(3) PISTONS AND CONNECTING RODS.

The B.H.B. aluminium alloy pistons are fitted with four compression rings and one scraper ring. Provision is made for the fitting of a second scraper ring if it should be required. When new, the rings should have 0.003 to 0.004 ins. side play and 0.012 gap.

The connecting rod big ends are fitted with split white metal shells and shims whilst the small ends have pressed in bronze bushes. The gudgeon pins are a push fit in the pistons and connecting rods, location is by circlips.

(4) VALVES.

These are operated through push rods and overhead rocker shafts from the camshaft which is driven from the duplex timing chain. The overhead rocker gear is enclosed in two detachable covers, each sealed with a cork gasket and secured by two hexagon headed screws. The clearance of the exhaust valve is 0.020 ins. and inlet valves should be 0.010 ins. hot.

The valve timing is as follows:—

Inlet opens	...	10° before T.D.C.
Inlet closes	...	38° after B.D.C.
Exhaust opens	...	40° before B.D.C.
Exhaust closes	...	8° after T.D.C.
Valve overlap	...	

(5) TIMING GEARS AND AUXILIARY DRIVES. (Plate 1).

A duplex roller timing chain, driven from the crankshaft sprocket, is located in the timing case in front of the engine and engages a number of sprockets. These drive the camshaft, water pump, governor and one dynamo, fan pulley and distributor gear. An automatic chain tensioning device is included in the drive which is lubricated automatically.

The engine fan pulley drives the fans through single pulleys and belts.

The distributor is driven through skew gears and a shaft at 30° to the vertical, the distributor being clamped in the shaft housing.

The water pump mounted in front of the timing case, and the $6\frac{1}{2}$ ins. dynamo and governor, which are mounted in tandem, in the rear of the timing case, are driven from the same sprocket.

The governor operating lever is actuated by a sleeve caused to slide along the governor driving spindle by centrifugal force from the governor weights which are forced out against the springs, on the spider keyed to the spindle.

The governor spindle is carried in ball bearings and is fitted with a driving dog which engages the driven dog of the water pump impeller. Between the two dogs are four springs which press the opposite face of the driven dog against the carbon gland ring in the water pump housing, thereby affecting a water tight seal.

The power and turret dynamos are driven separately, the former by belt drive from the crankshaft pulley, the other in tandem with the governor. A belt tensioner is provided for the power dynamo drive.

The automatic chain tensioner consists of a sprocket on an eccentric sleeve which is carried on a shaft fitted to the timing case. Inside the eccentric and engaged with it is a spiral spring, the other end of which is fixed to the shaft. A

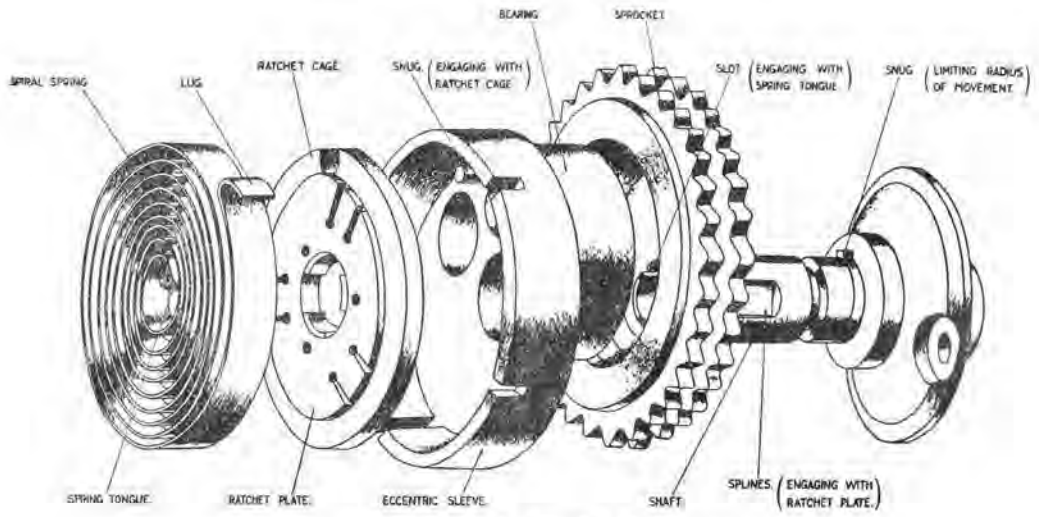

Fig. 2. **Automatic Chain Tensioner.**

(5) BREATHERS.

