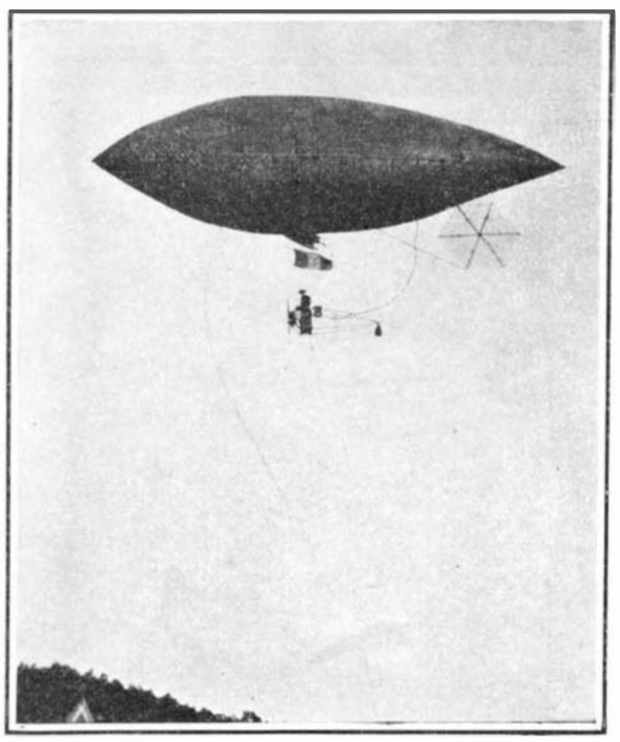
### THE SANTOS-DUMONT "NO. 14."

BY THE PARIS CORRESPONDENT OF THE SCIENTIFIC AMERICAN.

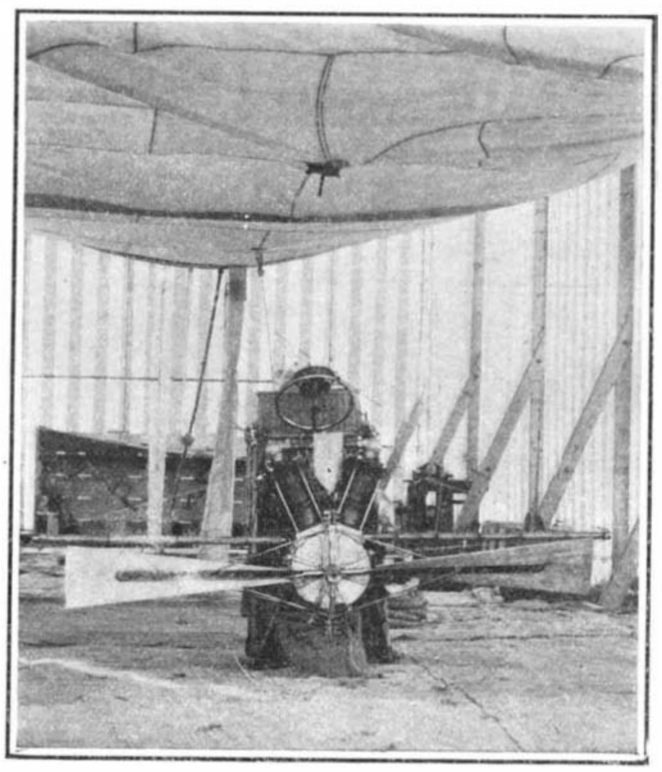
Santos-Dumont has been making the first trials of his new airship, the "No. 14," on the beach at Trouville. The balloon is housed in a shed which he had built here, and he intends to carry out a number of experiments. Starting in the latter part of August, he made a series of flights over the beach and advanced above the sea. The experiments were watched with interest by large crowds of people who are spending the season at this well-known resort. During the maneuvers, Santos-Dumont was very successful in piloting the new airship and in steering it about as he wished. He expresses himself as very well satisfied with its performance. When all is in good shape he expects to make a long flight, probably above the sea, continuing the experiments he began some time ago at Monaco.

