The Vienna Electrical Exhibition.

The Rev. Charles A. Stoddard, D.D., one of the editors of the New York *Observer*, is writing from abroad to his paper some very interesting letters descriptive of the places he visits, his experiences and observations as a traveler on the Continent. His last letter was from Vienna, and his account of the International Electrical Exhibition now open there is the best we have read. Mr. Stoddard pronounces the exhibition complete and beautiful, and says: "Aside from the telephones, telegraphs, and countless varieties of electrical appliances for generating and applying power, the two striking points of the exhibition are the Siemens electric railway and the numerous practical methods of lighting which are exhibited. The railway seems to be a success, its car runs back and forth constantly, carrying crowds of people to their own satisfaction and to that of the onlookers. It differs from the electric railway which was constructed in the environs of Berlin, in that the electricity is stored for the trip, beneath the car. In the Berlin railway it was communicated by means of a cable on posts along the line. The car runs rapidly and noiselessly and is easily controlled by the conductor.

"The lighting of the buildings by electricity is on a vast scale. There are numerous steam engines which drive the machines furnishing the electricity, and the immense hall when lighted was as bright as day. There are English and American and German systems exhibited, and a series of rooms fitted up with extreme elegance illustrate the practical application of the electric current to the purposes of house lighting. No more beautiful and brilliant suites of apartments could be seen even in the palaces of kings. The Edison, Brush, Maxim, and Swan systems are each magnificently represented. The Swan light is white and more agreeable than the Brush or Maxim, but the yellow light of the Edison system, while it is accompanied by some heat, is upon the whole the most agreeable; all are brilliant, and all are painful to the eye after a few hours, but they are vastly superior to gaslight, and in due time the gas companies will pass away and their meters will be exhibited in the same museums with the instruments of extortion used by the Inquisition. The accuracy and perfection of some of the electrical machines made upon the Continent was worthy of notice. They were so steady and constant in the light which they furnished as to excite the admiration of all beholders. These lamps are called by different names, known to experts as the Pilsen, Ganz, Schuckert, and Schwerd machines. The Ganz lamp is the simplest in its construction and gives a steady light. It is a lamp with a single solenoid; the electric current enters through a lower, fixed carbon, passes into the solenoid's iron core, and by an ingenious but simple contrivance forms the arc upon a positive carbon.

"The possibility of turning on and off any number of incandescent lamps in one circuit, without regulating the main current, is shown in a very successful way. This will reduce the expense of electric lighting by removing the necessity for special apparatus designed to introduce a greater or less resistance into the circuit; and thus the main obstacle to the introduction of electric lighting, its great expense, bids fair to be modified by the inventions presented at the Vienna exhibition. Some of the designs shown are most beautiful. Besides ordinary chandeliers and brackets, there are bouquets of glass flowers, from which the light proceeds; fountains in the center of a room that seem to be throwing out crystal streams of light; rays of light flowing into the room without any jet or fixture being visible, a beautiful boudoir whose ceiling is pierced in manifold places in the form of little stars, and behind each opening an incandescent lamp is placed, so that the apartment seems starlit. To recount the wonders which have already flowed from the practical application of electricity, and which are on view at Vienna, would require," says Mr. Stoddard, "the knowledge of an electrician, the terminology of a machinist, and several issues of the New York *Observer*."

A Deep Artesian Well.

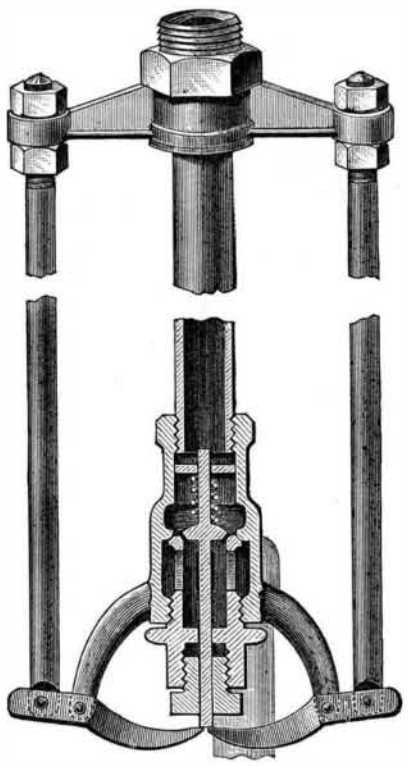
The artesian well now being drilled in the cellar of Cyrus W. Field's new building, at No. 1 Broadway, will be one of the deepest and largest in this country, and the tools used are among the heaviest ever made for this purpose. The bore is 8 inches in diameter, the usual size being from 4 to 6 inches. The hole in this well is between 300 and 400 feet deep, and progress is being made at the rate of 100 feet a week. An abundance of water has been reached, but not in sufficient quantity to justify a discontinuance of the drilling. The auger and bit weigh 4,800 pounds, and are lowered into the hole by a cable. One end of the cable is attached to an immense walking beam, by which it is raised and let fall with every stroke. A man stands constantly at the mouth of the well, turning the cable as the bit is raised, so that the boring is as perfectly done as if the rock were of pine and the auger of steel.

