extend the cable from Manila to Shanghai. Of the exent of this great work some opinion may be formed when it is considered that the length of the cable will be three and one-half times longer than the Atlantic cable. The whole length of the line will be about 10,000 nautical miles.

Some account of the actual work of laying the cable should here find a place. The telegraph steamship "Silvertown," which laid the cable from San Francisco to Honolulu, is the first ship that was built expressly for cable work. When launched she was the largest merchant ship afloat with the exception of the "Great Eastern." Upon this trip she carried 2,413 nautical miles of cable, weighing 4,807 tons, her total weight being between 6,000 and 7,000 tons. She left Portland on the English coast September 23, 1902, steamed 1,720 miles to Teneriffe, and then 900 miles to St. Vincent. Here she made a short stay to secure coal and fresh water. Then she made her longest run between coaling ports, a distance of 6,180 miles, from Teneriffe to Coronel, Chile, and thereupon proceeded to San Francisco. The value of the vessel, her cargo, the loss which would have resulted from disasters, made her a tremendous commercial risk. Throughout the voyage constant tests of cable were made. A man sitting in the testing room of the vessel could send a message to himself through over 2,000 miles of cable lying in the same vessel's hold. On September 4 the "Silvertown" arrived at San Francisco. She took on coal and supplies, laid the shore end of the cable at that point, and left for Honolulu at 2 o'clock on the morning of the 15th instant. She arrived off the islands on Christmas Day, and at about 2:30 o'clock on the morning of the 26th of December, buoyed the cable during a heavy gale at a point about thirty-five miles from Honolulu.

On reaching the place selected for the landing of the cable, the ship approached as close to the shore as possible. A couple of spider-sheaves were sent ashore, and fixed by sand anchors some 60 yards apart. Hauling lines were payed out from the ship. reeved through the sheaves, and brought back on board again. One end of this continuous line was attached to the cable, and the other to the picking-up gear. The engines were then set in motion, and the cable was dragged slowly out of the ship toward the shore. As it went, large India rubber buoys inflated with air were lashed to it every 50 or 60 feet to keep it afloat and to prevent the damage which would result from its being dragged along the bottom.

When sufficient cable was landed, the piece on shore was laid in a trench which ran from low-water mark to the cable hut; the end was inserted through a hole in the floor, and testing and speaking instruments were set up in the hut, which was occupied night and day during the laying by the electrician in charge and his assistants.

The laying of this American Pacific cable may be attributed to the untiring energy of the late John Mackay, who turned his attention to the Pacific after his achievements in the Atlantic. He foresaw an American cable must be laid sooner or later in the western waters. Still, he was not the first in the field. As far back as 1874, a Pacific cable from the States via Honolulu to Japan had been proposed, and in that year the "Tuscarora," U. S. N., under the command of Captain, now Admiral Belknap, surveyed the route. In 1879 Cyrus Field, whose name figured prominently in connection with the first Atlantic cable, renewed the Pacific scheme, but nothing more was done till the "Albatross" and "Thetis," U. S. N., were commissioned in 1891-92 to survey the route between San Francisco and Honolulu. This survey resulted in the valuable report drawn up by Commander Richardson Glover, then hydrographer of the United States navy. Three more years passed before the Senate voted $500,000 for the laying of this section, but the measure failed to pass in the House of Representatives. The steamer "Nero," U. S. N., surveyed the route between Honolulu and Manila in 1899. On the ratification of peace with Spain, President McKinley addressed a message to Congress, directing attention to the imperative necessity of speedy communication with the Philippines via Hawaii and Guam. "The present conditions," he said, "should not be allowed to continue a moment longer than is absolutely necessary."

The project, however, hung fire, and might to-day have still been as far as ever from accomplishment, if Mr. Mackay had not taken the bull by the horns, and offered to lay the cable without any subsidy whatever from Congress. Thus to the enterprise of a private individual, and not to their government, will Americans owe the enormous advantages of telegraphic communication across the Pacific.

New Comet Discovered.

