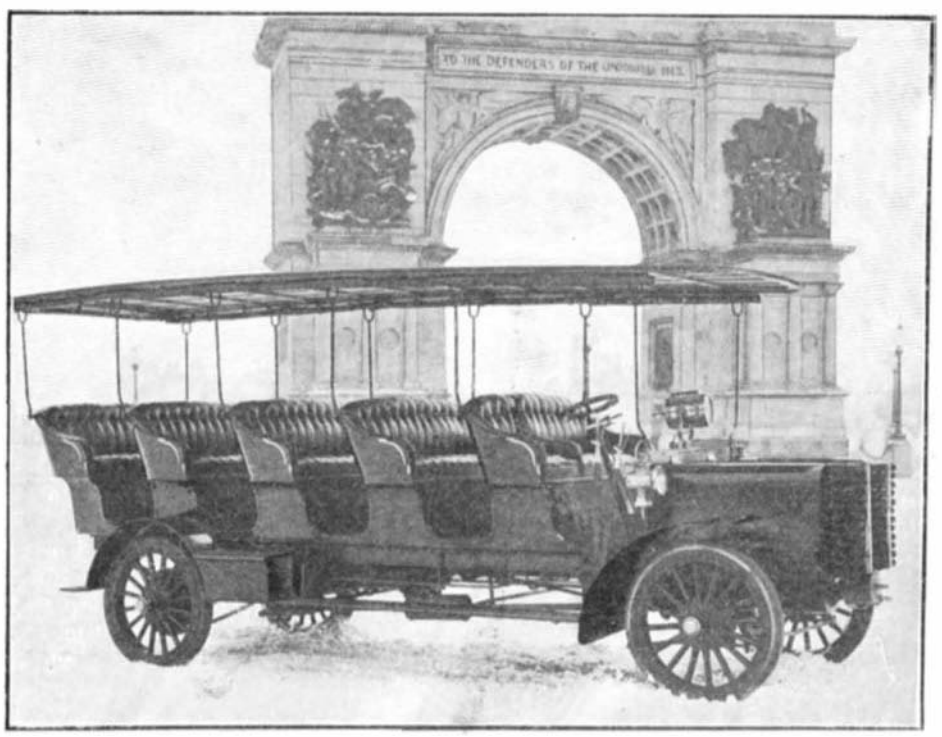
TWENTY-PASSENGER AUTO-STAGE FOR LONG-DISTANCE ROUTES.

The large twenty-passenger stage shown in the annexed engraving is built by the Mack Brothers Company, of Brooklyn, N. Y. It is intended for carrying passengers long distances over roads, and on good roads a maximum speed of 25 miles an hour can be obtained. The car is driven by a four-cylinder 5½ by 6 gasoline engine, having mechanically-operated inlet and exhaust valves in single chambers at the side of each cylinder, and operated from a single cam shaft. Jump-spark ignition from a single vibrating coil is used. The current is supplied by dry batteries, and the secondary current is distributed to the various plugs by means of an Altemus distributor. A finned tube radiator of the usual type is employed, the water being circulated by a centrifugal chain-driven pump. A novel feature of this car is a compact device containing a powerful spring, which is wound up by the motor when it is running, and the energy of which is used to turn the engine over a number of times, in order to start it. This device does not interfere with the operation of the motor in any way, nor with its being started by hand, if found necessary. It can be fitted to any gasoline engine. The twenty-passenger stage shown was exhibited at the recent Automobile Show in this city, and we are told that several of these stages are to be used in a daily service between Philadelphia and Atlantic City, and Atlantic City and Asbury Park, during the coming summer.



The Manhattan Twenty-Passenger Auto-Stage.

A GASOLINE POLICE PATROL WAGON.

