KNABENSHUE'S AIRSHIP AND ITS EXPLOITS.

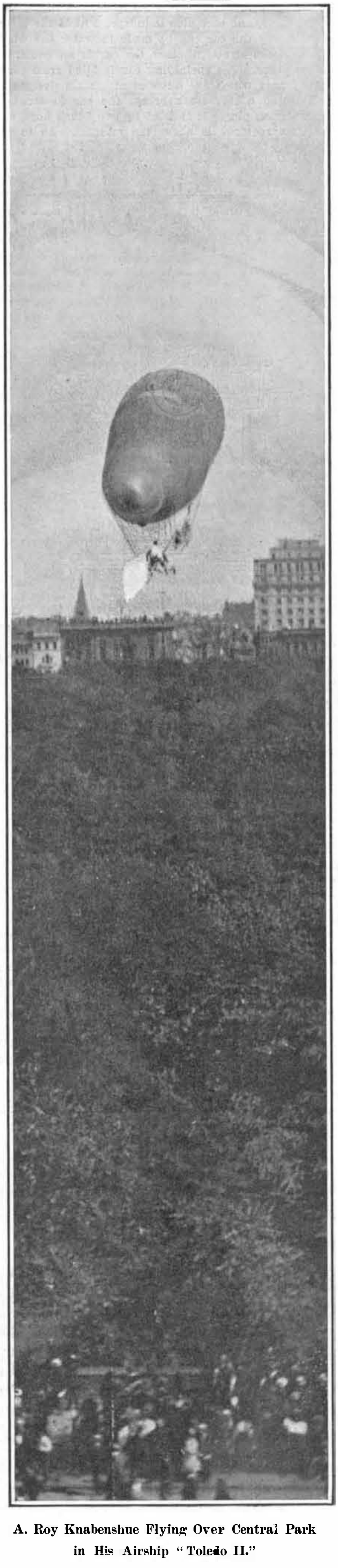
The great popularity of experiments in aerial navigation has again been proven by the interest evinced by the general public and the press of New York city in the recent successful airship flights of a young westerner, A. Roy Knabenshue. So great was the curiosity of the New Yorkers to view the flights that almost all business and street traffic was at a standstill and throngs followed the course of the great dirigible balloon hovering over the city. Mr. Knabenshue is the aeronaut who so successfully piloted Baldwin's "California Arrow" at the World's Fair, at St. Louis. The present machine, however, the "Toledo II.," is entirely his own design and construction, and is, in fact, the second that he has built for his own use and experimentation.

The gas bag, 62 feet in length, which supports the framework carrying the motive power and the motive and steering apparatus, as well as the navigator, is cigar-shaped, the forward end being sharply pointed, while the rear extremity is rounded. The highest point of the curve of the upper surface, as well as the greatest diameter of the bag, 16 feet, is about one-third of the length from the forward end. The curve of the under side is somewhat flatter. The shape of the balloon differs materially from that of the "California Arrow," which is practically a long cylinder with pointed ends. Mr. Knabenshue states—and his experience with both types makes the statement authoritative—that with the latter shape the airship is given to pitching badly because of the movement of the body of gas in the bag, but that this difficulty is obviated in the "Toledo II.," as the curved lines of the balloon permit of little or no shifting of the gas. Moreover, the wind-resistance appears to be less with this shape, especially as the diameter is a foot less than that of Baldwin's machine. The material used in the construction of the balloon is the finest Japanese silk, of great strength and exceedingly light weight, covered with a special varnish prepared by the aeronaut himself, which is said to be superior to anything of its kind hitherto used. The balloon of the "Toledo II." requires 7,000 cubic feet of hydrogen to inflate it, this being somewhat less than the quantity necessary for the "California Arrow," as the latter's cubical content is 8,000 feet. The framework is hung to the bag by means of a square-mesh net of strong cord, as the aeronaut believes this form to be superior to the usual diamond-mesh. The entire weight of the bag is but 65 pounds.

The framework is 38 feet in length and consists essentially of three parallel longitudinal pieces, forming a triangle in cross section, which come together in a point at each end. These are braced and tied in their proper relative positions by means of wooden struts and piano wire. The wood used is almost all spruce, with the exception of a few pieces of bamboo. The netting from the balloon is fastened to the two lower longitudinal frame pieces which lie in the same horizontal plane. The weight of the framework, as well as the entire apparatus upon it, is approximately 210 pounds.

