The New 8 h.p. Rover Car

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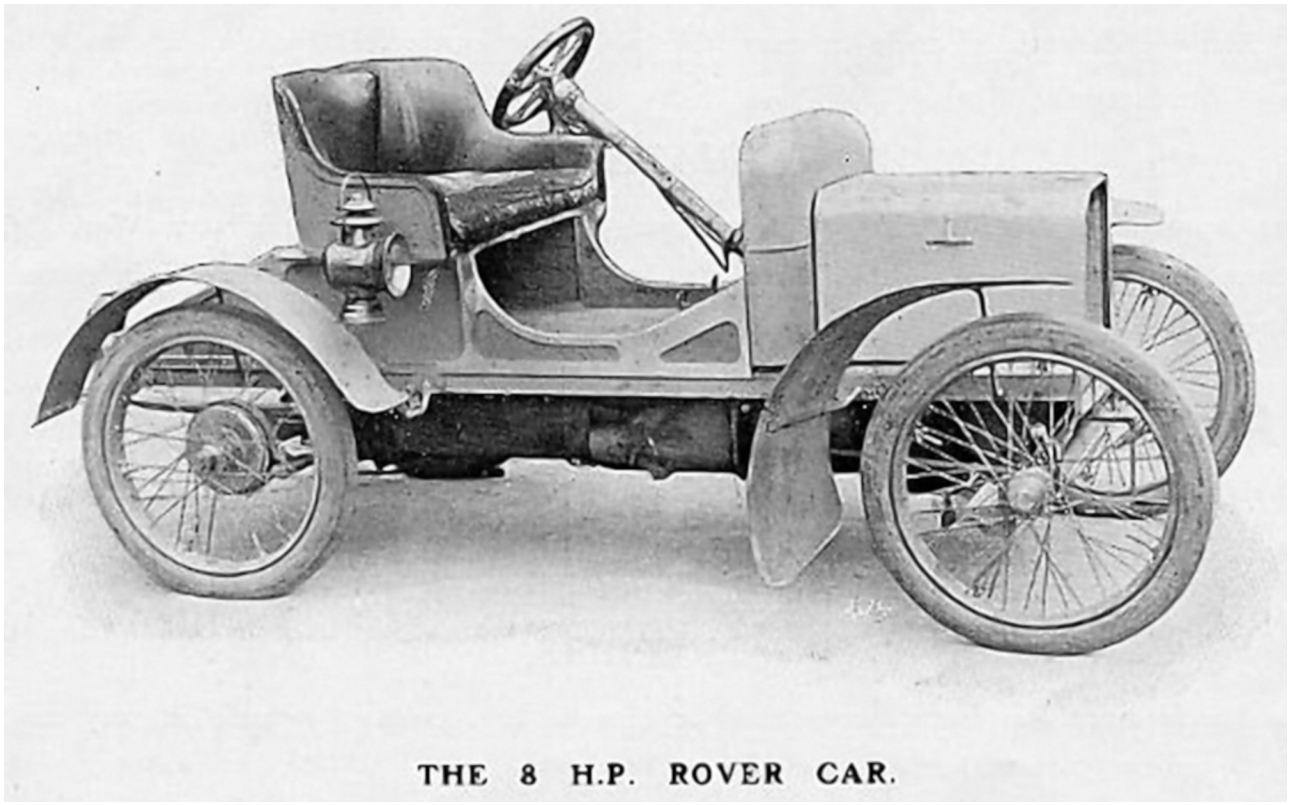


THE 8 H.P. ROVER CAR.

This car, which is unique in design in many respects, is one of the new machines entered in the small car trials. Its most striking features are the central box girder in place of the usual frame, the engine brake, and disc clutch.

The Chassis (Figs. 1 and 2).

