

#### THE MONT BLANC OBSERVATORY.

It is useless to insist upon the importance of mountain observatories. The stations of the upper regions have a clear sky, of a perfect transparency, that singularly facilitates the observation of the stars. They are situated, besides, at the very origin of atmospheric phenomena, and offer to the meteorologist as well as to the astronomer the most valuable elements of study.

One of our most illustrious scientists, Mr. Janssen, who has given an example of his ardor for science on numerous occasions, resolved to give France the highest observatory in the world, and, despite the difficulties that the ascent of Mont Blanc presents, to erect a station at the summit of the giant of the Alps. We have kept our readers informed as to Mr. Janssen's preparatory expeditions, and we have spoken to them about the soundings made in the snow at the very summit of the mountain, in order to find a rock basis to serve as a foundation for a solid structure. No rocks were found. Mr. Janssen, without being discouraged, resolved to plant in the snow a wooden observatory, whose parts should be carried up the mountain and put together at the summit.

From the very beginning of his labors, Mr. Janssen was of the opinion that it would be impossible to place the observatory upon the hard and compact snow of the summit. This idea was impressed upon him as the result of a reading of the narratives of the ascents of the last century. The intrepid De Saussure found that the small rocks situated near the summit emerged about the same as they did a century ago. It was therefore evident that the depth of the snow toward the summit and the configuration of the latter itself merely undergoes changes that must oscillate around a mean position of equilibrium.

Doubtless secular changes may occur analogous to those presented by the glaciers themselves, but such changes will, by their very nature, be extremely slow, and, consequently, little to be feared.

An experimental structure having stood upon the summit of Mont Blanc for a whole winter, Mr. Janssen decided to pursue his work. He constructed at Meudon, on the grounds of the observatory of physical astronomy, the structure shown in Fig. 1, and which constitutes the observatory. This was taken apart and carried to Chamounix by rail, after which it was carried, piece by piece, to the summit of the mountain, where it was reconstructed in the snow.

We reproduce herewith a portion of the interesting narrative addressed by the eminent astronomer to the Academy of Sciences:

Starting from Chamounix on Friday, September the 8th, at seven o'clock in the morning, we reached the summit on Monday, September the 11th, at half past two in the afternoon. The observatory stood before us. This structure consists of two stories, the framework of which, formed of wide and massive beams, crossed in all directions, in order to assure the rigidity of the whole, produced a deep impression. It may be asked how it could have been carried up to and built at such an altitude, and especially how one could have dared to found it upon the snow. Yet, if we attentively examine the conditions offered by the latter, which is so hard, so permanent and so slightly movable at the summit, we shall find on one hand that it is capable of supporting a great weight, and, on another, that it but slowly causes changes that necessitate a righting of the structure seated upon it. Upon my arrival, I devoted myself to a brief inspection. I found that the structure had not been sunk in the snow to as great a depth as I had demanded of the contractors, and this did not meet with my approval. My guides and I then took possession of one of the chambers of the observatory—the largest one of the lower floor. I had in the first place had the instruments brought up, so as to be able to begin observations immediately. The provisions remained at Rocher Rouge—a circumstance that for the moment embarrassed us. The weather having suddenly become bad, we remained separated from our food supply for two days. The storm lasted from Tuesday to Thursday morning. Then the weather became fine and I was able to begin observations. The main object of the latter was the question of the presence of oxygen in the solar atmosphere.

As known to the Academy, I touched upon this question in my ascents of the Grands-Mulets (3,050 meters) in 1888, and at the observatory of Mr. Vallot in 1890. But what constitutes the novelty of the observations of 1893 is, in part, that they were made at the very summit of Mont Blanc, and especially that the instrument employed was infinitely superior