The Knox Company has recently produced the first American gasoline police patrol wagon, the general appearance of which is seen from the accompanying cut. The body is mounted on a standard double opposed-cylinder chassis. It is 5 feet 9 inches high inside, and under the usual seats running lengthwise on each side there is sufficient locker space to carry a stretcher, emergency kit, etc. The stretcher is fitted with four ball knobs, which drop into slots on the edges of the seats, so that it can be suspended, and does not need to be placed on the floor. This patrol wagon shown is being used by the Springfield, Mass., police department, and is giving entire satisfaction.

THE BRUSH MOTOR OMNIBUS.

The omnibus has been almost entirely superseded by the tram-car, but in sparsely-populated districts, where laying an expensive permanent way is not commercially practicable, there is a growing demand for motor omnibus services, by means of which passengers may be conveyed to the tramway terminals or the railway station.

The Brush Electrical Engineering Company, of Loughborough, England, has specially designed the vehicle illustrated for districts in which the traffic is small. The main feature of novelty is the transmission gear, which is of the individual clutch type.

With this type of transmission it is evident that when changing speeds, nothing but a simple movement of the lever is required; and as friction clutches are the means of transmission, there is no need to work the foot clutch when changing gear. Sudden shocks such as are experienced with other types of gears are entirely avoided, thus effecting a great saving in wear and tear, and a great reduction of vibration throughout the whole frame. The life of the tires is said to be also considerably extended owing to the increase of speed being gradual, thus preventing the ripping action due to wheels suddenly brought into mesh as in the ordinary gear.

The engine develops 30 horse-power at about 900 revolutions per minute. The bore of the cylinder is 110 millimeters (4.33 inches) and the stroke 130 millimeters (5.118 inches). The drive is by universally-jointed shafts to gear rings on the inside of the driving wheels.

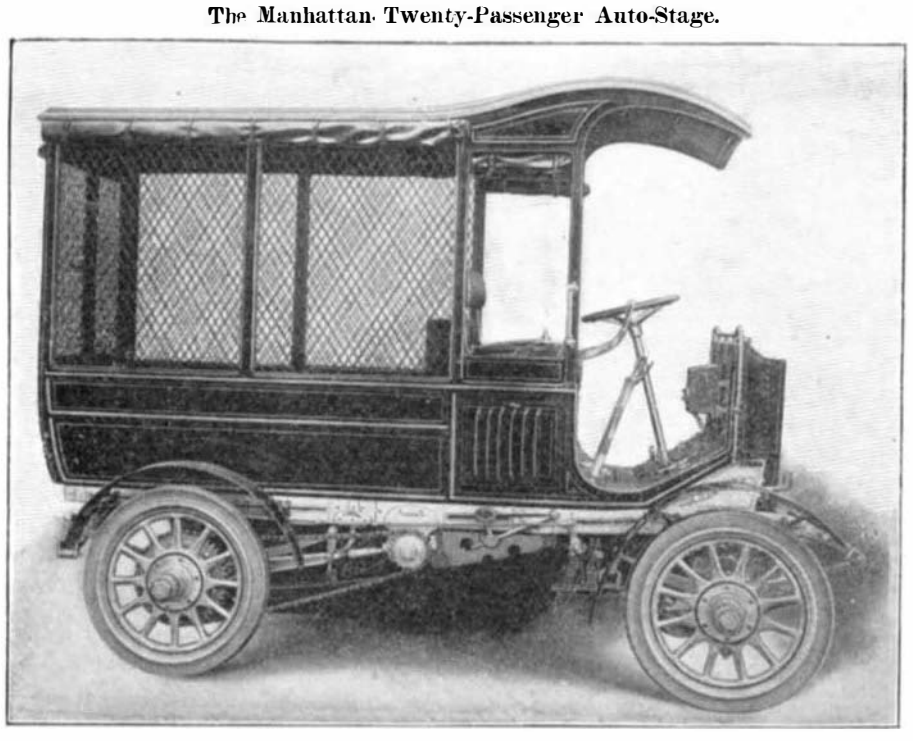
The entrance to the omnibus and the method of paying fares when passing the driver, obviate the necessity of employing a conductor, and the saving in wages may be just sufficient to make the enterprise profitable. This type is therefore suitable as a feeder to railway and tramway systems, as it affords absolutely the cheapest form of passenger traction for thinly populated districts.