Another new comet has been discovered by Prof. Giacobini of the Nice Observatory. Like the one he discovered at the end of 1902, the newcomer is a telescopic comet, but is of the tenth magnitude instead of the twelfth. It is now moving slowly through the constellation Pisces in a northeasterly direction.

THE THIRD ANNUAL AUTOMOBILE SHOW.

The Automobile Show of 1903 may be said to be an unqualified success, most instructive as an exhibit of the many improvements made within the past year, and remarkable in showing the rapid growth of the automobile industry. The exhibition opened on the evening of January 17, at Madison Square Garden, in this city, and closed on the 24th. The daily attendance was very large and exhibitors, as a rule, were fortunate in doing a good business.

The great hall of the building was crowded with magnificently finished vehicles, and at night the numerous electric illuminated signs produced a brilliant effect. The prevailing type was the gasoline-propelled vehicle, modeled generally after the foreign tonneau form, though here and there were new shapes distinctively American in their idea. With each group of vehicles it was usual to show an example of the running gear and machinery by itself, in order that the working parts could be readily understood and examined. In many cases aluminium bodies are substituted for wood, molded in graceful lines, rendering a vehicle more fireproof in case of accident. The expensive tonneaus are richly upholstered with high-back seats, and a special drop-down seat is arranged on the rear entrance door. They are very roomy and comfortable. Very long wheel bases also seem to be the rule. The upper illustrations show that this idea is taken from the American buckboard, for it is a gasoline-propelled buckboard weighing but 350 pounds, having the air cooled flanged 4 horse power motor on the rear axle, with a special rotary incased fan to project a current of air upon the valves and explosive chamber at the top of the cylinder. The speed is varied by a throttle and spark lever. It has a wheel base of 6 feet 8 inches. The Orient is made by the Waltham Manufacturing Company, of Waltham, Mass., and certainly presents a very simple and attractive appearance for practical work. A somewhat more substantial vehicle of the same type, called the "Buckmobile," was exhibited in the basement.

Another form of an air-cooled motor, and one that went through the New York and Boston endurance test successfully, is the Franklin four cylinder roadster, of which we give two illustrations. In one a view of the cylinders and machinery is given. The interior size of each cylinder is 3¼ inches, and the ports and valves are readily accessible. All portions are well balanced and jarring is avoided, since there is an explosion at every fourth part of a revolution. At 1,000 revolutions the car travels at the rate of 20 miles per hour, and a rate of 30 miles can be attained.

The four cylinders, aided by a large flywheel, give a very constant torque, and allow of such effectual throttle control of the motor, that but two speeds ahead are needed. The ignition outfit consists of an Apple dynamo, driven from the flywheel by a bevel friction pulley, and two cells of storage battery. But one spark coil is used, the secondary current being switched to the proper spark-plugs by means of sectors on the two-to-one shaft that carries on its end the commutator for primary current. The advantage of an air-cooled motor of this kind without auxiliary cooling appliances is self-evident.

We illustrate two new styles of covered gasoline tonneau machines for touring purposes, one exhibited by the Locomobile Company of America after the French tonneau "Limosine" style of aluminium body, inclosed with glass windows and a glass front.

Another Mercedes gasoline Panhard pattern exhibited by Smith & Mabley has a luggage space on top inclosed by a wire network. The front pane of glass ahead of the driver may be turned up and suspended from the underside of the top. In rainy weather the open sides may be closed with curtains.

Of the closed variety of gasoline vehicles the most interesting was an Oldsmobile brougham which resembles a miniature cab and is manipulated from within. It has a bow glass front with side doors and room for one person in the rear and one in the front. It is intended as a closed carriage for stormy weather, a desirable vehicle for physicians and others.

Another of our illustrations is of the Centaur lightweight electric runabout manufactured by the Centaur Motor Vehicle Company, of Buffalo, N. Y. It is a substantial vehicle of its character, supported on four springs and is propelled by 14 cells of "Exide" battery. The motor is hung under the center of the body, a sprocket chain conveying the power to the rear axle.

The different speeds are obtained by paralleling the fields of the motor as well as by the usual battery connections. The usual 40-mile radius is obtained.

