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The Book of the
NSU QUICKLY

A PRACTICAL HANDBOOK
COVERING ALL MODELS

BY

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LONDON
SIR ISAAC PITMAN & SONS, LTD.

First published 1959

SIR ISAAC PITMAN & SONS, LTD.
PITMAN HOUSE, PARKER STREET, KINGSWAY, LONDON, W.C.2
THE PITMAN PRESS, BATH
PITMAN HOUSE, BOUVERIE STREET, CARLTON, MELBOURNE
22–25 BECKETT'S BUILDINGS, PRESIDENT STREET, JOHANNESBURG

ASSOCIATED COMPANIES
PITMAN MEDICAL PUBLISHING COMPANY, LTD.
39 PARKER STREET, LONDON, W.C.2
PITMAN PUBLISHING CORPORATION
2 WEST 45TH STREET, NEW YORK
SIR ISAAC PITMAN & SONS (CANADA), LTD.
(INCORPORATING THE COMMERCIAL TEXT BOOK COMPANY)
PITMAN HOUSE, 381–383 CHURCH STREET, TORONTO

MADE IN GREAT BRITAIN AT THE PITMAN PRESS, BATH
E9—(G.4227)

CHAPTER I

PRODUCTION OF THE NSU QUICKLY

THE NSU Quickly is a German-made machine—the NSU standing for Nekkarsulmer Strickmaschinen (after the South German town of Neckarsulm, where the factory is situated). NSU, in fact, is Germany's largest manufacturer of mopeds, motor-cycles and motor-scooters, and of motor-cycle, four-stroke and two-stroke engines. All production is centred at a large factory at Neckarsulm to which visitors are always welcome. The present NSU factory is designed and built on the best modern lines, incorporating the latest types of machine tools, painting and finishing equipment, etc. It is a relatively new factory since the original works were almost completely destroyed in March, 1945.

Pressed-steel Frame. When production started again on motor-cycles after World War II, a number of new design ideas were incorporated, notably the employment of a pressed-steel beam frame in place of the more conventional welded-up tubular frame. To do this demanded the employment of very heavy and costly equipment for the cutting out or "blanking" of sheet steel pieces and then forming them into a hollowed or sectioned shape for welding together. Superior performance is claimed for this type of construction, e.g. greater rigidity and strength, better appearance, etc., the main reason why it is not more universally adopted being the high initial cost of laying down the plant to do the job, especially if an existing production line is scrapped in consequence of the changeover.

The principle of the production of a pressed-steel frame is as follows. Starting with a sheet of steel, two blanks are punched out in a large press. The blanks are then transferred to another press which both shapes them to half-shell form and punches in necessary fixing holes. At another point on the production line the half-shells are joined by welding to complete the basic frame, and the engine bracket, head tube and various other fittings, are welded on. Finally alignment is checked in a special jig and the unit is inspected before being passed on to the paint shop for finishing. After joining the main assembly line the finished frame becomes virtually the backbone of the whole machine to which the various other components are attached. Fig. 1 shows the main assembly around the standard Quickly frame.

The NSU Quickly was introduced in 1953, at a period when there were nearly fifty different manufacturers producing mopeds in Germany, to say nothing of the dozens of other individual manufacturers in the remainder

of Continental Europe. It rapidly established itself as the leading German moped and in the space of three years production exceeded the half-million mark. Current production rate of Quickly mopeds is approximately one thousand *per day*, delivered to customers all over the world. Fifty per cent of all the German exports of mopeds are NSU Quickly machines.