An overflow pipe leads from the oil canister to the timing case cover.

A breather pipe also leads from the timing case cover to an Amal flame trap and thence by two pipes to the carburettor air intakes.

(6) MAINTENANCE.

In addition to the daily "topping up," the engine oil must be changed and the oil canister cleaned every 400 miles. Directions are given in Section 15.

Section 4. COOLING SYSTEM.

Cooling is effected by water, the system incorporating two radiators, two fans and a water pump.

(1) RADIATORS.

The two radiators are placed over the clutch and gearbox; each is carried on two trunnions, which also act as water passages. These are provided with glands.

The single filling orifice is enclosed by a cap which incorporates a combined pressure and vacuum relief valve. This valve assembly is set to blow off at 5 lbs. pressure and 3 lbs. vacuum. This permits a cooling water temperature of approximately 228° F. to be reached without loss of water provided there are no leaks anywhere in the system. The adjustment of the pressure valve is by means of a screw which is located inside a small cap on top of the valve.

The pressure valve functions as follows:—

As soon as a pressure is generated in the system, the whole valve and seating rises, compressing the corrugated metal bellows which carries the valve seating and, in addition, compressing the large spring inside them. When the top of the valve butts against the adjusting screw, it cannot move up any more and and further pressure forces the seating only upwards, thus opening the valve and allowing steam to escape through the hole at the top.

Should any vacuum occur in the system, the valve will be sucked downwards against the small spring and, as the seating will not move, the valve opens and allows air to enter through the hole at the top.

Adjustment of the screw is as follows:—

To increase the pressure at which the valve blows off, unscrew the adjusting screw upwards (i.e. turn anti-clockwise). To decrease pressure, turn screw clockwise. No adjustment, however, must be carried out by unqualified personnel.

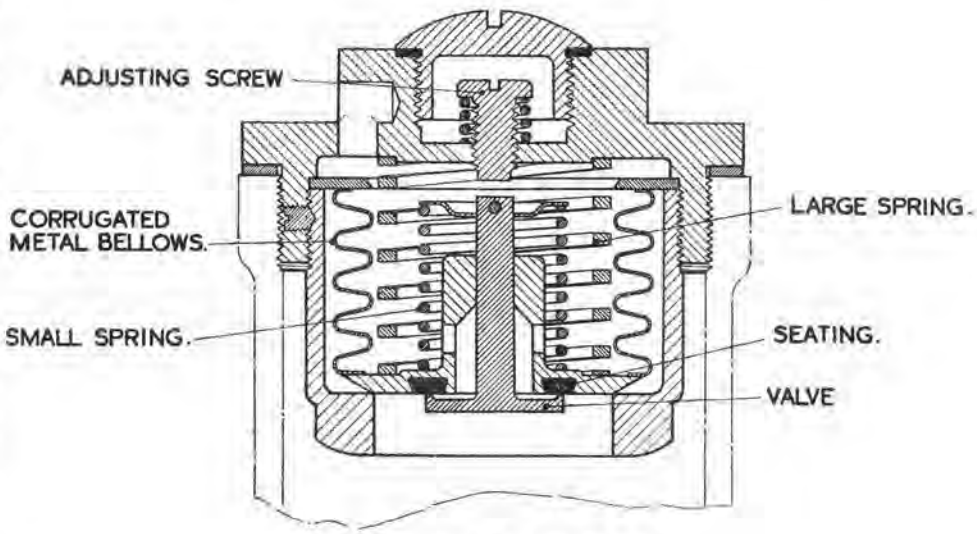

Fig. 3. **Radiator Relief Valve.**

Pressure and relief valves should be tested for leakage before the approach of hot weather when water temperatures may exceed normal boiling point, i.e. 212° F.

Approximately 8½ gallons of water are required to fill the system.

(2) FANS AND FAN DRIVE.

The fans are situated between the rear of the engine and the radiators through which they push air. The drive is from the front of the engine by belts and shafts.

Adjustment of the fan belts is carried out by moving the fan pulleys separately. This is accomplished by loosening the three bolts holding the fan pulley brackets and tightening up the horizontal adjustment at the front of the timing case.

On both the primary and secondary fork are trunnion brackets with cap squares. Between these are fitted the trunnions of the spring and shock absorber unit. A description of this unit is given in paragraph (5).

