HIGH-POWERED AMERICAN TOURING CARS.

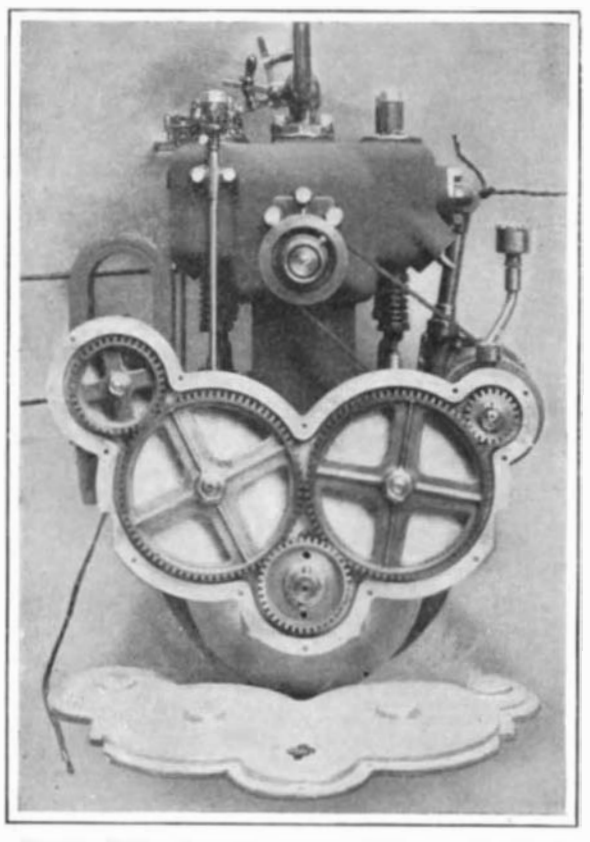
CLEVELAND 30-HORSE-POWER TOURING CAR.

A substantially-built touring car of modern construction is the 30 to 35-horse-power Cleveland shown in the annexed illustrations. This car is thoroughly up to date and, besides the usual three-speed transmission and bevel-gear drive, it has several improvements that are usually found on the best foreign cars. The first of these is the adoption of the low-tension make-and-break system of ignition with a gear-driven Sims-Bosch magneto as the source of current. The operation of the igniters is shown in the smaller cut. By referring to this cut, the reader can see that the chief parts of each igniter mechanism consist of a small cam-shaped projection, *T* (which is part of the movable stem of the igniter) and a long finger, *D*, which is mounted upon an eccentric and is clamped to a vertical rod driven by bevel gears from the camshaft. Another eccentric, *E*, is placed beside the finger, *D*, and the latter is held against *E* by a light spring, *F*. Another light spring, *S*, separates the electrodes after they are pressed together by the finger, *D*, and then suddenly released. A reciprocating motion is given *D* by the eccentric upon which it is mounted, and as it approaches the finger, *T*, it is pushed sideways by the eccentric, *E*, so that after it has moved *T* a certain distance and made the contact within the cylinder, it slips off *T* and allows the latter to spring back, under the influence of the spring, *S*. The result is the circuit is made and quickly broken, which gives a large spark. The insulated post of the igniter is shown just at the left of *F*. This is connected to a common bus-bar by means of switches, seen above the motor in the other view. The system of levers, *H*, *H*, *H*, are connected so as to rock the different eccentrics, *E*, and cause them to throw the rods, *B*, out of contact with the fingers, *T*, earlier or later. The spark is retarded in this way when starting, and afterward it is set about at dead center. As the magneto speeds up, the spark increases in volume and ignites the gas quicker, which has the same effect as an automatic advance.

THE 30-35-HORSE-POWER CLEVELAND 4-CYLINDER TOURING CAR.

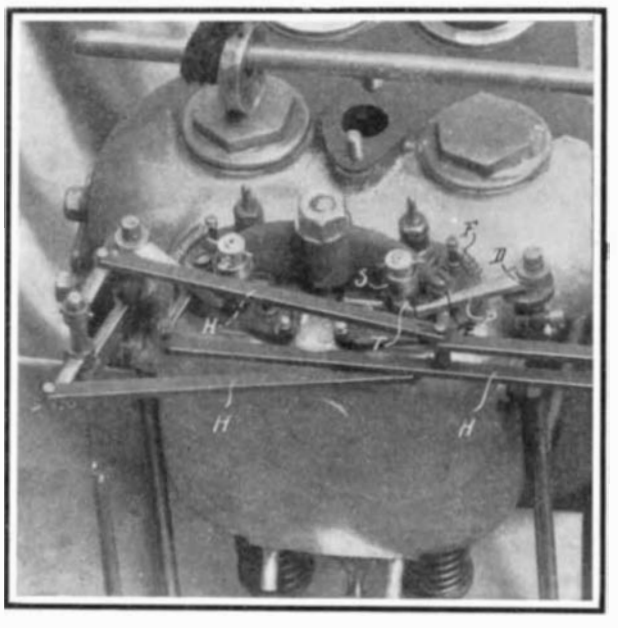
The end view of the motor shows the two half-speed gears in mesh with the smaller gear on the crankshaft. These drive still smaller gears, which rotate the water pump and fan (through a belt) and the magneto, respectively. The illustration shown above on the left is a typical end view of a modern motor having valves placed symmetrically on each side. The present practice is to inclose all the gears and run them in an oil bath, which gives them a long life and does not produce much noise. The motor is built strongly and of the best material. It is lubricated by a force-feed oiler, which supplies oil to all of the bearings. The crank-pin bearings are fitted with patent ring oilers, with which the oil is thrown by centrifugal force into the hollow crank-pin. The cylinders are 4⅛-inch bore by 5¼-inch stroke. The transmission gives three speeds forward and a reverse, with a direct drive on the high speed. It is connected with the rear axle through the usual propeller shaft having two universal joints, the rearmost of which is provided with a slip joint, to compensate for the vertical movement of the car upon its springs. The rear axle is of the usual tubular type, with which the wheels are carried upon ball bearings. The differential gear within this axle, and the live axles which drive the wheels, all run on ball bearings. Internal expanding brakes are placed in the rear wheels. The muffler of this car is much like that of the Richard-Brazier. It is composed of concentric tubes having perforations of sufficient area to allow the gas to expand from one chamber to the other without back pressure. Flattened tubes projecting back of each rear wheel emit the exhaust gases, which lay the dust rather effectually. The machine is fitted with 34 x 4-inch tires,

(*Continued on page 51.*)

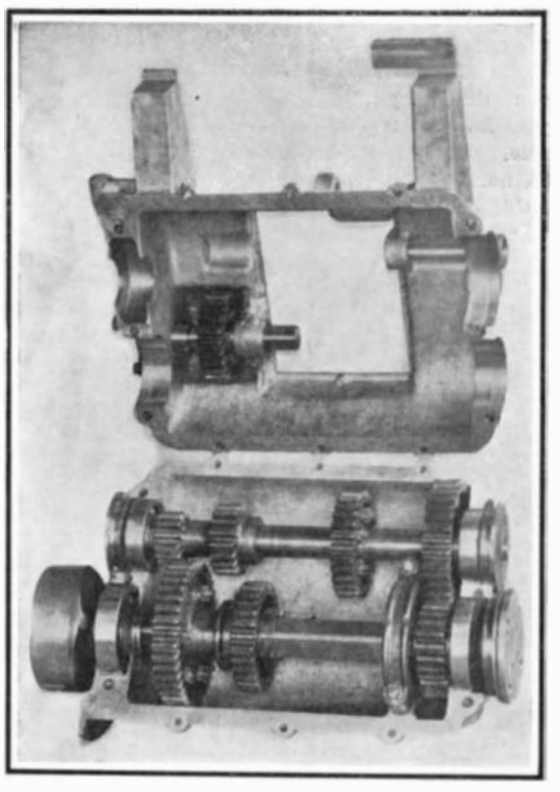


FRONT VIEW OF CLEVELAND MOTOR WITH GEARS EXPOSED.