The hole is round and smooth, and almost polished by the constant friction. Every few hours the auger is drawn out and a large brass syringe inserted to suck out the rock sand which is made by the drilling. The bits are constantly being dulled by rocks, and a blacksmith's forge is necessary to sharpen and temper them to their work. One bit lasts usually about four hours, when it is removed and another one put in its place. Mr. C. J. Bushnell, the contractor for the work, estimates that the well will cost nearly $15,000, and will yield about 50 gallons of water per minute.—*Engineering News.*

THE CHAMPION STEAM TRAP.

This steam trap is simple in construction, effective in operation, and strictly automatic. It consists of a central tube of heavy brass passing through a crossbar, to each end of which is attached an iron rod by means of two nuts. The lower end of the brass tube screws into the top of the valve case. The rod of the valve is held in place at its upper extremity by a horizontal piece extending across the chamber, and its lower extremity passes through a stuffing box, and upon the outer end rest the two points of the curved levers. A spiral German silver spring tends at all times to close the valve.

From the lower part of two opposite sides of the case project two downwardly curving arms, whose ends are pivoted to two horizontally placed arms attached to the ends of



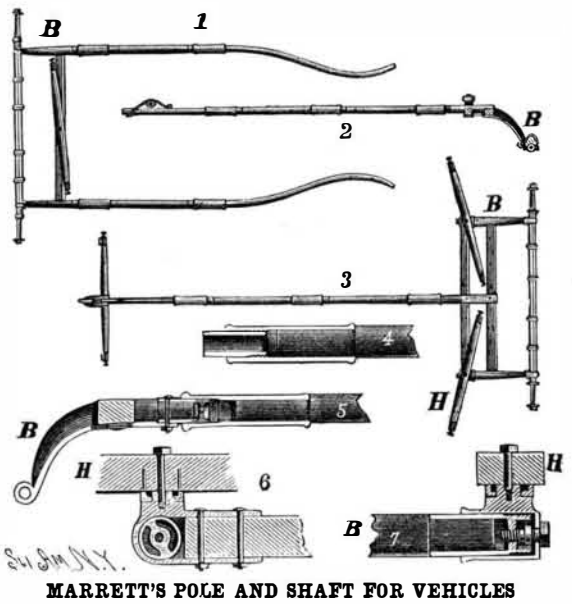
THE CHAMPION STEAM TRAP.

the iron rods. As the brass tube is expanded by the water passing through it the levers are depressed, the relative lengths of the long and short arms allowing the valve to move a great distance compared with the expansion of the tube. This enables the trap to act through a wide range of temperature and to discharge water almost cold or at the boiling point, as may be required. The valve is adjusted by means of the two nuts on each end of the iron rods. The ends, levers, and valves are made of hard brass. The expansion and contraction of the tube will not result in leakage or breakage, and the annoyances consequent upon such occurrences are done away with.

Further information may be obtained by addressing the manufacturers of the Champion Steam Trap, 821 Cherry Street, Philadelphia, or the New York agents, Messrs. H. T. Patterson & Co., 138 Centre Street.

POLE AND SHAFT FOR VEHICLES.

The invention herewith illustrated has for its object the utilization of the pole or shafts of a carriage for either when it is desired to use the same vehicle either for one or two



MARRETT'S POLE AND SHAFT FOR VEHICLES

horses, thus doing away with a separate pole and separate shaft. For this purpose a sectional construction is used, with socketed screw couplings, for uniting or disconnecting the sections of the pole and shafts, special devices being designed for other connections. This plan insures greater compactness when not in use, increased strength, facility of repair in case of breakage, and adaptability for stowing the parts away in the carriage when not in use. Figs. 1 and 3 represent the shafts and pole respectively. To change the shafts to the pole the whiffletree of the former is removed and two nearest couplings unscrewed, and the pole and its whiffletrees attached, the manner of making these connections being shown in the sectional drawings, Figs. 6 and 7. The two first sections of the shafts are then placed end to end and constitute the central portion of the pole, a side view of which is shown in Fig. 2. The screw coupling for the straight sections is shown in Fig. 4, and Fig. 5 shows the first joint of the shafts. All the details of construction will be readily understood from the engravings, in which like letters represent like parts.

