

THE "TELEPHOT," A NOVEL APPARATUS FOR PHOTOGRAPHING AT GREAT DISTANCES.

BY DR. A. GRADENWITZ.

An interesting communication on telephotography was read before last year's Congress of Swiss Naturalists, by Mr. A. Vautier-Dufour. The author has experimented in this field for many years past, and is keenly alive to objections urged against telephotography. He has however obtained excellent results by means of a telescope, the objective of which has a focal distance as great as 2.40 m. The eyeglass was removed so that the image was formed at the focus of the objective. The author hence inferred that this process would best suit his purpose. The only drawback was the difficulty of carrying so cumbersome an apparatus about. With the assistance of the Geneva astronomer, Scheer, the problem was solved. Both constructed an apparatus with an objective 16 cm. in diameter and 2.40 m. in focal length, the latter being reduced to the third part of its value, by inserting two plane mirrors between the objective and the plate. The losses by reflection of these mirrors did not exceed 5 per cent. Exposures of 10 seconds were required when yellow screens and orthochromatical plates were used, while without a screen excellent snap shots could be taken with exposures of about 1-75 sec. The total length of the apparatus was only 3½ inches.

Vautier-Dufour is now constructing an apparatus 40 cm. in length, the diameter of the objective being 0.10 cm. and the focal length 1.20 m. It is hoped to obtain good instantaneous photographs with exposures ranging between 1-200 and 1-500 sec. The same apparatus may be used to take ordinary photographs with an objective 0.25 m. in focal distance.

The following advantages are claimed for this ingenious device, as compared with tele-objectives—greater intensity, better definition, higher magnification, and an easier adjustment. As regards the neatness of images, the views presented before the members of the congress were perfectly sharp as far as the edges of the field of view. Twelve-fold magnifications were obtained, without the apparatus ceasing to be portable.

Telephotography in its new form is likely to prove useful both for scientific and industrial purposes, as well as in warfare. The physicist will be able to photograph any phenomenon visible at the extreme horizon, such as mirages, etc., as well as those which he could not approach himself without danger, such as, for instance, volcanic eruptions. The naturalist may now safely observe wild animals and photograph them from a distance. The amateur astronomer will be in a position to take splendid views of the principal heavenly bodies. The explorer of Arctic regions will observe, by means of the "Téléphot," distant and inaccessible points. Archæologists and architects will use the apparatus to fix on the photographic plate buildings and monuments too distant to be taken with an ordinary apparatus. Military and naval officers will be able to observe and to study the movements of the enemy (the apparatus may in fact be well used as a telescope); finally, all topographical measurements will highly profit by this ingenious apparatus.

The scheme of the apparatus, as constructed by Messrs. Boissonnas & Co., Ltd., Geneva, Switzerland, is shown in the diagram. The rays emerging from the objective *A* will strike the plane mirror *B*, by which they are reflected on the second mirror *C*, to be conveyed after another reflection, to the photographic plate placed at *D*. By substituting for the long-

distance objective an ordinary one (with a focal distance of 20 or 30 cm.), the apparatus may be made to serve for ordinary photographs. The "Téléphot" may,



The Telephotographic Apparatus.

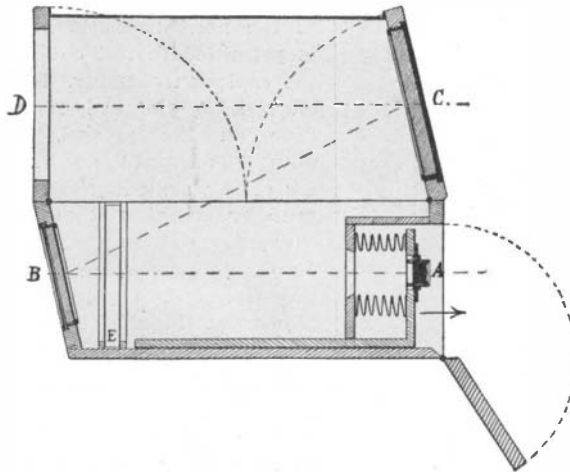


Diagram of the Apparatus.

moreover, be, at a moment's notice, converted into a terrestrial or astronomical telescope.

