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.

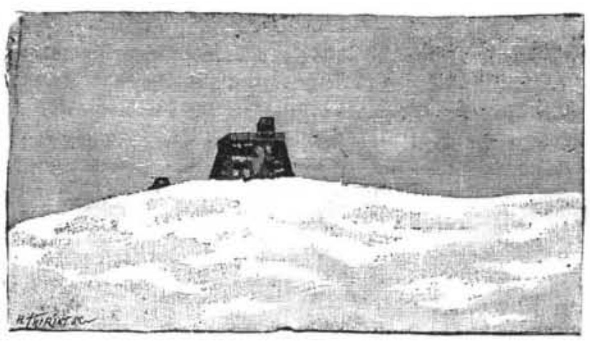


Fig. 2.—THE OBSERVATORY BURIED IN THE SNOW.

to that of the two preceding ascensions. The first, in fact, was a Duboscq 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.

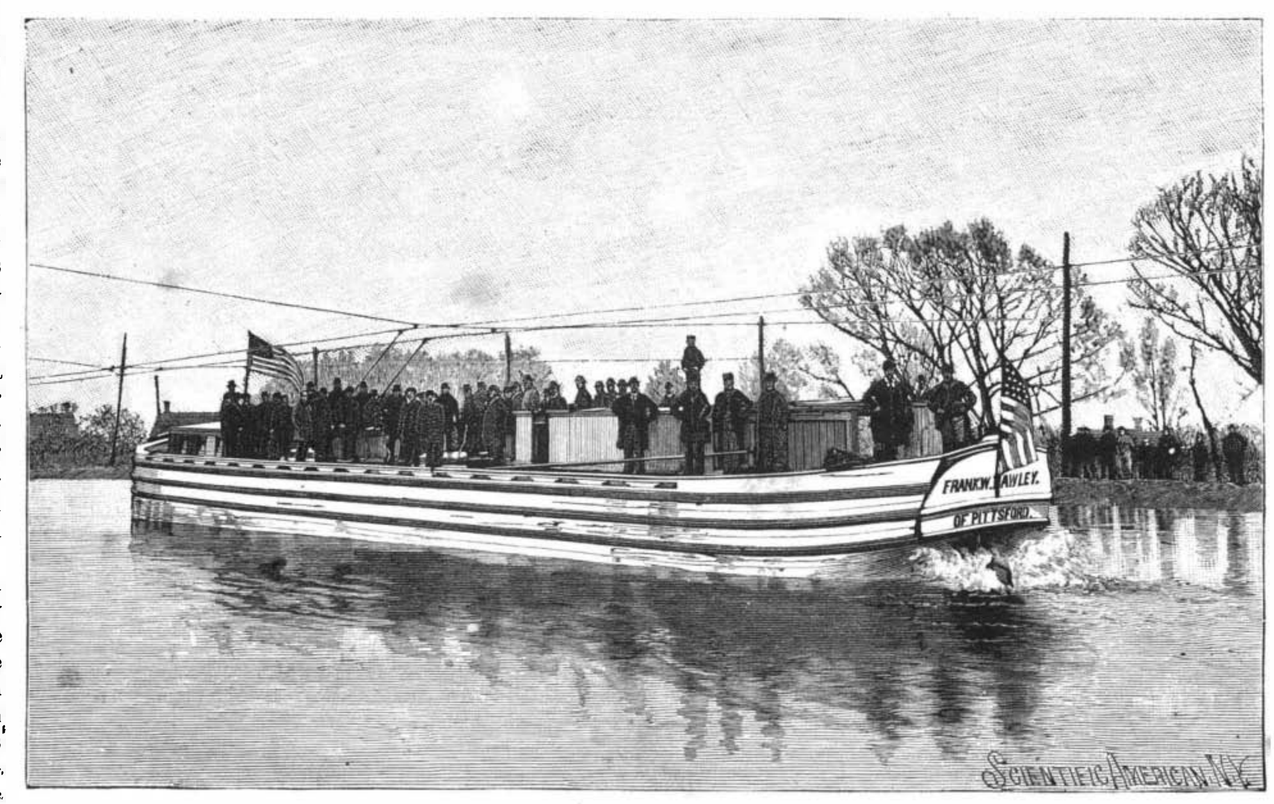
The entire observatory has double walls, for the protection of the observers against the cold. The windows and openings also are double, and, besides, are provided externally with shutters closing hermetically.

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.*



TRIAL OF ELECTRIC TROLLEY SYSTEM ON THE ERIE CANAL.

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 were in position and the boat was ready for the experiment. A canal boat, rechristened the Frank W. Hawley, was fitted with Westinghouse motors. A double line of trolley wires was used and the boat carried two trolley poles, thus working without grounding. The switchboard was located near the helm. The Rochester Railway Company supplied the electric power. The Niagara Power Company was interested jointly with the Westinghouse Company in the trial, and the name of the boat was that of the representative of the Niagara Company, which may have much to do in the near future with canal transit. On Friday, November 17, a private trial was made with success. On Saturday the official trial took place.

