The Book of "The Scott"

DRIVING INSTRUCTIONS

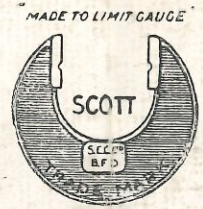
MADE TO LIMIT GAUGE

The SCOTT MOTOR CYCLE COMPY. LTD
SALTAIRE YORKS.

"Scott"

MOTOR CYCLE

DRIVING INSTRUCTIONS



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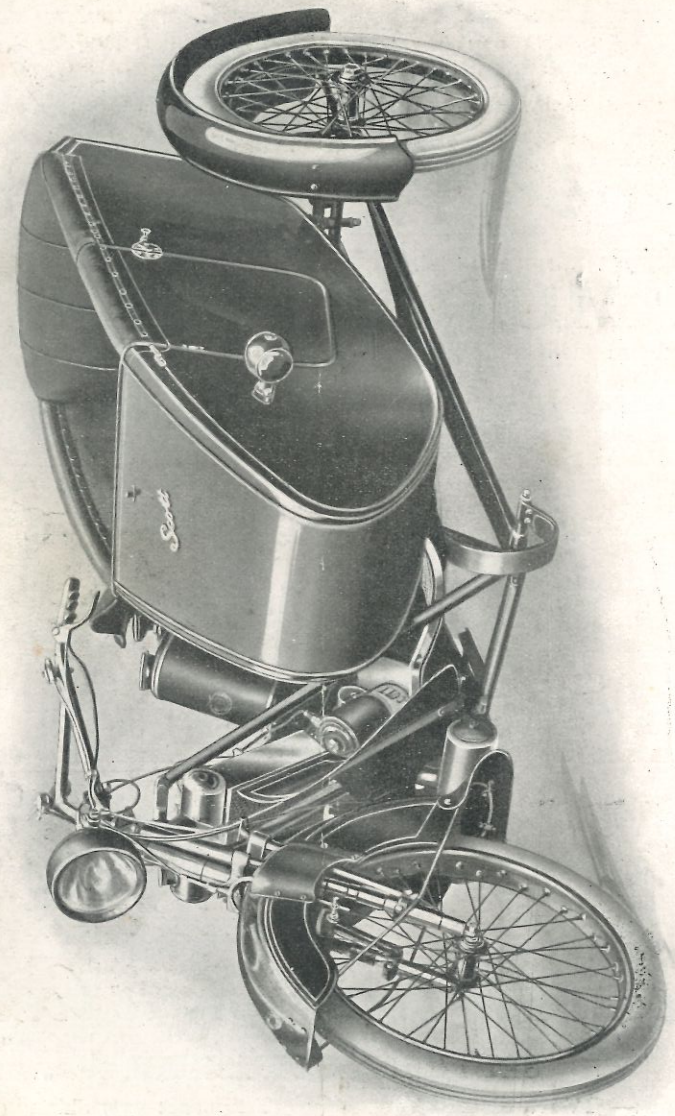


THE SCOTT STANDARD COMBINATION.

INSTRUCTIONS IN THE CARE AND MANAGEMENT OF THE SCOTT "STANDARD" MOTOR CYCLE

Before Running a New Machine

(1) The **crank case** and **oil tubes** must have a supply of oil, The radiator must be full of water, and see that sufficient petrol is in the tank.

To Start the Engine

Do not under any circumstances operate the starter when the machine is on the stand, as the side pressure is liable to bend the legs.

(1) Turn on petrol tap.
(2) Close extra air (top lever) by pushing the lever outwards.
(3) Open throttle lever in line with handlebar.
(4) Flood carburettor by depressing the knob on top of float chamber.
(5) Advance ignition lever to mid-way position.
(6) See gear is in neutral position (pedal horizontal).
(7) Lift up the half compression lever on left-hand slightly, but not to the full extent, otherwise the magneto cut-out comes into operation.

Fig. 1

(8) Stand over the machine, place the sole of the right foot on the starting lever, and push **smartly** down, at the same time holding the palm of the hand over the air intake on carburettor. When the engine fires, take the hand away and drop the half compression lever. The engine can be instantly stopped if required by fully lifting the lever on the left hand handlebar.

Fig. 2

(9) If starting is very difficult the machine can be pushed backwards and forwards at arm's length with the high gear engaged.
(10) Do not open the throttle too far.
(11) Do not jump on starter pedal.

Special reference to the Squirrel Model will be found on page 28.

To Engage the Gear

Place the heel of the foot on the rear arm of the gear lever and press gradually into position until the gear begins to engage. When in motion change over into high gear by pressing the heel of the foot on to the forward portion of the gear pedal.

For starting from a standstill the low-gear clutch should be engaged more or less gradually while the machine picks up the load. Always let the machine get **well** away on low gear before changing up on to high.

It is perhaps advisable to practice changing before going on the road, so as to thoroughly acquaint yourself with the position and method of actuating the gear pedal and of finding the neutral position, which is always more or less horizontal.

When changing up do this as smartly as possible to prevent engine racing unduly, and we also recommend the half-compression lever to be raised at that moment. Do not allow the gears to slip when changing from low to high for any length of time.

Starting Difficulties

Difficulty in starting from the cold is generally due to insufficient petrol, and may be remedied by holding the hand over the air intake, whilst **difficulty in starting when engine is warmed up** is invariably due to over-flooding of petrol, consequently, whilst it is of assistance to inject petrol and flood the carburettor well when starting from the cold, it is unnecessary and inadvisable to inject when re-starting after engine is warmed up, since the greatest difficulty may then be experienced, and the only effective remedy is to get rid of the excess of petrol by giving full air, and cleaning out the cylinders by repeated downward pushes of the starting lever or with throttle slides removed.

The following may be the cause of failure to start :

(1) **Choked Jet.**

(2) **Oiled up Plugs, due to Excessive Lubrication.**

(3) **Defective Plugs.**

(4) **Rocker Arm on Contact Breaker of Magneto stuck up,** or put out of action by breakage of spring.

(5) **Short Circuit in Switch Wire or Switch.** This can be detected by temporarily removing switch wire from magneto terminal, and then starting up. If the engine will then start without difficulty, examine switch wire and search for a defective place in the insulation.

(6) **Defective Carbon Brush Holders.** The vulcanite insulation may have burnt through.

(7) **Incorrect Timing of Magneto.**

(8) **Firing on One Cylinder,** suggesting air leak on the other cylinder.

(9) **Excessive Leakage from Crankcases** or fitting of inlet pipe—examine and trace where leakage occurs.

(10) **Attempting to start with either Gear partially engaged.**

(11) **Attempting to start with Magneto Cut-out** by raising half-compression lever too far.

(12) Wet or rain drops on porcelain insulation of plug or on vulcanite insulation of carbon brush holders.

Operation of the starter is a matter of practice, a smart push down is all that is required. Do not jump on the pedal or allow the foot to slip off at the end of the stroke.

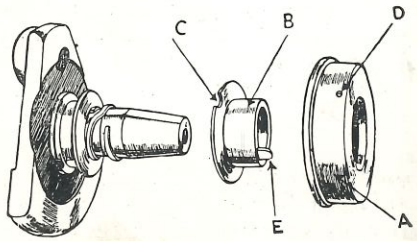


Fig. 3.

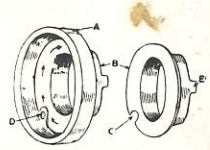


Fig. 4.

Lubrication of Engine

The "Scott" patented system of mechanical lubrication is fitted to the 1911, and later models, but cannot be fitted to the 1910 model.

This is effected without the addition of any extra moving parts, and is incorporated in the metallic packing glands on the crankshafts. The oil is fed to each crankcase during the working of the engine through a small hole (D) on the inner face of the hardened steel cups (A), in which the main roller bearings revolve.

This oil hole (D) is normally covered by the flange face of the rotating packing gland (B), which fits over and revolves with the crankshaft by reason of the tongue (E), and is kept pressed up (by the action of an internal coil spring), against the inner face of the cup (A).

A small recess (C) is cut on the outer edge of the packing ring flange (B) in such a position that during its rotation the hole (D) is periodically uncovered and exposed to the maximum suction in the crankcase which occurs just before the inlet port is opened (that is when the crank is vertical) and in this position only can oil be fed to that crankcase.

It will thus be seen that the system is quite automatic, and the oil feed begins with the starting of the engine, and is discontinued when the engine stops.

Sight-feed Controlling Device

To ensure equal oiling to both crankcases we fit a double sight drip feed, this takes the form of a plunger pump fitted with a screw regulating valve. To fill the pump with a charge of oil press the pump-handle (A) down, this forces the oil, which is already in the lower part (C) of the pump barrel, past the "piston washer" (D) and fills the upper part of the pump barrel (B), the coil spring (E) now forces the "piston washer" upwards and drives the oil through the passage (F) to the controlling valve (G). If the regulating screws (H) are then slightly unscrewed, oil will be seen to drip through the valves and will then run by gravity through the pipes leading to the crankcases.