The advantages claimed for the system are the following: The change of speed is effected with the utmost simplicity, smoothness, and safety. There is no possibility of missing the striking of any gear desired, either in ascending or descending hills, as the gears are always in mesh. No jolting or jerking accompanies the increase or decrease of speed. Any omnibus driver can take charge of the vehicle after a few minutes' instruction, without any danger of his damaging the mechanism or losing control. If both brakes were to fail, the omnibus would be able to descend the steepest gradient at walking pace on its lowest speed. The reverse may be readily thrown in while the car is running forward on the second and top speed, which is specially advantageous in crowded streets.

An English Motor Omnibus.

THE NEW OLDSMOBILE DELIVERY WAGON.

Besides a new double opposed-cylinder side-entrance tonneau, the Olds Motor Works, of Detroit, Mich., have this year brought out the gasoline delivery wagon illustrated herewith. A type of motor new to the Olds Company is used on this car. This is a double-cylinder vertical engine situated under the driver's seat. This location of the motor makes it possible to use a longer body without increasing the length of the car, and, at the same time, the valves and other mechanism can be readily inspected or adjusted by removing the seat. The motor drives a countershaft, placed directly behind it, through a Morse silent chain; and the drive from the countershaft to the rear wheels is by side chains. The countershaft carries a planetary gear transmission containing bronze and steel gears running in oil, and giving two speeds ahead and a reverse. Expanding ring brakes are fitted on the hubs of the rear wheels, and there is also the usual band brake on the transmission. The former are controlled by a lever, and a pedal operates the latter. A tubular radiator is used with this car, the circulation being maintained by a positively driven gear pump. The motor is thoroughly



Oldsmobile Delivery Wagon Fitted with 16-Horse-Power Vertical Motor.

Knox Patrol Wagon Propelled by 16-Horse-Power Horizontal Air-Cooled Motor.

SOME NEW TYPES OF COMMERCIAL VEHICLES.

oiled by a mechanical lubricator. It has two vertical 5 x 5 cylinders, and is rated at 16 horse-power. Its crankshaft is 2 inches in diameter and is a steel drop forging, as are also both axles of the car, which are of an I-beam section. The wheels are fitted with 4½ x 30-inch solid tires. The Olds Company also makes a lighter delivery wagon fitted with a single-cylinder motor of their well-known type. An automobile express company located in Detroit has used these cars for the past six months, and has obtained excellent results. One machine missed but one trip out of 198, and that owing to laying the machine off for some slight adjustments when it could have been run. The average cost of operation, including wages of the driver, was found to be 4.2 cents per mile, and the cost per package for delivery about 3 1-3 cents.

For the past three years, at Christmas time, the Olds Company has placed at the disposal of the postmaster of Detroit several of its delivery wagons for use in delivering and collecting mail matter and transferring it to the different sub-stations. During the holidays, recently, four delivery wagons were used. The postmaster informs us that "the service rendered by these machines was on the whole very satisfactory, and their use was instrumental in securing the delivery and collection of large quantities of mail matter in a very short period of time, and they were also of material assistance in the matter of making quick special trips to our station postoffices. It is, no doubt, a fact that the aforesaid congestion would have burdened the office for one or two extra days had not these machines been employed."

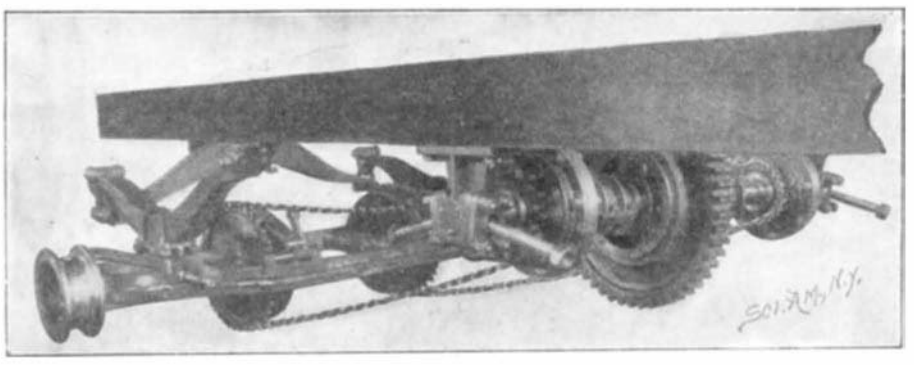


Fig. 1.—Differential Countershaft and Rear Axle.

