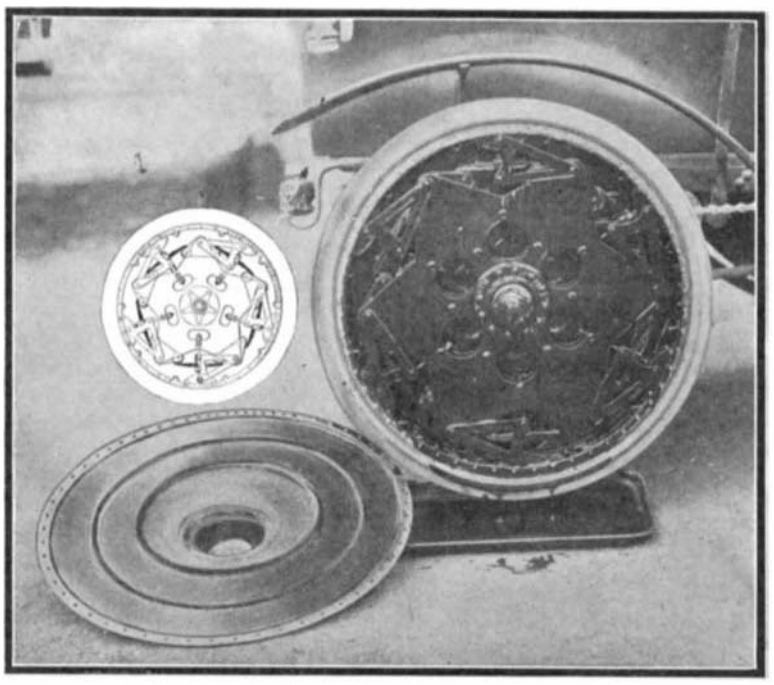
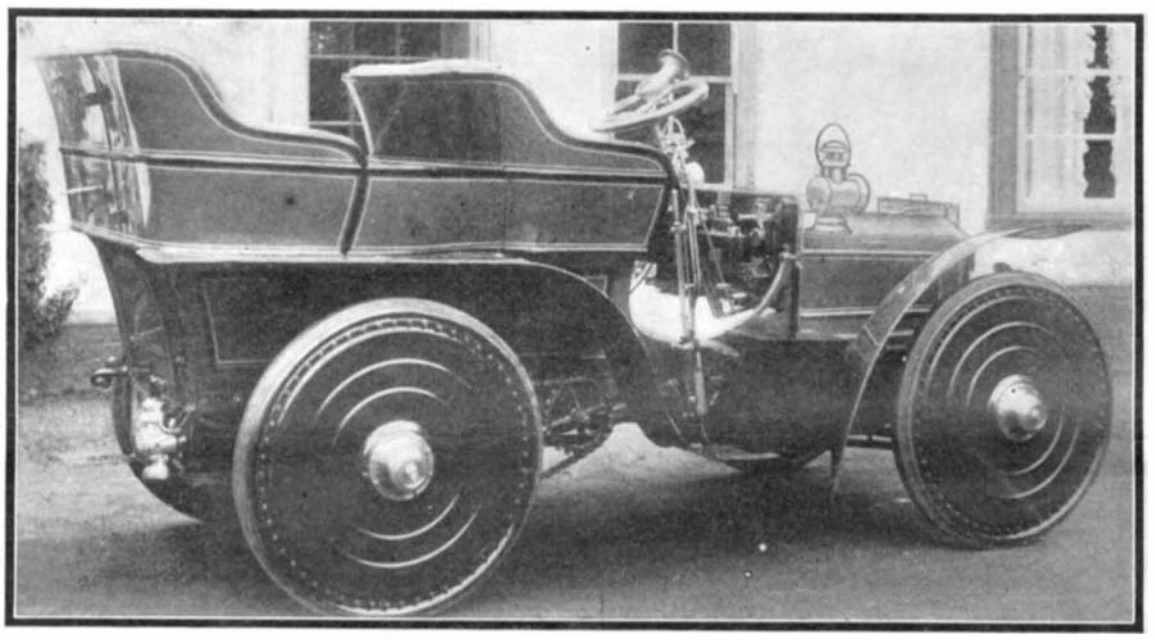
THE NORTHERN TOURING CAR.