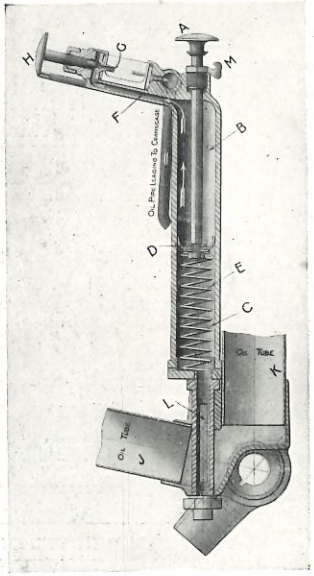


Fig. 5.

As the oil is gradually forced out of the pump the handle (A) will be seen to gradually rise, and when at the limit of its travel must be pressed down again, thus re-filling the pump. The oil travels in the first instance from the oil tubes (J and K) through the gauze filter (L) into the chamber (C).

With a new engine it is advisable to slightly over-oil for the first two or three hundred miles, and the engine should in that case use up a pumpful of oil about every three miles, but when thoroughly run in a pumpful every five or six miles will be found sufficient provided that care is taken to prevent leakages at the transfer port covers, etc. Using a pumpful of oil every three miles works out at about 300 miles per quart at 20 M.P.H., more being required for higher speed.

Upon starting up a new machine it is advisable to see that each crankcase is supplied with the correct amount of oil to start with. The level of oil in each crankcase should be about $\frac{1}{2}$ in. below the crankcase cover door.

It will be noticed that the drip varies according to the temperature of the atmosphere and also the density of the oil used—being more rapid in hot weather, or with thin oil, and less rapid in cold weather, or with thicker oil, and the regulating screws will accordingly require adjusting to meet these varying conditions.

The foregoing figures are based on an average touring speed and gearing. When using a sidecar, racing, or climbing long hills on the low gear, or in fact under any conditions by which a heavy

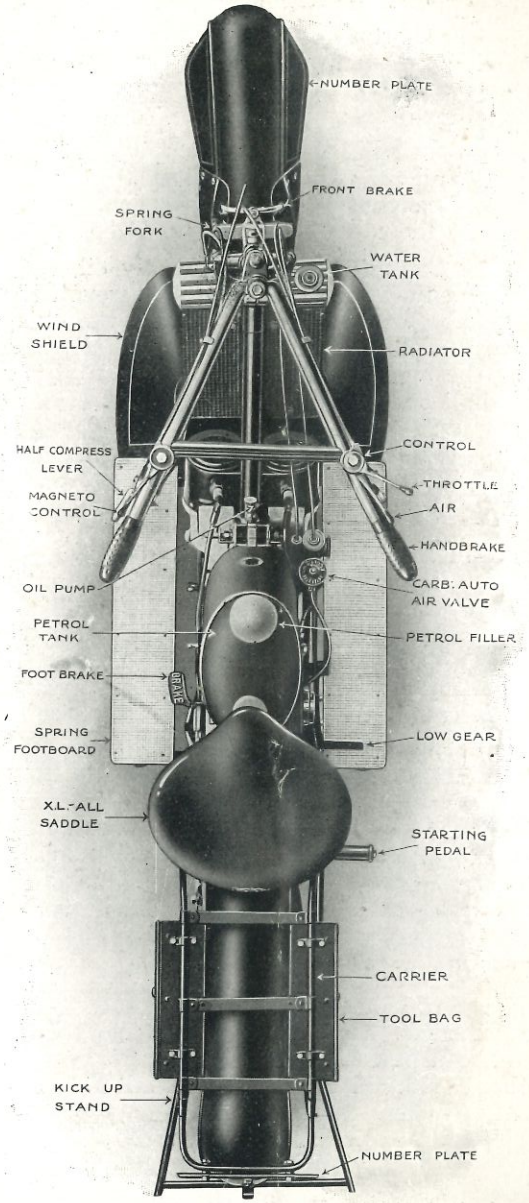


Fig. 6.

load is put on the engine, slightly more oil should be given. When the oil in the tubes is exhausted the pump handle will refuse to stay down. The shortage can be verified by opening the oil filler cap and moving the pump plunger, if empty, a gurgling will be heard at the pump base. The engine must not be run more than 6 miles until more oil is supplied.

It will be noted that although the supply of oil to the engine is automatically shut off when the engine stops, the oil drip will continue until the sight feed glass is full, unless the pump handle is held down by the catch—as mentioned above.

If the oiling arrangements are perfectly oil tight the engine suction will be sufficient to suck the oil through the sight feed, thus it is not absolutely necessary to have the plunger working. It can be clipped down and held by catch (M) and the supply adjusted by the regulators (H.H.). If extra oil is required the plunger can be instantly released.

Persistent over-oiling is to be avoided, since it tends to cause pre-ignition and knocking. With correct lubrication it should be possible to run at least 2,000 miles without removing the cylinders for cleaning.

On new engines particularly, petroil can be used in conjunction with ordinary system. Half a pint of oil to two gallons of petrol.

We recommend the use of Wakefield "Castrol" "C" or Vacuum T.T.

A periodical inspection of the oil level in the crank case should be made to ensure the oil being kept at the correct running level.

Lubrication of Two-Speed Gear

The oil is fed to the gear from the pump through a pipe with tap, when new half a pump full every 20—30 miles. The oil is fed centrally to all parts of the two-speed gear—first to the central thrust bearings then to the ball bearings, and the main clutch bearings and, finally, to the expanding ring surfaces.

Although the friction clutches are not sensitive to excess of oil, holes are provided on the outer drums, so that an abnormal excess of oil can be easily washed away by petrol injection, or on the other hand, oil may be injected to assist the gradual engagement of the low gear.

Chains

All the chains should occasionally be lubricated with engine oil or treated, if preferred, with graphite lubrication.

Spring Forks

The upper sliding tube of the spring fork is packed with grease which will last indefinitely, additional lubrication can be afforded at this point by prising aside the spring cap behind the lamp bracket, and inserting oil. The slides at the fork ends should be lubricated through the hole provided (which is covered with a spring cap at fork crown) every 200 miles. The rollers at the fork ends (1914 and earlier models) are lubricated by screwing down the caps of the stauffer grease cups. These must, of course, be periodically re-filled.

Wheel Bearings, Etc.

The hubs should be filled with a good hub lubricant after 3,000 miles. When wheels leave these works the hubs are full, sufficient for the above distance. Replenishment for front similar to three-speed machine.

Magneto

Owing to the especial nature of the ball bearings employed on this magneto, only very occasional oiling is necessary ; since the efficiency of the distributor and particularly the commutator, is seriously affected by excess of oil, and to give less oil to the commutator side. Dirty platinum points are invariably a sign of excessive oiling. Some makes of magnetos do not require oil.

Leakage of Oil from Engine

Owing to the special construction of the "Scott" engine it is possible to avoid the slightest leakage of oil at any point.

The arrangement of packing gland prevents any possibility of oil leakage at any time (whether after 100 or 1,000 miles) from the crank-shaft bearings, while the acreite packing on the crank-case covers makes an oil-tight joint which does not stick.

Leakage, however, may be caused if the covers are removed and laid on the roadside, and then replaced with particles of grit, etc., adhering to the packing ring face.

Further leakage may be caused at the transport covers by replacing the gauzes and jointing washers out of register with the port ledges.

To test for leakage, remove the transfer port cover, place the piston at the top of the stroke and fill the crankcase with some oily fluid through the transfer port. Replace the port cover and revolve engine, pressure will then be set up in the crankcase by the descending piston, consequently any leaks will be distinctly noticeable. It is preferable to use a coloured liquid, any leaks will then be more plainly seen.

Two-Speed Gear

The two-speed gear consists of two selective **Friction Clutches** mounted side by side, which can be alternatively thrown into action by the rocking motion of the gear pedal.

There are **no gear wheels.**

All parts are made from UBAS steel stampings—case hardened and ground to limit gauge. Since no malleable iron castings, phosphor bronze, or other soft metal wearing parts are used, the gear is practically impervious to clutch slipping.

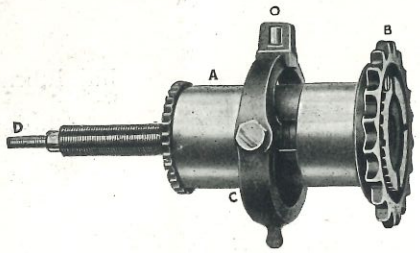


Fig. 7.

The hub (A) runs on ball bearings and drives on to the back wheel by chain from the sprocket (B).

The hub (A) contains an internal central ball bearing thrust block, pivoted by means of screws, passing through slots in the hub, to the ring-shaped thrust lever (C), so that this lever may be moved backwards and forwards during the rotation of the hub by means of the sliding rod (D) passing through the hollow spindle on which the hub revolves.

The movement of the rod is obtained by the rocking motion of the gear pedal attached to the quick thread drum (E) over the internal drum (F), which is fixed in a definite position to the right-hand frame lug.

The hardened steel drums (G) are each mounted on two ball races on each side of the hub, and are held on by screwed lock rings at each end.

