Corrosion of Pipes and Telephone Cables Due to Electrolytic Action.

Since the introduction of the trolley electric system, considerable has been said and written concerning the subject of corrosion of pipes, etc., by the return current of electricity used in operating the roads. The subject is a very serious one, when you consider the extent of damage done the water pipes, gas pipes and telephone cables by electrolytic action. The trouble lies in inability of the return circuit to carry back to the dynamo the current discharged through the car wheels. There are several systems used in operating trolleys, the most prominent of which is the single trolley system, where but one overhead wire is used for each track. More than 75 per cent of the roads operated in this way use the overhead wire for carrying the positive or outgoing current; but Mr. J. H. Vail, who is an authority on such subjects, in a paper read before the annual convention of the National Electric Light Association in Washington, D. C., last month, says: "The track system of all electric railways should really be the positive side or outgoing circuit. It will be readily understood that as the current travels from positive to negative, therefore any arc which occurs between the trolley wheel and the trolley wire will carry metal from the trolley wheel and deposit it on the trolley wire. If the reverse method of connection is made, the trolley wire will lose the metal, which will be deposited on the trolley wheel, and in time the strength and conductivity of the wire must be seriously impaired, eventually resulting in breakages." Some time ago a road in Boston changed from the former to the latter system for experimental purposes, finally deciding in favor of the overhead wire for the positive current. One year was devoted to each system.

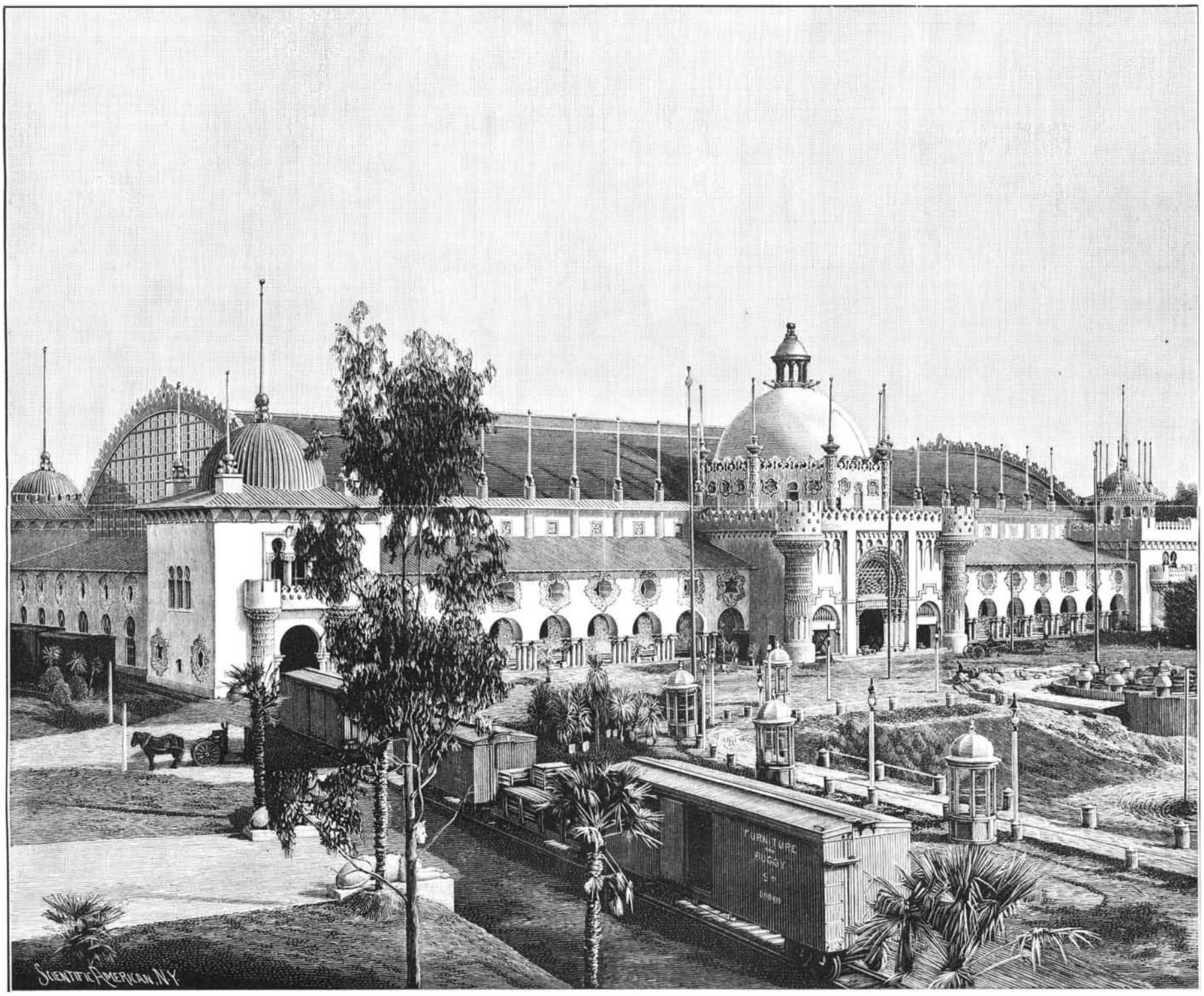
In the positive overhead wire system the rails should act as a continuous conductor for carrying the discharged electricity back to the dynamo; but they fail, owing to improper connections at the rail joints. Leakages occur at these points even when a very heavy copper bond is used. Earth, especially when it becomes damp, acts as a conductor; consequently, when a leak age occurs at a rail joint, the electric current immediately takes to the ground, and the earth in the vicinity becomes charged with the current which was designed for the rails, and plays to a considerable extent the part of a return wire. Iron or lead pipes (which are better conductors than the earth) extending along the route below the surface become charged. This condition involves a discharge at some point, and here the electrolytic action is established, which, little by little, carries away the metal, or rather converts it into a compound which, in the moist earth, is readily detached. When this action is confined to a limited area, as at an abrupt bend in the pipes, the corrosion is rapid; but when it is distributed along a stretch of several hundred feet the destructive action is slower, but nevertheless constant and sure. Of course in some places electrolysis is more rapid than in others, owing to difference in the chemical composition of the earth. Several plans for correcting this evil have been tried, the best results so far obtained being from electrically welding the rails in sections of about two thousand feet. Rails of a new line soon to be constructed in the southern part of Brooklyn, N. Y., will be laid on this plan.—*Railroad Gazette.*

