THE "LEBAUDY II."

BY EMILE GUARINI.

On the morning of the 28th of August, impelled by a heavy gust of wind, Lebaudy's airship "Le Jaune" broke away from its moorings and began its upward flight very much as did the captive balloon recently from Porte-Maillot, but with this more fortunate difference, that no one was in the basket at the time, nor did an explosion ensue as a consequence; except for a few unimportant injuries, everything went well.

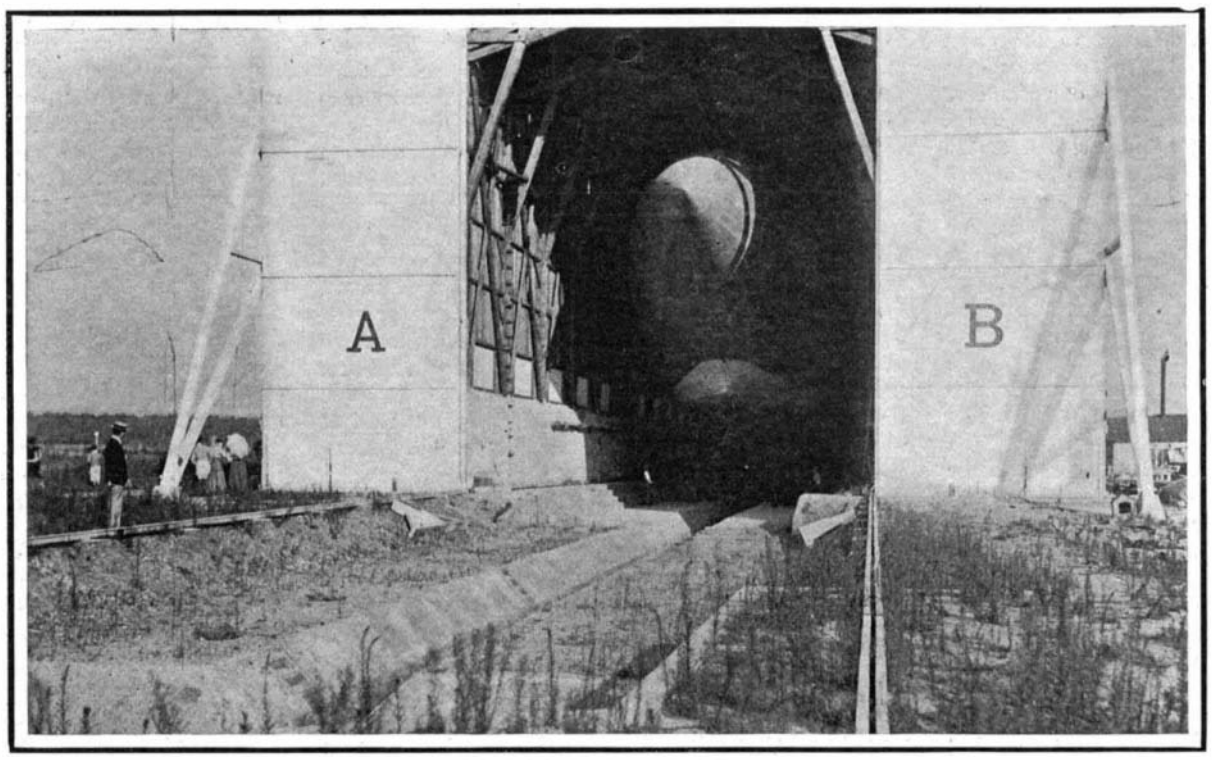
The accident happened while making the balloon fast to its retaining ropes. It rushed up rapidly to a height of 1,000 meters, but as the result of a lowering of the temperature it descended of itself, and touched ground in the forest of Fontaine-Labbé near Serquigny after a flight of more than 80 kilometers (50 miles).

By a miracle almost the gas bag was not torn at all; while the metallic framework suffered only slight injuries.

