

Making War Photographs from Aeroplanes

The Fabbri Automatic Photographic Apparatus

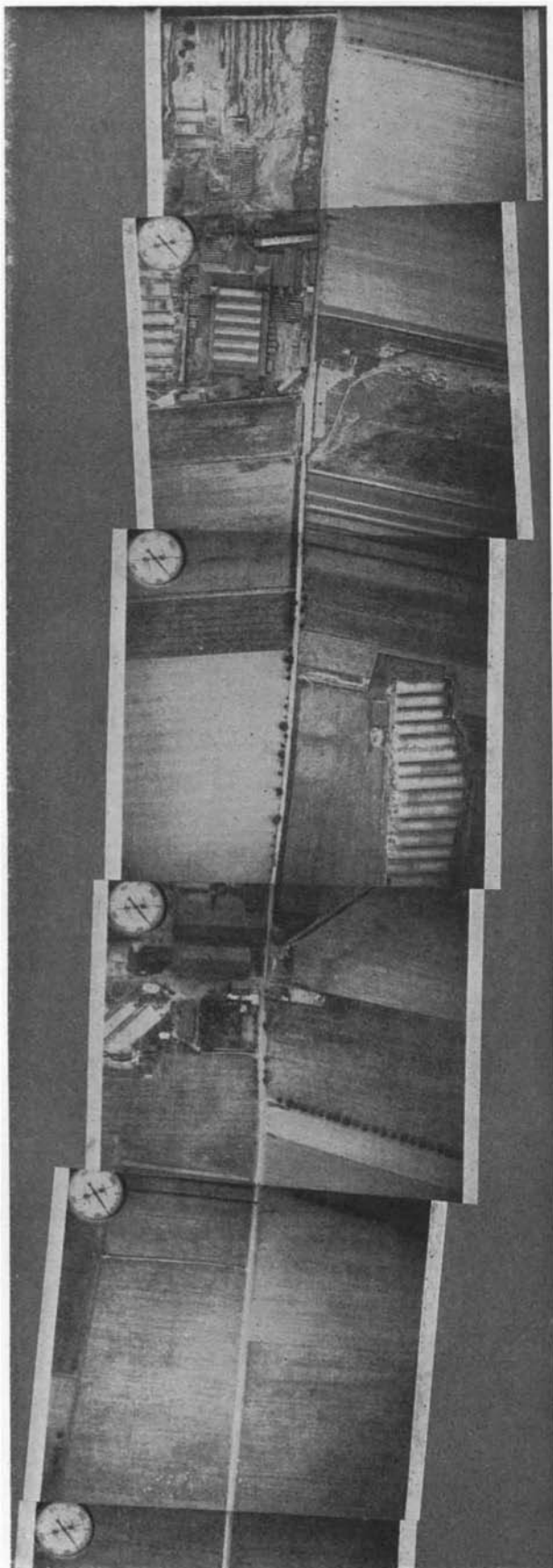
By Major H. Bannerman-Phillips, English Aeronautic Correspondent of the Scientific American

WHEN for purposes of military reconnaissance or to correct maps already in existence of the country which is to form the scene of operations of an army in the field, it is necessary to send out observers in aircraft, photography must be called in to their aid, if detailed reports and representations of the ground are to be furnished. From a height of 3,000 to 4,000 feet objects at the ground level not only look very different from what they would from a horizontal or only slightly elevated viewpoint, since from aircraft they are seen in plan, and the contours are flattened out to all appearance, but the objects themselves often seem so small as to escape detection entirely. This is more especially the case with the observer in an aeroplane, from the pace at which it travels, and from the fact as a platform for observation it is inferior to the airship. Telescopes and field glasses can, of course, be used, but the vibration of the engine in an aeroplane militates against the use of lenses with high magnifying power, even if the observer should be able to examine terrestrial objects while lying face downward and looking through an opening in the floor of the aircraft.

Moreover, when the area to be reconnoitered or surveyed covers several hundred miles, it is a physical impossibility for the human eye, brain and hand, however well they may co-operate, to do the work required and produce a useful and legible record for the information of the higher authorities, within reasonable limits of time.

