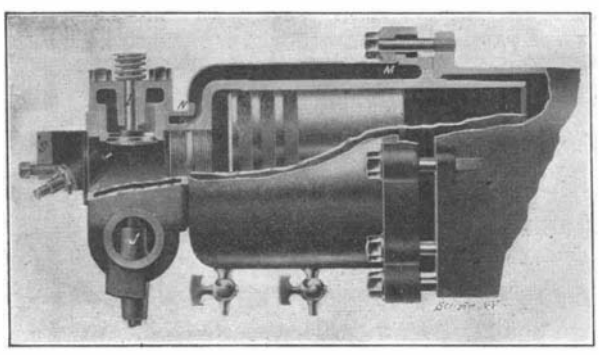
distant, where a depot was formed for flying columns. The service on this road lasted for many weeks, in fact, up to the time the corps started for England, and was carried out without any mishap or loss, although during the whole of the time the line was threatened by the Boers, and sniping frequently went on, but no one of the corps was hit. A new system of escorts was adopted; sufficient men to form two or more escorts being put under the command of the officers of the corps and encamped with the corps. The engines did twice whatever the Boers did, and twice whatever the English sailors did."

The lesson of the war as regarded automobilism was a very striking one. It was this—the whole of the Transvaal was one mass of dead animals. It was impossible to feed them. They died by hundreds of starvation. The great outbreak of enteric fever was no doubt caused by the mass of dead and dying animals. But there was not a dead or stinking traction engine in the whole of South Africa. While managing a line of steam traction from Pretoria to Rustenburg, Col. Crompton took about 130 tons of food per week for two columns 20 or 30 miles west of Pretoria. Thirty tons of that amount was food for men and 100 tons was for horses and mules. Had it been possible to supply self-propelled vehicles to the columns, the weight could have been cut to about seven or eight tons of fuel in place of the 100 tons of forage. All the heavier things, such as guns, wagons, engineers' park, etc., have been and can be transported most successfully by self-propelled machines, either steam or oil. There is a much more difficult question, and that is to do something to relieve the English cavalryman and mounted infantryman of the huge weight the horses have to carry. Col. Crompton wishes to introduce into the service some light vehicle that could accompany the cavalry and mounted infantry, and carry part of the weight which killed the horses and destroyed the mobility of the British army. He sees no difficulty in producing a 25-hundredweight engine to carry its two tons of load, to follow the mounted troops in all places where wheeled carriages could go. As an instance of what traction engines had done in South Africa, Col. Crompton stated that he had seen engines take a 10-ton gun up a gradient of 1 in 5.

THE CADILLAC GASOLINE RUNABOUT.

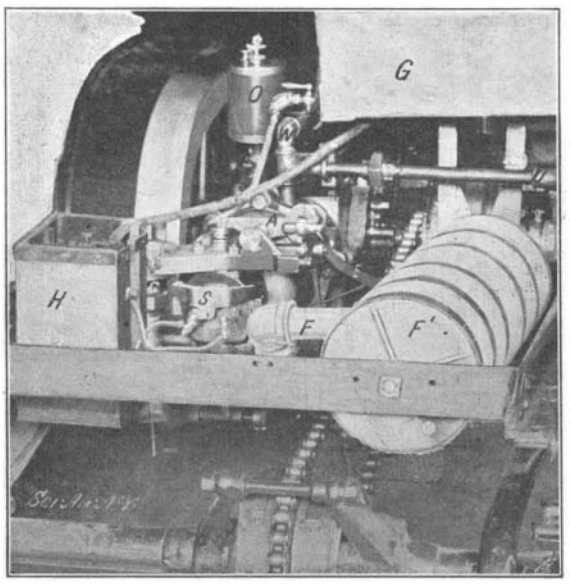
The gasoline machine illustrated on this page is a moderate-priced car recently placed on the market,



CYLINDER OF MOTOR, SHOWING METHOD OF CLAMPING ON COPPER WATER JACKET.

and having a number of original features worthy of description. All parts are made interchangeable as far as possible, and the body is entirely separate from the chassis, from which it can be quickly removed by withdrawing six bolts.

The chassis is planned after the standard pattern of American runabout. A 5 x 5-inch horizontal motor is mounted on an angle-iron frame and is connected to the rear axle by a chain. The planetary gears for the slow speed and reverse, as well as the fast speed clutch, are carried on the motor shaft outside of the



MECHANISM OF CAR VIEWED FROM THE REAR.

driving sprocket, and this shaft is made sufficiently heavy so that a third bearing on the end beyond the gears is not required. The slow-speed and reverse gears are thrown in by the usual band brakes, while the fast speed clutch of the friction disk type is operated by a long lever seen at the side of the seat.