Mr. Julliot, the maker of the balloon, declared with satisfaction that this unforeseen escapade has established what the "Jaune" can do when left to itself, as well as permitting the opportunity to confirm the perfect functioning of the automatic valves, to which is due the circumstance, that, in spite of the elevation of the temperature, the balloon did not burst.

It is in condition to continue its ascensions—this one being the fourth or fifth since the flight of July 1 in five or six weeks—the repairs being limited to the replacing of several tubes that were bent. It has been decided that the aeronauts will continue their experiments in France. Both Mr. Paul and Mr. Pierre Lebaudy deem it of greater interest to spend the rest of the year making experiments in France than to waste their time making ascents at the St. Louis Exposition. The "Lebaudy II." is above all an airship for study, and is equipped accordingly. It is provided with a Gaumont camera that can be continuously operated, besides having some horizontal projections that allow of rigorously determining the variation of the velocity and direction attained, by causing the power, the direction, and the velocity of the balloon itself to vary.

It is proposed also to make use of the balloon, which will thus become an actinometer of precision, to determine the action of atmospheric agents. It will become a veritable floating observatory. Nocturnal voyages are in prospect during the absence of that grand disturber called the sun. With this end in view, the "Lebaudy II." carries a powerful searchlight, which will illuminate the surface of the earth most vividly, making it possible to distinguish the places over which it is passing. These experiments must infallibly lead to renewed study of spherical balloons, whether provided or not with balloonets, as well as to the further investigation of propelling devices. The essential characteristic of the "Lebaudy II." as well as of the "Lebaudy I." is stability. The catastrophe which happened last year at Chalais-Meudon and put an end to the career of the "Lebaudy I.," in the opinion of Col. Renard, cannot be attributed either to faulty construction or to mistaken manipulation of the pilot Juchmès.

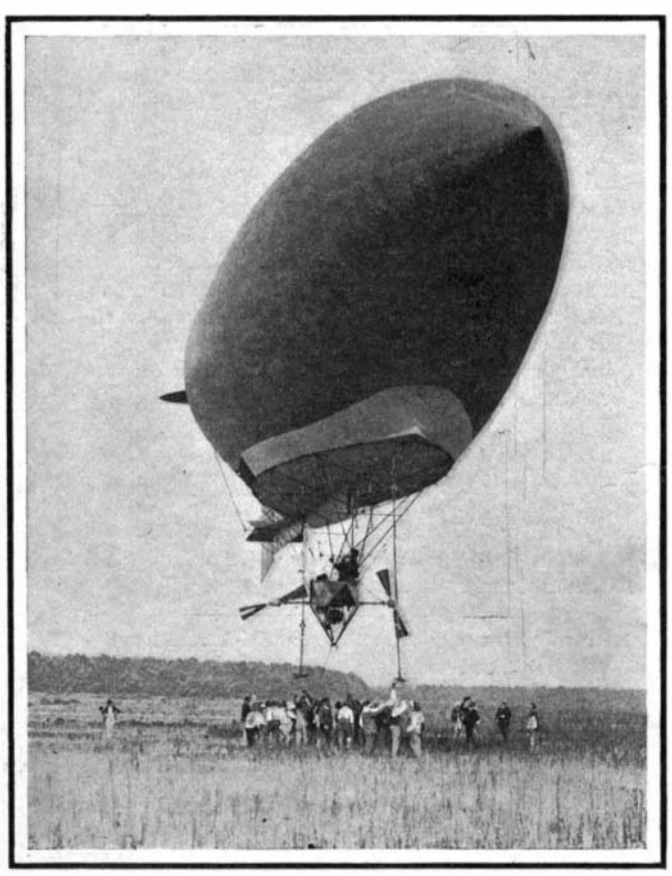


The "Lebaudy II." in Its Shed.

