power 500 volt six pole machine, designed especially for electric railway work. The comparative size of the armature of this generator is readily seen from the armature exhibited in the foreground. This shows the manner of its construction and also illustrates one of its striking features, which is a thrust bearing of the same type that is used on the large ocean steamships. This bearing is so constructed that the shaft runs in oil. It is provided with a device by which the position of the armature in relation to the poles can be regulated to the smallest fraction of an inch. The speed of this generator is 300 revolutions in a minute. Its framework is one immense casting 16 feet long.

The railway motor, which the Short Company believes will be the motor of the future, is one that is so constructed as to be practically flexibly suspended in the truck, which relieves it of all strain and jars incident to the ordinary single and double reduction motors. Another very important point is gained by this flexible suspension, and that is, the doing away with the tremendous hammer blows upon the track. The wear and tear on the track by the ordinary motors in use is so great that it would seem that the Short Company are moving along in the right line. The abandonment of all gears is a special feature of the motor, and a very important one from a standpoint of repairs. The development of this motor is rapidly traced in the various stages, from the first one that was built in 1890 to the latest type. This latest type is a six-pole 20 H. P. motor. It is incased, protected from mud and dirt. The working parts are readily reached. This motor is suspended by spiral springs on the car truck. The armature is attached direct to the axle. It has but two brushes and runs without noise.

The rest of the Short exhibit comprises rheostats, motor and generator parts and all other electric street railway supplies.

There are a number of single reduction and double reduction motors exhibited.

DISAPPEARING GUN CARRIAGE.

The question of coast defense has been agitated in this country for many years, without material results so far as fortifications are concerned. The government is partly supplied with heavy guns, with a prospect of more to come, but the mounting and placing of these guns seems, as yet, to be an unsettled matter.

The government has been experimenting at Sandy Hook with a 10 inch breech loading steel rifle which throws a projectile weighing 575 pounds with a velocity of about one mile in 2·6 seconds, the gun being mounted upon Captain Gordon's disappearing gun carriage. The pressure on the breech of this gun is about 3,000,000 pounds, and the problem is to resist the recoil without producing undue strains or shock, and to store and use the power for raising the gun. In the Gordon carriage the gun is mounted on four heavy double cranks journaled on the top of the frame, the arms of each crank being arranged opposite each other. The longer arms support the gun, while the short arms extend downward outside of the frame, and are pivoted to a counterweight frame which surrounds the main frame of the carriage. The counterweight balances the gun and top carriage, so that the only resistance to be overcome in the maneuvering of the gun is the friction on the journals. When the gun is fired, the upper arms swing rearwardly and the lower arms swing upwardly, carrying up the counterbalance. The carriage is brought to rest by pistons working in two hydraulic cylinders provided with an air chamber. By means of this construction, the air pressure, which in the beginning of the movement of the gun is 80 pounds in the air pump, increases at the end of the movement to about 275 pounds per square inch. This energy is stored and utilized in raising the gun preparatory to firing.

In Fig. 1 the gun is shown elevated in position to fire over a parapet; in Fig. 2 it is shown depressed in position for loading.

STATUE OF DUHAMEL DU MONCEAU.

Recently, this carriage has been tried in rapidity tests. Ten rounds were fired in 36 seconds less than an hour, with full service charges of 250 pounds. The weight of the projectile was 575 pounds. The carriage was worked by hand throughout, no power appliances of any kind being used. The value of guns of this character can scarcely be overestimated in the defense of low-lying coast. The guns are exposed only when ready to fire. While being loaded, and at all other times except while actually firing, they are protected by the parapet, and are thus proof against the enemy's fire, and hidden so as to elude discovery.

