ELECTRIC MOTOR VEHICLES.

The wonderful development of electricity within the past few years, for power purposes, and its great economy, adaptability, and usefulness in that line, as shown by its universal adoption for the propulsion of street railway cars, also clearly demonstrate its superiority as a convenient and easily controlled power for motor vehicles, which are becoming so popular.

While the well known trolley car takes its power through the overhead or underground wires and conductors from an inexhaustible source of electricity, the motor vehicle is limited to the charge or amount it can carry, in consequence of the fact that it is intended to travel in places and over roads where there is no continuous outside supply of electricity. Hence, the means of storing electricity economically in the form of batteries is now one of the problems which is undergoing development.

New ideas are constantly being worked out, and it is confidently expected improvements will continue by which greater efficiency will result. At present, changes have been made in the construction of storage batteries whereby a surprisingly large quantity of active material is put into a small space, and this accounts for the neater appearance electric motor vehicles now possess over former designs. It is also a fact that the aggregate weight of battery for the amount of current discharge obtained is less than formerly.

The factor of weight is one of the features in electric vehicles that practical men are working to overcome, and it is said that whenever a storage battery or a system of storing the electric current is invented by which the weight of the battery is greatly reduced, there is certain to be an impetus given to the electric motor vehicle industry such as has never been thought of.

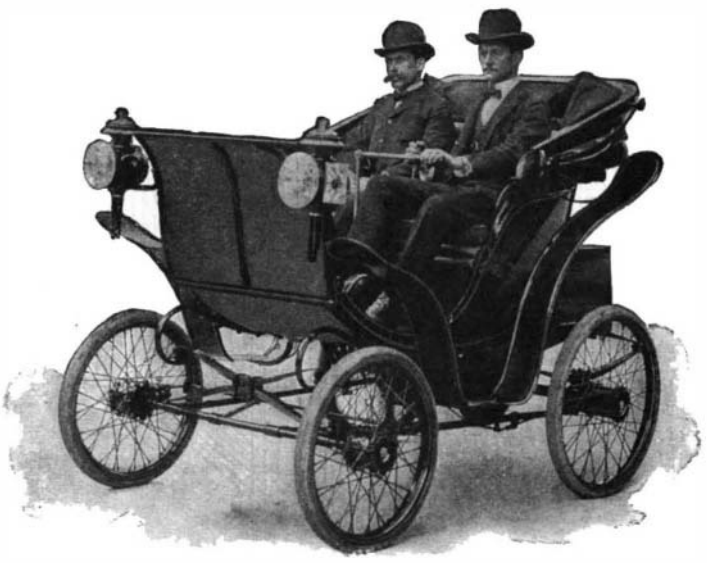
One of the essential requirements in a motor vehicle is that the reserve power shall be instantly available for a brief period of time, as, for example, when heavy grades are met with. In a storage battery this condition is perfectly met, the increase of current demanded being readily given off and accurately measured by the ampere meter, so that by observing the latter while traveling on an apparently level road one can detect slight grades by the varying position of the ampere needle.

The battery may be considered as an elastic equalizer capable of giving off in an instant the amount of current needed at various times and emergencies. This makes electricity an ideal power for vehicles, for it eliminates the complicated machinery of either gas, steam, or compressed air motors, with their attendant noise, heat, and vibration. It is not only serviceable as power, but also as light at night.

In the accompanying illustrations on the front page will be seen a new design for an electric surrey which has the appearance of an ordinary two seated carriage. The upper illustration, reproduced from a photograph, shows its appearance when on the road carrying a full load of passengers; the lower illustration gives an idea of the construction of the working parts. Referring to this, it will be seen that the storage battery is divided into two main parts, one section being in two boxes under the front seat and the other in two crates under the rear seat; access under the front seat is had by a door opening on the side, and the rear by the lowering of the hinged back of the carriage. The Willard storage cell is used, forty-four of them, the size of each is $3\frac{3}{4} \times 5\frac{9}{16} \times 9\frac{5}{8}$ inches high, and total weight nine hundred and fifty pounds. The active material is very compactly placed, yet arranged to provide a large surface. Insulated wires lead from the terminals of the battery to the controller located under the front seat just ahead of the battery, which controller is in the form of a cylinder having a number of contact plates on its surface separated by insulating material on which bear brass springs severally connected with battery in such a way that in one position of the cylinder only a few cells will operate, or in another so that they will be arranged in parallel, or in another in series, or in another for reversal of the direction of the current.

