Crude Attempts at Telegraphy.

About seventy years ago, perhaps before the present mode of telegraphy had been thought of, an attempt in that direction was made by a Mr. Porter, a man of inventive faculties, who afterward became originator, proprietor, and conductor of The American Mechanic, the pioneer publication in that direction, and the predecessor of the present Scientific American.

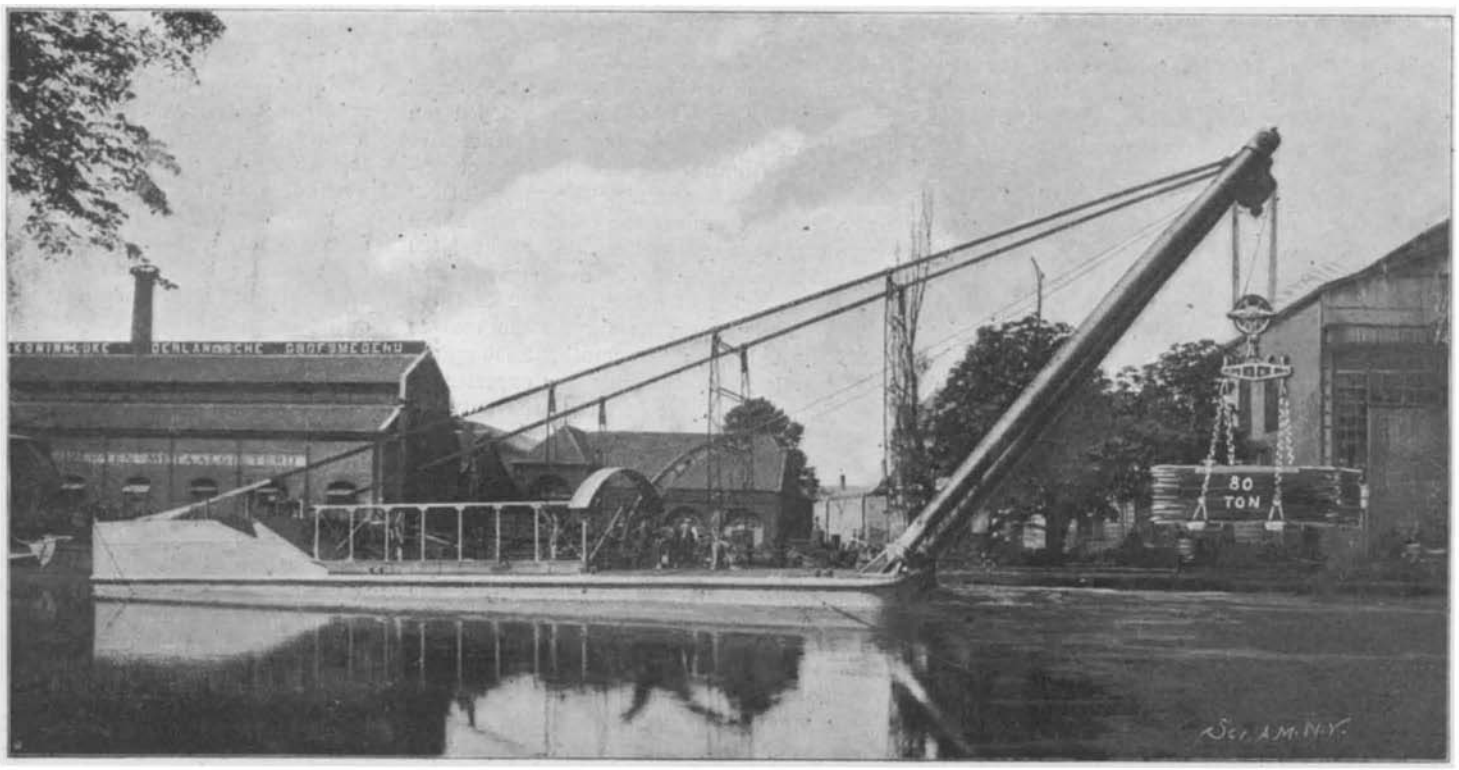
The southern and ocean terminus was on Rhode Island on Rocky Farm, and the place of its location has since been known as Telegraph Hill. It was constructed wholly of wood, was in part a species of wireless telegraphy. It consisted of a series of upright posts, with a number of arms secured to the post at one end by pivots, permitting the arm to be moved in any direction desired, at the liberated part, up or down, and the information was derived from the relative position of these arms. The signals were placed on the summits of the highest hills, at desired intervals, an operator being required at each signal post to convey the signals to the next station.