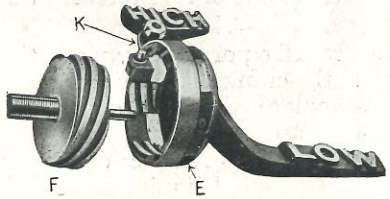


Fig. 8.

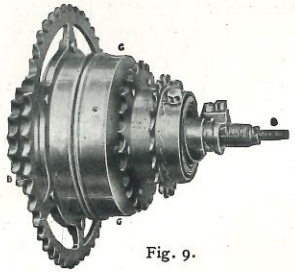


Fig. 9.

The low gear drum is fitted with a large chain wheel, and the high gear drum with a smaller wheel, and both chain wheels are directly driven by a pair of chains so that they are always in gear with the engine and revolve at different speeds, according to the variation in size and number of teeth of chain wheels.

The hardened steel split rings (H) are supported on side plates, which are mounted on the hub (A), so that the pair of split rings lie side by side within the drums (G).

The opened ends of these rings are formed so as to present a slightly tapered slot (N), and are driven round with the hub (A) by the thrust lever (C), one end of which has a tongue fitting into a recess on each ring, while the other end carries a pair of rollers (O), which normally lie in between the two tapered slots.

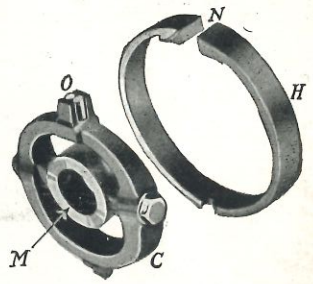


Fig. 10.

These split rings can, therefore be expanded by the sideways movement of the thrust lever, causing the rollers to enter the tapered slot on either ring—thus expanding the ring and bringing it into frictional contact with the inner surface of the drum surrounding it.

In the neutral (midway) position of the thrust lever and rollers neither ring is expanded, so that both rings run free, out of contact with the drums.

When the engine is started up the hub (A) is stationary with the back wheel, but the drums (G) revolve with the engine on the bearing surfaces of the hub at different rates of speed—the low gear drum with the large chain wheel running about half the speed of the high gear drum, with the smaller chain wheel.

Upon rocking the gear pedal backwards, the thrust lever and rollers are moved so as to expand the split ring within the low gear drum until the whole of its frictional surface is brought into contact with the inner surface of the drum, causing its gradual engagement until the drum (G) and hub (A) move together as one, and the drive is transmitted without slip to the back wheel. At the same time the high gear drum runs idle with the hub, but at a higher rate of speed.

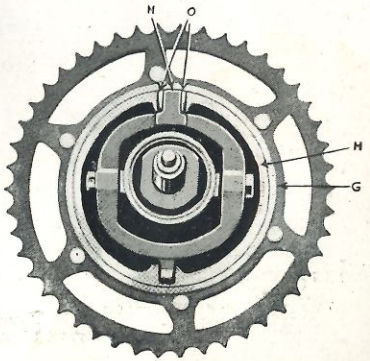


Fig. 11.

Upon rocking the gear pedal forward, the low gear clutch is disengaged, and the high gear drum is thrown into action in the same way, whilst the low gear drum runs idle with the hub, but at a slower rate of speed.

Consequently the drive is always transmitted through one chain at a time whilst the other runs idle.

The pedal is retained in position by the action of an automatic grip device, which is released when the pedal is placed midway or horizontal so that the "free engine" position can be easily found by the slack feel of the pedal in contrast to the increasing stiffness of movement as the pedal is pressed over to engage either clutch. By this means exact position, and corresponding engagement of the clutches can be gauged to a nicety by the "feel" of the pedal.

Since the magneto is driven from the high gear drum it is impossible to run the machine with the high gear chain removed. It is, however, possible for racing purposes to run without the low gear chain.

To Remove Gear

The complete two-speed gear can be removed from the frame without undoing the engine chains. After removing the side-shields and under-shield take off the rear driving chain, then unscrew and remove the bolt passing through the oil pipe lug, after which remove the gear pedal and proceed to take off in the following order : $\frac{1}{2}$-inch shoulder nut, together with spring washer, outer quick thread drum and friction clip, $\frac{1}{4}$-inch washers on end of sliding shaft, $\frac{5}{8}$-inch hexagon nut on end of spindle, internal quick thread drum. The complete gear can then be lifted out of the lugs and after taking off the starting device the chains can be slipped off the chain wheels, and the complete gear will come away beneath the frame tubes.

To Alter Gear Ratios

This can be done by substituting different size sprocket at B (19, 20, 21 and 22-tooth sprockets are kept in stock). These sprockets fit on to the hub flange and are held in place by a screwed lock ring which is further secured by a set screw. Upon unscrewing these the sprocket can be readily withdrawn and replaced by one of another size.

Care must be taken that the lock ring is driven up tight and the set screw replaced.

It is not essential to take the gear out of the frame, the lock ring can be undone and removed, together with sprocket, after the hollow bolt and distance washer have been detached, only slack off and tighten lock ring when hollow bolt is in position and tight.

To take Gear to Pieces

Remove the slotted lock ring on the ratchet side, the high gear drum can then be removed, and the expanding ring, side plate, and distance washer withdrawn. The gear will then appear as shown in Fig. 11. Then by removing the screws pivoting the thrust lever C (Fig. 10) to the thrust block M (Fig. 10), which is contained within the hub, the low gear expanding ring, side plate, and distance washer can be removed. Now remove the locking ring at driving end and detach the driving sprocket. The Cones will then be accessible and the driving sprocket on L.H. should be removed, leaving the R.H. one in position on the shaft.

The hub cups are a press fit in the hub, consequently the spindle complete with thrust rod and centre bearing can be removed by lightly tapping the spindle (short end) holding the hub firmly in the hand.

The centre bearing consists of a centre thrust block, two centre thrust washers, two lock rings, two ball cages and set of balls, these are mounted on a sleeve which slides on the spindle and is attached to the thrust rod by means of a pin rivetted at both ends.

When re-assembling the chief points which require particular attention are :—

Freeness of sleeve on spindle. Correct adjustment of centre bearing and tight locking rings. Correct adjustment of main bearing (cones should be tight up against shoulders on spindle) no play but perfectly free. The adjustment is provided by different thicknesses of washers which fit the spindle (short thread end).

The sprocket and the lock ring should be next replaced, the hub can then be held firmly when replacing the drums, etc., and tightening up the hub lock rings.

Take care to replace the parts in the correct way, and after replacement of the gear in the frame, see that the chains are running in true alignment. The magneto will require to be re-timed whenever the high gear chain is removed.

Two-Speed Gear Defects

(1) Slipping Clutch is due to insufficient grip of expanding ring on the drum.

The pedal is retained in either the forward or backward position by the friction grip provided by the clip (K) on the outer quick thread drum, to which the pedal is attached. To increase this grip tighten the bolt and nut securing this clip.

If slipping in either gear can be prevented by applying foot pressure to the pedal it proves that the gear itself is in working order, and all that is necessary is adjustment of the quick thread drums.

It is only necessary to fit new rollers when the pedal movement is so great as to foul the footboard.

The thin $\frac{1}{4}$-inch washers on the thrust rod are for this purpose ; increasing the number will make the high gear go lower before the gear is engaged, and decreasing the number will allow the low gear pedal to go further down.

When making any adjustments to the thrust rod be sure that the outer drum is quite free when the sleeve nut is screwed home. Do **not** put great pressure on this sleeve nut, remember it is only $\frac{1}{4}$-inch diameter thread.

If the outer drum is not free, turning moment is put on the thrust rod, which usually results in a fracture.

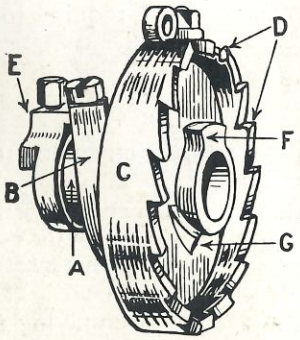
Excessive side play can be taken up by removing the high gear drum and replacing the distance washer between it and the expanding ring side plate, by a slightly thicker one. If more than $\frac{1}{16}$-inch play is still there, it will be necessary to place a slightly thicker washer between the low gear expanding ring side plate and drum.

(2) **Excessive Oiling.** This can be remedied by injecting petrol with the petrol squirt through the small holes provided on the drum of the clutch.

Fierce action of clutch is due to want of oil—lubricate through holes in outer drum, as well as the usual place.

The Starting Gear

consists of a foot lever working from the back fork lug with a bell crank arm connected by rod and chain to a ratchet drum mounted on the right-hand side of the two-speed gear inside the frame lug.



Ratchet Sprocket of Kick Starter.
Fig. 12.

The ratchet drum (C) is mounted on a boss (A), which fits over the gear spindle. The drum contains a scroll spring (B), the inner end of which is fixed to the centre of the drum, whilst the outer end is anchored by means of the spring retainer (E) to the boss (A).

The side facing the two-speed gear is formed with ratchet teeth (D), which engage with a ratchet ring fixed on the end of the high-gear drum.