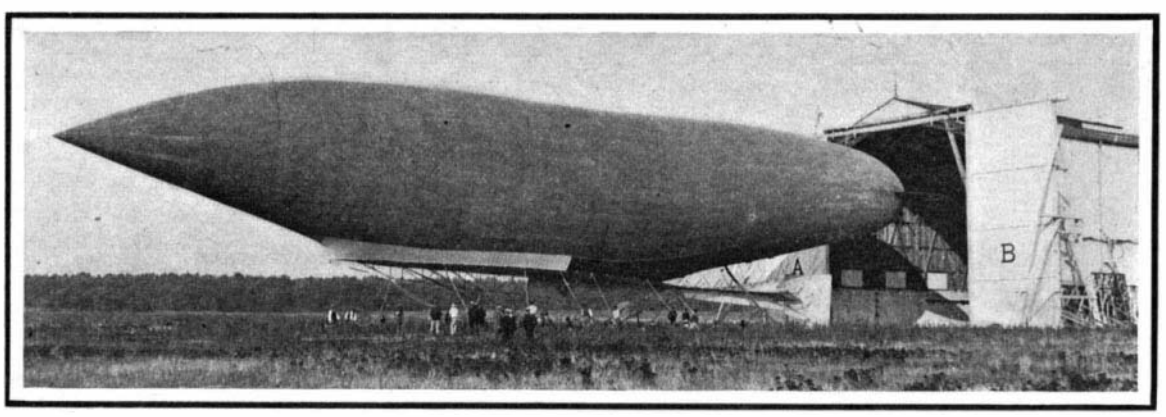
It seems to him that this exceptional stability is due to the fact that Mr. Julliot, the constructor of the balloon, did not allow himself to be deterred by the objections raised by the expert mechanics, who found in their calculations that he must use propelling screws of very large diameter working at the end of a strengthened beam. On the contrary, Mr. Julliot created a particular type suitable to aerial locomotion, for in this instance he made use of two screws of moderate diameter, which he established at the greatest cross-section of his dirigible airship, one on the port and the other on the starboard side, each one actuated by a separate motor.

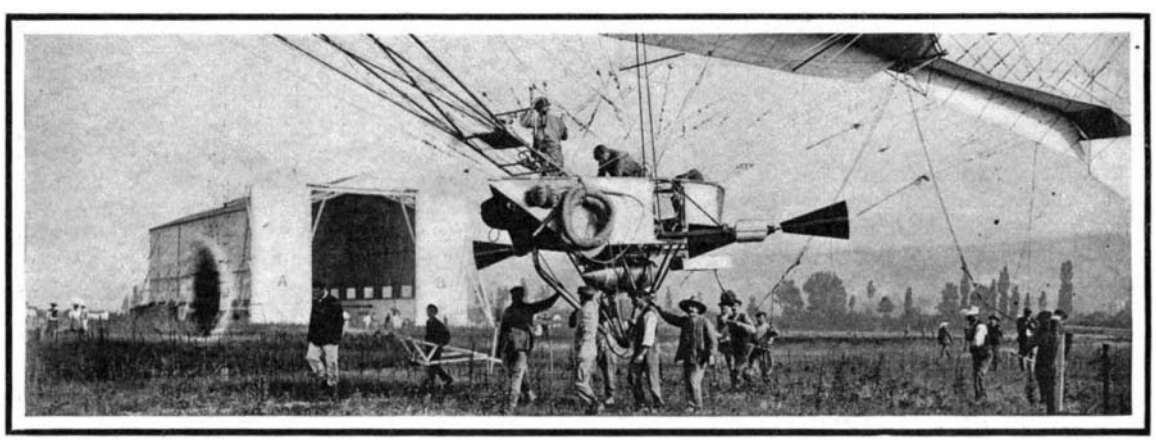
Consequently, even admitting it to be a logical proceeding to study the conditions affecting stability in a balloon during its flight, by forcing air, with rotary fans, into a tunnel containing paper models, no one was reasonably capable of applying to the "Lebaudy" the results of the calculations reached during experiments with other machines. Besides, the stability is obtained by means of a system of planes. Now the idea of making airships stable by means of aeroplanes is by no means new. It has been mentioned in patents on several occasions, but without exactitude, and it was only in the Lebaudy patent of May 8, 1903, that the means employed in the "Jaune" for making the airship stable were brought forward for the first time—means which have certainly contributed to the exceptional stability of this aerostat.