To reach Boston, as was intended, would require a large number of signal stations and operators, and the execution would have been necessarily slow and expensive. Of course, no approach could have been made toward the present manner and matter of telegraphy, at best being confined to the briefest expression of important information, to carry which to Boston, for instance, would have required a comparatively long time. It was put in operation, if the writer mistakes not, and for a sufficient length of time to test its availability, but not its practical value, and it was early abandoned. It is only within a few years that the southernmost signal post disappeared from Telegraph Hill.—Newport News.

EIGHTY-TON FLOATING CRANE FOR THE SANTOS HARBOR WORKS.

We present an illustration of an 80-ton floating crane which has been built by the Royal Dutch Forge Company at Leyden, Holland, for the Santos Harbor Works. Its principal dimensions are: Length of vessel, 100 feet; beam, 35 feet; depth, 7 feet 3 inches; outward overhang of shearlegs, 35 feet 3 inches; height of top of shearlegs above water level, 50 feet. The power needed is supplied by a vertical high-pressure engine, with two cylinders, each 12 inches in diameter by 15-inch stroke, and taking steam at an initial pressure of 120 pounds per square inch. The general appearance of the craft is shown by the accompanying engraving. The hoisting gear consists of two sets of wormwheel gearing and two sets of spurwheels. The worms, of forged steel, are driven from the steam engine. The wormwheels are fitted on intermediate shafts, on which, on the other end, are fixed cast-steel pinions, driving the cast-steel spurwheels, and bolted to the drums. Each drum, of cast iron, has a diameter of 3 feet 7 inches by a length of 3 feet 7 inches between the flanges, and weighs about 4 tons. All shafts are of forged steel; the bearings have large surfaces, and are lined with white metal.

The shearlegs are constructed of mild steel plates, the diameter in the middle being 2 feet 8 inches. The upper ends of the shearlegs are provided with cast-steel top pieces to take the upper shaft, which is of forged steel, 12 inches in diameter. The water-ballast tank, having a capacity of 130 tons, is divided into four compartments. Each compartment can be filled separately, and also all compartments together, by a duplex ballast pump, placed in the engine room. The hull of the vessel is built of mild steel, and special attention has been paid to the longitudinal stiffness of the vessel. The crane has been tested on the works with full load by a commission of engineers, and proved satisfactory in all respects.