M. Jablochkoff.

A dispatch from St. Petersburg states that M. Paul Jablochkoff died April 5 at Saratoff. M. Jablochkoff, who was an officer in the Russian army, invented in 1876 one of the earliest successful electric lights. The invention, which was known as the Jablochkoff candle, attracted great attention at that time, and in 1877 it was used quite extensively in Paris for lighting stores and streets, but has since been superseded by the more economical arc light. In brief the invention consisted in placing two carbon pencils side by side insulated from each other by some substance which is non-conducting at ordinary temperatures but which will, when fused by the intense heat of the current, become a conductor of electricity. The substance usually used was plaster of Paris, which gives a faint rose color to the light.

THE MIDWINTER FAIR.

The idea that was kept steadfastly in view in designing the buildings and in laying out the grounds of the Midwinter Fair was to obtain picturesqueness. The well macadamized highways wind in and out, flanked by pretty little Swiss chalets, kiosks, or State buildings. This seeming haphazard arrangement is really a triumph of art, and is a radical departure from the somewhat stiff and formal arrangement of the White City. The Midwinter Fair at no point resembles the dreary, sun-scorched, shadeless avenue of concessionaires—the Midway Plaisance. Of course, the Fair requires some large open space to admit of an effective architectural grouping of the larger buildings. This is afforded by the Grand Court, which replaces the world-famed Court of Honor at the late Columbian Exposition. In the center of the court is a rich growth of grass, which is separated from the buildings by a road sixty feet wide. On the inner side of the road is a row of vases bearing palms and other exotic plants.



THE MIDWINTER FAIR, CALIFORNIA—THE MANUFACTURES AND LIBERAL ARTS BUILDING.

The decorative effect of the Grand Court is heightened by fountains, statues, and a series of highly colored Venetian masts. When the search lights bring out the gorgeous colors of the brilliant hued domes and minarets, the effect is superb and beggars description.

Probably the first building to attract the eye on entering the Grand Court is the Manufactures and Liberal Arts building, so named from the huge prototype at the Columbian Exposition. The great blue dome and golden lantern glistens against the intense blue of the semitropical sky like an immense jewel, while a peculiar suggestion of age is given by the grayish-green tiles of the roof. This building is the largest structure at the Fair. The architect was Mr. A. Page Brown, and the style adopted is Moorish. The building is situated at the eastern end of the Grand Court and faces the Administration building. The main portion of the Manufactures building measures 462 by 225 feet, while the annex is 370 feet long by 60 feet wide, so that with a gallery in the main building, 35 feet wide, the total floor space is 177,000 square feet. Under the dome there is an additional floor, 54 feet from the

ground, devoted to a roof garden. The span of the main trusses is 158 feet. The roof which they support is 92 feet from the ground.

