A GIGANTIC KITE.

After remaining for a long time an object of amusement merely, the kite is becoming one of study for the mechanician, who finds in it a means of applying and verifying formulas relating to the resistance of the air, and of thus contributing to the progress of the difficult and complicated problem of flight. So we believe it will be of interest to give a summary of two recent studies—one of them purely scientific and relating to the theory of the kite, and the other an experimental one, in which the author succeeded in raising from the ground a gigantic apparatus, powerful enough to carry a weight equivalent to that of a man.

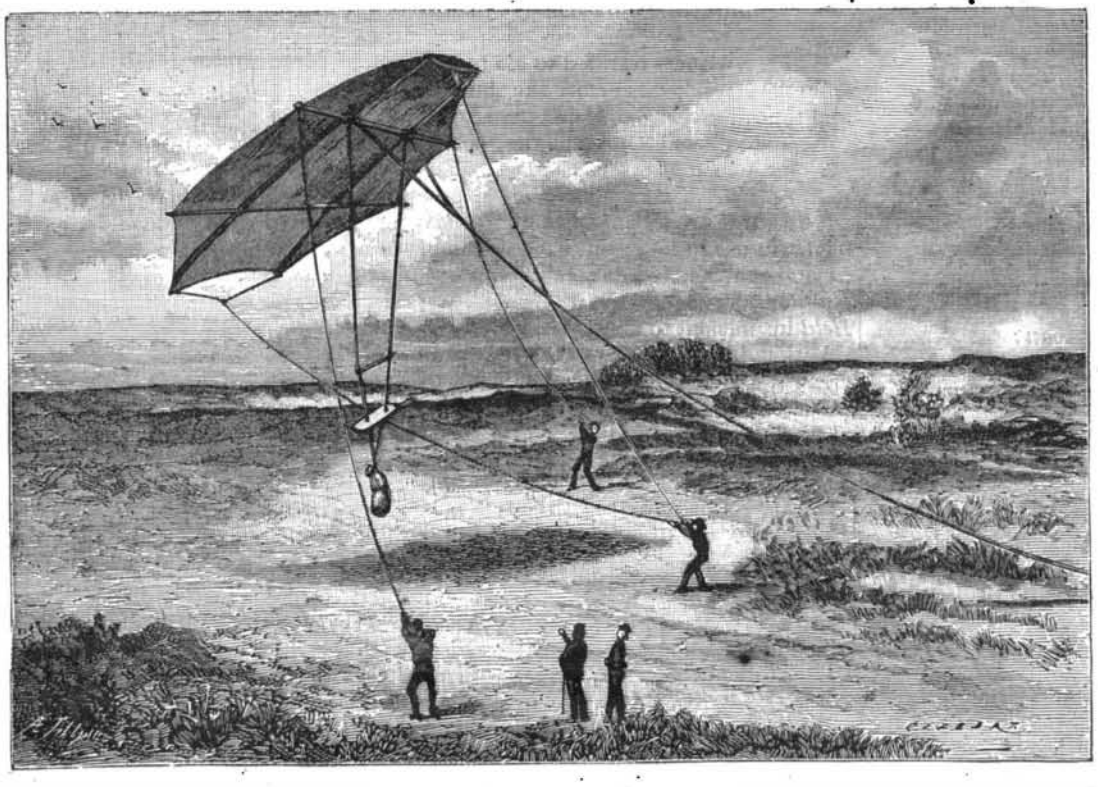
In a communication to the French Association for the Advancement of Science, at the meeting held at Grenoble, in 1885, Mr. J. Pillet, teacher of machinery drawing at the Polytechnic School, presented a very simple and elegant theory as to the equilibrium of the kite, and deduced therefrom certain general principles that may be useful to some of our readers as a guide in the construction of this affair.

In a kite, the elements to be considered are its weight, P; its plane surface; the position of its center of gravity, which the trial has the effect of bringing very near the lower extremity; the center of the wind's pressure, which, as a general thing, is confounded with the geometrical center; and, finally, the point of attachment of the string.

