THE TROJAN UTILITY CAR

A Successful Attempt to Manufacture an Economical Car With a Very Simple Power and Transmission Mechanism. Solid Tyres and Efficient Springing are Essential Features

The Trojan car is not by way of being an entirely new proposition suddenly put on the market for trial by the general motorist. It has passed the experimental stage, and the manufacturers, Leyland Motors, Ltd., of Trojan Factory, Kingston-on-Thames, who are producing it in large quantities, have specialised on the construction and output of all the component parts on mass production lines, which allows of the vehicle being made in the most efficient manner and of the finest materials, and sold at a remarkably low cost in view of the service which the car is capable of giving.

But it is right to say that the design is that of Mr. L. H. Heinsfield, A.M.I.C.E., M.I.A.E., who set out to solve the problem of an efficient car in which the mechanism shall be reduced to terms of the greatest simplicity, and in which the running expenses were reduced to that which should almost term the irreducible minimum. In respect of the remarkably efficient springing alone, which allows the user to dispense with what was hitherto considered the indispensable pneumatic tyre, the car stands out as a remarkable automobile engineering achievement.

In the photographs and drawings which we have specially prepared to illustrate these notes we have endeavoured to give an idea of all the interesting and unconventional features of the vehicle.

Reduced to its barest form, the general arrangement may be said to consist of a four-cylindered horizontal engine, with pairs of cylinders operating together (or nearly together), and on the two-stroke principle, so that there is the constant torque of the four-cylindered engine, with a two-throw crank-shaft and two combustion chambers. This, through a spring drive on its flywheel, transmits power to a two-speed and reverse planetary gear controlled by external hand brakes, and in turn transmitting the power (via a helical toothed reduction gear) by means of a duplex roller chain direct to a double chain sprocket on one of the road wheels, which drives the second road wheel through the solid axle in the axle tube at the rear. But while this is simple and tersely may indicate the simplicity of the general lay-out of the mechanical plant, the details—equally simple and robust—are of exceptional interest.

Taking first the engine. It has four cylinders in pairs, the pairs lying alongside each other horizontally, and the lower and upper cylinder of each pair have their aluminium pistons coupled to a common connecting rod, which really comprises two rods integral at the big end and spayed apart at the little ends for attachment, one to the gudgeon pin of the lower piston and the other to the gudgeon pin of the upper piston.

These connecting rods are coupled to the crankpins of a two-throw crank-shaft of splendid design and material, the cranks being set at an angular position of 180° to each other. Since the two pairs of pistons obtain an expansion impulse on each outward stroke, the result is what very nearly approaches a constant torque—in fact, the same approximation...
to a constant torque which we get in the four-cylindered vertical engine of conventional design.

The fact that the cylinders of each pair are one above the other and not in line axially with the crank, but having their axes, when produced, passing above and below the crankshaft, causes a slight lead of one piston over the other on the outward stroke and a corresponding lead of the other on the inward stroke. This peculiar motion, a variation of acceleration as between the two pistons, is ingeniously made use of in the uncovering of the ports by the pistons at such relative times that a fuller index of the crank-case compressed gases and a more complete outflow of the exhaust are obtainable than in the case of the conventional two-stroke engine, with one operating piston in each compression space. So that, although the two pistons only really act as one, since they move out and in at approximately the same time and are simultaneously driven out by the expansion of the charge in a common combustion chamber, yet their ingenious arrangement has the effect of getting a more complete scavange and induction, and baffles on the piston heads are not required, while the cooling can be more effectively carried out since the surface area in contact with the surrounding water-covered walls is greater. In all respects the arrangement has cumulative advantages which have been very fully availed of by the ingenious engineers who are responsible for the unique design.

The bore of the cylinders is 2½ ins. and the stroke of the pistons is 4½ ins. This gives a Treasury rating of 10 h.p. and, of course, a 1½ tax. There is no valve gear. Each pair of cylinders, with its pair of pistons and single connecting rod, has its own crank-case compression space, a central mixture to be drawn into the crank-case while the pair of pistons are moving towards the cylinder head. The outward movement of the pistons compresses the charge, and at the same time opens the exhaust port in one of the pair of cylinders and the inlet transfer port in the other, and across the common combustion space, coming considerable turbulence and thorough mixing.

