

# A GUN FOR POTTING SKY-SHIPS

### Admiral Twining Invents an Upright Rifle That Experts Believe Will Make the Heavens Too Dangerous for Bomb-Dropping Aeroplanes



ADMIRAL NATHAN C. TWINING, U.S.N., INVENTOR OF THE AERO GUN

By William L. Aldorfer  
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**B**EFORE long American warships will be equipped with another battery of guns to fight hostile invaders in the air. Uncle Sam, with the assistance of his ordnance experts at Washington, has invented a new gun that will shoot more than three miles straight up in the air. Any hostile airship coming within this distance of a battleship in future will be taking great chances, for the new gun will be able to bring it down, no matter how great the speed it may be traveling through the air.

After shooting a shell more than 18,000 feet into the air and closer to the skies than an aeroplane has ever flown, the experiments with the new naval gun destined to destroy the airships of an enemy, have proved successful even beyond the fondest hopes of its inventor, Admiral Nathan C. Twining.

The new gun is a great improvement over the aeroplane guns of other countries, as much of the intricate mechanism and gears has been eliminated. The perfection of this gun places the United States far in advance of her rivals in the matter of defence against aerial attack. Many guns for defence against aeroplanes have been built by European powers, but their success has been limited. Probably the best known aeroplane gun is manufactured in Germany. Recently this gun was mounted on an automobile truck, and is said to be efficient, but very clumsy. A crew of six men is needed to operate it.

All that is needed to put an aeroplane or balloon out of commission, and probably kill the occupants instantly, is to explode a small shell somewhere near it. The white hot steel from the bursting shell and the flame from the explosion are sufficient. This result can be obtained from the Twining gun, which is so small it can be operated by one man if necessary.

Admiral Twining's story of how he happened to design the gun is interesting and shows what can be done in a remarkably short time. "About a month ago I thought of the aeroplane guns invented by foreign countries and realized it was time the United States got in the procession. I started the plans and within a week they were finished.

"About three weeks from that time the gun was completed at the Washington naval yard and sent to the naval proving grounds at Indian head, where the experiments proved it a success.

"In an aerial gun the problem of the recoil and the sight is the hardest to overcome. The great difficulty in designing a mount to withstand the terrific recoil of a gun pointing directly up in the air was successfully met, and the only thing now necessary to make the gun accurate and almost sure to hit an airship is the matter of the sight. Our experiments at Indian head have given us sufficient data from which to design a sight, and it is now being done.

"Another great problem confronting us with an aeroplane gun is to figure out the trajectory or curve the shot describes while going through the air. When firing straight ahead or on a horizontal plane, this has been figured out to a certainty, but when we fire into the air—something entirely new—it is altogether different. However, it is certain this point will be determined in a very short while.

"In order to hit an aeroplane the man who sights the gun must be very skillful. It is something like wing shooting, and requires accurate judgment on the part of the man sighting the gun. The range finders we already have in the navy can be used to find the range of an airship just as well as finding the range of an object on a horizontal plane."

In speaking of the danger of bombs thrown from an airship striking the

deck of a battleship, Admiral Twining gives some interesting reasons why this would be next to impossible, unless the airship comes dangerously close to the battleship. He said: "A shot from a gun on a battleship can reach the aeroplane much quicker than a bomb can be dropped from the airship to the battleship. If a gun could be placed on an airship and fired downward, the airship would then be in nearly as good a position as the battleship, but there has been no such gun yet invented. The question of weight comes in here. A gun to be of any value at all should weigh about 100 pounds, and when this weight is added to that of the operator it would be too heavy for the aeroplane to carry."

"A striking and simple illustration of the difficulty an airman would experience in dropping a bomb on the deck of a battleship is that of a person going over a trestle in a railroad train traveling at the rate, say, of 30 miles an hour, trying to drop an orange between two ties of the trestle. In order to accomplish this feat it would be necessary to drop the orange several seconds before reaching the particular ties because the velocity of the train would throw the orange ahead just so many feet. This is the problem the airship is up against when it attacks a battleship, only on a much greater scale.

"Again, the weight an aeroplane can carry is limited and very few bombs could be carried by the airman; but, on the contrary, a battleship carries almost any amount of ammunition, and it can therefore afford to take more chances than an airship. This same reasoning applies if a fleet of airships should attempt to destroy a city.

"We hope ultimately to have such a sight that will enable us to fire at and reach an aero at any point in the sky within a vertical distance of at least 15,000 feet, or within a horizontal radius of a mile. And we believe that such a sight will be designed shortly. When this is done there will be practically no danger to be apprehended from an airship."