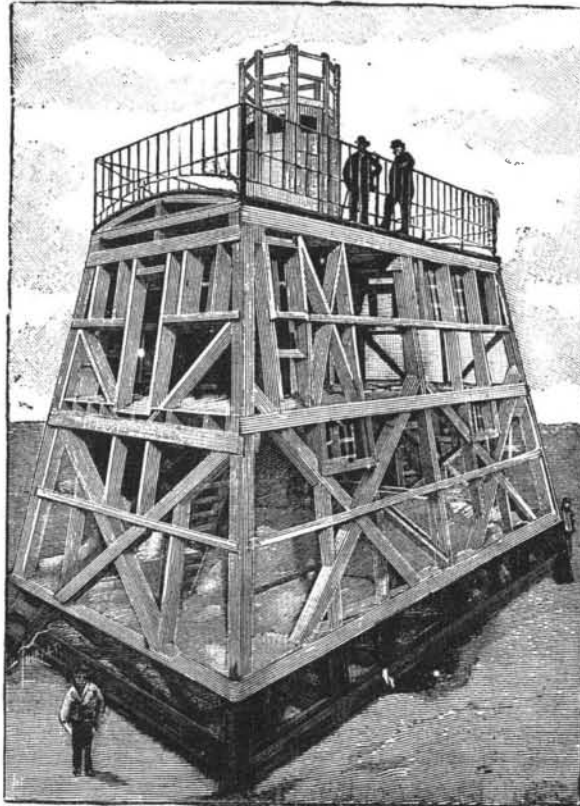


Fig. 1.—FRAMEWORK OF THE JANSSEN OBSERVATORY MOUNTED UPON THE SNOW AT THE SUMMIT OF MONT BLANC.

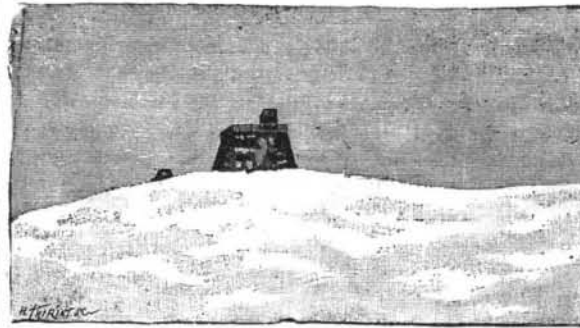


Fig. 2.—THE OBSERVATORY BURIED IN THE SNOW.

to that of the two preceding ascensions. The first, in fact, was a Duboseq spectroscope, incapable of separating the group B into distinct lines, while the instrument that has just been employed at the summit of Mont Blanc is a Rowland spectroscope (that I owe to his friendship) with telescopes of 0.75 m. focal distance, giving all the details known of the group B.

After enumerating the details of his observations, Mr. Janssen adds:

Upon the whole, I would say that the observations that have just been made at the summit of Mont

Blanc permit of giving, in the study of this question of purely telluric origin, groups of oxygen in the solar spectrum and new and much more precise bases, and that they lead to the conclusions already enunciated. Independently of such observations, I devoted my attention to the qualities of the atmospheric transparency of this nearly unique station and to the atmospheric phenomena that are embraced in so great an extent and through so considerable a thickness.

The observatory is, of course, not finished. There still remains much to be done aside from the internal arrangements and the mounting of the instruments. But the great difficulty is conquered. We are under shelter for working, and have no longer to contend with snow storms. The rest will come in its time. I hope that the observatory will soon be able to allow of a more comfortable sojourn than the one that I made there. However this may be, I regret nothing. I ardently wished to see our work in place, and more ardently still to inaugurate it by some observations that I have at heart. I am happy that, despite a few inconveniences, it was permitted me to realize them.

The structure at the summit of Mont Blanc is a two story one, with terrace and balcony. The whole forms a truncated pyramid, whose rectilinear base is sunk in the hard snow. This base is 10 meters in length by 5 in width. The rooms of the basement are lighted by wide and low windows, situated above the snow. The upper story serves for the observations. A spiral stairway runs to the top of the edifice and even to several meters above the terrace, where it supports a small platform designed for meteorological observations.

The entire observatory has double walls, for the protection of the observers against the cold. The windows and openings also are double, and, besides, are provided externally with shutters closing hermetically.

The lower part of the observatory has a double floor and a system of traps that permit of reaching the snow that supports the observatory and of manipulating the jack screws that are capable of restoring verticality to the structure in case of an inclination. The observatory will be provided with petroleum heating apparatus and all the movable objects necessary for living at such an altitude.

Such is the history of the memorable inauguration of this fine work, which is assuredly destined to furnish astronomical and meteorological science with the newest and most fecund studies.