In this patent the Messrs. Lebaudy show the coexistence of two species of plane surfaces, the one a horizontal, to establish a horizontal or flat stability, and the other a perpendicular plane, to endow the airship with constancy in the vertical plane. Although both species of planes are mentioned together, the means of producing the horizontal stability are the ones upon which the greatest dependence is placed. As a matter of fact, the efficiency of these planes increases with the velocity of the ship. Several planes for attaining different positions have been fixed upon the long keel, which formed a sort of a feathered tail. The direction of these planes, and even their surfaces, may be changed, but not during flight; otherwise they would constitute merely a bundle of little rudders. Here is an example of the construction of these directing planes, destined to keep the ship upon an even keel. The make-up of the other planes in analogous. It must first be stated, however, that the basket is soldered to a steel cylinder, solidly braced and rendered non-breakable by interwoven steel wires, thus constituting a stiffening system of great strength. This cylindrical tube is of oval shape, having a diameter of 95 feet in one direction and 19.68 feet in the other. The directing plane, of which we shall now speak, is formed by a tube extending over a semi-oval, soldered upon the tube and made solid, in the same manner as the oval cylinder, by braces and steel wires. This plane is 95 feet long, with a height of 4.23 feet, affording a surface of 172.16 to 193.68 square feet. It is situated about 16.4 feet below the center of gravity of the balloon, which will permit us to estimate its efficiency. The prospective "Lebaudy," which will make ascensions next year, will have, however, both fixed and movable planes, adapted to both horizontal and vertical motion; moreover, the screw propellers will be pro-



Preparing for an Ascent.





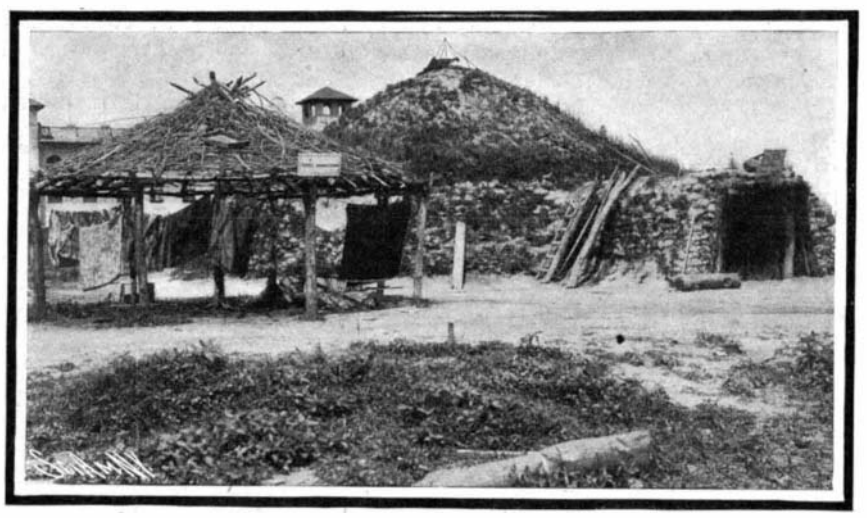
Ready for a Flight Over the Meadows of Moisson.

THE "LEBAUDY II."

Philippine House. Native Cooking Dog Meat.