The spindles at the fulcrum points of the suspension assemblies are supported in either needle bearings or bakelite bushes on their outside and ball bearings on their inside ends, and are sealed against the ingress of dust, mud or water by rubber seals of the Hordern pattern. They are packed with grease on assembly and should require no attention between overhauls.

The only difference between any of the four main suspension assemblies is that the two front are built up with the main fork and the 24-in. wheel in front, and the two assemblies in the rear with these components at the back. The near-side front assembly is therefore interchangeable with the off-side rear and the off-side front with that on the near-side rear.

(4) BOGIE WHEELS.

The wheels, of 24-in. and 19½-in. diameter, are both similar in construction.

(*a*) The wheel is an easy fit on the hub, to which it is secured by six bolts. The centre boss of the wheel encloses the outside ball bearing. A lubricating nipple is positioned in the wheel.

(*b*) The hub, roller bearing, outer and inner distance tubes and ball bearings are secured on the spindle by a large split-pinned nut. An oil seal and a dust cover are located on the inside.

(*c*) The inner and outer retaining rings, to locate the tyre are secured to the wheel by 12 bolts. In addition, special bolts are also provided to hold the inner ring permanently to the wheel. Four of these are fitted to the large, and three to the small wheels. On the outer ring, corresponding with these bolts, are an equal number of set-bolts. If these are removed and a "Forcing screw" (Part No. 18521.T) is screwed into each tapped bush, the outer ring is forced off the wheel, provided the 12 ring bolts have first been removed.

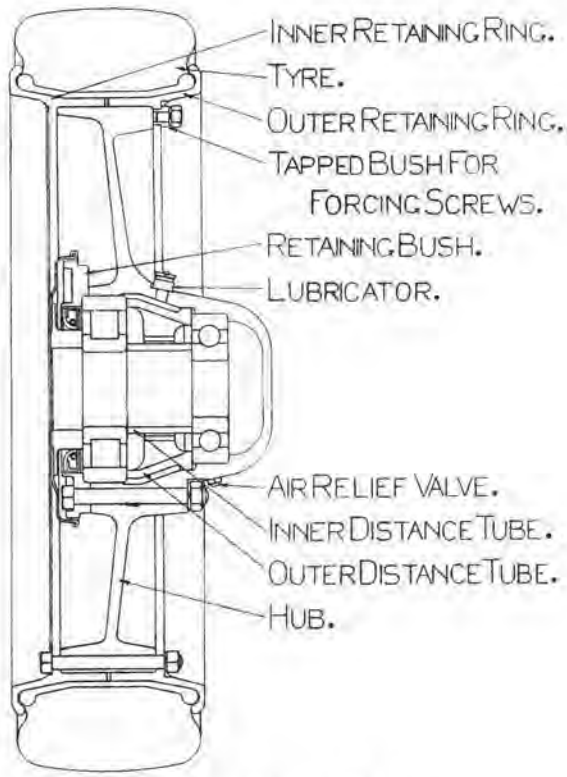

Fig. 8. **Bogie Wheel.**

(*d*) The tyre is held in position by the grip of the inner and outer retaining rings. This is sufficient to prevent any "creep" taking place, provided the rings are fitted correctly and are bolted fully home.

(5) SPRING AND SHOCK ABSORBER UNIT.

Each unit consists of a two-way Newton hydraulic shock absorber, type V.T.1 built up with the spring, spring supports and trunnions for attachment to the trunnion brackets of the suspension forks.

Needle bearings inside detachable sleeves are mounted round the trunnions. These are packed with grease and require no attention between overhauls. Maintenance instructions are given in Section 36.

The shock absorber consists of a piston (with calibrated valves) working inside a cylinder. The upper trunnion is secured to the cylinder. The lower trunnion is free to slide on a sleeve on the cylinder and is connected, by means of a housing, to the end of the piston rod. This piston rod passes through glands and packings into the cylinder and is secured to the piston assembly. The spring is located between the fixed and moving spring supports and trunnions.

The cylinder is actually divided into two parts by a bulkhead called the "displacement head." The part of the cylinder below the displacement head forms the oil filled working space for the piston. The other part forms an oil reservoir so that the working space can be replenished (when required) with oil through ball valves in the displacement head.

The piston assembly consists of :—

(*a*) The piston, which is secured to the piston rod and has two valves. The spring-loaded plate valve opens on the compression stroke whilst the spring-loaded piston valve opens on the rebound stroke. The plate valve is set to a dimension, but the piston valve is set by a special machine at the factory.