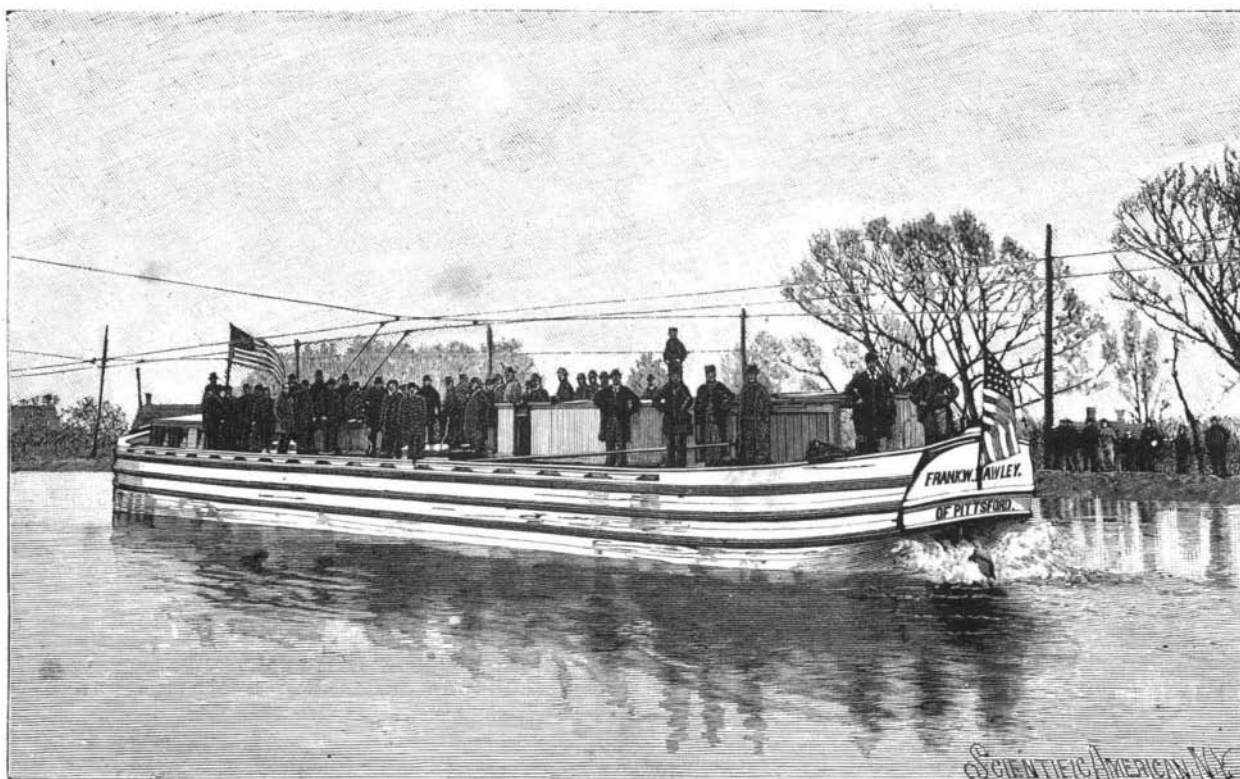
We reproduce in Fig. 2 a view of the finished structure as it appears half buried in the snow. It forms above the extreme surface of the giant of the Alps a true house which terminates in a terrace and a pavilion. Alongside of the observatory may still be seen the little hut that was constructed two years ago. We have already said that some preliminary experiments upon the resistance of packed snow encouraged Mr. Janssen to undertake the construction of this important edifice. The learned astronomer had assured himself by numerous experiments that there was nothing impracticable in it. It is well to recall the fact that the idea of establishing an observatory at the summit had been rejected by everybody, by reason of the general belief that the summit had rejected all the objects that had been placed upon it.

In the arrangement of the structure, Mr. Janssen was assisted by his friend Mr. Vaudremer, architect of the Academy of Fine Arts, who had fully accepted the ideas of the foundation on the snow. It now only remains to proceed to arrange the interior and put the instruments in place. This will be the work of next year, as will be also the erection of the astronomical portion.—*La Nature*.

#### ELECTRIC PROPULSION OF CANAL BOATS.

The application of the trolley line to the propulsion of canal boats was recently the subject of an experiment upon the Erie Canal under the auspices of the government of the State of New York. The plan tried was that submitted by the Westinghouse Electric Company, of Pittsburg, Pa., and the results obtained were most satisfactory.

A section a mile long of a canal level east of Brighton, near Rochester, N. Y., was selected for the experiment. Work was begun on November 13, and on November 17 the span wires and trolley wires



TRIAL OF ELECTRIC TROLLEY SYSTEM ON THE ERIE CANAL.