

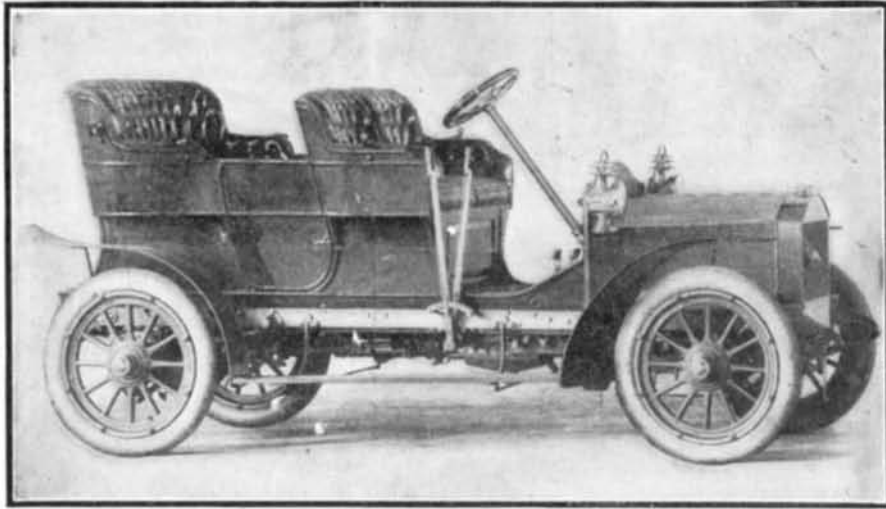
**TYPICAL AMERICAN TOURING CARS FOR 1905.**

The new side-entrance tonneau shown at the top of this page is the latest product of the Autocar Company, of Ardmore, Pa. The new car is comparatively light, its weight being but 1,900 pounds, while the 3½ x 4-inch four-cylinder motor used is capable of developing 16 to 20 horse-power. The Ardmore Company is another of the leading firms to this year bring out a four-cylinder vertical car. The motor cylinders are cast in pairs, with inlet valves on one side of the heads, and the exhaust valves on the other side. All valves are mechanically operated and interchangeable. The bearings of the crankshaft are bolted to the upper half of the crank case, so that the lower half can be removed without interfering with the bearings. Splash and continuous force-feed lubrication, by means of a gear-driven oil

pump, is used for motor and transmission. The transmission is of the sliding-gear type, giving three speeds ahead and a reverse, with direct drive on the high speed. The shafts of the transmission run on large Hyatt roller bearings. A bevel-gear drive to the rear axle is employed. The rear axle and front wheels are also mounted on Hyatt roller bearings. The driving shaft within the rear axle is squared into the hubs of the wheels, thus avoiding the use of keys at that point. A bevel differential is used, and the large top cover of the differential can be removed, so that the gears may be inspected or adjusted at this point. The car is fitted with a band hub brake on each rear wheel and a band brake on the transmission. A pedal controls the former, while the latter is operated by a side lever, which is used as an emergency brake. If this brake is applied, the clutch is thrown out at the

same time. The clutch is of the expanding ring type within the fly-wheel. It is ordinarily operated by a pedal, and this pedal may be set to hold the clutch out, if desired. The steering apparatus consists of a bevel gear and segment, and a novel feature of this car is two grips, one on either side of the steering wheel, by twisting which the spark and throttle are operated. The contact box is brought up back of the dashboard and directly in front of the driver, so that should the occasion require it, this box can be got at as easily as can the vibrators on the spark coil, which is also mounted on the dash. As will be seen from the plan of the chassis, this car is simple in construction and a typical example of the four-cylinder vertical motor as applied with a three-speed transmission and bevel-gear drive.

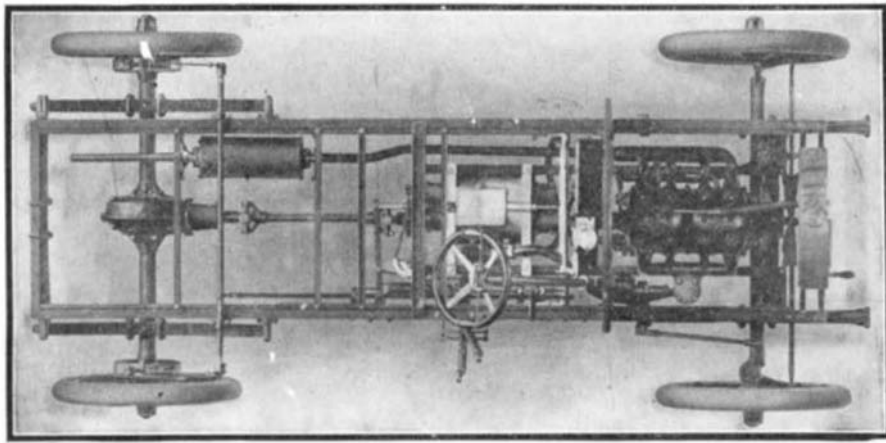
The 1905 Thomas touring car is built on the same



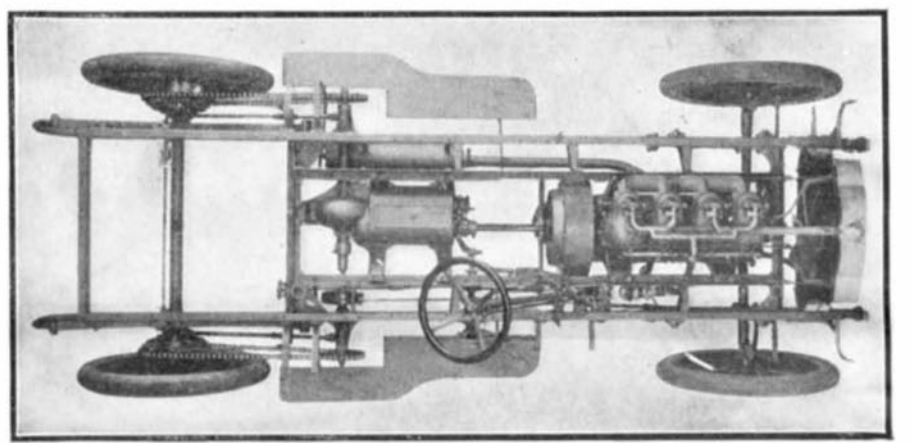
New 20-Horse-Power Autocar Tonneau Fitted with 4-Cylinder Vertical Engine and Bevel Gear Drive.