At the lower piston, which governs the exhaust, moves in advance of the top piston (due to the arrangement of the connecting rod, which gives it a lead) it uncovers the exhaust port in advance of the opening of the inlet port, and the exhaust gases commence to flow out before the compressed gases start to flow in. On the inward stroke the lower piston leads and closes the exhaust before the transfer port has been closed by the top piston. At the end of the backward stroke of the top piston there is a slight oscillation, if we may so call it, due to the peculiar arrangement of the common V connecting rod, and the gases are, as it were, oscillated backwards and forwards in the combustion space across the tops of the two cylinders. This is claimed to aid very considerably to the effective and rapid and equal propagation of the flame in the combustible mixture, and ensures a maximum effective pressure above the piston heads. The lubrication is effected partly on "Petrol" system. Oil is mixed with the spirit in the proportion of one part of lubricant to 30 parts of petrol. This ensures the lubricant being proportional to the engine load. The oil falls to the bottom of the crank-case as the petrol mixture is gased, and a series of ingenious ducts in the rotating crankshaft journals, in combination with oil passages in the main bearings, ensures the oil being fed by the partial vacuum to chambers, whence it lubricates the main bearings. The system is quite simple and sure, and operative so long as the crankshaft is rotating. No valves or pumps are required.

The epicyclic (planetary) gear is contained in the rotating gear-box, which is driven from the flywheel by a series of coil...
springs in tension. Some of these are seen in our photograph. They act as a very effective cushion drive, and also prevent undue shocks as between gear and engine.

The gear is operated by external metal, friction-lined brakes, which hold one or other of the planetary gear units, and so give a direct top gear (when both elements of the planetary gear are locked together and the gear rotates as a mass with the flywheel), a low gear and a reverse. A most ingenious

The attachment of the full cantilever spring to the back axle. The brake adjustment is clearly shown.

The cantilever rear spring of the Trojan: The leaves are riveted together, and a spring pressure plate holds them in the box trunnion bracket.

gate-control lever is applied to the gear, which, in combination with the pedal, which also controls the epicyclic brakes, gives the same method of changing practically as in the case of a conventional gear-boxed car. The drive from the epicyclic gear is through a spiral toothed reduction gear running in an oil-tight gear-box, and then by a duplex roller chain direct to the solid back axle.

The ignition and lighting equipment derives its current from a six-volt accumulator, carried accessible on the running-board of the car. The accumulator is charged from a small dynamo driven by the engine, and supplies current for the coil and accumulator ignition and the lamps.

The springing is one of the great features of the car. Full cantilever springs are used, front and rear. These are full-crowned on trunnions carried across the punk-like sheet-metal chassis frame, which forms a complete under-protection to the road. To adopt for one of our premier tyre makers.

There are other details of interest in the Trojan. Thus, the carburettor is particularly simple. It has been designed specially for the engine, and is beautifully made. The front axle is tubular, with neat steering heads with antifriction metal thrusts. The steering is by internal toothed ring and pinion reduction gear, and is very sensitive, but not liable to be driven by the wheels. It is entirely enclosed and runs in oil. Two independent brakes are fitted; one acts on the transmission shaft and the other on the rear axle, while in emergency the epicyclic gear brakes are available.

The body seats four people comfortably, as we have tested. There is an adjustable wind-screen and a very neat folding hood and side curtains, which makes the car a very cozy family travelling conveyance in any sort of weather. Under
the dash is a spacious cupboard for luggage. It can be illuminated by one of the dash lamps, which is a very great convenience. A full set of tools in a neat tool box is provided, and strong and easy foot mats.

The wheel base of the car is 8 ft., and the track 4 ft. Over all the dimensions are 11 ft. long and 4 ft. 10 ins. wide. The weight is 19½ cwt. There is a mechanical starter for the engine which can be operated from the driver’s seat.

The finish is in saddle blue, with black wings, and the price with lighting set, hood, side curtains, adjustable wind-screen, horse mats, kit of tools and a couple of gallons of petrol, is £175.

The Company also make a detachable coupé top to fit the standard car, for which an extra £10 is charged. It makes a very convenient vehicle for professional or business use, or for service as a limousine vehicle. The petrol consumption is at the rate of 40 miles to the gallon. Oil consumption is at about 1,800 miles to the gallon, and the tyres will run 18,000 miles for the set. An average speed over any give-and-take road of 35 miles per hour can be easily maintained with four passengers. Bad roads do not seem to affect the comfort of the vehicle or very much the pulling power of the engine, which does not tear itself to pieces, but gives out its best power at a very reasonable speed. At 400 revolutions per minute it will develop its 10 h.p. Higher speeds do not greatly increase the power output, so that it will climb hills generally on top, and is conservative as regards wear and tear. On the low gear it may confidently be claimed to be capable of climbing anything at a trot with on any ordinary road in a civilised country—Scotland not excepted. The car carries a guarantee for six months.

The manufacturers are Messrs. Leyland Motors, Ltd., of Kingston-on-Thames, and Leyland, Lancashire.

A NON-LEAKING PETROL VALVE

Thorn with leaking petrol tanks and valves are. the new tax is 8s. It is to be had from Messrs. Hobbed.