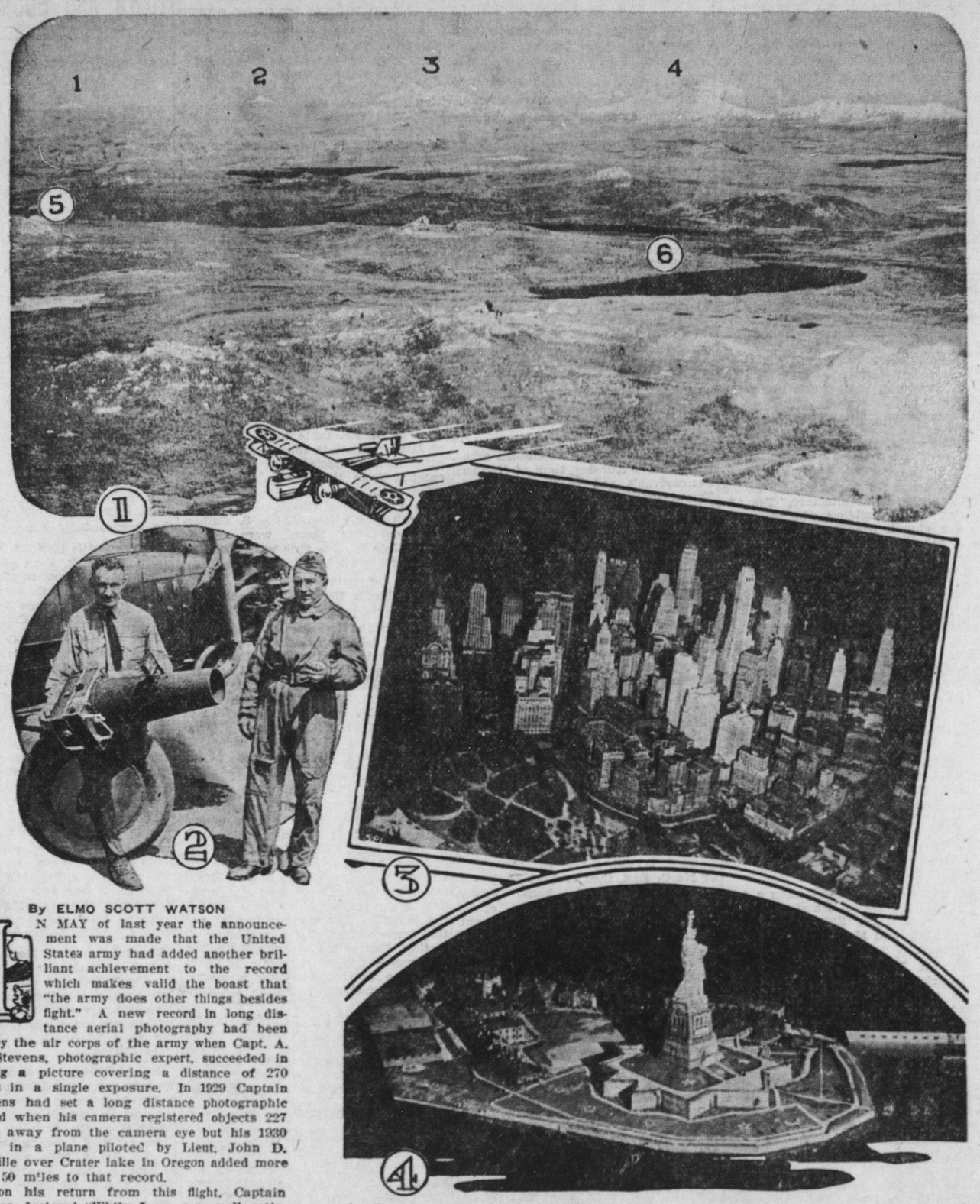
Aerial Photography — A New Scientific Marvel



By ELMO SCOTT WATSON

IN MAY of last year the announcement was made that the United States army had added another brilliant achievement to the record which makes valid the boast that "the army does other things besides fight." A new record in long distance aerial photography had been set by the air corps of the army when Capt. A. W. Stevens, photographic expert, succeeded in taking a picture covering a distance of 270 miles in a single exposure. In 1929 Captain Stevens had set a long distance photographic record when his camera registered objects 227 miles away from the camera eye but his 1930 flight in a plane piloted by Lieut. John D. Corkille over Crater lake in Oregon added more than 50 miles to that record.

Upon his return from this flight, Captain Stevens declared "While I am very well satisfied with the results obtained on this particular mission, I am inclined to believe that it will only be a matter of time before we will develop a camera that will record even greater distances. Before we can use it, however, we must have a photographic plane that will take us considerably higher than 20,000 feet because from that altitude even an object as tall as Mount Rainier will sink below the horizon at 300 miles.

"Shooting at Mount Rainier from a distance greater than that between New York city and Washington is much like shooting at the moon, with the difference that you can see the moon. The principal task is to aim the camera in the general direction you believe your objective to be, snap the trigger and hope for luck." What "luck" the army captain had on this expedition was revealed by the remarkable photograph which is shown above.