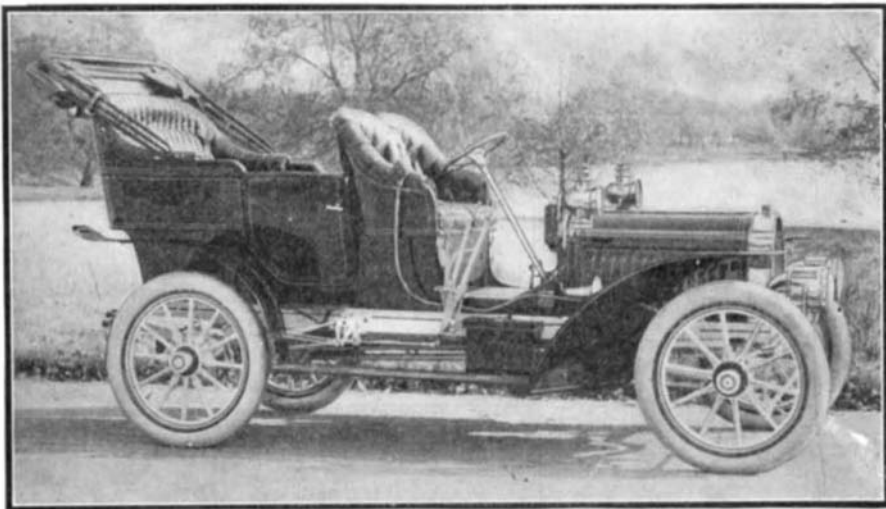
Thomas 4-Cylinder 40-Horse-Power Side Entrance Tonneau Fitted with Chain Drive.



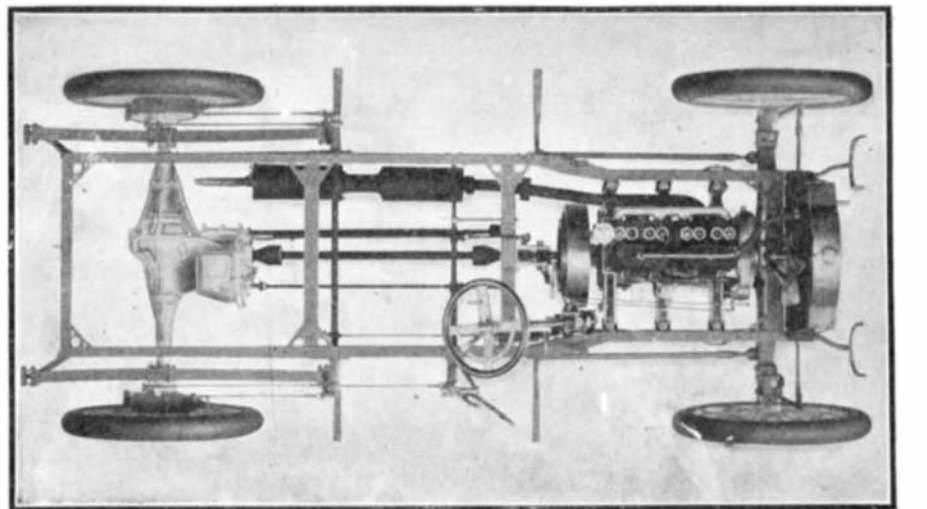
Chassis of Autocar, Showing Bevel Gear Drive.



Chassis of Thomas Car, Showing Chain Drive from Countershaft.



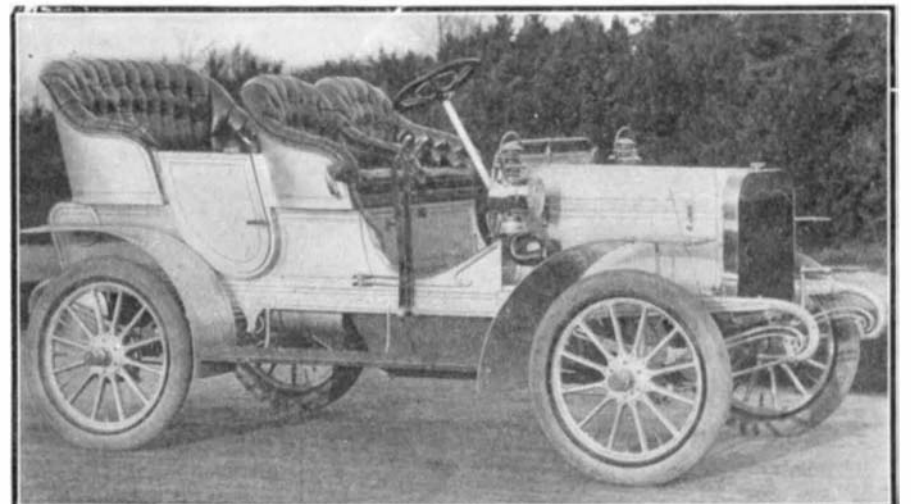
The Packard 28-Horse-Power Side Entrance Tonneau.



Chassis of Packard Car, Showing Transmission at the Rear Axle.



The Stevens-Duryea 20-Horse-Power Side Entrance Tonneau Fitted with 4-Cylinder Vertical Engine.



