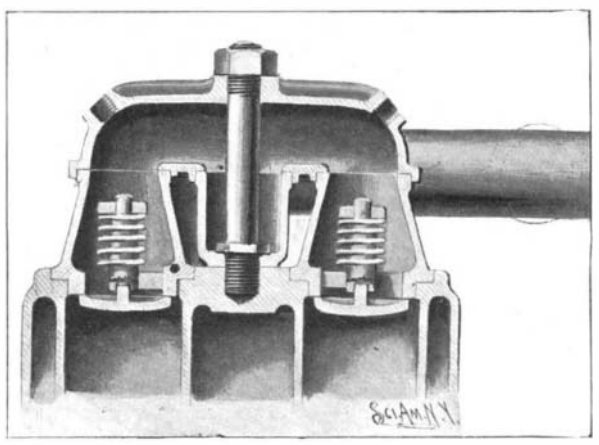
THE LOCOMOBILE GASOLINE CAR.

The Locomobile gasoline cars of this year, built after the designs of Mr. A. L. Riker, are characterized throughout by the greatest simplicity of parts and construction conformable with the attainment of the ends desired.

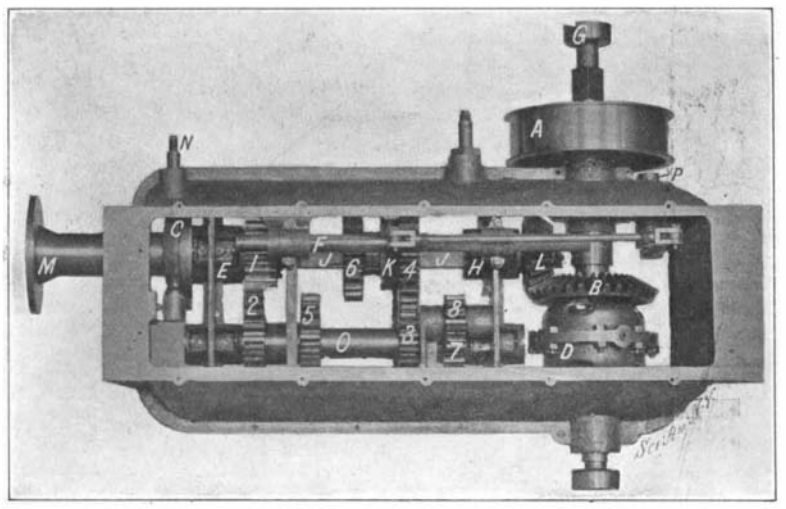
Two sizes of touring cars are being manufactured. These are a 16 horse power, four-cylinder, and a 9 horse power, two-cylinder car. The cylinders have a 4-inch bore and 5-inch stroke, and the motors make 900 R. P. M. when the cars are going 30 miles an hour. The horse power they develop is in reality greater than that at which they are rated, the larger engine having generated, when direct-connected with a dynamo and at a speed of 1,000 R. P. M., 21 electrical horse power.



METHOD OF SECURING INLET VALVES.

