

ELECTRIC CARRIAGE.

We have already described in these pages a certain number of electric carriages run by accumulators. The researches in this direction date from the epoch at which the accumulator left the laboratory of its true inventor, our regretted compatriot Gaston Plante, to enter into industrial practice. But the very imperfection of the first types, from the standpoint of the discharge, capacity, solidity and duration of the plates, was the main if not the sole cause of the want of success of the first experiments, which date from 1881. But the progress of accumulators aiding, more recent tentatives have been more fortunate, and as long ago as 1888 we took occasion to present to our readers two improved electric dog-carts that had begun to be employed in England and Turkey.

The electric carriage that Mr. Paul Pouchain, of Armentieres, has just brought out marks a new stage and seems to come near enough to the solution of the problem to allow us to devote an article to it. This carriage, represented in the accompanying figure, is a phaeton with accommodations for six persons, and is mounted upon four wheels. The whole upper part is movable in order to facilitate the inspection and maintenance of the accumulators and electric motor. The electric current is furnished by a battery of Dujardin accumulators composed of six boxes of nine elements, say in all fifty-four elements. Each box is 44 centimeters in length by 33 in width and 31 in height.



POUCHAIN'S ELECTRIC CARRIAGE.

Each element contains one positive plate and two negative plates mounted in an ebonite box. The nine elements are coupled in tension in an invariable manner. In order to assure of the hermetical closing of the elements, the box is provided at its upper part with a flange, into which is set an ebonite plate whose dimensions are a little smaller than those of the flange. A rubber plate one millimeter in thickness is fixed to the lower part of the cover and overlaps it by about one centimeter, so that upon applying the cover to the box the rubber turns up and hermetically closes the element. The opening of each element, its inspection, surveillance and its maintenance, are thus greatly facilitated. The nine elements are united in a tarred pitch pine box, thus forming six absolutely independent groups that communicate with a coupling commutator through twelve wires, two per box. This commutator, which is of bronze, constitutes a twelve-sided cylinder, upon ten sides of which are mounted pieces of copper electrically insulated from the body of the commutator, and connected with each other in a permanent manner. Upon acting on a lever, one can give the commutator a rotary motion, and cause it to take five different positions that establish contacts between the pieces of copper and fourteen elastic jaws at which end the twelve wires coming from the six batteries and the two coming from the motor. The connections affected by the commutator in its five positions are as follows:

Position of Rest.—All the accumulators out of circuit. Motor in short circuit forming a brake for the stoppage.

First Position of Velocity.—The six groups mounted in derivation upon the motor (17 volts).

Second Position of Velocity.—Three groups of two in tension (34 volts).

Third Position of Velocity.—Two groups of three in tension (50 volts).

Fourth Position of Velocity.—The six groups in tension (100 volts).

The motor is a series dynamo of the Rehniewski system, of a normal power of 2,000 watts, but which, in case of necessity, is capable of producing twice that power. It is placed in the center of the carriage, and actuates a differential movement through the intermedium of a pitch chain.

Above the hind wheels are arranged four groups of accumulators, the motor and the differential system that controls the wheels. Under the front seat are placed the two other groups, the coupling commutator and a tool box. Against the dashboard are installed the measuring apparatus, a circuit breaker, the interrupter of the three front lamps and an inverter permitting of running the vehicle backward.

A collector fixed under the carriage permits of

putting the battery in charge by means of flexible wires connected with an electric source. The charge is effected by properly coupling the six groups according to the electromotive force at one's disposal.

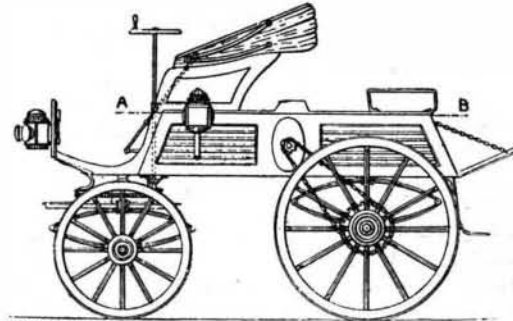
The steering mechanism acts upon the fore-carriage, which is arranged like that of ordinary carriages, but is completed by an endless screw gear that is actuated by a hand wheel with a horizontal spindle, placed within reach of the coachman, through the intermedium of a pair of bevel wheels. Owing to this arrangement, the direction given by the fore-carriage is preserved indefinitely so long as the hand wheel is not touched, and this facilitates and assures the maneuver

and permits of leaving the hand wheel to

and even electric coaches shall have come into general use. For central works of distribution of electric energy, this will prove an important outlet, of which we long ago pointed out the possibility and the practical future. The results already obtained demonstrate that our hope of twelve years ago was not chimerical, and prove that we are on the eve of its realization. Before the end of the century, Paris will have ceased to be the hell of horses in order to become the paradise of electric coaches.—E. Hospitalier, in *La Nature*.

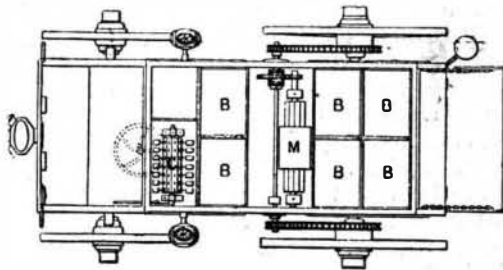
AN IMPROVED VALVE GEAR.