The lightest weight electric runabout exhibited was that shown by the Electric Vehicle Company, which weighed less than 1,000 pounds and has the batteries in a box suspended underneath the body. This machine has also a specially designed controller. The same company also showed a new physician's brougham operated from within, and a new model hansom, with large wheels and under-slung battery.

The National electric runabout with thirty-six 125-ampere-hour cells of Pumpelly battery, is guaranteed to have a 75-mile radius per charge on good, level roads. Several cells connected together of the improved Edison storage battery were on exhibition, and presented a very neat and attractive appearance. The battery was not in operation, but assembled together to illustrate how it is to look. The statement was made that the six months' actual test of the battery had been most satisfactory and that certain additional trials were now being made in this city on delivery wagons, after which it would be ready for the general public in May or June next. The workmanship and general makeup of the battery is very unique and its care will be of the utmost simplicity. The bright aluminium-colored cell has horizontal corrugations on the exterior to strengthen the metal sides, but the cover is the most interesting feature. A spring-hinged rubber plug clamped in position closes the supply aperture and a special miniature poppet valve having a stationary perforated cover protected on the top by a fine Davy gauze wire operates in such a way as to allow the gas to escape during the charging and prevent the solution from coming out. It also prevents the gas in the cell from being accidentally ignited from the outside and thereby avoids any possible explosions. The connections are very simple and rest upon the slightly-tapered end at the top of the plate terminal secured by a nut, which is held in place by a cotter pin. This enables any one cell to be removed without difficulty. To care for the battery it is only necessary occasionally to fill the cells with distilled water, which is done by the aid of a special funnel having a float gage indicating when enough water has been added.

It was said the battery would take a charge as high as sixty amperes and could discharge readily two hundred amperes at one time. Each cell weighs seventeen pounds and has a voltage when charged of 1.3 volts.

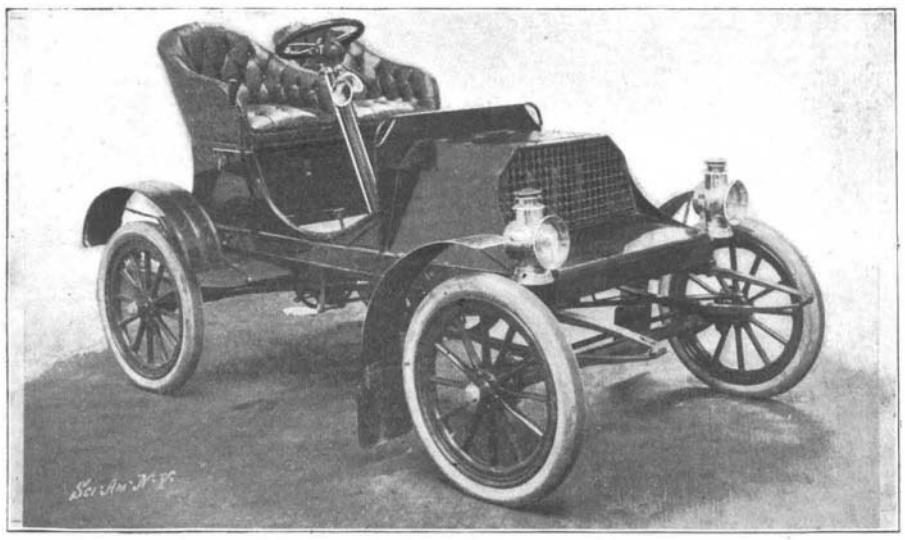
A very handsome combination gasoline electric tonneau vehicle was the Neftel, exhibited by the Ranier Company, of this city. The usual gasoline engine in front under the bonnet operates a generator hung under the center which supplies current to two motors under the rear and also charges a battery hung underneath. The engine is started automatically by the pressure of a button or lever, and the operation of the machine is controlled after that precisely as an electric vehicle. The complicated transmission gear of the regular gasoline machine is thus avoided.