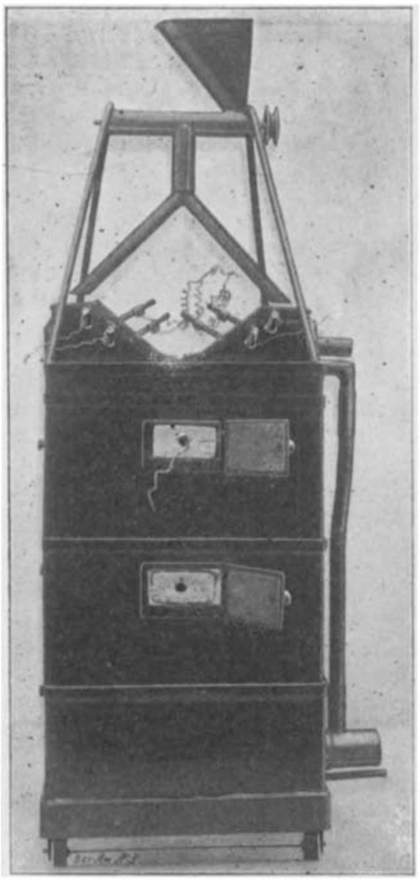


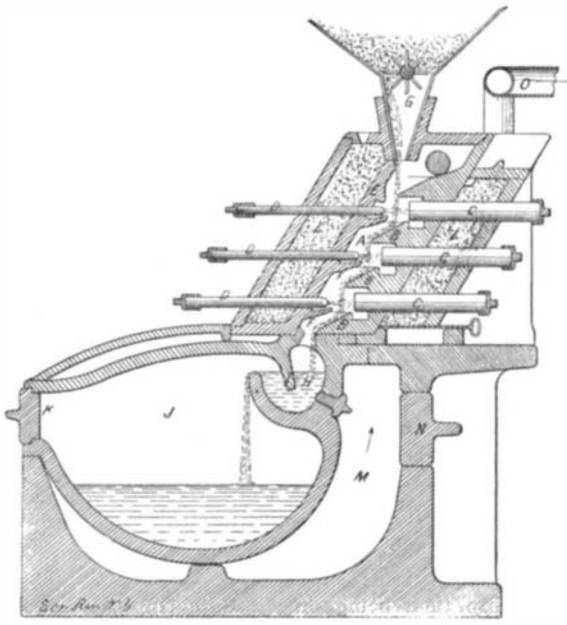
EIGHTY TON FLOATING CRANE FOR THE SANTOS HARBOR WORKS.

A mixture of two parts olive oil and one part turpentine gives an excellent furniture polish. It at once removes all finger marks, etc., from the furniture.

AN ELECTRICAL GLASS-FURNACE.

Most varieties of glass are largely composed of silica, often mingled with oxides of sodium and calcium. The glass from which ordinary tumblers, for example, are made is composed essentially of white sand (silica), soda (sodium carbonate) and lime (calcium carbonate). The raw materials are pulverized, intimately mixed, and subjected for 20 to 30 hours to an intense heat either in clay crucibles (glass-pots) or in large basins (tubs). However economical the most improved forms of glass-furnaces may be in the consumption of fuel, and however small the percentage of loss in glass, the fact still remains that the amount of fuel required and the quantity of heat radiated without any effect on the contents of the furnace are enormous. Moreover, the installation of a glass-furnace is exceedingly costly; valuable space is taken up both below and above ground; the health of the workmen is endangered by the fierce heat radiated by the furnace; and the plant must be worked continuously, so that the loss in heat may be reduced to a minimum.


AN ELECTRIC GLASS-MAKING FURNACE.


VERTICAL SECTION OF ELECTRIC GLASS-MAKING FURNACE.

A new type of glass-furnace recently attracted our attention, which seemed to mark a great onward step in the manufacture of glass and which seemed to be singularly free from the defects enumerated. Through the courtesy of Dr. Voelker of the Société Anonyme, L'Industrie Verrière et ses Derivés, Brussels and Cologne, we are enabled to present to our readers a clear account of this departure in one of the most important industries.