Theory indicates that it requires a certain ratio between the position of the center of gravity, the center of pressure, and the point of attachment of the string, in order to obtain with a given kite a maximum of altitude and of ascensional force. The point of attachment should be upon the straight line passing through the centers of pressure and gravity, higher than the center of pressure, and so that the distance from the center of gravity to the same point of attachment of the string shall be triple the distance from the center of pressure to the same point of attachment. A calculation of the tension of the string in a properly constructed kite shows that such tension varies between very narrow limits only, whatever be the velocity of the wind. In a light wind, all that the string does is to hold the kite, which hangs vertically, and the lower value of the tension is then equal to the weight, P, of the kite and its tail. In an infinitely swift wind, the upper value of the tension of the string is equal to 2 P only. This weight represents quite a feeble tension, and one which even quite a fine cord could easily withstand. Consequently, when the kite is pulling very strongly, this proves that it is badly attached, and not, as one is tempted to suppose, that it is prepared to rise well.

We trust that Mr. Pillet will complete his study and let us know the considerations that he has drawn from it relative to the best form to give a kite, as well as the consequences relative to the problem of flight. The note presented at Grenoble stops at the principles that we have just recapitulated.

The experiments that we shall now speak of offer Mr. Pillet an almost unique opportunity of verifying the accuracy of his theory and formulas on a large scale. It concerns a huge kite constructed and experimented with last May by Mr. Maillot, and a description of which we find in the *Aeronaute*.



MAILLOT'S GIGANTIC KITE.

This kite is a regular octagon, having a superficial area of 85 square yards, and the frame of which weighs 150 pounds. The canvas and cords weigh 99 pounds, and the kite has lifted a bag of earth weighing 150 pounds. The structure of the affair and its unusual dimensions render the maneuvering of it peculiar. Two cords, maneuvered from the earth, and connected with the two extremities of the vertical line passing through the geometric center of the kite, permit of giving the latter the proper inclination, according to the velocity of the wind and its variations. Two assistants prevent a lateral inclination.

After firmly fastening the cord, which was 820 feet in length, Mr. Maillot and his assistants lifted the top of the kite and let the wind in beneath. The affair then arose, and lifted a 150 pound bag of earth to a height of 32 feet above ground. It is in such a position that it is shown in the accompanying figure. Each operator pulled in or paid out the cord according to the velocity of the wind, and the kite preserved a certain amount of stability.

In the discussion that followed the communication to the French Society of Aerial Navigation regarding these experiments, Mr. H. De Villeneuve recalled the fact that the English journals had once spoken of a woman being lifted by a kite in the last century.

It was the constructor's idea that the maneuvering of the cords that regulate the inclination ought to be performed by the person lifted in the place of a bag of ballast; and the kite would then have been connected with the earth only through the main cord. This bold and dangerous experiment was opposed by the spectators on the 16th of May last, when Mr. Maillot operated his kite in the presence of the members of the Society. It was rightly feared that Mr. Maillot, after he had been lifted, might not manipulate the cords properly.—*La Nature.*

THE NEW TUNNEL, KONIGSTRASSE, BERLIN.

This tunnel is about 52 feet wide, 14 feet high, and 188 feet long, and is arched, as is shown in the accompanying cut. The masonry of the crown of the arch, that is to say, the central fourteen feet of the curve, is about 2 feet 1½ in. thick, and from these points to the impost its thickness is about 2 feet 5·3 in. The abutments and arch are faced with Greppin brick, and the frontal face and projecting edges with hewn stone.

The abutments are made of hard burned brick set in cement, and the voussoirs are arranged according to the line of pressure. To effect a saving of masonry, the abutments are not solid, but are built with openings; and to prevent the tipping of the abutments before the completion of the arch, 9 in. braces were placed 6 ft. 6 in. apart, and walls were built from the arch to the outermost limits of the street. These walls, as well as the wings, the faces, and the under surface of the arch, are faced with Greppin brick.

The arch was very carefully built of narrow voussoirs, so that when completed the crown sank 1·5 millimeters. The centering had to be arranged so as not to interfere with the traffic of Konigstrasse. So two passages, each 10 ft. wide, were left for the vehicles, and a passage about 5 ft. wide was left on each side for pedestrians. Tubs filled with sand were used for the support of the centering, and each of these tubs was provided with a plug, all of which plugs could be removed at the same time when the arch was finished, so that the tubs could be emptied, and in this manner an even and rapid settlement of the arch was accomplished.