The Winton 24-Horse-Power Side Entrance Tonneau with 4-Cylinder Vertical Engine.

general lines of construction as the last year's car, which was described in our previous Automobile Number. The Thomas company has abandoned the three-cylinder motor for one of the four-cylinder type, developing 40 or 50 horse-power, and it also makes a six-cylinder, 60-horse-power racer and touring car. Mr. E. R. Thomas has given great attention this year to perfecting the body of his automobile, and the new body, while having very graceful lines, has also an abundance of space for storing articles needed in touring. In a locker located in the tonneau behind the forward seats, there is sufficient room to place two suit cases, or this space can be filled with drawers, shelves, or small lockers. There are 4,388 cubic inches of locker space in this one compartment, while by lifting the two cushions of the tonneau seat a space 36 inches long by 10 inches wide by 12 inches deep, or a total of 4,752 cubic inches, is exposed. Under the tonneau floor is a space 33½ inches long by 31½ inches wide by 3½ inches deep, or 3,693 cubic inches. This space is capable of accommodating a 32 x 4-inch tire, extra inner tubes, repair kit, and tools. Beneath this tire box is another compartment 21½ x 12½ x 4¾ inches (2,205 cubic inches), which has sufficient room to carry a long pump, oiler, large tools, waste, etc. These two lockers are opened by a door at the back of the machine.

There are also two small lockers, one on either side of the dash, besides pockets 14 inches long by 2 deep in the upholstered sides of the tonneau doors. It will thus be seen that every provision has been made for the accommodation of the tourist. The total storage space provided is 15,858 cubic inches, or more than 9 cubic feet, and this space is all obtained without in any way encroaching upon that necessary for the comfort of the passenger. The dashboard is made of rolled steel and is curved over sufficiently to protect the spark coil and to allow a space for the two small lockers mentioned above. A single coil with vibrator is used for all four cylinders, and the commutator is arranged beside the coil. The five sight-feed oilers are mounted on the dash on the other side of the coil, and the dash is provided with a brass pan at its bottom to catch any oil drippings. The motors are built with automatic inlet valves. The transmission used on the Thomas cars gives three speeds with direct drive on the high speed and with the gears on the lay shaft remaining idle. It is impossible to shift the gears before first throwing out the clutch by means of the pedal, and should the pedal be released while changing gears, the clutch cannot engage until the gears are entirely in mesh. The transmission gears and inside bearings all run in an oil bath, and the outside bearings are lubricated with chain oilers. Another good feature of the

Thomas car is the safety ratchet device in the rear wheels, which makes it impossible for a car to descend a hill backward should the chain break. Either the 40 or 50 horse-power car will, it is claimed, develop a speed of 60 miles an hour, and yet they may be throttled to about four miles an hour on the high-speed gear. A foot throttle is used, and this can be instantly set or released by the foot. It is automatically closed when either brake is applied, thus preventing the motor from racing. The spark advance lever is directly under the steering wheel. One of these cars

with a governor, which automatically controls the speed at whatever point the throttle is set for. A range of from 6 to 50 miles per hour is obtainable on the high speed. By means of the accelerator pedal, the power may instantly be increased to any desired extent. The main clutch is an expanding band working in an auxiliary drum within the flywheel of the motor. This clutch is readily adjustable for wear, and also has a certain amount of self-adjustment. The main feature of the Packard car is the live rear axle, which has combined with it a transmission gear of the sliding type, giving three speeds ahead and one reverse. The rear axle, as well as the transmission gear, is fitted with ball bearings throughout. The balls are of large size, and sufficiently numerous to bear any strains that are liable to be put upon them. A long driving shaft with universal joints extends from the motor back to the transmission on the rear axle. The frame is of cold-rolled steel, pressed so as to form a girder truss, the corner supports and cross members being riveted through steel gusset plates. The standard Packard suspension, consisting of semi-elliptical springs in the rear and a transverse spring at the front end for supporting the frame in the center, is used. The brakes are of the duplex double-acting type, and are both on the rear wheels.

The regular foot brake consists of bands on the outside of the brake drums attached to the rear wheels, and an emergency brake consists of expanding rings on the inner surface of these same drums. The regular foot brake is not interlocking with the clutch, but on applying the emergency brake, the clutch is automatically released. The placing of the brakes on the rear wheels takes all strain off the transmission and rear axles. The wheel base and tread of the new machine are 106 and 56½ inches respectively. Aluminium is used in the paneling of the body and for the mud guards and bonnet. The car is extremely roomy, and is finished off in dark blue, which is very effective.

The J. Stevens Arms and Tool Company have this year brought out a new model in their four-cylinder touring car, having a vertical motor in front, connected to the usual sliding gear, and with transmission by bevel gear at the rear axle. The car, as shown in our illustration, is a roomy side-entrance tonneau, capable of seating five persons comfortably. It has a wheel base of 90 inches, the standard track of 56 inches, and is mounted on 30-inch wood artillery wheels. The weight of the car complete is but 1,650 pounds, while the motor is a 20-horse-power one, having individual, integrally-cast cylinders. The exhaust and inlet valves are in a common chamber on one side of each cylinder, and are both mechanically op-

(Continued on page 85.)

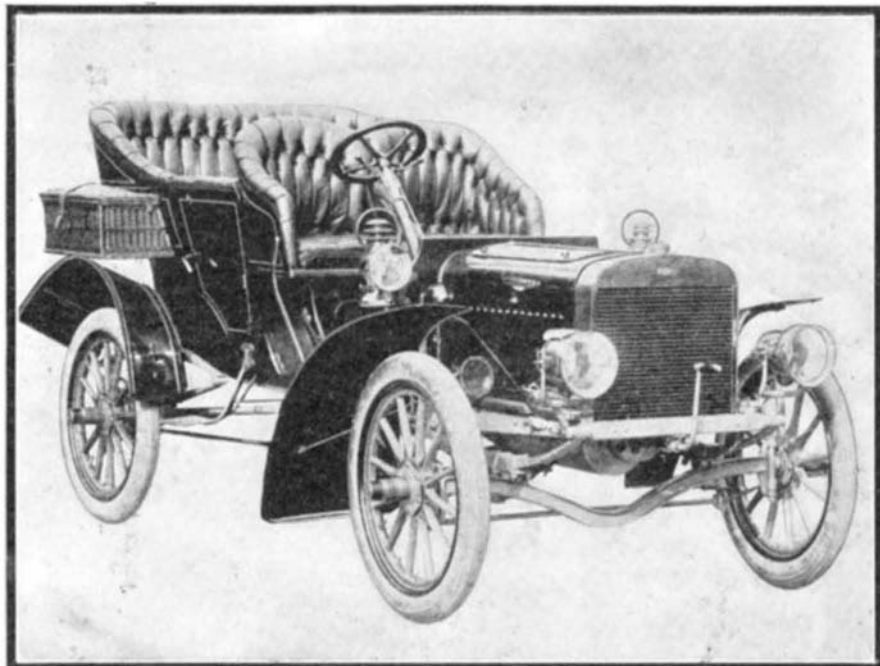


The Peerless 60-Horse-Power Side Entrance Tonneau Fitted with Bevel Gear Drive.