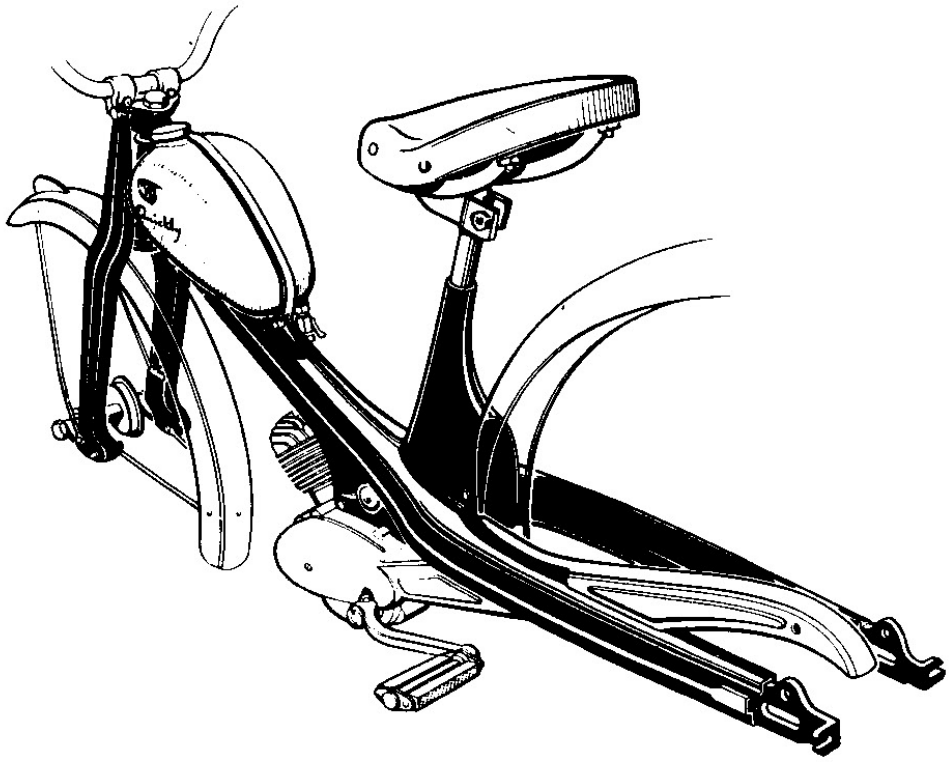

FIG. 1. THE NSU QUICKLY PRESSED STEEL-FRAME

British Agents. For the import of all NSU machines into this country a British company—NSU (Great Britain) Ltd.—was established in 1954, with registered offices at 7 Chesterfield Gardens, Curzon Street, London, W.1. A separate maintenance and spares section was set up at Hammersmith, London, in 1957 to handle major overhauls and repairs and facilitate the flow of spares, etc., to NSU agents and dealers.

Spare Parts. All authorized NSU Agents and dealers—of which some two thousand are established throughout the country (1957)—carry a representative stock of spares, as part of their agency agreement, and all servicing required by private owners is normally undertaken by them. Additional service can, if necessary, be obtained from any garage. It must be remembered, however, that all Quickly spares come from Germany and many components, e.g. nuts, screws, etc., are of German DIN standard, not normally stocked by garages unless they are accredited agents for NSU. Hence the most satisfactory contact for Quickly spares is the local NSU agent. The spares distribution system initiated by NSU

(Great Britain) Ltd., and their vast holding stock is aimed at giving a "spares service" to individual customers at least comparable with that on any British-made machine.

Not that spares or servicing should ever be a real problem. The Quickly is robustly made and excellently designed. Regular maintenance of a non-technical nature—which virtually boils down to regular attention to lubrication and simple periodic adjustments—should keep the Quickly running for years without trouble. Even the more detailed maintenance which may become necessary eventually can usually be tackled on a "replacement" basis by anyone without previous mechanical knowledge, simply by following the stripping and reassembly instructions. To do this competently, it is an advantage to appreciate how the various parts function, and such information will be found in Chapter V dealing with detailed maintenance.

CHAPTER II

GENERAL DESCRIPTION AND HANDLING

THREE versions of the NSU Quickly are currently produced (1957) around the same basic design. These are the Standard model, also known as the Quickly-N or Quickly Normal, (Fig. 2); the Quickly-S (or Special)

