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The Role of the Kite-Balloon in Anti-Submarine Operations

By Robert W. Neeser

THE student of naval tactics will search the books on that subject in vain for references to the use of kite-balloons in major operations at sea; yet this ungainly creature that sits tailwise in mid-air, can hardly be said to be the product of the present war. The French used war balloons as early as 1794 in their operations against the Austrians, to the discomfiture of the latter, who denounced them as "an insidious form of attack" and declared that all balloonists who fell into their hands would be treated the same as spies. During the Franco-Prussian War, the French had recourse to the use of balloons after the investment of their capital, for communicating with the outside world, and these balloon sorties so vexed the Prussian military commanders that they sought by every means possible to invent guns for use against the "blockade runners."

The old-fashioned spherical gas balloon, however, had many defects, even when anchored as a stationary observation platform. The chief drawback was its natural instability. In a dead calm it would revolve continually owing to the tendency on the part of the cable holding it to untwist itself, while in a breeze the balloon oscillated backwards and forwards so violently that it rendered any satisfactory observation work practically impossible. During the siege of Port Arthur, the Japanese for the first time made use of an elongated type of kite-balloon, manufactured out of the remains of an unsuccessful airship, but, while the new model gave good results, it was evident that much still remained to be done before the observation balloon could be depended upon as a reliable arm of the military and naval service.

Before the outbreak of the European war, the kite-balloon was not looked upon with favor by any of the military or naval powers, except Germany and Austria. The French army in 1914 had a number of spherical balloons, but these could not compete with the more stable "drachen ballon" with which the invading forces were equipped. Fortunately for the Allies, the Belgian government had a specimen "drachen" which it had purchased from Germany some time previous, and this, as soon as it became apparent how greatly superior the kite-balloon really was, was copied by the various allied services until they themselves could devise something better. It was in this way that the French, after experiments held at the front under actual war conditions, produced their famous Cacquot balloon. Thanks to the ingenuity of the French inventors, the Allies thereby

obtained the service of a kite-balloon which not only embodied all the good qualities of the "drachen ballon," but in addition proved capable of being used in a high wind besides offering greater facilities for observation.

At sea, the use of kite-balloons was unknown until the year 1916, when the constantly increasing activities of the German submarines caused the Allied navies to resort to novel measures for combating this new pest

It is evident that the advantages offered by these aerial observation posts in extending the range of vision of the naval lookouts charged with the duty of reporting the presence of the enemy's submarines, could not be overlooked. Anchored over some shore station, the observers surveyed a considerable area of the waters adjacent to the roadstead, inlet, channel, or sound, which they were assigned to watch. On the water, the role of the kite-balloon was the same, only instead of being anchored on terra firma, the end of the cable would be made fast to the deck of some trawler or fast steaming patrol vessel cruising on the surface of the sea. In this way the range of vision of the mast-head lookout on the warship could be trebled or quadrupled, depending upon the condition of the atmosphere. When towed at a height of two or three hundred yards, the "horizon" of the aerial observer extended for a distance of about thirty miles.

It is from this lofty perch that the presence of floating mines, of obstructions, of vessels in distress, and of hostile submarines, are thus discovered. A U-boat cruising on the surface becomes plainly visible to the aerial observer at a distance of several miles, while the foamy streak of the periscope's wake cannot remain unnoticed for any length of time. The kite-balloon, by its mere presence, therefore, causes the enemy's commerce raiders to seek the protection of the ocean's depths. In this way the submarine's offensive powers are curtailed almost immediately from the moment that it comes within the "zone" of the kite-balloon. This prevents the German commander from coming to the surface to use his deck guns, and this factor alone is an extremely important one. If, on the other hand, the enemy persists in coming nearer in order to use

his torpedoes, he can carry out his "approach" only beneath the surface, and here again the aerial observer has the advantage. While running submerged, the submarine must come to the surface occasionally in order to take a sight with its periscope. This maneuver, however, instantly betrays the submarine's movements to the observer and permits him to warn the patrol boat, either by signal or telephone, of each change in

course, or of the direction from which a torpedo has been fired (in case the submarine commander decides to strike by launching one of his subsurface missiles) long before the captain on the man-o'-war's bridge can himself see the threatened move. The kite-balloons have also been found useful in connection with the all-important operations of mine-sweeping and of guiding the convoys and merchant vessels through navigable waters. Naturally the usefulness of the kite-balloon depends upon the continuance of daylight and

Kite balloon hauled down; the observer descending from the car by means of a rope ladder

of the seas. The British naval airmen were the first to venture experiments in this new field, and the trials were so satisfactory, notably in the case of the "sausage" which spotted for the "Queen Elizabeth" when the latter was firing across the Gallipoli Peninsula in order to reach the Turkish forts on the Asiatic shore of the straits, that the French also decided to adopt the "balloon captif" as a recognized type of naval aircraft.