Governor Flower and a large party of guests and representatives of the interests concerned were on the boat. To the executive was assigned the turning of the motor switch. On his doing so the motor started and the propeller began to churn up the water. The boat started off and in a few minutes was moving along at about four miles an hour. Curves and a bridge were passed without trouble and a lock was entered. The boat was loaded with sand ballast and her deck was crowded with people. A strong head wind and a head current were encountered.

Other causes also did much to interfere with a successful issue. The Rochester Railway Company failed in maintaining enough voltage. The pressure given was from 200 to 250 volts instead of 500 volts, as it should have been. Under this pressure, 60 amperes of current were taken, so that about 15,000 watts at the most were absorbed, indicating about 20 horse power. The boat was an everyday canal boat, with an old type propeller. Its preparation for the trial consisted in the removal of its boiler and engine, and the introduction of two Westinghouse street car motors. Each was of 25 horse power, and the two motors were connected directly to the propeller shaft. Under the circumstances the experiment was a very great success.

The trolley line was of No. 0 wire. The lines were about five feet apart, and were strung about two-thirds of the width of the canal from the berm bank or tow-path. The trolleys were regular street-car trolleys. It is proposed to use a trolley running on the wire and connected by a flexible conductor with the boat, so as to permit the craft to be steered in any direction. Under the present arrangement the trolley lines have to be followed within the limits of a small lateral deviation.

Much expense it is hoped can be saved by this use of electricity. The maintenance of the Erie Canal costs the State of New York almost $1,000,000 per annum, of which the greater part is devoted to the tow-path. The abolition of the tow-path would save in this item a good deal of money. By increased average speed it is believed that the capacity of the canal can be doubled or trebled, while material reduction can surely be made in the help required to run a boat.

The trial is due to Governor Flower. He secured an appropriation of $10,000 from the State legislature for the purpose. The experiment cost about $5,000, and its cost was divided between the State and the Westinghouse Company.

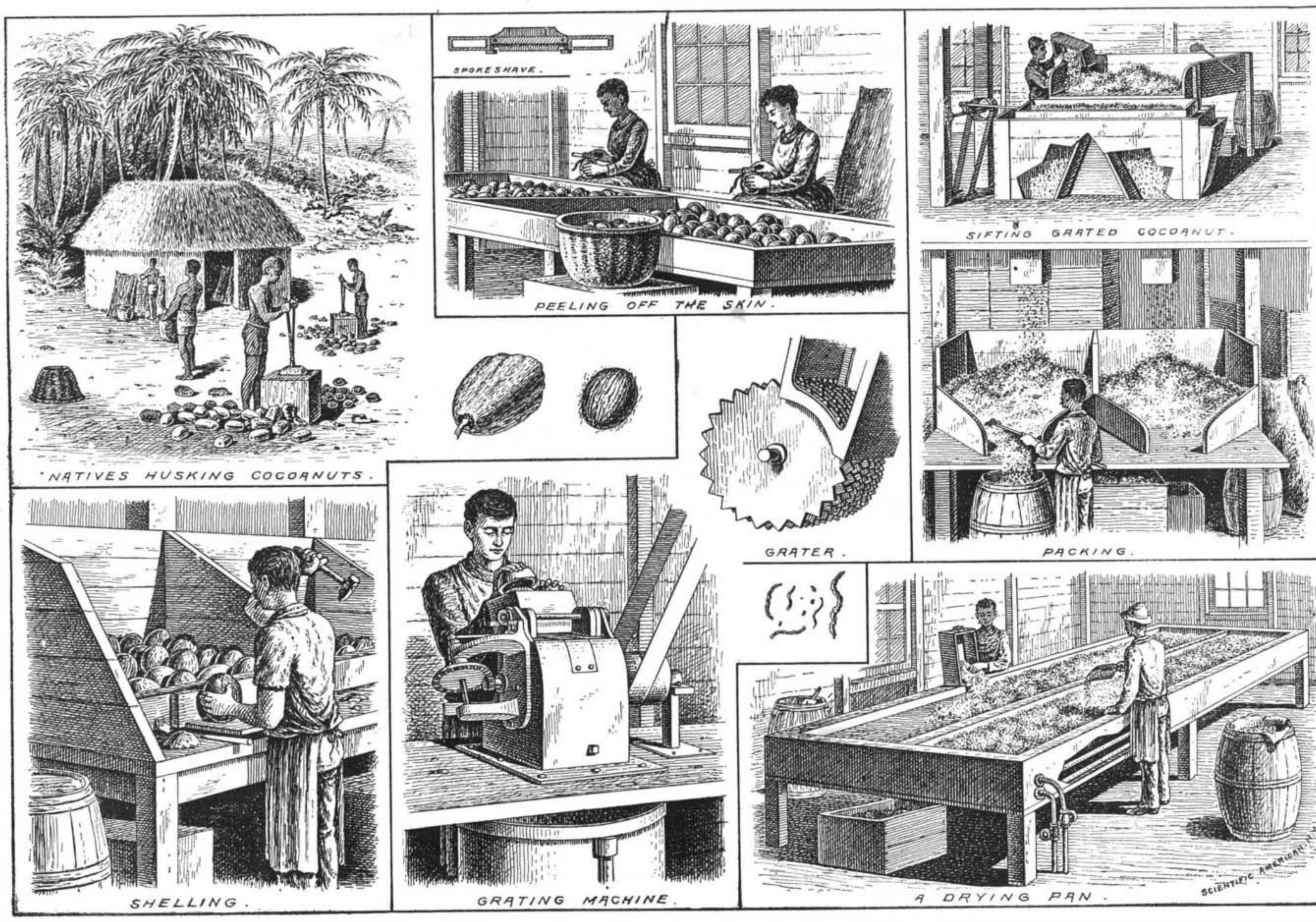
THE MANUFACTURE OF DESICCATED COCOANUT.

