

The framework is of light bamboo, of one and one-quarter inches, and is covered with light canvas treated with a preparation of boiled linseed oil and a drier. The joints are bolted with 3/16-inch bolts, and bound with light yacht marlin. There are two groups of three superimposed aeroplanes placed by pairs in tandem fashion. A large supporting surface with a manageable area and less weight of frame is gained by using superimposed aeroplanes in this manner. The two halves of each of the two middle aeroplanes are set at a diedral angle with each other.

The upper forward aeroplane is a trapezoid in shape. Its forward edge is 13 feet in length, its rear edge is 18 feet. Its sides are 7 feet 3 inches in length, and it has a depth of 6½ feet. The middle front aeroplane forms a diedral angle with the top of its sides reaching the upper aeroplane, and its two halves are 7½ feet long, with a depth of 6½ feet. The lower front aeroplane is rectangular in shape, and has a width of 10 feet and a depth of 6½ feet. The open space dividing the two sets of aeroplanes is 6 feet wide.



Stern View of the Ludlow Aeroplane, Showing Double Set of Propellers.

A NEW AEROPLANE.

The upper rear aeroplane is rectangular in shape, and 21 feet by 6½ feet in width and depth. The two halves of the middle or diedral angle rear aeroplane are each 11 feet wide by 6½ feet in depth. The lower rear aeroplane is rectangular in shape, and 9 feet by 6½ feet in width and depth.

There is a total of 556¼ square feet of surface; but as the supporting surface of the diedral angle aeroplane is not greater than the horizontal projection of such diedral angle aeroplane, the supporting surface is calculated at 491¼ square feet. These diedral angle aeroplanes give direction to the line of flight, prevent