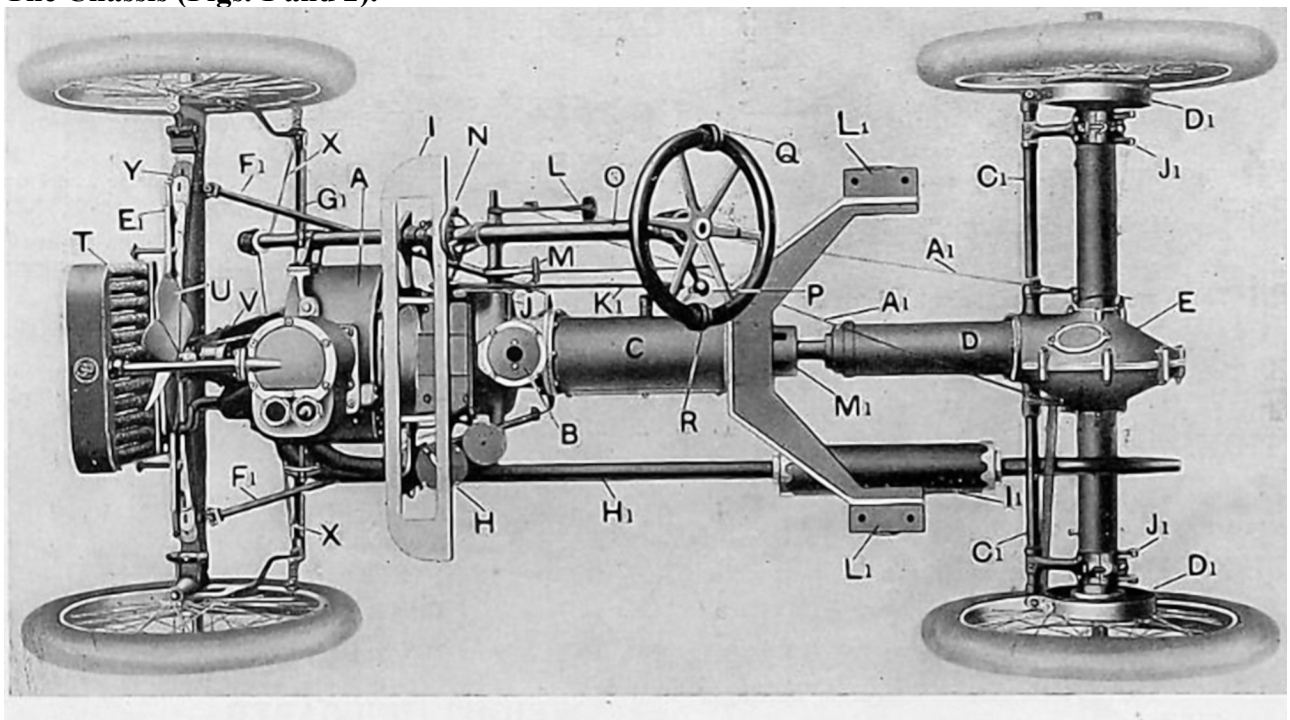


FIG. 1.—Plan of the 8 h.p. Rover Chassis.

As ordinarily understood, there is no frame to this car, as the engine A, clutch box B, gear box C, propeller-shaft casing and exhaust box D, togeher with the rear axle, which is made up with a solid cast aluminium casing E, run con tinuously through from the front of the car to the rear, as it were, in a deep box girder section. To the front part of the engine crank case is bolted a strong aluminium channel bracket. To this, its front end, is fixed a strong swivel bolt placed in the horizontal plane, so that this bolt engages in a bracket connected to the front cross spring Y, and can thus oscillate about it when any inequality in the road is met with. In other words, the chassis is really mounted on a three-point bearing, the two rear wheels forming two of the points, whilst the front swivel pin forms the third. It will be seen from the this description that there is no spring introduced between the rear axle and frame, simply because there is no frame, but the body is supported at the rear on two very long springs, which are separately fixed by means of a single bolt in brackets J1 J1 carried at the outer ends of the rear axle case casting, the front end of the body being secured or hinged to a swivel bar E1, which is in turn secured to the bracket carrying the swivel pin before-mentioned, so that the front part of the car, with the front of the body, is carried on the front cross spring Y, whilst the rear part of the body only moves on the two rear springs.