The action of the scroll spring (B) is to twist round

the ratchet drum so as to draw back the chain and rod attached to the starting lever, and also to force the drum sideways towards the gear ratchet, so that the ratchet teeth are engaged—but as the starting pedal is brought back to its normal position by the rotation of the drum, the lug (F) is brought into contact with the fixed lug (G)—formed on the end of the boss (A)—and the drum is forced back so that its ratchet teeth are thrown out of engagement with the gear crown ratchet. The distance between the ratchet is regulated by the length of the rod and chain.

Adjustment of Starting Gear

The ratchet device with spring and boss complete forms a separate unit, which can be supplied ready to slip on to the two-speed gear shaft.

This can be removed without taking out the two-speed gear by taking off the gear pedal and quick thread drum. Then slacken the nut on the brake side of the gear shaft, next slacken the bolt on the underside of the right-hand lug in which the gear is mounted, so that this lug can be twisted round to allow the complete device to be slipped off the end of the shaft while the gear is slightly lifted up.

It is necessary to wind up the scroll spring by twisting round the device in a right-hand direction, before attaching the chain and rod to starting pedal, so that it will spring back when the pedal is released.

This should be adjusted by screwing up the link roller on the thread of the rod, so that the ratchets are thrown out of action on the return stroke of the starting pedal.

The device bearing should be occasionally oiled to avoid sticking.

If the ratchet will not come out of mesh when the rod is so adjusted that the cams (F) and (G) are "head on," the starter device must be taken off the spindle and a thin $\frac{5}{8}$-inch washer slipped on the spindle up against the main bearing cone, and the device replaced. This will throw the device further away from the high gear drum, and the ratchets will consequently be clear. The above washer is similar to those used for adjustment of the main bearing cones.

Slipping Ratchet

caused by—

(1) Drum sticking on boss, through dirt or want of oil.

(2) Defective spring so that ratchets are not properly engaged.

(3) Wear on ratchet teeth caused by improper setting of ratchet drum.

To avoid Backfire on Starting Pedal

Do not let the foot slip off the pedal at end of stroke, let the pedal up as quickly as possible, but do not allow it to fly back.

Acquire the knack of easy starting by a quick, smart push downwards.

To Tighten Chains

Engine chains. Slacken bolts under both gear lugs and then the lugs will be quite free and the gear can easily be moved into the required position, the bolts must then be tightened up.

It is of much more importance to have the gear and chains in line than to have correct and equal tension on both high and low gear chains. The chains will wear longer and run smoother.

It is usual for the high gear chain to be slightly tighter than the low gear chain, but if the alignment is correct, this will not be noticeable when running.

Back driving chain is adjusted in the same manner as on the ordinary bicycle by means of the chain adjusters, great care being taken to keep the chains and wheels in line. Tighten the nuts holding the back wheel very securely.

Magneto Chain.—This chain can be readily adjusted by loosening the three bolts holding the magneto bracket to the frame ; the bracket is now free to swing upwards, thereby tightening the chain.

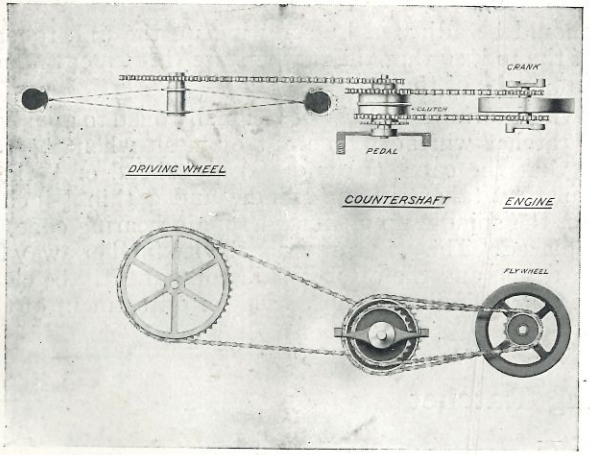


Fig. 13

After replacement of either high gear or magneto chain, it is necessary to re-set the timing of the magneto.

Breakage of chains is inevitable if the chains are allowed to run out of alignment through inaccurate setting of the gear or back wheel.

Magneto

is driven by chain from two-speed gear, and revolves at the same speed, and in same direction of rotation as the engine, giving two sparks each revolution.

The high-tension distributor on sprocket side of magneto distributes the spark from the two carbon brush holders by means of the short insulated wires to the cylinder sparking plugs, to which they are attached by a spring grip device.

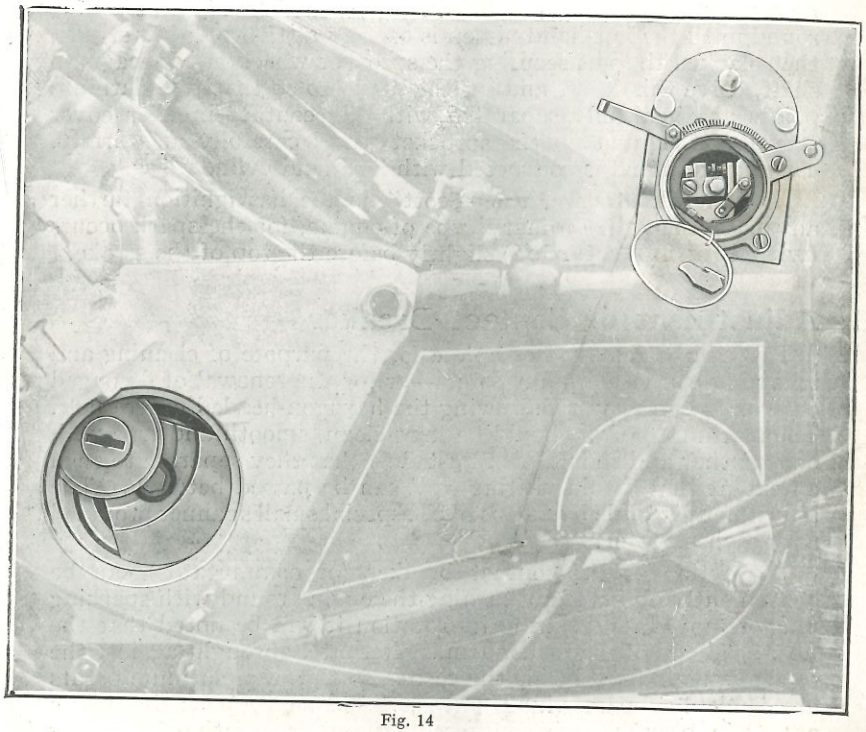


Fig. 14

The distributor consists of a vulcanite ring fixed on to the end of the armature having a brass contact piece let into the insulation, which is wired up to one end of the high-tension winding. The two carbon brush holders (which also serve as high-tension terminals) are set at such an angle in relation to one another that the carbon brushes are alternately brought into contact with the brass segment of the distributor during its rotation, so that the high-tension current is distributed to each terminal in turn.

These high-tension terminals are connected by the insulated wires to each plug respectively (the rear terminal to the left-hand

cylinder), and it is, of course, important that all chance of leakage, caused by frayed insulation on the wire, etc., should be avoided, also the vulcanite insulation on the high-tension terminals should be kept clean and protected from dirt or wet.

Timing of Magneto

To set the timing of the magneto remove the sparking plug, retard the ignition lever to its furthest extent, take off the left-hand crank case cover so that the exact position of the piston can be clearly ascertained, put in the gear, and then turn the engine round until the left-hand piston is exactly at the top of its stroke, then slacken the nut securing the sprocket wheel on the magneto shaft, drive this loose, and set the magneto so that the platinum points are just fully separated with the contact breaker cover retarded. Tighten up the sprocket wheel carefully and firmly. The rear terminal is connected with left-hand cylinder.

As you will observe, the "Scott" engine has ignition further advanced than the ordinary type of engine, for the spark occurs (**with ignition retarded**) slightly before the top of the stroke.

Adjustment of Contact Breaker

This can be removed complete for the purpose of cleaning and trimming of the platinum points—or for the renewal of damaged or broken parts by withdrawing the hexagon-headed centre bolt. The platinum points should be kept clean, smooth and true with one another and should be adjusted so that they separate to such an extent that a thin visiting card can be passed between. The adjustment is made by means of the special small spanner provided with each machine.

The action of the contact breaker (or commutator) can be conveniently observed by turning the engine round with sparking plugs removed, and during its rotation it will be noted that the fiber-shod end of the rocker arm is alternately brought against the steel segments fixed inside the casing, so that the platinum points are suddenly separated. Upon leaving each segment the points are again brought into contact by the action of the flat spring fixed to rocker arm.

It is consequently of importance that the rocker arm should work freely on the pivot bearing, and that the spring should be of sufficient strength to bring it back at high speeds. It is also necessary that the platinum points should separate to the right extent and, since there are two separations per revolution, these also should be equal.