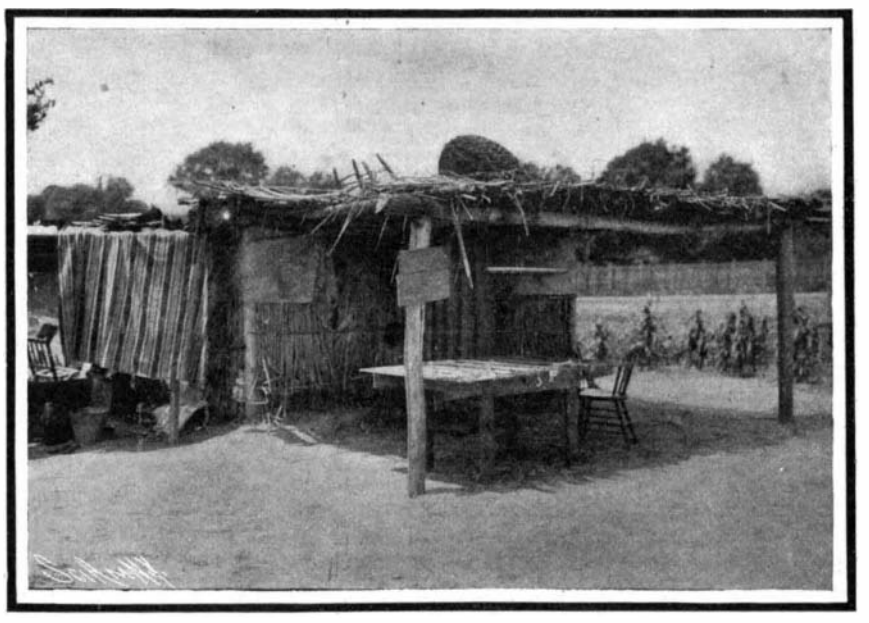
Dwelling of Ainus, the Aboriginal Race of Japan.

Wichita Summer and Winter Grass Houses.



Pawnee Earth Lodge to Right; Summer House to Left.

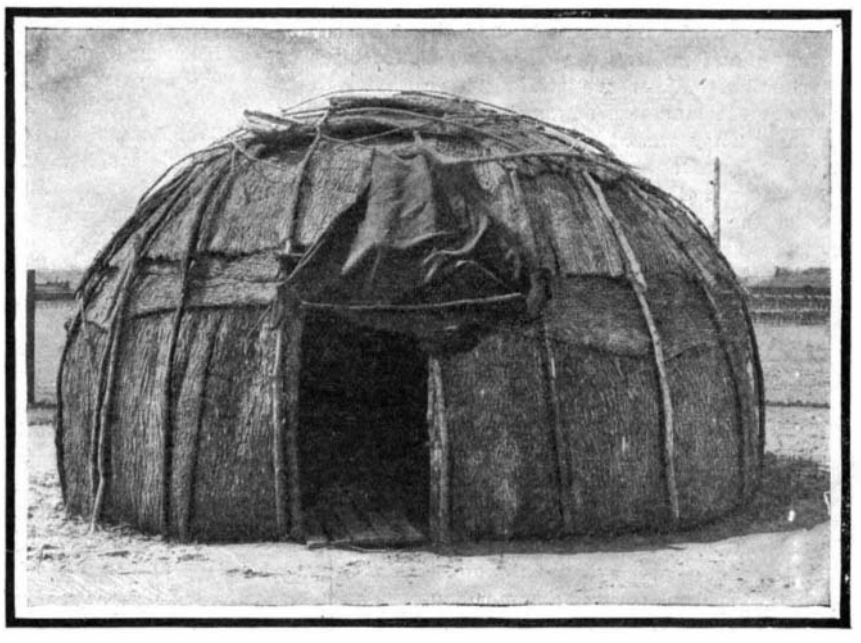
Arapaho Winter Tepee, with Brush Wind-Break; Summer House in Foreground.



Cocopa House, Old Mexico.

From photographs taken especially for the SCIENTIFIC AMERICAN.

Patagonians in Front of Native Hut of Pole Framing Covered with Hide.



Kickapoo Indian Bark House.

GROUP OF NATIVE DWELLINGS, ST. LOUIS EXPOSITION.—[See next page.]

vided with jointed wings. It must not be overlooked that the "Lebaudy II." is a trial ship, and that the pilot Juchmès must have at his disposal several means of procuring the requisite stability of his ship during flight, so that he may choose that which offers the greatest advantages.

