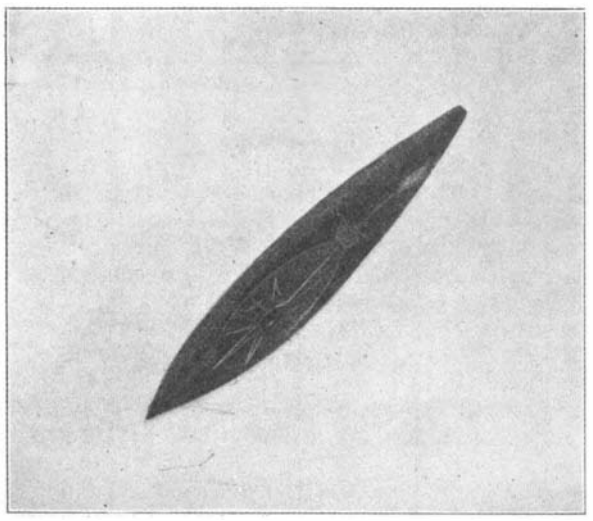
THE LEBAUDY DIRIGIBLE AIRSHIP.

Since the period of the first trials of the dirigible balloon constructed by MM. Julliot and Surcouf for the Lebaudy brothers, the inventors have been continuously carrying on their experiments with their airship, which is now complete and provided with its vertical rudder. The favorable predictions that it was possible to make from the first ascents have now been realized. Proceeding as in the past, the cord was first actuated in order to test the steering apparatus. Then a free ascent was made, but with the guide rope trailing upon the ground and capable of being easily seized by men who followed the balloon afoot.

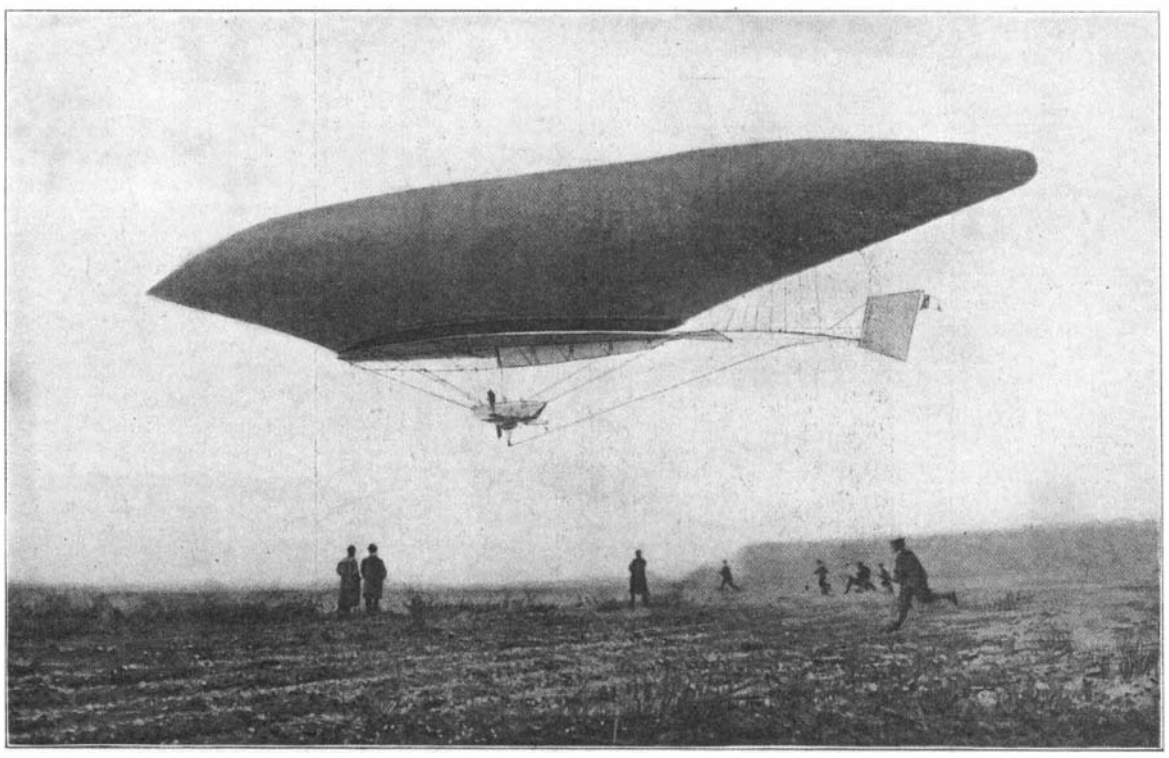
The start has been made every time from the cemented trench in front of the shed. In this trench a suitable guideway enables the car to start smoothly and without shocks that might harm it or strain its external pieces. The trench thus greatly facilitates both the starting and landing maneuvers.