The cocoanuts which are used in this country for the manufacture of confectionery, oil, etc., come principally from the West Indies. They thrive best on or near the coast. The cocoanut palm is a beautiful and lofty tree, growing sometimes to a height of 60 to 100 feet, with a cylindrical stem, which attains a thickness of about two feet. The tree terminates in a crown of graceful waving pinnate leaves. The leaf, which is about 20 feet in length, consists of a strong midrib, from which a number of long acute leaflets spring, giving the whole the appearance of a gigantic feather. The fruits mature in bunches of from 10 to 20. The fruits, when mature, are oblong and triangular in cross section, measuring from 12 to 18 inches in length and 6 to 8 inches in diameter. The fruit consists of a thick external husk or skin of a fibrous structure, within which is the ordinary cocoanut of commerce. The nut has a very hard wooden shell inclosing the kernel, within which is a milky fluid called cocoanut milk. The natives in Ceylon raise these palms in vast numbers, the ground being peculiarly suited for that purpose. It is estimated that as many as 20,000,000 of these trees flourish there. In planting the ripe nuts are placed in squares containing about 400 each. About an inch of sand or seaweed is covered over them and watered daily till they germinate. The nuts put down in April are sufficiently grown to be planted before the rains of September begin. They are then set out in holes 3 feet in depth and 20 to 30 feet apart. The roots of the young plants are first covered up with soft mud or seaweed, and for two years watered and protected from the glare of the sun. The palm begins to bear fruit from the fifth to the seventh year of its age, each stock carrying from 5 to 30 nuts, the tree bearing on an average 60 nuts yearly. The husk yields the coir fiber, which is used in the manufacture of rope, cordage, brushes, etc. The nuts are husked by the natives. They are first placed on blocks of wood and an instrument similar to a pair of shears is jabbed into the husk, the handles or arms are then opened, which tears the husk apart so that the nut can be taken out.

The cocoanuts come to this country packed in burlap bags, containing about one hundred nuts, weighing about 160 lb., and are sold from the dock or vessel at $30 to $60 per thousand.

The first operation in the manufacture of desiccated cocoanut is shelling. This is done by standing the nut on one end and striking the other with a hammer, which cracks the shell and kernel at the same time and lets out the milk. The attendant then takes an oyster knife and separates the outer shell from the kernel, which is then passed along to the peelers. An expert can shell as many as 3,000 per day. The peeling operation is done mostly by girls. The kernel is held in an upright position on the knee of the operator; starting at the top with a knife or spokeshave, it is drawn downward, taking off the dark skin from top to bottom in one stroke. This operation is repeated, the kernel being turned with the hand at every stroke until every particle of skin has disappeared. A first-class hand can peel as many as 1,800 per day. The kernels are then cut into halves and put through the grating machine. The kernels are first placed into a movable hopper at the top of the machine, which, when in motion, moves back and forth, drawing the material across a number of circular revolving knives, similar to those of a saw, which cut or grate the kernels into fine particles. The knives are about 9 inches in diameter, ⅛ inch thick, with twenty-two teeth about ¾ inch in length. The knives are set about ¼ inch part. The graters, when working steady, can grate as many as 7,000 cocoanuts per day. After grating, the material is taken to the drying room, where it is placed in heated galvanized iron pans. The tables containing the pans are 20 feet in length and about 7 feet in width.

Each table contains two pans 3 feet in width and about 5 inches in depth. Inclosed underneath these pans are nine double rows of steam pipes, which run back and forth the length of table. About seventy pounds of the grated material is placed in each pan, and from eight to thirty pounds of granulated sugar is added. The steam is then turned on, which heats the pans, melting the sugar, which, in turn, adheres to the grated cocoanut, the attendant occasionally mixing and turning over the material so that the melted sugar can freely mix with it. After drying twelve hours, it is passed through a sieve, which separates the coarse from the fine material, and then packed into boxes and barrels. Thirteen hands can turn out from twenty to twenty-five barrels per day. Twenty-five horse power engine with eighty pounds of steam is used in running several graters and furnishing steam for heating twenty-four drying pans. The sketches were taken from the plant of Bussing & Graef, Jersey City.



THE MANUFACTURE OF DESICCATED COCOANUT.

THE Simplon road, from Switzerland to Italy, was built by Napoleon's engineers, in 1807; over forty thousand workmen were employed at one time.