THE HAMBURG ELECTRIC TRAMWAY.

In May last, the entire local press of Hamburg was invited to be present at some experiments on electric traction. It is a question here of a city tramway line, organized under the direction and auspices of Engineer J. L. Huber, who has secured the working of the patents taken out in Germany by the Messrs. Faure, of the Electrical Power Storage Company, of London, and by Julien, of Brussels.

Your readers know the excellent results that the above named company has reached with its style of accumulators.

Mr. Julien, through the introduction of an important improvement into the construction of these apparatus, has singularly increased their practical value. The lead that forms the positive plates is slowly destroyed in consequence of the chemical phenomenon that Mr. Plante has called the *formation* of the secondary pile. When this formation, which is really an oxidation of the metal, is allowed to go on for a certain length of time, the plates are soon observed to get out of shape, or even become destroyed and fall into fragments. Mr. Julien has succeeded in limiting this destructive action of the oxygen by substituting for the lead of the accumulators an alloy that is not attacked. I do not know the exact composition of this alloy, but it must give good results, since Mr. Huber uses it exclusively in the construction of his accumulators. The secondary elements are inclosed in boxes made of a new material, which, in certain respects, differs from ebonite. As regards insulation and lightness, it is but slightly distinguishable from ebonite, but it has a certain flexibility and a greater resistance to breakage—qualities that render the use of it particularly advantageous in the composition of an apparatus for rolling stock, as is here the case.

