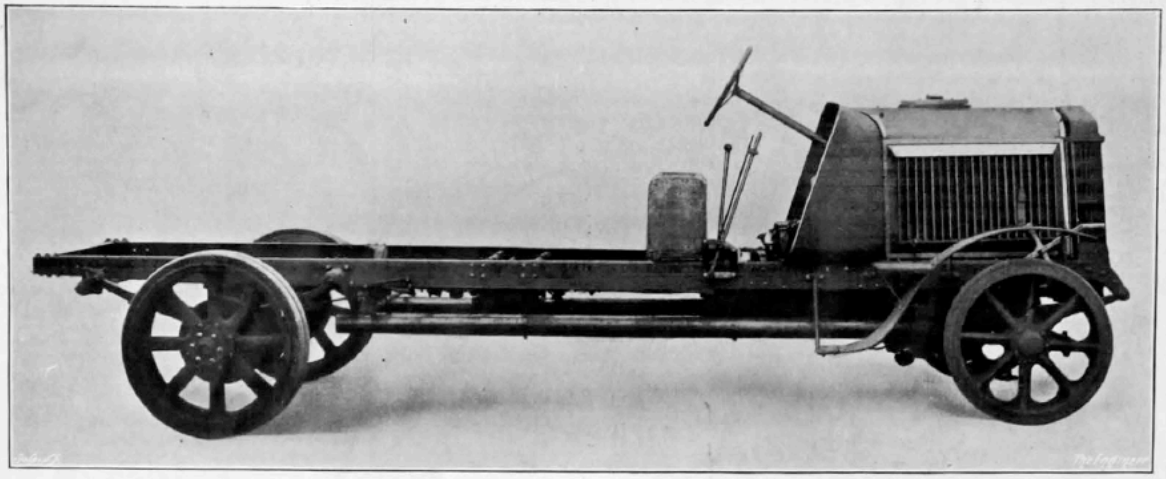
CHASSIS OF COKE FUEL STEAM MOTOR

CLARKSON, LIMITED, CHELMSFORD, ENGINEERS



A NEW COKE FUEL STEAM MOTOR.

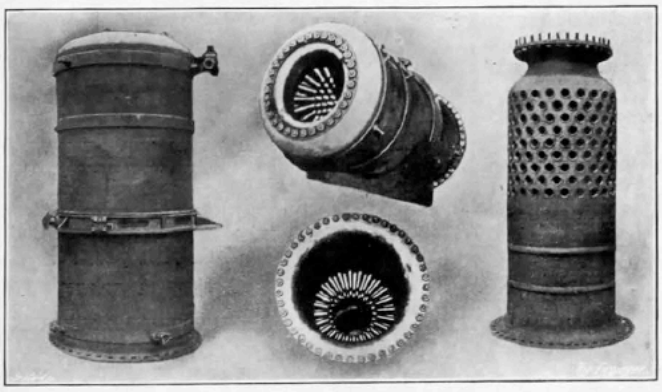
MR. THOMAS CLARKSON has been so consistent an advocate of the steam-driven mechanically-propelled road vehicle, that any new development with which his name is associated must merit the close attention of engineers associated with transport work. The new motor, on which satisfactory tests have been carried out on an experimental chassis, is the ninth steam type with which Mr. Clarkson's name has been linked. His first experiments in this field were made as long since as the year 1894, and it is now eighteen years since a steam-driven vehicle of his design was put into public service at Torquay. A large fleet of Clarkson omnibuses is now being operated by the National Steam Car Company, which works in conjunction with the great traffic combine which serves the street and tube transport systems of London. These omnibuses are all fitted with what in the light of the latest development must be regarded as one of the earlier types of steam motor, and if the anticipations of the inventor are realised, are destined to be replaced by the new type, of which a demonstration has just been given to a representative of THE ENGINEER, and a fully illustrated description of which is now for the first time published.

The experimental work with the coke-fired motor was begun in 1913, and in the succeeding year trial runs between London and Brighton, extending over a distance of 219 miles, were carried out under the observation of officials appointed by the Royal Automobile Club. That test was carried out on a three-ton lorry, the gross weight being 6 tons 11 cwt. 2 quarters, and the certified fuel consumption at the speed of twelve miles per hour averaged on the two days' running slightly under 4 lb. of coke per mile. The experience gained at that period and in a series of subsequent tests indicated the directions in which progress was to be sought, and the outcome has been the evolution of the new type, which, although primarily designed to use solid fuel, can also be operated on liquid fuel. The need at the present time of developing new applications of solid fuels is sufficiently obvious, and of the solid fuels which are available, coke is by far the most abundant as well as the cheapest under present conditions. The Coal Controller is desirous of encouraging the use of gas coke in every possible way, and from this standpoint the new motor is being introduced at a most opportune time.