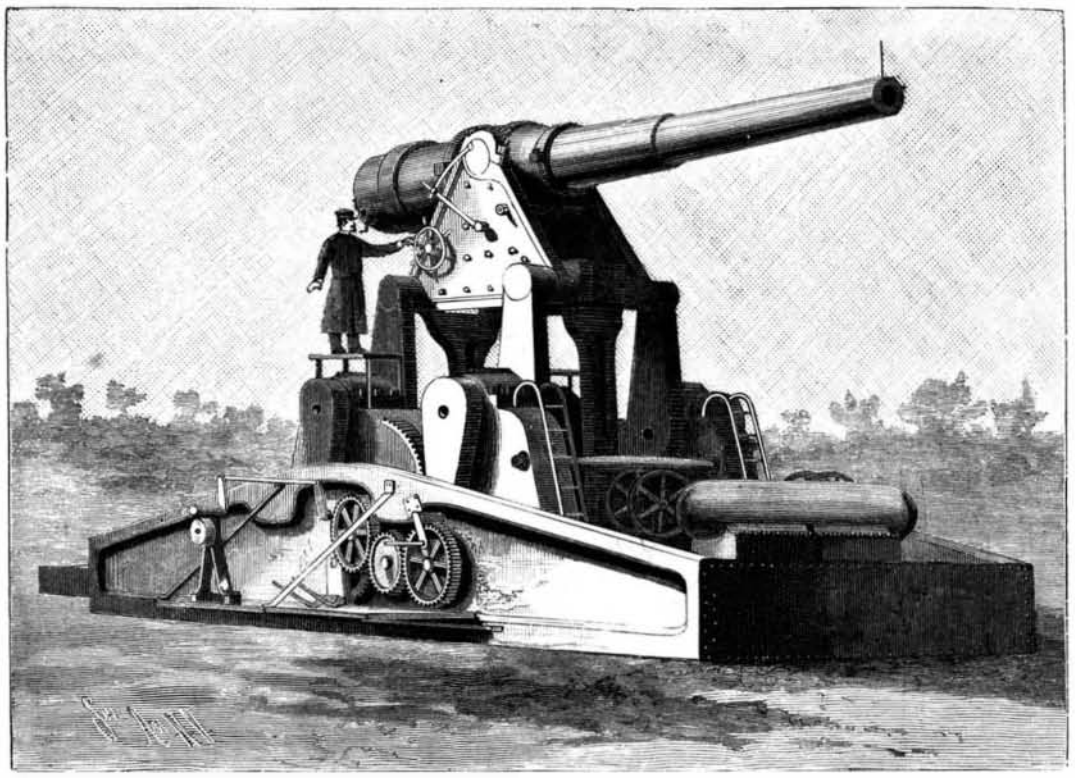

Fig. 1.—CAPTAIN GORDON'S DISAPPEARING GUN CARRIAGE.