Note make and break igniters with knife switches above on left and gear-driven magneto below; also centrifugal water pump and pulley for fan on gear-driven shaft on right. The large gears are on the cam shafts for operating the valves. These shafts run at half the speed of the motor. The vertical rod on left-hand side of motor operates the igniter mechanism of the forward cylinder and is revolved by a bevel gear on the camshaft.

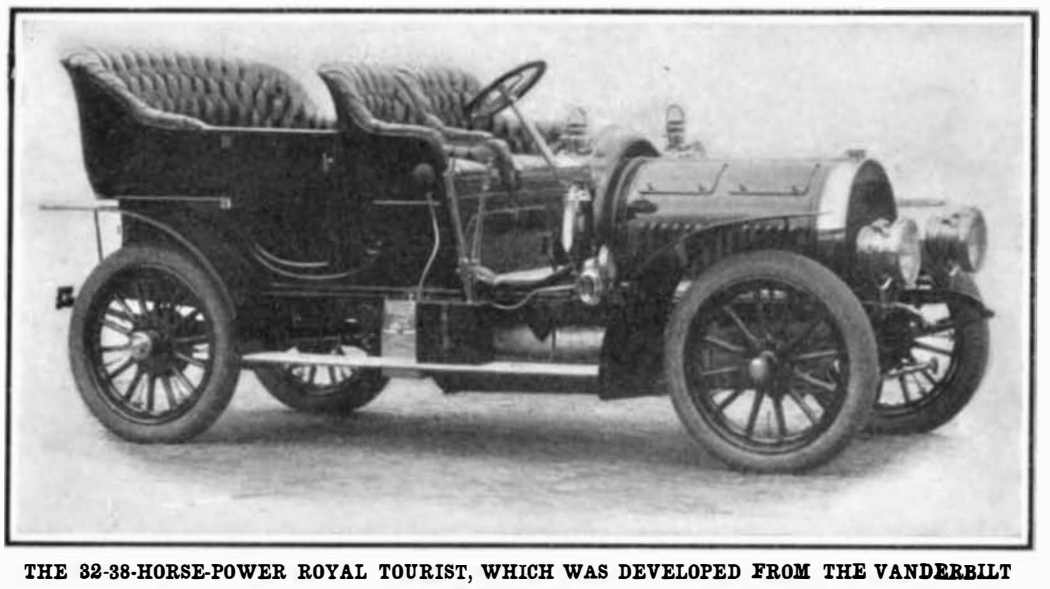


IGNITER MECHANISM OF ONE PAIR OF CYLINDERS OF CLEVELAND TOURING CAR.

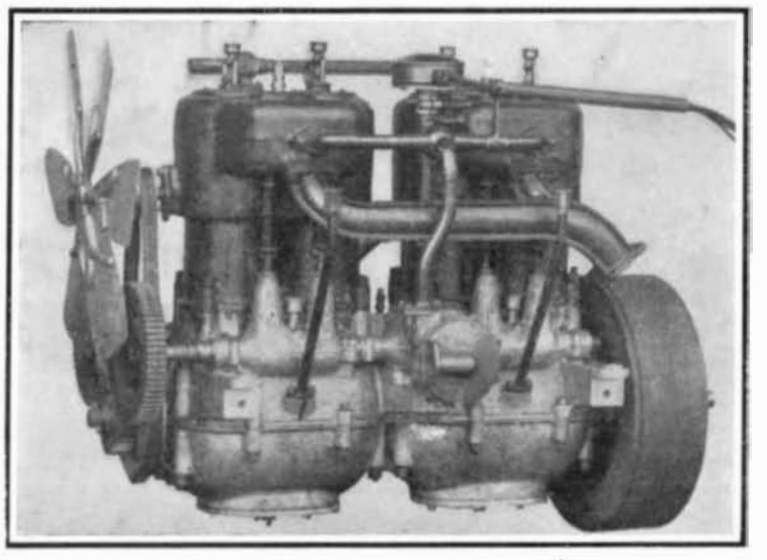


GEAR BOX OF THE ROYAL TOURING CAR

This is a typical 3-speed sliding-gear transmission. The hangers are on the top of gear box, which also carries intermediate pinion for the reverse. The single sliding member on square lower shaft is moved by a fork fitting in collar between the two gears and mounted on a slidable rod carried in top of case. The jaw teeth on right side of sliding member engage similar teeth in extreme right-hand gear for producing the third speed, which gives a direct through drive from one end to the other of lower shaft.



THE 32-38-HORSE-POWER ROYAL TOURIST, WHICH WAS DEVELOPED FROM THE VANDERBILT CUP RACER.



THE 4½ x 5 ROYAL ENGINE, SHOWING BEVEL-GEAR-DRIVEN PUMP AND COMMUTATOR.

the center, and makes a very easy-riding car. Besides the 30-horse-power car, a 45-horse-power model is also built.

HIGH-POWERED AMERICAN TOURING CARS.

(*Continued from page 32.*)

has a 104-inch wheel base, and weighs complete 2,300 pounds.

THE ROYAL 50-HORSE-POWER TOURING CAR.

The 1906 car put out by the Royal Company has practically the same chassis as the racer which made such a fine performance at the Vanderbilt cup race last October. The motor has a bore and stroke of 5 and 5½ inches, respectively. It is fitted with mechanically-operated valves on opposite sides, the cylinders being cast in pairs, and the valves being interchangeable. The bearings are bronze on the crankshaft and hardened steel at the wrist pins. They are all of sufficient surface not to require replacement more than once a year. The gears which drive the cam shaft are of fiber, uninclosed. The commutator is placed on top of the cylinders and is driven by bevel gears from the cam shaft. The centrifugal pump, which is also bevel-gear-driven and inclosed, can be seen in the view of the motor. The motor is fitted with a positive mechanical oiler which effectually lubricates all its parts. The ignition system consists of quadruple coils and storage batteries. It is of the usual jump-spark type. The radiator, of the cellular type, has a large belt-driven fan behind it. The Royal clutch is of the conical leather-faced type. It is of large diameter and has flat springs beneath the leather for the purpose of making it take hold easily. A universal joint is used between engine and transmission in addition to the usual two joints in the propeller shaft. The transmission, shown herewith, is of the sliding gear type, giving three speeds ahead and reverse with a forward and backward movement of one lever. The shafts are mounted on ball bearings and the gears are bolted to flanges made solid with the shafts, instead of being keyed or pinned. The gear case is suspended from the upper half by means of hangers, which makes it possible of removal without taking out the bolts which fasten it to the car, as by separating the two halves of the gear case, the bottom part carrying the gears can be immediately dropped. The intermediate reverse pinion is carried upon a short shaft in the upper part of the case, and when not in use is thrown out of mesh by a spring. The rear axle is of the live bevel-gear-driven type, the weight of the car being carried on the tubing which surrounds the driving axle. Roller bearings are used in the axle and wheels.

