CURTISS BUILDS BIG WAR BIPLANE

GIANT AIR FIGHTER WILL BE CAPABLE OF DROPPIING A TON OF HIGH EXPLOSIVES AT ONE SPOT

The day of the big flying aeroplane is at hand. With a ton of explosives it is to be baited by the Allies into the strategic line of the Rhine, to be met by the anxious flyers of Germany in similar giant crafts, armed with high artillery and machine guns, and using a raining projectile.

Practically all the great powers of Europe are at work on the construction of such big aeroplanes. In America, where aviation has long been neglected by the government, Glenn H. Curtiss is leading the way for the rest of the world in the service of England and her allies.

It has taken a year of modern warfare to develop the fighting aeroplane from the experiments of light-aircraft would-be who flew in small craft under great limitations. Today, Curtiss has produced a machine lifted little more than three times in exhibition in American cities. Though of the highest importance for observation, they may be rated as fighters with the smallest torpedo boats. They have succeeded largely on the elements of surprise and swiftness, and are limited in operation by their low fuel capacity. The radius of action of the small military aeroplanes now in use in the European is little more than 200 miles.

Four hours’ gasoline supply was the usual military requirement before the war. It soon expanded to six hours, and before long may exceed twenty. The big Curtiss craft at Toronto might meet such a demand if need be. There are, however, other needs that are considered more important than endurance of flight, chiefly that of lifting a great load of high explosives and carrying it to the enemy’s base or to other strategic points within easy striking distance.

The Curtiss war machine, though assembled at Toronto, is largely a product of the Curtiss factories at Hammondsport, N. Y., where the motors were built, and at Buffalo. In weight it will reach nearly two tons without load. The two engines alone will weigh 1,500 pounds, and deliver a total of 200 horse power. This is nearly double the power of the American, built by Mr. Curtiss last year for the Redman Wannamaker transatlantic expedition, though the power plant’s weight is only 50 per cent. greater. With a ton and a half load aboard the total weight to be lifted will be about three and a half tons.

Mr. Curtiss and his advisers are confident that the big craft, which spans 100 feet from tip to tip of her wings, will do what is required of her, leaving orders for a large squadron of similar aeroplanes for the British Army’s use, besides others for Russia. He is developing another class of equal power, but slightly smaller, a flying boat of high speed, for the Russian Navy, at his Buffalo works.

With a load of a ton and a half in fuel, coal and explosives, the new Curtiss biplane will be able to start from the British base at Dunkirk and strike at any of the German military centres along the Rhine. She may drop almost a ton of dynamite in one spot; for instance, at the point where the Rhine enters the Ruhr near Cologne, or at the Ruhr near Düsseldorf, or at the point near Aachen where the railway enters that city, and right at night and right away those men and munitions into the German tramline across the Rhine the Rhine bridges night and right.

To meet the threatened attack Germany’s air fleet is receiving strong additions in the form of high-power biplanes and triplanes known as “Kolumbus.” Several of these already have been seen in this field, according to official reports. They are driven by double engines and carry light fire arms of artillery, degrading the value of the southern coast of the Rhine for investment by the enemy.

In Italy a 200 horse power Papebi flying “du- ster” has been constructed for government shops, with three engines. In Russia, four airplanes are endeavoring to give more speed and lift to the big Ilja Mouromtsef biplane of 400 horse power, which started sixteen persons aloft at one time in a brief flight. Other construction in England and France are required to work on the problem of the big aeroplanes.

With engine power known, and speed and lift approximately determined, it is easy to see the possibility of the big Curtiss biplane. Mr. Curtiss recently said that the aeroplane he had designed would carry, if required, enough fuel to cross the Atlantic from Newfoundland to Ireland——about 1,000 miles. For military purposes, of course, this would not be required, as to carry four men alone would deprive the craft of offensive power. But the estimate served to show the size of the big load to be carried.

At seventy-five miles an hour, the approximate speed of the biplane, the duration of a 1,400 miles’ flight would be nearly twenty-five hours. Tests have shown that her motor can carry more than half a piston of fuel an hour for each horse power, weighing thirty-eight one-hundredths of a pound. For twenty-five hours at this rate, 220 horse power would require 6,950 pounds of gasoline.

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Built in Britain and French aeroplanes have dropped 200 to 400 pounds of explosives each on vital points in the German defense system have caused a great stir. There was a bitter outcry in London even over such an attack on Kiel. Recently, in fact, the German government has ordered forty-five machines to be produced, and every one of these is capable of attack from the big biplane, carrying ten times the destructive power of the small aeroplanes, operating from the Allied bases at Dunkirk on the north and Southport on the southern extremity of the fighting line to the West.