Measuring the pull on the balloon cable with a tensiometer

Telephone operator taking messages from the balloon. In the background is a balloon windlass

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The Current Supplement

IN their air raids on English and French cities the Germans have been actuated more by barbarous and brutal malice than by any idea of military advantage, and the special objects of their attacks have been historic edifices and similar buildings that are not only of local interest, but valued by students of history and art everywhere. In fact these raids have been studied insults and challenges hurled at the whole world. Following the example of their masters the Austrians have been carrying out similar contemptible raids on the Italian cities, and active measures have been taken to guard against these attacks by removing as many art treasures as possible to places of safety to save them from wanton destruction. An account of this work is given in an article in the current issue of the SCIENTIFIC AMERICAN SUPPLEMENT, No. 2219, for July 13th, entitled *Rescuing the Art Treasures of Venetia*, written by the official under whose direction it was carried out. It is illustrated by a number of excellent photographs. One of the most important of our home war measures has to do with the problems of transportation, and prominent among these is the efficient utilization of our highways. A discussion of some phases of this matter will be found in a paper on *The Relation of Highways to Freight Transportation*. The *Concrete Ship Problem* reviews some facts developed in recent discussions of this proposed means for increasing our transportation facilities. Illustrations accompanying the article show interesting details of construction. The paper on *Gravitation* is concluded in this issue. The *Manufacture and Use of Die Castings* gives much information about an important industry of recent development. The *Relation of the Most Ancient Flint Implements to the Later River-Drift Palæoliths* is an interesting contribution to the history of primitive man, and is illustrated by numerous drawings. Other articles of value in this issue are *A Study of the Proteins of Certain Insects with Reference to their Value as a Food for Poultry*; *Irrigation in Mesopotamia*; *Animal Life at the Front*; *Heat Treatment of Steel and Electricity in Medicine*.

purposes, but also for the satisfactory control of the fire of the main-battery guns? On land, the cooperation of the "sausages" has been found necessary to the success of every major operation against the enemy's lines. It seems only logical that at sea their rôle should be the same, namely to act as an aerial eye for the admiral, whom modern naval science has doomed to direct his fleet from within the steel walls of an armored conning tower, as well as for the naval gunner, whom the tremendous power and range of modern weapons has destined to fight an enemy below the horizon.

Motion-Picture Portrait Photography

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ending interest of parents and friends. Indeed, an animated portrait is by far the best kind of a portrait, and becomes a priceless souvenir in later years. Glass-plate positives printed from the negatives, obviously, can be projected in the camera or in a similar machine as motion pictures on a screen.

Encouraged by the police officials on the Pacific coast, Mr. Anderson set to work some time ago on designing a stool for photographing criminals. He has finally evolved a stool which, driven by an electric motor contained in the iron pedestal, slowly revolves while the sitter is unable to stop the movement. A switch in one hand of the photographer starts and stops the stool. There are no projections on the pedestal which the criminal might use to arrest the movement of the stool, and with the camera recording his every movement the candidate for the rogues' gallery is photographed hundreds of times for identification purposes.

Work of the War Trade Board

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South America. Here outgoing cargo space is utterly inadequate to care for all the exports for which the Board, in its general policy of encouraging foreign trade would like to grant. Essential exports, for which our South American associates are in crying need, are in danger of being shut out or held back, while other exports for which the need is not so great, are going forward. The War Trade and the United States Shipping Board have been endeavoring to meet this problem by increasing tonnage on East coast routes. Now the War Trade Board is studying just what exports are most urgent and the order of priority in which they should go forward. Combatting German trade and cutting off all possible exports into Germany and her associates continues relentlessly, but without attempts to attract public notice. What has been accomplished is manifested in the steadily restricted diet of the German civilian and his allies, in the lack of raw materials urgently needed by the Central Empire for munitions and the maintenance of their armed force, and in the easily apparent economic desperation of the Central Governments. The German bread ration is now 15 per cent below the point at which it has been maintained for many months, and which was then considered inadequate properly to maintain the strength of the German working classes. Their butter ration has been reduced to 25 grams (slightly over the weight of an ordinary letter). German cattle have been slaughtered so they no longer maintain the half-pound weekly ration of meat for civilians. As a result, the productive ability of the German workmen has been reduced from 25 to 50 per cent due to the success of our war trade policy, steadily and relentlessly enforced.

Coöperating with the Allies, this country, through the War Trade Board, is also combatting the German trader and the German propagandist wherever he is endeavoring to maintain a footing in neutral countries to the disadvantage of the United States and its associates in the war.

The policy of the Board, fixed as to general lines of principle, is a progressive one. Wherever opportunity presents to carry out the purpose entrusted to it by the Executive Order, new measures and practices will be adopted and enforced as the necessity demands.

The Rôle of Kite-Balloon in Anti-Submarine Operations

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upon the very essential atmospheric conditions as regards visibility.

The British navy solved the problem of housing its kite-balloons at sea by the creation of "balloon transports" such as were first used during the naval operations in the Dardanelles. In the coastwise operations, such as have characterized the anti-submarine war of recent years, the French have found themselves confronted with a different problem which they met with their usual ingenuity by basing their naval balloons on the various shore stations that dot their coast. At each of these "centers" fully equipped aerodromes were organized, with hangars containing the inflated balloons ready for instant service, and depots fitted with the necessary machinery and personnel for inflating and repairing the fragile silken envelopes. It takes only a few minutes, after a strange sail is reported on the horizon, to bring the kite-balloon out of its hangar, attach the end of its cable to the stern of a towing vessel, place on board of the latter the aeronautical detachment assigned to duty with that balloon, and dispatch the observer on his aerial reconnaissance. Officers commanding the patrol vessels charged with the duty of towing the kite-balloons have reported that this operation in no way affects the navigation of their ships, nor handicaps them in the least, and this enables the balloons to be used at sea for long periods or until the patrol vessel returns to one of the many shore stations equipped with aerodromes, when the kite-balloon is "landed" as easily as it was "launched" in the first place.

Up to the present time, there has been no occasion to use kite-balloons in connection with fleet operations, but who can tell whether in the next great naval battle of the war, their cooperation may not become essential, not only for reconnaissance

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