Figs. 1 and 2 show the general arrangement of parts. Immediately behind the engine, and bolted to the front part of the clutch case B, is a cast aluminum bracket I, which performs several functions, viz., it forms a stand on which is carried the petrol tank, which tank is so shaped that it forms a very striking-looking dash. The battery is also carried in this casting, and a foot lever J to operate the cams on the half-time shaft, carburetter H, quadrant N for the speed gear changing; and it also forms an additional stay for and at about the middle of the steering stem O. There is also a cross shaft through the top of the clutch case, which carries the clutch and foot brake levers M and I respectively; and the bracket before-mentioned as carrying the front swivel pin also carries a bracket which supports the steering column tube O at its base, whilst the radiator T, fan bracket, and also the cross rod E1, for the body hinges at the front are fitted up on this forward bracket.

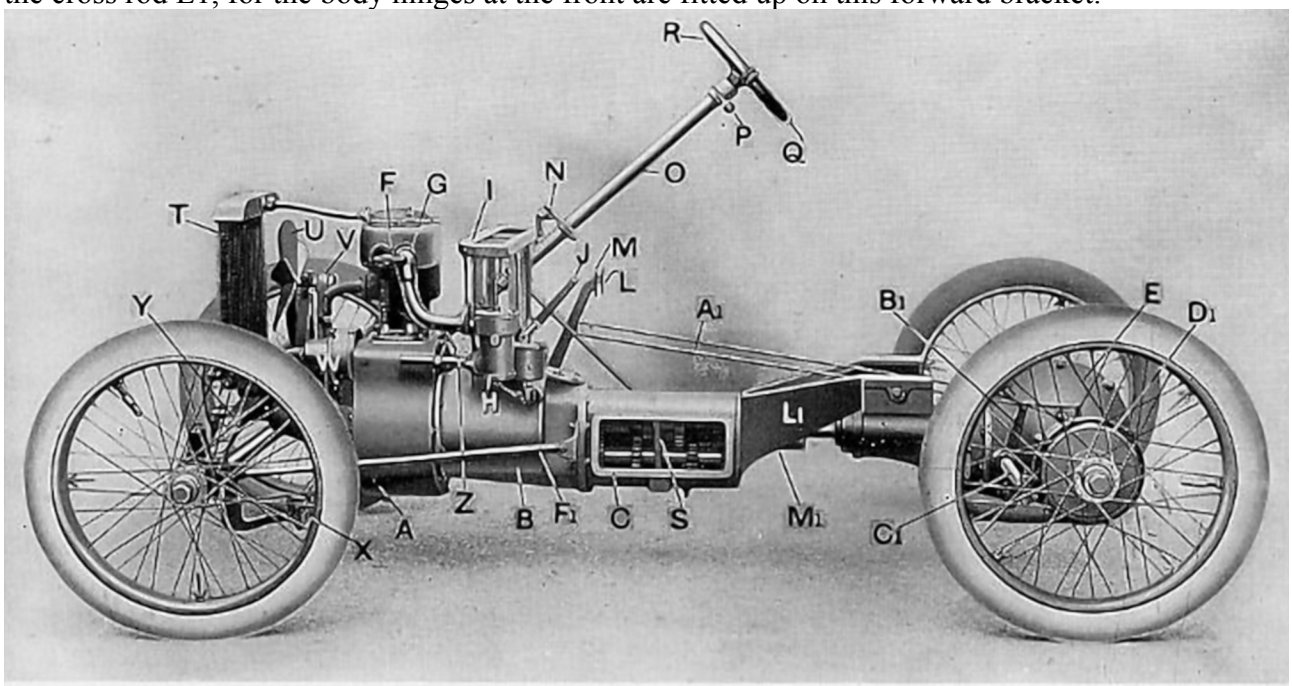


Fig. 2.—Side elevation of the 8 h.p. Rover Chassis

The Motor and Motor-Brake

The motor is of the single-cylinder, water-cooled type, with mechanically-operated exhaust and induction valves. Eight horse-power is developed on the brake at a normal speed of nine hundred revolutions per minute, although the engine can be accelerated up to 1.500 if desired. The bore and stroke are respectively 4½in diameter x 5in. The water spacing round the cylinders and valve bodies is ample, and an aluminium top is bolted above the combustion chamber, so that an inspection can

be made of the water-jacket space betwen the cylinder and the inner part of the jacket casting. The crank is made from a solid steel forging, and internal flywheels are secured to the cheeks of the cranks, and driven from the same by specially machined surfaces, and are centred above the crankshaft, a securing bolt being fitted simply to hold the cast-iron flywheels to the crank-pin, but no driving stress is taken by this bolt. The weight of the flywheels is 120 lbs, which is about one-eights of the total weight