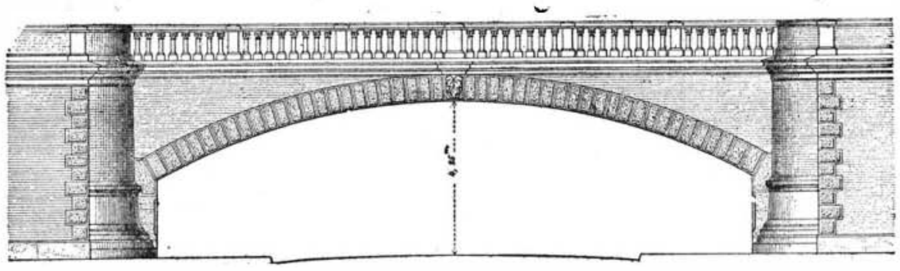


Fig 2 Querschnitt nach c d (in Fig 3.)
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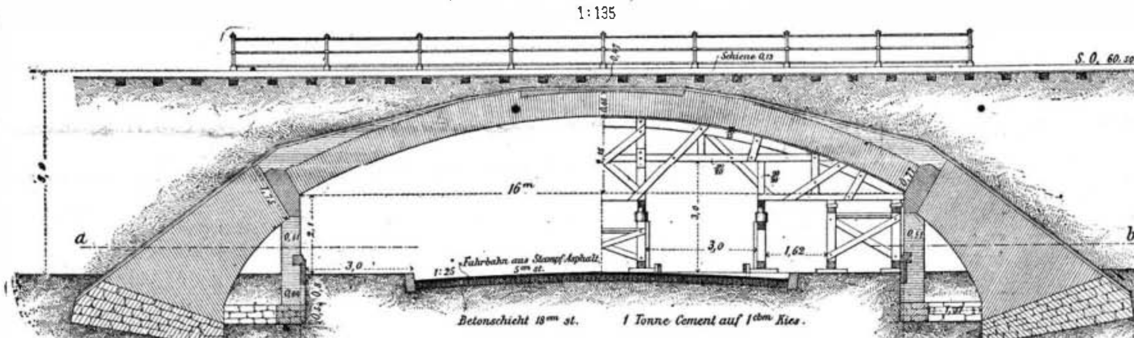

Fig. 3. Grundriss nach a b (in Fig. 2.)
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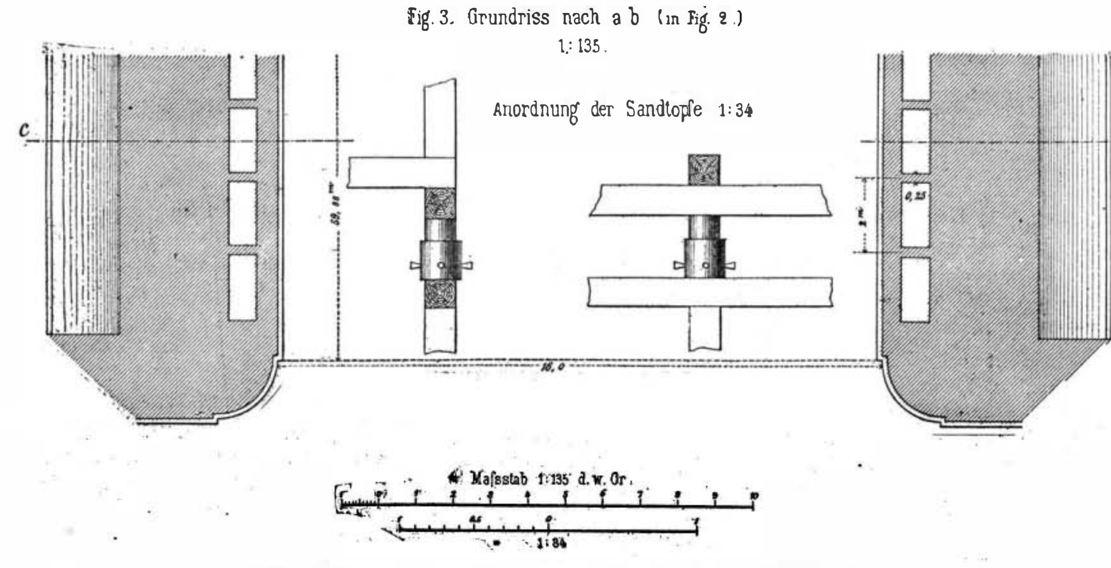

THE NEW TUNNEL, KONIGSTRASSE, BERLIN.