A NOVEL AERIAL RAILWAY.

A German engineer named Leps has conceived a novel and marvelously impracticable mode of transit, a sort of cross between the airship and the electric railway, in which a balloon supports the weight of passenger cars, which run on aerial cables and are propelled by electricity. According to Umschau, whence we derive our information, the balloon is a horizontal cylinder with conical ends of the rigid Zeppelin type of construction. It is about 200 feet long and 33 feet in diameter. On each side, at the level of the axis, are pairs of small horizontal wheels which move between guiding cables supported by tall latticed steel towers. The function of these wheels and cables is to counteract the force of the wind. A wheel on the windward side is pressed against the inner cable, and a wheel or roller on the leeward side is pressed against the outer cable, and thus the stress is equally divided between the windward and leeward towers, and also between the two sides of the balloon.

Beneath the balloon, and attached to it, are the cars, each of which accommodates 60 persons. The cars and connecting passages are made of steel, wood, and canvas, and provided with windows. There is a small forward compartment for the motor and the motorman. The larger compartment is furnished with revolving chairs and folding tables, for the use of passengers. Even toilet rooms are provided. The cars are heated and lighted by electricity, and are propelled by electric motors capable of developing a speed of about 125 miles per hour. The motor shaft is extended outward, and each end carries a driving wheel which runs on a propulsion cable. Below this directly-connected wheel and the cable is another driving wheel mounted on a movable axis, so that it can be brought to bear on the cable from beneath. Thus the cable is pressed tightly between the concave rims of the two wheels, producing ample friction for traction, and the car is propelled as on an ordinary electric railway. The propulsion cables, which are guide cables as well, are supported by latticed towers, which are shorter and lighter than the main towers, with which they are connected by trusses. An electric cable, suspended between the propulsion cables but at a lower level, furnishes current to the motors by means of contact wheels beneath the cars. The brakes are applied, not to the wheels, but to the propulsion cables.

At present this novel railway exists only on paper. In order to test the practicability of the scheme it is proposed to construct a short experimental line from Marburg to the summit of a neighboring hill, the Frauenberg, 1,250 feet higher than the Marburg terminus. The promoters calculate that the operating expenses of a railway of this kind would be about one-fortieth those of an ordinary railway, and that the diminution in the cost of right-of-way would reduce the initial outlay to about $30,000 per mile. According to the estimates of the company, a line from Berlin to Hamburg could be constructed for less than $4,000,000, and the English Channel could be crossed at a cost of $5,000,000, while the 6,000-mile journey from Berlin to Vladivostock, which now occupies seventeen days, *via* the Siberian railway, could be accomplished in three days by the Leps aerial railway. We would venture to point out that the limited number of passengers which an airship car could carry would mean a prohibitive fare. Count von Zeppelin, we believe, intends to charge $125 for a trip from Switzerland to Hamburg on one of his aeronautic "Lusitanias." Although there may be curious applicants in plenty for airship reservations, it is not likely that railways will suffer from Count Zeppelin's competition. There are engineering as well as financial objections to Leps's scheme. Zeppelin has found it difficult to anchor his airships in high winds. It is probable that storms will play havoc with an enormous gas bag held in place merely by rollers. A railway or foot bridge must be provided with more or less wind bracing if it is of any length, and it would seem that similar provision ought to be made for an airship train. The problem is hardly likely to engage serious attention, for it is not likely that this fanciful road will ever be constructed.

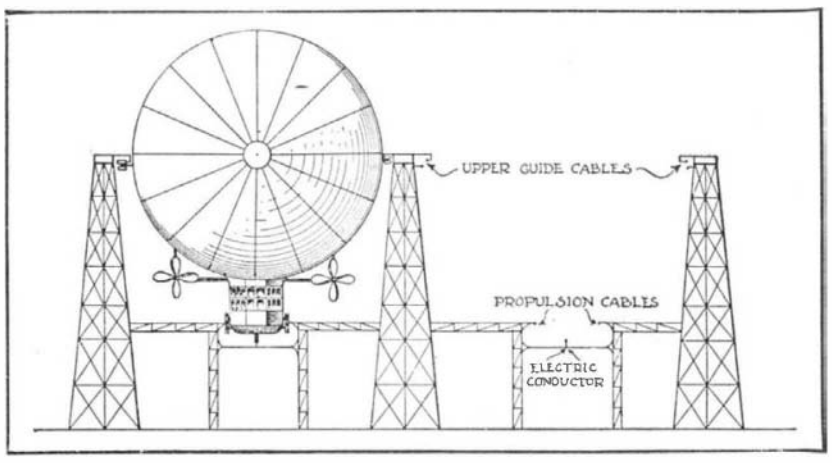

DIAGRAM OF LEPS AIRSHIP RAILWAY.

