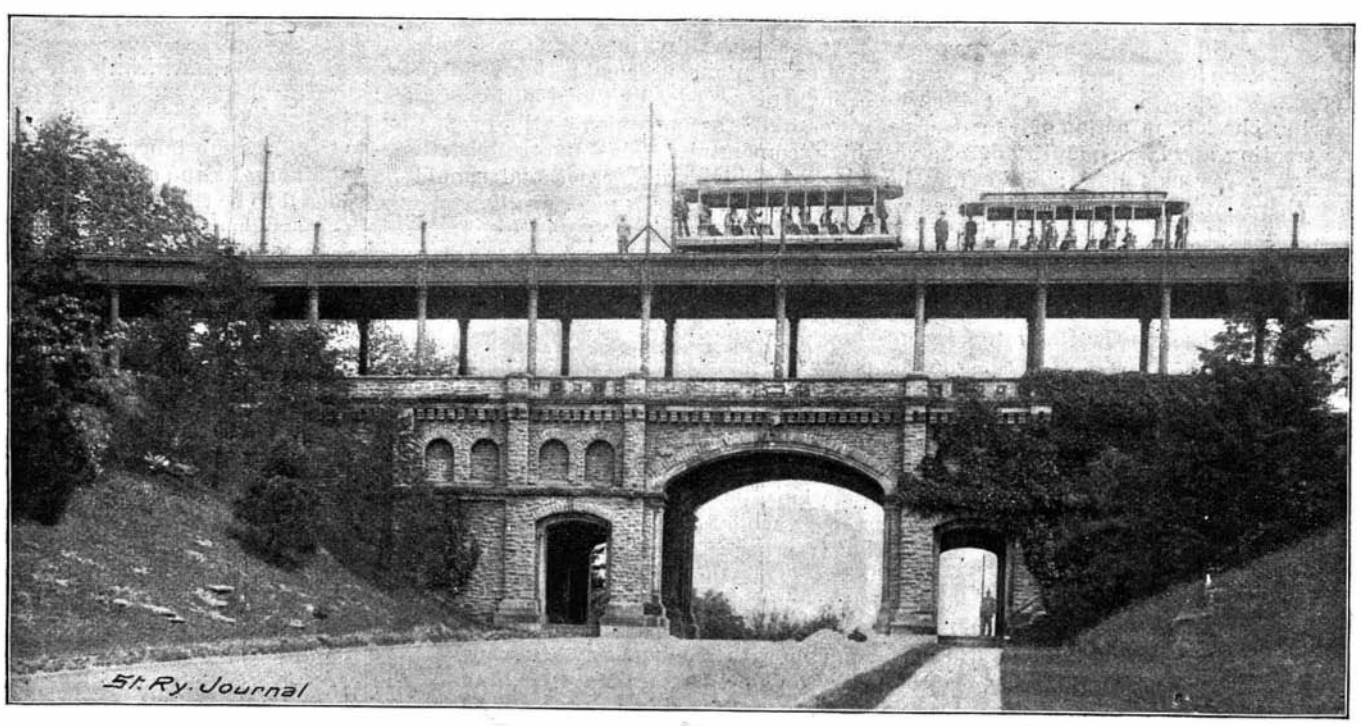
The Action of Acids upon Glass.

Experiments made with flasks of different kinds of lime-alkali glass proved that the loss of weight resulting after heating with diluted acids to 100° for six hours was always the same with the same kind of glass, and was entirely independent of the strength of the acid or of its chemical composition. Sulphuric, hydrochloric, nitric, and acetic acids gave identical results. Only very strong acids had less effect than dilute ones, which again have less action than pure water. Similar results were obtained in working at temperatures of 160° and 190° with pieces of glass tubing inclosed in sealed tubes. The influence of the degree of concentration was, however, more pronounced than in the previous experiments and was again in inverse ratio to the strength of the acid used. The dissolving action of the acids is therefore governed by the amount of water contained in them. Bearing in mind that the action of water upon glass consists in the liberation from it of alkali, which again further increases its vulnerability to water, the passive part played by the acid may be readily understood. In the case of glass containing an unusually large amount of alkali, the action of the acid, however, is more pronounced than that of pure water, the decomposition being analogous to that of many natural silicates. Lead glass exhibits the same peculiarities as lime-alkali glass, according to the proportion of lead contained in it. The nature of the base in combination with the silica likewise seems to influence the resisting capacity of the glass. Thus a zinc-lime-soda glass (Jena thermometer glass 16 III) was more attacked by concentrated acid than lime-soda glass of equivalent composition. The action of pure sulphuric acid is less strong than that of boiling water, but at very elevated temperatures its vapors produce a more marked effect.