The two-bladed propeller, which is at the bow of the machine and pulls rather than pushes it, is 10 feet in diameter. The blades are 29 inches wide at the outer extremity, and narrower toward the hub. The covered length of the blade is 40 inches. The framework of the propeller is of spruce, the covering fine muslin. The entire weight is 7 pounds. The following figures of the propeller thrust are the results of some rather rough experiments carried on by Mr. Knabenshue, who is at a loss to explain the wide discrepancy between the last two: At 150 revolutions per minute the thrust was 22 pounds; at 180, 35 pounds; at 200, 41 pounds; at 210, 46 pounds; and at 220, 61 pounds. The usual rate used during a flight is 180 revolutions per minute, and at this the speed is estimated to be 15 miles per hour. The rudder, at the stern, is also of spruce and muslin, and is about 9 feet long and 5 feet wide. This is hung to the framework and to a bamboo support attached to the netting. It is worked by cords running nearly the entire length of the framework, so that the aeronaut may have control of his steering apparatus regardless of the position in which he may be.

The engine which drives the propeller is located about a third of the length from the forward end. It is supported on two angle-iron cross pieces on the two bottom bars of the framework. It is a four-cylinder, air-cooled, gasoline motor, and is geared to the shaft by means of a chain and sprocket. An ordinary friction clutch is used. The cylinders are 2¼-inch bore and 3-inch stroke. The greatest rate of speed obtained by the engine was 2,160 revolutions per minute, though this is far in excess of the speed used during the flights. The reduction of the engine speed to shaft speed is 6 to 1. The horse-power is estimated at 10. The speed is regulated entirely through the sparking, no throttling of the explosive mixture being attempted. The entire weight—engine, shaft, clutch, batteries, and tank—is 92 pounds. The tank will hold sufficient gasoline for a five-hour sail.



A. Roy Knabenshue Flying Over Central Park in His Airship "Toledo II."

KNABENSHUE'S AIRSHIP AND ITS EXPLOITS.

Unlike Santos Dumont, or the French aeronauts, Mr. Knabenshue does not attempt to regulate the height of the machine above the earth by means of a gas valve attached to the balloon. As a matter of fact the "Toledo II." has no such valve. When the bag is filled with hydrogen the silk neck or gas inlet is simply tied with a piece of rubber. The elevation is determined by the quantity of gas in the balloon, as after rising to a certain height this is expanded by the decrease in atmospheric pressure, and bursts the above-mentioned neck, releasing some of its volume and allowing the machine to settle to earth. Otherwise, Mr. Knabenshue simply descends by pointing the nose of the balloon downward, and using the screw, the power of which is sufficient for this purpose. The angle of the machine, with reference to the horizontal, is attained entirely by the shifting of the position of the aeronaut, who is seated astride the upper bar of the framework, one foot on each of the lower longitudinal pieces, and moves backward or forward as the occasion requires. Only about 20 pounds of ballast are carried for emergencies.

As Mr. Knabenshue himself says, he has not solved the problem of aerial navigation, and has only demonstrated that, in the absence of heavy wind, it is possible by means of the usual screw and rudder to drive and guide a balloon. The practical airship of the future must be made to dispense with the huge gas-filled bag which offers more resistance to the air currents than the canvas of a fair-sized sailing vessel. This being so, we can but regard the "Toledo II." as an interesting experiment, an astonishing toy, and while we realize that the machine is not capable of commercial use, our appreciation of the aeronaut's courage and perseverance is general and decided.

Use of the Metal Calcium.

Now that the metal calcium is produced cheaply and in large quantities, as we find in the Bitterfeld electrolytic works, it is possible to use it in different kinds of chemical operations, where it acts as a reducing agent. M. Moisson has been able to reduce the chlorides of sodium and potassium and to separate the latter metals at a red heat. M. L. Hackspill takes up this work and uses calcium in large quantities to reduce the chlorides of rubidium and cæsium. He places a mixture of calcium in small fragments and chloride of rubidium, melted and dry, in a small iron trough. This is placed in a horizontal tube having a vertical tube at the end. A vacuum is made in the apparatus and the horizontal part is slightly heated. When we reach 400 or 500 deg. C. a metallic ring is formed beyond the trough, and when heated more, the chloride is decomposed and gives off heat. This is sufficient to volatilize all the alkaline metal. It collects in the vertical tube, which is then sealed off with the blowpipe. In this way we obtain 150 grains of pure rubidium in less than fifteen minutes. The metal is very pure and is equal to that which the Erdmann process gives. It is a more rapid method and gives a better yield. Cæsium is formed in the same way. M. Hackspill also tries to reduce chloride of lithium and obtain this metal. But as lithium is not nearly as volatile as rubidium or cæsium, he only succeeds in forming an alloy of calcium and lithium.

Increase in Price of Single Numbers.

On and after this date, September 2, the price of single copies of the Scientific American will be advanced from eight to ten cents. The lower price has been in force for many years when the Scientific American was not only smaller, but when the information was obtained at comparatively small expense. We are now maintaining correspondents in the principal centers of the world, and we have enlarged the paper, and largely increased the number of illustrations. We think that those of our readers who have been in the habit of purchasing single copies from news-stands will agree with us that the Scientific American is fully worth ten cents a copy. There will be no increase in the price of subscription, which will remain $3 per year, or $1.50 for each six months. Persons who are unable to obtain the Scientific American regularly from news-dealers should subscribe direct, thus taking advantage of the reduced rate.