Science, however, in the person of Capt. Giovanni Fabbri of the Italian Aviation Service, has now come to the aid of the hard-worked staff officer and the airmen of both naval and military services, and has produced an automatic camera, by which a continuous photographic record is obtained of the whole tract of country covered during a flight. There is a double advantage thus secured, in that not only is the observer free to devote his whole attention to the country over which he is passing, but it enables his independent observations to be described later on.

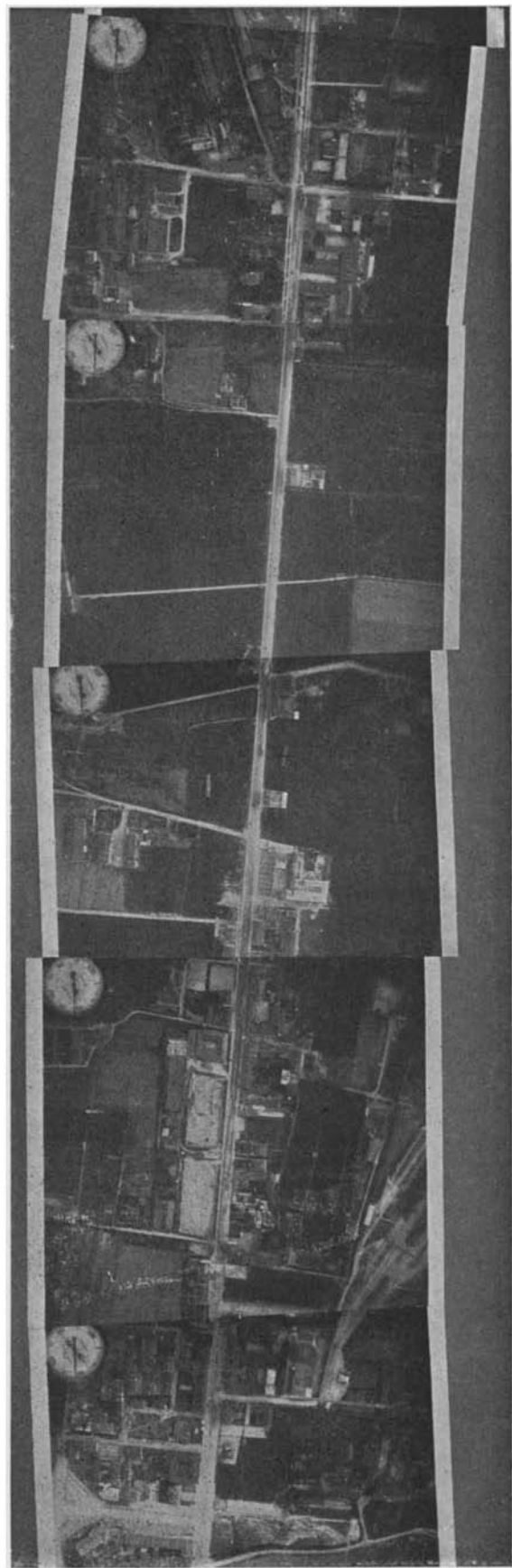
One great merit of the apparatus is its size, and another its simplicity. It can be readily installed in



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Views by the Fabbri Camera.

The several exposures have been matched together to form a continuous record.