The "Lebaudy II.," having no need of ballast, may without inconvenience make ascents of 6,500 feet, a circumstance that offers many considerable advantages. First of all, the pilot has more latitude in the choice of a more favorable current of air or in the avoidance of unfavorable currents. Again, from this height he can examine the surface beneath him, comprised within a circle having a radius of 74.5 miles—surely an inestimable advantage in time of war. Still another good quality possessed by the "Jaune" is that of preserving its shape without variation and not forming pockets. An airship which does not fulfill these conditions is a hundred times worse than a spherical balloon. The catastrophe attending the "Santos-Dumont II." furnishes a memorable proof of this. The danger begins at the moment when the apparatus which inflates the bag ceases to act, from any cause whatever. The precaution taken by Mr. Julliot, of placing two independent motors in the basket, is therefore a good one.

Presumably no accident will happen to both motors at the same instant; such a disaster is less to be feared, because both of the motors are under care of an engineer, who never loses sight of them while in operation.

NATIVE DWELLINGS AT THE ST. LOUIS EXPOSITION.

BY THE ST. LOUIS CORRESPONDENT OF THE SCIENTIFIC AMERICAN.

In previous articles on the World's Fair at St. Louis, we have referred to the unique opportunities which are presented for a study of the various races of the earth, their habits and their modes of life. A most attractive and eminently instructive branch of the anthropological section is a group of reproductions, built to full size, of native dwellings, the greater part of which represent the homes of the various aboriginal tribes of North America. The exhibit encircles the large parade ground in front of the building of the United States Indian Industrial School, of which we shall have more to say in a later article. In every case the dwellings are built of the same material and in the same manner as were customary, or are to-day customary, among the tribes that they represent. In the case of several of the North American Indian tribes, it was difficult to find Indians who were familiar with the art, now extinct, of building these homes, and in almost every case it was necessary to seek out some very old Indian, who acted as master builder over the younger natives. The first, and in some respects the most striking structure, is the bark house of the Kickapoo Indians, which is about 12 feet in diameter by 6½ feet in height. It consists of a framework of willow poles, each frame being approximately semicircular in form, to which is fastened wide strips of overlapping white or red elm bark, the pieces of bark being tied to one another and to the framework by strips of the bark. There is a single low door, that is usually covered by a skin. In the center of the roof is a square opening that serves as a chimney, and is sometimes provided with a bark or canvas hood, which can be shifted with the wind.

Next follows the primitive dwelling of the Maricopa Indians of Arizona. The huts, which were generally built along the rivers, were constructed on a willow frame, the sides and roof being built of arrow weed. The Maricopas are gentle, and of kindly disposition. When the white man first discovered them, they were prosperous, having adapted themselves to the Aztec style of farming, and making use of the old Aztec ditches for irrigation. When the white people came, they found that the land was of good quality, suitable for irrigation. They went above the Indian reservation, taking out by means of ditches all the river supply, and leaving practically no water, under normal conditions, for the farms of the Reservation. As a consequence, these people soon found themselves to be objects of charity, depending upon Government rations; and many who were formerly prosperous had to leave their homes and scatter in search of work. Next to the Maricopa dwellings one sees two small, conical, earth-covered houses of the kind that were built by the Navahos. These consist of a framework of willow poles covered with grass sod. Compared with some of the other native homes, they are small and uncomfortable. The Navahos are still a more or less nomadic tribe.

In most cases the exhibit includes both the winter and summer homes of the tribes represented. Thus the winter tepee of the Cheyennes is shown side by side with their light bark-covered summer house. The same is true of the Arapaho exhibit, of which we present an illustration. It shows a typical tepee, or winter tent, consisting of framework of poles covered by canvas (originally of course, the Indians used skins for this purpose) and surrounded by a brush stockade, which serves to break the force of the winds that sweep at times with great force across the prairie. In front of the tepee is the light summer house, consisting of a flat roof covered with grass and supported on four corner posts; the object in building the summer dwelling being to get as much ventilation as possible, while securing shelter from the direct rays of the sun.