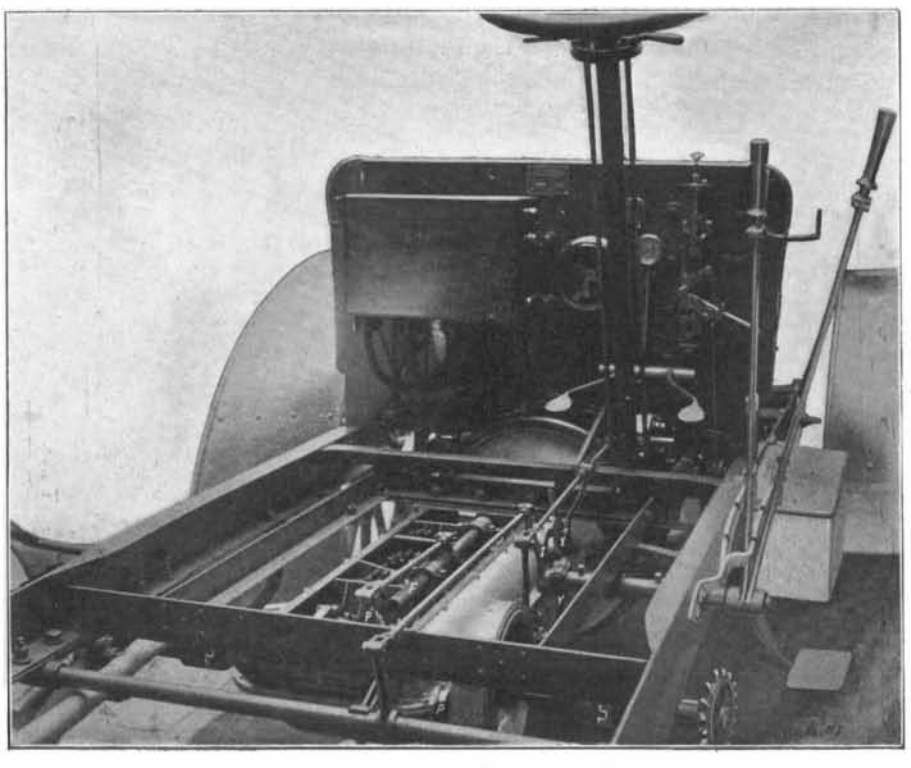
The main frame of the car is made of 4-inch channel steel, tapered down to a width of 2½ inches at the ends, which reduces the weight of the entire frame from 5¼ to 3½ pounds per foot. Within the main frame, and extending back to the cross angle iron at the back of the gear case, are two longitudinal angle irons on which the motor is mounted. These angle irons weigh less than the extra long brackets which would otherwise be needed on the motor would weigh; and they give a stiffer, stronger construction. As shown in our illustration, the four bronze brackets of the motor are bolted to them. The upper halves of the crank and gear cases are made of bronze and the lower halves of aluminium. The cylinders of the motor are cast integrally in pairs, and bolted to the crank case, as shown. Each pair has inlet and exhaust valves, the one directly above the other, in a valve chamber at the side. A conical gas entrance pipe or cap covers each inlet valve, the two caps being connected by a bridge pipe, which also fits over the branch of the main inlet pipe, located between the two valves. The bridge pipe is clamped in place by but one nut, by removing which the bridge pipe, conical caps, and inlet valves may be quickly removed. The spark plugs are of the single porcelain type, and, like every other part of the machine, are specially made after Mr. Riker's design. Very heavily insulated cables, coming from the secondary binding posts of the four encased spark coils on the dashboard, are held in brackets clamped to the motor, with their terminals an inch or two away from the spark plugs, but connected to them by brass chains. This makes a flexible connection that gives no pull on the plugs, while at the same time the benefits of the outside spark gap are obtained. The outside spark gap is a recent discovery credited to workmen in the Panhard factory. It was found that a plug which is short-circuited and will give no spark, will immediately do so regularly if the wire connecting with it is held a short distance away from the end of the plug, thus making an auxiliary air gap. Mr. Riker states that he discovered this fact nearly two years ago. He has embodied the principle in the chain connection here shown. At night, when the motor is running, sparks may be seen jumping along the chains. In the illustration, the exhaust valve stems and springs can be plainly seen below the valve chamber of the motor. The valves are opened and closed mechanically by cams on the two-to-one shaft, which is rotated by the large gear mounted on it and driven by a pinion having half as many teeth, on the crank shaft of the motor. (This gear is inclosed in the large casing in front of motor.) A lug on the cylinder wall, just below the exhaust valve spring, enables one to raise the spring with a lever, so as to withdraw the pin upon which the spring bears and allow the valve stem to slip through the spring, whereupon it can be removed through the inlet valve opening. This is an example of how convenience is considered in the minutest details of the car.

On a second shaft, parallel to the two-to-one cam shaft and driven by a small pinion meshing with the large gear of the latter, are the dynamo and centrifugal water-circulating pump. With this positive drive, the flow of water and of electricity is always assured. Two two-cell sets of 40 ampere-hour accumulators, carried in a box beside the step, furnish the sparking current. The set that is in use is constantly being charged by the dynamo, which is switched in circuit automatically as soon as it comes up to speed. If one set gets out of order from any cause, there is always the other to fall back upon. Four spark coils with vibrators, incased in the large box on the dashboard, complete the system; but another convenient feature that should be noted is, that in switching on the electricity to start the motor, the operator also turns on the lubricating oil. This is fed to the crank case by gravity, a short standpipe in the bottom of the latter carrying off the surplus. A ring, or groove, near the bottom of each cylinder, connected with the crank case by a passage, collects and delivers back to the latter any superfluous oil that is splashed up on the piston. The governor is operated by two jointed, weighted arms, thrown out by centrifugal force against the pull of two springs. The arms and springs are hung on pins *NN*, in lugs on gear, *G*. (See diagram.) The movement thus obtained, transmitted through arms, *AA*, serves to rotate sleeve, *S*, a certain distance. This sleeve projects forward and carries the commutator, *C*, for making and breaking the four primary circuits. The movement of the sleeve through its arc, therefore, serves to advance or retard the spark, by the corresponding movement it gives to the cam. Two long pins, *PP*, projecting back from the two arms, *AA*, of the sleeve through gear, *G*, pass loosely through holes in the governor shipper, *D*, which is revolubly mounted on the cam shaft, *W*, with a spiral groove in its hub, *H*. A pin in the shaft projects through this groove, and, when the sleeve, *S*, rotates the shipper, *D*, through the determined arc, the latter is moved along the shaft also by the spiral groove and pin, sliding, as it does so, on the driving pins, *PP*, and assuming the position shown by the dotted lines. Thus is obtained the