The Countershaft carries three Differentials, and Drives by Chains the Sprockets of Universally-jointed Shafts which Revolve the Rear Wheels; the Front Wheels are Driven in the same way.

A GASOLINE TRUCK DRIVEN BY ALL FOUR WHEELS.

The Four Wheel Drive Wagon Company, of Milwaukee, Wis., has been experimenting for something over a year with a gasoline motor truck which drives by all four wheels. The illustrations shown herewith give a good idea of the appearance of the truck and its mechanism. It has been given tests in snow, through which it showed its ability to travel without the least hindrance, although the snow in places covered the axles and more than half of the wheels. It demonstrated the theory that a machine driving all four wheels independently will not slip its wheels, and will be able to travel through roads impossible to negotiate by a two-wheel drive, although its tires are neither corrugated, spiked, nor roped in any way, nor have they any special anti-slip device of any kind.

The machine shown will carry five tons. But while this machine is a chain-driven machine, the 1905 model, which is now being gotten out, will have a bevel gear drive throughout, the chain drive being superseded by this type of drive except for exceedingly heavy trucks.

The theory that the additional machinery necessary for driving four wheels as compared with driving two wheels would produce more extra friction, and consequent loss of power, than the value of any advantage which might be gained by a four-wheel drive, has been demonstrated to be false entirely in this machine, for it is possible to move this 6,000-pound truck up and down the shop floor by simply turning the starting crank; and there seems to be very little difference in the power needed to turn the engine alone is whether the entire being turned or the entire driving mechanism.

Our illustrations give a fairly comprehensive idea of its appearance and construction. A four-cylinder, 5 x 6 Rutenber gasoline engine of 25 horse-power is mounted transversely in front, and drives by a Morse silent chain a three-speed sliding-gear transmission immediately behind it. Another chain extends from the transmission to the differential countershaft placed at the center of the chassis. This countershaft has a large differential in the center, and a smaller one at each end. The large differential takes care of the difference in movement on the two sides of the vehicle, while the small ones equalize the difference between the front and rear wheels, on either side. Sprockets on the hubs of the smaller differentials drive through long adjustable chains the sprockets on the four drive shafts which are connected to the outer face of the wheel hubs through universal joints in said hubs. The outer ends, *E*, of the axle frames are shaped as shown in Figs. 2 and 3. Taper pivot pins, *PP'*, project through holes in the top and bottom of each axle and in the central hub cone-carrying ring, which is flattened on opposite sides so as to fit on the corresponding top and bottom part of the axle end. The bottom flattened portion of this ring (*T'*, Fig. 5), as well as the pivot pins passing through the axle end, and half of the universal joint, *U*, of the drive shaft within it, are plainly visible in Fig. 3. The cone ring, *T*, has the steering lever-arm, *S*, cast integral with it, this arm being behind the hub in the photograph, Fig. 2. Two cone rings, *C'* are mounted on this ring, *T*, and the cups that match are on each side of a center lug of the L-shaped hub ring, *O*, Fig. 5. Upon this ring, *O*, are mounted segments of wood, which are bolted to it by bolts passing through it and the detachable outer flange, *R*, Fig. 5. These segments are also bound together near the periphery by shouldered rings, *SS'*, bolted on. In putting together the wheel, the inner ring of balls is first assembled on the cone, *C*, of ring, *T*, Figs. 3 and 5. Then the wheel proper, which is built up on ring, *O*, is slipped on, the central lug on the bottom of *O* coming against the right-angled race of one ring of balls. The other ball bearing is then put in place, and both are held in by a retaining ring, which is screwed into place.