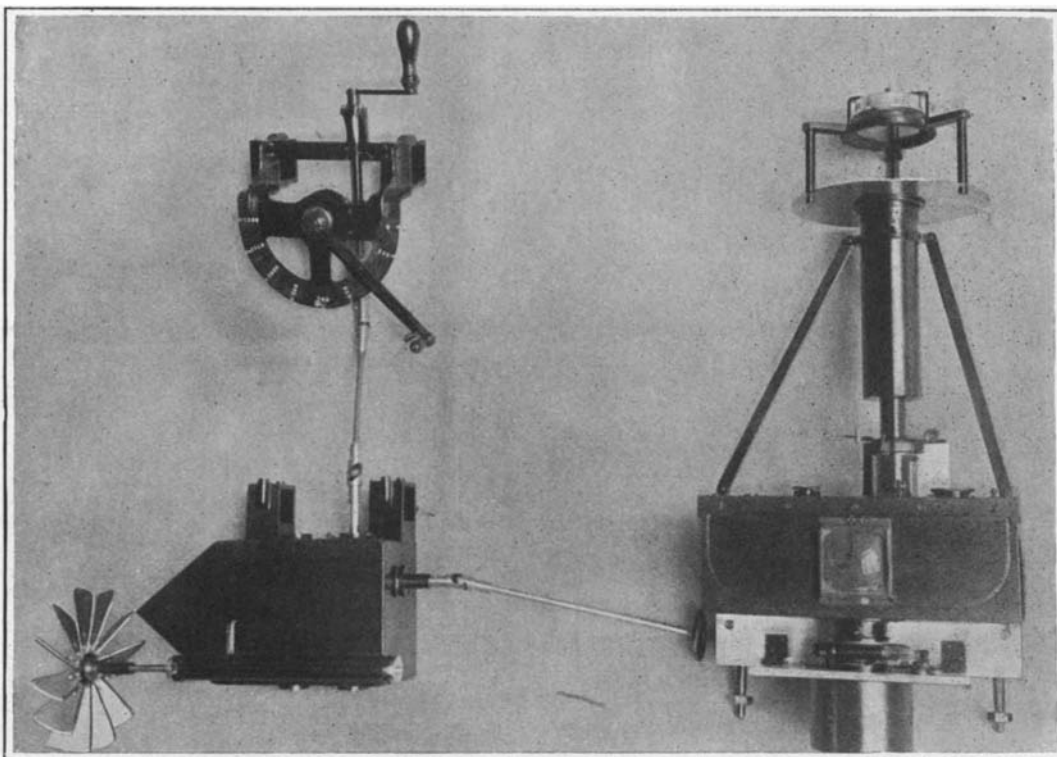
Aeronautics, London.

Views by the Fabbri Camera.

Note that each exposure automatically records the compass direction and altitude.

any aeroplane, and while essentially automatic and continuous in its working when once started, it can be stopped at any time and used for occasional single snapshots if so desired.

A rough and ready way of describing the apparatus would be: "a miniature cinematograph." It has a roll of film which winds and unwinds over two bobbins. Along one edge of this film are a series of perforations at stated intervals, and a tooth in the side of the camera presses against the film. When it enters one of these perforations, the film is stopped automatically, the shutter released, an exposure takes place and a snapshot of the terrestrial surface underneath at the time is secured. The unrolling of the film is effected by the rotation of a small propeller, driven by the passage through the air of the aeroplane, which rotation is conveyed by a shaft to a chain, which unwinds the film. The shutter is automatically released at intervals by gearing.



Aeronautics, London.

The Fabbri automatic aeroplane camera.

Of course the speed of the film must be regulated in accordance with the pace of the aircraft relatively to the ground over which it is passing, and the velocity of the wind must be allowed for, and there are arrangements for "setting" the machine accordingly. A very important point in connection with the photographic records furnished is that each time the shutter is released the faces of the compass and aneroid are photographed at the same time with the view, and are shown in a corner of the film; and the capacity of the latter is equal to recording at a height of 4,000 feet the features of a tract of country 150 miles in length.

Wireless Telegraphy in the German Army

WIRELESS telegraphy has reached a stage in its development at which it may be said to be fairly well standardized. Three types of wireless stations can be distinguished. There are first the permanent or sta-

tionary wireless plants, second, portable or mounted wireless stations, and third, wireless installations on ships. According to a description given in *Prometheus*, the fixed stations in Germany are located in fortresses and have a range of action of 1,000 kilometers (about 620 miles). All the German fortresses can be placed in communication with the central station at Nauen, and can also receive messages from airships and aeroplanes. The portable stations are assigned to the army divisions. The carriages upon which they are mounted are somewhat similar to gun carriages, and are drawn by six horses. In the case of the heavier wireless stations the crew rides upon the carriage. The operators of the smaller stations are on horse back. Portable stations of the latter type are attached to the cavalry divisions and to those reconnoitering squadrons to which a central reporting bureau is attached. From here all the news collected can then be forwarded to the various headquarters. The heavier stations are placed at the main headquarters and the cavalry division staff quarters. They have a range of about 120 miles, while the light-weight stations have a range of 35 to 45 miles. The stations are used in pairs. When at rest, one of the two stations of the pair is kept in action, while the other is held for reserve. When in motion, they are used alternately, one being in action while the other is being moved forward. It takes about fifteen minutes to set up a station. Dirigible balloons carry only transmitting apparatus, with about one hundred and ninety miles radius of action.