How the Power Drive Operates.

Move the selector lever, mounted on the gear box, to the "power" position.

First press in the trigger lever on the control handle in order to close the main switch and energise the motor field. Now twist the control handle to the right or left in order to traverse the turret to the right or left.

The speed of the traverse will increase as the control handle is turned, until when the handle reaches the end of its travel, the maximum speed is obtained.

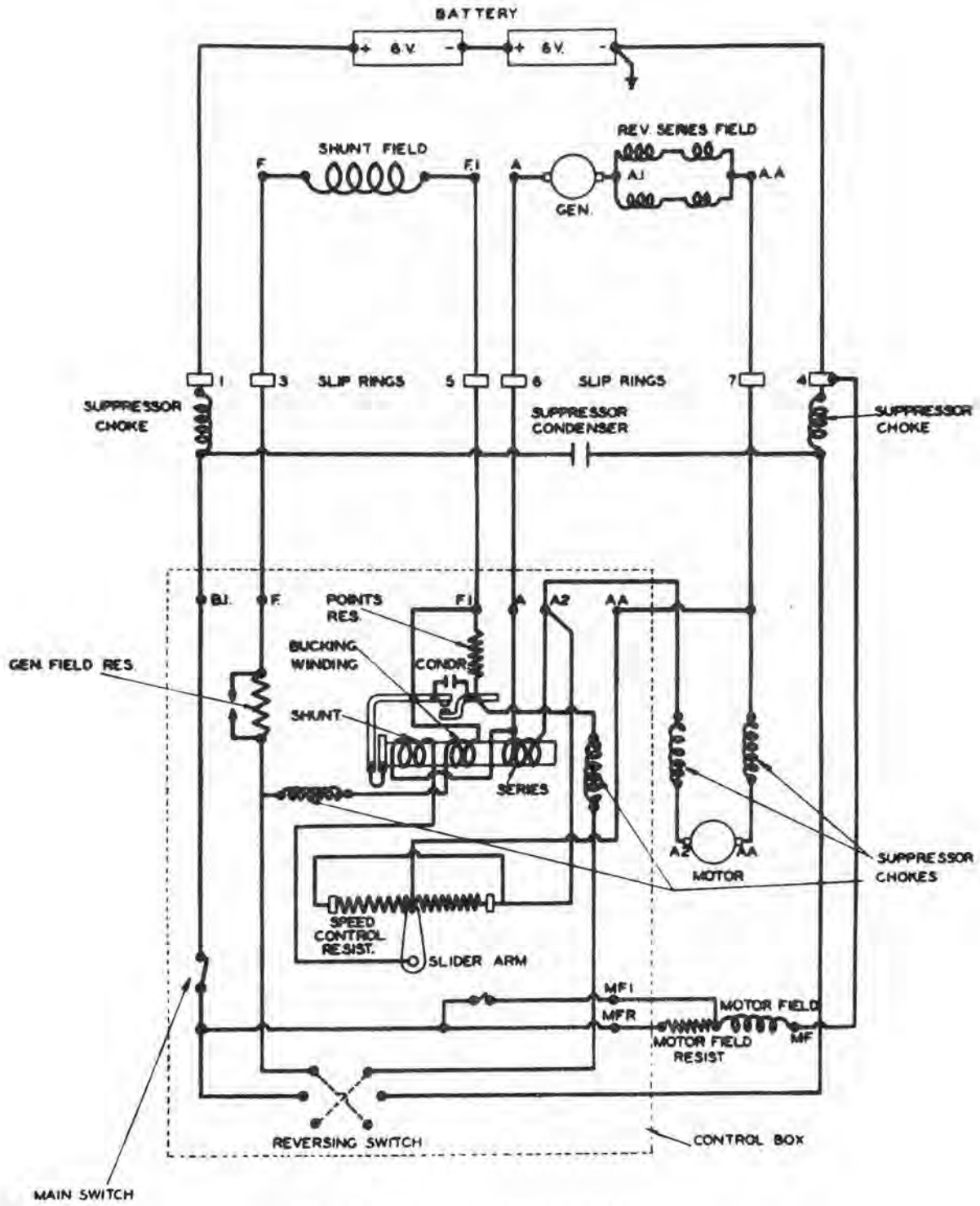

Fig. 12. **Theoretical Wiring Diagram.**