Located in the northeast part of the hall was the latest type of the Stevens-Duryea gasoline machine, equipped with a perfect working engine and appliances for starting and transmission gear. The vehicle has a phaeton top and a special seat in front to accommodate two extra persons if needed. It is regarded as a powerful machine and won the hill-climbing contest at Eagle Rock, N. J. The Pan-American Company exhibited a very high-powered tonneau machine.

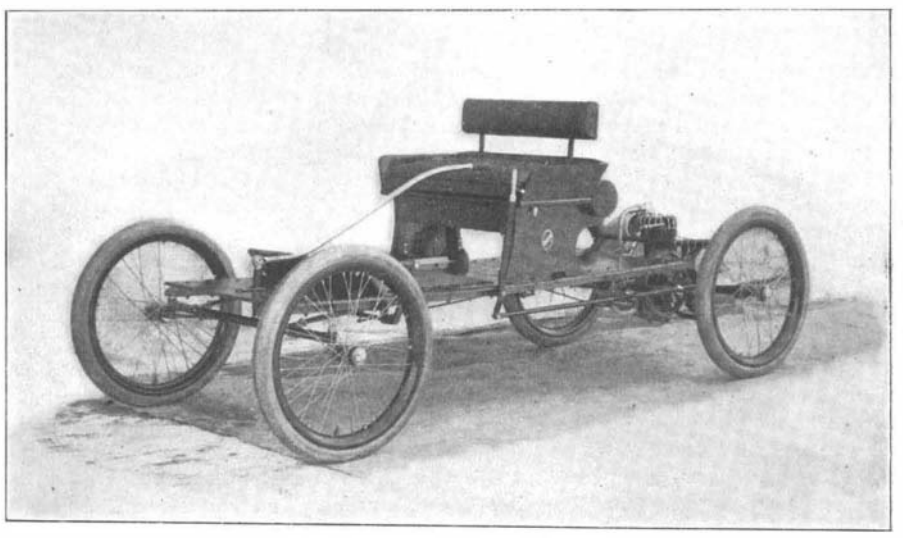
The White steam tonneau exemplifies the latest model in steam cars. The engine that propels it is a double-cylinder compound, having 3 and 5-inch cylinders, having its crank shaft directly connected to the bevel-gear driven differential by a shaft with universal joints. The flash boiler of the car is situated beneath the forward seat. The condenser gives the machine a radius of 100 miles without refilling the water tank. Now that the condenser has been demonstrated a success on the White cars, most of the other progressive manufacturers of steam automobiles are fitting it on their cars also. The Grout steam tonneau is finished off in front with a miniature cowcatcher, which serves to protect the condenser, and at the same time gives the car a locomotive-like appearance.

In the line of clutches was an electro-magnetic clutch of simple construction exhibited by the Electro-Magnetic Speed Changing Gear Company, and a pneumatic clutch by the Country Club Car Company, of Boston, which for simplicity of operation was extremely interesting. A small reservoir of compressed air in which the pressure is maintained by every movement of the engine piston at the time of explosion, enables the operator by the slight turn of a valve, the same as the engineer on a locomotive operates the air brake, to operate one of three pistons and thereby to clutch the engine shaft for any speed desired, or for reversing. Lack of space forbids further mention of numerous other novelties on exhibition.