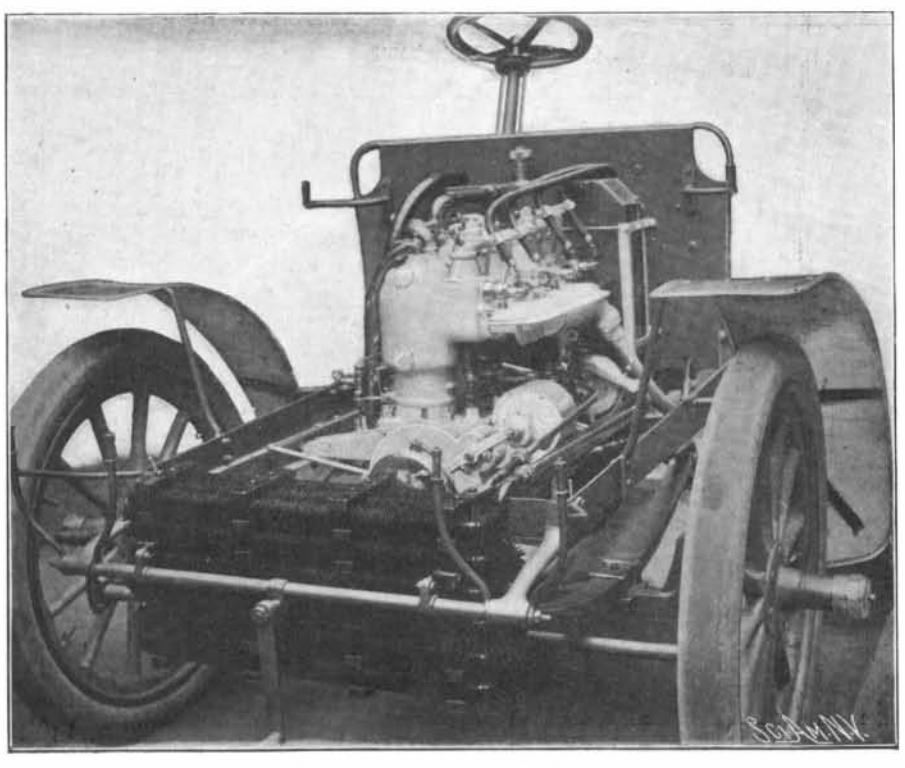


TRANSMISSION GEAR OF TOURING CAR.

16 H. P. LOCOMOBILE TOURING CAR.



CHASSIS OF LOCOMOBILE CAR.



MOTOR OF LOCOMOBILE CAR.

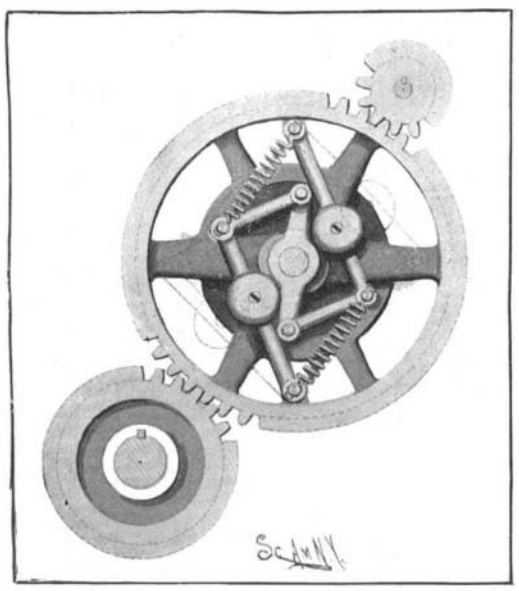
movement of the shipper, which is transmitted to the carbureter lever through the long lever pivoted in the casing of the gear and seen running across the front of the picture of the motor. A link connects this lever with that on the carbureter.

