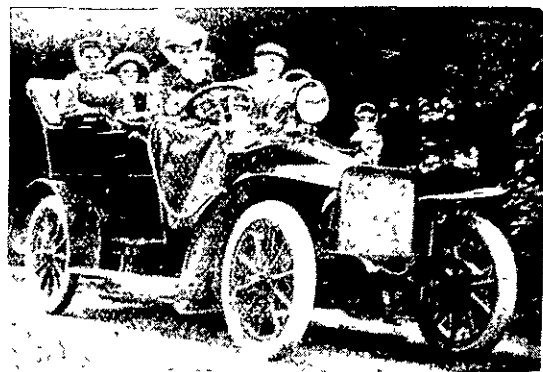


and is of the usual sliding-gear type, a new pair of gears being brought into mesh when it is desirable to alter the speed of the car relatively to the motor. The friction clutch is of the leather-faced, cone type, mounted on crank shaft and it carries a Renold silent chain driving the gear-box counter-shaft. Four speeds forward and one reverse are provided. The forward gears give a speed up to twenty-five miles per hour on the level. All changes of speed are made by means of one lever. The chassis is fitted with the following first aid appliances manufactured by a leading firm of fire-appliance makers: one 35-gallon chemical cylinder, one 3-gallon hand chemical cylinder, two 10' 0" ladders, 3½" sides, also one hose reel with 160' 0" of hose.

The Emission of Smoke and Steam.

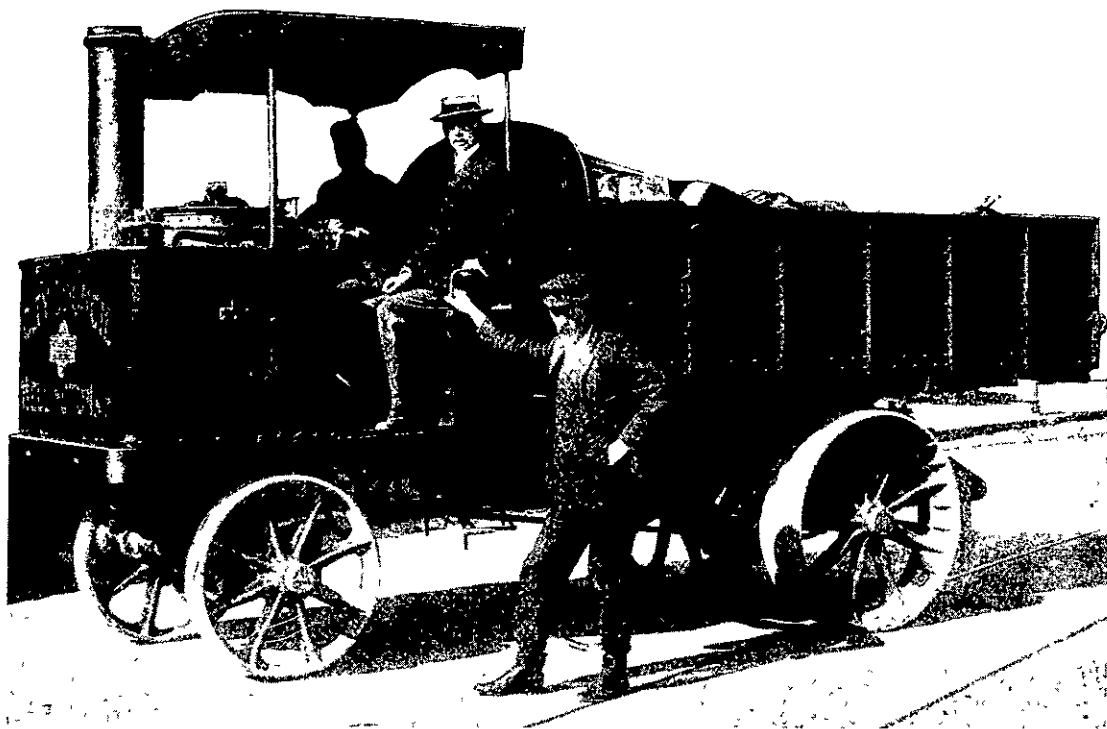
HOW TROUBLE MAY BE AVOIDED.