The invention is an electric furnace which can be made in various forms, and one type of which is pictured in our sectional view. The silica and other ingredients are finely pulverized, intimately mingled, and introduced into a hopper, in the discharge-opening of which a feed-wheel is mounted. If the hopper be long and the discharge-opening located at one end, a screw-conveyor is used. From the hopper the material to be fused is fed to an inclined melting-chamber, *A*, which is formed by the wall, *E*, and by a continuous series of hearths, *B*, so situated that one is placed above and slightly to one side of the one immediately below. The surfaces of the hearths are inclined to permit the fused material to flow off; and the edges of the hearths are made as sharp as possible to permit the escape of the bubbles of carbon dioxide gas. Through perforations in the wall, *E*, and in the hearth-wall, carbons. *D* and *C*, are respectively passed. Beneath the carbons, *D*, the wall, *E*, is formed, with pan-like projections, *F*, which receive the ashes and unconsumed portions of the carbons. The carbons, *C*, are mounted immediately above the corresponding hearths, *B*. Direct current generated by a 360-ampère dynamo with a voltage of 120 is passed through the carbons. The intense heat of the first arc melts the raw material fed from the hopper. The molten glass trickles down the first hearth; drops upon the second hearth; is there subjected to the heat of the second arc; falls upon the third hearth; and finally reaches the collecting cup, *H*, as an exceedingly liquid glass, free from all gases and impurities. Since it is of the utmost importance that no air be allowed to enter the melting-chamber, *A*, during the operation of fusing the silica, a compartment, *L*, is provided at the side of each wall, which compartment is filled with refractory material, packed so closely around the electrodes that no air can possibly enter. The gases which bubble from the molten glass are led through several passageways into the air space, *M*, surrounding the pot, *J*. In the air space, *M*, the gases are mixed with hot or cold air and burnt, the heat thus generated serving to warm the walls of the pot. The products of combustion pass through suitable channels to the out-take, *O*.

It is claimed for this electrical method of fusing silica that 60 per cent of the fuel formerly required is saved. But, even if this figure be possibly modified when accurate data are obtained, it cannot be denied that the remarkable compactness of the furnace, the unprecedented rapidity with which the materials are fused (bottles can be blown within half an hour after the hopper is charged), and the very small amount of heat lost by radiation are sufficient to predict a bright future for the electrical system. The pots, besides being small, and cheap in cost, last longer than has ever been the case in glass-making. The workmen are subjected to no fierce heat. The task of superintending the work of glass-making is considerably lightened, for the usual subterranean passage, batch chamber, and fuel inlet are entirely dispensed with.

THE "SANTOS-DUMONT NO. 6."

The "Santos-Dumont No. 5" was wrecked at the Trocadero on Thursday, the 8th of August last. On the very same day, the constructor, M. Henri Lachambre, received an order for the "Santos-Dumont No. 6" and agreed to deliver it by the 1st of September. Now, on Friday, August 30, M. Santos-Dumont had possession of his new balloon, and on Sunday, the day on which, according to contract, the balloon was to have been delivered, the latter was inflated and waiting under the Saint Cloud shed for the moment to take its flight. The balloon thus constructed in twenty days differs slightly from its predecessor. It has the form of an elongated ellipsoid, which was primitively that of the "Santos-Dumont No. 5"; but the latter, modified during the course of the experiments, and twice elongated at the center, finally assumed the form of a cylinder terminating in two ellipsoidal cones. The following particulars were given by M. Santos-Dumont in his letter of engagement for the Deutsch prize:

"Form: elongated ellipsoid of 16.7 feet short and 98.4 feet long axis, terminating at the two ends in cones 3.28 feet in height. Capacity, 21,925 cubic feet. Motor, gasoline of 20 horse power, cooled by a circulation of water. Screw with two blades of a spread of 13 feet. Keel formed of a beam 46 feet in length. Suspension by means of steel wires attached to the envelope here and there. The length of the preceding balloon was exactly the same as that of the new one, but the larger dimensions of its small axis gives the latter a greater capacity and proportionally increases its ascensional power, and the more so in that its envelope, which weighs 242 pounds, is lighter by 88 pounds than that of the balloon destroyed. This envelope is made of a fine and white Japanese silk.