The Strategic Island of Helgoland

IF the sagacious men who are directing the naval policy of Great Britain had been in control at the time when Helgoland was ceded to Germany, it is safe to say that the transfer would not have been made. In that transaction Great Britain acquired from Germany a colonial possession of doubtful value, and in exchange handed over to her a small island at the entrance to the Elbe, which to-day is, next to the Kiel Canal, the most important strategic point in the whole scheme of German naval strategy. The island is small, measuring about a third of a mile in breadth by a mile in length. It consists of the Oberland, standing some 200 feet above sea level, and generally flat on its surface, and the Unterland, a stretch of low-lying shore at its foot. At the time of its acquisition in 1890, the island was subject to heavy erosion. This has been prevented

by the construction of sea walls and other protective works. The view of Helgoland which we present herewith shows the low-level portion of the island. The value of the island from a naval standpoint lies in the fact that it is situated about forty miles northwest of the mouth of the Elbe, and in such a position that it commands the approaches to the Elbe, the Weser, and to the great naval base of Wilhelmshaven.

The Germans have done an enormous amount of work

of these guns have never been made public; but the Germans have repeatedly stated unofficially that among the mortar batteries are to be found pieces of 16 inches caliber. It is also stated that 16-inch guns, probably of the mortar type, are mounted on the mainland in the great fortifications at Cuxhaven. The system of defense is stated to be similar to that employed by our own coast fortifications, the whole area of the sea between Helgoland and the mainland and all that area

covered by the effective range of the mortars being mapped out in squares, the progress of the enemy's ships through the fields so covered being determined by observation, and the fire of the batteries being concentrated accordingly.

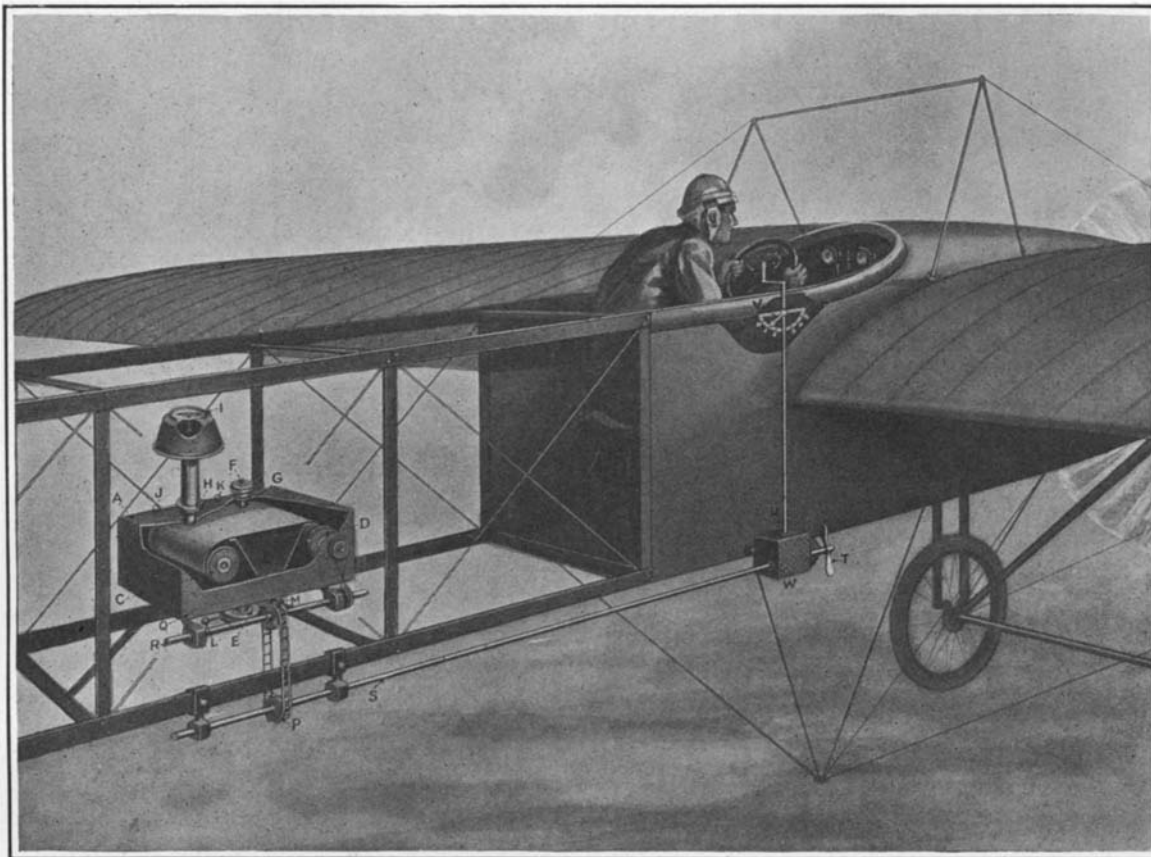
It is possible that some of the 16-inch mortars have been dismantled and transported by rail to assist in the reduction of the Belgian and French fortifications; although, as we explain on our editorial page, we are inclined to think that the 16-inch piece being used in the field by the Germans is a special type of siege gun of lighter weight, firing a high explosive shell of large capacity.