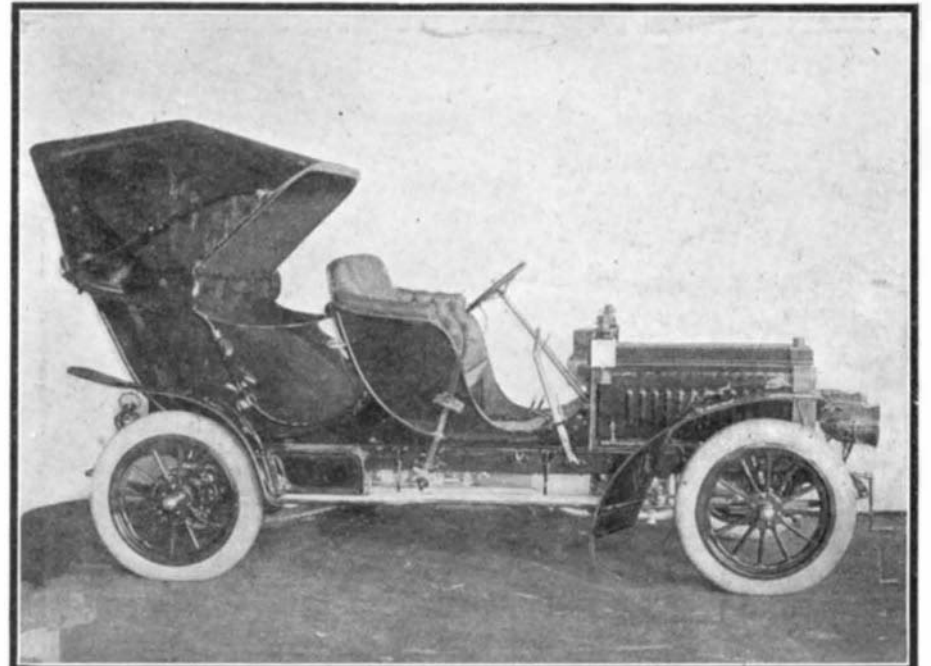
received a road test of 5,000 miles during the past fall and early winter.

The illustrations show the chassis and complete car manufactured by the Packard Motor Car Company, of Detroit, Mich. The machine differs from that built last year principally in the dimensions of the cylinders of the motor, which are now 4 1-16 x 5 1/2 bore and stroke, and in the proportioning of the essential parts to stand the additional power.

An inspection of the Packard factory will convince anyone that this car is one of the finest and most thoroughly well-built American machines; great care is used throughout its manufacture, and every part is finished in the most thorough manner. The new side-entrance tonneau weighs 2,200 pounds, and has an engine with separate integrally-cast cylinders capable of developing 28 horse-power, and fitted with mechanical valves and gear-driven oil pump. But one sight-feed is used, and this is sufficient to supply oil to the crank case and keep the oil level at the proper height, so that all the working parts are well lubricated by splash. The contact box is arranged on top of a vertical shaft projecting up from the crank case in front of the dashboard and driven by helical gears. An automatic carbureter supplies a practically uniform mixture at all speeds of the motor. The radiator is of the finned tubular framed-in type, the water being circulated by a positively-driven gear pump. The motor is provided



24-Horse-Power Ford Tonneau Having Copper Water Jackets, Bevel Gear Drive and Two-Speed Planetary Transmission.



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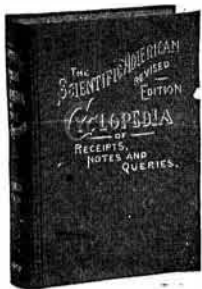
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### TYPICAL AMERICAN TOURING CARS FOR 1905.

(Continued from page 59.)

erated from a single cam shaft. These valves are interchangeable. The clutch used on this car is of the multiple-disk type. Another of its features is that the engine and transmission are supported upon three points on the main frame, thus making it impossible for them to get out of alignment. This company will continue to make the double opposed-cylinder runabout with individual clutches which has been so successful, and which was described in our Automobile Number last year. In bringing out a touring car, however, the vertical type of motor was adopted as being more in line with current practice.