of the car when ready for the road. The two main crank bearings are fitted with large size ball races, as also are the camshaft bearings.An intermediate wheel is fitted between the crankshaft pinion and the half-time shaft driven wheel. The half-time shaft carries a special set of cams (see fig. 3), which are actuated endwise by means of of a foot lever. In the normal position, the foot lever does not act upon the cams, so that the control of the engine is entirely by means of the throttle valve on the carburetter and the ignition timing, which are respectively operated by means of milled red fibre discs and Bowden wires, the discs leing inserted in the steering wheel rim. When it is desired to slow up the engine, pressure on the aforesaid foot lever first of all moves the cams so that the inlet and exhaust valves have their lift reduced; and, finally, further movement of the foot lever causes the engine to entirely cease operations as an engine, and it becomes converted into a powerful air compressor, and this action is conveyed to the rear road wheels, so that a most effective and uniformly applied brake is obtained. The action of the second set of cams is to convert the cylinder of the engine into an air compressor, air being taken in through the exhaust valve, then compressed, and finally released as the piston comes to the top of its stroke, it being so arranged that the compression is brought about at every revolution of the crankshaft.

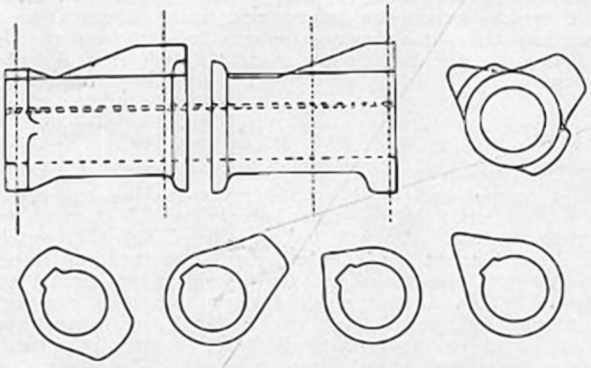


FIG. 3.—Elevations and Sections of the Rover Cam Mechanism.

Section of air compressor cam. | Section of exhaust cam (full lift) | Section of inlet cam (reduced lift) | Section of inlet cam (full lift)

The left-hand upper figure shows the combined air compressor and exhaust cams, whilst the right-hand figure shows the inlet valve cam, the tapered lines showing how the cams fall away to reduce the lift as the cam is slid along its shaft. The dotted lines indicate the positions at which the sections of the cams are taken. The combined end view indicates the relative positions at which the cams are set.

