missionary work in Asiatic Turkey would do well to put themselves in communication with the missionaries in charge of them. Robert College at Constantinople, and the Syrian Protestant College at Beyrout, are too well known to the British public to require special notice at my hands. It gives me pleasure, however, to report in regard to both of those deservedly popular institutions that their prospects were never so full of hope as at the present time.

Still another Chemical Photometer.

There are several metals like uranium which are more or less sensitive to light when mixed with organic matter. The high degree to which silver possesses this character is well known. Dr. Eder, in Vienna, has studied the action of light on corrosive sublimate (mercuric chloride), and finds that it is easily reduced to calomel (mercurous chloride) in the sunlight. As the former substance is soluble in water and the latter is not, a white precipitate shows the change. It was found that the following proportions were the most sensitive: Dissolve 40 grammes of oxalate of ammonia in 1 liter of water (4 per cent) and 50 grammes corrosive sublimate (5 per cent) in 1 liter of water. Mix together 2 volumes of the former and 1 of the latter. In the red, yellow, and yellowish-green portions of the spectrum the solution remains clear, but is rapidly precipitated in the blue, violet, and ultra violet. The weight of the precipitate per minute is proportional to the photometric strength of the light.

The Largest of Land Animals.

In the *American Journal of Science and Arts,* Prof. Marsh describes the largest land animal yet known to have existed on the globe. Its name is *Atlantosaurus immanis.* The thigh bone of this creature is over 8 feet long, with a thickness at the larger end of 25 inches, though the bone has no true head. A comparison of this bone with the femur of a crocodile would indicate that the fossil saurian, if of similar proportions, had a total length of 115 feet. That the reptile was 100 feet long when alive is at least probable. The other bones of this animal that have been found are proportionately gigantic; caudal vertebra has a transverse diameter of more than 16 inches. All the bones of this reptile yet discovered are in the Yale College Museum. They are from the Upper Jurassic of Colorado.

A Fish Story.

A Boston correspondent of the *Forest and Stream* tells the following remarkable story. The scene is laid in Long Island, where, on the shore of a pond, the correspondent was watching the play of swallows as they skimmed just over the surface of the water shortly before sunset. "About a hundred yards out was a bed of lily pads; and as the swallows skipped it, occasionally a good sized ripple could be seen, and sometimes a break from the edges indicating a fish there. This fastened my attention to the particular place. I had often seen cats play with swallows, swooping at them, but the idea of fish doing the same was something new to me. Presently I saw a clean breach, and a fine large pickerel showed his whole size and got a swallow, too, as he disappeared beneath the water. This I saw repeated several times, and I called the attention of my companion to this novel sight. While we were watching we saw two large fish break at the same swallow, the fish coming from opposite directions, and each head on to each. Both missed the swallow, but, singular to relate, only one fish was seen to fall into the water, and neither was seen to pass the other. My companion and myself looked with wonder. There was a great commotion in the water with a continuous spattering, and a boat being handy we jumped in and rowed to the spot, and picked up the largest pond pickerel I ever saw. When we had him in the boat the mystery was solved; the smaller of the fish had, in his eagerness for the swallow, jumped clear down the larger one's throat, and only the tail, to the extent of about an inch, showed. The large fish was completely rent asunder and killed by the catastrophe. Both together weighed 22 pounds."

Two telephone companies have been chartered in Paris by the government, and are now connecting their central offices with the residences and offices of the subscribers. The company using the Edison telephone charge six hundred francs a year. The Société Générale de Telephones uses the Gower telephone, and charges one thousand francs per year. The government reserves the privilege of buying out both companies.

ELECTRICAL RAILWAY.

The electric railway illustrated in the accompanying engravings, which we take from *La Nature,* was exhibited at the Berlin Exhibition of 1879. It presents a good example of the conversion of motive force into electricity and the conversion of the electric current back into motive force.

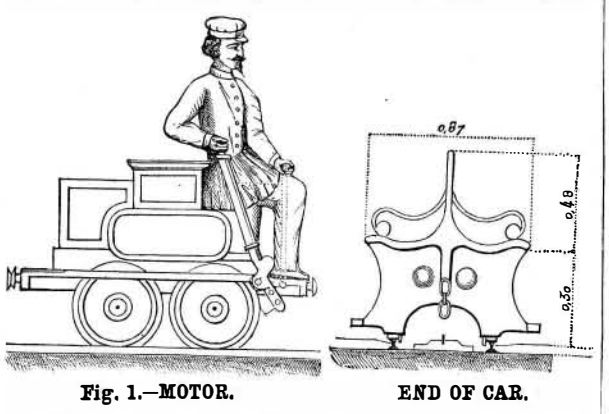

Fig. 1.—MOTOR. END OF CAR.

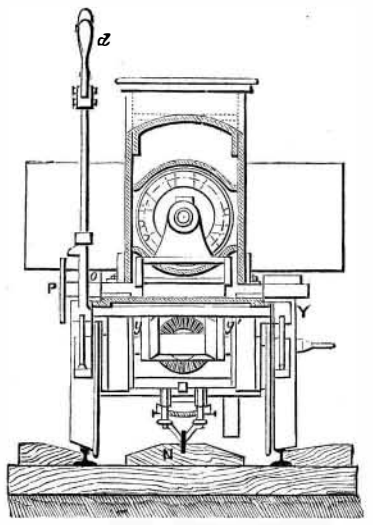

Fig. 2.—END VIEW OF MOTOR.

