

DR. DE GRAAF HUNTER'S TRESTLE TOWER FOR GEODETIC TRIANGULATION.

The Director of the Geodetic Branch of the Survey of India has forwarded to the International Hydrographic Bureau a description of Dr. J. DE GRAAF HUNTER'S Trestle Tower for geodetic triangulation in wooded country, with permission to reproduce the description and illustration which appear in the Records of the Survey of India, Volume VII, Calcutta, 1916.

The trestle illustrated consists of twelve sections, each five feet high. It has been erected by hoisting the whole in a vertical position, and adding section by section underneath. This process is illustrated in the photographs, in which may be seen the four guy wires which emanate at the same rate from a four-grooved wheel, and other details. These wires keep the trestle vertical. In the first place about four sections may be joined together on the ground and then pulled up into a vertical position. When this is done the platform may be added without difficulty at the moderate height of 20 feet. After this the other sections are added one by one from below until the required height is obtained, all work being done on the ground.

In the design special attention has been given to lightness and portability. The wooden members are all five feet long, and the iron angle pieces are held in contact with them merely by the weight of the trestle and the tension of the tie-rods. This leaves the wooden members without projecting pieces, and accordingly convenient for packing up. They are also all interchangeable. Successive sections can be added until the necessary height has been obtained.

The length of the longest members and some other particulars are as below :—

Four legs of lifting gear	10 1/4 feet.
Six pieces of T-iron in platform.....	8 " "
Eight pieces of L-iron rail round platform.....	8 " "
Total weight of trestle for a height of 60 feet.....	2,000 lbs.
Additional weight per 5 feet	130 " "
Lifting gear and derrick	300 " "
Height from ground level to platform	61 feet.
Height to theodolite axis.....	66 " "
Height to top of tent.....	70 " "
The platform is 8 feet square.	

The whole trestle can accordingly be carried on bullock carts or camels, and the total weight is about one ton.

Access to the top is obtained by means of a ladder formed by a series of rungs strung on two wires, which can be rolled up for transit.

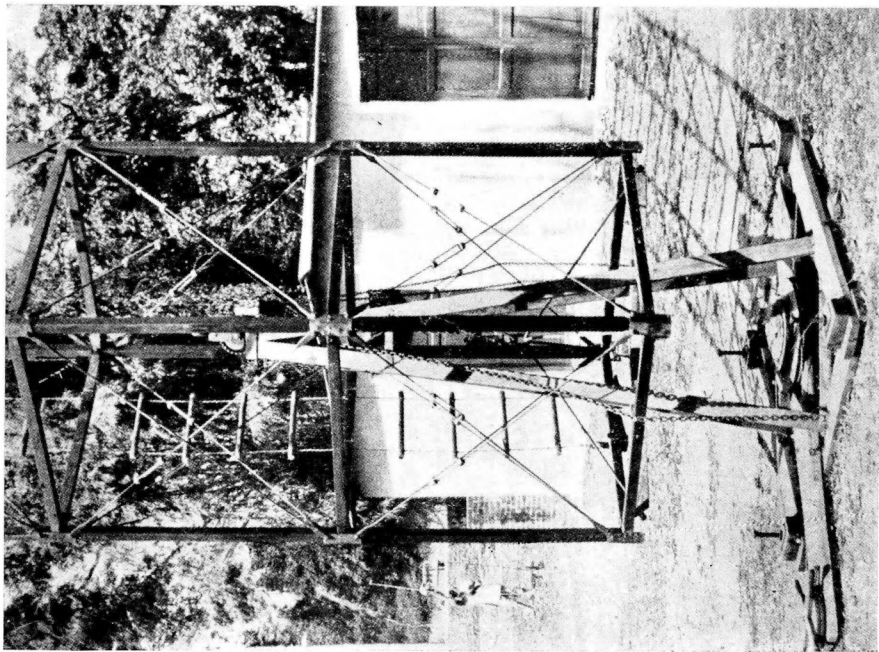
The theodolite is placed on a table which is mounted on gimbals, and the level of this table is controlled by four wires reaching to the base of the trestle. By this means permanent dislevelment of the instrument, due to movements of the trestle, is prevented. By balancing the instrument and its table, that is by arranging that the centre of gravity of the whole lies in the same horizontal plane as the gimbal bearings, oscillations of the instrument are largely avoided.

It was found in the early trials that when the observer moved, though the level remained satisfactorily constant, a change in azimuthal angle occurred, due to the change in loading of the trestle and a consequent skewing round. To overcome this the platform was also mounted on gimbals and controlled by four wires to ground level. By this means the loading of the trestle remains central and the non-central strains are taken up by the wires.