The carbureter is of the usual float-feed atomizer type. Inside it are two sleeves, one acting as the throttle and cutting down the mixture at the same time that it throttles the air; the other, an auxiliary throttle that the driver can set at any point at which it is desired to have the governor cut off. Beyond setting this throttle according to the speed at which he wishes to travel, the driver has nothing to do with the control of the motor. Moreover, the valves in the carbureter are so arranged that when the auxiliary throttle is wide open, the size of the port in the carbureter leading to the motor is the same as that of the inlet pipe, even when the governor throttle valve has shut off to its full extent. Consequently, the governor has no effect, and the motor will develop its full power.

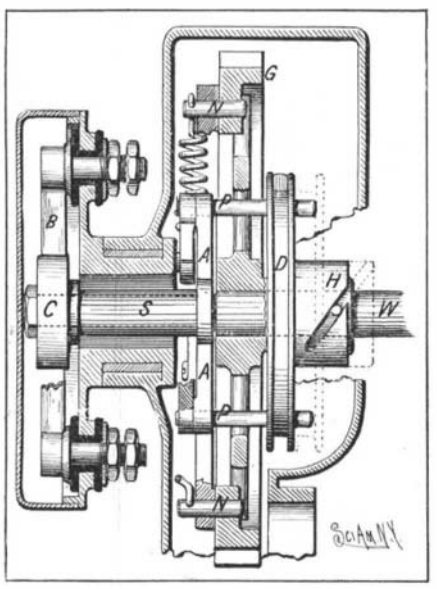
The transmission gear of the Riker machine is of the usual French type, giving three speeds forward and one reverse, with a direct drive from motor to countershaft on the high gear. Referring to the illustration of the gear, the reader will see its construction and main points. *M* is the sleeve and flange, bolted to the usual friction clutch in the flywheel of the motor. This sleeve has a square hole the greater part of its length, into which fits a short shaft extending through bearing, *E*, and terminating in a wide pinion, *I*. The shaft, *JJ*, also squared, has one bearing in pinion, *I*, and the other at *H*. Gears 4 and 6 are slid on it by means of shipper, *K*, and movable rod, *F*; and it drives the differential, *D*, on the countershaft, through the bevel pinion, *L*, and bevel gear, *B*. The side thrust of the bevel gear is taken up by a corrugated, propeller thrust bearing in the gear case. Parallel with the main shaft is another shaft, *O*, carrying gears 2, 5, 3, and 7, keyed to it. Gear 2 is always in mesh with pinion 1. Consequently, shaft *O* is always in motion when pinion 1 is turning. The illustration shows the position of the gear on the slow speed—1 driving 2, and 3 driving 4, which is squared on main shaft, *J*. The middle speed is obtained by sliding gears 6 and 4 along on *J* till 6 meshes with 5. For the high speed, 6 and 4 are slid still further to the left, when the teeth of pinion 1 engage with similar internal teeth cut in 6 on that side, and hence lock shaft, *J*, to the short driving shaft carrying 1. This gives the high speed. The reverse is obtained by means of an idle pinion 8, with which 4 meshes, and which is driven by gear 7. *C* is the shipper of the flywheel clutch, which is operated by the rotating rod, *N*. The bearing of the lever arm that moves the shipper, *K*, is seen in the case at *P*. The arrangement used makes it possible to have no sliding parts projecting through the gear case. *A* is the band brake drum, and *G* the female portion of the Oldham universal coupling employed to allow for any misalignment of the countershaft due to straining of the frame. The end of the shaft attached to the frame also has a grooved flange, while in the position in which the male floating member rests between them, their grooves are set at right angles. These universal couplings are plainly to be seen in the rear view of the chassis.

The car is steered by a wheel, connected to the steering knuckles of the front wheels through a worm gear and segment.