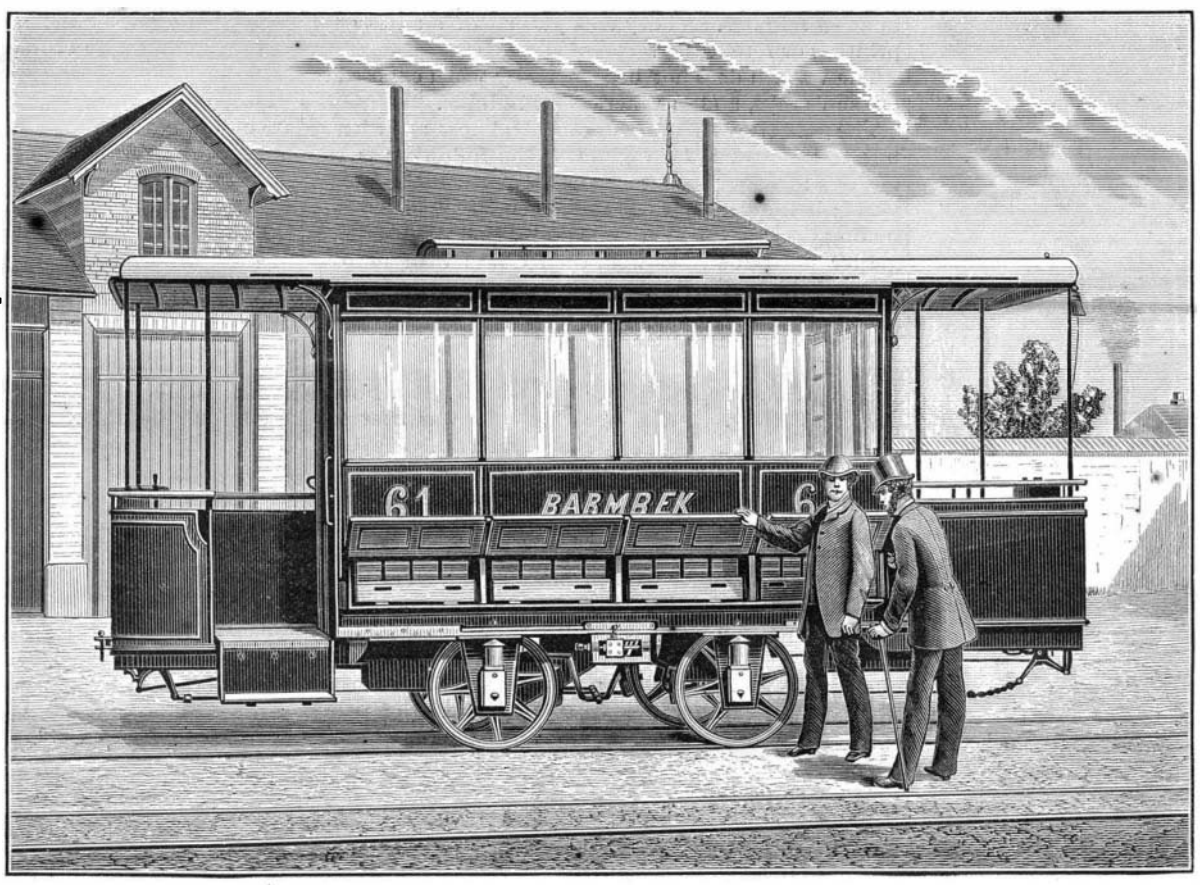

Fig. 1.—ELECTRIC TRAMWAY CAR AT HAMBURG

I illustrate these notes with a few photographic views. The car is built for the carriage of 33 passengers, and weighs, loaded, 10,625 pounds. The weight of the accumulators alone is 2,640 pounds. The battery of accumulators consists of 96 elements, each of which is formed of 15 plates—17 positive and 8 negative. The surface of the plates is relatively small (5 × 6 in.), and their thickness is 0·15 in.

The elements are grouped at first by threes, and then by twelves, in partitioned boxes. These latter are arranged along the sides of the car in a space prepared for their reception, as shown in Fig. 1. Owing to this arrangement, and to the accompanying accessory ones, manipulation is rendered very easy.

The replacing of the exhausted accumulators is very easily effected. Fig. 2 will help to make understood the processes employed by Mr. Huber. This figure represents the car in the depot, standing between two long platforms that are used for putting in and taking out the accumulators. The boxes containing the elements move along well greased slides, so that it takes but the least effort to move them from the car to the platform, and *vice versa*. When the accumulators of a car are exhausted, the latter is hauled into the depot and brought to the position shown in the cut, and the boxes are removed. After this has been done, the car is shoved ahead so as to bring the empty spaces opposite a series of charged boxes, which latter are then pushed into the compartments in front of them. The car is then ready to start.

Thanks to a very simple and ingenious device invented by Mr. Huber, the communications of the accumulators with the charging circuit when they are on the platform, as well as with the speed regulator when they are on the car, are effected automatically by the maneuvers of transshipment solely. On each side of the boxes that contain the secondary piles there are arranged strong contact screws, to which correspond contacts fixed upon the platforms as well as in the drawers of the car. The manipulations are thus greatly simplified, and may be intrusted to the ordinary employes of the stable.

The space occupied by the generators is of very modest dimensions. The steam engine is of the Lilienthal type—a small vertical one of ten horse power, mounted upon a bracket; and steam is furnished to it by a generator, about which there is nothing peculiar. A Buss tachymeter permits of regulating the velocity of the main shaft at any instant. The two dynamos are of the Schwerd type, and each is capable of running a car. This arrangement is rendered complete by an assortment of voltameters and amperemeters of various styles (Patterson & Cooper's, Breguet's, Hummel's, and Ayrton & Perry's), which permit of watching the electric state of the elements.

The electric motor that actuates the car is a Siemens dynamo, D_2, in which the inductors and armature are grouped in series. The total resistance is 0·6 ohm. The change in the motor's direction of running is secured by the use of two pairs of brushes, one to cause the car to run forward and the other to run it backward. The dynamo is connected by a cord with a shaft suspended in the center of the car, between the axles. The motion of this shaft is transmitted to the axles through the intermedium of pitch chains.

I must give a few details regarding a very ingenious device invented by Mr. Julien for regulating the speed of the motor without having recourse to the use of artificial resistances. Upon each of the platforms there is a commutator, against which rubs a contact lever. The accumulators are distributed in three groups, and the elements of each of these are connected in series. The terminals of these four groups communicate with regulating commutators, by means of which one can, according to the lever's position, bring about one of the six following combinations:

1. No connection with the accumulators. It is only in this position that the maneuvering key can be put in place.
2. The four groups mounted in quantity.
3. The groups in tension, and then quantity.
4. Two groups in quantity, and then in tension with two others.
5. The four groups in tension.
6. All the groups in quantity. Connection with the motor broken—the position of rest. When the winch has this position, it cannot be made to turn back.

It is easy to see that positions 2, 3, 4, and 5 give four different tensions, of 48, 96, 144, and 192 volts, to which correspond the variable speeds of the motor. This arrangement is a very happy one as regards economy, since all the energy of the accumulators is effectively expended.

The car is capable of making a 30 mile trip with a single charge, and the time required to recharge the accumulators is eight hours. The car that is now in service between Rathhausmarkt Place and Bambek runs 60 miles a day. It therefore necessitates two charges daily.