Our illustrations show the apparatus set up for use, as well as some photographs taken with it.

COALING WARSHIPS AT SEA.

BY HERBERT C. FYFE.

For some little time past experiments have been carried out both in British and American waters with apparatus for coaling men-of-war while steaming on the high seas.

These experiments, so far as the United States navy is concerned, have reached a practical conclusion, and the U. S. battleship "Illinois" is now completely fitted with an apparatus for taking coal at sea. She is the first warship to be completely equipped with the marine cableway, and her equipment will permit her to take coal at sea from any masted vessel. The Imperial Russian battleship "Retvizan" is also equipped with a similar installation which is giving satisfactory service.

In Great Britain the apparatus with

which experiments were made consisted of a cableway fitted on the "Muriel" collier. It has had several sea tests and the results were considered highly successful. The collier delivered thirty-five to forty tons of coal per hour in a moderate sea and half a gale of wind to H. M. S. "Trafalgar," the battleship towing the other at speeds varying from eight to eleven knots per hour.

The idea of placing all the appliances for coaling at sea on a warship did not at first find favor in the eyes of many American naval officers, who argued that battleships were already overloaded with machinery and that to carry the apparatus on board would require a number of important changes in the disposition of material located in more or less essential places.

The U. S. Navy Department selected the "Illinois" for the installation and the equipment is being successfully operated. The only machines required for the warship were two special operating winches, but these were so designed that they served a double purpose and displaced two deck winches which were already on the superstructure deck of the "Illinois."

The new winches now perform all the functions of the old ones besides their own particular work, and they occupy precisely the same bed and employ the same foundation bolts as the old ones. These winches work the load carriage running between the collier and the warship. One winch draws the loaded carriage toward the warship, the other winch draws the empty carriage back to the collier.

A single wire rope ¾-inch diameter, 2,000 feet long is employed for this purpose. Both winches run all the time in the same direction and the ropes are always taut. The reciprocating motion is given to the load carriage by the friction of one slipping drum overpowering the other. The drum of one winch is always winding in rope. The drum of the other is always paying out rope under tension of the slipping of the friction-heads. The great point about this method of operating a load carriage is that it is independent of the relative motion of the two ships. When the ships pull apart one drum slips, thus paying out the rope; when the ships approach each other, the slack given to the rope is wound in. It is of course essential that the rope speed of the winches be greater than the speed at which the ships approach each other.

The operating levers on the after bridge occupy a space of about 1¼ square feet between two ventilators in the center of the ship, and it is here that the operator takes his stand in full view of the load carriage at all times in its passage to and from the collier.

The remainder of the equipment on the "Illinois" is to be found just below the steering compartment and beneath the platform deck. It consists of the following items: A reel suspended from the deck carries 2,000 feet of ¾-inch diameter sea-anchor line (weight 2,640 pounds). There are also two ¾-inch diameter conveyor lines (weight each 508 pounds) and two sea