THE 50-HORSE-POWER HAYNES TOURING CAR.

Although one of the oldest automobile firms in America, the Haynes Company, of Kokomo, Ind., nevertheless obtained valuable experience in the past year with a racer built for the Vanderbilt race. This car made one of the steadiest-running performances of any in the race, and won fourth place. The 50-horse-power 1906 touring car is practically a duplicate of the racer, it having all the features which were tried out on the latter. Besides the peculiar roller bevel-gear drive employed on last year's cars, the new Haynes has an ingenious ratchet arrangement in the main driving gear of the transmission for the purpose of making it possible to jump back from high to intermediate or low speed when the car is running rapidly, without the danger of stripping the gears. This danger is a very grave one with all ordinary transmissions of the sliding type. By means of a ratchet in the main driving gear, this gear is allowed to run ahead of the driving shaft when the gears are changed from a higher to a lower speed, which ordinarily results in the car tending to drive the engine and consequently being brought up with a shock. So severe is the strain on the gears under these conditions that a 2,750-pound car carry-

ing a normal load undergoes, when the gears are changed from high-speed (30 miles per hour) to intermediate (15 miles per hour) a shock to its mechanism equivalent to a vertical fall of 7 feet. The new construction does away with this shock completely and the life of the gears is greatly increased by it. Another feature of the new car is a solid inner live rear axle. This is fastened to one side of the differential and to the corresponding rear wheel, while the other side of the differential is attached to a sleeve slipped over the axle and driving the other rear wheel. Both axle and sleeve run in roller bearings of ample size. This type of bearing is also used on the ends of the engine crankshaft, and in the transmission. A new inclosed universal joint which transmits the power through the wide, flat surface of the forks is another feature of the car. The clutch is of the band brake type, having springs in the drum for the purpose of cushioning the latter when the band takes hold. The water pump is a very powerful one, and the motor, which has a 5⅛-inch bore by 6-inch stroke, has liberal water jackets. Special double piston rings are used with this motor. A mechanical oiler has leads to each cylinder and the crankcase.

THE LANE STEAM TOURING CAR.

A firm which has done much to promote the use of the steam vehicle in this country, and which still pins its faith to this type of machine, is the Lane Motor Vehicle Company, of Poughkeepsie, N. Y. The Lane car shown on page 33 embodies all that is best in steam vehicle construction, and is an up-to-date machine in every particular. The boiler, which is a combination flash and water-tube affair, is placed in front under the bonnet. The engine is located in an inclined position under the footboard, and the gasoline tank is under the front seat. A single chain from the engine crankshaft to the differential on the rear axle drives the car. The layout of chassis just described is one which was employed with success last year by two American constructors. It has been adopted by the Serpollet firm of France for this year. Thus, while France is said to lead the world in gasoline car construction, one of her leading steam-car makers has adopted an American design. The arrangement of the boiler in front takes away the heat from beneath the seats, and allows of much more space for carrying purposes. The engine is readily accessible by removing the floor boards, and the boiler by removing the bonnet. The claim is made for the Lane boiler that it has the economy of the regular flash-tube type, the reserve of the water-tube boiler, and a better draft than either. The burner is made entirely of tubing, and is said to be indestructible. The engine is completely incased and protected from dust. It is of the cross-compound type, with 3¼ and 5¼-inch cylinders and a stroke of 3½ inches. The steam chests are placed side by side between the cylinders, and they carry on their back surface the control device for running the engine simple or compound. This is operated by a pedal extending through the floor, and by means of it the engine may be made to exert two and one-half times its normal power. The engine is mounted in a frame of steel rods, suitably braced. The crankshaft, with its eccentrics, flywheels, sprocket disks, cranks, and counter-balances, is a single piece of hardened steel having its bearings ground. The crankshaft and wrist pins have roller bearings, and the eccentrics ball bearings. Both the air and water pumps are inside the oil-tight casing, and are directly actuated by the crosshead. Experience has shown the makers that the piston and valve rods carry sufficient oil into the interior of the engine to lubricate the cylinders properly. An oil cup for this purpose is placed on the dash, but it is only intended to be used occasionally when starting. The automatic by-pass for the water is operated by a thermostat, which depends upon the water level in the boiler. There is also a hand by-pass arranged on the steering post for use, if necessary. The air pressure on the fuel tank is maintained automatically by an air pump driven from the engine. The maximum pressure this pump can produce is determined by an adjustable clearance space, having a considerable range of adjustment from the outside. An independent steam air pump for emergency use and for tire inflation is also provided. The boiler is fitted with a fusible plug in case the water level falls within three inches of the bottom. This plug can be replaced without stopping the machine. The condenser, seen on the front of the car, is constructed of thin, flat, brass tubes, arranged vertically with their edges toward the front and air spaces between them. The steam enters a header at the top, and the water flows out at the bottom, and is returned to the tank by the back pressure. The top carries a coil for heating the feed water on its way to the boiler. The condenser is said to return practically all the water when the engine is running compound under normal conditions. The dash of this touring car is fitted with a considerable number of gages for indicating all that should be known by the operator when driving the car.

THE RAMBLER AUTOMOBILES.

Besides the regular runabout and touring car of the single-cylinder and double-opposed-cylinder type which have been regularly made by the Jeffery Company, this concern has brought out for 1906 a standard four-cylinder touring car with a three-speed sliding gear transmission, shaft drive, and all the usual features of this type. The engine consists of four individual cylinders having a 4-inch bore and 4½-inch stroke and rated at 20 to 25 horse-power. It has mechanically operated valves placed directly in the cylinder heads and opened by rocker arms on top of the cylinders. The rocker arms are made adjustable for the taking up of any wear; and the valves and cages may be removed readily for the purpose of grinding. The cam-shaft gears are inclosed in a dust and oil proof casing. The pistons of the Rambler engine are provided with six rings each, the rings being located in pairs with their joints at opposite points. Great care is taken in fitting the rings and pistons. The motor is fitted with a jump-spark ignition system, the source of energy being a six-volt, 60-ampere-hour storage battery. Individual Splitdorf coils are mounted on the dash. A safety device is fitted to the engine for the purpose of retarding the spark when the crank is released from the holding latch, in order to start the motor. The mechanical force-feed oiler is placed on the dash, with sight feeds in full view of the operator. A float-feed carbureter with an automatic air valve supplies the motor with the proper mixture. The throttle is controlled by a special wheel just under the steering wheel. This control is peculiar to the Rambler cars and is used in combination with an accelerator pedal. The spark advance is inter-connected with the wheel throttle control, so that the spark is advanced ordinarily as the throttle is opened. Under conditions where this is not desirable, however, the spark may be retarded and the accelerator opened to obtain full power. The clutch is interlocking with the gear-shift lever, so that it is impossible to change gears without first disengaging the clutch. The car has two sets of brakes, the regular brake being on the differential drum, and the emergency brake being of the expansive type placed within the rear wheels. This company also makes a larger four-cylinder car having a 5 x 5½-inch motor of 35 to 40 horse-power and fitted with a countershaft and chain drive to the rear wheels instead of the bevel-gear drive used on the lighter model. The larger car is a trifle longer than the others and is provided with 34-inch wheels and 4-inch tires. A Limousine model is also one of the products of the Rambler factory, which is this year

turning out one of the most complete lines of cars of any factory in the country.