The main entrance is surmounted by a dome, 46 feet in diameter and 132 feet high. On each corner of the main building is a pavilion or tower, 50 feet square, covered by a dome. The roof is covered with Spanish metal tiles and glass. The building is surmounted with a series of flagstaffs, bearing national standards and coats of arms of the various States. The total cost of the building, which is constructed of wood, iron, glass, and staff, was $120,000.

The decoration is in bright colors, but the effect is not so garish as might be expected, and the building is withal very pleasing, and adds to the Oriental effect of the whole.

In this great building thirty-eight nations have exhibits, so that the Fair can really lay claim to being a true international exhibition. The United States is well represented, while California is, of course, in the lead with her manufactures and the exhibition of her wonderful resources.

Pilgrims from the remotest corners of the West coast flock to San Francisco to behold the wonders of the great Fair. Among them are many of the pioneer settlers, who for years have been hidden away in quiet hamlets, seldom emerging from their retreats, and knowing but little of the wonderful growth and doings of modern civilization. The awe and astonishment of these good people on arriving at the Fair is well expressed in one of the photographic groups we herewith present.

JUST ARRIVED AT THE FAIR.

IMPROVED HIGH PRESSURE AIR COMPRESSORS.

The air compressor which we illustrate is one of a type introduced and constructed by Messrs. Elwell Fils, of Paris. We are indebted to the *Engineer*, London, for our illustration and the following particulars:

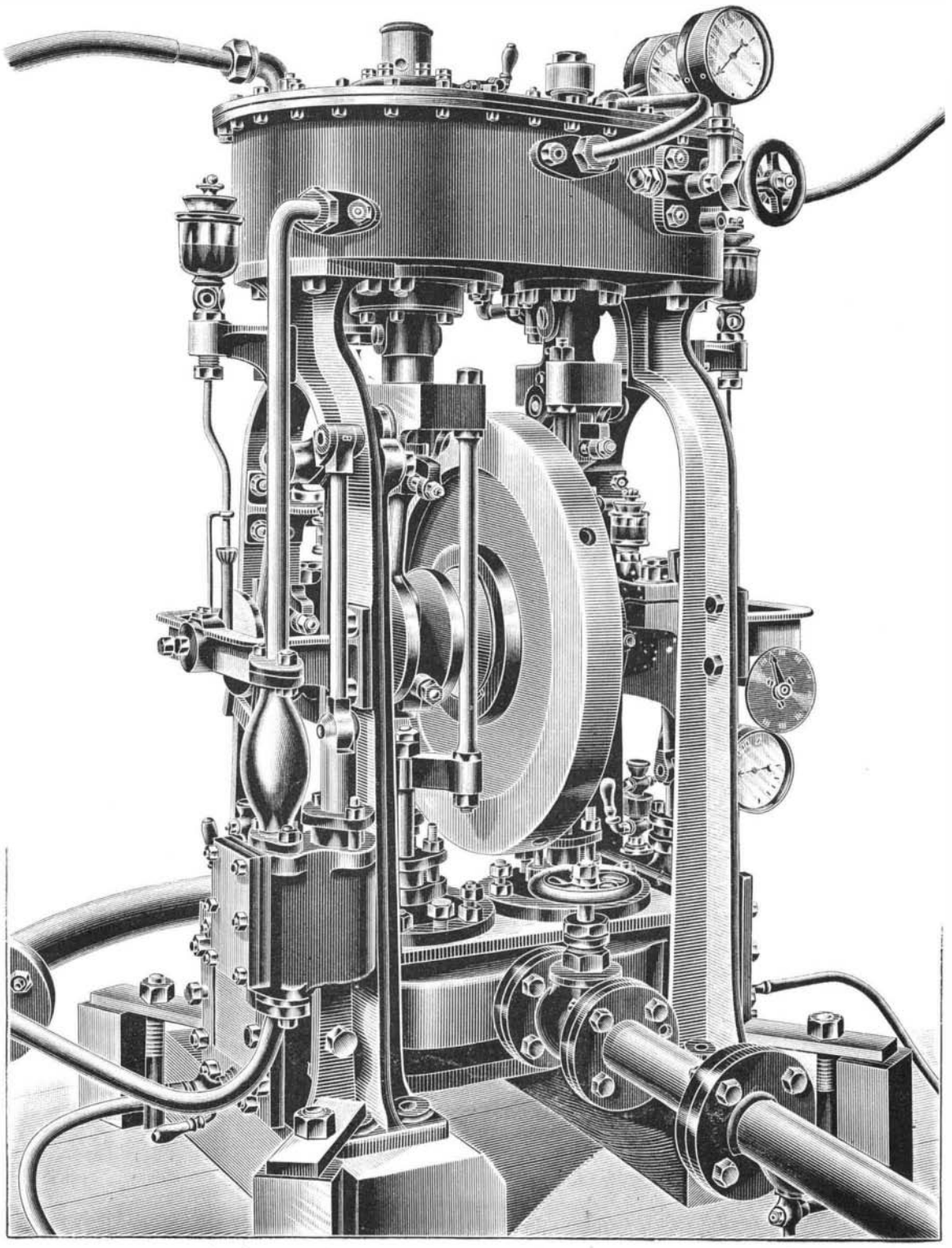
The machine consists in effect of two double-acting compressing pumps, in which the air is compressed in four stages. The capacities are so calculated that the pressures shall be equalized on each side of the pistons. The pistons are provided, it will be seen, with trunks, and the first stage raises the pressure to about 57 pounds. In the second stage this is brought up to 142 pounds, in the third to 430 pounds, and in the fourth stage to 1,430 pounds per square inch. The two compressing cylinders are cast together, with a casing or jacket to contain water, in which are placed two coils of piping. The first serves as an intermediate receiver for the first cylinder, and the second coil, connected with the small cylinder, serves to cool the air before it is delivered into the storage reservoir. The air to be compressed is drawn into the large cylinder at the top through eight valves in the cover, and kept closed by helical springs. A spray of water is introduced at the same time, while a small quantity of oil is drawn in from the lubricator on the top of this cover.