In view of the opprobrium to which the owners of steam motor vehicles are liable, it is important that they should make themselves acquainted with the precautions that can be taken to prevent the emission of smoke or of visible vapour. It should be sufficient to show that a vehicle is so constructed as to consume its own smoke, but evidence must be given as to the actual construction of the essential parts. A short description of the usual devices employed to prevent the creation of smoke, and the emission of visible vapour, will not, therefore, be inappropriate. It must be understood that "to consume its own smoke" is an entirely legal phrase, and is a mechanical and physical impossibility: all that can be done is to prevent the creation of smoke; once it has been produced it cannot be consumed. A bright red fire will cause no smoke, because all the volatile parts of the coal have been driven off, and nothing but solid carbon is left. As the air passes through the fire bars, the oxygen combines with just so much carbon as is chemically required to create either carbon monoxide or carbon dioxide, both of which are colourless gases. When, however, fresh fuel is necessary, the cold coal is put on the top of the hot fire, and is really "baked" for some little time. During this baking all the volatile hydro-carbons



15-H.P. DARRACQ, AND AN ENTHUSIASTIC MOTORISTE (MISS COOKE, PETONE).

are driven off as gases. If a stream of air is brought in contact with these gases while they are at a sufficiently high temperature to burn, they will be consumed thoroughly and efficiently. On the other hand, if only a small supply of air reaches these gases they will decompose, the hydrogen combining with the oxygen to form water, and minute particles of solid carbon being freed in the shape of smoke. Oxygen has a much greater affinity for hydrogen than for carbon, and consequently it combines with hydrogen in preference. In order to make the matter quite clear, let it be put this way: if no oxygen reaches the gases which are given off by baking coal, they will leave the chimney as unburnt coal gas—the equivalent of "retorting" in a gas works; if a very small quantity of oxygen reaches these hot gases, the hydrogen in them will be burnt, whilst the carbon in them will take the form of smoke; if a sufficient supply of oxygen reaches the gases, they will be entirely and smokelessly burnt. With the conditions ruling in a steam-wagon fire box, simple destructive distillation never results, as some unconsumed oxygen is sure to find its way through the lower layers of the fire, and this decomposes a little of the gas and causes some smoke. It is, therefore, obvious that some means must be taken to ensure a better supply of air directly smoke becomes visible at the top of the funnel. The usual practice is to open the fire-hole door, and to regulate the admission of extra air by the amount to which this door is opened. When the motor wagon is in motion, the exhaust steam



STRAKER 5-TON STEAM WAGON JUST DELIVERED TO WELLINGTON CITY COUNCIL.

which discharges through the funnel will draw a much greater supply of air through the fire, so that, by applying the coal in small quantities at short intervals, the air will be found sufficient for combustion; but directly the engine stops, this induced draught ceases, and it is then that the extra supply of air through the fire-hole door must be given. There is a further provision in the shape of a supplementary steam jet in the funnel, which can be turned on to induce a draught when the engine is not running.

The open fire-hole door is a remedy that must only be applied in "homœopathic" doses; sufficient air must be admitted to complete combustion, and no more. If too much is admitted, the products of combustion are cooled, so that they cannot communicate much heat to the boiler, and the cold air striking against the tube plates will have a tendency to cause the joints to leak. When to open the door, and when to apply the jet, are questions that circumstances alone can decide; but, as a general rule, opening the fire-hole door reduces the generation of steam, and turning on the jet increases it.