The intensity of the current on an ordinary run, that is to say, on a level and straight line, is 10 amperes. But on going around curves and up steep gradients, the intensity may, exceptionally, reach 80 amperes.

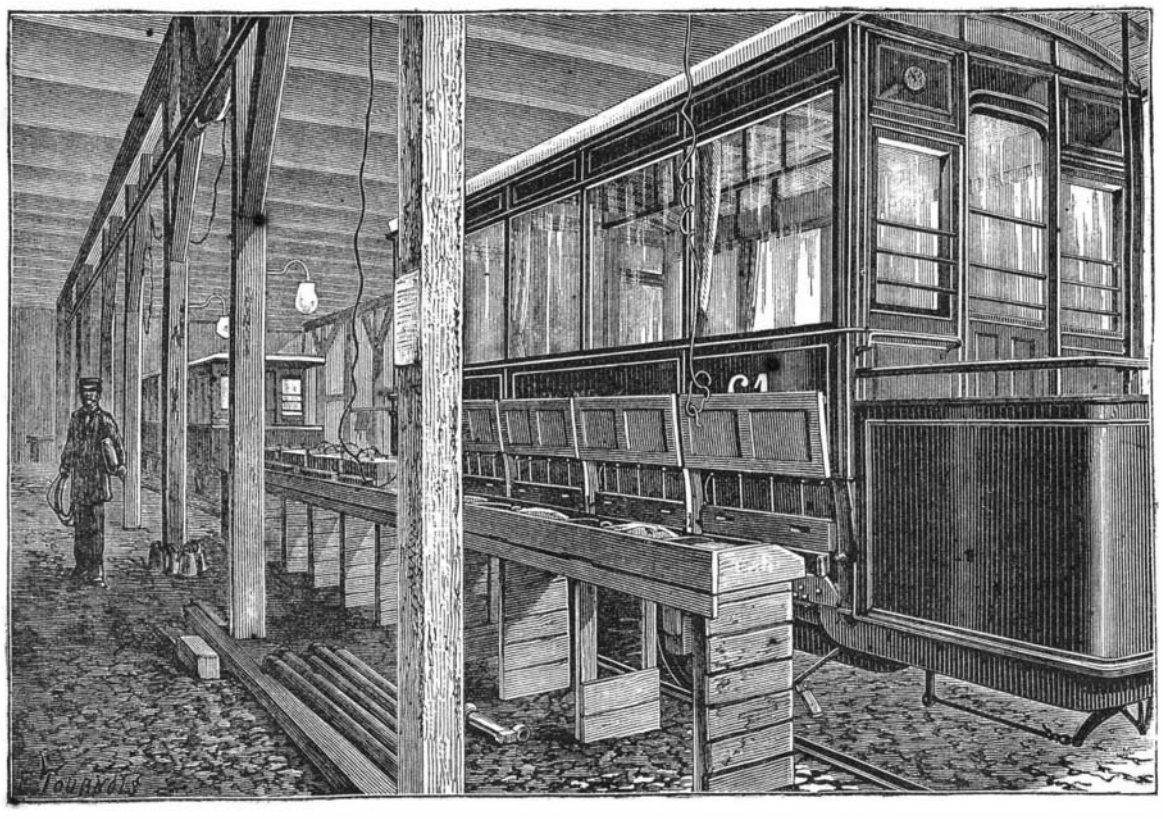

Fig. 2.—INTERIOR OF DEPOT.

After visiting the plant just briefly described, Mr. Huber invited us to take a seat in the car. The automaton appeared to be very familiar with its electric horses, and everything ran as well as could be desired.

Upon the whole, the plant, although modest, is an entire success. It is an encouragement and a promise for the future of electric traction.—*F. Uppenborn, in La Lumiere Electrique.*

Resuscitation of the Drowned.

One of the simplest methods of artificial respiration is that which Mr. J. A. Francis has described in the *British Medical Journal*. The body of the patient is laid on the back, with clothes loosened, and the mouth and nose wiped; two bystanders pass their right hands under the body at the level of the waist, and grasp each other's hand, then raise the body until the tips of the fingers and toes of the subject alone touch the ground; count fifteen rapidly; then lower the body flat to the ground, and press the elbows to the side hard; count fifteen again; then raise the body again for the same length of time; and so on, alternately raising and lowering. The head, arms, and legs are to be allowed to dangle down freely when the body is raised.