In designing their 1905 touring car, the Northern Manufacturing Company have kept the general lines of the light touring car put out by them last year. The main characteristics of this car are a double opposed-cylinder, gasoline motor, placed transversely of the frame, immediately back of the radiator, and having its crankshaft extended into an adjoining case cast integral with the crank case of the motor. In this case, which is separated from the crank case by a partition wall, a planetary gear transmission is mounted to run in oil on the extension of the motor crankshaft, and outside the case the crankshaft is connected by a single, inclosed, telescopic, universal joint, with a housed propeller shaft extending to the rear axle. The drive is by bevel gear and a live rear axle, which revolves in a sleeve formed of two malleable castings, having expanding ring brakes integral with them at their outer ends. These castings are expanded and ribbed to form the differential gear case, and thus an exceedingly rigid axle, oil-tight and dust-proof, is had without any brazed joints. The differential is mounted on independent bearings, so that it cannot receive any side thrust from the wheels. So rigid is the axle that no truss rods are needed, nor are any strut rods required for holding it at the proper distance from the frame. The roller bearings on which it runs are adjustable. The outer ones can be adjusted without removing the wheels. The front end of the chassis contains all the machinery of the car, as can be seen from our illustration. The gasoline motor is mounted at an angle of 11 degrees from the horizontal. The inlet and exhaust valves are seen in the end of the cylinder. These can be readily removed by unscrewing the caps *I* and *E*. The spark plug is in an elbow at *S*. The oil reservoir of aluminium forms a cover, *R*, for the motor crank case. It contains a single sight feed, *F*, and the oil is fed by pressure from the crank case in sufficient quantities to always maintain the proper level. The oil tank can be removed by unscrewing a thumbscrew, and the cranks of the motor are then exposed to view for adjustment. The commutator is shown at *C*. It is of a special form for use with a single coil, and both the primary and secondary currents are commutated, which makes it possible to easily determine which cylinder is missing fire, in the event of uneven running. The motor has a suitable oil pocket which catches the oil and conveys it through a tube to the outer end of the forward bearing, which is babbitt lined. The flywheel of the motor has fan blades, for inducing a draft of air through the radiator. So powerful is this draft, which passes down under the car, that it is said to effectually lay the dust. The motor is controlled by a foot throttle, which automatically locks at any desired point. The clutch lever is a small handle mounted just under the steering wheel. The reverse is obtained by one of the pedals shown, while the other pedal operates the brake. As the rear space of the chassis is unimpeded by machinery, this is filled with two long muffler tubes connected in series. The exhaust, after being expanded in the first tube, passes to the second, or low-pressure muffler, where it is still further expanded and cooled before entering the air. The car is fitted with an adjustable bevel gear steering device and adjustable ball-and-socket joints in the steering connections. A great feature of this form of construction is that the machinery forms a unit in front, and can all be got at from above the car. A form of rotary vane circulating pump is used on the car. The 5¼ x 5¼ motor is of very heavy construction, being built to have a long life. When the car is loaded, its weight is evenly divided between the front and rear axle. The total weight of the car alone is 2,100 pounds. The construction is very substantial, and it should hold up well over all kinds of roads.



THE ROBINSON SPRING WHEEL PARTIALLY ASSEMBLED



APPEARANCE OF SPRING WHEEL AS APPLIED TO A MOTOR CAR.

THE NEW GROUT STEAM AUTOMOBILE.

Grout Brothers, of Orange, Mass., have this year brought out a steam side-entrance tonneau, the chassis of which we illustrate. The boiler, as can be seen, is mounted in front, under a cylindrical bonnet similar to that shown on the National car on page 66. The engine, *E*, is placed horizontally under the footboard, and drives a countershaft behind it by means of a chain. The drive is thence by side chains to the rear wheels. This arrangement makes the engine and all the working parts of the car thoroughly accessible. An auxiliary air pump that may be thrown into action by depressing pedal, *P*, is driven from the countershaft, as is also the water pump. A hand water pump is provided for emergencies. Two force-feed lubricators of novel design supply oil to the engine. A ratchet device driven from the countershaft forces a small cylinderful of oil to the engine cylinders once in a certain number of revolutions, while a gear pump, *O*, forces oil through a pipe having perforations on its under side which spray the oil over all the other working parts. The cut-off and reverse lever is seen behind the dash at *R*. A new form of throttle is used, operated by a small handle, *T*, traveling over a sector under the steering wheel. There is also a little handle, *C*, for by-passing the water. The fire is controlled by the usual pressure diaphragm operated by the boiler pressure. The steam is superheated after passing the throttle valve. This valve is fitted with an interlocking arrangement which closes it when the brake is applied.

The arrangement of the gages and valves in the dash is a very convenient one, and is that which seems to be prevalent on all the new steam cars.

Lane Brothers, of Poughkeepsie, N. Y., also exhibited a car and chassis built on the same lines as the Grout and having numerous valves in the dash, all suitably labeled. The Lane engine is set at an angle of about 45 deg. and is also incased, and the car is fitted with auxiliary steam, air, and water pumps.