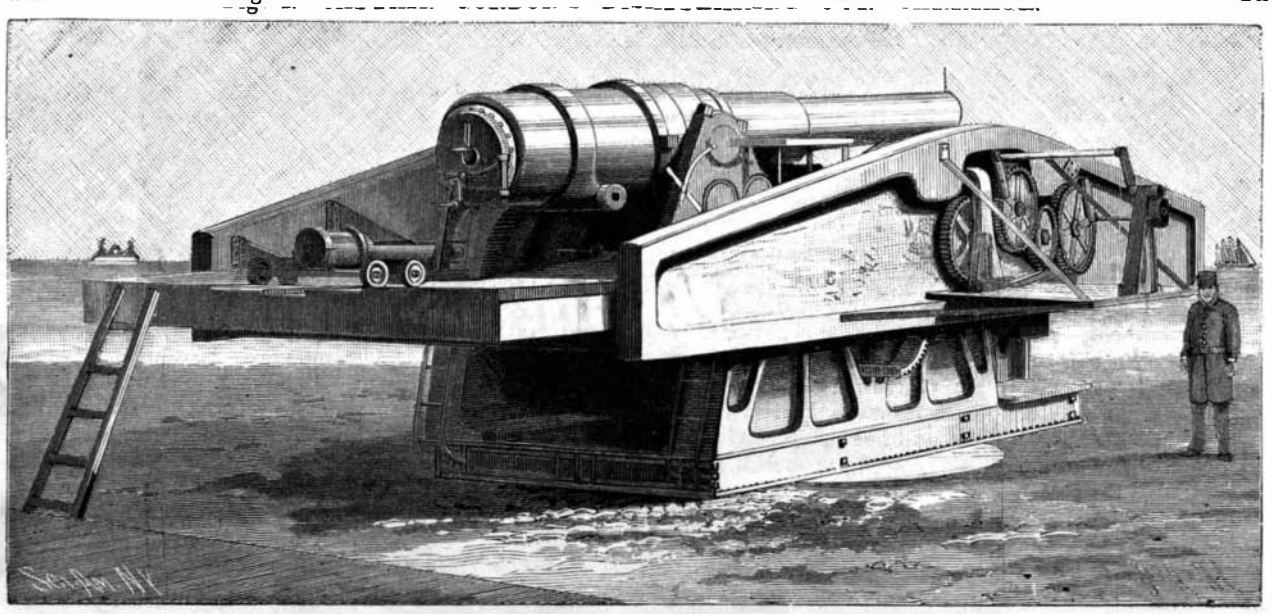

Fig. 2.—DISAPPEARING GUN CARRIAGE—GUN DEPRESSED.

DUHAMEL DU MONCEAU.

On Sunday, the first of October, the city of Pithiviers solemnly inaugurated the statue of Duhamel du Monceau. On this occasion, an agricultural exhibition, with a special competition of dairy apparatus, was organized by the Society of Agriculture, and proved very interesting.

Henri Louis Duhamel du Monceau, who was born at Paris in 1700 and died in 1782, was one of the principal agriculturists of the eighteenth century. Inspector of the marine, he devoted his studies principally to forests. In his *Physique des Arbres*, he was the first to describe with accuracy the laws of the growth of plants, of the formation of wood and bark, of the double circulation of sap, etc. He discovered the *Oidium*, one of the most destructive parasites of the grapevine, and for a long time studied the disease of the saffron. It was in the train of these labors that he entered the Academy of Sciences. He was also a member of the National Society of Agriculture. This learned author of numerous agricultural treatises passed the greater part of the year on his family estate near Pithiviers experimenting upon new agricultural theories, studying fertilizers practically, and occupying himself with perseverance with the enriching of the flora of France through the importation and acclimation of exotic plants.

He was an indefatigable worker, and imposed upon himself the task of laboring twelve hours a day—a rule that he observed during the whole course of his existence. His fortune, which was sufficient to assure him independence, permitted him to devote himself freely to his studies, and to make experiments, which were often very costly, in physics, chemistry, botany, the culture of trees, and meteorology.

He was a philanthropist, and, in his passage to the marine, not content with occupying himself with the improvement of the *materiel* and of the service, and with the construction of posts, lighthouses, etc., he greatly interested himself in the condition of the *personnel*, and published his "Instructions upon the Manner of Preserving the Health of the Crews upon Vessels under Way," a work in which he gives the most practical advice as to the hygiene on board and the preservation of food, and points out one of the simplest of methods of aerating holds by means of a draught of air through the galley stove.

The following is an anecdote concerning him: One day a young naval officer asked him a few questions, to which the scientist answered: "I do not know." "What is the use, then, of being an academician?" replied the young man. Duhamel preserved silence, but, shortly afterward, the officer having become involved in an argumentation that proved his ignorance of the subject, Duhamel retorted: "You see now, sir, of what use it is to belong to the Academy; it is to speak only of what one knows."

The beautiful statue that we reproduce herewith is due to the chisel of the sculptor Blanchard. The pedestal is by Mr. Ratouin, an architect attached to the School of Fine Arts. The savant is represented standing in the attitude of a professor giving a demonstration, and the monument does the greatest honor to the artists who conceived and executed it.—*L'Illustration.*

THE walls of Babylon are said by Herodotus to have been 350 ft. high and 100 ft. thick at the base.