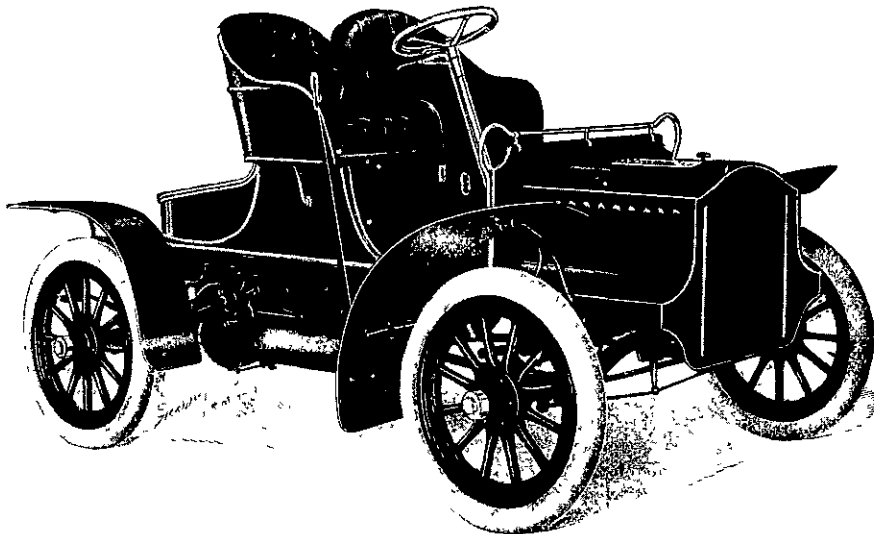
The question of exhaust steam is really quite separate from that of smoke, but a study of the cases that have been brought into the police courts shows that the English policeman is even incapable of distinguishing between black smoke and white exhaust. In some cases where white "visible vapour" has been the sole cause of offence, the policeman has sworn that dense volumes of black smoke were emitted. It will, therefore, be seen that, though the owner may be convinced that the sole cause of complaint had relation to visible vapour he must be prepared to contest it as a smoke cause. A further article will serve, at an early date, to illustrate the devices that are employed to render the exhaust steam invisible, and thus to arm those interested on all these points.

To allow the air to escape from the petrol tank, when the petrol is being added to it, the funnel used should be made with a small air pipe up the side of the stem, which (the stem) should not be less than an inch in diameter.

The Straker Steam Wagon.

Our illustration shows the new Straker 5-ton steam wagon recently delivered to the Wellington City Council. At the preliminary trials this wagon pulled five tons dead-weight up the Pirie street hill, varying from 1-7 to 1-8; and on the official trial, under the superintendence of the city engineer, Mr. Morton, the wagon went out light from the Council yard to the Corporation quarry at Maranui, via Oriental Bay, a distance of six miles, in forty minutes. Here 4½ yards of road metal were taken to the top of the Crawford road hill, a distance of two miles and an upgrade all the way, in twenty minutes. The city engineer is perfectly satisfied with the working of the Straker, and the wagon is now being employed for regular work, it being estimated that it will be able to take from twenty-five to thirty yards of metal per day to various parts of the city, and that it will prove a saving to the Council of from £20 to £25 per week. The machine can easily do the work of five teams at a cost of under £8 per week, including wages, depreciation, fuel, oil, repairs, and interest.

The Gordon-Bennett Cup race was killed by the English and French. The British Automobile Club decided to abandon the event in the interest of its own Tourist Trophy race, a speed contest held in the British Isles open only to touring cars under touring conditions. The French Club withdrew because it felt that France was not treated fairly considering her position as the boss nation of the motor world. Meanwhile, the valuable Gordon-Bennett Cup presented by and called after the proprietor of the New York Herald, is held by the Automobile Club of France, having been won by the reckless Thery in 1904 and 1905. France has won it four times, England and Germany once each. The French club will replace the lost race by another over the Fontainebleau circuit, in which there will be no restriction as to the number of representatives any nation may have. That was the rock which wrecked the Gordon-Bennett race.



6-H.P. CADILLAC RUNABOUT.