On the left hand end of the controller cylinder is a small cog wheel which meshes with a segment gear forming the lower end of the reciprocating controller lever standing in a vertical position between the cushions of the seat. The movement of this lever forward rotates the cylinder and puts on the current of varying degrees of quantity and intensity, according to the speed desired. There is a ratchet wheel adjoining the pinion of the cylinder on which a spring pawl acts as a temporary friction lock, holding the cylinder in whatever position it is placed, yet yielding to the motion of lever when forced forward or backward by the hand.

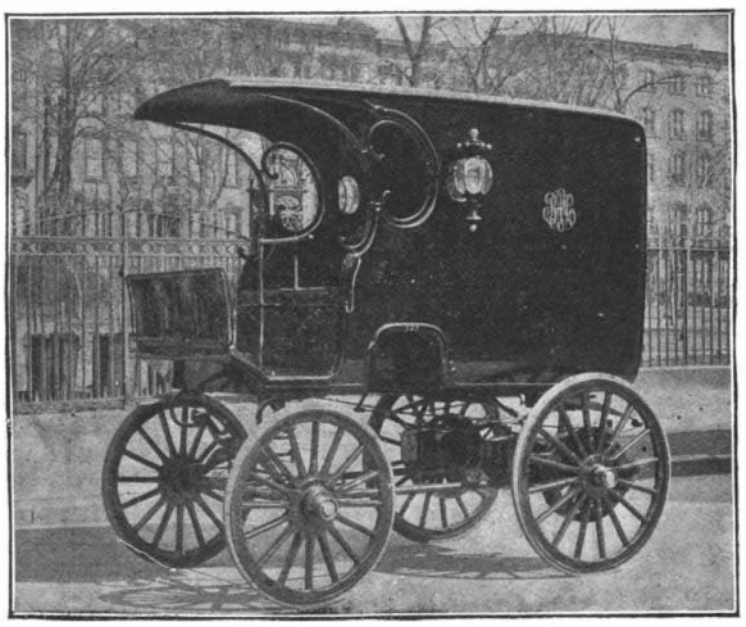
Pushing the lever forward one notch or click of the spring below gives a very slow speed of two to three miles an hour, to the second notch six to seven miles an hour, to the third notch ten to twelve miles an hour, to the fourth notch fifteen miles an hour. By drawing the lever back to the vertical position the current is thrown off. Running the length of the lever is a latch rod terminating at the upper end of the handle. To reverse the current for backing, this rod is pressed downward with the thumb at the top of the handle, which permits the controller to rotate in the opposite direction. Two different speeds for backing may be used. Thus one lever is used for a forward or backward movement. The driver sits on the left hand side of the seat, operating the driving lever with the right hand and the steering lever with the left. The steering shaft rises vertically through the bottom of the carriage, just in front of the driving lever, and is hinged so that the upper part can lie in a horizontal



AN ELECTRIC VICTORIA.

position, either to the right or the left. The driver, in the upper illustration, is in the act of operating the steering lever. An electric push button is inserted in the handle connected with a signal electric bell, seen attached to the underside of the bottom of the carriage, at the front. The signal is sounded by pressing the button with the thumb of the left hand. Under the left hand end of the front seat is a special safety switch for completely cutting off the current. At the opposite end is another switch for the electric dash lamps observed on each side. Beside this switch is a three-knife switch which is turned down for charging.

The vertical steering shaft is connected underneath the carriage by a crank and rod with one end of an interior movable hollow hub, around which the front wheel runs on ball bearings; the hub is pivoted on its interior to the carriage frame. Another connecting cross rod extends from this hub to the same style of hub on the opposite side. So that the movement of one hub by the steering shaft operates the other in the



THE RIKER ELECTRIC DELIVERY WAGON.

same direction, both moving parallel to each other. This enables the steering to be done very easily.

The carriage frame which supports the springs is built of strong steel tubing, well braced and jointed. The foot brake lever projects slightly above the floor, and has side notches for holding the lever in any position it may be placed. From this lever under the carriage, the brake rod extends to a band brake wheel secured on the rear tubular propelling shaft adjoining the large gear wheel, also keyed on the same shaft. To exclude dust, these are covered by a metal casing which is removed in the illustration for more clearly showing the driving mechanism.

