EXPERIMENTS WITH MOTOR-DRIVEN AEROPLANES

Our illustrations depict experiments with an aeroplane carried out recently by Mr. Gustave Whitehead, of Bridgeport, Conn., who has been studying the subject of mechanical flight for upward of fifteen years. In one of the pictures is shown a light-weight, two-cycle motor, which was used on the aeroplane in a recent experiment.

Unlike Lilienthal and Chanute, Whitehead does not attempt to soar by jumping off a hill or precipice. He is content, on the contrary, with flying near the ground, if he can only solve the problem of rising from it quickly at will, and descending gently whenever and wherever he wishes.

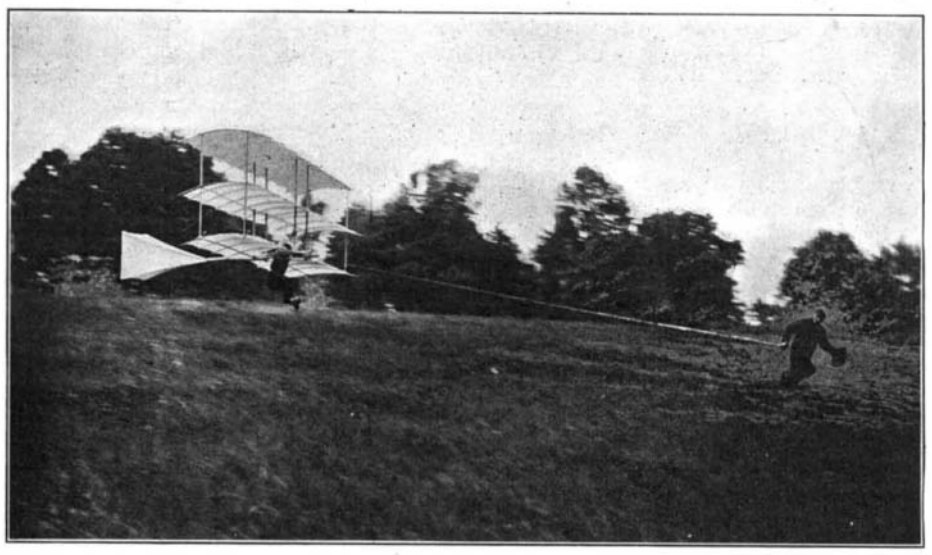
The method of soaring used by Mr. Whitehead consists in running with the aeroplane against the wind, preceded by an assistant who draws it with a rope when it leaves the ground. When sufficient speed is attained, the operator, by tilting the aeroplanes slightly upward, can leave the ground and skim along in the air, as shown in one of the photographs. The trimming of the aeroplanes, both longitudinally and transversely, is accomplished by the operator shifting the position of his body, and the proper trimming necessary to keep from taking a plunge is quite a delicate matter. A puff of wind striking the aeroplanes harder on one side than on the other can also easily upset their transverse stability, unless the operator is quick to counteract it.

After practising considerably at balancing the aeroplanes when drawn by a man, Mr. Whitehead at length designed and built a light-weight, two-cycle gasoline motor for propelling them. This motor is of the air-cooled type, and has numerous loops of aluminium wire fastened to the two cylinders in order to radiate the heat. The inventor says that he has found aluminium to be much better for this purpose than copper, which is the metal generally employed. The cylinders of the motor have a 4-inch bore and a 4½-inch stroke, and it is designed to run at speeds of from 1,000 to 2,500 R. P. M. It develops 12 horse power at the latter speed, and its weight complete is but 54 pounds, or 4½ pounds per horse power, which shows it to be one of the lightest gasoline motors ever built. Over 100 pounds compression is employed, the sole compression space being the small dome on top of each cylinder, in the top of which is seen the sparking plug. The motor, being of the two-cycle type, is valveless, with the exception of light aluminium check valves, through which the gas passes before making its entrance into the sheet-steel crank case (which is divided by a central partition) through the holes seen in its side. Splash lubrication is employed in the crank case, and oil is fed to the cylinders from two oil cups. A 25-inch wire wheel was used as a flywheel, and carried fan blades for assisting in cooling the motor. Its dimensions are 18 inches high by 12 inches long by 8 inches wide, and in the experiments made with it, a two-bladed propeller 4½ feet in diameter was fastened on the motor shaft and revolved at a speed of 1,000 R. P. M. As the motor has four disk flywheels inside its crank case, the large wire-spoked one is not absolutely necessary, and in actual tests, when mounted on the aeroplanes, the motor was found to work equally well without it, thus reducing the total weight of the motor to 47¼ pounds.