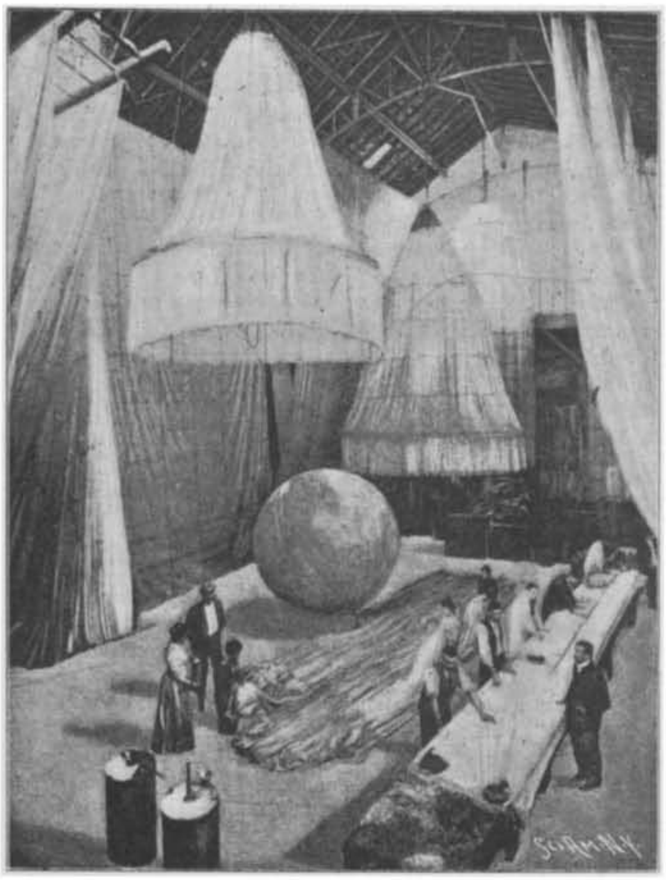
"From looking at and touching this pliable and translucent fabric one would never imagine that a man would dare intrust his life to anything so light and fragile. Nevertheless, it has a wonderful resistance, since it is capable of supporting a weight of at least 200 pounds to the square foot without tearing."

The Lachambre shops, at which the "Santos-Dumont No. 6" was constructed, are situated at the end of the Vaugirard in a quiet, narrow street. It is in these shops that was constructed the preceding balloon, and that of André. One of our engravings shows M. Santos-Dumont engaged in inspecting his motor.

