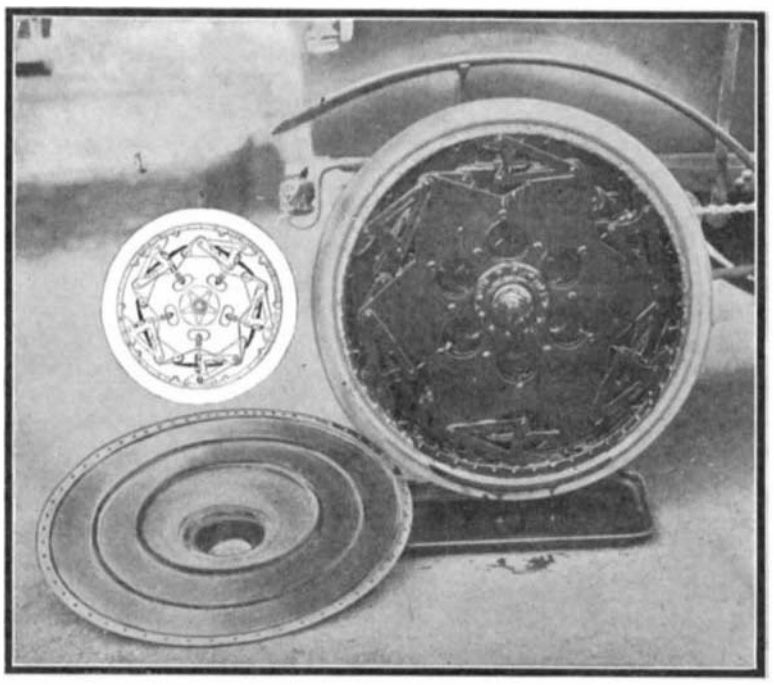
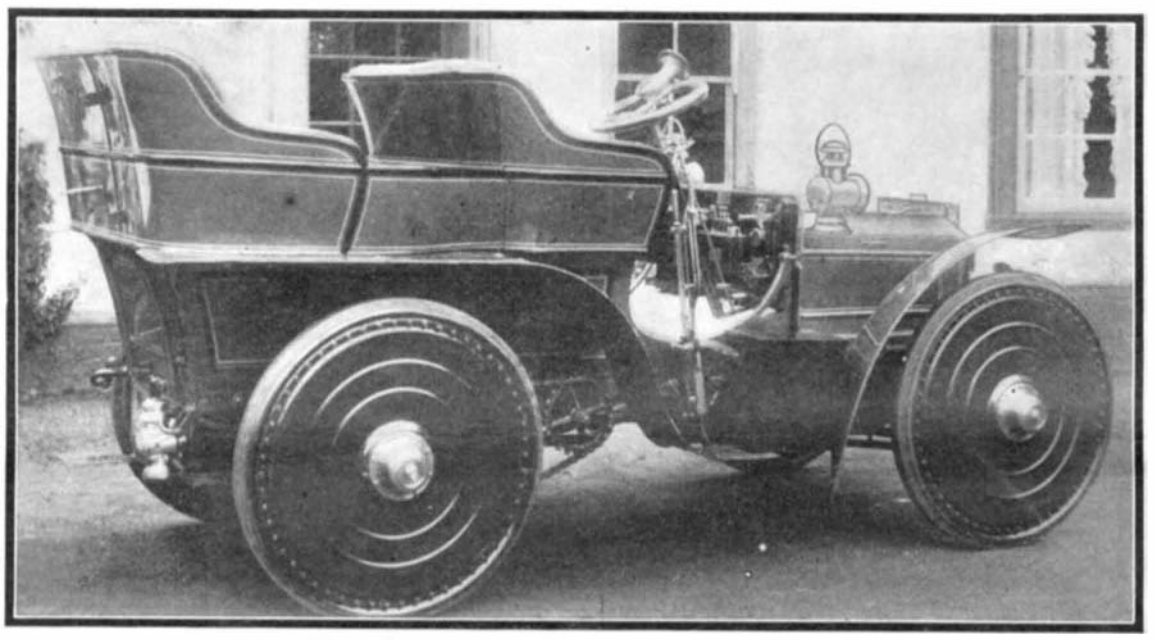
THE NORTHERN TOURING CAR.

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.