THE COLUMBIA 40-45-HORSE-POWER TOURING CAR.

The new Columbia heavy touring car is much the same as the 1905 model, though the new "Mercedes" type bonnet and several changes in the body have changed its general appearance. The motor is made up of two pairs of 5 x 5 cylinders. It develops its rated power at 800 R. P. M., but it has a range of from 150 to 1,500 R. P. M. under throttle control. The mechanically-operated valves are in a chamber on one side of the cylinders. The inlet valves are directly above the exhaust valves, and are opened downward by vertical pull rods having arms on their top extending over the valve stems. A cam-operated lever within the crank-case draws each rod downward and opens the inlet valve. The breech-lock scheme of fastening the spark plugs in place is retained. The ignition is by jump spark with quad coil on the dash and storage batteries as a current source. The crankshaft is made from a solid slab of steel. The car has a 3-speed sliding-gear transmission and chain drive to the rear wheels. Roller bearings are used in the wheels. Both brakes are interconnected with the clutch, which is of the leather-lined cone type in the flywheel.

All the Columbia cars are fitted with a new automatic governor having no needle valve or gasoline-feed adjustment. The auxiliary air is let in by a sliding piston, which uncovers ports in the bottom of the carbureter. The governor operates a by-pass valve and not the throttle. The latter is connected to a pedal. The new 24-28 horse-power four-cylinder light car has low-tension magneto ignition besides several other improvements. The E. V. Company also manufactures the same 18 horse-power double-opposed-cylinder car that it marketed last year. In electric vehicles, a brougham with cross seat in front for driver is one of the new models.

THE GROUT GASOLINE TOURING CAR.

The Grout Brothers Automobile Company, Orange, Mass., has once more turned its attention from the steam to the gasoline car, and a new, large touring car (shown on page 33) of 30 to 35 horse-power is the result. This machine is of the standard four-cylinder type, having individual, integrally-cast cylinders, with mechanically-operated valves placed on one side and driven from a single camshaft. The valves, as is usual with most modern cars, are all interchangeable. The ignition system, of the jump-spark type, is carried out with the use of a single coil and a new pattern of high-tension distributor which allows of the use of rigid wires. An improvement is also to be noted in the spark advance mechanism. Instead of moving the box itself, the revolving wiper is made to advance on its shaft. The motor and transmission are oiled by a novel force-feed lubricator, having a single pump and a distributing valve, which sends the oil through the various pipes. The transmission is of the usual three-speed type with direct drive on the high speed. The countershaft at the rear of the gear box runs on roller bearings, and has a band brake operated by a pedal. A double chain drive to the wheels is employed. The main frame of the Grout car is of armored wood, strengthened at the corners by steel braces. The power plant is mounted on a sub-frame of channel steel. Ball bearings are used in the wheels, which are shod with 32 x 4-inch tires having non-skid treads. The car is controlled from the steering wheel, the ignition and throttle levers being mounted on segments, which remain stationary when the wheel is turned.

THE AMERICAN MERCEDES AUTOMOBILE.

The product of the Daimler Manufacturing Company, illustrated on page 33, is said to be an exact duplicate of the world-famed machine made by the Daimler Motoren-Gesellschaft. The American

company has acquired the complete specifications of the German machine, and in some instances has imported parts from Germany. The materials used in the construction of the American Mercedes are required to pass the same rigid tests used abroad. The steels used in the axles, crankshafts, gears, and gearshafts are made from a special alloy said to have a tensile strength nearly double that of the best axle and shaft steels obtainable here. Thus, it will be seen that as far as material is concerned, the American car should be equal to its more celebrated brother. The motor is a four-cylinder engine having its cylinders in pairs and the valves placed symmetrically. All the valves are operated mechanically, and mechanical make-and-break igniters are also employed in connection with a Simms-Bosch magneto. Sight-feed oilers located on the dash and fed by pressure are used for lubricating. There is also an auxiliary hand oil pump. The transmission is of the latest Mercedes type, in which there are two bevel gears on the differential. One of these is driven from the secondary shaft of the transmission, while the other is used only on the high speed when a direct through drive is maintained. Chain drive to the rear wheels is employed, and Brampton self-hardening steel chains are used. The car has two separate pedal brakes working on the transmission, as well as expanding brakes in the hubs of the rear wheels. The engine develops 45 horse-power at 1,000 R. P. M. The cylinders are 120 by 150 millimeters. The valves are twice as large as those used last year, and the metal expanding clutch is inclosed and runs in oil. The engine crankshaft is mounted in non-adjustable ball bearings of the type shown on page 34.

THE RAPID MOTOR VEHICLE COMPANY'S TRUCK.

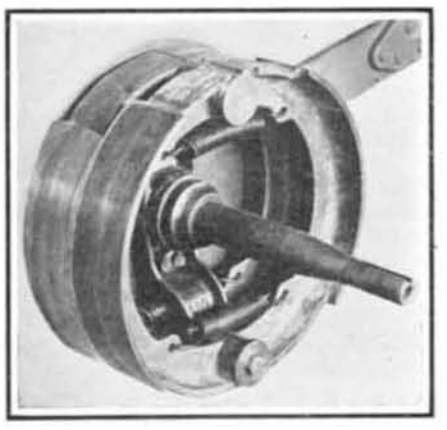
The truck shown on page 33 is fitted with a double-opposed-cylinder motor placed fore and aft of the vehicle beneath the driver's seat. This engine has a 5-inch bore and stroke, and is rated at from 16 to 18 horse-power. It is connected direct to a planetary gear transmission, giving two speeds forward and reverse, and which is mounted at its outer end in a special form of bearing, which can adjust itself to any mis-alinement caused by strains upon the frame. A chain from the engine crankshaft runs back to a countershaft just forward of the rear springs, and the wheels are driven by individual chains from this countershaft. Roller bearings are used throughout, and the car is mounted on exceedingly heavy springs, of which there are a considerable number. Transverse springs are used at front and rear, besides a supplementary transverse spring over the rear axle. This latter spring only comes into play when the car is heavily loaded. The body of the truck is very strongly constructed, and is heavily ironed throughout. The motor is lubricated by a mechanical oiler of novel design, which has but one plunger that forces the oil through a series of holes at every stroke. The commutator is placed in a very accessible position at the side of the car. The construction throughout is of the simplest and most substantial sort. A multiple-disk clutch is used for the high speed, and it is claimed that the car can be started on an incline when fully loaded by simply throwing in this clutch. The machine shown is intended for a load of a ton and a half, but it will carry heavier loads if necessary.