The Krupp works at Essen and Düsseldorf are about equally distant from the British base at Dunkirk——about 150 miles, or five hours there and back for the aviator, at seventy-five miles an hour. Expanding about one and one-fourth pounds of fuel for each mile flown and about the seventy-five-mile pace, he must take with him about 500 pounds of fuel and about sixty pounds of all for the two 150 horse power motors. At least ten men, weighing, say, 250 pounds, must make the journey, one to steer, the others to attend to the motors. They must be ready to fight. In an emergency the control may be put to maintain a given course with the aid of the gyroscopic stabilizer invented by Bernet A. Sperry of this city, which is being installed. This instrument also automatically balances the aircraft at all times, leaving the pilot’s hands comparatively free for a clash of arms. Deflecting the weight above gives lever a lifting power of 2,000 pounds, or more than a ton, which can be used entirely for engine bombs to destroy the enemy’s works. The weight carried would be divided as follows:

- 200 pounds of gasoline
- 300 pounds of explosives

Total weight: 1,500 pounds

For encounters with other aircraft it would be possible to carry machine guns, 10-centimeter, or light canon, the weight of which would be deducted from the allowances for bombs.

By carrying more gasoline——250 pounds——the raiding craft could reach Coblenz, 250 miles from Dunkirk, where another of the big German train lines crosses the Rhine. She would have available lifting power on this incursion for 1,700 pounds of dynamite, and feel strong enough to return to her base at Düsseldorf.

Cologne is 250 miles from Dunkirk. In the British base, and about 2,000 pounds of explosives could be used against this railway building. Twenty-five miles south of the city another of the rival rail lines from Berlin into Belgium and Luxembourg crosses the Rhine on a bridge, a fair mark for the airman.

The fortress and railway bridge at Malmedy are 250 miles from the British base. This city can easily be reached by bombing 800 pounds of gasoline. This carries 1,750 pounds of high explosives.

Coblenz and the German fleet head- log here and guarding the Keel Canal are 250 miles from Dunkirk——about four and a half hours’ flight. There is nearly the same westerly. Fuel and oil for this raid would weigh 1,300 pounds, leaving 1,000 pounds for explosives. Bremen, the big
seaport near the mouth of the Weser, lies about the same distance away.

Hamburg, the principal seaport of Germany, is 500 miles from Danzig. After taking aboard the necessary stores, it would still be possible for the seaplane to carry 1,500 pounds of explosives to wreck the shipping there.

From Belfort, the air base at the southern end of the allied line, Uim, the big railway centre in Württemberg, is but 156 miles. Baden-Baden is 130 miles away, Karlsruhe and Friedrichshaven, the Zeppelin-building city, are each 120 miles away. Consequently, only a small load of fuel is needed, giving room for more than a ton of bombs, to work destruction at these places.

Darmstadt, residence of the Duke of Hesse, is little more than two hours' flight from Belfort. Münch, the Bavarian metropolis, is 280 miles away. About 1,500 pounds of dynamite could be taken there besides fuel and oil. Dresden, the Saxon capital, or Prague, in Bohemia, can be struck after flying 385 miles, little more than five hours, with 1,560 pounds of explosives.

Most interesting, perhaps, is the possibility of taking the war in the air to the two Kaisers at Berlin and Vienna. The Prussian capital is 455 miles from Belfort. One of the big new fighters could cover the distance in little more than six hours, in fair weather. About 1,500 pounds of fuel would be needed for the daring enterprise, but this would still leave room in the bomb compartment for eleven missiles, each weighing 100 pounds, enough to disturb the poise of Potsdam. Vienna is slightly nearer, and might be agitated a trifle more by the new aeroplane.

From the 27 horse power motor that the Wright brothers first used, to twin motors of 100 horse power each, is a long step. Most of it has been taken by Mr. Curtiss in the last eighteen months under the stimulus of the Rodman Wanamaker transatlantic flight effort. Indeed, America's lead in the development of the big aeroplane is directly due to the encouragement given by Mr. Wanamaker to the constructor and his staff at Hammondsport, N. Y., at a time when aviation was languishing. In one short season, on the order for a transatlantic flyer, Mr. Curtiss produced what had previously been found impracticable—a double-engined aeroplane, and one of larger size than any other flying boat.