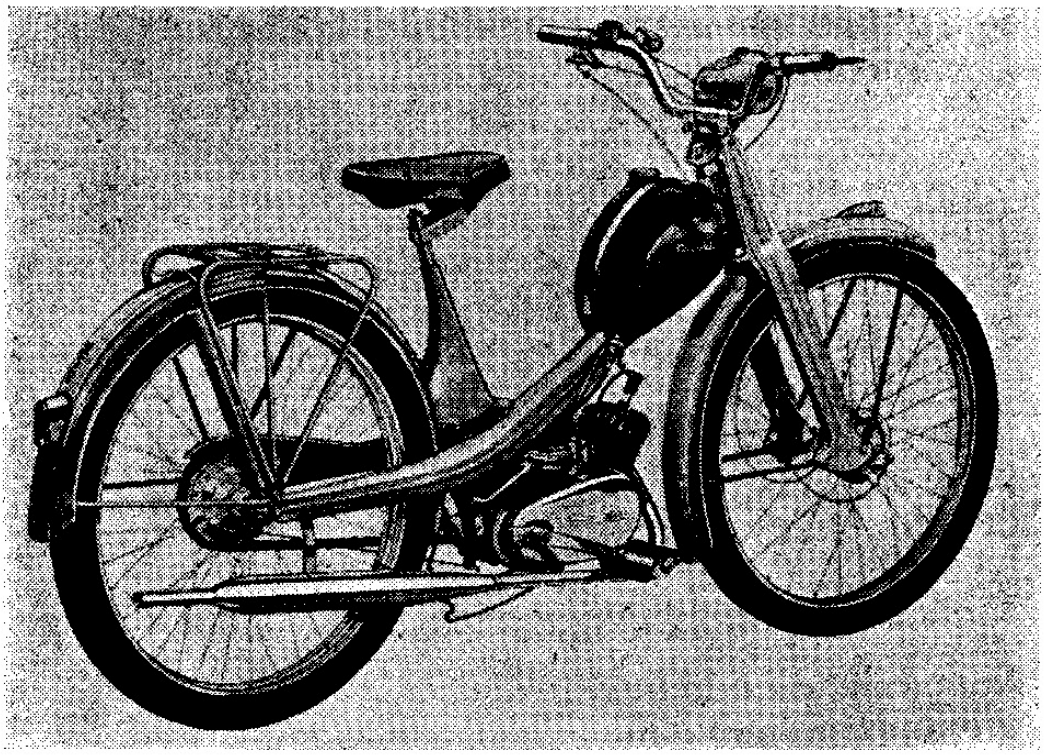

FIG. 2. THE BASIC MODEL—THE QUICKLY-N

(Fig. 3); and the Quickly-L or Luxe (Fig. 4). Differences are mainly a matter of detail refinement.

DIFFERENCE OF MODELS

The Quickly-N is the lowest priced model, supplied with painted wheel rims and without a speedometer. The Quickly-S has valances on the front and rear mudguards, chrome plated wheel rims, a side-prop stand and is fitted with a combined mileometer-speedometer in the headlamp as standard. It is finished in a single colour. Otherwise the appearance is identical with the model N.

The Quickly-L has a more widely valanced front mudguard and a completely re-designed rear mudguard which joins to the saddle tube and

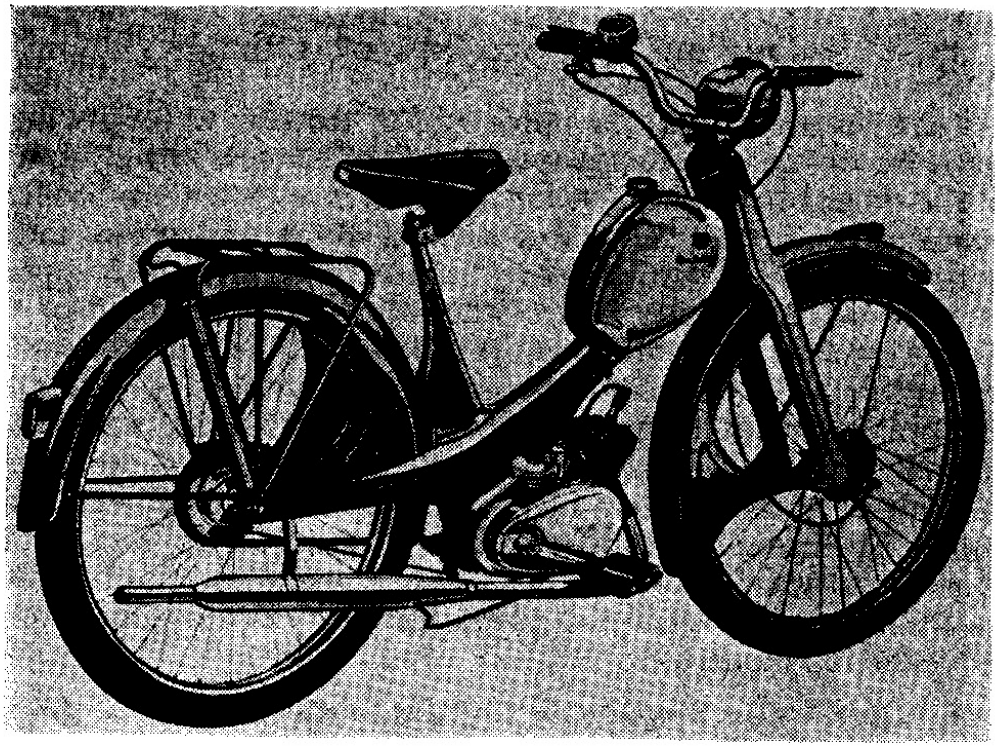

FIG. 3. THE QUICKLY-S

This model incorporates slightly more fairing.