This can be ensured by adjustment of the steel segments and by slackening the screws securing it to the case and inserting one or more thicknesses of paper between so as to slightly raise the

segment, an increased movement of the rocker arm can be obtained from that segment until it gives exactly the same amount of lift as the other. It is important in judging this to make sure that the case is properly in place, and not tilted over so as to cause inequality from this cause. The case has a limited movement controlled by lever on handlebar and can be partially rotated so as to alter the timing of magneto. It must, however, be remembered that the best spark is only obtained with the contact breaker fully advanced, since the platinums are then suddenly separated when the armature is leaving the magnetic field at the point of greatest intensity, and consequently if the commutator is retarded, the magnetic effect is reduced when the break occurs, and the resulting spark is very much weaker.

For this reason it is never necessary or advisable to fully retard the contact breaker even when starting, and the ignition should always be more or less advanced when running.

Magneto Defects

Faults in the magneto are generally confined to the contact breaker and distributor, and are as follows :—

(1) **Broken Spring on Rocker Arm.**

This is easily replaced by taking off casing, withdrawing centre bolt and removing complete contact breaker. The broken spring can then be easily replaced by new one.

(2) **Rocker Arm Stiff or Stuck up.**

Take off contact breaker, slide aside spring blade holding rocker arm on to its pivot bearing, remove rocker arm (this can be done without taking off spring), clean and oil fibre bush bearing in which rocker arm pivot works. In replacing contact breaker, take care that the key or tongue on contact breaker boss enters the corresponding keyway or slot on end of magneto shaft.

(3) **Defective Carbon Brush Holders.**

To remove these it is not necessary to detach the magneto from the frame. The carbon brush holders are fixed to the magneto by a spring clip. The ends of the carbon brushes which bear against the distributor should be trimmed by scraping with a knife or file, and the distributor ring can also be cleaned, if dirty through excess of oil, by injecting petrol through the terminal holes, or by turning the magneto round with a piece of cloth bearing on the dirty surface. A defect in the vulcanite insulation of the carbon brush holders may be detected by first of all finding out which one is at fault by alternately detaching the high-tension wires from the sparking plugs whilst engine is running, and holding end of wire about $\frac{1}{8}$-inch from metal part of engine, and noting if either wire gives no spark—or only sparks occasionally. Then by changing over the carbon brush holders it can be determined if either of these is actually at fault by the resulting improvement of spark from the same high-tension wire.

If the engine will fire only on one cylinder and the magneto is suspected it can be tested by timing the magneto on the other cylinder and changing over the high tension leads. If the magneto is at fault the other cylinder only will now fire.

Unusual Magneto Defects

(1) **Defective Condenser.** This is quickly detected by the excessive sparking at the platinum points, accompanied by abnormal pitting and burning of the platinum (this, of course, should not be confused with the somewhat similar effect caused by lubricating oil getting on to platinum points), also by the poor spark obtained.

(2) **Defective Wiring in Armature.**

(3) **Weak Magnetism in Field Magnets.**

The only remedy for these defects is to return magneto to the makers. Before imagining that the magneto is defective from any of these causes, see if improvement is made by careful attention to adjustment as previously directed.

Magneto Cut-Out

This is operated in combination with the half-compression lever from the handlebar.

The purpose of this is to provide that the magneto cut-out is only operated upon half compression, in order to avoid the sudden jerks in the drive caused by the constant switching on and off on full compression. For this reason we do not advise the fitting of any extra direct-acting switch to the magneto.

The handlebar lever is provided with a small spring plunger, which is brought into contact with an insulated switch bolt passing through the handlebar tube, from which an insulated low-tension wire is carried to the cut-out terminal on the contact breaker case of magneto.

Defective Switch

This may be detected by detaching switch wire. The insulating fibre bushes by which the switch bolt is insulated from handlebar may be defective, and can be readily replaced, or the bushes can be restored by boiling in paraffin wax.

The Engine

Is of normal 3 port design.

The twin cylinders of the 1911, and later models, are completely water-jacketed, and together form a monobloc casting readily detached from the crankcase by the removal of the four outside bolts.

It is not necessary or desirable to periodically remove cylinders, since carbonization is almost entirely prevented by the even temperature ensured by the water cooling, and by the regular system of lubrication.

The piston rings can be examined without removing cylinders by taking off transfer port covers, and the exhaust ports can be also got at for occasional examination or cleaning by removal of exhaust covers.

The plated cylinder head rings can be unscrewed giving access to jacket without disturbing the radiator.

The crankcase covers are quickly removed by unscrewing wing nut, and sliding aside cover bar. Do not attempt to run the engine with either of these covers removed or improperly replaced.

To take off Cylinders

Drain out water from radiator and cylinders by drain tap. Take out sparking plugs, remove the central bolt holding the silencer ends and slip the silencer down. Remove exhaust port covers and detach the half compression actuating rod. Take off transfer port covers, slip off both rubber tube connections to radiator, remove radiator by withdrawal of the three fixing bolts passing through radiator. Slacken off cylinder holding down nuts (A) and draw out cotter pins (D). The cylinder casting can then be lifted off crankcase, leaving pistons projecting from crankcase casting.

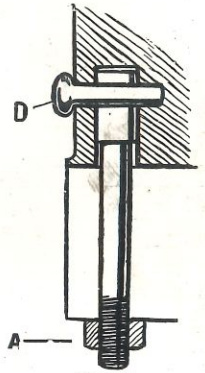


Fig. 15.

If the cylinders are stuck do not lever them off by using a screw driver between the cylinders and crankcase, it will spoil the aluminium face. The best method is to put a bar into the sparking plug holes alternately and lift the cylinders by pressing the piston carefully against the bar.

In replacing cylinders take great care that the rubber cylinder base rings are correctly fitted (if these are stretched or damaged, new ones should be fitted). It is equally important that the linen cylinder joint washers between the cylinders and top of crankcase should be replaced if defective, since any suction leak here materially affects the action of the carburettor. Care must also be observed in guiding the piston rings into their grooves while the cylinders are being replaced. Use seccotine only to keep base rings in position.

To take off Pistons and Connecting Rods

Detach crankcase cover bar, insert the milled end into slot on crankpin screw and twist round, bearing in mind that the **right-hand crank screw has a left-hand thread, and the left-hand crank screw a right-hand thread.** This is

indicated by the letters R and L stamped on the screws. After unscrewing the crankpin screw, the piston and rod can be removed by placing crankpin at top of stroke the rod will then come off sideways and the rollers inside the bearing should be collected and put together. Do not mix up the rollers from each side together. The piston and connecting rod is a complete unit, and we do not advise any attempt to separate the rod from piston. If difficulty is experienced in unscrewing crankpin screws, tap the end of bar while attempting to unscrew, this will slacken the grip on the threads.

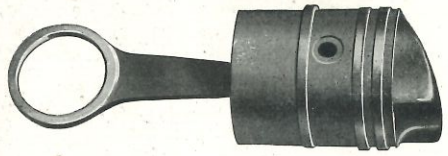


Fig. 16.

It is preferable to slacken the crank pins before the cylinders are lifted, the engine can then more easily be prevented from turning by placing a bar in the plug holes and pressing the piston against it.

Piston Rings

are easily removed by raising ends over the piston and moving the ring round until it mounts over the piston body, replace rings the right side up—that is with the bright side facing the lower face of the grooves. On no account replace by fancy rings with step cut ends, etc., or with rings other than the special hammered and ground rings supplied.

Crankshaft, Main Bearings and Packing Gland

We do not advise the removal of the crankshafts by any but the most expert and skilled hands. These are, however, readily removed with the use of a box spanner. First of all unscrew left-hand lock-nut on right-hand crank. Then partially unscrew bolt head on left-hand crank two threads. By means of a smart blow on the bolt head the right-hand crank may be driven out, the bolt can then be further unscrewed and withdrawn, allowing the right-hand crankshaft to be removed complete with rollers and packing gland.

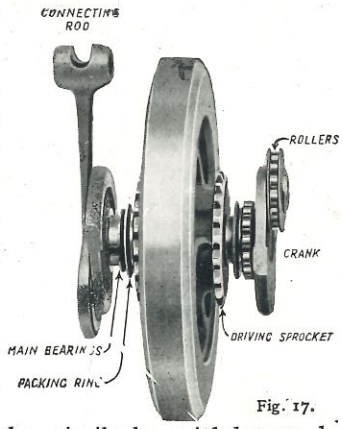


Fig. 17.

The left-hand crank can then be similarly withdrawn by inserting a rod from right-hand side and driving the crank out of flywheel by a smart blow.

The greatest care must be taken in replacing the crank. The rollers are most easily held in position by grease, be sure that each is down on the bearing, otherwise difficulty will be experienced in getting them all into the crankcase cup. Care should be exercised in replacing the packing rings, and that the tongue enters the key-way in the flywheel.

After the crank bolt is screwed up, each crank should be driven up against the other by using a hammer and a punch, that is, one crank should be supported against a solid mass, and the other driven up into the taper of the flywheel, it is advisable to turn the crankcase over and drive up the other crank, after each knocking up the bolt should be tightened.

We cannot emphasise this operation too strongly, as invariably shearing of the flywheel key is caused by the omission of the driving up.

The tapers of the cranks and flywheel are intended to take the major turning stresses, and not the key. If the tapers are not tight the key is subjected to the whole turning moment of the explosion, and usually shears in consequence.