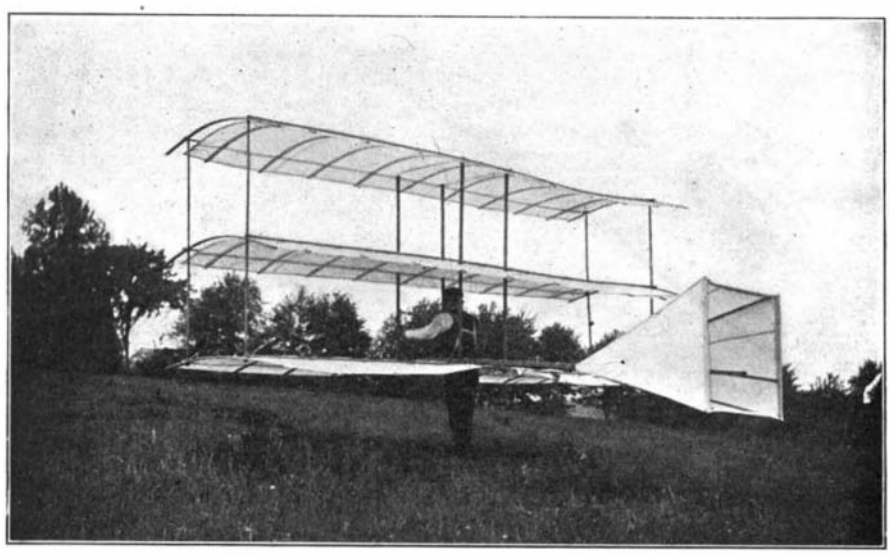
The three aeroplanes are spaced 3 feet apart and are 16 feet long by 5 feet wide. They are made up of spruce wood frames, covered with muslin, and are suitably braced with diagonal wires. There is a space in the center of the lower one for the operator, who hangs from the two forward uprights and keeps the apparatus in trim by shifting his body. A rigid, pyramidal-shaped rudder projects from behind.

After ascertaining, by loading himself with sandbags, that the aeroplanes were capable of lifting the extra weight of the motor and propeller, the motor was attached to the two longitudinal projecting rods of the lower aeroplane, and carried the propeller in front of it on its crank shaft. By running with the machine against the wind, after the motor had been started, the aeroplane was made to skim along above the ground at heights of from 3 to 16 feet for a distance, without the operator touching, of about 350 yards. It was possible to have traveled a much longer distance without touching *terra firma*, but for the operator's desire not to get too far above it. Although the motor was not developing its full power, owing to its speed not exceeding 1,000 R. P. M., it developed sufficient to move the machine against the wind. The total thrust, or, in this case, pull of the propeller was found to be 280 pounds, while all that is needed to keep the machine in the air, according to the dynamometric measurements made when it was drawn by a man, is a pull of 28 pounds. Making the propellers pull, instead of push the machine, aids greatly in maintaining its stability.

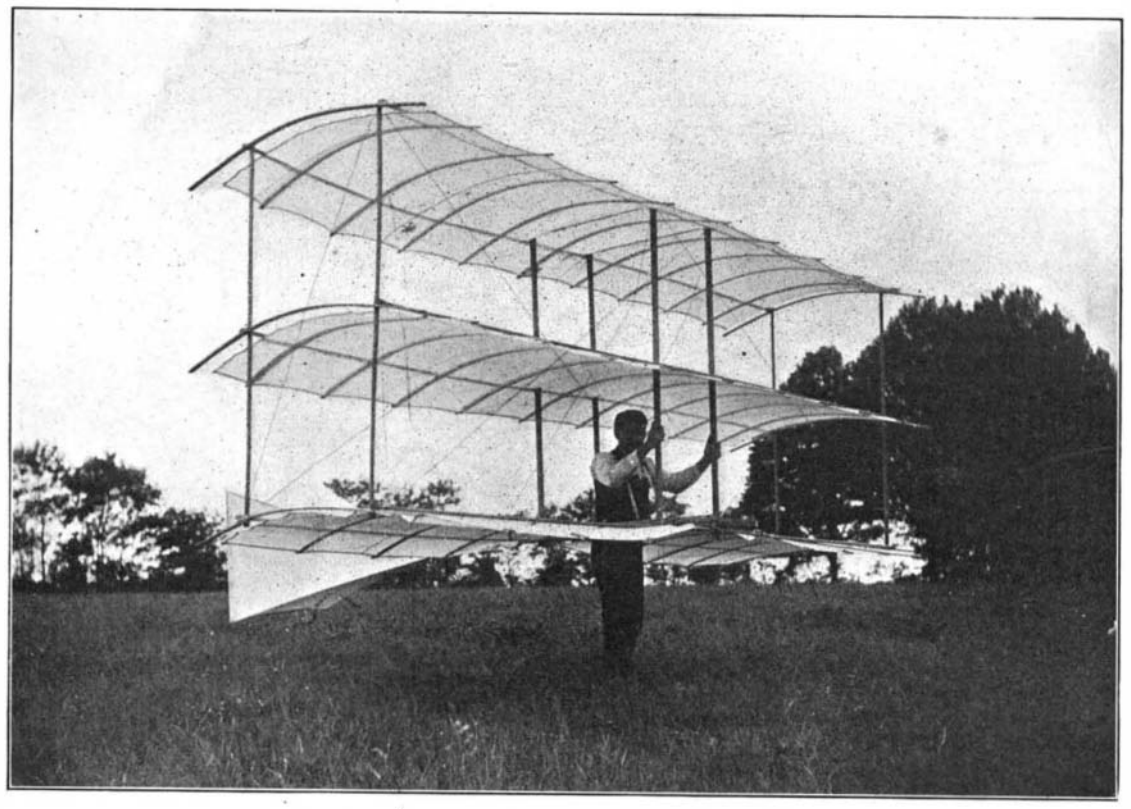
Having proven that a less powerful motor will do the work, Mr. Whitehead is now constructing one of 6 horse power which will weigh between 25 and 30 pounds. He intends to drive two 4½-foot propellers with this, by means of bevel gears, giving the proper speed reduction for obtaining a speed of 600 to 800 R. P. M. of the propellers. Besides this smaller two-cylinder motor, he is also constructing a four-cylinder one, of 10 horse power, which he expects will not exceed 40 pounds in weight, aluminium being used as far as possible in its construction. This is to be used on an improved aeroplane with which the inventor hopes to be able to rise vertically in still air, travel horizontally, and descend vertically again. This is the desideratum of the aeroplane flying machine.