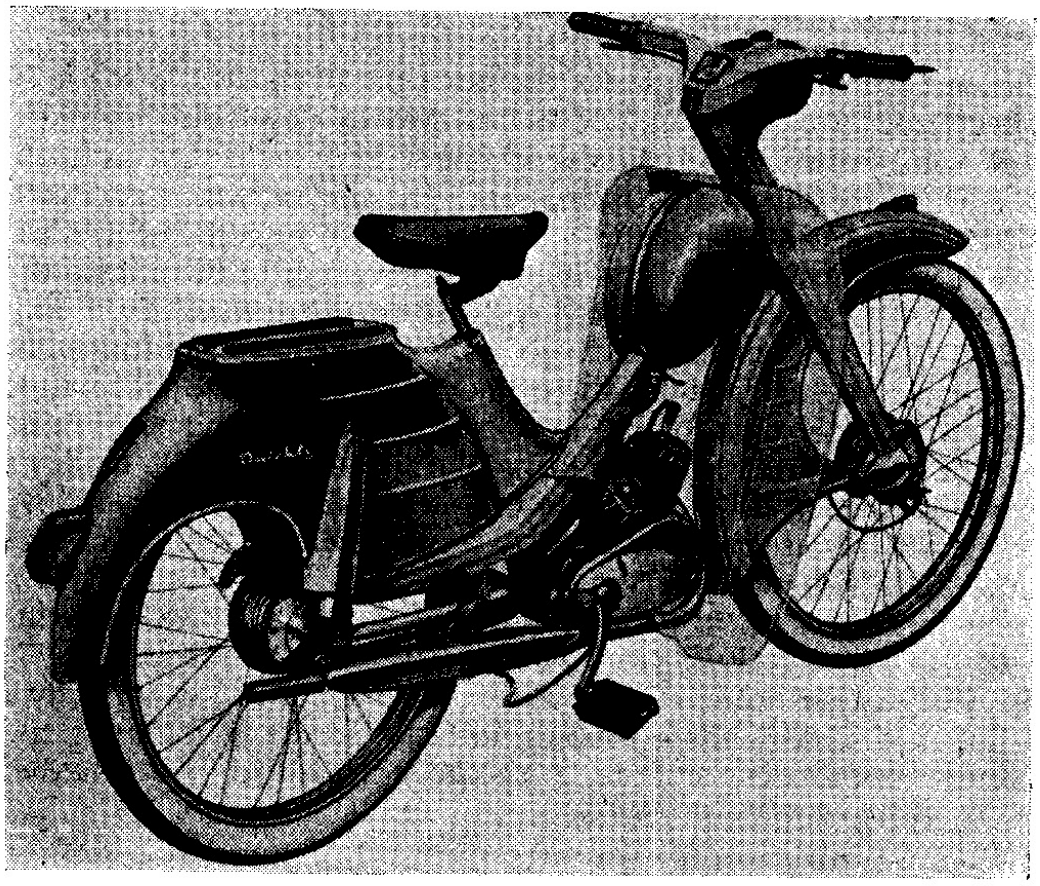

FIG. 4. THE QUICKLY-L

This model extends the degree of fairing employed, has redesigned handlebars and sprung rear suspension.

almost completely encloses the upper half of the rear wheel. A luggage carrier is incorporated in this shape, instead of being separately mounted as on the other two models. A further difference is that the handlebars are made as a pressed-steel unit of channel section in place of the conventional bent tube, with the steering head streamlined in, and appearing much more solid and with control cables led underneath out of sight. The lamp is formed integrally with this head and the mileometer-speedometer is re-positioned behind the line of the handlebars. The overall appearance, whilst still retaining the basic Quickly outline, is more in the nature of a motor-scooter than a moped. There is also an improvement in the ride given by the addition of rear suspension which entails a slight change in the rear end of the frame design, whilst the appearance of the front and rear wheels has been enhanced by the adoption of full-width hubs. Dual colour schemes and white sidewall tyres are standard on all Luxe production models.