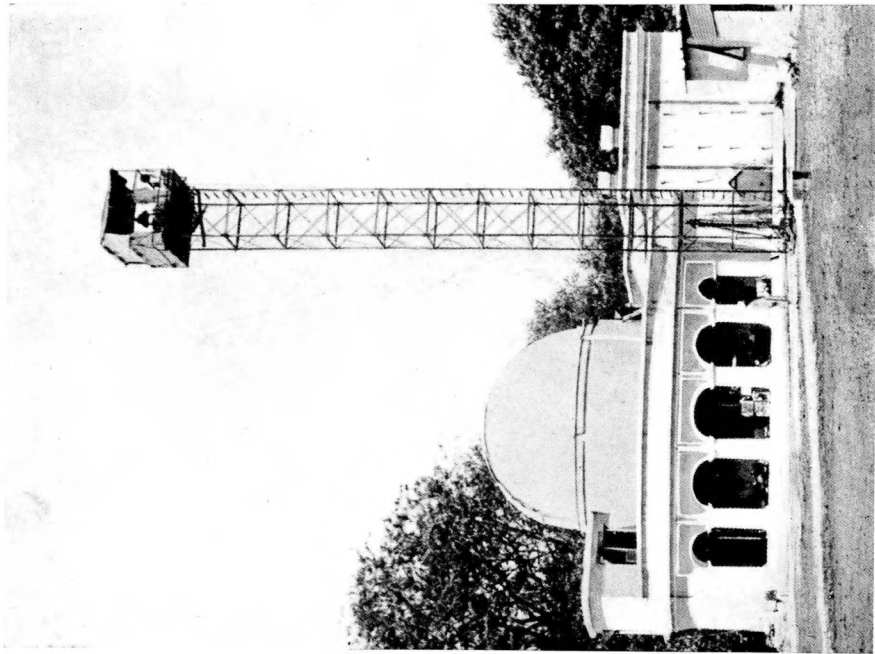
A few angles have been measured with a twelve-inch theodolite mounted on the trestle. It is found that an unfavourable time for observing occurs as the sun gains power a few hours after rising, and the effect is to cause changes of both level and azimuth. After the trestle is properly heated up these changes cease; and measures of angles in the afternoon have given very satisfactory results. Thus on 13th May 1915, between 5-40 and 6-40 p.m., ten measures of an angle were made giving the mean value 26°55'48.4". The seconds of the individual angles were 51.0, 47.6, 48.4, 48.9, 46.2, 48.7, 50.5, 47.7, 48.3 and 47.0, giving a probable error of 1" per observation. This seems to show that with proper precautions observations may be made of very nearly as high quality as can be made from a station at ground level.



DE GRAAFF HUNTER'S TRESTLE TOWER. — TOUR A TREILLIS DE GRAAFF HUNTER.



Lifting arrangement. — Dispositif d'érection.



General view. — Vue générale.

Bilby Tower — Tour Bilby

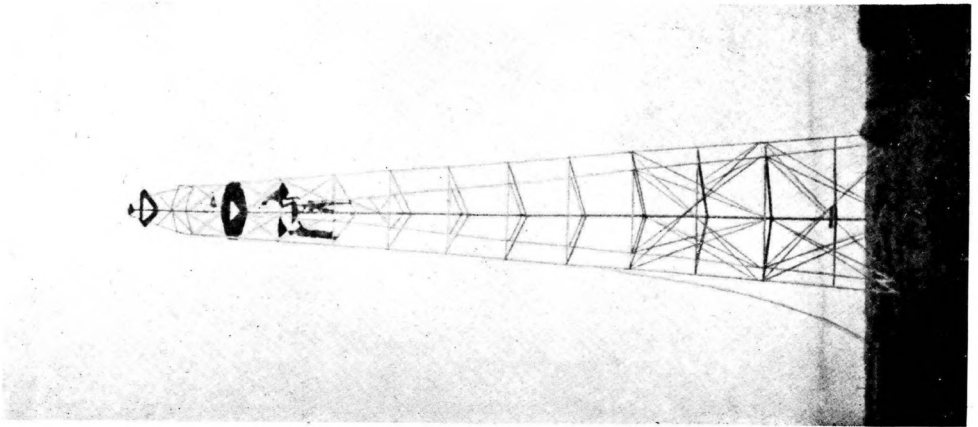


FIG. 1

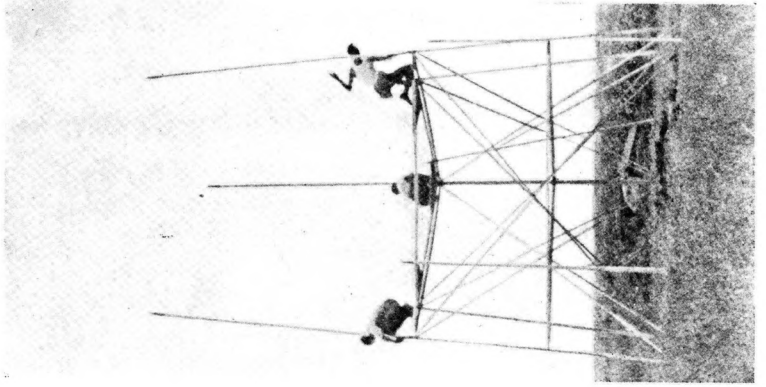


FIG. 4

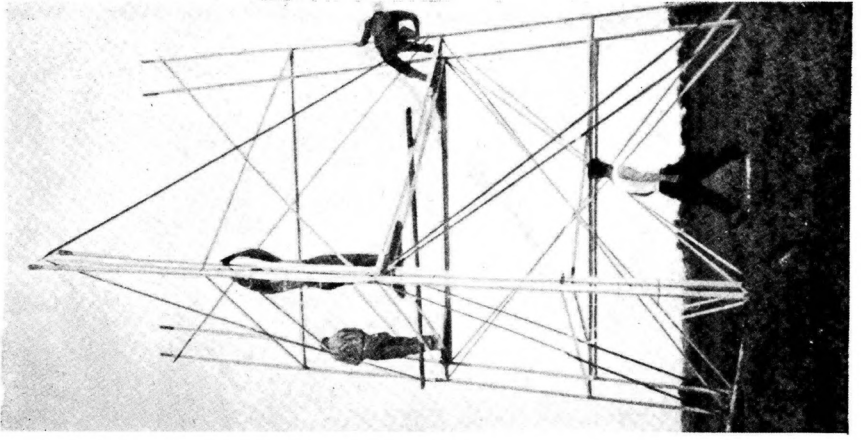


FIG. 5