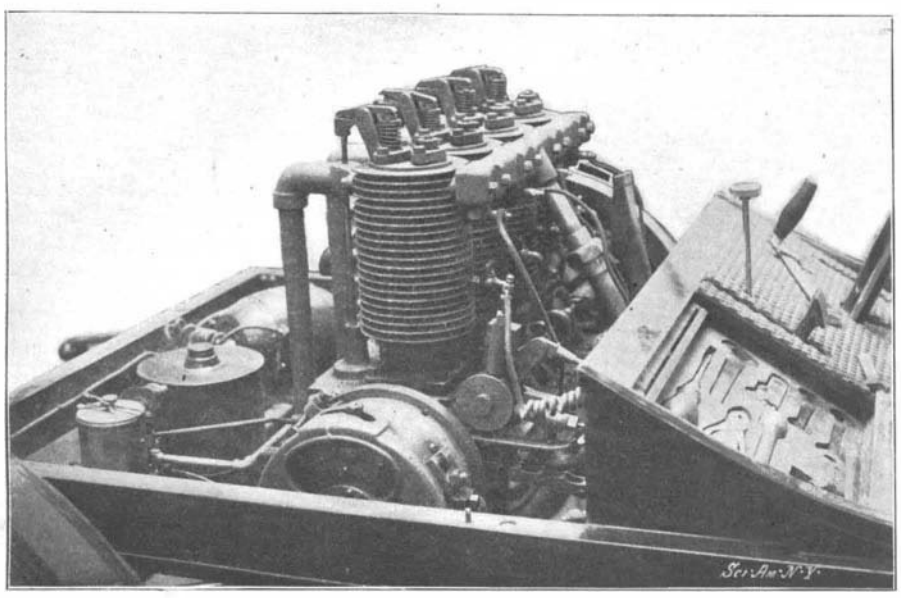
The Enno Sander prize of the Association of Military Surgeons of the United States for 1903 will be awarded to the author of the best essay on "The Differential Diagnosis of Typhoid Fever in its Earliest Stages." The Board of Award will consist of Dr. Austin Flint, of New York; Colonel Calvin DeWitt. of the Army, and Prof. Victor C. Vaughan, of Ann Arbor. Full information concerning the contest may be obtained from Major J. E. Pilcher, of Carlisle, Pa., secretary of the association.



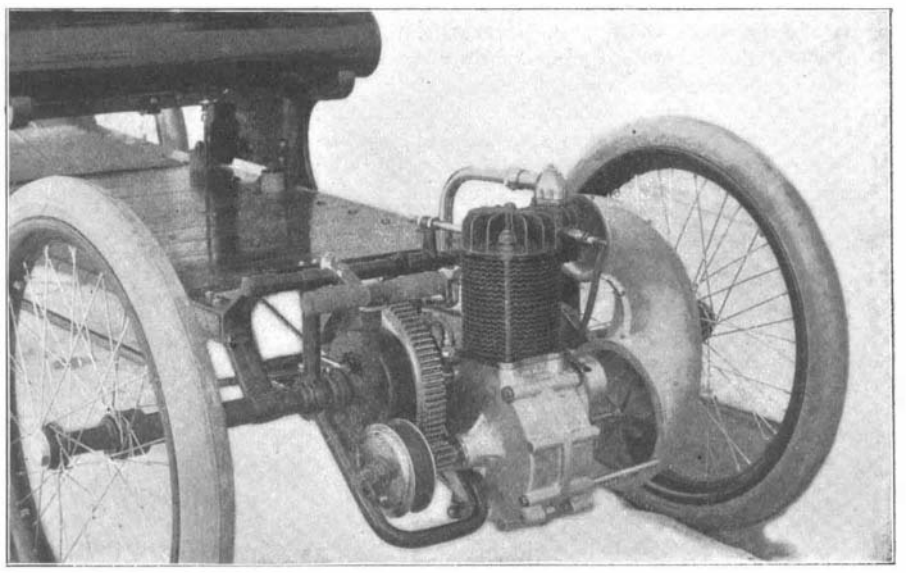
The Franklin Air-Cooled Roadster.