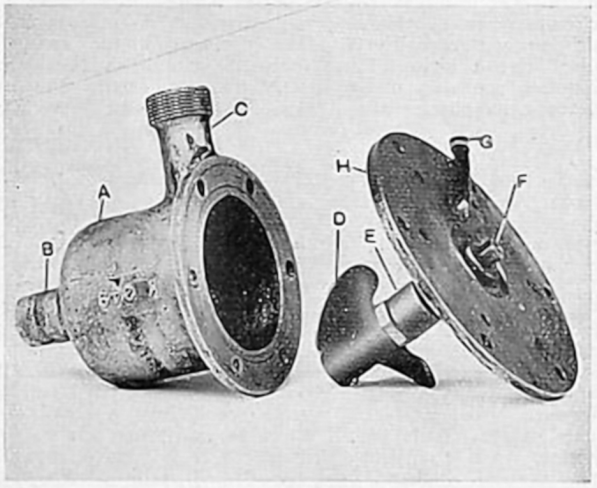


FIG. 4.—Details of the Rover Water Circulating Pump.

A, body of pump.
B, water inlet boss.
C, water outlet boss.
D, two-blade propeller.
E, propeller-shaft bearing
F, squared driving end of propeller shaft.
G, lubricator for propeller shaft.
H, plate to carry E and to bolt crank case.

The Ignition System

Accumulators and Bassée-Michel high-speed trembler coil are used in conjunction with a wipe contact, which is situated on the tail end of the half-time shaft, whilst the sparking plug is fixed in the induction chamber cap immediately over the induction valve. Owing to the position of the battery and coil with respect to the engine, all wires are kept very short, and no trouble should be experienced with short.circuiting. A small switch is fitted on the steering wheel centre, so that the primary current can be cut off at any moment desired, without removal of the hand from the steering wheel.

Cooling System

The cooling system is arranged so that a special double blade propeller D (fig. 4) mounted on a small shaft, and driven by a squared end F from the half-time shaft, takes in the water through the boss B from the bottom of the radiator tank, and ejects it upwards through C into a part of the cylinder close to the valves, whence it passes upwards to the aluminium top cap above the combustion

chamber, and thence to the top tank, this being connected to the bottom one by means of a series of twelve vertical copper radiating tubes carryng aluminium gills. With this system of radiator and pump, the circulation can continue on thermo-syphon principle, even if the pump fail to act. The weight of the cooler complete is only about 9 lbs, and only half a gallon of water is carried. A strong current of air is caused to pass over the gills of the cooler by means of a fan driven at a high speed from a pulley on the forward end of the crankshaft, a flat belt of about 1in width driving the fan pulley.

The Clutch

The Rover Clutch was designed with the object of preventing all jerks and strains when starting the car. The surfaces are metal to metal, running in oil supplied from the base chamber of engine. These friction surfaces are particularly large, and are constructed so as to stand almost indefinite wear. There is no leather or fibre to burn or get out of condition, and the clutch will probably run for a year or more without any adjustment being required. The clutch surfaces are forced together by compound levers, held in position by a spiral spring.

The clutch is of the metal-to-metal type, and is made up in the form of a floating cast-iron disc O (fig. 5), having a centre boss with a squared-out hole, the drive being transmitted from the engine crankshaft D, through the belled clutch casting N to the plate O, and through the square-ended schaft G1 to the first gear wheel X, which carries the jaws A, and also carries a thimble bearing in which the gearshaft H1 can rotate at its forward end. The clutch foot lever operates the lever R, and draws back the sleeve V against the action of the spring W, when the pedal is pushed forward, and the levers Q - of which there are three, equally spaced round the inner circumference of the ring adjusting nut S - pull back the disc P which carries the levers, and which forces O into driving contact with N. The pressure of the spring W exerts five times the leverage power on the face of the disc, and a powerful easy-actuated clutch is thus obtained. When it is necessary to adjust it, the ring S only requires screwing up a little, and this carries the lever supports along equally, a rapid and efficient adjustment being thus obtaines.