OLDSMOBILE BUS.

The bus shown on page 33 is a 20-passenger rig, mounted on the largest commercial vehicle chassis that the Olds Motor Works produce. This chassis is fitted with a vertical 2-cylinder engine located under the driver's seat, and having a planetary gear arranged on its crankshaft. A Morse silent chain runs back from this shaft to a countershaft in front of the rear springs, and an individual chain from this countershaft drives each rear wheel. The machine is fitted with roller bearings throughout. The wheels are large, and are shod with solid rubber tires. A speed of 15 to 18 miles an hour is obtainable on the high gear, and this machine will be found very serviceable for carrying on a bus business where the roads are fairly good.

THE NATIONAL SIX-CYLINDER TOURING CAR.

Without a doubt one of the largest and finest American machines is the new six-cylinder National. This car has a 4½ x 5-inch engine, having individual cylinders and mechanically-operated valves in a single valve chamber on each cylinder. These valves are worked by a single camshaft. The crankshaft of the engine is supported in five large bearings, and the crankcase is divided into four compartments. It is also provided with handholes of large size, so that the crankshaft bearings can be readily inspected. Jump-spark ignition with individual vibrating coils and a dynamo, storage and dry batteries as sources of current supply are used. The dynamo is placed on end just back of the dash, so that its bevel friction pulley runs against the side of the motor flywheel. The commutator can be readily reached by removing a cap. A positive mechanical oiler is used for lubricating the engine. The water-circulating pump is driven from the camshaft, and is readily removable without disturbing any parts of the engine. The same type of clutch having flat springs beneath the leather is used. The clutch is interlocked with the brake and gear levers. The propeller shaft and the transmission shafts are mounted on non-adjustable ball bearings. A feature of the National car that is noteworthy is the employment of two tie-rods between the steering knuckles of the front wheels. The hub of each rear wheel is fitted with two internal expanding brakes, as shown in the accompanying cut. This is a new feature found on but few of the 1906 cars. One of these brakes is operated by a pedal, and the other by the emergency lever. The steering gear is of the worm type, and is non-reversible. The body used on the car is of cast aluminium. It is very commodious, and has a capacity of seven passengers, all facing forward. The control of this car when running on the high speed is so complete that it can be speeded from 3 to 60 miles an hour simply by opening the throttle. A four-cylinder National car holds the record of 1,094 3-16 miles in twenty-four hours. This means an average speed, while the car was running, of 51.9 miles per hour. The record was made upon the track at Indianapolis on November 4 last, and it was an excellent demonstration of smoothness and steadiness of running. Two cars made the attempt on the previous record, but one was driven through the fence by accident at night. The other car continued in its race against time, and succeeded in beating the previous record by 78 9-16 miles. It also broke the 150-mile record, and all the other world's records from 650 to 1,050 miles. A test of this kind is one of the most severe that can be given a car, and one which approximates rather closely to what it will have to do when driven at high speeds over good roads.



TWIN EXPANDING HUB BRAKES.

THE STODDARD-DAYTON TOURING CAR.

An excellent example of a modern 4-cylinder touring car is that made by the

The Morgan & Wright Automobile Tires.

A firm that has done much toward bringing the automobile tire to its present improved state is the Morgan & Wright Company, of Chicago. This company was well known for its bicycle tires some years ago, and it has consistently maintained its reputation by the manufacture of first-class tires. The 1906 line manufactured by this firm is said to have several distinct improvements as follows: In the first place, an increase in fabric strength of something like 40 per cent over the fabric ordinarily used has been obtained by a special method of manufacture. Furthermore, the fabric is so laid down in constructing the tire that the latter, when finished, has the precise shape that it would naturally have when inflated, and consequently there is no undue strain of the fabric set up when inflation takes place. Another advantage found in the Morgan & Wright tires is that not only the tread but the whole tire is wrapped throughout in its construction. The "wrapping" process, which is rather of a mystery to the layman, is the process of laying in place by hand several layers of fabric, in order to insure a correct placing of said layers. In this way they obtain the position which they were to assume naturally, and they are not subjected to undue strains of stretching. This process is generally used on the tread only, but with the Morgan & Wright tire it is used throughout. The fourth improvement is the employing of a very tough grade of specially compounded stock for the tread of the tire. The balance of the tire is made of the highest grade Para rubber, which gives the tire great resiliency. These tires are made in several styles, including the Clincher rim, the Dunlop rim, and with the Baily "Won't Slip" tread. This tread consists of a series of disk-like raised places on the tread of the tire, which keep it from slipping under the most adverse conditions, and also aid in preventing punctures. The Dunlop tires are made of the very best materials. The rings which secure the tire to the rim are of imported piano wire. The great care which is used in the construction of the tires will be apparent when it is stated that the makers keep an expert constantly on duty at the mill which supplies them with the fabric, for the sole purpose of inspecting the raw material and rejecting any which shows the slightest impurity. The record of these tires for resiliency and durability is of the highest, and the reason for this is readily seen in the care which is taken in their construction.

HIGH-POWERED AMERICAN TOURING CARS.

(*Continued from page 54.*)

Dayton Motor Car Company, and known as the Stoddard-Dayton. This machine is a high-class car in every respect. It is fitted with a 4½ x 5 Rutenber motor having interchangeable, mechanically-operated valves, all on one side. The inlet and exhaust pipes may be detached readily by removing four nuts. The connecting rods are adjustable at both ends. A mechanical pressure-feed oiler operated by an eccentric lubricates the engine. This is controlled by spark and throttle levers on the steering column. The brake pedal, when pushed, also throws out the clutch, and both pedals are connected so as to close the throttle and prevent the engine from racing. The transmission gives three speeds and a reverse. It is of the selective type and is controlled by a single lever working in an H-shaped quadrant. A double universal joint is fitted between its forward end and the clutch, which is of the standard cone type with ball thrust bearing. The rear axle is of the usual live floating type employed almost universally nowadays with a bevel-gear drive, the wheels turning on roller bearings on the ends of the incasing tube and being driven by the inner live axle through jaw clutches in the hubs. Expanding-ring brakes lined with camel's hair are fitted in the wheels, and a transmission brake operated by a pedal is also provided. The car has a 103-inch wheelbase, and 32 x 4-inch tires.

AUTO-CAR EQUIPMENT COMPANY'S COMMERCIAL VEHICLES.