While the new gun can be fired from any angle in a half circle, it is the general belief that it will never be aimed at 90 degrees or in a perpendicular position, for the reason that the shell might return to the deck of the battle-

ship, probably unexploded, and there would be the destruction intended for the enemy. The angles of firing probably will range from 50 to 75 degrees.

When the gun was submitted to its first test at Indian Head, Md., 15 shots were fired in the air at various angles, then the gun was lowered to 70 degrees, but the firing crew lost sight of the place where the shell fell because of the haze. Unloaded shells were used in the experiments. The fuse of a loaded shell is so sensitive, ordnance

experts say, that explosion would result immediately upon contact with an airship even though it grazed only a wing and would disable or demolish the aeroplane and probably kill the aviator.

The second day's tests were even more favorable than the first day. A preliminary examination of the new gun showed it stood the first test without injury. The first shot was fired at an angle of about 70 degrees and a long line of smoke, curving slightly as

it reached the heavens, furnished the commanding officer with his only clue as to the course of the shots. Observers placed along the river bank to ascertain the spot where the shot struck said it had become lost in the haze.

A few seconds afterward another shot was fired at a lower angle. This test continued, the gun being altered with every shot, until 10 rounds had been fired. The gun was swung on its turret so as to cover a quarter of the horizon and discharged at angles ranging from 60 to 85 degrees.

It was then arranged to point at an angle of 75 degrees, when the final volley of the day—five shots fired in rapid succession at an imaginary aeroplane—was discharged. From these tests it was shown that the new aero gun could, in warfare, keep up continuous firing at the rate of 12 shots a minute.

The government expects to build at least 25 of the new aerial guns and, after being tested at the Indian head proving grounds, they will be sent immediately to the battleship fleet for mounting in a new deck battery. Because of the low caliber it will be possible to have them made at the Washington navy yard. This foundry has for years been too small to meet the exacting casting requirements for modern big guns, and all big gun castings have been made by private concerns.

The idea of the new one pounder gun is expected to be developed later into a three inch gun. Naval experts say the three inch gun will shoot seven miles straight up into the air, and with this great range they claim no airship will be able to live long enough to come within striking distance of any battleship. And even should it manage to live through the hail of shot and shell which would greet it, the chances are a thousand to one it would fall in strik-

ing the battleship with a bomb. The army has progressed even farther than the navy in perfecting an aeroplane gun. The new army gun is a six pounder, equipped with specially adapted high explosive projectiles and shrapnel shells, to demolish aeroplanes and balloons in battle. It can be elevated at any angle and throws a shell seven miles.

The construction of the new army rifle has just been completed at the Rock Island, Ill., arsenal. Experiments with it are expected to begin at the Sandy Hook proving grounds within a fortnight. The army thus is in advance of the navy toward the solution of the problem of defense against airships.

The shells which this gun will hurl into the skies are remarkable devices. They are loaded with Junnitte and other high explosives, and, on bursting, send forth a shower of shot in a cone-like area, similar to the performance of a skyrocket, almost certain to strike an airship if aimed with any degree of accuracy. Other projectiles which have been designed for the new gun contain only a high explosive, which, on exploding, would wreck any airship in its vicinity.

Following in the wake of these powerful projectiles will be "tracers," which will aid in accurately aiming the gun in the course of a hostile airship. The "tracers" to be used in daylight will be of smoke, while sparks will show the path of the shell at night.

The sight of this new gun also has been perfected. It is designed to meet the changing conditions of the trajectory of a projectile fired at varying angles. As soon as the angle of the aeroplane has been determined, the sight will automatically set the gun to the proper elevation.

In the forthcoming experiments at Sandy Hook, the army will shoot at balloons and box kites, and possibly a real aeroplane will be used for the purpose of sighting at great distance. The signal corps is expected to co-operate with the ordnance department and send one of its airships now at College Park, Md., to the proving grounds. Credit for the invention is due ordnance experts of the army working under the direction of Brigadier General William Crozier, chief of ordnance.

The strenuous efforts now being made to perfect an instrument of war capable of demolishing an airship, it was pointed out to the writer, demonstrate the seriousness with which the possibilities of the aeroplane in any future conflict is regarded by naval experts.

Many American officers still cling to the belief that its mission in warfare will be confined largely to scouting purposes. But even this, they admit, is of tremendous importance. The scout cruisers—the "eyes of the navy"—by the utilization of aeroplanes, which could be sent aloft from their decks at any moment, would increase their radii by hundreds of miles. Few believe, however, the airship ever will be resolved into an attacking force.