The Winton Company has abandoned altogether the horizontal motor, and has this year brought out a new four-cylinder touring car having a number of novel features. The car is laid out on the general lines of most four-cylinder cars, having a vertical water-cooled motor with the cylinders cast in pairs. The cylinders are mounted on an aluminium crank case which is split vertically, so that one side may be detached for inspection and adjustment of the crank boxes. This makes it possible to get at the crankshaft on the side of the car without lying underneath it. A permanent dust pan is attached to the chassis below the motor, which is fitted with adjustable bushings throughout. The inlet chambers are cast in pairs, and bolted to the cylinders with copper-asbestos gaskets. The inlet valve caps may be readily unscrewed by hand. The cap is shown removed in one view of the motor on page 57, which shows in section the end cylinder. The carbureter, C, has a water jacket for keeping it at a uniform temperature. A hand screw, W, extending through the dash makes it possible to shut off the gasoline instantly at the carbureter. Jump spark ignition with gear-driven magneto, M, and a single non-vibrating coil, which returns the secondary current to a distributor, D, on the magneto for distribution to the various spark plugs, S, is employed. The contact maker for the primary current is also attached to the magneto. The spark may be varied by a lever attached to the steering column above the steering wheel. The usual Winton individual clutch system, giving two speeds and a reverse with a direct drive on the high gear, is used. The motor and rear axle bearings are all oiled from a common lubricating device, O, mounted beside the motor. The oil is picked up by a revolving cylinder, from which it is scraped by a plate beside the cylinder into the various oil tubes that carry it to the bearings. In order to guard against the oil becoming too thick, an auxiliary scraper set at a certain distance from the roller keeps the film at a certain thickness and causes a certain quantity only to flow to the regular scraper, which feeds the ten tubes. The oil is fed in exact proportion to the motor speed. The circulating water is cooled by being pumped through 89 vertical copper tubes 17 inches long and covered with 13-16 inch square radiating fins 3-16 of an inch apart. Both the centrifugal pump, P, and the fan behind the radiator are gear-driven. The motor is controlled by throttling the quantity of the mixture. The well-known Winton air governor, acting directly upon plungers, p, on the inlet valves, and thus keeping them from opening, is used. The air pressure for this purpose is produced by a gear-driven air pump, A, on the front of the engine. The piston of this pump, as well as those of the power cylinders, has a convex head. A diaphragm, H, is interposed between the pump and the air pipe, a. The priming valve for the carbureter is at V. The Winton car has a propeller shaft and live rear axle with bevel gear drive. The transmission gear employed makes it possible to control all the speeds with one pedal and two levers. The 16 to 20-horse-power car weighs 1,800 pounds,



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and is fitted with a four-cylinder vertical motor of 3 1/2 inches bore and 5 inches stroke.

The large Peerless side-entrance tonneau here shown has a 5 3/4 x 5 3/4, four-cylinder gasoline motor, which is a duplicate of that on the "Green Dragon" racer which, driven by Barney Oldfield, captured about all the track records last year. This motor is said to develop 60 horse-power. Its main features are an auxiliary exhaust port uncovered by the piston at the end of its working down stroke, the location of the valves in the cylinder head, and both make-and-break and jump spark igniters. A gear-driven magneto furnishes current for the former ignition system, and accumulators and coils for the latter. The transmission of the sliding gear type gives four speeds ahead and reverse. The car has a bevel gear drive. The rear wheels run on ball bearings on the rear axle tube, the divided driving axle within this tube connecting with the outer ends of wheel hubs through jaw clutches. The Peerless Company was the first to use this construction, which has the advantage of relieving the inner axle of all but the driving strains. Other features of the 1905 Peerless car are a special automatic carbureter, pedals having long levers and which push forward instead of down, throttle and spark control in the steering wheel, and both expanding and contracting brakes on the rear wheels, which are 36 inches in diameter, and which in connection with the 107-inch wheel base, make an extremely easy-riding car.

The Ford Motor Company, of Detroit, has this year added to its two-cylinder-opposed-type car the new four-cylinder tonneau shown herewith. This car weighs 1,700 pounds, and is fitted with a 20-horse-power 4 1/4 x 5-inch engine having copper water jackets, mechanically-operated inlet valves, a force-feed oiler worked by the pressure of the exhaust and feeding oil positively to all four cylinders, and a gear driven circulating pump. The commutator is on top of a vertical shaft driven by spiral gears, and it can readily be got at through a hole in the dash. A planetary transmission giving two speeds and reverse is arranged back of the motor in an open aluminium frame, and is connected through a universal joint with an inclosed propeller shaft running to the rear axle. This is of the live divided type, driven by hardened steel bevel gears and mounted on ball bearings. It is braced by two rods running from the spring perch blocks to the front end of the propeller shaft housing and forming, with the axle, a triangular frame. These two rods take the driving strains off the springs and transmit them to the frame through a large globe universal joint, which supports the front end of the propeller shaft. Expanding ring brakes in the rear-wheel hub drums are operated by a pedal. Another pedal works the reverse, which is also used as a brake if necessary. The low and high speeds are obtained by pulling back or pushing forward the long lever at the side. The throttle and spark are controlled by small handles on the steering column. The Ford is one of the few cars to combine a bevel-gear drive with the well-known American planetary gear, which is simpler to operate, and, it is claimed, is quite as efficient as the usual sliding gear. The motor is sufficiently powerful to drive the car over all ordinary roads on the high gear, upon which the drive is direct, efficient, and economical. A speed of 40 miles an hour is obtainable with it on good roads.

The new 35 to 40-horse-power Columbia machine, fitted with a Royal Victoria tonneau body, having a leather hood over the rear seat, was one of the distinctly new models exhibited at the Automobile Show. Besides the graceful lines in the body, this car has also several improvements in the mechanism proper, one of the most important of which is a new carbureter of the aspirating type, which automatically maintains a correct explos-



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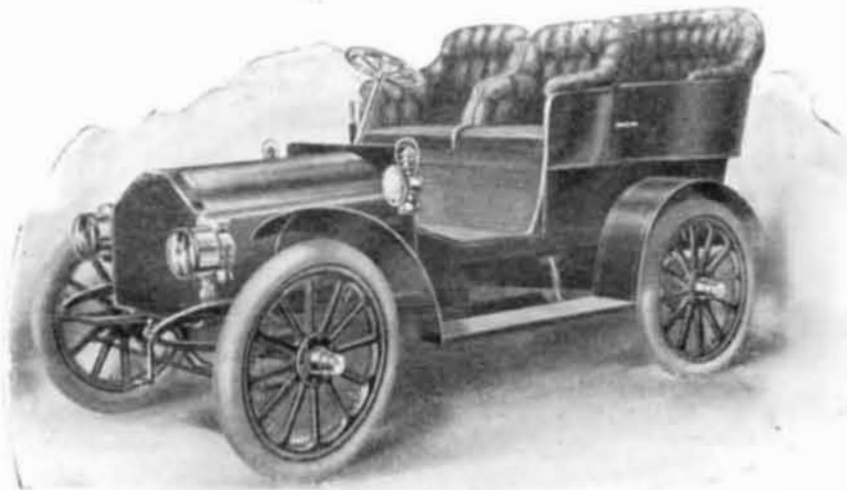
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WALTHAM, MASS.