This concern makes a specialty of vehicles for commercial purposes, such as passenger omnibuses, delivery wagons, trucks, and sight-seeing automobiles. One of the new models on exhibition at the Armory Show is a 12-passenger wagonette, fitted with a double-opposed motor of 18 horse-power, mounted crosswise beneath the body. This motor is in an accessible position and is fitted with a planetary transmission, giving two speeds ahead and a reverse. It drives, through an inclosed bevel gear running in oil, the countershaft from the ends of which chains extend to the rear wheels. The machine is very compact and neat in appearance. Its length over all is 9½ feet. It is fitted with movable sashes, which can be taken out in the summer, and which thus make it a practically open vehicle.

Another machine turned out by this firm has a handsome closed body designed to carry fourteen people, while two more may be carried on the driver's seat. The body is mounted on the running gear by a three-point suspension. The car is fitted with large 36-inch wheels having 3½, and 4-inch endless solid rubber tires in front and rear. Roller bearings are used in the wheels, which also have integral brake drum and sprockets attached. The car is driven by a four-cylinder vertical motor placed in front. This engine is said to develop 34 B.H.P. at 1,000 R. P. M. Its valves are all mechanically-operated and located in the cylinder heads. The motor is connected to a two-speed transmission, the gears of which are of wide face and heavy pitch. The machine has a wheel base of 120 inches, and its length over all is 13½ feet. It is proposed to have one of these cars running between the Garden and the Sixty-ninth Regiment Armory during the show week. An electric hotel bus somewhat similar in design is another of the models manufactured by this concern. The company also makes a 3-ton gasoline truck, having the same power plant as the 16-passenger wagonette. This truck will travel 10 miles an hour at high speed. It is fitted with a stationary or removable top, as the purchaser may desire. A novel feature of this truck is sand boxes and valves for sanding the road in front of the rear wheels, should this be found necessary.

THE 1906 WHITE STEAM MACHINES.

The new White steam car has a very much lengthened wheel base and a roomy side-entrance tonneau body. The power plant is practically identical with that used last year, the compound two-cylinder vertical engine being placed in front under the bonnet, and the flash generator being situated under the forward seat. The car is fitted with bevel-gear drive and disconnecting clutch, for the purpose of allowing the engine to run idle for a few moments at the start. In connection with this clutch a secondary gear is provided, by which the car can be run at half speed when the engine is making its full number of revolutions. This lower gear can be used whenever the road conditions necessitate slow traveling and increased power. Ball bearings are used in the engine, transmission, rear axle, and wheels. The engine is lubricated by a belt-driven oiler located on the dash. The crankcase is filled with oil, and the splash from the cranks is relied on for oiling crankshaft bearings. The low speed, bevel, and differential gears all run in oil. This thorough lubrication of all wearing parts is a point which has received special attention with the new models. The engine of the 1906 car is rated at 18 horse-power. There are several forms of closed bodies constructed by this company, any one of which can be used upon the standard chassis. This chassis consists of an armored wood

frame 13 feet 5 inches in length, and carrying at its front end the motor, which is directly connected to the rear axle by a universally-jointed propeller shaft. Two powerful brakes are provided; one, a foot-brake, acts upon the flywheel by means of expanding shoes, while the other, the hand brake, is connected with expanding shoes within the hub drums of the rear wheels. The wheel base of this chassis is 9½ feet. It is fitted with 34-inch wheels having 4-inch tires, and the weight of the complete touring car is 2,275 pounds.

THE DECAUVILLE MODELS FOR 1906.

In the Decauville exhibit at the Madison Square Garden Show will be found representatives of the five models constructed for 1906. All are built upon the patented frame, in which a steel pan stamped integrally with the side bars of the frame supports the engine and gear case. The engine has four vertical cylinders cast integrally in pairs, with valve chambers on opposite sides. It is automatically oiled through a sight-feed lubricator, and is fitted with high-tension ignition by means of a magneto or batteries. The carbureter is of the automatic type controlled by the speed of the engine. Gasoline is supplied by pressure from the gasoline tank. A honeycomb radiator fitted with a fan, and having its water circulated by means of a positively-driven gear pump, is used on all the cars. All of the driving gears are inclosed and run in oil. The five different sizes of cars are fitted with 12-16, 16-20, 26-28, 30-35, 45-60 horse-power engines. The two larger cars are fitted with side-chain drive, while the three smaller ones have shaft drive. The lowest-powered car is capable of a speed of from 30 to 35 miles an hour, while the 60-horse-power machine will travel from 50 to 60 miles an hour. The Decauville Company's exhibit of foreign cars is one of the most complete at either show.

THE NEW DARRACQ LIGHT TOURING CAR.

In view of the fact that the Darracq machine won the Vanderbilt cup, and that an extremely high-powered racer has been built recently with a view to capturing the two-mile-a-minute trophy at Ormond, a brief description of the light Darracq touring car, marketed in this country by the American Darracq Co., will no doubt be of interest. A 20-32 horse-power model has a four-cylinder vertical engine of 112 millimeters bore by 120 millimeters stroke, the cylinders being cast in pairs. The engine drives a three-speed sliding gear transmission, which is in turn connected through the usual universally-jointed propeller shaft and bevel-gear drive to the live rear axle. The three forward speeds and one reverse are obtained with a single lever. The clutch used in the engine flywheel is a leather-faced cone, having four springs beneath the face to allow of easy engagement. The clutch pedal is connected with the throttle in such a way as to close this when the clutch is disengaged. The throttle lever is located on a stationary sector in the steering wheel. The car is fitted with internal expanding brakes on the propeller shaft and rear wheels. The engine is lubricated by splash, the level in the crankcase being maintained by a small paddle pump, driven off the camshaft, and which sends oil through sight feeds on the dash to the crankcase. Either high-tension ignition by coils and accumulators, or low-tension magneto ignition is used. The wheel base of the machine is 120 inches. It is fitted with 880 x 120-millimeter tires in the front and rear; and the speed it is capable of making is in the neighborhood of 50 miles an hour.

THE FOUR-WHEEL DRIVE TRUCKS.

In our Automobile Number last year we illustrated a new form of gasoline truck, in which all four wheels were driven from suitable countershafts connected with a three-speed transmission. The Four-Wheel Drive Company, of Milwaukee, Wis., have improved this truck, and have now brought out a model in

which all four wheels are shaft-driven through bevel gears. The dispensing with chains on a vehicle of this size and construction should be a valuable feature, as such a machine has to go through all kinds of weather and traverse bad road surfaces, and the four long chains heretofore employed were apt to stretch and become clogged with mud. The new trucks are made in several sizes. The drive by all four wheels gives them great tractive power, and makes them able to extricate themselves from almost any position without difficulty.

The Swinehart Solid Cushion Tire.

The Swinehart tire, which was illustrated in our last automobile number, has been used with success by an increasing number of automobilists during the past year, and almost all of these testify to its good qualities as regards resiliency and speed. While it is generally conceded that with an ordinary solid tire a speed of 15 miles an hour is about the limit, several users of the Swinehart tire have traveled in the neighborhood of 40 miles an hour without serious results or great discomfort, and have proved that this tire is applicable to the heaviest and fastest vehicles, as well as to the runabout and light touring car. The large number of testimonials from users of the tire apparently show that the great troubles of shaking to pieces of the car and crystallization of the parts from excessive vibration are not what they were thought to be. The tire is constructed on very different lines from the ordinary solid tire, it having concaved sides, a rigid tread, and a clincher flange on the bottom. The latter makes it possible to use the tire with the ordinary clincher rim employed with pneumatics. The tires are constructed with rather soft rubber, which has great resiliency; and it is due to this fact and to their peculiar shape that they ride much more easily than the ordinary solid or cushion tire. For the automobilist who wishes to be free from the thought of puncture, there is no better substitute for a pneumatic tire than that made by the Swinehart Company.