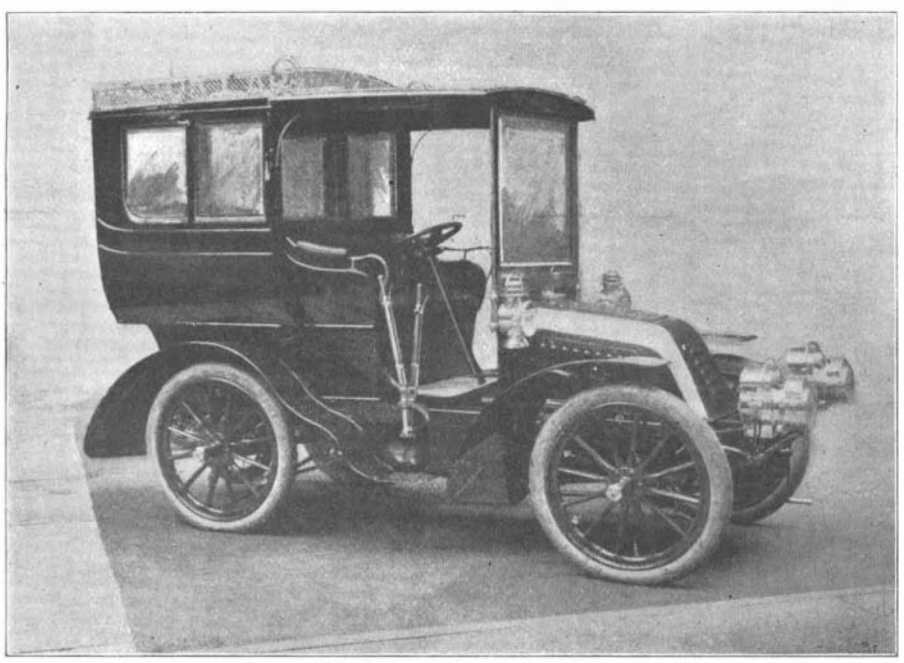
Orient Buckboard Motor Vehicle.



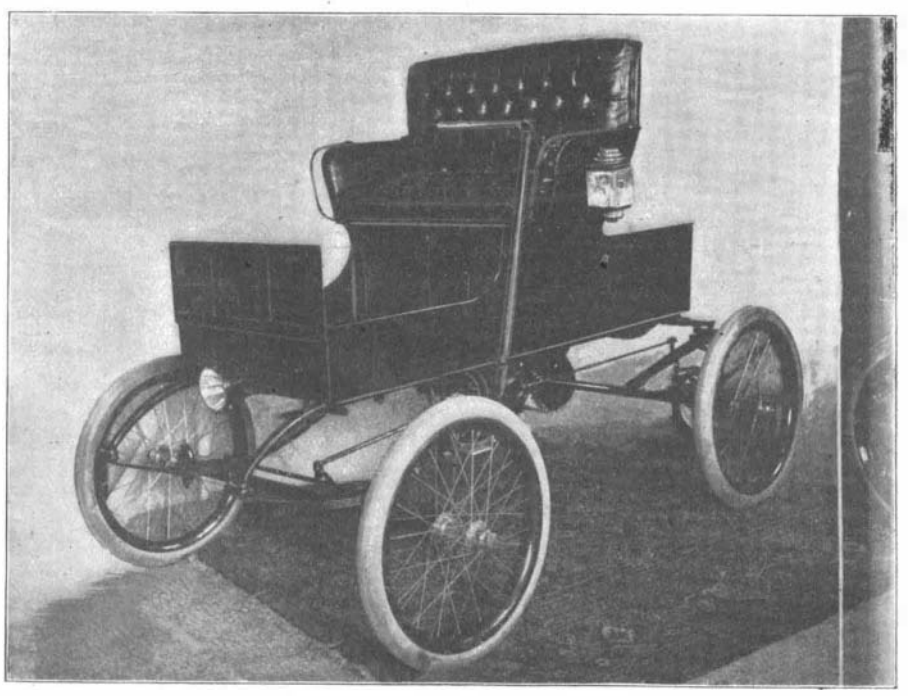
The Franklin Four-Cylinder Motor.