In some metallurgical and chemical operations steam is admitted to large vats or tanks for the purpose of agitating, and, in some cases, heating their contents. In special cases, the consumption of steam for this purpose is enormous. It is often possible to obtain better results by mixing air with the steam. This may be accomplished by using an ordinary injector. To insure the proper working of the device, the steam is first turned on, then the valve of the injector gradually opened until the desired amount of air is obtained. By the use of this device, better agitation is secured, the contents of the tank or vat suffer less dilution, and there is a large saving in the amount of steam used.

Destruction of Wood Borers.

BY R. B. HOOPER.

In our waters there are two genera of mollusks, viz., Xylotrya and Teredo, and three of crustaceans, viz., Limnoria, Chelura, and Sphæroma, that attack and seriously damage structures of wood in salt water. The Xylotrya and Teredo are very similar in structure and action. The former are by far the more numerous, and what are commonly called Teredo are, in the large majority of cases, Xylotrya, and all references to the Xylotrya will be understood to refer to both genera.

When first coming to life the Xylotrya is very minute, being the thickness of a hair and about one-twentieth of an inch long. When very young it attacks the wood in countless thousands, and immediately begins to bore.

In structure it is comparatively simple. Its body consists mainly of a tube beginning at the posterior end of the body, running to the head, and then returning to the posterior end. At the head end is a sucker-like foot or tongue inclosed in two shell valves which are provided with fine, hard, tooth-like protuberances. It is with these valves that the boring is made. Through the longer end of the tube water is taken in, passed through the body, through the return tube, and is ejected through the shorter end with the wood borings and the excreta. It does not appear that the Xylotrya gathers any sustenance from the wood, its food consisting only of the infusoria in the water.

Of the crustacean borers the Limnoria, or "wood louse," is the only one of great importance. It is about the size of a grain of rice, and tunnels into the wood for both food and shelter. The little galleries excavated are about one-half inch long and extend inward radially, side by side, in countless numbers, so that the wood partitions between them, which are very thin, are soon destroyed by wave action, thus exposing a fresh wood surface to attack.

A new method of destroying these borers has been found. The piles to be treated are inclosed by a canvas apron supported by floats, and kept in an upright position in the water by weights at the lower end. The inclosed space is ordinarily not more than 40 x 80 feet square. The water in the inclosure underneath is decomposed by means of an electric current, and chlorine, with small quantities of bromine and iodine, are formed, rising through the water around the piles. By a mechanical contrivance the apron and electrical terminals can be lowered to the mud level and gradually raised, the gases being constantly generated in the inclosure. As previously seen, the Xylotrya draws in water through one end of the tube, always exposed, which passes through the entire body. It has been proven that a mixture of one part of chlorine to one-half million parts of water is sufficient to destroy life in marine animals, so a very small quantity passing through this breathing tube causes death. As the Limnoria obtains a part of its food from the water, the same result is obtained with this type of borer. It is true that one application of this method simply kills the borers existing in the pile and surrounding waters, and does not prevent further ravages from others, but the process is so cheap that it can be applied as often as necessary, say every two or three months, thus insuring long life to an unprotected pile.

A public demonstration of this method of destroying wood borers was recently made in the waters of Elliott Bay, the inventors using for the purpose of generating the chlorine gas a current of 100 amperes at about 12 volts.