Another achievement in this new scientific marvel of aerial photography, which was not so much a matter of luck, was demonstrated during the army air maneuvers over New York city during May of this year, the results of which are shown in the photographs numbered three and four above. As explained in the captions, these pictures were taken by exploding a bomb containing enough magnesium powder to make a 3,000,000,000 candlepower flash and snapping the shutter at the height of illumination.

It would seem to be an easy matter to drop a flashlight bomb and at the moment of the explosion to take the photograph. Since, however, there is a definite relationship between the altitude of the airplane and the height at which the bomb explodes, it is not so simple. Night photographs can be taken only at comparatively low altitudes. Measurements of the photographs taken over New York showed the airplane to have been flying at only 1,500 feet, although night photographs could be taken effectively up to around 3,000 feet. The lens cannot be left open until the bomb explodes because lights from the ground would blur the plates or film.

The only thing the air camera man has to do at night is to release the bomb; the rest of the details are taken care of automatically. The bomb, containing twenty-five pounds of magnesium powder, is checked in its fall by a small parachute and a time fuse sets the interval from the release to the explosion. As the bomb bursts the camera's shutter is automatically tripped by an ingenious mechanical device.

Before the World war the science of aerial photography, except for a few cases, most of which were unsuccessful, was virtually unknown. It took on added importance early in the war and developed rapidly as the airplane became such an important factor in waging successful battles. But it has been since the war that its most rapid development has taken place and that development in this country has been carried forward mainly by the United States army.

Although the army is chiefly interested in map-making and intelligence photography, each of which requires a different technique, it has many times sent its camera men and planes to co-operate with other government agencies. The army has indirectly aided commercial aerial photography by developing the best in technique and in precision of the instruments. In addition to military work, aerial surveys are used for a large variety of operations. Few public utility companies would consider putting down a new power line without first having an aerial survey made. Aerial photography is also in demand for forestry services, geological surveys, harbor developments, highway and traffic surveys, and all manner of city uses, from planning and zoning to tax equalization.

The cameras and equipment used for civil aerial surveying and for the production of aerial photographs as illustrations have been improved but little during the last ten years, because the ordinary air camera, operated at relatively low altitudes, meets all usual requirements at a small cost. This is not the case with military photography, and so it is in this branch that the latest developments are found.

Perhaps the most interesting development lies in the use of long-range or high-altitude cameras, the same technique being used also for lower altitude work through fog. In high altitude work the camera must have a long focal length (the distance from the nodal point—where the light rays cross, between the two lenses—to the surface of the plate or film). With a short focal length it would be possible for the camera to "take the whole world," but the detail would be too small. A camera with a long focal length, on the other hand, while it will not take more than about thirty-three square miles from an altitude of approximately 33,000 feet, gives such clearness of detail that the negatives may be readily enlarged to ten diameters.

If the camera is tilted an oblique photograph is taken—that is, a photograph which is progressively distorted as the objects taken are distant from the lens. Tremendous distances have been covered in this way and objects have been taken which were not visible to the naked eye, because aloft there is almost always, even on a clear day, a certain amount of ground haze.

Several refinements are necessary, however, before these photographs may be taken. The camera must be fitted with a special film sensitive only to infra-red rays below the visible spectrum—that is, the long wave lengths which go through fog easily. This condition is met by taking ordinary gelatine film and immersing it in a solution of kryptocyanine.

The next requisite is a special type of filter, so dense as to have the opaqueness of rubber. All lenses have to a greater or less extent the property of a prism; that is, they break up the white light into spectra. It is necessary under given conditions to use a filter to eliminate the active colors(such as violets, blues and greens) and restore the light to white. By increasing the opaqueness of the filter more of the visible spectrum is eliminated, and it is possible to eliminate it altogether. This is what has been done in the cast of the long-range camera.

Through its filter only the infra-red rays are admitted, and as ground haze or smoke is no obstacle to them, objects are recorded on the film which are invisible to the naked eye. In this way Captain Stevens was able to photograph Mount Rainier from the record distance of 270 miles, the peak jutting up above the horizon, though it was miles beyond it.

In the taking of photographs for map-making a special technique has had to be developed, equally applicable to military and commercial purposes. It is not enough to sight the camera and trip it; all sorts of things have to be determined before the photograph can be taken. Because only the center of each photograph can be considered anything like optically perfect, a large number of overlapping exposures have to be made.

1. Two hundred and seventy miles of wide open spaces! A photograph of Mount Rainier taken from over Crater lake, a distance of 270 miles, by Capt. Albert W. Stevens from an army air corps plane piloted by Lieut. John D. Corkille. To get the "shot," the two army airmen flew at 20,000 feet for nearly five hours in a temperature of 20 degrees below zero and came down only when their supply of liquid oxygen was exhausted. Some of the mountains shown in the picture are: 1. Mount Rainier, 270 miles; 2. Mount Hood, 200 miles; 3. Mount Jefferson, 175 miles; 4. Three Sisters, 125 miles; 5. Diamond Peak, 50 miles; Crescent Lake, 45 miles.