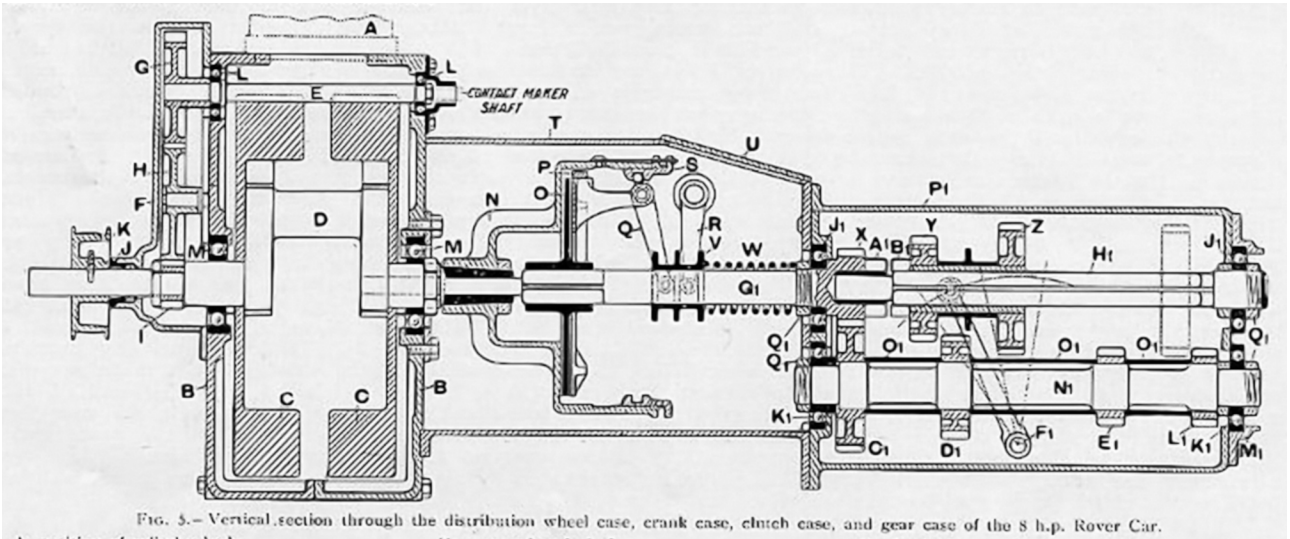


Fig. 5.—Vertical section through the distribution wheel case, crank case, clutch case, and gear case of the 8 h.p. Rover Car.

A, position of cylinder body.
A1, jaws of clutch on gear wheel X.
B B, crank case.
B1, jaws of clutch on gear wheel Y.
C C, flywheels secured to crank D.
C1, constant wheel meshing with wheel X.
D, engine crank.
D1, countershaft second speed wheel.
E, camshaft.
E1, countershaft first speed wheel.
F, cover for distributing wheels I, H, G.
F1, shaft carrying gear striking lever.
G, camshaft gear wheel.
G1, main driving shaft from clutch.
H, intermediate distributing wheel.
H1, squared mainshaft.
I, crankshaft distributing wheel.
J, stuffing gland to prevent oil escape.
J1 J1, ball races for mainshaft.
K, fan driving pulley.
K1 K1, ball races for countershaft.
L L, ball races for camshaft.
L1, reverse pinion.
M M, ball races for engine crankshaft.
M1, case for exhaust box and propeller-shaft.
N, bell clutch secured to crank axle D.
N1, countershaft carrying gear wheels C1, D1, E1, L1.
O, cast iron clutch disc.
O1 O1 O1, sleeves for distance pieces between pinions C1, D1, E1, L1.
P, clutch ring carrying levers Q.
P1, aluminium gear case.
Q, levers to apply action of clutch spring W to disc P, O, and N.
Q1 Q1, locking nuts for ball races.
R, lever worked by foot lever shaft to release clutch.
S, adjusting ring for clutch lever fulcrums.
T, aluminium clutch casing.
U, inspection door for clutch case.
V, clutch operating sleeve.
W, clutch spring.
X, constant mesh pinion driven by G1.
Y, second speed spur wheel on squared sleeve
Z, first speed spur wheel on squared sleeve.