TWO-STROKE ENGINE

Apart from detail differences related to these various modifications, all models can be considered identical for the purpose of handling and maintenance.

Engine Cooling. The engine is the same on all models, being a NSU single-cylinder two-stroke unit of 49 c.c. capacity developing a maximum of 1·4 horse-power. The cylinder is finned and cooled by air blowing past it when the machine is in motion. The finned area is adequate to dissipate enough heat when the engine is running stationary for it not to overheat in this condition when idling, but prolonged *fast* running of the engine when the machine is stationary is not advisable. Even so, the Quickly engine is far less likely to seize through over-heating than a conventional engine for both the cylinder and piston are made of light alloy and therefore tend to expand equally when hot. The usual cause of seizing on a conventional engine being that the piston is of light alloy and expands at a much faster rate than the surrounding steel cylinder. As a consequence the piston can increase to a size where it "jams" or seizes in the cylinder. Another point in favour of a light alloy cylinder is that aluminium conducts heat more readily than steel, and therefore tends to *lose* heat to the surrounding air more rapidly. The main reason why light alloy cylinders are not employed more is that the metal is normally soft and thus not suitable for a rubbing surface. In the Quickly engine the inside of the cylinder, or bore, is specially treated to give a hardened finish by being chromium-plated.

Two-stroke Principle. The engine operates on the two-stroke principle. That is to say it dispenses with mechanically-operated valves to control the flow of fuel through the engine, and the escape of the exhaust gases.

All the necessary timing of the gas flow is done by the movement of the piston up and down the cylinder, which opens and closes openings or ports formed in the cylinder. Thus the operation of the engine is made as simple as possible. Actually there is one valve in the cylinder head, operated by a cable controlled by a small lever on the left-hand handlebar. This is a "decompressor" which, when operated, opens the top of the cylinder to the outside air, through the exhaust port. This prevents compression building up in the cylinder when the engine is turned over and moves the piston to the top of its stroke. Its purpose is to enable the engine to be turned over freely and rapidly by the pedals for starting, and also to stop the engine if opened when running (at idling speed). The pedals are geared up to the engine for the purpose of starting and without this decompressor to "free" the engine, it would be quite hard work to set the motor spinning. More complete details of the engine can be found in Chapter V, Section 8.

Engine Unit. The engine assembly is attached rigidly to the pressed-steel frame by means of three mounting bolts. The complete unit (*see* Figs. 44 and 45) comprises the engine itself; the carburettor, supplying fuel mixture to the engine; the magneto-dynamo, driven by the engine crankshaft and supplying the spark to the spark plug and electricity for the lights and horn; the clutch; the gearbox; and the pedal drive.

Carburettor. The carburettor is a metering device which provides the correct mixture of fuel and air for the engine. Air is drawn through the carburettor by the suction of the piston inside the cylinder. Fuel is added to it and the combustible mixture is sucked into the engine, compressed by the piston inside the cylinder, and ignited by the spark plug. Since the air drawn in might well contain dirt, dust and similar abrasive particles which could cause damage to the inside of the engine, the air intake side of a carburettor is fitted with a filter—merely a form of "sieve," if you like, which traps harmful solid particles and thus allows only clean air to be drawn through it.

On the Quickly, ingenious use is made of the shape of the pressed-steel frame to improve on this. The open underside of the frame tends to trap and direct air onto the filter (Fig. 5). This form of pre-entry passage, it is claimed, effectively smooths the airflow and in so doing causes it to drop much of the solid impurities which may be carried with it before it reaches the filter. Thus there is less work for the filter to do and far less risk of abrasive particles getting inside the engine. This feature is also employed on NSU motor-cycle designs and is stated to reduce piston and cylinder wear by 70–75 per cent.