2. Captain Stevens and Lieutenant Corkille of the United States army air corps with the large aerial camera used in taking high altitude photographs. This camera uses a 30-inch focal length lens of special construction.

3. This night photograph of lower Manhattan, New York city, was taken by Captain Stevens from an airplane piloted by Lieutenant Corkille at an altitude of about 1,500 feet. A bomb containing sufficient flashlight powder for a three billion candlepower flash was dropped from the plane and the picture taken with a specially constructed camera equipped with an automatic device for exposing the film at the height of illumination.

4. A night photograph of the Statue of Liberty and Fort Wood on Bedloe's Island in New York harbor taken in the same manner as described in No. 4.

All photographs, courtesy United States Army Air corps.

Dotted Net Is Charming and Chic

By CHERIE NICHOLAS

WHAT with the program of party frocks for the last several summers being mostly a matter of one printed chiffon frock after another, the idea of printed or embroidered cotton net suggests a most intriguing diversion.

The beauty about these very charming new quality-kind cotton nets which are now so smartly in fashion for evening wear is that they can be safely and successfully washed—no danger of colors "running" as heretofore. Then, too, these nets drape ever so charmingly, at the same time having enough body in them to stay crisp and fresh looking on the warmest evening.

Very newest printed nets carry the message that dots have appeared on fashion's horizon for midsummer evenings. For the slender woman the dress pictured is ideal. It is a very "young" frock for slim and svelte youth, and later providing you're the type.

A particularly summery and actually washable durene cotton net fashions this lovely gown. Of course, you will be interested in the deep capelet collar which reminds us that shoulders are generally covered this summer if only with a wisp of a scarf, or a tiny drapery which looks as if it might have started to be a sleeve and decided to "just pretend." We most forgot to tell you that the dots which pattern this particular dress are in "English Officer" red, from which striking color the hand-made silk apples, which form the corsage take their cue. A slightly stiffened peplum is featured, its hemline following the contour of the skirt hemline with considerable artistry.

Quite as effective, although not so unusual and new as the big coin dots are the charming nets which are patterned with colorful florals. These tune in every key from flamboyant rose motifs to demure Dolly Varden flowerettes.

You may have quite a time deciding whether to buy a printed or an embroidered net for your next evening or garden-party frock. Choose either and you will play safe. The inspiring thought in this connection is that through perfected processes these fine quality durened nets no matter how delicate their tones and tints may be or how bold, they may be relied on as being fast color. This means they are not only appealing from an esthetic point of view, but they are also thoroughly practical.

HATS OF ALL SIZES APPROVED BY PARIS

There is nothing monotonous about hat fashions this summer. Sizes range from mere skull caps to cape lines, with brims a foot wide. There is as much variety in shapes as in sizes and more materials involved than there is room to list. Soft, fabriclike straws, crocheted or mesh straws are being used for new versions of the beret, and to make crowns for some of the brimmed hats. The familiar panama, baku, milan, leghorn and other well knowns are making all manner of brimmed hats. Stitching is used to give body to cotton and linen hats and to decorate brimmed sports hats of jersey and felt.

Among the small hats Agnes' French colonial creations and Suzanne Talbot's derby-brimmed hats are of particular interest. Agnes has taken the various headgears and hair dresses of the Moroccans, the Algerians, the Cambodians and translated them in a collection of peaked and wrapped and draped turbans and berets that are enormously smart. Furthermore, she has taken over the brilliant and exotic colorings that distinguish the original models.

Mesh Stockings Regarded Comfortable for Sports

Do you like lisle for sports stockings? Many women do, because it looks less dressed up and formal. Do you like mesh for sports stockings? Its open work seems next most comcomfortable to bare legs. Lisle and mesh conspire, therefore, to make comfortable, good looking stockings to go with sports costumes. And lisle mesh socks are a joy for tennis.

Socks continue to be worn for active sports, but usually over stockings. Bare legs may be worn for comfort, but only in private and informal places.

With the white clothes and the bright colors you will be wearing this summer you will find that a light clear beige is most becoming. This is the shade that tones best with your outdoor-darkened skin.

Women at Palm Beach adopted this shade almost universally in the daytime. In the evening they wore paler tones—nude and peach.

There is talk of white and off-white hose for wear in the evening.

Stunning Dinner Gown

This is a Lanvin replica of a dinner gown in black. The braided peplum is unique, as are the long satin gauntlets with jeweled bracelets.

Three Colors for Scarf; Worn With White Sports

There are all sorts of attractive scarfs, many of them made of red, white and blue. There are lots of clothes accessories in those colors, anyway. They are worn with white sports clothes.

There are, for instance, scarfs made in triangles of the three colors, oddly chunked together. There are scarfs of the three colors in wide stripes, others with the center portion of the scarf white, the ends striped red and blue. These scarfs, striped and triangles, are made of the finest wool crocheted in a loose, lacy stitch.

Other scarfs are made of the three colors striped lengthwise, in soft silk crepe. Still others are made of two colors on one side, lined with the third color.