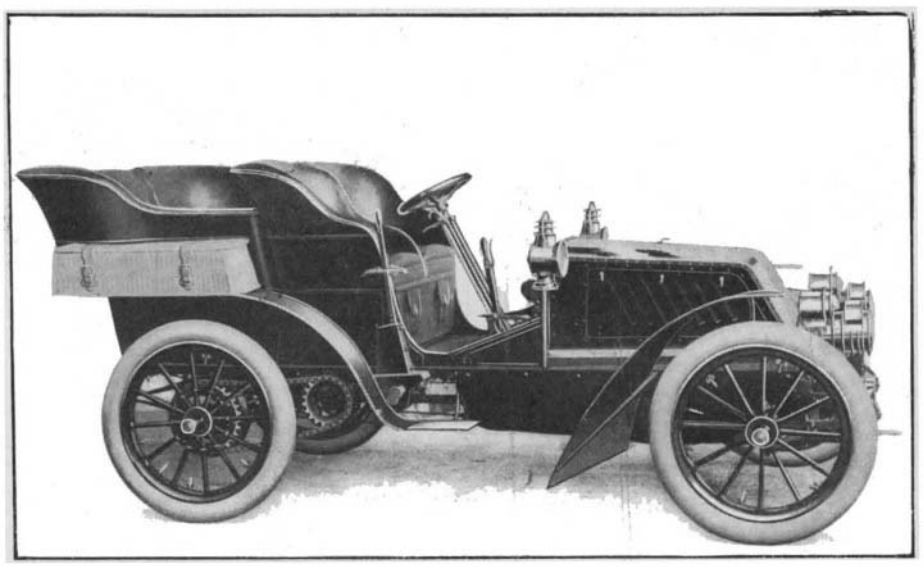
Two pedals and two levers control all the mechanism from the driver's seat. The pedal for the left foot draws forward the lever *X* by means of a rod connection, thus withdrawing the clutch as explained above. The right pedal does the same thing, but, having a greater movement, also applies the band brake, the lever of which is also connected to *X*. The shorter lever changes the gears, the rocker arm, *Y*, on its shaft being connected by a link to another depending arm, *P*, joined to the upwardly projecting arm, *P'*, within the case, which slides the shipper-carrying rod, *F*. The powerful band brakes on the rear wheels are set by the outer lever, which moves arm, *Z*, connected to the transverse brake shaft. The forwardly-projecting arm of *Z* pushes against a special arm on *X*, thus moving *X* forward sufficiently to throw out the clutch before the brakes are applied. The cars are fitted with artillery wood wheels having plain bearings. The cap on each wheel forms an oil reservoir, and in the end of the box is a curved groove that scoops up the oil and leads it to the oil groove on top of the axle. The only balls used throughout the whole machine are in a thrust ring on the clutch, in use only when the clutch is withdrawn. The wheels are fitted with 34 x 3½ inch detachable tires. The wheel-base of the large car is 84 inches; the tread is standard; and its weight complete is 2,150 pounds. The chassis can be fitted with any style of body desired to suit the taste of the purchaser.



CENTRIFUGAL GOVERNOR OF RIKER CAR.



CROSS-SECTION OF GOVERNOR.



COLUMBIA 24 H. P. TOURING CAR.

THE COLUMBIA GASOLINE TONNEAU.

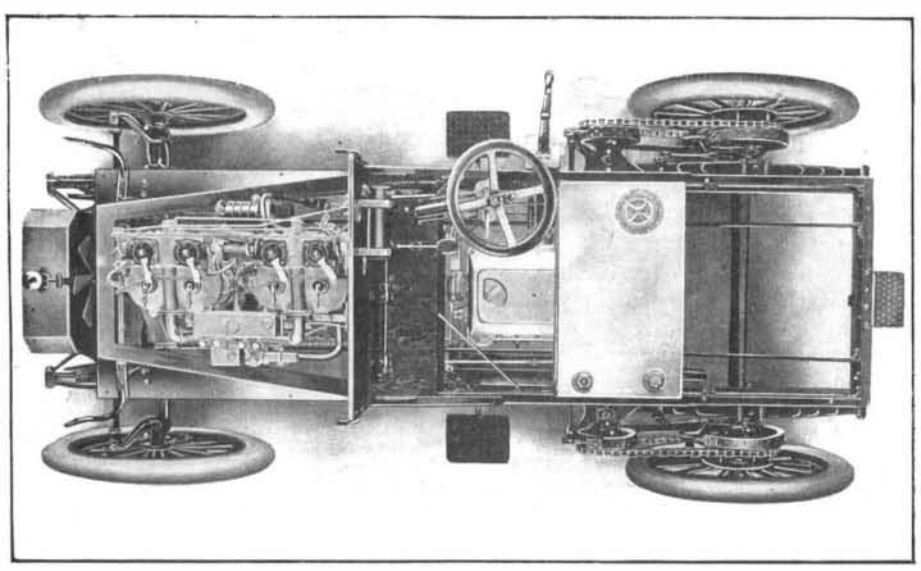
The new gasoline automobile that is being manufactured this year by the Electric Vehicle Company, of Hartford, Conn., is the invention of Mr. Fred A. Law. The chief idea of the inventor in designing it, was instant accessibility of all parts that may require attention.