ive mixture under all conditions of engine speed and throttle opening without the loss of any power from the operation of a suction-operated auxiliary air valve. The car also contains a new system of spark and throttle control, by means of two levers mounted on a stationary plate within the steering wheel, so that they do not move with the steering wheel, and consequently can be adjusted to a nicety. These levers are connected to the engine through positive ball joints, in which there is no back lash or loss of motion. The pedals that operate the clutch and foot brake are much longer than formerly, and the hand brake and speed-changing levers are held by a new ratchet arrangement. The car is mounted on a pressed-steel frame 5 inches deep, which entirely does away with any warping, and makes the frame particularly strong to carry the new type of side-entrance tonneau body, the footboard and dash of which are permanently attached to the frame. The engine is a four-cylinder vertical one, having a bore and stroke of 5 inches and a normal speed of 800 to 900 R. P. M. The valves are all on the same side of the engine, and mechanically operated. Lubrication of the engine is obtained by means of a mechanical oiler. Jump-spark ignition with two sets of storage batteries is employed. The Whitlock cellular radiator used contains 7 gallons of water, and is backed by a high-speed fan, which aids in the cooling. The car has a four-speed transmission having a direct drive on the high gear. The drive is by countershaft and chains to the rear wheels. Both the foot and hand brake are interlocking with the clutch, which is conical and leather-faced, with provision for greatly reducing the driving effort of the engine before the clutch is released. The car is fitted with irreversible wheel steering, by means of a worm and sector, and having spring-cushion connections to prevent shocks. It is said to be capable of a range of speed of from 8 to 60 miles an hour on the high gear. A wheel base of 108 or 112 inches is used, according to the choice of the purchaser. The Electric Vehicle Company has also continued the manufacture of its double opposed-cylinder 12 to 14-horse-power tonneau, which we illustrated last year, and which won two gold medals in the Mount Washington hill-climbing contest. A new 18-horse-power car of this type, having two 4 1/2 x 5 cylinders and three speeds controlled by a single lever, has also been brought out. This car has a ball governor acting directly on the throttle valve in the carbureter, besides jump-spark ignition by means of current obtained from twenty-five dry cells, arranged in five groups of five cells each, so that they will have an exceedingly long life. The clutch used is formed of expanding bronze shoes, working inside a steel drum. It is run in oil in a compartment at the forward end of the gear box. A bevel-gear drive is used on both of these cars. Besides the gasoline vehicles mentioned, this company also makes its usual line of electric machines.

The Locomobile Company of America has this year brought out four different powered cars, all of which are fitted with a side-entrance tonneau body. These cars are driven by four-cylinder engines, employing make-and-break ignition with current from a magneto. A three-speed transmission is used in all but the 40 to 45-horse-power car, which is fitted with a four-speed sliding gear transmission, has a wheel base of 110 inches, and weighs complete 2,800 pounds. The 15 to 20-horse-power car has a 92-inch wheel base and weighs 2,300 pounds; the 25-horse-power car has a 96-inch wheel base and weighs 2,300 pounds; and the 30 to 35-horse-power car has a 106-inch wheel base and weighs 2,500 pounds. Mechanically operated inlet valves are used on all but the second sized car, which also differs from the others in that it is fitted with jump-spark ignition. This car is practically the same as that turned out by the company last year. The new



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cars do not differ materially from the model of last year, a chain drive from the countershaft to the rear wheels being used on all of them. A new automatic carbureter is one of the improvements. Simplicity is the keynote of the construction of the Locomobile gasoline machines. This is seen in the fact that plain bearings are used throughout.

The Haynes automobiles exhibited at the recent show are fitted with several novel features. Besides a large 35 to 40-h. p. 4-cylinder touring car, having the usual Haynes individual clutch transmission combined with a new form of bevel gear drive, the usual two-passenger runabout, with an opposed-cylinder motor under the seat, and a new light tonneau with an opposed-cylinder motor placed transversely in front under the bonnet were exhibited. This latter car, which is of 16 to 18 horse power, has all the features of the larger car just mentioned. These consist of a form of roller bevel pinion which operates on a suitably-toothed sprocket arranged on the differential; a vertical stay-bar attached to the differential casing and sliding in a socket on a cross member of the frame, the purpose being to take the thrust from the bevel gear drive off the springs; and a four-pronged slip joint which operates in connection with the rear universal joint near the axle, and allows for the longitudinal motion of the propeller shaft arising from the up-and-down motion of the car body on the springs. Mr. Haynes is one of the oldest automobile builders in America, and in all probability the new features of the Haynes car will be found to give great satisfaction to all users of the same.

The George N. Pierce Company, of Buffalo, N. Y., is one of the leading firms to manufacture a light two-passenger car as well as a large four-cylinder touring car known as the Pierce "Arrow." The small car is fitted with a 6-horse-power, single-cylinder motor of the de Dion type, mounted, together with the transmission, directly on the rear axle. This arrangement removes all vibration of the motor from the body, while at the same time giving a direct drive through spur gears. This light car can be fitted with a stan-hope or canopy top with glass front, thus making it usable in all weathers. The Pierce "Arrow" is a large yet light touring car having all modern improvements.

The Elmore Manufacturing Company, of Clyde, Ohio, exhibited the only two-cycle touring car noted at the show. This machine is one of the simplest built, being fitted with a double-cylinder, horizontal motor placed under the seat and driving the rear axle through a chain and planetary gear transmission. It was a car of this type which made two round trips to St. Louis—a distance of 6,000 miles—last summer without the replacement of a single part. One also recently climbed Eagle Rock Hill on the high speed in 2 minutes, 41 seconds—remarkably good time for this 12 per cent mile-long grade.

Another firm that has added to its standard double opposed-cylinder line of touring cars a new model of the four-cylinder vertical type is the Wayne Automobile Company, of Detroit. The new car is a light, high-powered one, having a pressed-steel frame, cellular radiator, and all the usual features of the best cars of this type. The double opposed-cylinder cars are also well-built, powerful machines, capable of giving entire satisfaction under all ordinary conditions of use.