Sure of the proper working of the gasoline motor, propellers, and rudders, it was now possible for MM. Julliot and Surcouf to trust themselves to the air with the balloon absolutely free. In an ascent that followed, the guide rope was pulled into the car, but was so arranged that it could be instantly thrown to the ground. Upon this occasion, MM. Julliot and Surcouf took along but one assistant, and compensated for the weight of the one left behind by means of ballast. The fog, in fact, was quite dense, and the aeronauts were afraid that its condensation upon the exterior of the balloon might load the latter and render the use of ballast necessary. Such fear, however, proved groundless, and the airship returned to its starting point fully inflated. It had not even been necessary to force air into the small compensating balloon of 7,000 cubic feet capacity, which is housed in the interior of the balloon proper for the purpose of remedying the reduction in volume due to leakages of hydrogen.

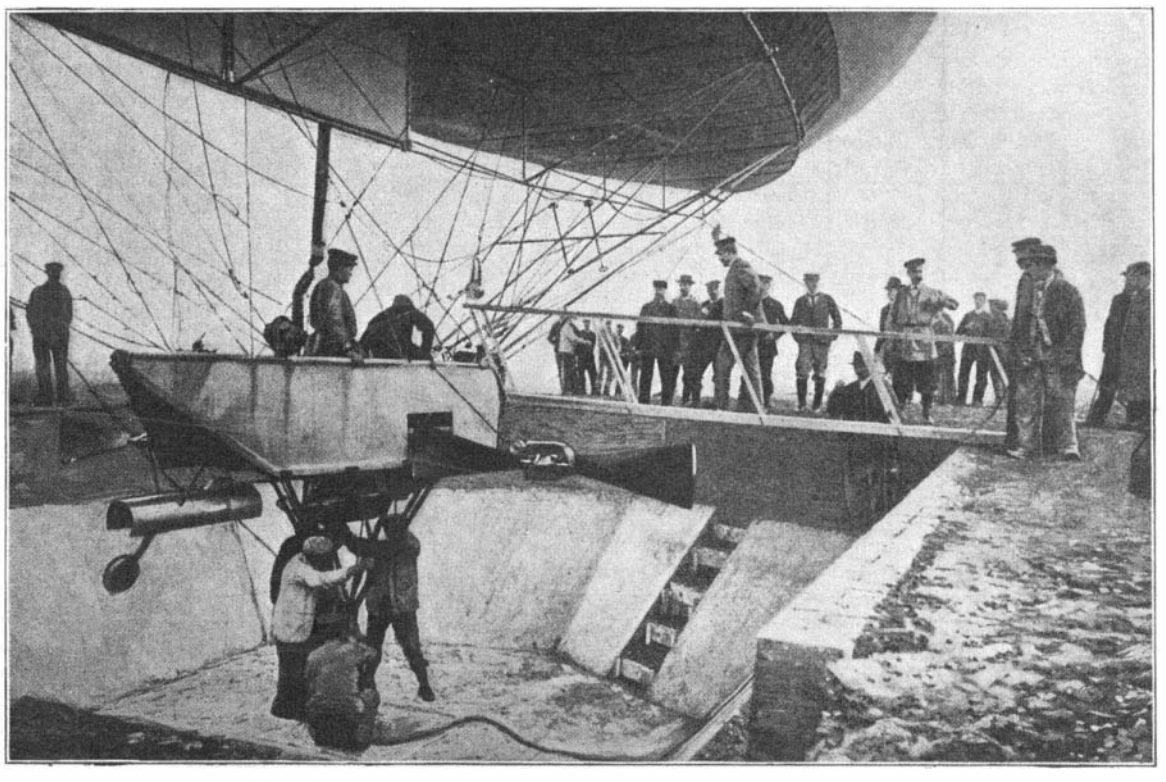
MM. Julliot and Surcouf were then desirous of noting, while on *terra firma*, the behavior of their balloon. So M. Juchmes, accompanied by two assistants, took charge of it, and, with great dexterity, caused it to make a trip in the form of the figure 8, which constituted a new experiment. MM. Lebaudy, Julliott, and Surcouf watched this evolution and expressed themselves as delighted with the maneuver and with the manner in which their balloon had behaved. The airship then landed again triumphantly and entered its shed. This may be said to have been the end of the preparatory experiments, and MM. Julliot and Surcouf have announced their readiness to attempt the journey from Moisson to Mantes and back on the first fine day that occurs.—Translated for the Scientific American from L'Illustration.