The main clutch is of the usual leather-faced, flywheel type, having eight brass spring-pressed shoes or plungers in its face. By means of the novel arrangement of plunger shoes, it is possible to slip the clutch without damaging its leather facing, which is 2 inches wide, and subject to very slight wear.

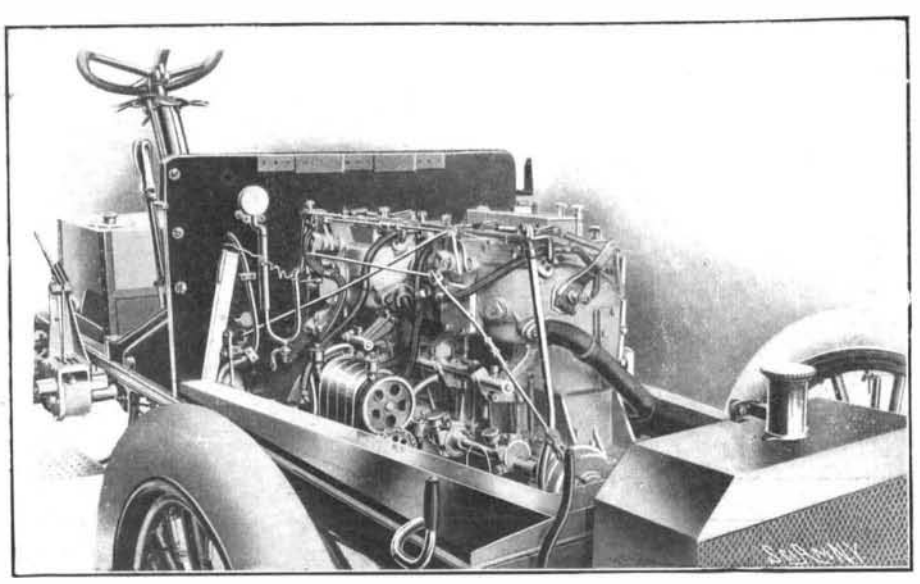
The flywheel clutch is connected to the main driving shaft through a sort of universal joint; and the transmission gears driven by this shaft are of the usual sliding French type, giving four speeds ahead and one reverse, with a direct drive to the countershaft on the high gear. This latter shaft is driven through the usual bevel gear with ball-bearing side thrust, and is fitted with a special jaw clutch by which both rear wheels may be driven together without the differential operating, if the machine should become stuck with one wheel on a muddy or icy patch of road, and the other on more favorable ground. By jacking up the rear axle and throwing in this clutch, one rear wheel can be belted to a dynamo or any other machinery it is desired to drive, and the automobile be made to serve as a stationary source of power. The countershaft has a band brake drum and radius rod on each end, beside the driving sprockets; and the rear wheels are also fitted with band brakes operated by the short lever located beside the steering column. The brake drum, sprocket, and clamping ring which is fastened to the spokes, form three concentric rings of the same size, connected together by pins. The body is hung on a pivot on the rear springs, so that the latter will not be strained if tilted a little by the radius rods in tightening the chains. Wheel steering through rack and steel pinion and a universally jointed connection to the steering knuckles is employed.

The transmission gear has two sets of sliding gears, operated by a single lever. By moving the lever back and forth in the two legs of an H-shaped slot, any gear desired may be thrown in. The lever can be moved to the other position, or *vice versa*, from any gear it may be on, without passing through any of the other gears. This, although the movement of the lever is not quite so simple as a straightforward movement, is advantageous, as any gear desired can be immediately selected. An interlocking arrangement makes it impossible for any other gears than the ones in use to engage.

The motor has four 5 x 5-inch cylinders, and is rated at 20 horse power at 900 revolutions per minute. It is said to have developed 26 horse power in a brake test, however. The cylin-



CHASSIS OF COLUMBIA TOURING CAR.



MOTOR OF COLUMBIA TOURING CAR.