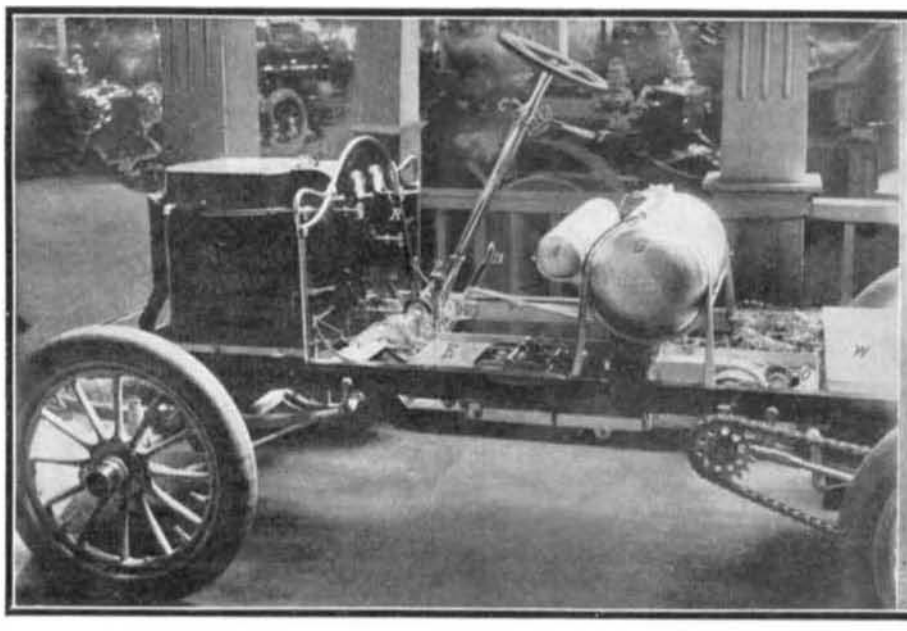
The Prescott Automobile Company exhibited the only steam runabout on view. The machine is much the same as that of last year, having a vertical engine under the seat, with chain drive to a live rear axle, and the boiler being in the rear of the body.

A NEW SPRING WHEEL FOR AUTOMOBILES.

BY THE ENGLISH CORRESPONDENT OF THE SCIENTIFIC AMERICAN.

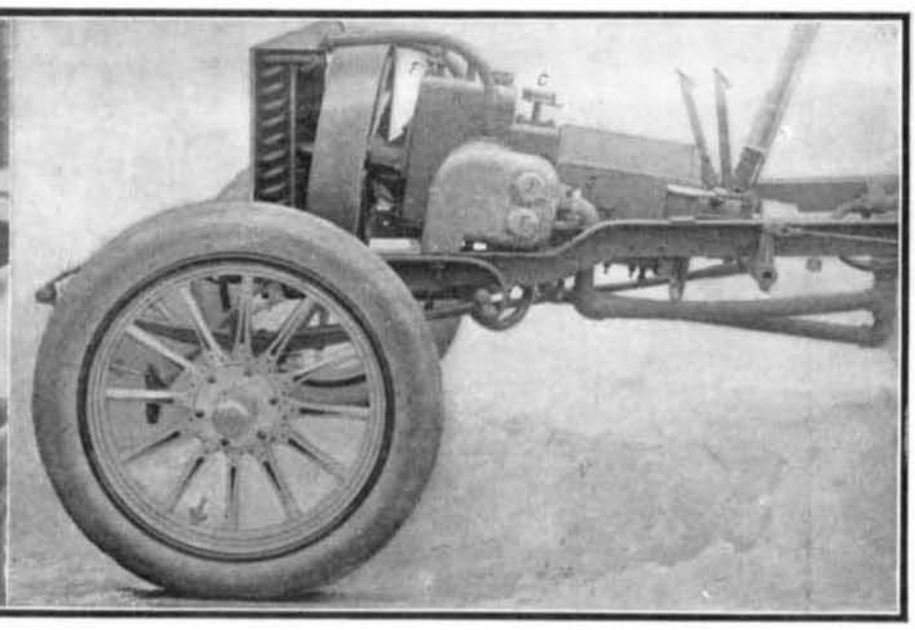
A novel type of wheel, specially designed for automobiles, has been devised by Mr. A. S. Robinson, Assoc. M. I. C. E., of Beccles (England), the main feature of which is to supply the resiliency of pneumatic tires by means of mechanical action. The broad principles of the design of this wheel may be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