The most imposing building of the whole group is a Pawnee earth lodge, 40 feet in diameter and 20 feet in height. This is an ordinary size; but at times these lodges would be built with a diameter as large as 65 feet. The framework of the building is very heavy, as it must needs be to carry the great weight of the earth and grass sod with which it is covered. A circle of eight 6-inch posts stands in the center of the lodge, the posts serving to support the main rafters. Arranged around the wall are a number of bunks, and entrance is had by a long vestibule or porch, the doorway of which is shown in our engraving. Adjoining the earth lodge is a summer house of light construction, but more pretentious appearance than that of the Arapaho. A picturesque group is that of the Wichita Indian dwellings, which comprise a winter grass house and two summer houses. The frame is of split willow, the rafters of lighter split willow, and the intersections are tied together by willow bark. The framework is roofed with rice grass. Of the two summer houses, it will be noticed that one is the customary flat roof carried on four posts, while the other is a larger and more pretentious structure, affording a considerable amount of shelter from the weather, but being left open near the ground to allow the wind to pass through. Another of our illustrations shows a typical dwelling of the kindly Cocopa Indians of old Mexico. It is a very primitive affair, built of willow poles and the tule rushes which grow in the water at the edge of the streams. On the top of the rude porch in front of the house are one or two native baskets, while on the table are spread out various samples of native bead work for sale.

One of the most curious and picturesque of the native homes is the dwelling of the Ainus, the aboriginal race of Japan. The hut has vertical walls and a rather high-pitched roof, the side walls and the roof being thatched with a native reed. Their dwelling is protected from the evil one by sacred prayer symbols, one of which is a head of a bear, which, by the way, is an object of worship. There is not a race among the many present at St. Louis that is attracting more intelligent interest than these remarkable people, who are ethnologically a puzzle even to the Japanese themselves.

The Patagonian "giants" as represented at the Fair are something of a surprise in the fact that their stature, judged from American standards, is not abnormally tall. Their dwelling, as shown in our illustration, is of a very primitive character, consisting of skins sewn together and supported upon poles and rafters in the manner indicated. We have so lately dealt with the Filipino that it is not necessary to say much about his bamboo house, as shown herewith. The particular Igorrote in front of the house is engaged in cooking a portion of the dog meat which forms one of their favorite and characteristic dishes.

The Making of a Welsbach Mantle Briefly Told.

The incandescent gas mantle was invented by Auer von Welsbach in 1885, and patented all over the world. The manufacture and use of mantles was first taken up in Austria, and has since found its way in all of the civilized countries where gas is introduced. At the present time it is estimated that no less than one hundred and fifty millions of mantles are manufactured annually. In the United States, although there are about forty millions manufactured annually, the industry is only partly developed. The public is gradually learning to use the mantle.

The mantle is made as follows: A "cone" or spool of No. 40 white cotton thread is knitted into a "stocking" or hose, about two inches in diameter. This stocking is thoroughly washed and dried. Then it is saturated with a solution of nitrate of thorium and one per cent of nitrate of cerium. The thorium is manufactured from a sand called monazite, which is found in Brazil and in the State of Carolina, and is rather expensive, being sold at $6.50 per pound.

One pound of nitrate of thorium yields from 300 to 350 mantles, depending on the quantity distilled. After the cone has been washed and dried it is either cut to proper size and impregnated with the thorium solution, or is first impregnated and then cut to the required lengths. The impregnated stockings after being cut and dried are sewed at one end with asbestos thread, so as to form a head provided with a loop, which serves to hold the mantle in process of manufacturing and when in use on the burner.

Then the impregnated stocking is hung on a wire by an asbestos loop, and heated in a gas flame of the Bunsen type. This is done in order to burn out the thread. The next process is called the shaping. The mantle now consists only of ashes of thorium (oxide of thorium) and is carefully held over a Bunsen flame, and gradually given the right shape, at the same time being hardened. As soon as the mantle is shaped and hardened it is practically completed; but in order to protect it from breakage it is "dipped" in a stiffening solution. There are many forms of "dip," but the one most used is made of soluble cotton (guncotton) dissolved in good alcohol and acetone. To this mixture castor oil and shellac are added. Before the mantle can be used on a burner this "dip" or coating must be burned off. The method employed in the manufacture will be described in detail in an early issue, and fully illustrated.