The crankshaft nut should be lightly rivetted over to prevent any chance of working loose.

To take Engine out of Frame

(1) Remove rubber pipe connection to radiator, leaving radiator in position.

(2) Undo patent spring clip fasteners and detach engine chains.

(3) Take off inlet pipe, transfer port covers, oil pipes, petrol pipe, and remove carburettor.

(4) Take off exhaust port covers, and remove half compression rod.

(5) Remove central bolt holding the silencer ends and slip silencer down.

(6) The engine fixing bolts may then be withdrawn and the engine moved forward in the frame.

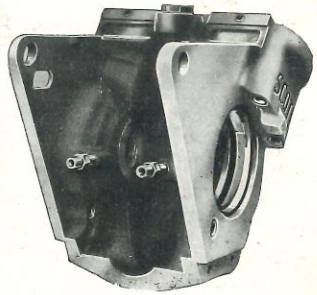


Fig. 18.

The engine can then be lifted out of the frame.

When replacing engine tighten up engine bolts securely, and time magneto as directed.

When replacing the spring clips on chain the closed end should always be in the direction of rotation, there is then no liability of it coming off if there is an obstruction in the path of travel.

To Remove Flywheel

This can only be taken out of crankcase when engine is out of frame, or lifted up from frame bracket to permit of flywheel being passed out. It is, of course, necessary to first of all remove cylinders, and detach piston rods and crankshafts as previously directed. In replacing flywheel see that it is put back the same way, which is such that the fingers of the R.H. fall naturally into the groove of the rim.

Engine Chain Wheels

These are fixed by four long $\frac{1}{4}$-inch rivets passing through bosses on flywheel web, and can be removed for replacement by drilling out the countersunk ends of the rivets on one side, and driving out same. Since these sprockets are made from case-hardened Mild steel, and have a comparatively large number of teeth (20), they last indefinitely, and show no trace of wear after many years running. Consequently renewal of the sprockets is seldom necessary. It must be remembered that **only 20 T Sprockets** can be fitted to the engine, otherwise the ratio of gear to magneto will be affected.

Half Compression Valves

The function of these valves is to reduce the compression in the cylinders by admitting access to the exhaust pipe from an additional exhaust port placed above the main exhaust ports. When this is opened to the exhaust the effective stroke of the piston is decreased, since compression will then only begin when the piston has travelled far enough to close off this extra port—resulting in about half the normal compression in cylinder.

Since these valves are not exposed to the extreme temperature, and pressure produced by the explosion at the beginning of the power-stroke, it is not necessary to ever grind them in, or to otherwise attend to them beyond seeing that they do not stick through gumming up—failure of springs—or incorrect setting of the operating tappets.

These should be set so that both valves get down upon their seats, and a space of about $\frac{1}{16}$-inch can be allowed between the valve stem heads (D) and the tappet arms fixed to the shaft carried on the exhaust cover casting. The amount of lift on the valves can be adjusted by sliding the clip to which is fixed the outer Bowden wire covering, and securing it in correct position on the frame tube.

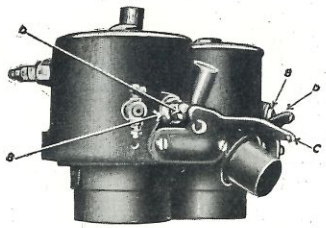


Fig. 19.

The end of the inner wire cable is connected through the medium of a short stiff tension spring to the lever (C), operating the half compression shaft. The purpose of this spring is to permit of a further movement of the hand lever after the valves are opened, in order that the switch cut-out can be brought into operation after the compression is thus reduced.

The valves can be removed without taking down cylinders, by unscrewing the lock rings (B) securing them in position.

Transfer Port Covers

The port covers are easily removed by unscrewing the single central holding bolt. This should not be screwed up more than is necessary, since the strain caused by screwing up too tight is likely to distort the aluminium casting.

Wire Gauzes

The wire gauzes which are inserted between the port cover faces and the cylinder and crank-case port faces are now provided complete with jointing washers fixed on both sides, and by means of the ledges formed on both the crank-case face and cylinder face they can be placed in register with the ports without difficulty.

The purpose of these gauzes is to prevent back firing into the crank-case, due to late firing of the charge, which is caused by weak mixture or defective ignition. The engine can be run for racing purposes, etc., without the gauzes and no advantage is gained by constantly examining and replacing them.

Owing to the complete water jacketing of the cylinder, the gauzes are kept cool, and consequently do not burn out while the cleansing effect of the petrol vapour tends to keep them clean.

Leakage from Wire Gauze Joints

May be caused by—

(1) Careless replacement of the gauzes.

(2) By unequal thickness of jointing washers at top and bottom of port cover.

(3) By distortion of port cover or crank-case caused by screwing up excessively tight.

(4) By defective packing joints.

Separate jointing washers are supplied, as well as the complete gauzes and washers.

Engine Defects

The efficiency of the engine depends upon the following :—

(1) Good cylinder compression.

(2) Good crankcase compression.

(3) Correct timing of magneto.

(4) Absence of air leaks.
(5) Freeness.
(6) Equal oiling.

Cylinder compression can be tested by standing on the kick starter pedal, or by engaging the gear and pulling the back wheel round. Each cylinder should be the same.

Defective compression in the cylinders may be due to :

Faulty or broken piston rings.
Want of oil.
Stuck up half-compression valves.
Leakage from sparking plugs.

It must be remembered that poor cylinder compression, with considerable leakage past the piston affects the suction in the crankcase. Owing to the water cooling the piston rings do not gum up in their grooves and there is no possible distortion of the cylinders, so that if the rings are not actually broken the compression will always gradually improve with the running of the engine.

Defective Crankcase Compression can be tested by removing the plugs engaging the gear and turning the engine round sharply. There should be a distinct "blow through" from the crankcase at each half revolution, similar to drawing a cork from a bottle. Any weakness in either cylinder can be noted.

Leakage may be due to badly fitting crankcase doors or transfer ports, or want of oil.

The test for leakage is similar to that shown in paragraph "Leakage of Oil from Engine."

Owing to the "Scott" system of spring supported metallic packing gland, whereby all wear on the hardened steel faces of the glands is automatically adjusted, there is no possibility of crankcase leakage after prolonged running, in fact it may be said that the only effect of wear is to improve the running joint.

Firing on one cylinder is commonly due first to **defective ignition** (which in turn may be caused by faulty plugs or defect in magneto) ; (2) **defective crankcase compression ; (3) to water in crankcase,** due to leakage from water jacket. This is only likely to show up after machine has been standing for any length of time, and since the jackets of the cylinder are subjected to a hydraulic test there is very little chance of trouble from this ; (4) **an air leak on the inlet side.** This is likely to cause weak mixture to the faulty side and consequent misfiring. To test for air leaks the best method is to run the engine slowly, and with a petrol injector squirt spirit round all the joints, especially at the cylinder holding down pins, the inlet pipe joints and joint between cylinders and crankcase. Any leaks will be shown by varying speed of engine.

The cylinder which is not firing can be readily detected by alternately detaching high-tension wires when engine is running, and noting on which cylinder the engine is firing.

Owing to the smoothness of running of the "Scott" two-stroke engine, it is difficult for the uninitiated to tell whether the engine is firing on both cylinders, except by the unusual loss of power.

Loss of power can often be traced to partial choking up with burnt oil of the silencer exhaust drain pipe.

Radiator

The honeycomb radiator is fixed to the frame brackets by three bolts passing through the radiator tubes (which are here protected by end ferrules), so that by the withdrawal of these bolts the radiator is quickly removed from the frame.

The level of water in radiator should be kept above the tubes. The water can be drained off by the drain tap on engine water jacket—or more quickly by detaching rubber tube connections. The radiator can be occasionally cleaned out by rinsing with soda and water.

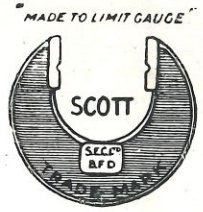
The air passages in the honeycomb portion of the radiator should be kept free from any accumulation of dust or mud, otherwise a considerable amount of the cooling area will be lost.

Leakage of Water

from radiator tubes can be temporarily stopped by plugging up the defective tube with a spare bolt with washers at each end. This is not likely to occur with the special strong radiator provided.

Leakage from rubber tube connections can be cured by the use of insulating tape or by replacement of rubber tubes. Leakage from the jacket head can be stopped by tightening down the nickel-plated lock ring with a hammer and blunt chisel, or by replacing the rubber packing washers.

In frosty weather it is advisable to drain off water.



The Squirrel

This machine is primarily designed as a fast mount, consequently the gear ratios are rather high, and one cannot expect the machine to run very slowly. The engine is capable of "reving," and with Standard gearing it is possible to do 45 M.P.H. on bottom. This speed should, of course, not be prolonged until the cylinders and pistons have been thoroughly run in. A little oil in the petrol will help matters very considerably, ½-pint to a 2-gallon tin.

