Engineering Notes.

The buildings of the Pan-American Exposition have been sold for $130,000 to a Chicago wrecking company.

The West Virginia University has recently received a gift of a passenger locomotive from the Baltimore & Ohio Railroad for experimental use in its new engineering building.

In one day 39,200 tons of iron were recently shipped from Ashtabula to the Pittsburg furnaces; fifty-five trains were handled in twenty-four hours, sixty-five locomotives being used; thirty-five locomotives and fifteen crews were borrowed from the main line for the occasion.

The Fire Department surgeons in New York city now attend second-alarm fires in order to attend to the injured firemen. On many occasions there has been a disgraceful conflict of authority between ambulance surgeons and firemen, in which the ambulance surgeons refused to carry out the orders of the firemen. Each Fire Department surgeon will take with him various dressings and articles for such emergencies. If the injured fireman requires to be treated in the hospital, he will be sent there in an ambulance.

Owing to the success which has attended the construction of the turbine passenger steamer "King Edward" upon the Clyde, another similar vessel is to be constructed. She is to be an improvement on the "King Edward" in every respect. She will exceed the dimensions of the latter vessel by 20 feet in length, 2 feet in breadth and 1 foot in draught. Her speed will be 22 knots—25 miles. She will be placed upon the Clyde for traffic between Campbelltown via Fairlie and Glasgow, and is to be completed in time for the pleasure traffic season of next year. Messrs. Denny Brothers, of Dumbarton, who built the "King Edward," will also construct the new turbine steamer.

Acetylene gas is now utilized for a variety of illuminating purposes in Sweden, owing to its low cost in comparison with other processes of lighting. Attempts are now being made to introduce it into factories, and it is anticipated that its employment will signify a very considerable saving. It has been calculated that a factory using fifty lamps of 16 candle power, each burning 720 hours per year, would find its lighting bill worked out as follows: With coal gas in common burners, $290; with electric incandescent lamps, $235; with petroleum, $150; with acetylene gas, $125. By this it will be recognized that acetylene is more than one-half as cheap as coal gas.

The British Naval Department contemplates introducing the German water-tube boiler into the English navy. Orders have recently been placed for experimental sets of the Duesseldorf-Ratingen water-tube types for trial in some of the cruisers, including the third-class cruiser "Medusa," used as a drillship at North Shields. Trials are also being made in other vessels of the "Medea" class, and it is to be fitted on the second-class cruiser "Encounter," a vessel of the improved "Highflyer" class, and at present equipped with Belleville economizers. The displacement of the latter by the German water-tube boiler will be watched with interest. The new boilers are said to give excellent results, but English naval engineers refrain from venturing an opinion regarding them until they have been submitted to severe trials.

The Parisian municipal authorities are paving several streets with glass. About twelve months ago the inventors of this process were accorded permission to lay down their glass pavement in certain thoroughfares on condition that, should the new material not be found to answer at the expiration of a specified time, the streets thus experimented upon were to be repaved in the old style at the inventors' expense. The paving has evidently given satisfaction, since the Municipal Council is laying down the glass in several of the busiest thoroughfares of the city. The vitreous paving-stones are made of powdered glass, which is baked until it becomes almost fluid, then compressed by hydraulic machines, and cut into cubes to facilitate the laying process. The chief objection against the glass pavement is that its surface offers no grip to horses' hoofs, which would render it dangerously slippery in wet weather, but results have proved that no greater danger is to be feared with this material than with the ordinary asphalt paving.