Automobile Notes.

Gen. Gallieni has lately organized an automobile service in Madagascar for transporting postal matter between Tananarive and Mahatsara. In spite of numerous difficulties which are due to the local conditions the experiment has succeeded very well. Capt. Gruss states that the automobiles have been running for seven months past with great regularity. At present there are six of the postal vans, but it is hoped to increase the number to ten, to take care of the large amount of mail matter which passes over this route. In seven months the automobiles have made a total distance of 30,000 miles, carrying 106 tons of mail matter. The total expense has been $18,000. The present system was supposed to be impossible by many, but it is now proved to be a success and will no doubt be greatly extended in the future and other lines will be run on the same plan.

The French Minister of War has opened a contest of automobile wagons for use in the army. They are to be heavy hauling cars or vans for transporting provisions and different kinds of material. The first three vehicles which come out best in the contest will be purchased by the state. The price of each is not to exceed $1,700. The trials will be made in the neighborhood of Paris and will comprise eight days of different kinds of tests. Only cars of French make are allowed to enter the contest. The total weight of the car when loaded is not to exceed 3.7 tons, of which 1.8 tons represents the net load. The motor is to give 12 horsepower at the minimum, at a limited speed of 1,000 revolutions per minute. The jury will pass upon the following points, giving each a certain co-efficient for a total of 100: Power of motor and design, simplicity, etc., 13; cooling, 5; consumption of combustible, etc., 15; operation of different organs, 15; wheels and tires, 15; brakes, 10; good handling of the car, 5; starting and grades, 8; proportion of load to total weight, 5; speed, 3; cost, 6.

To find out how automobiles can be best utilized for military service, an interesting series of maneuvers is now being held in Italy. The idea is to call upon automobiles in time of need and to mobilize them just as is done in many countries for horses belonging to private individuals. The present tests have been organized by the Minister of War in connection with the Milan Automobile Club. The tests last for a week and were commenced on the 30th of August. More than fifty chauffeurs entered the maneuvers, which were held at Brescia. They started early in the morning. At the last moment each chauffeur received a sealed envelope giving him a certain route to follow, and he was obliged to reach a certain point, which was often at a great distance off or at a high altitude in the mountains. The chauffeurs were required to return to their posts in less than 24 hours. Some of them were ordered to proceed at full speed to the Austrian frontier. The result was very satisfactory. All the cars except one returned to Brescia before midnight. The remaining car had been damaged by running into a telegraph pole. The military authorities are highly pleased with the performance of the cars and the skill of the chauffeurs. These experiments will no doubt be followed by others.

The autumn military maneuvers in France have brought out an unusual number of automobiles. The chauffeurs who figure in the exercises are to pilot the officers of the Etat-Major in their cars. The maneuvers of the automobile corps commenced by a grand review which was passed before Commandant Gentry. This well-known officer has charge of the army automobile matters and is himself an experienced chauffeur. Each *quartier general* will have two high-speed cars and four light cars at his disposal. To each corps of the army is allotted one high-speed car and one light automobile. In the maneuvers are many well-known chauffeurs, and nearly all the leading makes of car are represented. The cars which are to follow the maneuvers of the East will start from Paris and arrive at Dijon on the 6th of September; those of the Northwest maneuvers reach Verneuil on the 4th. Gen. Pendezec, the chief of the Etat-Major, who is in charge of the exercises, will be piloted by Marechal Cailiois on a Georges Richard car. The military chauffeurs will receive an indemnity during the whole of their voyage which has been fixed by the Minister of War at $0.008 per horse-power-mile, and $0.027 per horse-power per day. To this is added a fixed indemnity of $0.50 for soldiers of the troops and $0.60 for the inferior officers.