The Franklin Medal

IN addition to other medals which the Franklin Institute has been accustomed to award, it now has at its disposal a new medal to be called the "Franklin Medal," which will be awarded from time to time in recognition of the total contributions of individuals to science, or to the application of physical science to industry, rather than in recognition of any

single invention or discovery. This medal will be of handsome design in gold, of a value of about \$75, and it is expected that two medals will be awarded each year. This medal is made possible by a donation by Samuel Insull of Chicago.

Some Automobile Developments.—A number of interesting patents have been issued recently for constructions which provide for certain shifting of the cushions and seat backs of automobiles in such manner as to form beds, thus furnishing sleeping accommodations while touring. Whether this will be the accepted style of convertible car, or if other ideas of construction will provide sleeping accommodations, remains to be seen. Touring is becoming more and more popular, and, when occasion requires, facilities accompanying the car and furnishing comfort and shelter at night, should find favor. These may as before suggested include a special construction of the car itself or separate equipments carried like other accessories.



The Fabbri photographic apparatus on an aeroplane.

A, Camera casing; C, D, bobbins on which the sensitive film is wound; E, principal lens; F, device controlling tooth G, which regulates the making of the exposures; H, secondary lens which throws an image of the compass I and barometer onto the film; J, K, L, M, levers for operating the shutters of the lenses E and H; T, air propeller that operates the apparatus; W, exposure regulating apparatus; V, lever regulating interval between exposures, which must be set according to height above the ground. Single exposure can be made by means of the small crank handle beside the aviator.

in developing the full naval value of Helgoland, and anyone who has not visited the island for a few years would be astonished to see what remarkable changes have been made. The fine bathing beach has been done away with, and a large area of land has been made by filling. The island forms one of the most important torpedo and submarine bases for the German navy, and a fine harbor of refuge has been constructed, together with a large number of concrete-steel buildings, some of which are shown in our illustration in the course of construction. These buildings include artillery depots, magazines and hangars for hydro-aeroplanes, etc., together with the houses for the officers, officials, and workmen employed on the island.

Although Helgoland is still used as a summer resort, only the lower portion of the island is open to visitors. The highland is entirely under the control of the government. It has been very heavily fortified, and the heaviest artillery, both for direct fire and for high-angle fire has been emplaced. The caliber and the number



The island of Helgoland, showing the harbor for destroyers and submarines, and the construction of new machine and store shops.