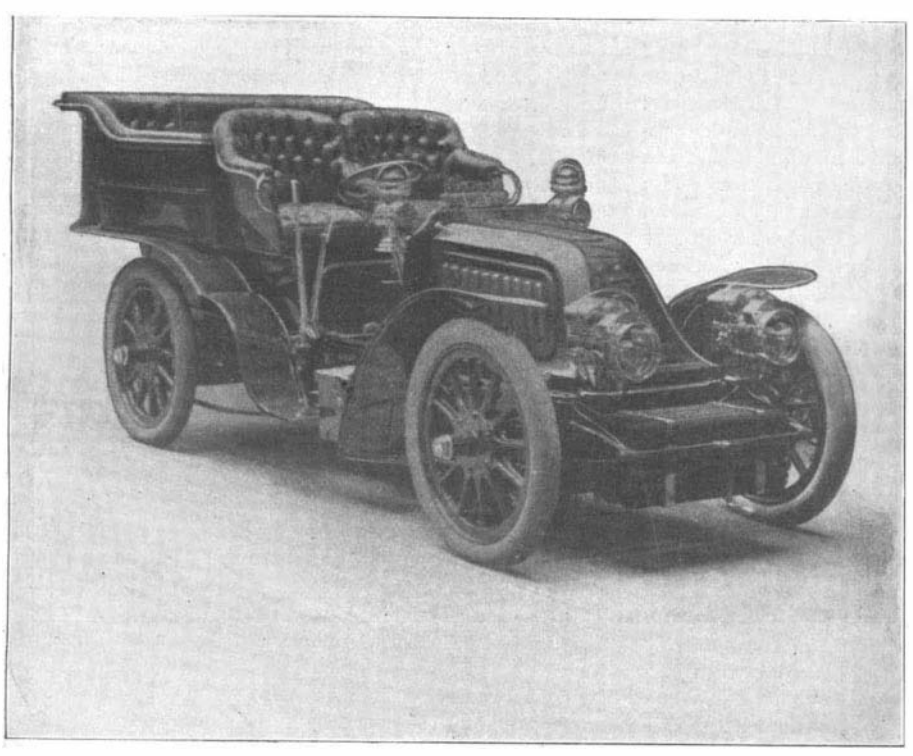
The Buckboard Motor and Fan Cooler.



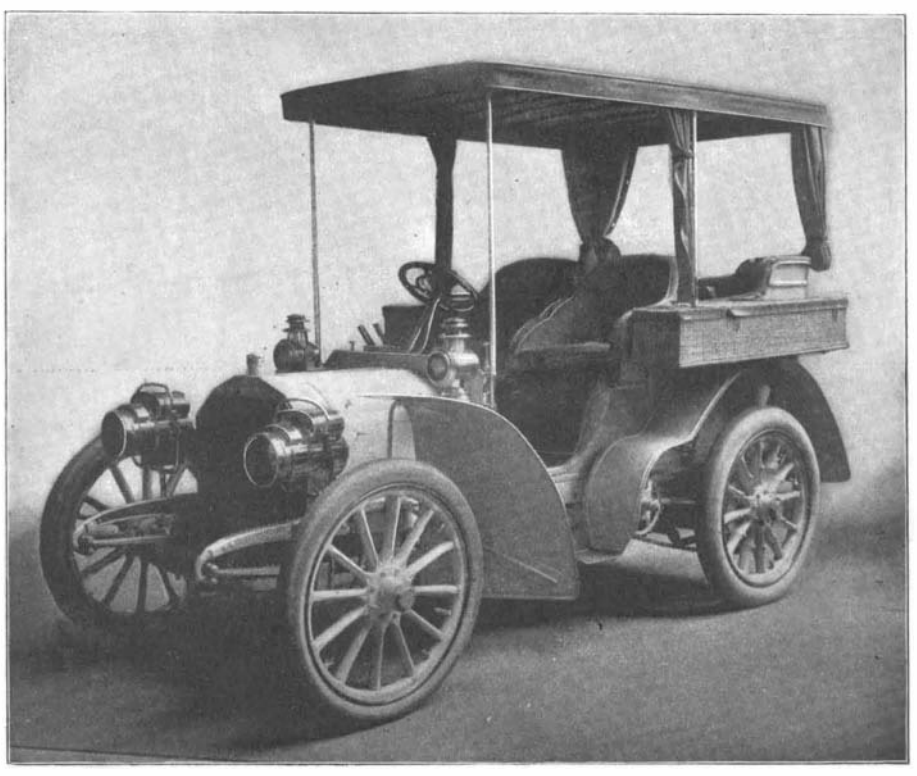
Panhard Family Protected Touring Car



The Centaur Electric Runabout.



The Pan-American 20-H. P. Touring Car.



A Mercedes Touring Car With Surrey Top.

THE THIRD ANNUAL AUTOMOBILE SHOW.—[See next page.]