The Waltham Manufacturing Company, makers of the well-known Orient buckboard, have this year brought out four-cylinder 16 and 20 horse-power touring cars of the air-cooled type, in addition to their regular line of runabouts and light cars. The motor of the new car has square flanges cast on the cylinders for radiating the heat. A fan mounted in front maintains the air circulation. The car is one of the neatest of this type that was seen on exhibition. The motor has mechanically-operated inlet valves and a

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Weight 1,250 pounds; 12 horse-power; four cylinder air-cooled motor.  
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The Franklin 12 horse-power Light Tonneau goes faster and better and smoother—on all roads—than most cars of 18 and 20 horse-power. It costs less to buy and less to maintain.

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three-speed sliding-gear transmission is used.

Two launch-building firms that have taken up the manufacture of automobiles are the Lozier Motor Company, of Plattsburg, N. Y., and the Gas Engine and Power Company, of this city. Both are manufacturing high-grade four-cylinder touring cars of 30 to 35 and 24 horse-power respectively. These cars have all the latest improvements, such as automatic carbureters, mechanically-operated inlet valves, bevel gear drive, etc. The material and workmanship on both leave nothing to be desired.

One of the automobile firms that has profited by road experience with its cars during the past year is the Royal Motor Car Company, of Cleveland, Ohio. The new 30 to 38-horse-power car exhibited by this firm at the show was second to none in general appearance and details of construction. The motor, a 5 x 5 1/2-inch four-cylinder, vertical engine having mechanically operated interchangeable inlet and exhaust valves, is mounted under a bonnet in front in the usual manner. The commutator is located on top of the motor, and is driven by a vertical shaft. The carbureter has an automatic auxiliary air inlet and an intake drawing warm air from a jacket around the exhaust pipe. Positive force feed lubrication is used, and the water is circulated by a gear-driven pump through a radiator of novel construction. The fan is driven by a flat belt having an adjustable pulley. Both the engine and the three-speed transmission are fitted with plain bearings having ring oilers connected with the lubricator. The propeller shaft is of large size and has protected universal joints. The driving gear and pinion are mounted on roller bearings with end-thrust ball bearings. The clutch is of the leather-faced cone type and is connected to the transmission through a universal joint. The brakes are of the expanding ring type both on the driving shaft and the rear wheels. The side-entrance tonneau seats five persons. It has a wheel base of 108 inches, standard tread, and is mounted on 34-inch wheels. The total weight of the car is 2,500 pounds.

The Pope Manufacturing Company, besides its large and powerful Pope-Toledo automobiles, one of which, finished in white, and fitted with a top over the rear seat, attracted much favorable comment at the show, still manufactures its single-cylinder Pope-Hartford model, and has also brought out a new Pope-Hartford machine having a double opposed-cylinder engine, placed transversely in front, and connected to the rear axle through an individual clutch transmission, and a bevel gear drive. This company also manufactures a light two-passenger touring car known as the Pope-Tribune, which has a two-speed and reverse sliding gear transmission and bevel gear drive. One of the 90-horse-power Pope-Toledo racers has been entered in the Gordon-Bennett race for this year. One of the main features of the Pope-Toledo car is a copper water jacket, which has been used successfully for several seasons. The transmission of this car, which was illustrated in our Automobile Number last year, has been somewhat modified and improved in the present model. In most respects, however, the 1905 car is quite similar to that built last year.

The Cadillac Automobile Company, of Detroit, Mich., is still another firm to adopt a four-cylinder, vertical motor as the propulsive mechanism of its 1905 touring car. This motor also is fitted with copper water jackets, clamped between a ring on the base of the motor and the cast head. The mechanically operated inlet and exhaust valves are arranged in chambers on one side of the cylinder heads, and the motor is fitted with a governor of a new type consisting of an oil pump which operates a piston connected with the cam shaft of the motor. The volume of oil delivered by the pump



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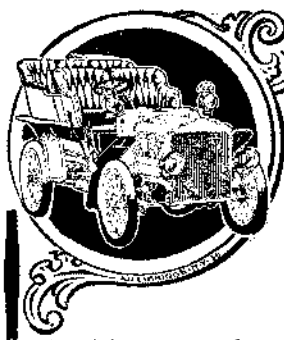
varies with the motor speed. When a sufficient pressure is obtained upon the piston connected with the cam shaft, to move it against the action of a coil spring, it slides the cam shaft lengthways in its bearings and displaces the cams that raise the inlet valves, and which are tapered so as to vary the lift. The consequence is that the valves do not open to their full extent and the motor is throttled. A planetary gear transmission is mounted directly behind the motor and drives the rear axle through a propeller shaft and bevel gears. This transmission is novel in that it gives three speeds forward and one reverse, with a direct drive on the high speed—a very unusual feature for a transmission of this type. The upper half of the differential casing is readily removable, in order to inspect and adjust the differential. Internal expanding ring brakes are used on the rear wheels, which run on ball bearings on the outer axle sleeve, and are driven by a squared-end internal driving shaft. Among the other features of the car are a novel form of flywheel and clutch-releasing mechanism, a new carbureter having no float and which is not affected by tipping in any direction, and a new muffler, designed so as to prevent back pressure.

Among the novelties on exhibition at the show this year was a gasoline lawn-mower—the first of its kind to be built in this country. This mower is manufactured by the Coldwell Lawn Mower Company, of Newburg, N. Y. It is propelled by a two-cycle motor of 4 or 8 horse-power, according to the size of the mower. It will take 10 per cent grades as a maximum, while the steam lawn-mower made by this concern is capable of climbing a 20 per cent grade. The gasoline lawn-mower has but one speed, which is obtained by a friction clutch. A honeycomb radiator mounted in front has a fan behind it which is driven by friction wheels. This fan blows air forward through the radiator, which is necessary to keep the cut grass from flying up in it. The lawn-mower is well built and is sold at a reasonable figure.