The drip oiling arrangements should be adjusted so that the engine receives one pumpful every 4—5 miles. The oiling can be considerably reduced when the running in process has been completed.

When tuning for maximum speed, it will be found necessary to fit approx. No. 34 jet, but this size will be too large for speeds under 30 M.P.H.

The gears are similar to the Standard, and are lubricated by the oil pump, one half pumpful every 50 miles is sufficient.

All methods of assembling and dismantling are similar to the Standard Model.

The chains and all bearings should be given the same attention. For speed work a little is gained by removing the low gear chain and omitting the gauzes from the transfer ports. The chains should **not** be adjusted too tightly.

Starting from cold in the morning can be usually done with one or at least two kicks, if the engine is stopped the night before by closing the air lever only. This, of course, applies to the Standard as well as this model. It must be understood that this practice must never be reverted to, if the machine is required again under three hours.

If difficulty is experienced in starting a warm engine, and the rider is certain there is petrol vapour in the crank-case, the cause is likely to be "choking." This is most easily remedied by unscrewing the locking ring above the throttle chamber and lifting out the slides. The engine should then be moved round a few times, if it fires, stop it immediately with the switch lever and replace the slides.

To facilitate filling up with oil, do not fill the cup, pour straight into hole if possible.

When the cylinders have been lifted for decarbonizing, or for any other reason, all the joints should be made with seccotine; a thin film should cover the rubber and linen rings, and the transfer port joints made in a similar manner. Seccotine is not affected by either petrol, benzol vapour or oil. In view of the presence of spirit, gold size, or other similar adhesive will be quickly dissolved.

We have found from experience that benzol is very suitable for our engine, and no detrimental effects have resulted from its use.

The Scott Three-Speed Countershaft Gear Clutch & Kick Starter

For Section of Box, see page 32.

These form one unit, and are made throughout at the Scott Factory. All three gears are brought into action by one Sliding Dog Clutch. **Wheels are always in mesh.**

All the **Wheels, Ball Bearings** and Operating Mechanism are exceptionally strong and there is no danger whatever of stripping the teeth. No Shock Absorber is fitted, this not being necessary, owing to the even torque of the Scott Engine. The change Speed Lever can be operated with the Clutch in engagement, the gear dog being moved by a spring loaded arrangement. It is of course advisable to ease off the engine and clutch when changing up.

The **Neutral Position** is between the first and second gear.

The **Clutch** is a multiple plate type with special friction linings which have ample surfaces. The Clutch can be operated by very small pressure upon the handlebar Lever, the spring pressure on the plates being very light.

The **Kick Starter** is very substantial and absolutely positive in action, fitted with a device which throws it out of gear before it returns to its normal position. The Ratio between the Kick Starter and the Engine being such that a lady can start the Engine with the greatest of ease.

Engine Chain Adjustment can be effected by slacking off the four bolts holding the Gear in position. It is impossible for the gear to come out of alignment when making this adjustment. It is **necessary** to tighten up the **driving side,** that is the left hand side **last.**

The **Ratios** of all gears can be easily altered by changing the Driving Sprocket for others of different sizes. The usual ratio being 4.5, 7, and 12.75 to 1. When the Engine Chain is adjusted, it is not necessary to adjust the Magneto Chain as the Magneto is mounted on the Gear Box. It will of course be necessary to adjust the rear drive.

The **Lubrication** of the Box is carried out in a normal manner. The oil filler plug on the box is in such a position that too much oil cannot be given. There is an Inspection Cover on the top of the Box, which swings on one side, enabling all the gears to be seen.

Scott Three-Speed Motor Cycle

The **Scott Three-Speed Motor Cycle** is primarily designed for use with sidecar, and after extensive testing has been found capable of hauling a Sidecar up any gradient where a wheel grip can be obtained.

The Frame Forks in principle are similar to those fitted on our previous Models—have proved highly efficient.

Both Brakes have been re-designed and are internal expanding, with instant adjustment if required.

The Back Wheel can be detached from the Frame, leaving the Brake Drum and Chain Wheel in position. It is impossible to replace wrongly.

The Bearings of Back Wheel are of the **Journal Type** (non-adjustable), this is following our practice, which we have found to be extremely efficient and reliable.

Lubrication of Both Wheels is accomplished in a simple manner. Near each cone, in the Hollow Spindle, a hole is drilled, through which lubricant is injected as follows :—

Front Wheel Hub

Take out Wheel, in one end of the Hollow Spindle insert a cork, place the Wheel horizontal with the cork underneath. The Hollow Spindle can then be charged with lubricant and forced through each hole in turn by means of the Pull-out Spindle acting as a Plunger.

It is of course necessary to repeat this process from each end of the Hollow Spindle.

Back Wheel Hub

Lubrication is carried out as in the front one, charge only being necessary every 5,000 miles.

It is advisable to use **Vaseline** only in this Hub.

Both Hubs are perfectly water and air tight.

The Fixing of the Engine and Gear

The fitting of the Engine in the Frame follows our usual practice except that the bottom fixing is to an aluminium tray, which forms part of the Frame, but is detachable therefrom.

The Gear Box is mounted on the tray and kept in alignment by guide rails and secured by four bolts.

Scott Three-Speed Motor Cycle

Gear Operation and Clutch

The **Gear is operated** in the usual manner. On the line drawing, the second Gear is shown in engagement, the **Drive** in this case being transmitted through the **Clutch** and **Wheel C** to **Lay Shaft** and back to **Wheel B,** the **Dog Clutch** on **B** engaging with **Sliding Dog D** on the splined **Main Shaft,** to which is attached the **Main Driving Sprocket.**

First Speed is obtained by moving **Sliding Dog D** so that it engages with the **Dog** on **Wheel A. Neutral Position** is when **D** is between **A** and **B,** or **B** and **C,** but for convenience the **Lever** is arranged so that only one **Neutral** is used, that is between **A** and **B.**

A **High Gear** is obtained by engaging **Sliding Dog** with the **Dogs** on **Wheel C,** the **Wheel C and Main Shaft** then running as one, all other **Wheels** running idle. **The Dogs** and **Wheels** are of ample strength, and made of special material, which will withstand any shocks that it is possible to subject them to.

The Clutch is of the dry multiplate type, having floating linings. It is impossible for any part to get out of order.

The whole of the **Clutch** can be withdrawn from the **Frame** without disturbing the Box, it being only necessary to detach the **Main Drive Sprocket Bracket.**

The operation on **Handle Bar** is very light and accessibility to **Gear** exceptionally good.

The Engine Gear can be mounted on the tray as one unit before being assembled in the Frame, the complete unit being assembled by six bolts.

Fixing of Magneto

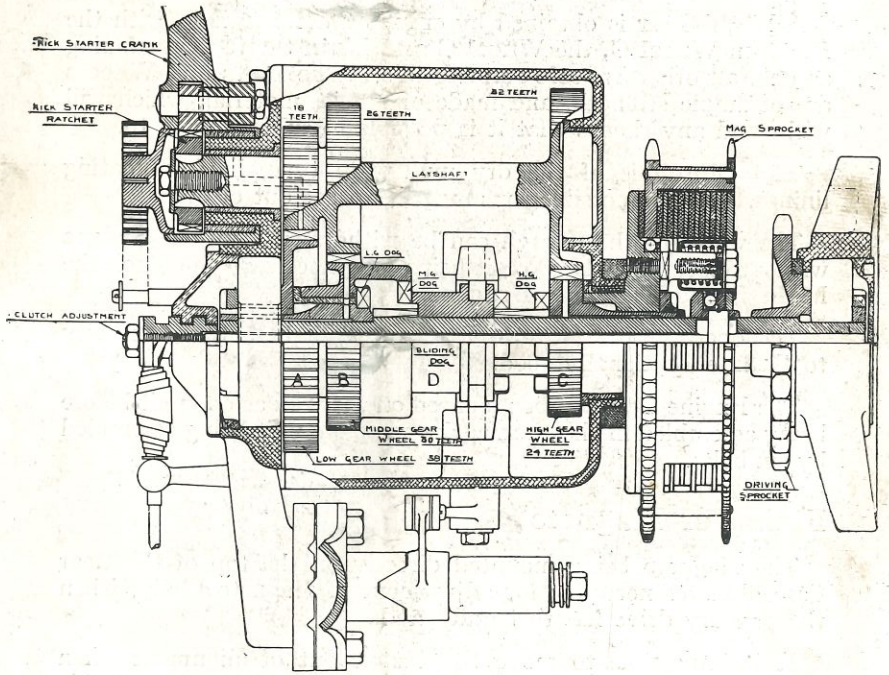
The Magneto being mounted directly on the top of the Gear Case obviates necessity for adjustment of Magneto Chain, when the primary drive has to be adjusted.

It is impossible to move the Chains out of alignment when making Chain adjustments, as the Gear Case slides along Guide Rails.