The motor crank case and cylinder are two separate castings, bolted together as shown. A copper water jacket is clamped in place between the clamping ring and flange, *M*, on the cylinder, and flanges, *N*, on the cylinder end and the valve chamber, which is screwed tightly against the end of the cylinder on a large steel pipe nipple. The two pet cocks shown connect with the cylinder and water jacket respectively. The inlet and exhaust valves, *I* and *J*, can be seen in the valve chamber in the sectional view of the motor, as well as the method of clamping the water jacket in place. The clamp, *S*, holds in place a plate carrying two mica spark plugs. The spark jumps from one to the other, and as both are insulated, the chances of short-circuiting are small. The inlet valve is operated mechanically, and the amount it opens is controlled by an eccentric-operated rod, *E*, curved at its end to pass between a roller on the end of the valve-opening arm, *A*, and a movable roller beneath it. The end of *E* is tapered on its lower side, which slides on the movable roller, and by sliding this roller forward so as to make more of the tapered part of *E* ride upon it, the upper surface of *E* and the roller arm *A* are raised higher, thus opening the valve wider. A handle on the steering wheel controls the movement of the lower roller and hence the opening of the valve. The motor is controlled almost entirely by this ingenious throttle arrangement.

The carbureter, seen at *C*, is of the float feed, atomizer type. The needle valve button for setting the mixture projects from the carbureter top. A wire gauze cone on a suction-lifted valve that fits in the spraying nozzle, breaks up the gasoline and tends to vaporize it. Wire gauze is also placed in the opening of the air-suction pipe below the carbureter. The spark coil is located in a box, *H*, behind the carbureter. Its two secondary wires can be seen connected to the two spark plugs, as well as a heavy primary wire extending to the circuit breaker on the motor. *O* is the cylinder oil-cup; *G* the gasoline tank; and *F* the exhaust pipe leading into the muffler, *F'*.

The water is circulated through the cooling coils by a centrifugal pump. It passes from the water jacket of the motor through pipe, *U*, while pipe, *W*, connecting with the water tank, conveys water to the system to replace any that evaporates. The water in the tank is always kept cool and forms no part of the circulatory system, being used merely as an extra supply.

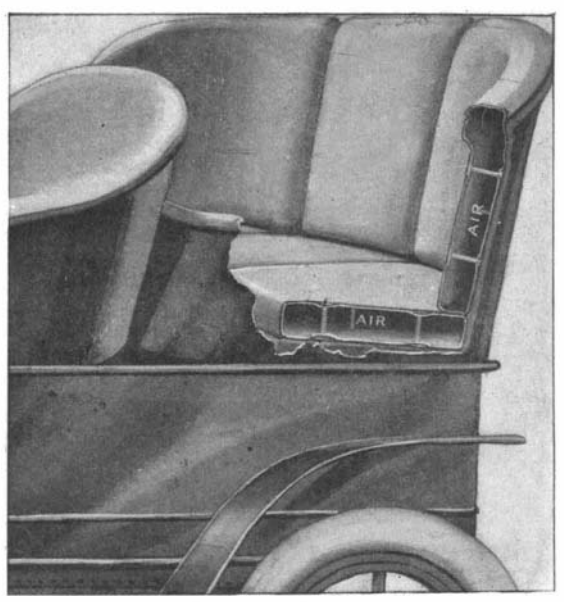
The crank shaft boxes of the motor can be slipped out and new ones put in without taking the whole engine apart. This can be accomplished very simply by removing four nuts and taking two caps off the crank case, thus enabling one to get at the boxes, which are each in two halves. The crank shaft is a one-piece forging, much larger and more substantial than is ordinarily used with the size motor employed.

The car is strongly built throughout. Ball bearings are used on the front wheels and rear axle, and the latter is strongly braced about the differential.

The tonneau body can be easily attached and fastened in place by two bolts, thus increasing the carrying capacity of the machine to four people, at a moment's notice.