The Gear Box

The gear box contains the necessary wheels to give three speeds forward and one reverse, these being respectively eight, sixteen, and twenty-four miles per hour forward speeds, and eight on the reverse. The top speed is obtained by means of a direct drive right through from the clutchshaft to the rear bevel, which is secured to the differential case, and is situated in the back axle aluminium casting. As will be seen from fig 5, for the low speed the gear wheels X meshes with C1, and transmits the drive through the countershaft N1 to the gear wheel E1, thence to Z and the shaft H1, which finally transmits the drive to the propeller-shaft through a connection to the end of H1. For the second speed, the drive is transmitted in the same manner between the two constant wheels X and C1, and along the N1, through the two wheels D1 and Y, and the shaft H1, and hence to the propeller-shaft; whilst for the top speed, the jaw clutches B1 fitted to the gear wheel Y go directly into mesh with the jaws A1 on the small constant wheel X, thus giving a solid and direct drive through. The reverse is obtained when the sleeve carrying Y and Z is slid along its shaft from the neutral position between the slow forward speed and the reverse speed into a small wheel behind L1, and which and which is continually rotating on an idle fixed shaft. This small wheel is constantly in mesh with L1 on the countershaft, and only comes into driving action when the slow-speed wheel Z is moved into engagement with it, which will be the case when Z occupies the position indicated by the dotted outline. Extremely wide teeth are a feature of this gear, and No 6 pitch is used throughout; whilst another point which should facilitate economical production is that only three sizes of wheels are used throughout the gear, the disposition being so arranged as to allow of this being carried out in the best manner. The gears are changed by means of a lever carried on the shaft F1, actuated from a connecting rod, which is in turn connected to a lever at the bottom of the steering wheel, this lever being operated by a tube arranged concentrically with the steering stem, and connected to a lever situated immediately under the steering wheel. The change-speed quadrant is secured to the before-mentioned aluminium casting, and hence no special fitting on the steering stem is required for this, so that matters are considerably simplified. The bearings of both main and countershaft are most substantial, and are of a ring ball-bearing type. After 1.500 miles running these were examined, and found to show absolutely no sign of wear.

This interesting car, which is made by the Rover Cycle Co., Ltd., Coventry, whose name is so well known in the cycle world, has been designed by, and made under the supervision of Mr E. W. Lewis, the inventor of the well-known Rover carburetter.

Front Axle and Steering

The front axle is made up with a substantial steel tube 1¾ in in diameter, and the end jaws, which are brazed into the tube, are fitted with a ball cup swivel pin, a large diameter ball being inserted in this swivel pin at the top and bottom, and being adjusted into place by means of a hollowed out set pin. A slight set is given to the front wheel spindles. The steering levers are situared at the rear of the axle, and are connected together by means of a cross rod, but the steering proper is effected by means of a double cable, which is rotated about the spindle at the bottom of the steering stem by means of the ordinary steering wheel. The connections between the cable and the ends of of the levers which actuate the wheel spinles are made through the medium of a strong adjustable spring, the spring being so adjusted that only one of the cables is thoroughly tight, the second one being slightly slacker. and acting as a reserve. It is claimed for this steering that it is practically irreversible, and that very little road shock would be felt by the hands, owing to the small diameter of the spindle about which the cable is rotated. The main steering stem is, as before-mentioned, secured to an aluminium cast bracket at its lower end, and also stayed further up by the same bracket. Two compression rods are fitted to stay up the front axle to the gear box so as to prevent the front wheels being deflected too far back by any road shock. Th rear axle is mounted on ball bearings, a double row of balls being fitted immediately behind the large bevel which is mounted on the differential box, so that all end thrust can be taken up without excessive fricton. All the bearings are interchangeable, and are very substantial, and fitted with large diameter balls. The differential shafts are squared at the outer ends to transmit the drive to the rear road wheels. The differential gear contains bevelled

