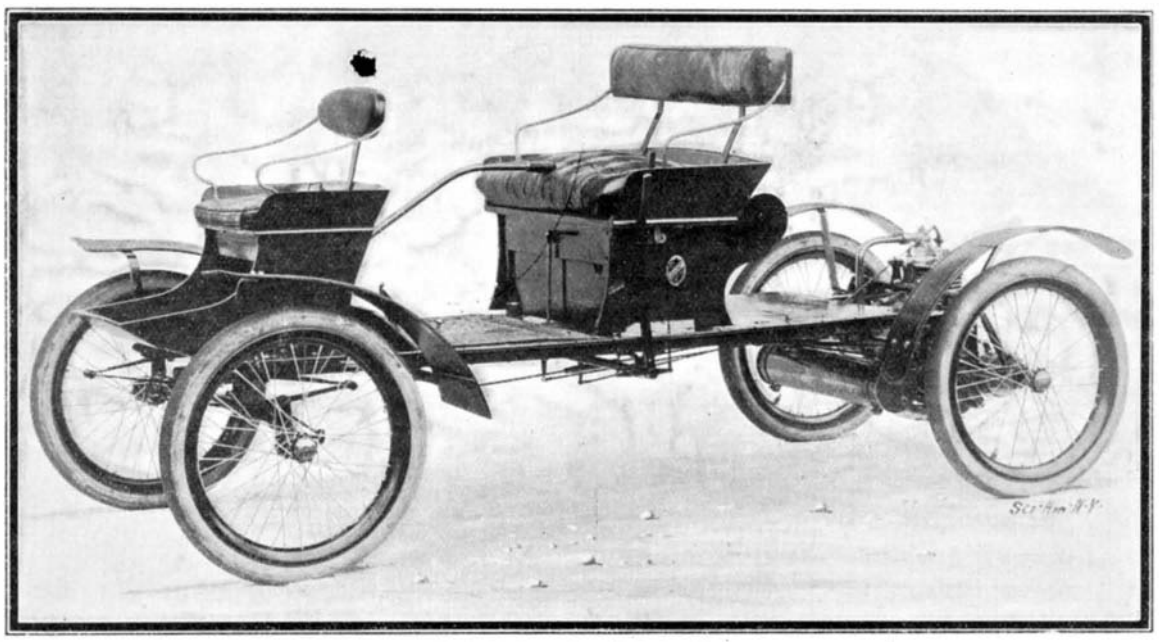
AN IMPROVED BUCKBOARD AUTOMOBILE.

The smallest, lightest, and cheapest automobile offered in the market is the Orient Buckboard, made by the Waltham Manufacturing Company, of Waltham, Mass. This is probably the simplest possible practical combination of a gasoline explosion motor and a four-wheeled road vehicle, and it has wholly superseded the motor tricycles and tandem-seated quadricycles that were so prominent during the introductory days of the automobile both in this country and in Europe. The Buckboard machine met with instantaneous success following its *début* at the Madison Square Garden automobile show a year ago, owing to its stability as compared with the bicycle and tricycle and to its closer resemblance to a "real" automobile. Moreover, in addition to being so simple that any person of ordinary intelligence and mechanical knowledge could operate it, it had a speed capacity of fully twenty miles an hour on good roads, was comfortable to ride in, and could carry two persons side by side, which overcame one of the strongest objections to the unsociable quadricycle with its tandem seats.



THE ORIENT BUCKBOARD.