After the treatment the pile was left in the bay for twenty-four hours, in order that should there be any power of revival it might manifest itself; then it was cut open, and all Xylotrya were found to be dead. The result was accomplished principally by the corrosive action of the chlorine upon the exposed parts of the Xylotrya, that is, the so-called "tail," which in reality constitutes both their feeding and breathing organs. It appeared that all exposed tails in the pile thus treated turned white, while when the animal is alive, they are a dark gray. As the chlorine penetrated the borer it coagulated the albumen which constitutes part of the body and which shows itself in white spots. The original appearance of the Xylotrya when alive is almost transparent and glassy.

The Quebracho Tree of South America.

The quebracho is a tree of South America (Argentine Republic), where it forms entire forests, but nevertheless has been, until now, almost completely unknown. Its use is now beginning to spread among tanneries, and for two reasons: First, its high content of tannin, which amounts to 18 to 20 per 100 pounds weight of wood and bark; second, the discovery of chemical methods of treating the extracts, which facilitate the employment thereof. It was a German tanner of Buenos Ayres who was the first to find that extracts of quebracho wood were able to tan hides; but the first sample of the wood was carried into Europe by way of Havre in April, 1875, by Dubosc, who undertook the industrial manufacture of the extract. The employment of the extract developed difficulties consequent upon the peculiar property of the tannin. When one extracts the tannin from the bark by boiling water, the solution deposits on cooling the insoluble tannin, while there remain in solution soluble tannins and the glucosides, or non-tannins. These three components operate during the tanning, the soluble tannins combining with the fundamental substance of the skin, the non-tannin fermenting and giving the acids, which are necessary for "plumping" the hides, and which facilitate the absorption of the tannin; the insoluble tannins finally penetrate uniformly into the pores and render the hide impermeable. The quebracho is composed of 20 parts of soluble tannins in 100 parts, and only 2.5 of non-tannins per 100, while it does not contain any glucosides; it is therefore not able to furnish enough acid by fermentation. But if one adds thereto acid liquors resulting from other extracts, there is produced a precipitation of soluble tannin, which renders the tanning process very difficult.

Attempts have been made from the first to eliminate the insoluble tannins by addition of lead acetate, alum, albumen, etc., and to thus obtain a clarified and decolorized extract, but these attempts have not solved the problem. After that endeavors were made to render the insoluble tannins soluble; two Italian chemists, Leptit and Tagliani, found that by a treatment with alkaline bisulphites, the non-soluble compounds were able to remain in solution and also in the acid liquors. This process, patented in all countries, has made feasible the universal employment of quebracho. In the United States there was employed in 1901 not more than 5,000 tons of extracts; in 1907, six years after the discovery of the bisulphite process, 50,000 tons were consumed; in 1909, 70,000 tons. The extraction is effected *in situ;* on the Parana River is found a plant producing 50,000 tons per year.—La Nature.

Wireless Telegraphy Between London and South Africa.

There are being carried out at this time trials looking toward the establishment of direct telegraphic communication by wireless between South Africa and England; this is being done at Durban in Natal. In spite of the immense distance, it is hoped that a satisfactory result will be obtained, particularly since it is known that the propagation of Hertzian waves occurs with much greater facility along the meridians of longitude than it does over the parallels of latitude. In undertaking the operation of wireless telegraphy between America and Europe, a task was assailed which was really more difficult. Fortunately, in this latter case, the fogs of high latitudes furnished facilities which may perhaps not be found in the South African line.

Since high towers are very expensive to erect, it is proposed to supplant them at Durban by kites, which will carry to a height of 300 meters the extremities of the antennæ, and it has already been estimated that the cost for transmitting messages may be successfully placed at 1.25 francs per word.—Cosmos.

Water Varnishes.—Solutions of resin in alkalies and water have been suggested as cheap varnishes, but owing to their lack of durability they are used only for common painting. Their preparation is very simple: dissolve the alkali (soda or potash) in the quantity of water decided on, heat it to boiling, add the resin gradually, in small quantities, stirring contantly, and clear by standing. Floor varnish, with shellac, 30 parts water, 3 parts crystallized soda, 5 parts shellac. Floor varnish with shellac and color, 20 parts water, 2 parts crystallized soda, 4 parts shellac, 4 parts washed ocher. The varnish is prepared as at first described, the ocher is added after cooling and thoroughly shaken up, and the whole ground in a paint-grinding machine.