It proved capable of lifting heavy loads and of traveling through the air at a rate of more than sixty miles an hour. Trouble in rising from the water, which appeared in the first tests, was overcome, soon after the war began in August of last year, by a simple alteration of the tail from a cylindrical to a flat form. The America, as she was known, flew with one motor stopped, the other sustaining her.

In England, where she was sold to the Admiralty on the recommendation of Commander John C. Porte, the Curtiss craft seemed to point a way ahead in aeronautics, and orders were given for thirty-two of her type.

Though the America proved useful in North Sea raids, she is a flying boat, unable to alight on or rise from dry land. In addition, there appeared the need of aircraft with still greater capacity than hers, said to be about 1,800 pounds.

It was found that the ordinary biplanes used by the British and French armies, sent to raid the line of Rhine defenses, supply stations and communications, arrived at their destination with a comparatively small amount of explosives, even after the pilot discarded his companion, the observer, and flew alone to save lifting power. This proceeding, while successful in a measure at times, failed at others. The strain on the pilot was tremendous. He was trying to aim at the enemy, while keeping a hand on the control and an ear to the engine's beats. Often he had fired and expended his few bombs in vain. The gyroscope stabilizer was added to the America class to relieve these overworked aviators.

Then came the demand for more speed, more lift and more power. It found the American builder already prepared with a big motor, developed for the next transatlantic effort, and another flying boat of larger size than the America, designed for the same purpose. The latter is the big biplane at Toronto, with modifications in the plans to give greater speed and load-lifting, and others to add to its offensive qualities, and to make it a landing machine instead of a seaplane.

Without exception this biplane is believed to be the largest ever constructed for military use. It is slightly exceeded by the Russian Sykorsky, built for passenger-carrying, with four motors of 100-horse power each. The Curtiss giant spreads its wings 100 feet, as against 72 feet, the stretch of the America's top plane. There is about one-third more sustaining surface in the new wings than in those of the Wana- maker boat. The stout main spars of these planes look more like a bridge span than a flying machine.

There is indeed the power of a miniature storm in the two engines and propellers of the big "pusher," as this type of aeroplane is termed in distinguishing it from the tractor type, which is drawn through the air by a screw at the bow. Each of the 160-horse power motors exerts a thrust on the air of 1,000 pounds through the grip of its nine-and-a-half-foot propeller.

The engines are of the water-cooled stationary pattern, each with eight cylinder, set V-shape, four on a side. The use of two of them gives the advantage that descent in a hostile country is not made necessary if one motor stops, the other being able to sustain the biplane in slow flight.

The engines are near a line midway between the upper and lower planes and on either side of a long torpedo-like body or fuselage, and are about ten feet apart. In the body are sheltered the pilot and engine, control wheels in duplicate, fuel and explosives. The engineer finds the motors more conveniently placed than in the America, where he was obliged to stand on the after deck to reach them. They were placed almost as high as his head.

To gain speed, Mr. Curtiss has cut down head resistance wherever possible to do so without weakening the craft.

In this work he has had the assistance of Dr. Albert E. Zahn of the Smithsonian Institution, a noted authority on aeronautics. The constructors' staff at Toronto is headed as manager J. A. D. MacCurdy, a noted aviator long resident in this city, and Anthony Jannus, constructor and pilot, recently of Baltimore. Charles M. Manly of this city, once Samuel P. Langley's aide, is watching the work for England.

Compared with the America, there is an increase of nearly a third in length, giving about forty-five feet over all. The expensive silk covering of the America's wings gives way to Irish linen over frames of spruce and ash. The fabric is coated with a waterproof and airproof preparation.

Balancing is obtained by flaps hanging from the rear edge of the upper planes, each about sixteen by four and a half. If the craft tilts to the right, the flap on that side is pulled down and the pressure of the air stream against it gives the effect of inclining the falling side, correcting the tilt.

Elevating planes are placed on either side of the tail, which is terminated by the vertical rudder. This sheet of steel armor will shield the under side of the pilot's and engineer's places and the motors from bullets fired from the ground.

The propellers are an interesting feature. Each swings through a circle of nine and a half feet diameter, a foot and a half greater than those of the America. At 1,500 revolutions the tips of these members are moving through 35,810 feet, or nearly seven miles a minute. Because of the great centrifugal force, a severe strain is imposed on the tips. The propellers are built up of layers of wood, and the tips are sheathed with copper.

Those working on the new biplane are enthusiastic in the belief that she is only the first of a big fleet of aeroplanes of even greater size that will be built by American ingenuity, encouraged by Europe's appreciation and money. Already nearly 3,000,000 is being sent here this year from across the ocean for aeroplanes and aeroplane engines.