Cable to Iceland.

The Great Northern Telegraph Company, of Copenhagen, has obtained a license for laying out and operating a submarine cable to Iceland. The cable is to be laid from the Shetland Islands, which are connected with Scotland, to the Faro Islands and thence to Iceland, where it is to be moored at some point on the eastern coast. The government of Iceland will lay out an overland telegraph line from that point through the island and is to take charge of this itself. The telegraph company is said to be ready immediately to commence the preparatory work, so as to enable the cable to be ready for operation by October 1, 1906. It will be remembered that the Marconi Company has recently erected a receiving station at Reykjavik, to which wireless telegrams have been sent.

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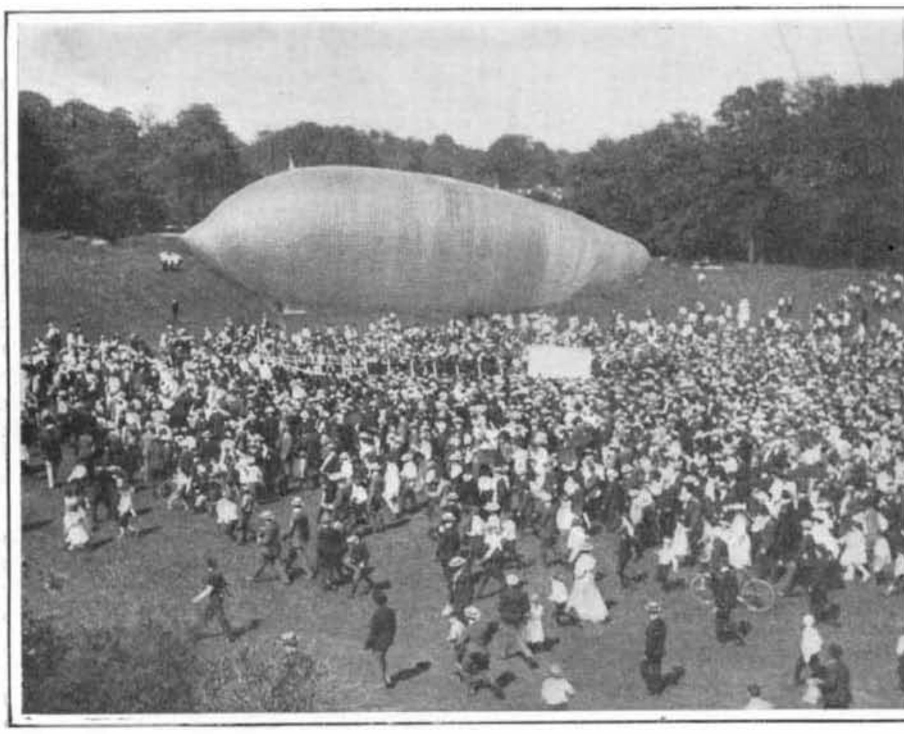
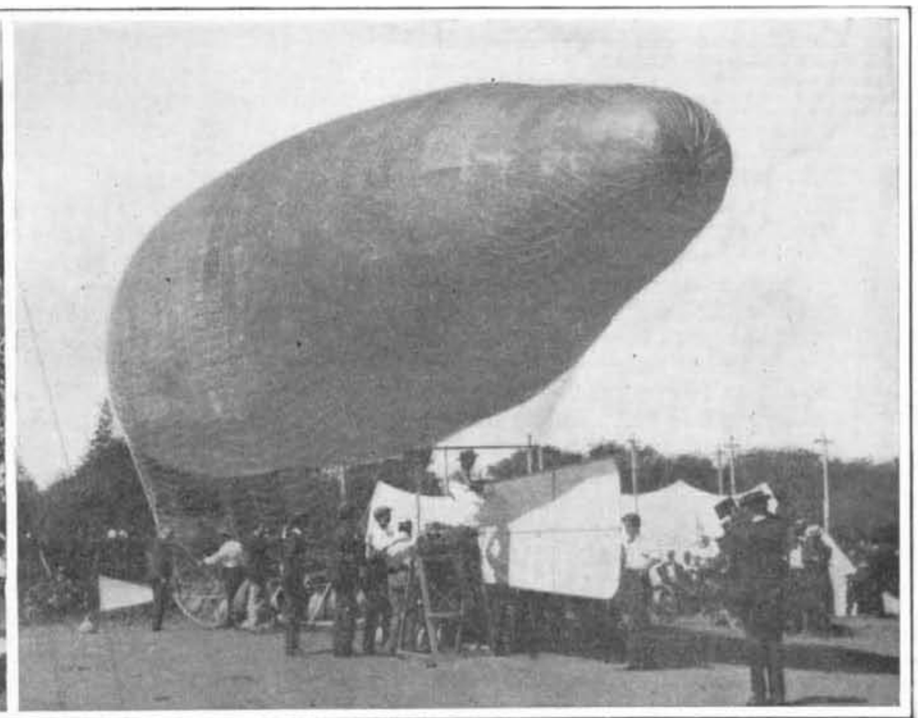
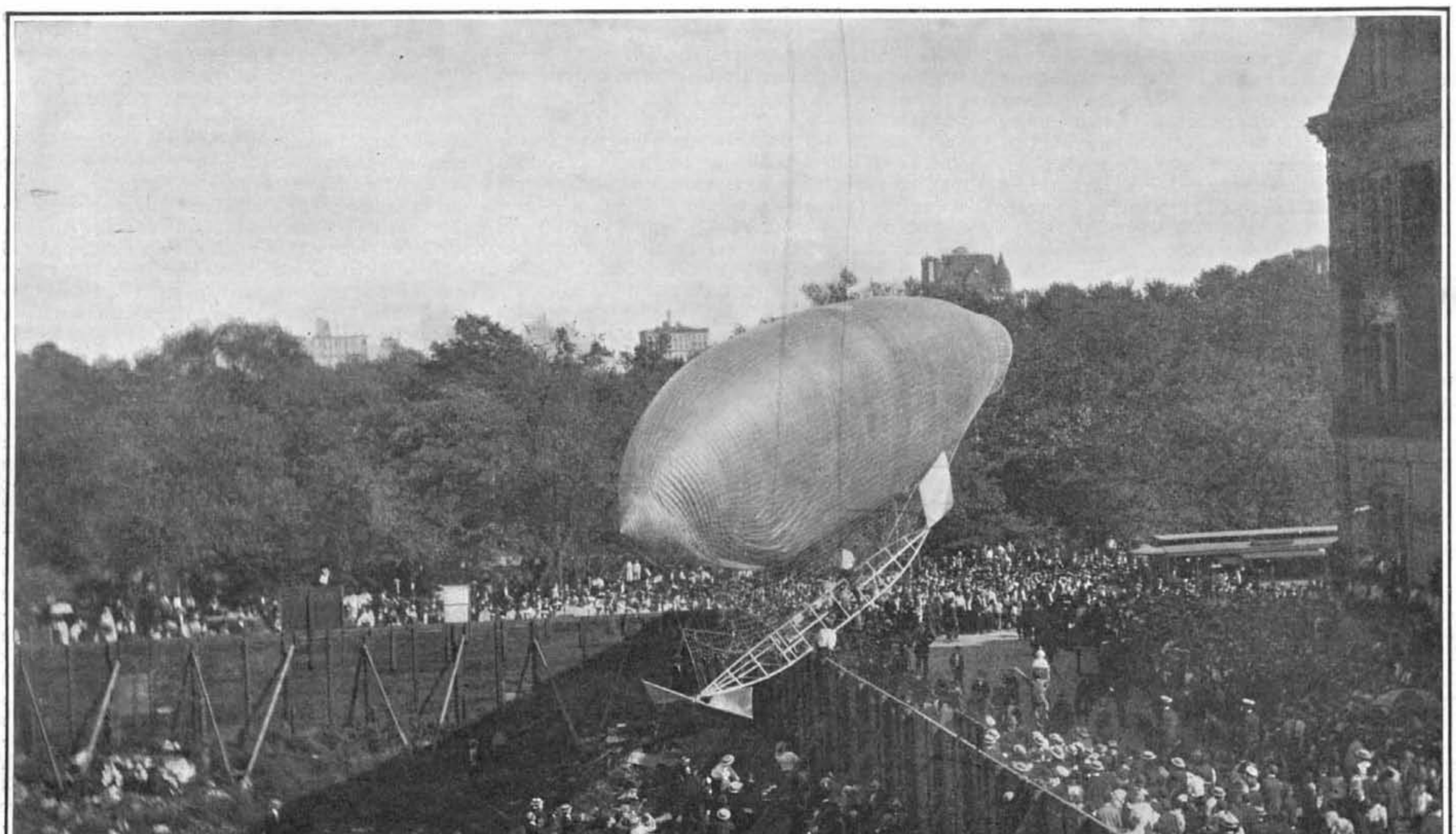


The Crowd About the Airship After It Alighted in Central Park.



The Airship Just Before the Start, Showing the Rudder.



Knabenshue Returning to the Starting Point. Guiding the Airship Over the Fence.

KNABENSHUE'S AIRSHIP AND ITS EXPLOITS.—[See page 181.]