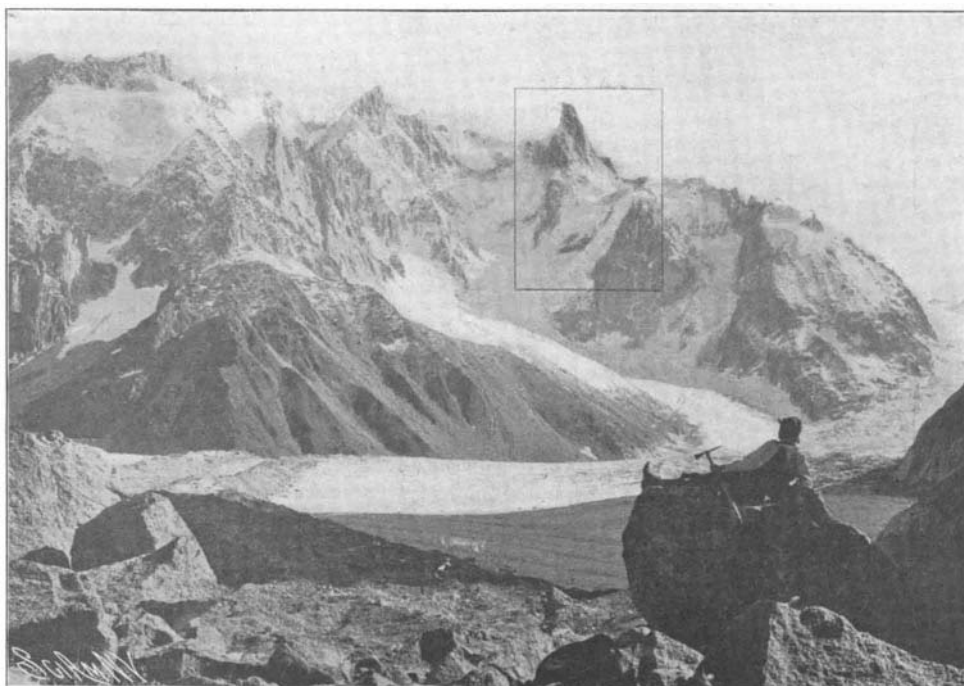


Fig. 1.—Aiguille du Geant seen from Mer de Glace (Mont Blanc.) Photograph Taken with an Ordinary Lens.

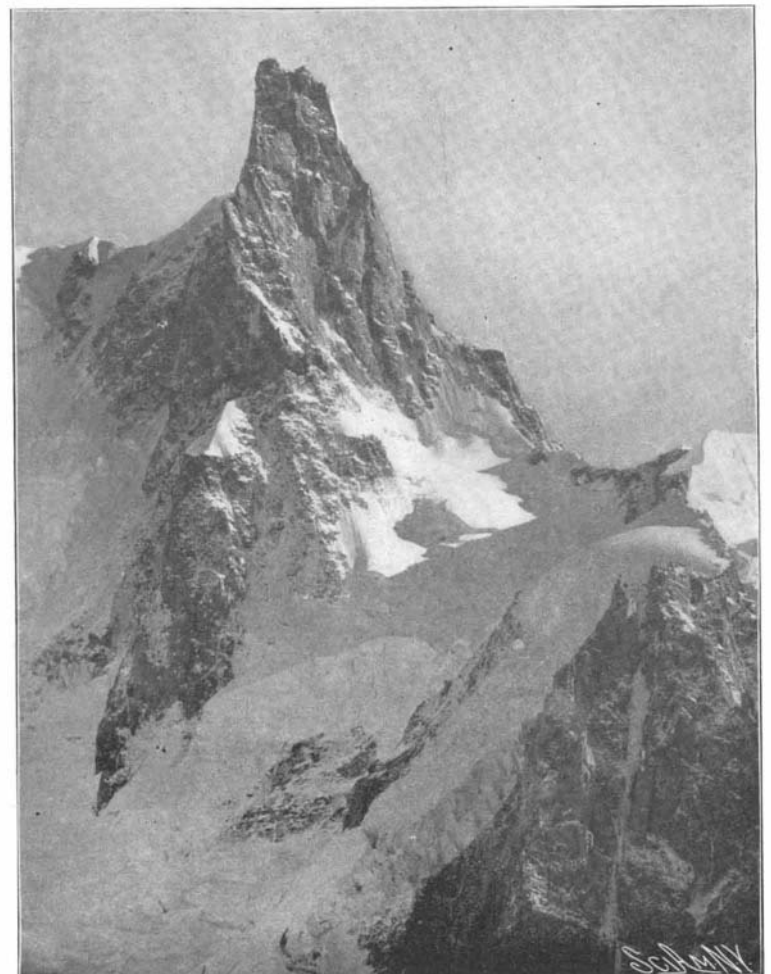


Fig. 2.—Aiguille du Geant. Telephotograph of the Peak Marked in Fig. 1, taken from Mer de Glace (Mont Blanc).

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