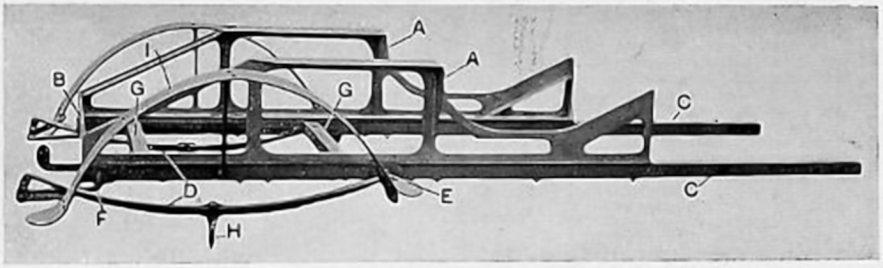
wheels, which are of substantial and workmanlike make. The whole of the axle casing is made up with two halves in an aluminium casting, and looks particularly smart. A bracket is clipped on either end of this casting, and each bracket has a boss, which carries the spring bolt for the spring which supports the rear part of the body. The front of this bracket carries a solid arm, and also carries the outer end of the brake shaft, the inner part of this shaft being carried by means of a boss cast on the centre and lower part of the cover surrounding the differential box, the whole being shown complete in figs 1 and 2. An inspection cover is fitted both to the clutch box, gear box, and also to the differential casing.

Lubrication
The lubrication of the engine is effected by means of the splash system. If a pint of oil is poured into the crank case at the commencement of a journey, one hundered miles can be completed without further attention. The clutch case, gear case, and rear axles, can be fed as desired by means of lubricant inserted through the inspection covers, the distribution to all the working parts being effected without any attention.

The Wheels
The wheels are built with steel tangent spokes, and are fitted with 750 mm x 83 mm pneumatic tyres. The wheelbase is 6 ft 6 in x 4 ft 8 in. (Artillery wheels can be fitted if desired.)

Brakes
As previously mentioned, the engine can be so arranged that it forms a powerful air compressing brake, whilst a powerful compensating foot brake is applied to the rear wheel brake drums by means of a compensating wire from the foot lever, these brakes being all wrought-iron working on malleable iron drums.

The Body



A A, skeleton sides cast in aluminium.
B, end stay cast in aluminium.
C C, ash side members.
D, rear body springs.
E, rear spring horn (front).
F, rear spring horn (back).
G G, cross stays in ash.
H, spring bolt to secure the spring to the rear axle bracket.
I, rear wheel wings.

Fig. 6.—The Rover Skeleton Frame.

The body is made to carry two passengers, the seats being of the bucket type, but that for the passenger is made deeper and more comfortable than the one occupied by the driver. A very large amount of leg room is given, so that a long journey can be taken without fatigue. The construction of the body is unique, and is illustrated by fig 6. The two sides of the body are made up in the form of a cast aluminium skeleton, and these are secured to two side members of ash 1¾ in square, and are prevented from opening or closing by means of the seats fixed to the top of the bracket, and at the rear by a cross skeleton cast bracket. Any kind of wood can be secured to this skeleton for the panels, and a very easily made, and at the same time handsome, body can be produced. The spring horns, which are of steel forgings for the rear springs, are secured to the ash sides, these sides being also further stayed by means of an ash crossd member bolted to webbed steel plates ⅛ in thick. The front part of the ash sides is connected to the hinged bracket, as mentioned. Rolled steel wings are fitted, and the rear springs have exceptionaily long plates, being 40 in between the centres.

General
The weight of the car complete ready for the road is 9½ cwts; five gallons of petrol can be carried in the tank, this being sufficient with the special Rover carburetter to carry one for a very long distance.