Dry carbonic acid does not affect glass, hence the action of the atmosphere primarily depends on the aqueous vapor contained in it. The liability of a glass to suffer changes by atmospheric influences can therefore be ascertained by estimating colorimetrically the amount of alkali separated on treatment with water. Glass, especially when rich in alkali, is capable of absorbing water, which can only be completely expelled by heating to about 500° C. The water combines chemically, forming hydrates, which represent the intermediate stage in the process of the decomposition of the glass by the action of water. An important part played by the alkali split off by water seems to consist in its facilitating the formation of such hydrates.

VIADUCT FOR STREET RAILWAYS, CINCINNATI.

The business portion of Cincinnati occupies a plateau nearly three miles wide, rising abruptly about eighty feet on the north side of the Ohio River, and beyond this is an irregular line of bluffs some 400 feet high, over and beyond which the city has spread. One of these hills is known as Mount Adams, and our illustration represents a view on the Mount Adams and Eden Park Railway, forming part of the street railway system of Cincinnati, the park being on a hill in the eastern part of the city, and containing two hundred acres. The heights are all reached by inclined planes, cable roads, and in some instances by electric lines. There are six inclined planes, on four of which the electric cars are transferred from one level to the other and continue their course, the planes being provided with triangular shaped trucks with platforms on a level, so that the electric cars are readily run on or off at the terminals. In the Cincinnati electric roads the double trolley is employed, both arms of the circuit being thus more equally balanced than with a track return, and the necessity of tearing up the streets is avoided, while the possibility of destruction of water and gas pipes by electrolytic action is entirely removed. The cars are also provided with electric heaters, and the closed cars have vestibules at the rear end, with an opening at one side. We are indebted for our illustration to the *Street Railway Journal*, New York.



VIADUCT IN EDEN PARK, CINCINNATI, FOR STREET RAILWAY CARS.

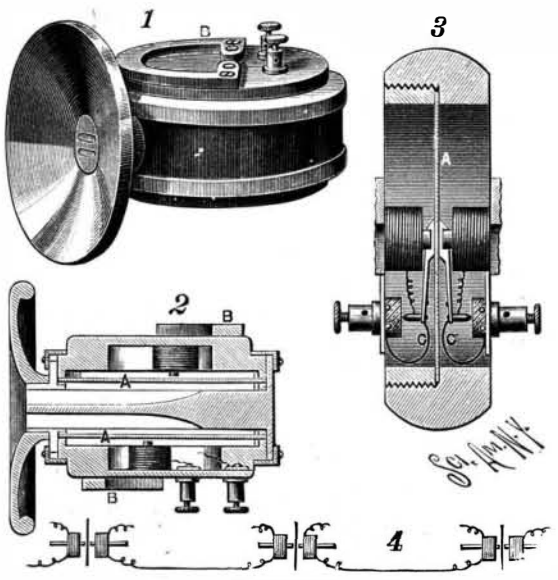
THERE are 10,000 copyrighted volumes of American poetry in the Congressional Library at Washington.

A NEW TELEPHONE.

Mr. Eloy Noriega, the well known electrical inventor of the city of Mexico, has recently patented in Mexico some improvements in telephones, for which greatly improved results are claimed.

The double receiver, shown in perspective in Fig 1 and in section in Fig. 2, is sensitive to weak impulses and gives excellent results with the normal volume of sound and current at the transmitting end of the line.

This instrument has a cell or casing provided with



NORIEGA'S TELEPHONE.

two separate chambers containing diaphragms. The two chambers terminate in an ear piece. Each diaphragm is in the field of a polarized magnet attached to the side of the casing, and the bobbins of the two magnets are connected with the telephone line.

In Fig. 3 is shown in section a double telephone, in which two polarized electro-magnets are supported on opposite sides of the iron diaphragm. The diaphragm carries two arms of insulating material, one on either side of the diaphragm, each provided with a metallic electrode at its free end, which rests on a contact block attached to the binding post. The metallic electrodes are connected with the bobbins, and the arms which support them are connected with delicate curved springs extending to the blocks attached to the binding posts.