This gear is designed to facilitate the correction of errors arising from the movement or position of the eccentric and insure the proper running of the engine.



E. MORIER, SC.

Plan suivant A B.



The invention consists principally of a connection between the eccentric rod and the valve stem, to correct the throw or travel of the eccentric by the angular movement of the eccentric at both the forward and backward stroke. The improvement has been patented by Mr. John Grime, of No. 1707 Seventh Street, South, Minneapolis, Minn.

In the cut is shown a standard, boxed upon the main axle and supporting a guide, or what some might term a link. In this guide slides back and forth a cast iron block; a little below this is seen the connection to rod that drives the valve. By throwing the guide over

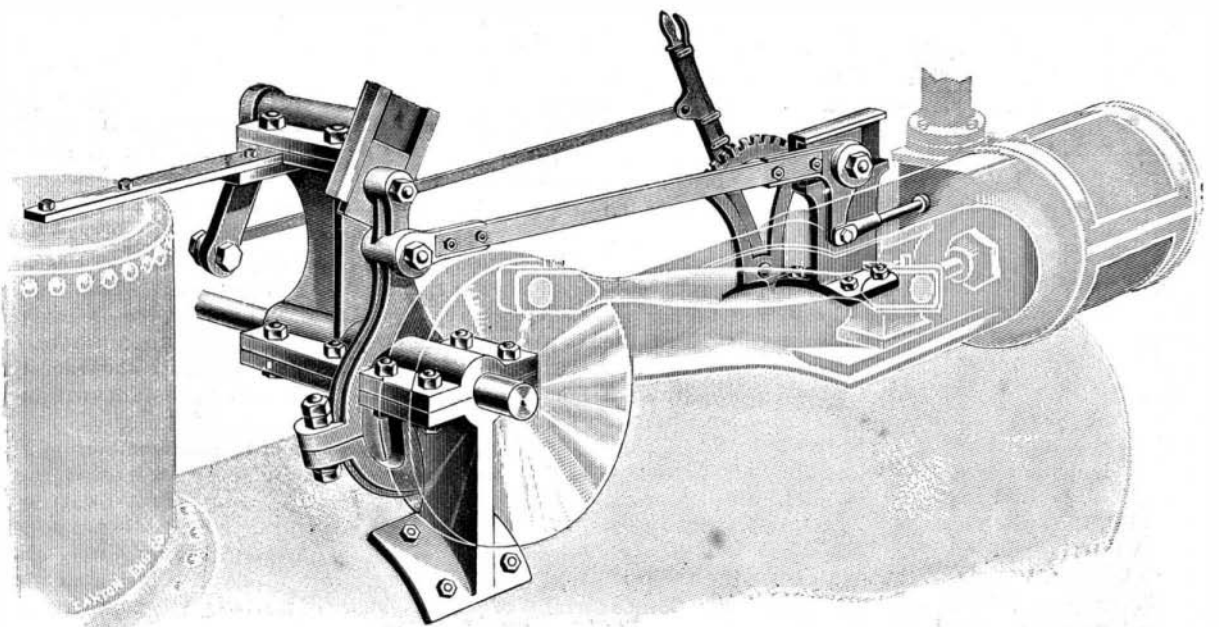
itself under many circumstances. The change of direction is effected by maneuvering the hand wheel, which obeys the least stress exerted upon its rim.

According to the data furnished us by Mr. Pouchain, the carriage in running order weighs 1,350 kilogrammes and is capable of seating six passengers. One charge of the battery permits of its making, upon a pavement in a medium state of repair, a trip of 70 kilometers at a mean speed of 16 kilometers per hour. A complete turn can be effected upon a width of street of less than four meters.

Upon a level, on an ordinary pavement, the normal speed naturally depends upon the number of accumulators mounted in series, the greatest speed (16 kilometers per hour) corresponding to the coupling of the six groups in tension. The other couplings give respectively speeds of 8, 6 and 3 kilometers per hour. In the last case, the six groups are in derivation and furnish 17 volts only. It is the mounting that corresponds to the starting that is ordinarily produced at 40 am-

peres (680 watts). In the ascent of a bridge covered with gravel, the current has risen to about 100 amperes without in any way being prejudicial to the accumulators, which, mounted in derivation, are capable of discharging 120 amperes normally.

The figure, reproduced from a photograph, shows that the electric carriage constructed by Mr. Pouchain is in no wise ungainly and presents even the advantage of being shorter than an ordinary carriage by the entire length of a horse—an interesting question from the standpoint of obstruction when, in a few years, the progress of accumulators aiding electric carriages



GRIME'S VALVE MOTION AND CORRECTING DEVICE.

is impossible for any one to tighten it, and may be slackened for insertion of paper liners. Eccentric strap is of the usual kind, with the exception that there is an extension with two holes for pins. The new correcting device serves to equalize the cut-off. The device is shown as an extension on the end of eccentric rod projecting downward and engaging and operating valve stem. It is of the nature of a cast iron bell crank, with a recess or socket for the insertion of a flat rod. The strain or pressure of valve is not transferred through any rocker bearing; one point only, and that is where attachment is made to valve