A Useful Ignition Battery.

An improved form of storage battery for ignition purposes is made by the Witherbee Igniter Company, of this city. The plates are assembled in separate compartments formed by division walls in the containing hard-rubber case, and the lugs are connected to suitable binding posts in the cover. The latter is sealed in the case by a soft rubber edge, and its overlapping top is bolted to flanges on the latter. The new battery has a new form of plate connection inside, and all metal parts that might cause a short-circuit should water accumulate on the top, have been dispensed with. A new form of vent having a large chamber for the separation of the gas from the acid is fitted. The battery is one of the neatest at present upon the market.

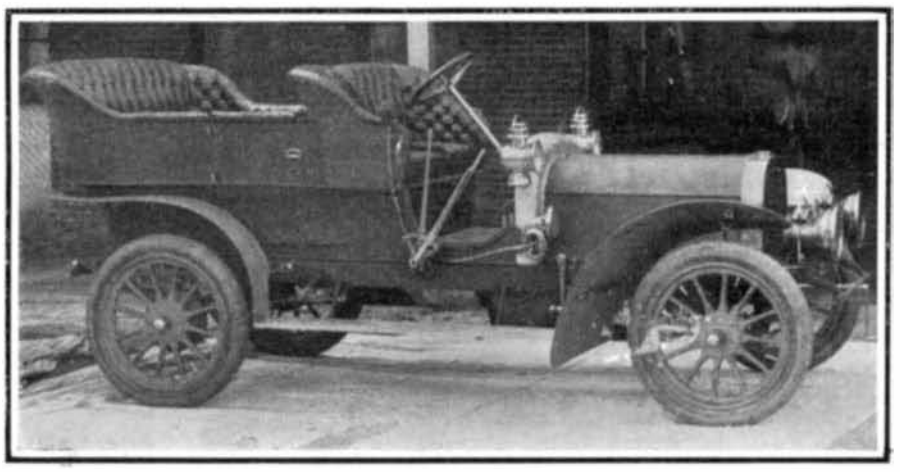
A CLEVER MECHANICAL AND ELECTRICAL AUTOMATON.

(*Continued from page 46.*)

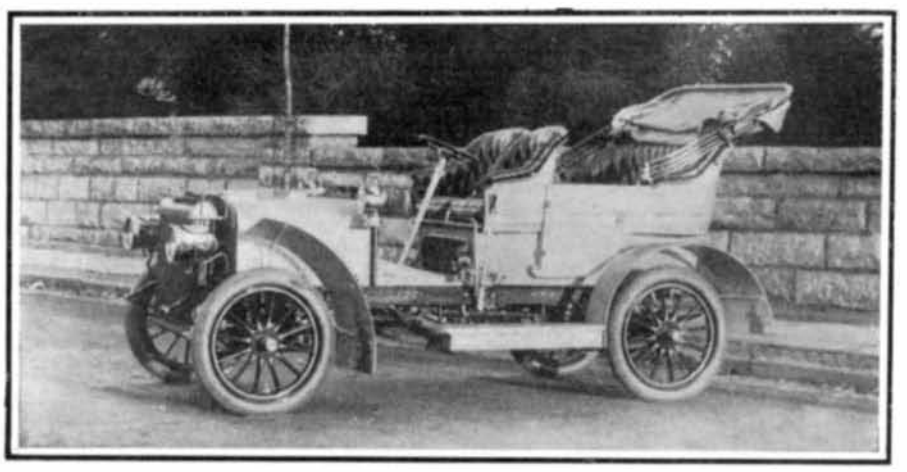
scending and terminating on the right side at a level with the terminal on the left. Upon this track travel fourteen ball-bearing swinging carriages, their movements being controlled by an electric motor. The carriages are filled with dry storage batteries, the combined weight of which is sixty pounds. These batteries are shifted from one side to the other of the body by means of an electric motor controlled by a mercury governor.

At the back of the figure is the switchboard containing the rheostat, fifteen switches, three single levers, and three automatic brakes, besides several other ingenious devices for directing the movements.

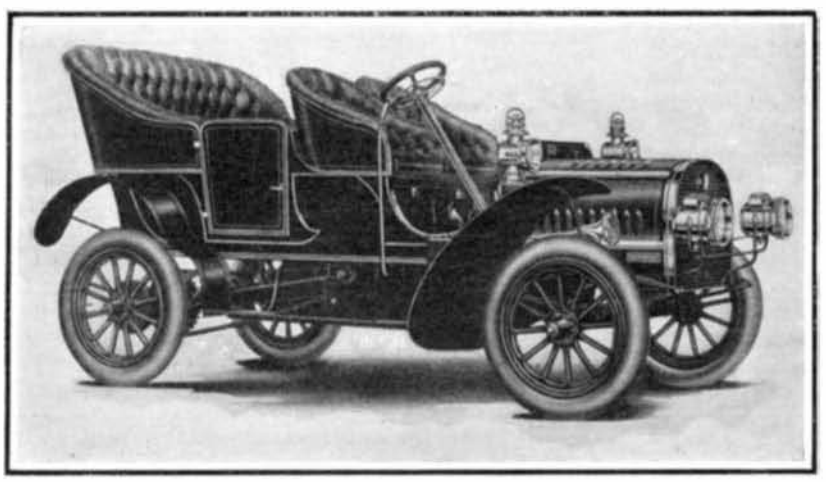
The connections are made, the current switched on, and at a given number of degrees or steps regulated by the centered gear-wheel, working on the cam of the motors, the weights are released from



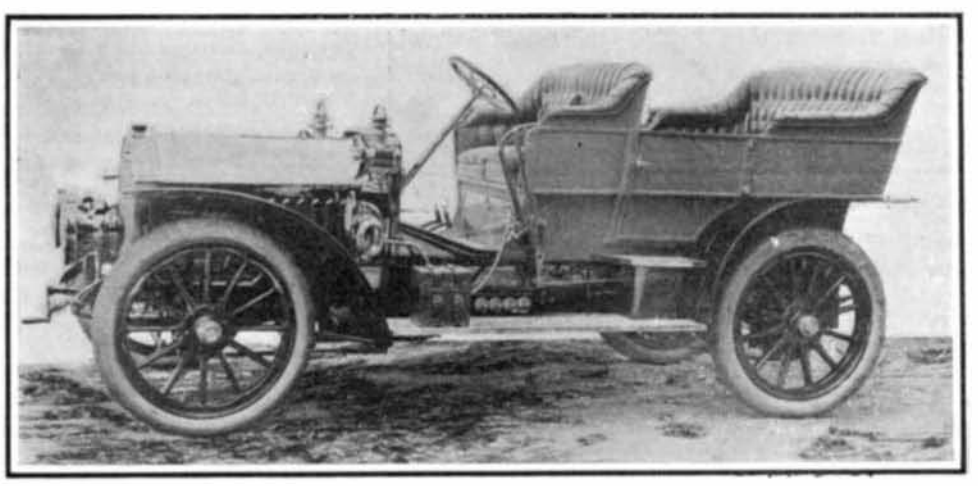
The Haynes 50-Horse-Power Touring Car.