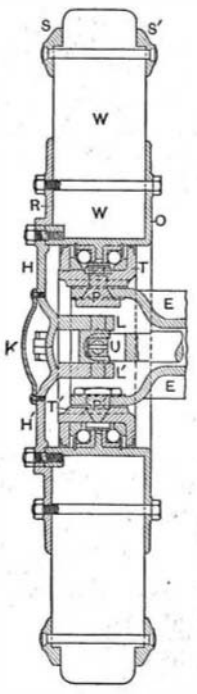


Fig. 5.—Cross-Section of Wheel.

Experience has shown wood wheels of this sort to be cheap and durable for all heavy work. The wheel is driven through a detachable outer hub plate made in two halves (*H* and *H'*, Fig. 5). These halves have lugs, *L* and *L'*, which are assembled around one fork of the universal joint, the other part, *U*, of which is seen in Fig. 3. *H* and *H'* are bolted together and to the outer hub binding ring, *R*. A light hub cap, *K*, completes the hub. In the new model the brake bands will be on a drum on the wheel hub instead of on the sprocket, thus removing from the universal joint the braking strains and leaving it only the driving to do. The brakes, of course, are all connected and balanced by adjustable rods. They are operated by a pedal. By removing *K* and *H H'*, the wheel can be readily removed, as well as the driving shaft. The wood part of the wheel can also be replaced readily at will.

The truck is controlled entirely from the driver's seat. So great is the combined tractive effort of the four wheels, that the machine can be started with its front wheels against the curb, and it will mount it at once, apparently without effort. A very strong company will manufacture the new trucks, which, from present appearances, will meet with as great success as they certainly merit.

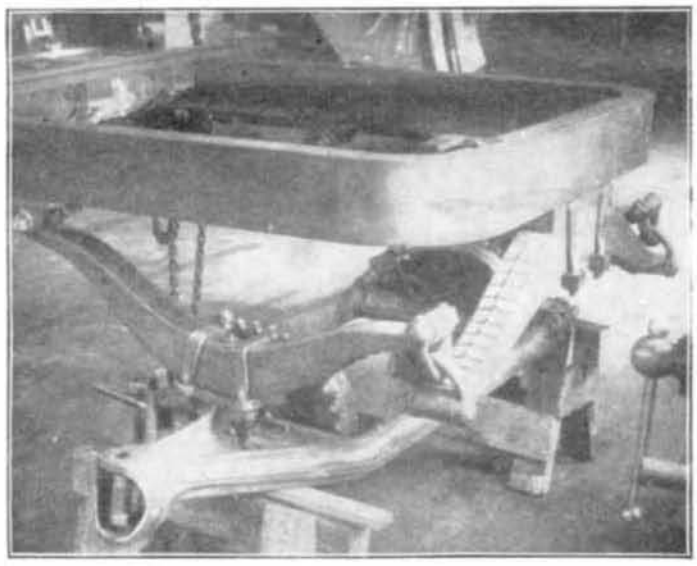


Fig. 2.—Rear Axle, Showing Flattened End for Wheel to Turn on, and Driving Sprocket Behind Spring.

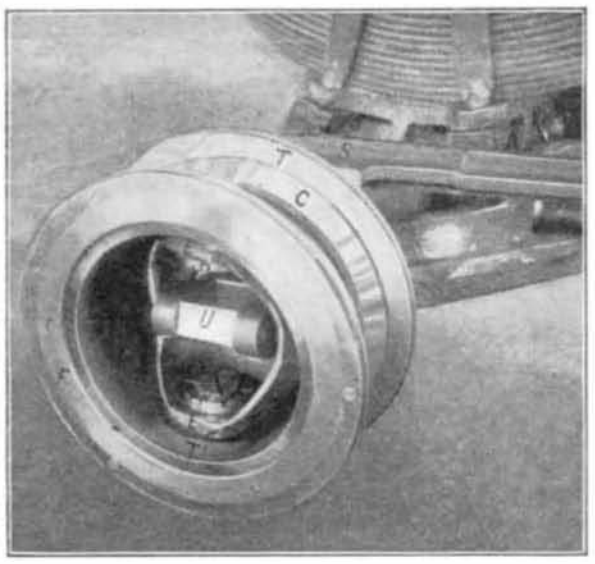


Fig. 3.—Ball Cone-Ring Forming Hub, Assembled on Axle End.