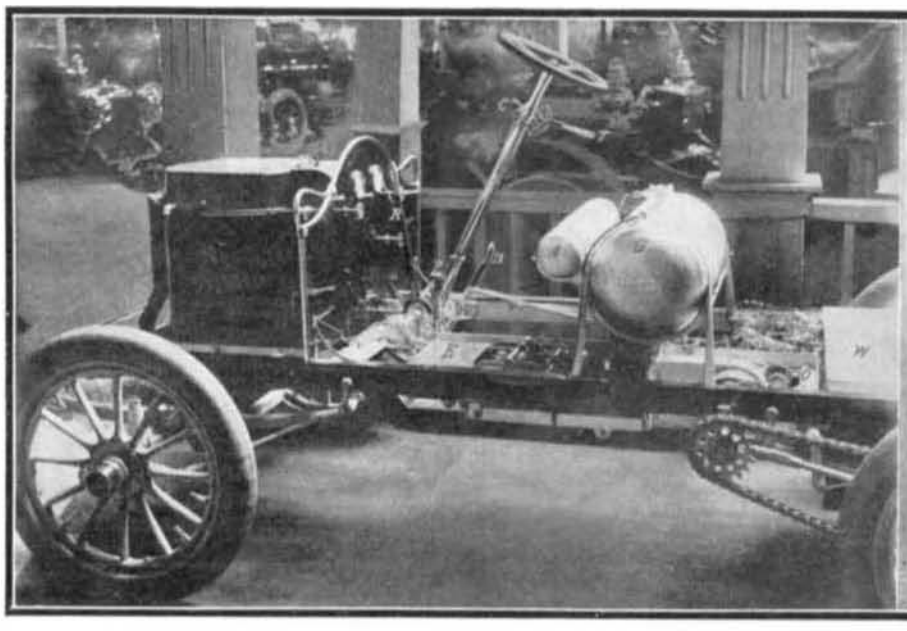
The Prescott Automobile Company exhibited the only steam runabout on view. The machine is much the same as that of last year, having a vertical engine under the seat, with chain drive to a live rear axle, and the boiler being in the rear of the body.

A NEW SPRING WHEEL FOR AUTOMOBILES.

BY THE ENGLISH CORRESPONDENT OF THE SCIENTIFIC AMERICAN.

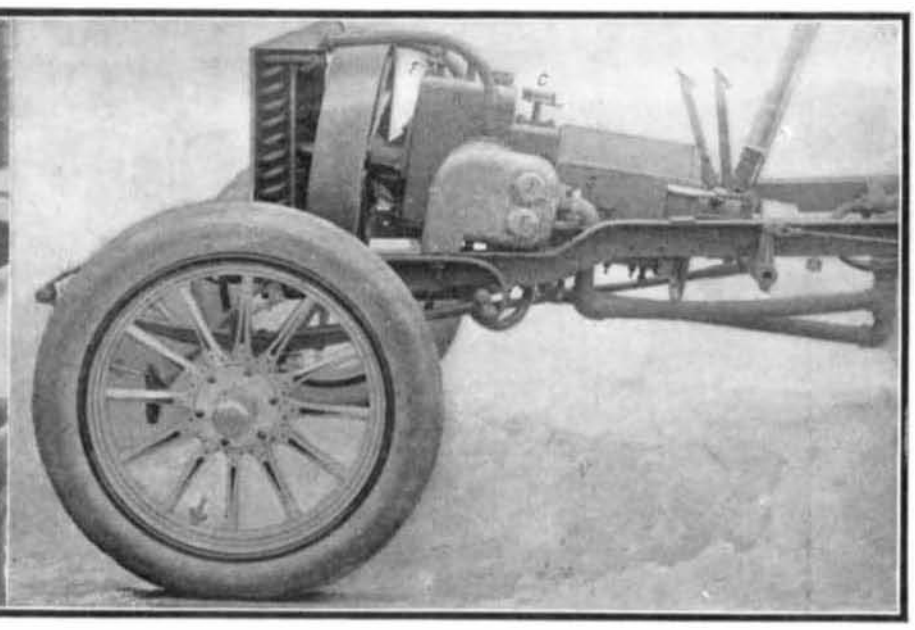
A novel type of wheel, specially designed for automobiles, has been devised by Mr. A. S. Robinson, Assoc. M. I. C. E., of Beccles (England), the main feature of which is to supply the resiliency of pneumatic tires by means of mechanical action. The broad principles of the design of this wheel may be adequately gathered from the accompanying photographs and diagram.

(*Continued on page 89.*)



CHASSIS OF THE GROUT STEAM TONNEAU.

A, Air tank; *B*, Brake pedal; *E*, Engine; *G*, Gasoline tank; *O*, Oil pump; *P*, Air pump pedal; *R*, Reverse and cut-off lever; *W*, Water tanks.



FRONT END OF THE NORTHERN CHASSIS.

C, Contact box; *E*, Exhaust valve cap; *F*, Sight feed; *I*, Inlet valve cap; *R*, Oil reservoir forming cover of crank case.

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—1⅞ inches—and it is 1⅝ 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 doing 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.

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 obtaintng 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.