Two magnets or dynamo-electric machines, A and B, connected by metallic conductors, form a complete system for the transmission of power. If motion is imparted to the machine, A, an electric current will be produced which is converted into motive power by the machine, B. Of course the machine, B, delivers only a part of the power applied to the machine, A, and this amount of power transmitted varies with the nature of the machines, their speed, and the length of the conductors connecting them. Some machines are capable of delivering 60 per cent of the original power under favorable circumstances. A dynamo-electric machine operated by a steam engine, and connected by conductors with a second dynamo-electric machine mounted on a vehicle, the wheels of which are acted on by the second machine, constitutes an electric carriage or wagon. If the vehicle be placed upon rails, and the rails are used as conductors, the current being taken from an insulated rail by a metallic brush and returned to the electric generator by the ordinary uninsulated rails, we have an electric locomotive; connect a few cars with this locomotive and we have the electric railway as constructed by Dr. Werner Siemens, the well known German electrician, and exhibited at Berlin.

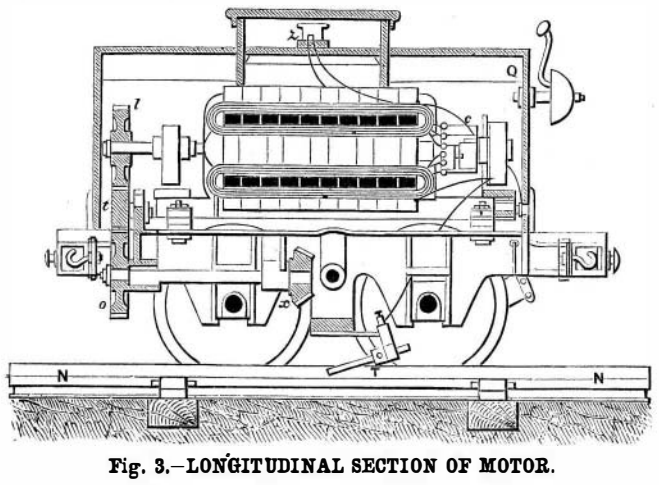

Fig. 3.—LONGITUDINAL SECTION OF MOTOR.

In the annexed cuts Fig. 1 represents a side view of the locomotive and a cross section of the cars, both drawn to a scale of $\frac{1}{10}$. Figs. 2 and 3 show detailed views of the locomotive on a scale of $\frac{1}{20}$. Fig. 4 shows the locomotive drawing three cars, each containing six passengers. The machines used are of the continuous current system of Siemens. The armature is rotated by means of the current received through the conductors from the stationary machine, and transmits its motion to the driving wheels through a number of gear wheels, *l, t, v, x, y,* which are necessary to reduce the speed.

The machine producing the current has one of its poles connected with the track rails, and the other pole is connected with the insulated central rail, N (Figs. 2 and 3), which is simply a conductor. A pair of brushes made of very fine copper wire, like the collectors of the Gramme machine, are kept in contact with the rail, N, completing the electrical communication between the rail and the machine. The current comes through the insulated rail, passes through the brushes, traverses the wires of the electric motor, and returns through the wheels and track rails.

The cars and the locomotive have an electrical connection through a copper wire. The sixteen wheels of the train form a perfect metallic communication between the locomotive and the rails for the return current.

The locomotive is started and stopped by a lever controlled by the driver sitting on the locomotive. The brake is operated in a similar way. The performance of the locomotive varies from 2 H. P. and a velocity of 6 feet per second, to 3½ H. P. and 12½ feet per second (7$\frac{9}{10}$ miles per hour), the train carrying eighteen passengers.

Fig. 4.—SIEMENS' ELECTRICAL RAILWAY.

MECHANICAL INVENTIONS.

Mr. Alfred H. Crockford, of Newark, N. J., has patented an improved brace for bits and drills of all kinds, whereby the bits and drills may be centered and firmly secured in the brace. The bits can also be readily applied to work in places or positions where the brace stock cannot have full swing.

An improved paper machine has been patented by Mr. William E. Phelps, of Lewisville, Pa. The object of this invention is to strengthen the paper by laying the fibers in all directions, instead of in the direction of the length of the paper only, as is now done.

Mr. Elijah Ware, of Omaha, Neb., has patented an improved spring power for watches and clocks. The object of this invention is to construct a spring power mechanical movement for use in watches and clocks, or for other purposes, where a small power is required, and to dispense with the train of gearing usually required. The inventor makes use of a spring attached to and coiled around a shaft that carries a loose and fast gear wheel, the spring being attached also to the loose gear, and the two wheels geared to a secondary shaft.

Mr. James A. Moore, of Kewanna, Ind., has invented a spring-propelled carriage, whose motive power is contained in a combination of coiled springs, levers, eccentrics, etc. These are so arranged upon a carriage as to be capable of exerting sufficient force after the springs are wound up to effect a long continued and economical propulsion of the carriage.

Improvements in pressing machines for printers, bookbinders, etc., have been patented by Mr. Joshua W. Jones, of Harrisburg, Pa. The object of this invention is to improve the construction of the machines for which letters patent Nos. 204,741 and 212,947 were granted to the same inventor June 11, 1878, and March 4, 1879, respectively, and which were illustrated in these columns some time since.

Mr. Ebenezer R. Gay, of Dubuque, Iowa, has patented a