CLUTCH AND GEARBOX

The engine is connected to the final drive shaft via the clutch and gearbox. The purpose of the clutch is to disconnect the engine from the gearbox

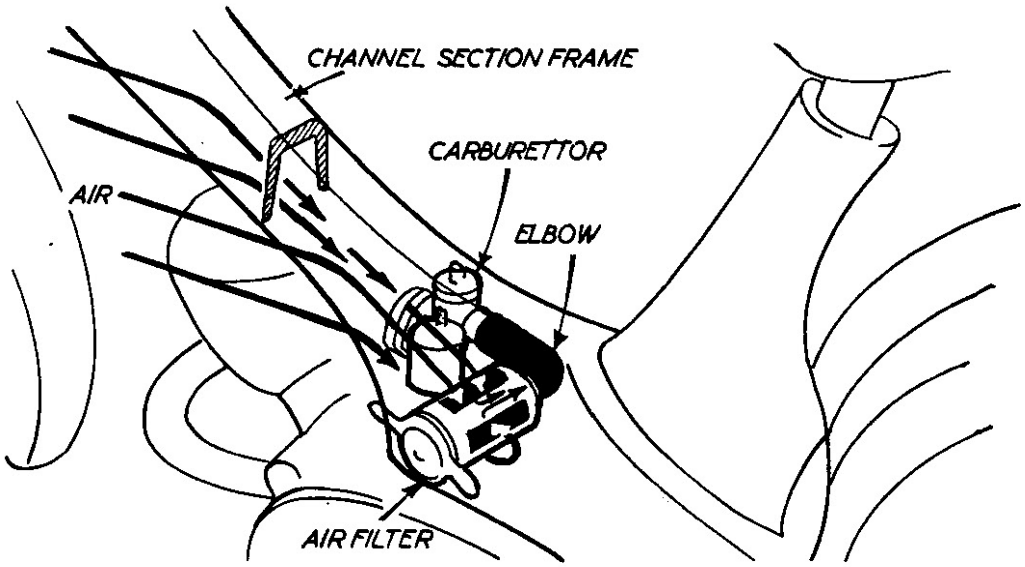

FIG. 5

A diagram showing how the air is trapped in the open channel section of the frame and fed down to the air filter and hence to the carburettor.

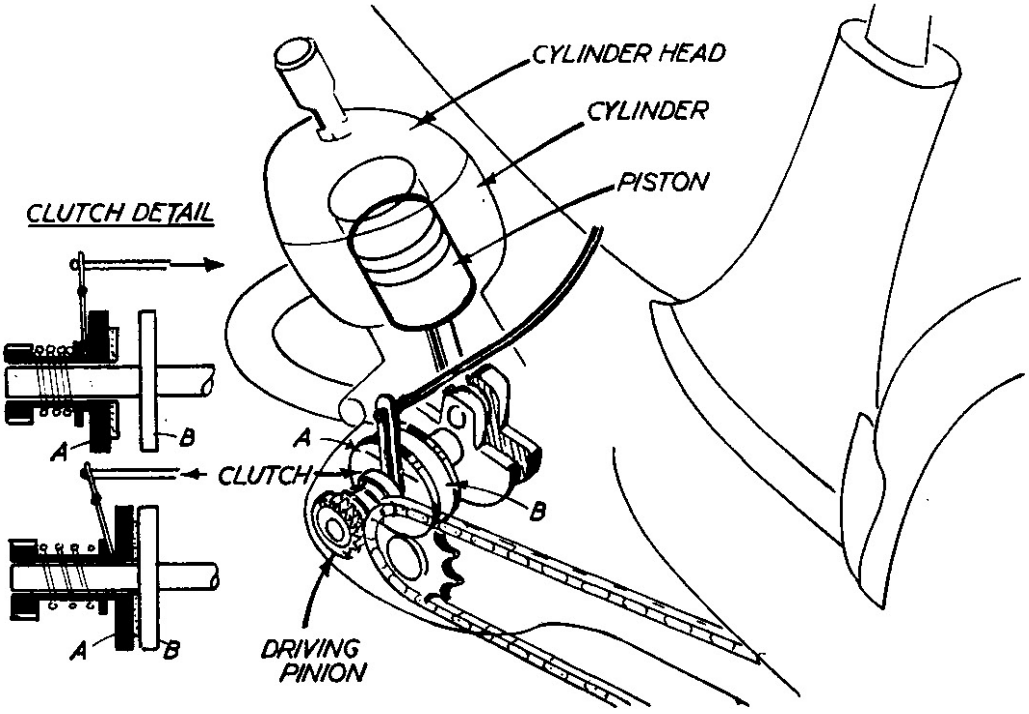

FIG. 6. SIMPLIFIED DIAGRAM OF THE ENGINE UNIT

The clutch is purely diagrammatic to illustrate its action in simple form. Compare with Fig. 50 for actual details of the Quickly clutch.

for the purpose of changing smoothly from one gear to another. The gearbox provides two different drive ratios, and also a neutral position where the engine can run disconnected from the final drive.