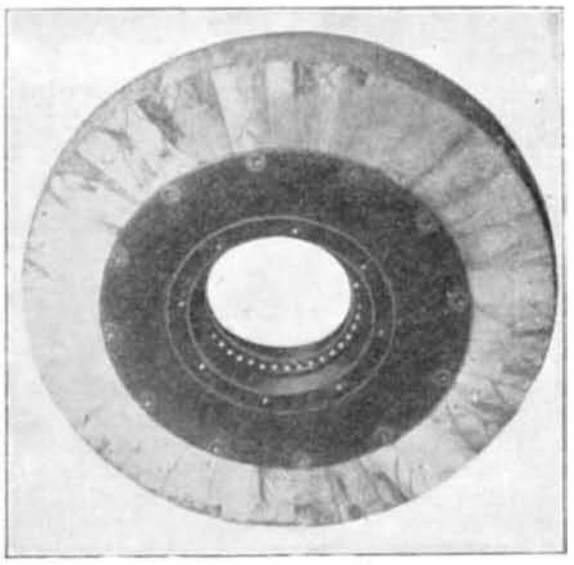
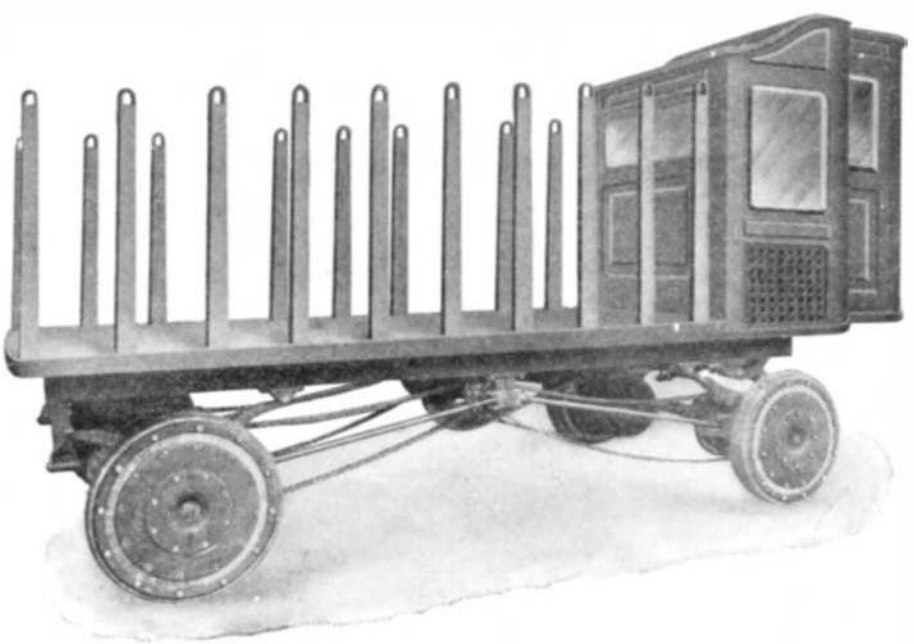


Fig. 4.—Wheel Formed of Wood Segments, Showing Ball Bearing in Hub.



FIVE-TON GASOLINE TRUCK DRIVEN BY ALL FOUR WHEELS.

Paraffin is employed for waterproofing paper. Wax may be used also but is more costly. Either may be applied by melting and drawing the paper through the liquid.—Drug. Circ.