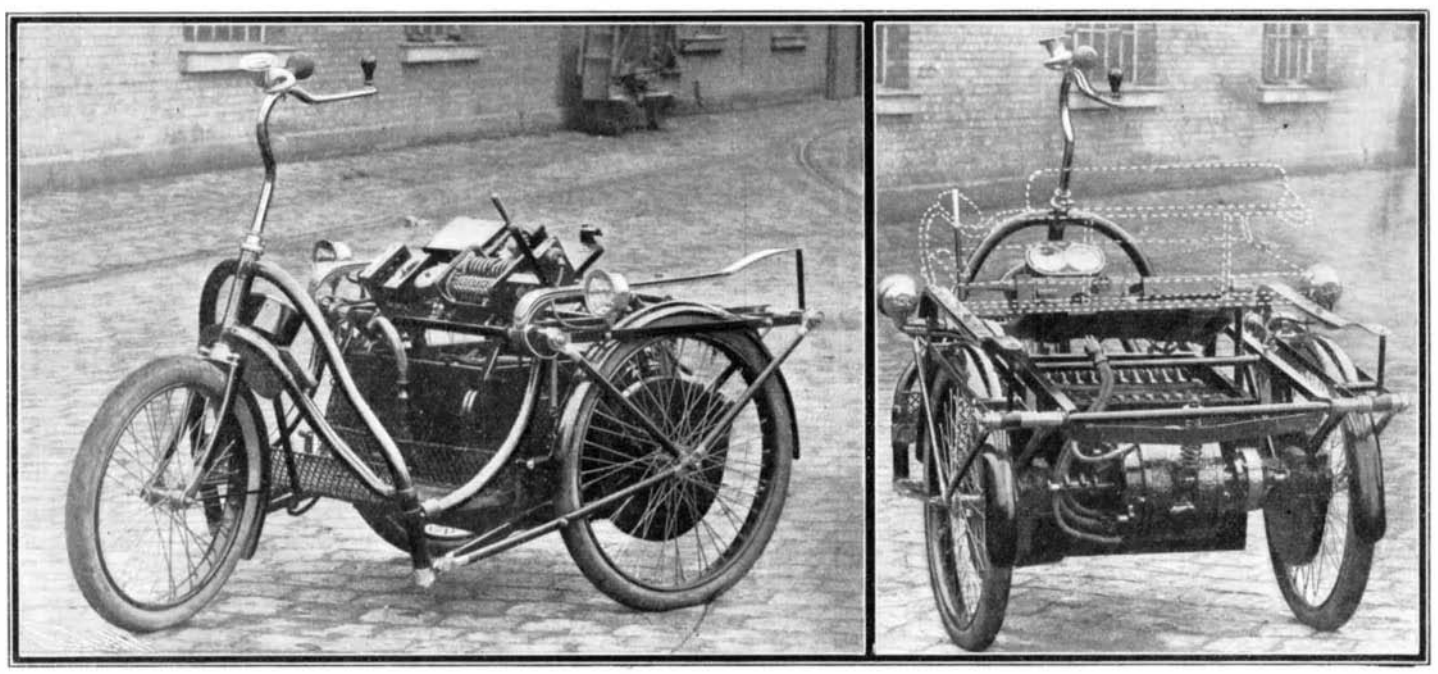
Briefly, the vehicle consists of two sets of 26-inch wire suspension wheels, the rear pair carrying at the middle of the axle a single-cylinder, air-cooled, upright gasoline motor of 4 horse power; a narrow platform, whose side members are of 1¼ by 3-inch seasoned hickory, and a cushioned buggy seat placed in the middle of this platform. The entire power and transmission mechanism is carried on the rear axle as a unit, the motor being supported in a tubular truss, the ends of which are as close as possible to the wheel bearings. The motor has flywheels inclosed in the aluminium crank-case, like a bicycle motor, and drives by a pinion a large spur gear on the differential. The gears are this year laminated with fiber to reduce the sound when running. Band brakes on the rear axle are operated by a pedal. A cylindrical gasoline tank is attached to the rear of the seat out of harm's way. The muffler is suspended below the platform just in front of the rear axle, and has been made larger this year than last to make the exhaust noiseless. Full elliptical springs have also been interposed in the new models between the rear axle and the rear end of the platform as well as under the front end of the platform, and the seat and its back have been provided with spring cushions.

Principal among the improvements for 1904, however, is the addition of a two-speed gear mechanism between the motor and the differential. This is operated by a left-hand side lever. It increases the hill-climbing ability of the machine, so that it can mount any grade met on public streets and roads, and it also enables the operator to drive slowly and carefully through streets congested with traffic and through mud and rough places. Another change is the substitution of a crank starting device for the strap and ratchet used on last year's machines. A more compact and reliable carbureter has been fitted, and mud fenders have been attached over all the wheels with bolts and nuts that are secured against working loose. Other improvements are the use of heavier hickory reaches in the platform, the raising of the platform two inches higher from the ground, and the use of a wider seat.

The Buckboard weighs about 500 pounds, is 106 inches over-all length, and 48 inches over-all width. It is finished in the natural wood. Single-tube Goodrich tires are fitted. The Waltham Company has recently brought out a carrier attachment for the buckboard to be used for delivery purposes by small merchants, such as grocers, butchers, laundrymen, druggists, dry goods, and notion stores, etc., and has also designed an extra seat for one person to be placed over the front axle as shown.