The Airship Under the Management of M. Juchmes, Describing a Figure 8.



The Lebaudy Airship Maneuvering Freely Over the Plain of Moisson.



The Start of the Airship from the Trench in Front of Its Shed.

THE LEBAUDY DIRIGIBLE AIRSHIP.

Utilization of Iron and Steel Slags.

The utilization of iron and steel slags is discussed in "Mineral Resources of the United States, 1901," by Mr. Edwin C. Eckel, of the United States Geological Survey. Mr. Eckel says that although the greater portion of the slag annually produced by iron and steel works is not available, a great deal of slag is used in the manufacture of cement and of slag brick, as a fertilizer, and in the form of mineral wool; also, to a less extent in the manufacture of paint stock, alum and glass, and a considerable quantity is disposed of less profitably as road material, railroad ballast, and in land reclamation.

The most important of these uses of slag is in the manufacture of structural materials, especially in the manufacture of hydraulic cements. Slag cement is produced by pulverizing, without calcination, a mixture of granulated basic blast-furnace slag and slaked lime. This product, although really a pozzuolanic cement, is usually marketed as "Portland cement," in spite of differing from true Portland cement in manufacture, composition, and properties. Six or eight plants are at present engaged in manufacturing slag cement in the United States, the production for 1901 being 272,689 barrels. As slags cooled slowly are only feebly hydraulic, the slag used in the manufacture of slag cement must be cooled as suddenly as possible. This is done by bringing the slag, as it issues from the furnace, in contact with a jet of cold water. This granulates the slag, renders it strongly hydraulic, and removes most of the sulphur. True Portland cements can be made from mixtures of which one element is blast-furnace slag, in which case the slag is ground, intimately mixed with powdered limestone, and the mixture then calcined and reground. Two plants are engaged in the manufacture of Portland cement from slag and limestone in the United States. In England, blast-furnace slag has been somewhat largely employed as an adulterant of Portland cement.

Slag run into molds on issuing from the furnace furnishes blocks which have been used for paving, notably in Philadelphia. These slag blocks are very durable, but objectionable because of their slipperiness, which, in English practice, has been overcome by the form of the mold used.

The manufacture of slag brick can hardly be considered as being more than a specialized phase of the manufacture of slag cement. On issuing from the brick machine, the bricks are placed on racks to dry, which takes from six to ten days, at the end of which time the bricks are ready for use. Slag bricks are light in color; they weigh less than clay bricks of equal size, require less mortar in laying up, and are equal to clay bricks in crushing strength.

The highly phosphatic slags produced by basic Bessemer converters are valuable fertilizers, and in Germany, especially, large quantities are annually sold under the name of Thomas silicate. These phosphate slags are more efficient as fertilizers than the mineral phosphates. The slight development of the basic Bessemer steel industry in the United States necessarily renders the use of these phosphatic slags of less commercial importance than in Europe. During 1901 about 1,000 tons of phosphate slags produced in the United States were sold as fertilizer. This American material has been tested by the American Agricultural Experiment Station, which reports that slag phosphate gave a greater total yield than did any of the other insoluble phosphates. The slags produced in steel plants using the open-hearth process are less valuable as fertilizers than those produced by basic Bessemer converters, as they contain less phosphoric acid and more silica and lime than the basic Bessemer slags. Over half the material marketed as "mineral wool" or "silicate cotton" is derived from slag, the remainder being manufactured from natural rocks of several different types.

Tea Growing in the United States.

The United States Department of Agriculture has been carrying on the work of introducing tea culture in the United States. Experiments conducted at Pinehurst, Summerville, S. C., in co-operation with Dr. Charles U. Shepard have yielded interesting results. Dr. Shepard now has at his place about 100 acres in tea gardens. His factory is well equipped for carrying on the work on a commercial scale and for accurate scientific experiments. The yield of tea in Dr. Shepard's gardens last year was 4,500 pounds. For 1902, there were about 9,000 pounds of marketable tea. Some of the gardens have proven very prolific and profitable, while others have given very slight yields of tea of pure quality. A tea farm is soon to be established in Texas if suitable land can be secured. Whether or not tea growing in this country can be made a commercial success will depend in a large measure upon the most rigid attention to the details of field and factory work.

According to a French contemporary, a good, simple test for the poles of an electrical apparatus is a slip of ferro-prussiate paper moistened and held on the pole. The negative pole makes a white mark on the paper, which, by the way, is the same as that used for making copies of engineering designs, where the lines appear on a blue ground. Old blue diagrams of this kind cut into slips will serve as test papers.