When the piston ascends it compresses the air in the cylinder. When a certain pressure has been reached valves in the piston are forced down, and the air then enters an annular space between the sides of the cylinder and the trunk. On the return stroke the air is forced into a coil. The action of the two pistons is identical. The process just described is repeated in the small cylinder. It is to be noticed that the water introduced into the first cylinder passes through all the stages and is always above the valves. It is claimed by the makers that this is a feature of much importance in machines running at a high speed, because then there is no danger of knocking a cylinder end out, or breaking a piston if too much water should chance to be admitted.

It is in reality a quadruple compression engine, the final pressure attained amounting to 1,400 pounds per square inch. The machines are made in several sizes. One to deliver 17·65 cubic feet of air per hour at the stated pressure has the following dimensions: Diameter of large air piston, 7⅜ inches; diameter of trunk, 6⅜ inches; diameter of small piston, 2⅝ inches; diameter of trunk, 1 1/10 inch; diameter of steam pistons, 6½ inches; stroke of all pistons, 4¾ inches; revolutions per minute, 300 to 350; steam pressure, 43 pounds to 71 pounds per inch. The following advantages are claimed for this system: (1) The use of a low pressure to begin with reduces the loss due to clearance; (2) the division of the work into four stages permits the air to be effectively cooled between the two cylinders; (3) the last stages of compression being effected by a very small piston, it is easy to make the piston tight, and the space over which leakage could take place is reduced to a minimum; (4) the whole machine can be taken to pieces and put together again in a very short time; (5) the delivery of the machine is independent of the pressure in the storage reservoir.

The quantity of water admitted amounts to about 15 cubic inches for every 200 cubic inches of compressed air delivered.

This compressor has been specially designed for charging torpedoes, and has, we understand, been adopted by the French naval authorities for that purpose.



IMPROVED HIGH PRESSURE AIR COMPRESSOR.

Silvester's Remedy against Dampness.

The process consists in using two washes or solutions for covering the surface of the walls—one composed of Castile soap and water and one of alum and water. The proportions are three-quarters of a pound of soap to one gallon of water and half a pound of alum to four gallons of water, both substances to be perfectly dissolved in water before being used. The walls should be perfectly clean and dry and the temperature of the air not above 50 degrees Fah. when the compositions are applied. The first, or soap, wash should be laid on when boiling hot, with a flat brush, taking care to form a froth on the brickwork. This wash should remain twenty-four hours, so as to become dry and hard before the second, or alum, wash is applied, which should be done in the same manner as the first. The temperature of this wash, when applied, may be 60 or 70 degrees Fah., and this also should remain twenty-four hours before a second coat of the soap wash is put on. These coats are to be applied alternately until the walls are made impervious to water. The alum and soap thus combined form an insoluble compound, says *Architect and Building*, filling the pores of the masonry and entirely preventing the water from entering the wall.

A Mahogany Pavement.

The dealer in hardwood who tenderly handles his stock of mahogany with kid gloves for fear of losing a splinter now and then will undoubtedly be shocked, says the *Mississippi Valley Lumberman*, to hear that mahogany is being used by the Paris Municipal Council for roadways. This sounds almost like a dream of oriental magnificence, yet it is true. A portion of the Rue Lafayette has been pulled up and workmen are laying down blocks of real Brazilian mahogany of a fine texture and color. It is, however, an experiment, as mahogany is dearer than other woods usually used for this purpose, but it is expected that the extra outlay will be more than compensated for by the greater durability of the mahogany.