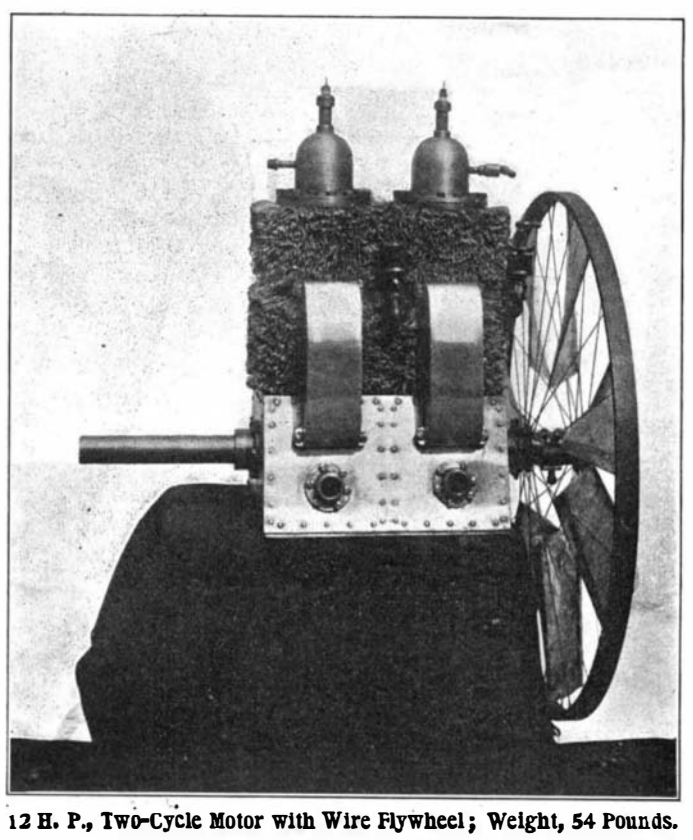
Gliding Near the Ground Against a 15-Mile-an-Hour Wind.



Rear of Aeroplane, Showing Pyramidal Rudder.



Front of Aeroplane, Showing Operator in Position.



12 H. P., Two-Cycle Motor with Wire Flywheel; Weight, 54 Pounds.

EXPERIMENTS WITH THE WHITEHEAD AEROPLANE.

The Current Supplement.

The current Supplement, No. 1446, contains the second installment of "The Mechanical Handling and Conveying of Coal and Coke," illustrating the best foreign practice. "The Siemens & Halske Fire Alarms" gives detailed illustrations of the Berlin fire and accident alarms, and other types are shown as well. "Practical Receipts for Silvering" gives a considerable number of valuable formulae. An article on a "Unique Color and Paint Laboratory" is devoted to an up-to-date technical and research laboratory built with special reference to the examination of paints and dyestuffs. "Artificial Silk, a Problem in Chemical Invention," describes this most interesting duplication of nature's work. "The Present State of the Art of Electro-Culture" is by Emile Guarini. The usual Engineering Notes, Electrical Notes, Trade Notes and Recipes, Selected Formulae and Trade Suggestions from United States Consuls will be found in their accustomed places.