The body of the balloon is of a rather long cigar-shaped form, and it will be noticed that the position of the largest diameter is placed somewhat near the front. This shape was adopted in some of the preceding types and was found very satisfactory. The front end is considerably pointed, however. Originally it was intended to use a very long balloon body for the "No. 14," but afterward the present form was adopted, as it seemed preferable. Some new points are to be noted both in the car and in the motor and screw. The car which is suspended some ten feet from the balloon body by fine steel piano wires, is made very short in the present case. It is large at the front end, which carries the basket, and then tapers to a sharp point in the rear. Bamboo poles are used in the construction of the car, and it is very much simplified in the present case, being reduced to four long bars, braced across in the middle by a light bamboo frame. The basket is very small and light, and is just sufficient to hold the aeronaut. It is somewhat widened out in the lower part. What is especially to be noticed in the present case is the new arrangement which Santos-Dumont has adopted for placing the motor and screw. Contrary to the method which he used in the other types, he places the screw in the front of the car. Thus it moves the airship by pulling and not by pushing it, as before. Aluminium vanes are adopted for the screw, instead of the usual covered bamboo frames. The vanes are held to the motor shaft by a light bar which is riveted to them. At right angles is placed a short steel bar, and from here three steel wires run to the blades of the screw on either side. The screw measures about 6 feet across, and the outer width of the blades is 8 inches. It runs at a speed of 2,000 revolutions per minute.

The second engraving shows the disposition of motor and screw at the front of the basket. A motor of considerable size and power has been placed on the "No. 14." The present motor is of an entirely new design, and is built by the Peugeot Company, the well-known Paris automobile builders. The cylinders are placed in V shape on a circular aluminium crank box. A smooth surface is given to the cylinders, except at the upper ends, which have the usual form of radiating wings. At the ends of the cylinders is a spherical inlet head to which comes the pipe from the carbureter. The gasoline tank and induction coil are placed on the top of the car behind the basket. Back of the motor is a bamboo cross-pole for attaching the front wires of the balloon. The steering apparatus has also been reduced to a very simple form. The rudder, a hexagonal frame stretched with silk, is jointed to the balloon body at the top, and at the bottom a single pole serves to hold it. Through the middle of the rudder runs a cross-pole whose ends are connected by wires to the steering wheel in front of the aeronaut.



The Latest Creation of the Brazilian Aeronaut, in Flight.



The Airship in the Shed, Showing the Arrangement of the Motor and Propeller.

THE SANTOS-DUMONT "NO. 14."

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To copper the surface of brass articles, all that is required is to wind a piece of wire round them, and dip them in dilute sulphuric acid. The zinc is dissolved from the surface of the brass, but the copper remains undissolved, and the article will appear as if coated on the surface with a layer of pure copper.

### Obtaining Thin Metal Wires by Electrolytic Means.

In a recent paper before the French Academy of Sciences, Mr. Henri Abraham suggests a method for obtaining very thin metal wires which is somewhat similar to the well-known Wollaston process of making platinum wires. The wire which is to be reduced in cross-section is taken as positive electrode in an electrolytic bath; its electrical resistance is measured from time to time, the current being stopped as soon as the cross-section of the wire has attained the figure required. The electrolytic bath should be rather dilute so as to have a very great resistance, when the current will be uniformly distributed throughout the length of the wire without its being necessary to give the two electrodes a strictly determined relative position. In fact, nearly the whole of the resistance of the liquid will be in the immediate neighborhood of the thin wire.

Distilled water containing some thousandths of its weight of copper sulphate can be used as a bath when dealing with copper wire, or else a similar amount of silver nitrate if silver wires are to be treated.

The operation should be controlled so as to be rather slow in order to allow the metallic salt forming around the wire to diffuse into the bath. Unless this precaution be taken, electrolysis will show a rather unstable behavior. Wherever the current happens to be too strong, an excess of salt will be formed, when the bath becoming too conductive, the current will augment and burn the wire. If on the other hand such salt as has been found be allowed to diffuse into the bath, the behavior of the electrolysis will prove quite stable, as the thickest parts of the wire are preferably attacked, owing to the resistance of the neighboring liquids being smallest in the neighborhood of these points.

Currents of about 0.01 ampere per square centimeter wire surface are especially convenient for the operation. The current intensity should be reduced as the wire becomes thinner, the preparation of a satisfactory wire lasting about half an hour.

The author states that wires treated with necessary caution show sufficient homogeneity to allow their new disruptive load to be calculated approximately by dividing their former disruptive load through the ratio of their present and their initial electrical resistances.

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### Official Meteorological Summary, New York, N. Y., September, 1905.