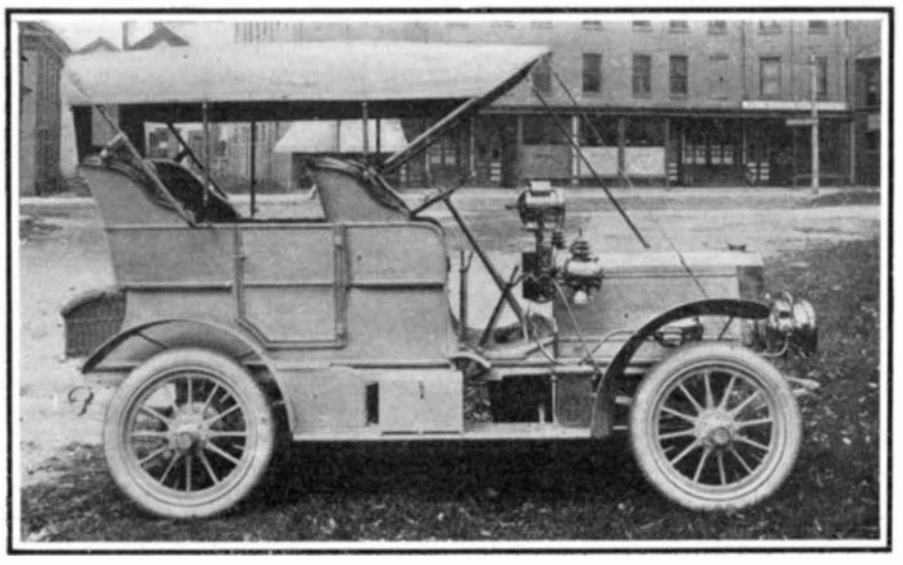
The 1906 Lane Steam Touring Car. This is One of the Few Steam-Propelled Cars Still Manufactured.



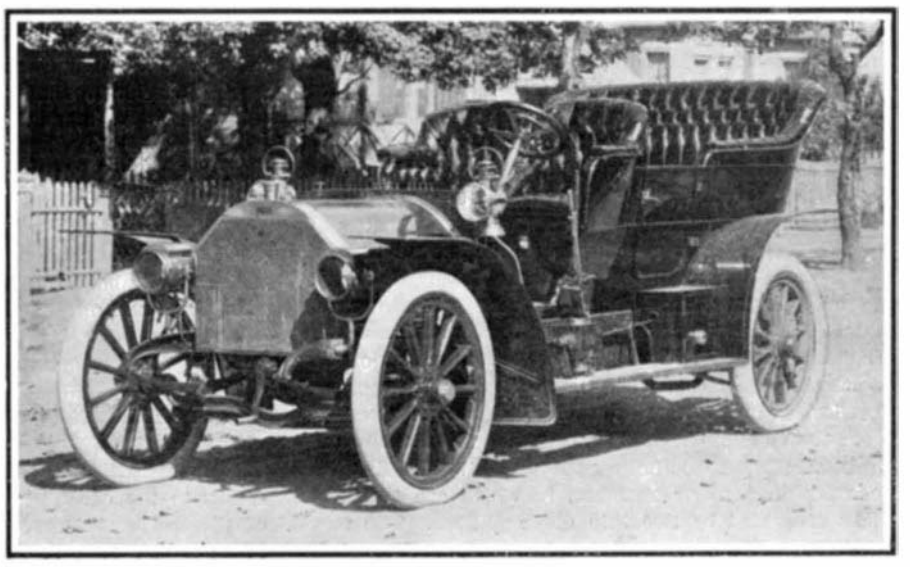
The Rambler 18-Horse-Power Double-Opposed-Cylinder Touring Car.



The 40-45-Horse-Power Columbia Heavy Touring Car.

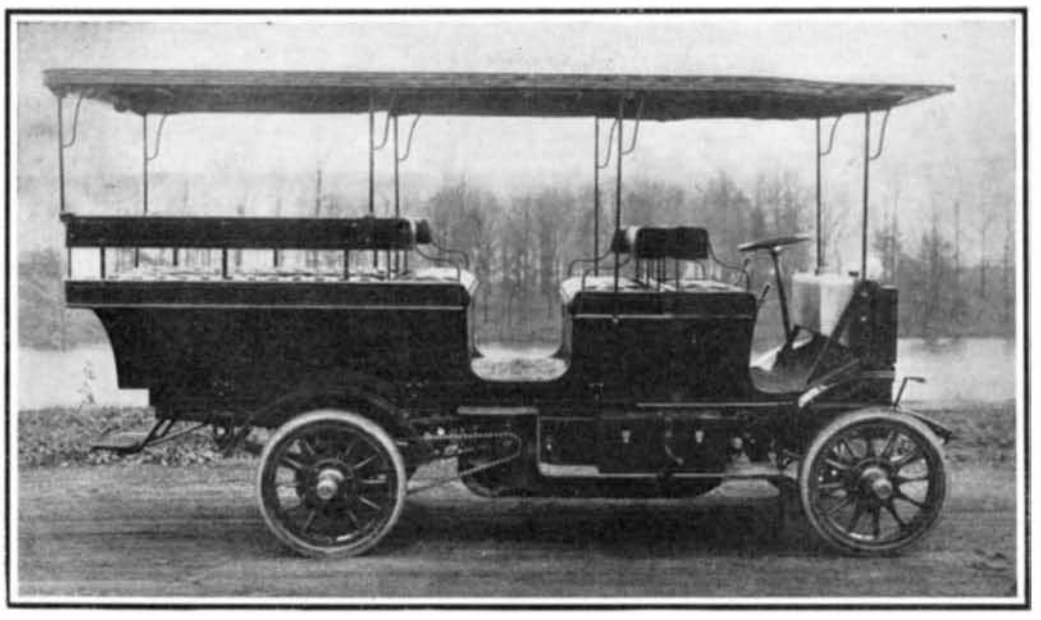


The New Grout 30-35-Horse-Power, 4-Cylinder, Gasoline Touring Car.



The 45-60-Horse-Power New American Mercedes. An Exact Duplicate of the Famous German Machine.

The 16-Horse-Power 1½-Ton Truck of the Rapid Motor Vehicle Company.



The 20-Passenger Oldsmobile Bus Fitted With a 16-Horse-Power, 2-Cylinder, Vertical Motor.

SOME OF THE LARGEST HIGH-POWERED AMERICAN TOURING CARS AND COMMERCIAL VEHICLES.