An additional safety hand brake is provided, the lever of which will be seen just inside the front seat frame, and operates the usual brake-shoes which bear against the rear wheels.

The motor, of 2 kw. capacity, is inclosed in a tight metal case; one side is clamped firmly to the axle casing, the other side is loosely secured on a vertical rod, but clamped between two spiral springs inclosing the rod. The object of the spring is to compensate for the sudden thrust or strain put upon the motor when the current is quickly applied, either for going forward or backward. The pinion of the motor is made of rawhide edged with metal, and meshes into the large gear driving wheel previously mentioned. This construction makes a noiseless gear.

The rear axle is constructed in two parts. One is a solid axle attached rigidly to one rear wheel, while the other end is connected by a differential gear in hub of the other wheel with the tubular driving axle, both being incased in a stationary tubular axle and run on roller bearings. The solid and tubular axles both revolve together ordinarily, except when turning curves; then, by means of this gear, one may rotate slower or faster than the other. Such construction permits the vehicle readily to turn small circles and curves.

A later form of applying the motive power is to employ two 2 kw. electric motors, each attached to a solid rear axle and adjacent to each rear wheel. On the interior face of the wheel is a concentric toothed rack in which the motor pinion engages, thus applying the power directly to the wheel instead of to the axle. This construction will be observed in the illustration of an electric delivery wagon, and it will be noted that the wheels are of wood, fitted with solid rubber tires. The battery in this vehicle occupies the floor space in the bottom and rises nearly level with the driver's seat. In other respects the controller and brake mechanism is the same. The weight of this vehicle is 3,600 pounds. It is extremely convenient to operate in crowded streets, and is more economical to run than a horse vehicle. With one charge of the battery the vehicle is capable of running 30 miles on a smooth, hard pavement.

In another illustration will be seen a single-seated victoria rich and handsome in appearance. In the piano-like extension on the rear is the battery. The vehicle has pneumatic rubber tires and is operated on the same plan as the others. It weighs 1,800 pounds and has run a total of nearly 5,000 miles.

Electric vehicles are provided with a special socket under the floor, in which a brass plug fits for charging and making connection readily with the source of electricity.

The charging of the storage battery occupies on the average about two hours' time, the quantity of current being varied to suit the rise of the voltage.

It should be mentioned that the weight of the electric surrey is 2,700 pounds and that it travels a distance of 25 miles on a level road on one charge. It has a combination ammeter and voltmeter on the dashboard in front of the driver, and thick pneumatic rubber tires blown to a pressure of 125 lbs. to the square inch. The wheels are about three feet in diameter. Adjoining the light switch on the left is a three-knife switch, which is turned down when the carriage is charged.

All of the foregoing described motor vehicles were designed and manufactured by the Riker Electric Motor Company, Nos. 45 and 47 York Street, Brooklyn, N. Y., on what is known as the "Riker system," after the patents of Mr. A. L. Riker, a well known mechanical and electrical engineer. The company has recently introduced another type, the "brougham," a very serviceable vehicle, and have supplied customers in France and England with their vehicles. Several of these vehicles are to be seen at the Electrical Show at Madison Square Garden.

Relief Expedition for Lieut. Peary.

The sealing steamer "Hope" is to be thoroughly overhauled and repaired preparatory to proceeding northward next month with an expedition for the relief of Lieut. Peary, who went to the Arctic regions last summer with a specially selected party. It is thought that he may now need assistance, as his steamer, the "Windward," has been frozen in the ice floes since the early part of last winter.

More Locomotives for England.

According to recent cable advices, it is stated that the Midland Railway of England has arranged to place another contract for 130 locomotives with American firms. It is understood that the Great Northern Railway will also order a large number of engines of the mogul type from American locomotive builders.

THIEVES have taken nearly all the brass work of the Yerkes electric fountain in Lincoln Park, Chicago, and, of course, in taking the brass fittings, they did great damage to other parts of the fountain.

SCIENTIFIC AMERICAN

(Entered at the Post Office of New York, N. Y., as Second Class Matter. Copyright, 1899, by Munn & Co.]

A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.

Vol. LXXX.—No. 19. [ESTABLISHED 1845.] NEW YORK, MAY 13, 1899. [$3.00 A YEAR. WEEKLY.

ELECTRIC SURREY IN OPERATION.

ELECTRIC SURREY CONSTRUCTED ON "THE RIKER SYSTEM," SHOWING DETAILS OF WORKING PARTS.—[See page 295.]