This instrument may be used for receiving from separate lines, also for transmitting to two circuits. It may also be arranged for use as a repeater, for repeating from one line to another, as indicated in Fig. 5.

The magnets used in these instruments are made from a new alloy of iron and tungsten, which is more efficient than iron or steel. The inventor claims the efficiency of these magnets ten times greater than that of the ordinary steel magnet.

Maryland Ship Canal.

The construction of a ship canal across the Maryland peninsula between the Delaware and Chesapeake Bays is again being agitated by the citizens of Baltimore, Md., a mass meeting having been held at that city June 25 to devise ways and means of promoting the project. At this meeting a permanent committee of 21 members was appointed to investigate the subject and to report to the city councils. The movement to construct this canal was started many years ago, and in 1878 the federal government appropriated money for making surveys, which were carried out by Major N. H. Hutton. Five routes were surveyed. In 1882 another route was surveyed by Capt. Thomas Turtle, Corps of Engineers, U. S. Army, which, with an early survey made by Mr. B. H. Latrobe, makes seven separate routes which have been more or less thoroughly surveyed.

Dyeing Leather.

BY J. J. HUMMEL AND H. R. PROCTER.

In applying basic coal tar colors to cotton, it is well known that the latter requires to be mordanted with tannic acid. In the case of leather tanned with sumac and other similar tanning matters, such preparation is of course unnecessary, not only because the leather already contains tannic acid, but because the substance of the leather itself as a protein compound has a natural attraction for the coloring matter. Nevertheless, very poor results are frequently obtained in dyeing leather, *e. g.*, skivers with the basic colors, the colors being pale or irregular. An examination of the dye liquors in these and other cases revealed the fact that the coloring matter was very largely precipitated, due no doubt to tannic acid dissolving off the leather.

Two methods of getting rid of the defect naturally occur to one, viz., to remove the excess of tannic acid present by previously steeping the leather in tepid water, or to render the excess inert by fixing it upon the leather in an insoluble form.

Both methods were tried, with the result that the second proved to be the most reliable and effective. To this end it is merely necessary to work the leather in a tepid bath (45°C.) containing the requisite quantity of tartar emetic for ¼-½ hour, then to wash, before proceeding to the dyeing operation.

By adopting this simple precaution, the dye liquors are maintained in a perfectly clear condition, and since they are invariably unexhausted, they can be used for dyeing further quantities of leather; moreover, the dyed colors are perfectly level, and many shades darker than without this preliminary treatment. The leather itself is in nowise injured, and since the antimony is in a perfectly insoluble form as a tannate, there can be no fear of injurious consequences arising in the ordinary use of such leather.

Dr. Cook's Arctic Expedition.

The steamer Miranda sailed from New York July 7, bearing Dr. Cook's Arctic exploration party. She has been chartered for two months and a half, to take a party to explore the coasts of the frozen North.

There were fifty passengers aboard, most of whom are scientists and sportsmen, a few of whom are going simply for the crisp northern air. The scientific men will make researches along the coasts of Labrador and Greenland, and the sportsmen will shoot polar bears and reindeer.

The Miranda will stop at points in Nova Scotia and Cape Breton, cruise around Newfoundland, cross Davis' Strait to the west coast of Greenland, where some of the party will remain to explore the fjords and to examine the fossil beds, the Norse ruins and the other things of interest to scientists.

The Miranda will enter Melville Bay later and go to the headquarters of Lieutenant Peary, and perhaps the sites of the winter quarters of Kane, Greely and Hayes will be visited. The return will be along the coast of Greenland and Labrador to New York, where it is expected the vessel will arrive on September 15.

Among the party were William H. Brewer, professor of agriculture, Yale University; C. Fred Wright, of Oberlin College; Professor B. C. Jillson, Professor G. W. Dove, of Andover; L. L. Dysche, professor of zoology, Kansas State University; Professor Charles E. Hite, of the University of Pennsylvania; Professor Elias B. Lyon, of Chicago; and Professor A. A. Freeman, of Andover.

THE Bhatgur reservoir, a great artificial lake in India, said to hold about 4,641,000,000 cubic feet of water, acts as a feeder to the Nira Canal. It is formed by a masonry dam 103 feet high and 3,020 feet long.