The Germans have made the greatest progress in the development of an airship gun, both for the army and the navy, while the French and the English follow closely. In Germany they have an airship gun which can be mounted on board ship, but at present has been adopted only for army use. This gun was shown at the Brussels exhibition, mounted on a powerful armored motor car, capable of a speed of 40 miles an hour.

On this gun the sights are changed by means of a hand wheel. They are telescopic, and a moving object can be followed easily, while a patent temperature scale indicates automatically the fuse setting for any elevation or range. Special arrangements were made for supporting the motor chassis as a gun platform, making it perfectly rigid.

The peculiar feature of this gun is that the recoil is absorbed without the necessity of compensating springs. These features are said to be especially useful in a gun carried on a car, and are such as to enable moderate curves to be taken at a high speed. For military use the German car carries six men, 110 rounds of ammunition and 200 litres of benzine.

The question of airships attacking submarines has also received considerable attention of late. Only last month an aviator named Abrin, flying outside Cherbourg harbor, France, was sent out by the French naval author-

ities to find two submarines which had been ordered to submerge in the harbor several hours before.

The aeroplane, at a height of 400 feet, discovered within a few minutes both submarines, which were over a mile and a half apart. It then returned to the harbor and prepared for a further test—to discover the submarines while submerged and going at a high rate of speed. Abrin rose at once to a height of 1,200 feet and, after a short observation, he found the periscopes of one submarine, which was at a depth of about 18 feet. This second flight occupied 20 minutes. It has now been demonstrated that from a height of about 2,000 feet it is possible to discover a submerged submarine; and that a submarine, with the aid of its periscope, can not sight an aeroplane when the latter is flying higher than 1,500 feet.

The other side of the story regarding the destructive possibilities of the airship or aeroplane against the aeroplane on land or sea is of interest. For instance, it is claimed an airship can drop from an unreachable height, at least 500 pounds of high explosives, and destroy railroads, bridges, ships and whole cities. Moreover, it should be considered that what goes up must come down, and the destructive force of a descending bomb would be just as great downward as in its upward flight, and there is no controlling its fall.

The fastest time made by expert gunners in recent experiments at finding the range of an aeroplane, with all the most advanced instruments, was eight minutes, and then the barometer record on the aeroplane showed the range was 200 yards off. The aviator is not standing still, waiting for the gunner to find his range and shoot him down, but he is on his way and out of sight before the gunner can adjust his sights.

In France there are more than 1,000 airmen all qualified for special military duty. There are also 50 schools of aviation there, 10 of which are of the highest order and can turn out aviators with a week's training if required. With the present facilities of construction, 20 aeroplanes a day could be produced if they were needed. These can be carried in compact form, so the question of transportation amounts to nothing. An old barn or a granary would afford all the needed facilities for putting together aeroplanes secretly near the scene of action, so the outside world would know nothing until the fleet of warbirds arose and was on its way carrying destruction.

It is just here that the generally unappreciated power of the aeroplane exists. It is in that psychic effect upon the minds of the people of threatened communities that the greatest peace compelling power of the aeroplane is to be found. Self-preservation is a sound law of nature, and the destruction of all one's family and belongings is not a thought that can be overcome by an appeal to patriotism. It is my all or your all that is at stake, and the crime of war under such conditions might cause an insurrection against any ruler who sought to permit it.

Unfortunately, it is claimed with all the progress made in aviation, conditions have forced development along lines not to the greatest good of science. It has been a money making period of the manufacturers, and they have only devoted their time to speed, ignoring other and more important phases. Now solid and substantial progress seems to be in order, according to experts, which will make the aeroplane as positive a factor in commerce and war as the railroad and the dreadnought.

While on the subject of aeroplanes, airships and aero guns, it is interesting to go back 20 years or so. If any one had said at that time that within two decades man would be able to see through opaque substances, to talk with vessels sailing on the high seas, or to fly higher and faster than most birds, no one would have believed. Roentgen's X-rays, Marconi's wireless, and the invention of a heavier than air flying machine have brought all these things to pass.

And what is more wonderful than the conception of a monster air liner crossing the Atlantic than in Jules Verne's description of the Nautilus, which was scoffed at by scientists, many of whom have lived to see submarines become an important factor in every modern navy. And has not Phineas Fogg's "impossible" feat of going "round the world in 80 days" been cut into by a young French newspaper man? So with the airship and the aero gun. It is more than possible that within the next decade we will have airships plying the atmosphere the same as automobiles now run upon the ground, and aero guns to bring down the aeroplanes when they become unruly, or on hostile mission from a foreign country.



NEW NAVAL AERO GUN PREPARING TO FIRE

GERMAN ARMY AERO GUN. IT CAN BE USED ALSO IN THE NAVY



NEW NAVAL AERO GUN FIRING AN AIRSHIP