Two other novelties seen at the show were speedometers for automobiles which were worked on much the same principle, viz., by means of a gear air pump driven from the wheel and blowing air through a closed circuit of rubber tubing to some sort of an indicating device mounted on the dashboard. One of these, the Webb speedometer, was illustrated in the SCIENTIFIC AMERICAN of Nov. 5. The other one, made by the Wood Speedometer Company, of Boston, indicates the speed upon a gage similar to a steam gage. This company has applied its instrument not only to automobiles, but also to steamboats for indicating the revolutions of the propeller, as well as to the new electric locomotives of the New York Central Railroad, in which the speed is indicated up to a hundred miles an hour. Both instruments are built with great care and are accurate to a remarkable degree.

The improved Morrow coaster brake, manufactured by the Eclipse Machine Company, is adapted for use on motor bicycles, as well as on the foot-propelled machines. This brake consists of an expanding brake sleeve which fits over the central hub carrying the sprocket. The brake sleeve is made the full width of the hub—1 7/8 inches—and it is 1 5/8 inches in diameter. The large friction surface thus secured, as well as the expanding-shoe principle of construction, makes the brake positive and sure to hold under all circumstances. In coasting, all the interior parts of the brake turn around with it, thus going away with any friction from these parts. The whole hub is then practically a unit revolving on ball bearings.

A new washable storage battery jar has a large screw plug with a rubber washer inserted in a hole in the bottom. By removing the plug and squirting water between the plates, the sediment that has collected in the bottom of the jar can be removed without disturbing the plates.



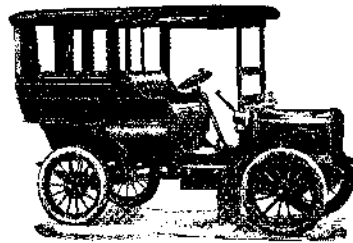
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With Limousine Body

**The Ideal Closed Automobile For Shopping and for Evening Use**

PRICE

**\$3,200**

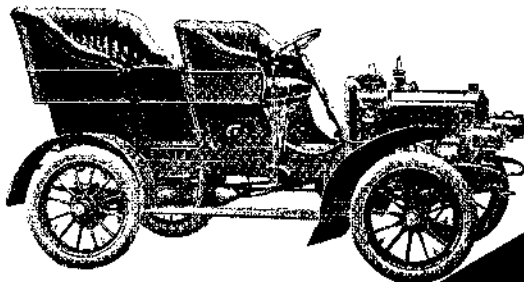


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16 H. P. Touring Car  
**\$1,400**  
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New Price

These two automobiles have jumped at a bound into the popular favor of those for whom they were built. The automobilists and the agents of expense who have long been searching for an absolutely dependable car at a moderate price have found in the Maxwell an automobile that exactly meets their requirements. Not only has it many new points that are self-evident in their practical utility, but its general thoroughness of construction and simplicity of design have won for it a recognition among the "wise ones" never before attained in such a short time.

The Maxwell cars have no pump (thermo-siphon). Their double opposed motor shaft drive is in front under the hood and easily accessible in every part. Bevel Gear Drive, Metal Bodies. Transmission Case and Crank Shaftcast in one piece of Aluminum. "Perfectly simple, simply perfect."

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**MAXWELL BRISCOE MOTOR CO.**

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**A NEW SPRING WHEEL FOR AUTOMOBILES.**

(Continued from page 64.)

There is fitted to either side of the hub of each wheel a six-pointed star-shaped plate. These are connected at each point by a pin. Each pin in turn carries a couple of triangular equalizing pieces between the plates, together with a pair of triangular levers outside. There is a pair of rollers between each equalizing piece, while the rollers on the adjacent triangles are connected by a series of plate springs. The centers of these latter are attached to the star plates by means of bolts, which pass freely through distance pieces between the plates. There are also pin joints connecting each bolt to one pair of corners of the triangular levers, while the other pair of corners are jointed to the center of a pair of segments provided with rollers at the extremities. These rollers bear against the inner side of the rim of the wheel. By this arrangement, when pressure is brought to bear upon any part of the rim of the wheel, such as that on road, the pressure is transmitted from the plate spring immediately opposite the point of application to the whole of the springs around the wheel through the medium of the equalizing pieces. Furthermore, these springs are protected from any oblique strains that may be set up by the agency of the triangular levers.

The inside surface of the rim, on each side of the rollers of the segment pieces, is provided with curved internal projections, so that if there were any motion of the segments, it would cause the latter to approach the center of the wheel. This tendency, however, is resisted by the tension of the plate springs, but yet this will result to a more or less degree, according to the irregularities of the power being transmitted through the wheel, such as arise from the variations in the speed of the motor, or in the resistances afforded by the road. The net result of this principle of design is that a spring drive is obtained, thereby obtaining much smoother running of the engine and the gear.

The foregoing cuts of the apparatus for the driving wheels make it appear rather complicated in construction. Such, however, is not the case, for the device is built up of a series of similar units, each of which, independently, is comparatively simple. It might also be supposed that the wheel is unduly heavy, but such is not the case. By fashioning all parts wherever possible of sheet steel stampings, the minimum of weight consistent with the maximum of strength is obtained. Side thrust or play furthermore is prevented by the series of plates on the obverse side of the wheel. The mechanism is entirely inclosed and protected from the inroads of dust and grit by large disks, which completely inclose the mechanism from the hub or boss to the rim, and also comprise a chamber for the oil to continuously lubricate the various moving parts. The wheel itself is shod with a solid tire of India rubber of shallow sectional thickness and flat on the tread, thereby rendering the wheel less liable to side slip, and lateral movement on greasy roads, than is the case with ordinary pneumatic tires, which, when turning corners at a high speed or upon wet roads, are susceptible to a rolling action and lateral slipping.

From experiments which have been carried out with an automobile fitted with this type of wheel, which is manufactured by the Metropolitan Engineering Association, of London, it has been demonstrated that from the point of resiliency, this mechanical wheel does not differ much from the ordinary pneumatic tire. There is complete absence of noise or rattle, and when run over even the roughest and most uneven roads, it was most comfortable and as resilient almost as the ordinary pneumatic tire. There is no vibration or shock even when traveling over irregularities in the road, as these are absorbed by the springs and levers within the wheel.