AN ELECTRIC TRICYCLE FOR POSTAL WORK.

The accompanying photographs show an electric tricycle specially constructed for the Royal Bavarian Postal Service, of Munich, by the Siemens-Schuckert Works.



THE SIEMENS-SCHUCKERT ELECTRIC AUTOMOBILE TRICYCLE.

The chassis consists of two truss frames, each of which holds a driving wheel. The hind wheels, as shown in the illustrations, are set one in each frame, and consequently there is no regular rear axle. By this arrangement, a greater space is obtained under the double seat for the storage batteries, motors, differential gear, etc.

The rear view shows very well the compact and practical arrangement of the various parts, which are so placed that there is room for a box for carrying small articles.

Both rear wheels are connected, through two strong pieces of tubing, with the double, inverted V-tubing that supports the front fork, while the cross-connection between the two side frames is made with light tubing, which conduces at the same time to simplicity of construction and ease of taking apart. The battery, the seat, and also the motor, are double spring suspended, and the differential gear renders it possible to steer the machine easily. It can be turned around in a street whose width is equal to double the length of the machine. There is both a foot and an electric brake ready at hand. The latter operates so energetically that when going at full speed and carrying two people, the machine can be brought to a full stop in from 7 to 10 feet. The machine is equipped with a motor capable of giving 1 horse power at 800 revolutions per minute. There are 24 cells of Tudor storage battery, arranged in two crates, and weighing complete 286½ pounds. They have a capacity of 18 ampere hours at a one-hour rate of discharge.

The controller has ten notches—one for the stop or off position, five forward speeds, two reverse, and two for braking. The total weight of the machine is 842 pounds, and the weight which it is capable of carrying is 352.73 pounds. Its maximum speed is 9.31 miles an hour.

THE 24 HORSEPOWER POPE-TOLEDO TOURING CAR.

The 1904 Pope-Toledo gasoline touring car differs radically from all previous models, and embodies many of the latest ideas in automobile construction.

The motor has four vertical cylinders of 4¼-inch bore and 5¼-inch stroke, and develops 24 horse power at a speed of 900 revolutions. The cylinders are cast separately without water jackets, and are merely flanged tubes, bored with great care within and machined on the outside to an even thickness. The water jackets, which are of copper, are corrugated to allow for expansion. The lower ends of the jackets are slipped into grooves turned in the cylinder flanges and "sweated" in place, after which the grooves are filled with solder. The upper ends of the copper jackets are turned in, and form gaskets between the cylinders and the cast-iron combustion chambers. This arrangement of cylinders and water jackets obviates the necessity for difficult cored work in casting the cylinders, while the fact that the cylinder walls are of even thickness assures equal expansion when they become heated. Further than this, the construction described affords ample opportunity to reduce weight to a minimum, although no strength is sacrificed.

The Toledo Company still maintains its claim that automatic inlet valves are preferable to the mechanically-operated variety, and its latest motors are so fitted. The inlet valves are held in place by strut pieces, which engage the heads of suitably-placed screws, and may be removed quickly and without difficulty. The inlet valves are forged of nickel steel, and the exhaust valves are of a special nickel alloy, which is practically the pure metal. It is generally conceded that nickel is particularly suitable for exhaust valves, as it does not warp under the ordinary heat developed by the engine, while constant "pitting" is eliminated by its use.

The cam shaft runs within a chamber cast integral with the upper half of the aluminium crank case, and the cams and shaft journals are splash-lubricated. The two-to-one gears are unusually large. The circulating pump, which is of the gear type, is mounted on the exhaust-valve side of the motor at the extreme front end of the crank case, and is driven from the large cam-shaft gear. The pump-driving gear carries a boss on which the fan pulley is mounted, the fan being belt-driven. The engine bearings are of bronze. They are cast in halves, accurately surfaced on a milling machine, soldered together and machined up as a single casting, and then separated, the bearing surfaces being scraped by hand to remove all tool marks and assure a perfect fit.

An efficient circulating system makes the use of a large supply of cooling water unnecessary, only 3½ gallons approximately being required. The construction of the radiator is such that the water is obliged to circulate back and forth from the top to the bottom in a very thin film; thus every drop is subject to the cooling influence, whether the system is filled or not, a feature not common to all types of radiators. The water is forced from the bottom of the radiator