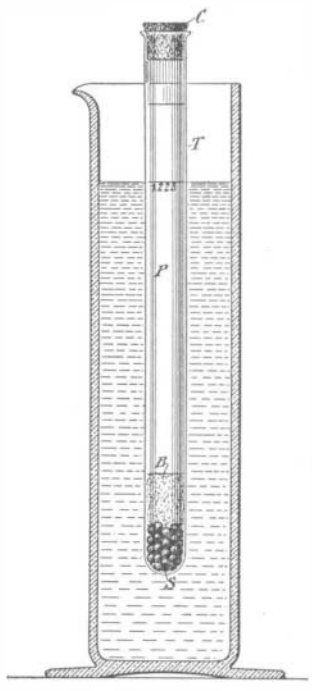
The work of constructing the great Simplon tunnel, which when finished will be 12½ miles long, and which will considerably facilitate railroad traveling in Italy, has been seriously interrupted by the striking of a copious vein of water which has flooded the whole of one section of the works. For several weeks boring to the south has had to be suspended. In the left gallery work is still going on, but all has to be done by hand, and the advance is little more than three feet a day. Here there is water also, but the pressure is less. However, when the streams of the two galleries unite, about 1,000.000 hogsheads of water will pass through every twenty-four hours. At first it was supposed that this enormous quantity of water came from Lake Avino, near which the tunnel passes, but such is not the case. Later investigations show that it probably emanates from the Cairasca torrent, which having its origin at the foot of Mont Leone, extends almost parallel with the tunnel. It is intended to prove this by the experiment of throwing a large quantity of strong coloring matter into the torrent, so that if it appears in the tunnel there will be proof that the water there comes from the Cairasca. In that case it will be necessary to open a new gallery to go round the inundation. Such an alternative will mean a great expense and occupy considerable time.

HOW TO MAKE A CHEAP HYDROMETER.

BY PARKER S. SIMONSEN.

There are many amateurs who have at one time or other tried to make a storage battery, but have given up in disgust on finding that their plates have sulphated, thus ruining their battery. This is often caused by not having the electrolyte of the proper density, but this fault can be corrected by the use of a hydrometer. Readings should be taken regularly with the hydrometer, and this will also form a valuable guide as to the amount of the charge in the battery; that is, the density of the electrolyte after charging will be found to be slightly greater than the limit of discharge. A simple and cheap hydrometer can be made as follows, which will more than repay the maker for his slight trouble:

Procure from a druggist or chemical house a test-tube (Fig. 1, *T*) 6 inches long and 7-16 of an inch in outside diameter. The test-tube should be free from flaws and very thin—about 1-32 of an inch in thickness. Now place some buckshot, *S*, in the bottom of the tube so as to form a column about a half-inch in height, or until it will float upright in water, the tube projecting about an inch above the surface of the water. A small wad of cotton, *B*, should be placed over the shot so as to hold them in place, and also a small strip of paper, *P*. should be placed inside of the tube on which to mark the necessary graduations. Now procure a bottle as long as the tube and large enough to allow the tube to pass into it. Fill this bottle full of dilute sulphuric acid having a specific gravity of 1.225 when cold. A druggist will put this up for a small sum, but if you wish to put this up yourself you can carefully add one ounce of good commercial sulphuric acid to four ounces of distilled water, and when this is cold place the tube in it. But before doing this place a small waxed cork in the mouth of the tube to prevent the liquid from accidentally flowing into it. Now mark the point to which the tube sinks into the dilute sulphuric acid, 1.225 specific gravity. If you desire any other graduations you can proceed as above, but you will then have to compare your hydrometer with a standard one. Most makers of storage batteries recommend the use of an electrolyte having a specific gravity of 1.225, so that is the only necessary mark. A small drop of glue on the strip of paper will hold it in place, completing your hydrometer.



HOME-MADE HYDROMETER.

Elastic Composition for the Preservation of Iron Ships Needed.

The life of iron and steel ships depends, other things being equal, greatly upon the prevention of corrosion in parts that are inaccessible and out of sight, such as the frames, reverse frames, shell plating directly above the cement in waterways, under the deck in the wake of stringer plates, and similar localities. The usual treatment of these parts to preserve them from rusting is to apply red-lead paint, but this is not a preventive, for the straining of the ship and wash of more or less bilge water soon cracks the thin coating so that the plates are attacked. An elastic coating that can be applied cold to the surfaces of iron and steel vessels would be of great value, but it should be comparatively cheap, contain no ingredients liable to spontaneous combustion in hot climates, and dry rapidly after application. These requirements are essential to the general adoption of such a cement or protective coating, and while they may be difficult to discover, will amply repay research in the direction indicated.