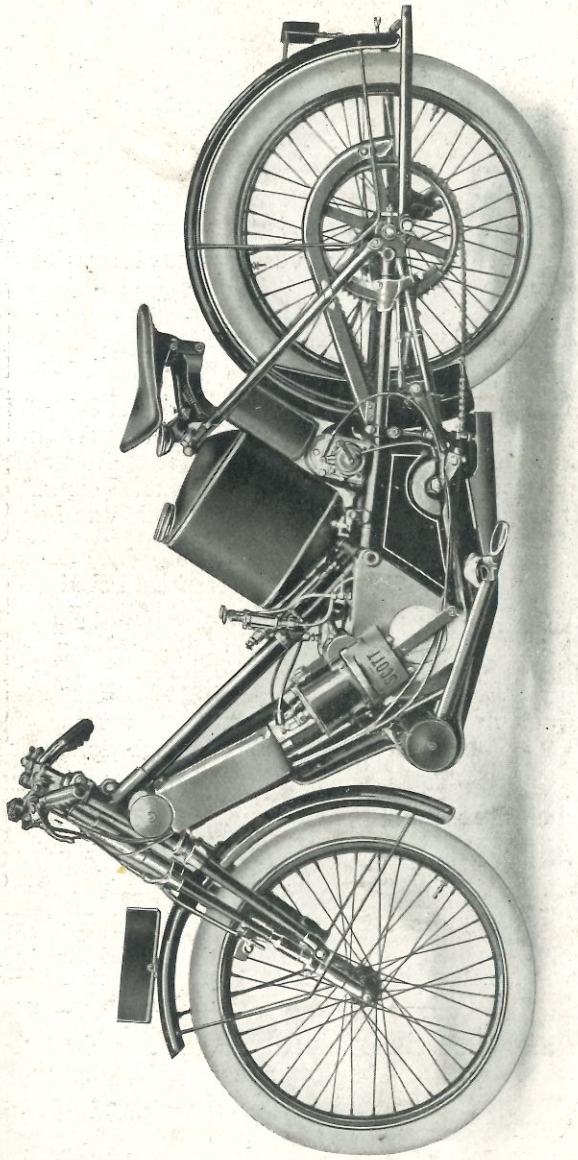
Scott Three-Speed Motor Cycle

LUBRICATION OF BOX

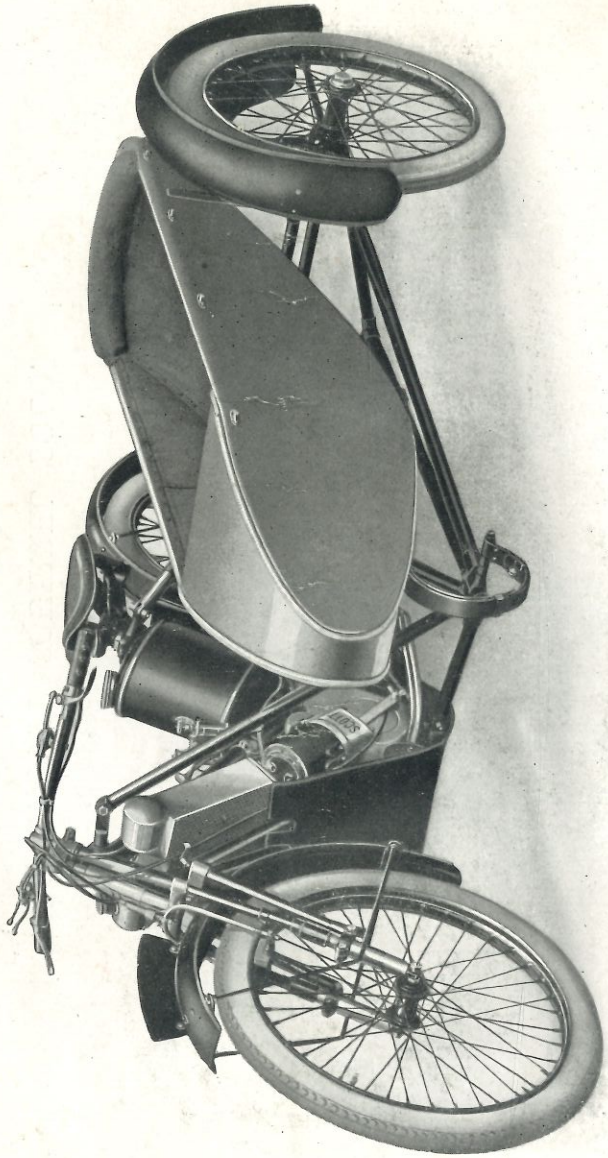
This is easily performed by filling through the inspection lid orifice on top of the box. The oil plug near the clutch adjustment should be removed and care taken that the level of oil is not above this opening. We recommend you to use Wakefield Castrol "D."



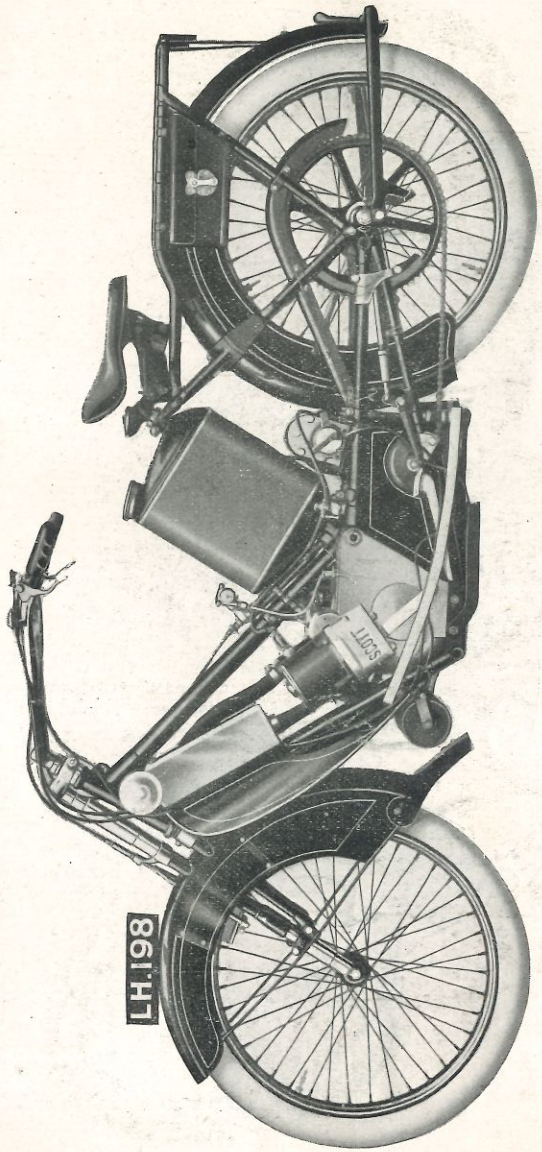
Section of 3-Speed Gear Box.



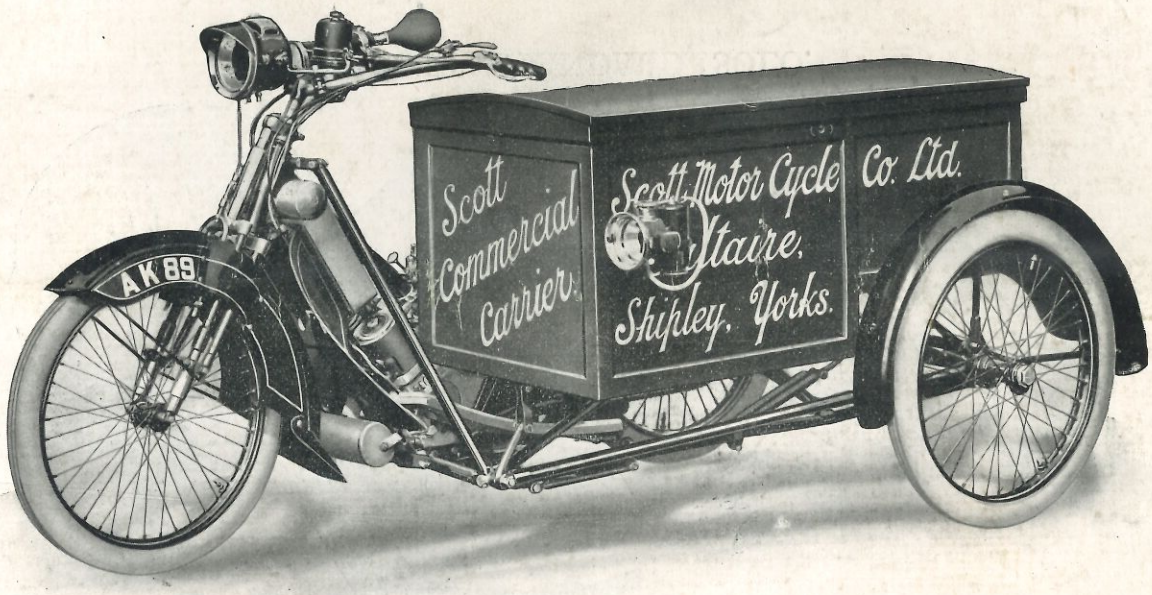
SCOTT SQUIRREL SOLO.



SCOTT SQUIRREL COMBINATION.



SCOTT STANDARD SOLO.



SCOTT COMMERCIAL COMBINATION.