This invention has been patented by Mr. Walter H. Marrett, of Brunswick, Maine.

Asphalt Pavement in St. Louis.

Pine Street, St. Louis, is being newly paved with asphaltum. The contract under which the work is being done, after providing for a foundation of cement, mortar, and concrete, provides that the pavement shall be completed as follows:

Upon the concrete foundation thus prepared shall be laid the wearing surface or pavement, the basis of which or paving cement must be pure Trinidad asphaltum unmixed with any of the products of coal tar. The wearing surface shall be composed of: 1. Refined Trinidad aspbaltum. 2. Heavy petroleum oil. 3. Fine sand, containing not more than 1 per cent of hydrosilicate of alumina. 4. Fine powder of carbonate of lime.

The Trinidad aspbaltum (so called), whether crude or refined, as found in this market, contains from 20 to 35 per cent of impurities, and is especially refined and brought to a uniform standard of purity and gravity.

The heavy petroleum oil, which may be the residuum by distillation of the petroleum oils as found in the market, generally contains water, light oils, coke, and a gummy substance soluble in water. The petroleum oil is freed from all impurities and brought to a specific gravity of from 18° to 22° Baume, and a fire test of 250° F.

By melting and mixing these two hydrocarbons, petroleum oil and asphaltum, the matrix of the pavement, called asphaltic cement, is manufactured, which cement has a fire test of 250° F., and a temperature of 60° F. has a specific gravity of 1·19.

They are mixed in the following proportions by weight: Pure asphalt, 100 parts; heavy petroleum oil, 15 to 20 parts.

The aspbaltic cement being made in the manner above described, the pavement mixture is formed of the following materials, and in proportions stated: Asphaltic cement, from 12 to 15; sand, from 83 to 80; pulverized carbonate of lime, from 5 to 15.

In order to make the pavement homogeneous, the proportion of asphaltic cement must be varied according to the quality and character of the sand. The sand and asphaltic cement are heated separately to about 300° F. The pulverized carbonate of lime, while cold, is mixed with the hot sand in the required proportions, and is then mixed with the asphaltic cement at the required temperature and in the proper proportion, in a suitable apparatus, which will effect a perfect mixture.

The pavement mixture, prepared in the manner thus indicated, shall be laid on the foundation in two coats. The first coat, called cushion coat, shall contain from 2 to 4 per cent more asphaltic cement than given above; it shall be laid to such depth as will give a thickness of half an inch after being consolidated by a roller. The second coat, called surface coat, prepared as above specified, shall be laid on the cushion coat; it shall be brought to the ground in carts, at a temperature of about 250° F., and if the temperature of the air is less than 50°, iron carts with heating apparatus shall be used in order to maintain the proper temperature of the mixture. It shall then be carefully spread, by means of hot iron rakes, in such a manner as to give a uniform and regular grade, and to such depth that, after having having received its ultimate compression, it shall have a thickness of two inches. The surface shall then be compressed by hand rollers; after which a small amount of hydraulic cement shall be swept over it, and it shall then be thoroughly compressed by a steam roller, weighing not less than 250 pounds to the inch run, the rolling being continued for not less than five hours for every 1,000 yards of surface.

The powdered carbonate of lime shall be of such degree of fineness that 5 to 15 per cent by weight of the entire mixture for the pavement shall be an impalpable powder of limestone, and the whole of it shall pass a No. 26 screen. The sand shall be of such size that none of it shall pass a No. 80 screen, and the whole of it shall pass a No. 10 screen. In order to make the gutters, which are consolidated but little by traffic, entirely impervious to water, a width of twelve inches next the curb shall be coated with hot pure asphalt and smoothed with hot smoothing irons, in order to saturate the pavement to a certain depth with an excess of asphalt.

The St. Gothard.

The approaches to the St. Gothard Tunnel are really more wonderful than the great tunnel itself. To get up to the level of the tunnel the railway track makes many spirals, winding, in some instances, three times around a single mountain, on three terraces one above the other, through twisting tunnels. The curves are, however, so gradual as to be hardly noticeable unless one carries a compass. Then is seen the curious fact that the needle makes complete circuits, and is constantly shifting its position.