Electrical Notes.

A Michigan firm has just received an order to ship fifteen hundred telephone poles to the Telephone Company of Egypt, which is making extensive increases in its business and the area covered by its lines.

The capitol at Hartford, Conn., is being wired for electric lighting. Incandescent, arc and Nernst lamps are to be used. At the top of the interior of the dome a large Nernst lamp will be located, and under the railing at the top there will be a circle of thirty-six Nernst lamps.

According to a foreign contemporary, three electrical furnaces, of 500 horse power each, have been erected at Camonica, in the north of Italy, where the manufacture of pig iron by the Stassano patent will be engaged in. The ore and other material are ground together and formed into bricks, a composition of coal tar being the binder used. It is thus fed into the furnace and subjected to the current. The electrodes are at the bottom of the boshes.

The Society for the Study of Electric Railways of Germany has been carrying out a remarkable series of speed trials upon a new electric railway. The speed attained varied from 100 to 105 miles an hour. While running at the latter speed the pressure was found to be equal to a wind force of 12 feet per second, a force which has only been registered once on the German coast, in the hurricane of February, 1894. The engineers of the railway are confident that even a much greater speed can be attained.

A curious accident was caused recently by a cat climbing a pole of the Buffalo and Lockport Electric Railway. While attempting to walk along the feed wires her tail touched one of the 22,000-volt Niagara transmission lines. The cat was instantly killed, but a short circuit was caused by the body falling across the wires; this resulted in shutting off the power at Niagara for two hours. Several electric railways and lighting systems in western New York were without power. The next day another cat in Utica, N. Y., prowling around the power house in Utica, also caused a short circuit, which resulted in blowing out several fuses, and the cars were stalled for some time. The cat, however, was not injured and still lives.

The engineers of the Brooklyn Rapid Transit Company have drawn plans to reduce the congestion on the Brooklyn Elevated Road. A considerable section of the Myrtle Avenue division is very much overcrowded, owing to the fact that the Long Island, Fifth Avenue, Bay Ridge, Borough Park and other trains which reach the suburban districts have had to cross Fulton Street and use the Myrtle Avenue and Adams Street line as the only means of reaching the bridge, while the traffic on the Fulton Street line is not very heavy. The plan proposed is to connect the Fulton Street and Fifth Avenue lines at Flatbush Avenue. The difference in the grade of the two roads will be adjusted by an incline. The closing of a number of stations on the Fulton Street line is also contemplated, with a view to reducing the number of stops and making the service to the bridge of an express nature for long-distance travelers. Naturally this has aroused considerable antagonism.

Some interesting experiments for the artificial production of rain by means of electricity have been carried out in Japan. The probability of greater success being obtained by this means, in lieu of the system of detonating explosives in the upper air strata, has often been advocated by scientists. This attempt by the Japanese, however, is the first practical effort to prove the truth of this theory, and it was attended with conspicuous success. The trials were made in the Fukushima prefecture. Operations were commenced at eleven in the evening, but there was no sign of atmospheric change until nine o'clock next morning, when a cluster of clouds was observed over the hill on which the experiment was held. At length rain began to fall, followed by a second fall at eleven A. M., and afterward a third, fourth, and fifth—the last being about 9:30 in the evening. The area upon which the rain fell extended over many miles. As a single experiment of this description is scarcely conclusive, the scientists who carried out these particular trials propose to repeat them, with a view to establishing the feasibility of the idea. It will be recollected that we recently published in the SCIENTIFIC AMERICAN an article describing the influence of electricity in connection with the weather.

The Current Supplement.

The current SUPPLEMENT, No. 1363, contains many articles of unusual interest. "Animal Haunts and Trapdoors" is an admirably illustrated article on natural history. "Recent Science" is a paper by Prince Kropotkin. "Scenes from Kilima Njaro" is an attractive article on exploration, and is accompanied by a number of engravings. "The Dignity of Chemistry" is by Dr. H. W. Wiley, Chief Chemist of the United States Department of Agriculture.