It will be noted from the accompanying illustration that the lines of design have been partially at least dictated with the object of making the engine suitable for operation by comparatively unskilled drivers.

As there are very large numbers of drivers accustomed to the control of petrol motor vehicles, it was decided at the outset to standardise the controls of this new steam chassis, in order that a driver who has driven a petrol motor vehicle can immediately learn to drive the new vehicle, and will find each pedal and lever in the usual position, and performing the same function as that to which he has been accustomed, *i.e.*, in addition to the steering column there is a clutch pedal for the left foot and brake pedal for the right foot, side brake lever and change gear lever. A feature in which this motor is quite closely allied to the petrol motor is in the introduction of gearing. In the past the design of the steam road motor has been based on the wider range of flexibility possessed by the steam in comparison with the petrol engine, and it has not been customary to introduce a gear box into commercial vehicles. The absence of gearing has, however, made it necessary, in order to meet heavy loads and soft ground conditions, to provide a larger engine than would otherwise have been needed, and Mr. Clarkson has decided that in the new motor he would provide an emergency gear ratio for this purpose. Once the principle of the gear box is admitted in conjunction with the steam motor, it is possible, of course, to simplify construction by eliminating the ordinary reverse gear and to have a free engine. It is stated that in an actual test the chassis fitted with the new motor was left with steam up all night, the engine quietly turning round and regulating its water feed, lubrication and steam pressure entirely unattended

Turning to the details of the invention, the power unit comprises boiler, engine and condenser, and although mainly intended for road transport work, is also claimed to be suitable for marine or other purposes where a light weight power unit is required.

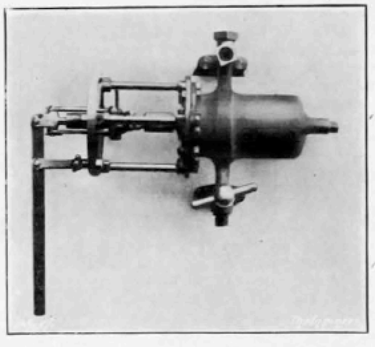


THE BOILER, WITH AND WITHOUT CASING

The boiler consists of two cylindrical steel shells flanged and bolted together at each end. The shells are each forged and drawn under a hydraulic press, and there is not a single weld or rivet in the boiler. When the two shells of the boiler are unbolted every part becomes accessible for inspection and cleaning. The outer shell is formed with thickening belts where holes have to be drilled for the attachment of boiler fittings. The inner shell is drilled to receive water tubes, which are of the "thimble" type about 4in. long and 1¼in. average diameter. These water tubes are not expanded, but pressed into the inner shell and held in position by the pressure within the boiler. The working pressure is from 300 lb. to 350 lb. per square inch. The maintenance of this pressure is controlled automatically by an oscillating valve which regulates the draught of the fire according to requirements.

The boiler is designed to be fired by either solid or liquid fuel. In the case of solid fuel it is fed through the central tube from the top. A superheating coil surrounds the central tube, the temperature of superheat being 620 Fah. On a 3-ton coke lorry it is only necessary to replenish the fire every 12 or 15 miles.

The supply of water to the boiler is by a pump operated by the engine at a reduced speed. The supply of water is controlled automatically by a reciprocating float which acts upon the foot valve of the feed pump in such a manner that as the float rises with the water level it prevents the foot valve returning to its seating; as a result the charge of water drawn into the pump barrel returns to the tank instead of being forced into the boiler until such time as the float descends and allows the foot valve again to become operative. This water control maintains the working level without any attention from the driver. The boiler is provided with a safety valve of the dual locomotive type which discharges through a vacuum valve into the condenser. It is also fitted with blow-down valve feed check and reflex water gauge.



FLOAT CHAMBER AND FLOAT OPERATING GEAR

The feed-water is introduced at the waist of the boiler. The water is not permitted to impinge directly upon the inner shell, which is in actual contact with incandescent fuel, but is brought into contact with a thin steel plate between the inner and outer shell, and any deposit from mineral salts contained in the water takes place on this thin steel plate from which it is readily detached, and falls by gravity to