The basic mechanics of this system are quite easy to understand and knowing *how* it works makes for a better understanding of the operation of the controls. A simplified drawing of the Quickly engine unit is shown in Fig. 6 from which the working of each of the components can be followed.

All we need to know about the engine at this stage is that it has a protruding shaft, called the crankshaft, which rotates at a speed controlled by the throttle setting—this, in effect, varying the amount of fuel fed into the engine and thus making it run faster or slower, at will.

Clutch Plates. The clutch is attached to the end of the crankshaft. In the diagram a very elementary form of clutch is shown for clarity. The Quickly clutch is a little more complicated (*see* Chapter V, Section 8, Fig. 50) but it works on exactly the same principle. The clutch, as drawn, consists of two flat plates, one with a facing of some frictional material. One plate is movable, that is, it can be drawn back along its shaft by operation of the clutch lever. In this position the two plates are quite free and so the engine crankshaft can rotate driving the one (driving) disc without any connexion with the rest of the mechanism.

If the clutch lever is released, however, a strong spring forces the two discs into contact, effectively locking them together solidly (which is where the frictional facing on one of the discs is effective). Now the engine drives both clutch plates as one, and anything else connected to the driven side of the clutch, e.g. the gearbox mainshaft and the rear wheel drive if the latter is in gear.

It will be appreciated that if the driven side of the clutch is connected through to the rear wheel, and the machine is stationary, this represents a fair load on the driven side. Thus, if the engine is running with the clutch fully disengaged and if the clutch is released suddenly so that the plates snap together, the load on the engine will change equally suddenly from nothing to quite a high load. If the engine is running at a low or moderate speed, this sudden load will make it stop dead. If running rapidly to start with, it may be able to pick up the load, but it will be with a sudden jerk. Thus the only *smooth* way to pick up the load is to let the clutch out *gradually*, so that the driving plate can rub and slip against the driven plate while the whole drive is taken up smoothly and the clutch is fully released.

Clutch Control. Letting the clutch pick-up gradually is the only way to get smooth starting from a standstill. When changing gear there is little or no load to take up since the machine is moving and the clutch here is mainly a convenience for getting the gears in and out of mesh without

having to bother about synchronizing engine speed. Hence in gear changing the clutch action can be much snappier—virtually "in and out."

Letting the clutch slip unnecessarily is in any case bad, for as we have seen, when the clutch plates are slipping there is rubbing wear on the friction lining. Too much of this and the lining will be worn right down and no longer be effective. Then the clutch will continue to slip, even in the fully engaged position. In an actual clutch there is never *complete* disengagement of the driven discs from the driving discs and so even when it is held in the fully disengaged position there is likely to be some rubbing