Atmospheric pressure: Highest, 30.36; lowest, 29.85; mean, 30.06. Temperature: Highest, 84; date, 30th; lowest, 46; date, 26th; mean of warmest day, 74; date, 30th; coldest day, 54; date, 26th; mean of maximum for the month, 72.9; mean of minimum, 60.7; absolute mean, 66.8; normal, 66.3; average daily excess compared with mean of 35 years, + 0.5. Warmest mean temperature for September, 72, in 1881. Coldest mean, 61, in 1871. Absolute maximum and minimum for this month for 35 years, 100, and 40. Average daily deficiency since January 1, — 0.3. Precipitation: 7.11; greatest in 24 hours, 3.58; date, 2d and 3d; average of this month for 35 years, 3.60; excess, + 3.51; excess since January 1, + 2.42. Greatest precipitation, 14.51, in 1882; least, 0.15, in 1884. Wind: Prevailing direction, northwest; total movement, 7,561 miles; average hourly velocity, 10.5; maximum velocity, 38 miles per hour. Thunderstorms, 3d, 20th. Clear days, 12; partly cloudy, 7; cloudy, 11.

### A HUNDRED WAYS OF BREAKING YOUR NECK.

When we witness the sensational performances of acrobats, are we attracted solely by the skill exhibited in accomplishing difficult feats? There is still another element of interest, which inspires a feeling curiously compounded of admiration and a painful presentiment of danger. The guiding principle of the inventors of these acts is to give our nerves a shock more intense than any hitherto experienced, and so we are encouraging a competition in rashness in which the contestants sometimes attempt the impossible. The familiar trapeze performances, aerial ballets in which the dancers are suspended by invisible wires, balloon ascensions, and parachute drops, even the "human cannon ball" hurled by powerful springs from the mouth of a simulated cannon, though dangerous enough and often fatal, cannot compare in hair-raising power with the astounding performances of the last few years.

"Looping the loop" and its progeny are the most effective devices yet invented for producing apparent as well as real danger. Does any one still remember the American bicyclist who used to ride at terrifying speed down a steeply-inclined sixty-foot ladder? One night an attack of vertigo caused his death, but his act was less dangerous than the performances on inverted and aerial paths to which we have since become accustomed. In "looping the loop," first performed by James Smithson, better known as "Diavolo," a bicyclist starts from a platform 60 feet high and plunges down a track which extends obliquely for 100 feet to the ground, and thence rises to form a complete spiral loop 20 or 25 feet in diameter. The speed acquired by the cyclist in descending the inclined plane carries him around the loop. When "Diavolo," preceded by a great reputation, came to Paris, he found one Noiset, known professionally as "Mephisto," preparing to loop the loop at a rival music hall. In spectators supposed to be civilized these performances and their successors produced the same savage delight that was evoked by the bloody sports of the Roman circus. While several cyclists were preparing to loop the loop honestly, one man, unwilling to risk his life for the amusement of spectators, devised a loop with a concealed groove which guided his wheel and kept it from falling. His trick was accidentally exposed by a clown, who got his foot caught in the groove, and the disgraced looper fell into obloquy and oblivion. The public soon tires of the strongest sensations. The stationary loop gave place to the rotating circle called "the devil's wheel," in which the cyclist spins like a squirrel. Taking his place inside the wheel, which is about fifteen feet in diameter, he pedals in a direction opposite to that of the wheel, and thus remains at the bottom until the wheel has acquired considerable velocity. Then he stops pedaling, applies his brake, and is carried backward and upward nearly to the top, whence he rushes down, and flies around and around the revolving wheel with startling speed.

At a performance in Vienna, a cyclist, stricken with apoplexy, fell from the wheel and soon expired. But the danger of cerebral congestion is not the only one. The critical phase of the act is the last, when both the bicycle and the large wheel are being brought to rest by brakes. The bicycle lurches, and the slightest error in steering may send it through the open side of the wheel and precipitate the rider to the stage.

In Germany a genius called "Eclair" invented an infernal wheel of another sort. It was about twenty-five feet in diameter, and a smaller wheel rolled around inside of it, obtaining its impetus from a plunge down an inclined plane, which made a descent of fifty feet. To this small wheel "Eclair" was lashed in "spread eagle" fashion. He accustomed himself to this novel mode of locomotion by having himself strapped to a similar wheel, which was turned rapidly about a fixed axis by means of a crank.

More startling and perilous than any of these devices is the "circle of death." This is a large, flat, truncated cone, like the rim of a pudding dish, supported by ropes in a position slightly inclined to the horizontal,