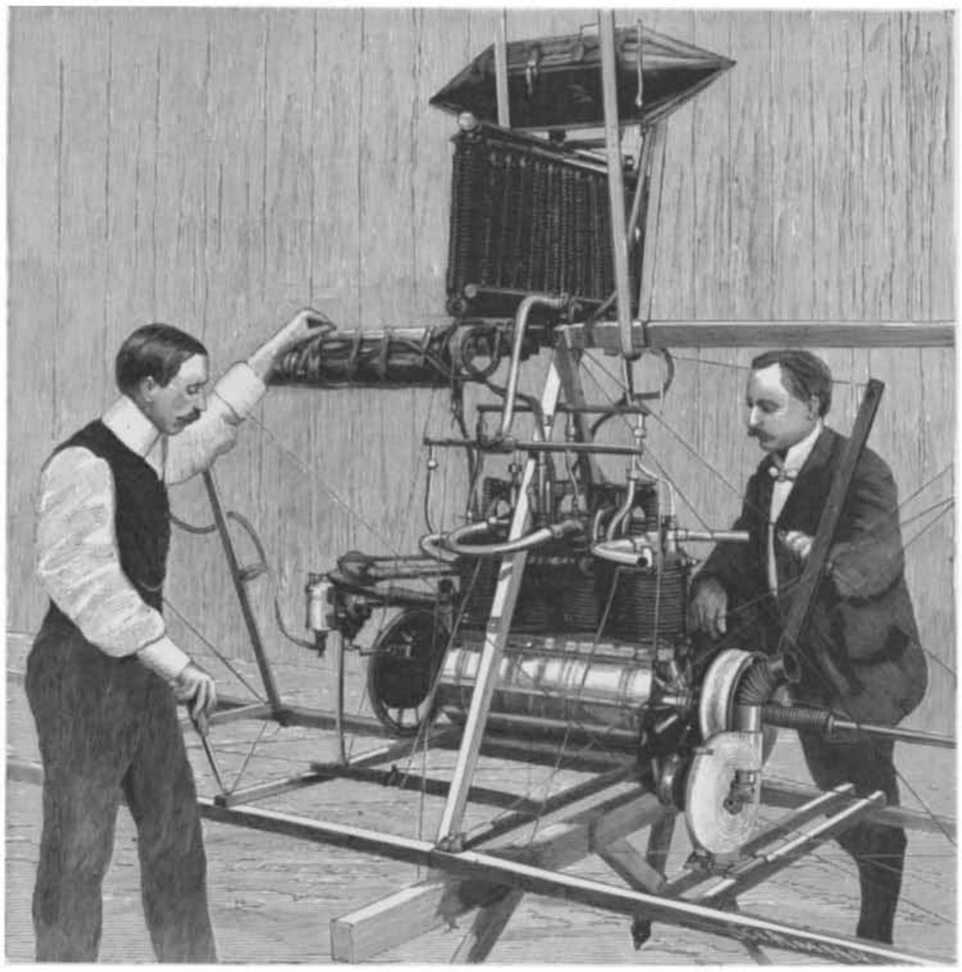
In the quiet of this remote quarter, and while in a manufactory of impermeable fabrics the beautiful white silk was undergoing its first preparation, and, through a special varnish, was being rendered impermeable to gas, M. Lachambre, provided with directions from M. Santos Dumont, was drawing his plan; and, when the material for the balloon reached him varnished and dried by the improved process now in use, all that he had to do was to set himself to work to cut it. Upon the diagram, the surface of the balloon had been divided, at right angles with the long axis, into forty zones, each of which was subdivided into panels of trapezoidal form, exactly equal. It was then possible to cut out at once the thirty-two panels of two corresponding zones on each side of the short axis, in taking care to reserve a width for the seams all around. These panels were at once put into the hands of seamstresses in order to be sewed together by machine, by crowns or zones. From the hands of the seamstresses, the zones, assembled by fives or sixes, were sent to the varnishing room in order that the apertures made by the needles might be closed, and the silken fabric be rendered perfectly impermeable. Then the parts thus prepared were dried by stretching them over hoops and suspending them from the ceiling, where they looked like big bells, or, perhaps, more like ample crinolines. After they were dry, the parts were formed and the seams again carefully varnished. With the addition of the two points (two small cases of double silk) the envelope was this time complete, and appeared in the form of a long cigar, the tightness of which had to be verified by means of a centrifugal pump that forced air into it at the front extremity. For lovers of precise details let us say that in the entire cigar-shaped envelope there are no less than 5,000 feet of seams.

But this envelope, so simple in form, is provided with important accessories. In the first place, there is the compensating balloon, occupying at the base and center of the balloon a tenth of its volume, and which supplied with air through a compression pump, serves to keep the balloon well inflated. Then came the valves; the escapement valve of the compensating balloon opening from the interior under the too great pressure of the air; two automatic valves, which at the bottom and back of the balloon perform the same role for the gas, when need be; and at the top a maneuvering valve actuated by the aeronaut. Finally upon the top of the balloon, near the front and rear, are sewed two panels, which, through cords running to the car, can be abruptly removed in order to cause the descent of the balloon.