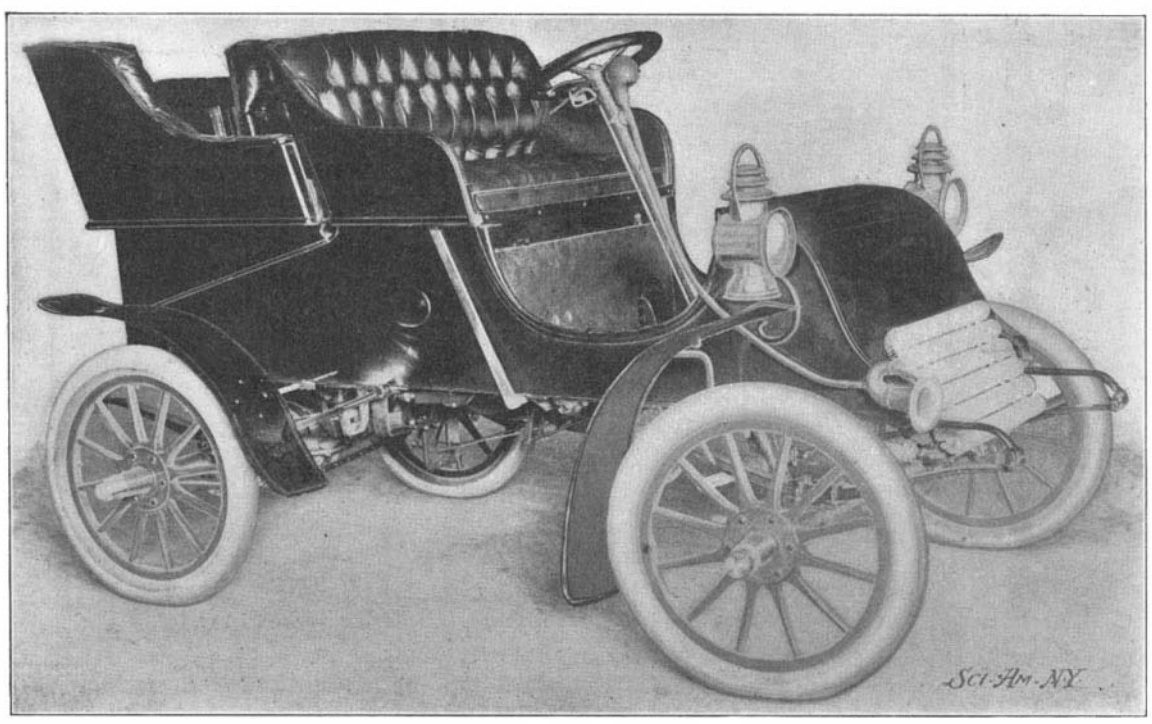
AUTOMOBILE AIR CUSHIONS.

Air cushions are now manufactured which are calculated to add as much to the comfort of the individual as pneumatic tires have to the smooth running of the machine. The cushions shown in the illustration are made of cotton duck coated with rubber sufficiently thick to make the fabric air-tight. Stays are placed on the inside at regular intervals for the purpose of holding the cushion in proper shape when inflated. The cushions have outer coverings of cordu-

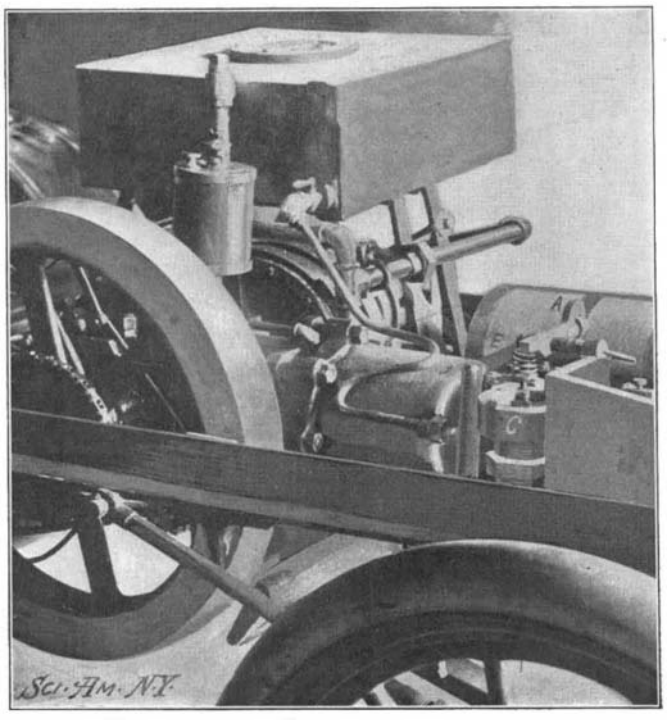


AIR CUSHION FOR AUTOMOBILES.

roy, leather, duck, etc., according to fancy. Their backs, sides, and seats are smooth and have no ridges or buttons to render them uncomfortable. Having no hollows, they do not hold the dust, and being made of rubber, are proof against dampness.



A 6 H. P. CADILLAC RUNABOUT.



ENGINE AND MECHANISM OF CADILLAC CAR.