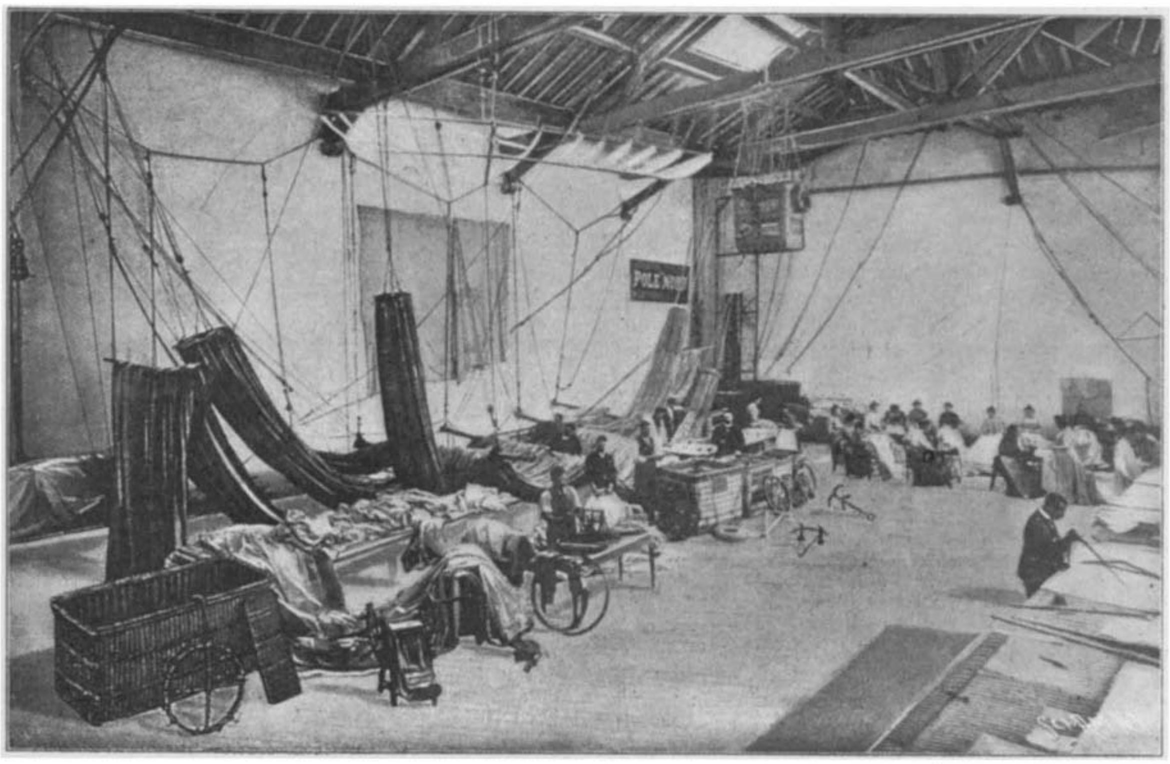
As for the system of suspension of the car and motor, that is the same as in the "Santos-Dumont No. 5."—For the above particulars and the engravings, we are indebted to L'Illustration.



THE VARNISHING ROOM OF THE LACHAMBRE SHOPS.



M. SANTOS-DUMONT INSPECTING HIS MOTOR.



MAKING THE BALLOON CASE.

Chloride of Neodymium.

M. Camille Matignon has lately made a series of experiments with the chloride of neodymium, and gives the results in a paper read before the Académie des Sciences. The chloride of neodymium, prepared for the first time by Shapleigh, crystallizes with $6H_2O$, like the chloride of didymium, of which it was the principal constituent; it has the formula $NdCl_3, 6H_2O$. The chloride presents itself in the form of large rose-colored crystals, deliquescent, of the clinorhombic system. They have a density at 16.5 deg. C. of 2,282. This salt is very soluble in water, and at 13 deg. 100 parts of water dissolves 246.2 parts of the hydrated salt, or 98.7 parts of the anhydrous, while at 100 deg. the same quantity of water dissolves as much as 511.6 parts of the hydrated salt. The chloride dissolves in water with disengagement of heat. The concentrated solution has the property of dissolving abundantly the insoluble oxalates of some of the rare earths, and upon cooling, crystals of oxalochlorides may be obtained. These latter salts have been examined by M. Job. The hydrated chloride cannot be dried by heating without being transformed into oxychloride, but the experimenter is more successful with a current of gaseous hydrochloric acid, and finds that when thus dried at 105 deg. C., the chloride loses $5H_2O$, when the action stops, and a new monohydrated chloride, $NdCl_3,H_2O$ is formed. At 130 deg. C. this chloride still preserves its water, and it is necessary to reach above 160 deg. to free it from the last molecule of water and obtain the pure anhydrous chloride. This process is much more simple than that of Muthmann and Stützel, and the author has prepared as much as 8 ounces of the salt. The anhydrous chloride has the appearance of a rose-colored powder, extremely deliquescent, which melts at a