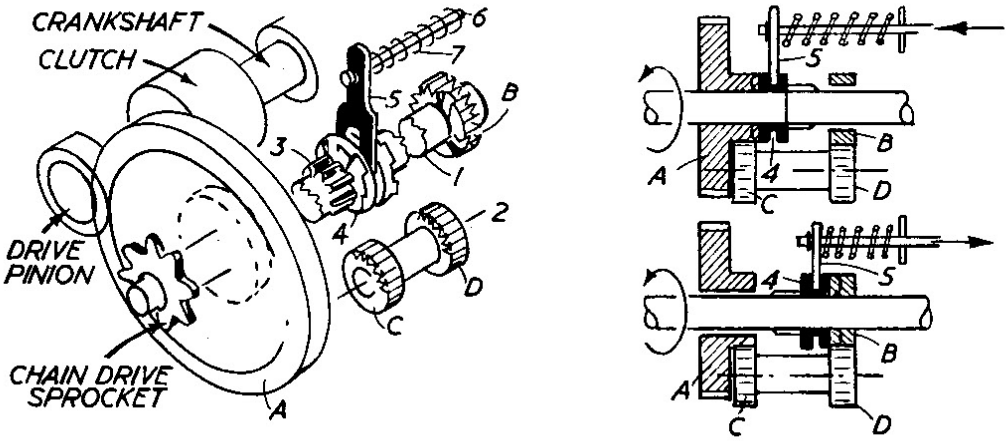

FIG. 7. SIMPLIFIED DIAGRAMMATIC ILLUSTRATION OF THE GEARBOX

The top right-hand sketch shows 2nd gear engaged with the drive between gear *A* and the mainshaft, gear *A* locked to the mainshaft (1) by the dog (4). Lower right sketch shows 1st gear position, drive being through gears *C* and *D* on layshaft (2) to gear *B* now locked to mainshaft (1) by dog (4). The dog is moved to the gear selection positions by the selector fork (5) moving on its spindle (6). The spring (7) tends to move the selector to 2nd gear position. In neutral position the dog (4) is in the central position on the mainshaft (1) and thus disengaged from both *A* and *B*.

wear. Hence using the clutch to disengage the engine when running and holding it disengaged from the drive in gear is bad practice, and promotes high clutch wear. It does not matter about the clutch being held disengaged so much with the gearbox in neutral for here the load on the driven side is only the gearbox main gear which can turn freely on the main shaft.

Gearbox Construction. The gearbox is separately detailed in a simplified diagram in Fig. 7. The main gear is in mesh with the pinion gear on the driven side of the clutch, and thus is always driven by the engine when the clutch is engaged (i.e. clutch plates in contact). On the inside is a smaller gear formed integrally with it, and on the other end of the mainshaft there is another smaller gear, also freely fitting on the mainshaft so that it can be rotated independently of the shaft. Separating these two gears is a splined length of shaft on which fits a specially shaped sliding member called a dog, with faces so shaped that if brought up against either gear the dog locks onto the gear. Since the dog is locked onto the shaft as far as

rotation is concerned by the splines, engagement of the dog with either gear means that that gear also becomes locked to the shaft and thus turns with the shaft.

Sideways movement of the dog is controlled by a selector fork, free to slide along a spindle. Operation of the gearchange twistgrip to the first gear position moves the selector one way; and moving the twistgrip to the second gear position moves it to the other extreme—carrying the dog with it in each case and locking either the small gear or the larger (double) gear to the mainshaft. In the neutral position the selector also assumes its mid-position, with the dog in the centre of the splined section of the shaft and thus not contacting either gear.

Changing Gear. Moving the twistgrip to the first gear position, pulls the control cable, which moves the selector in the gearbox against the action of the spring assembled on the spindle with it. It moves to the right-hand side so that the dog is brought up against the smaller inside gear, and so locks this gear to the mainshaft. The drive from the clutch is now transmitted to the gearbox mainshaft via the larger gear. Its smaller pinion on the inside face (still freely rotating independent of the shaft) drives the small layshaft gear assembly which is meshing with the inside gear.

On changing to second gear the selector arm is moved in the opposite direction (to the left) carrying with it the dog to engage the large gear and lock this to the shaft. The drive is now direct from the clutch to this large gear, with the layshaft gears still being driven and also driving the inner gear, although this latter gear is now merely running free on the shaft. It will be appreciated, that the spring on the selector spindle is now helping to maintain second gear by keeping the selector over and holding the dog in mesh with the main driving gear. The actual operation of the gearbox, shown simplified in Fig. 7, can be followed in more precise detail by studying Figs. 44, 45 and 49. The mechanical movements involved are actually quite simple and can be readily understood.

PEDAL SYSTEM

The pedal cranks are mounted on a separate spindle behind the gearbox unit. A simplified drawing is shown in Fig. 8 whilst more precise details are given in Fig. 49, where the complete engineering layout can be studied.

Locking and Disengaging. The pedal cranks are locked to the spindle but the large gear in the middle is free running on this spindle. It comes up against a short length of "quick" thread formed on the spindle and is held in this position by a spacer tube fitted over the other end of the shaft. The gear meshes with the inner gear on the gearbox layshaft and is thus being driven by the engine in both gear positions and neutral, but merely idling on the spindle.

The boss of the gear, facing the threaded length of spindle, is serrated. Mounted on the spindle close by—actually on the thread—is a driver also with serrated faces, held away from the gear boss by a spring. If, however, the pedals are rotated in the direction for normal pedalling the spring is compressed and the driver is forced to run down the threaded portion of spindle so that its serrated face locks against the serrated face on the gear boss. The gear is now locked to the pedal crank spindle as long as the pedals are kept turning fast enough to keep up with the speed of the gear as driven by the engine (if the engine is running); or as long as pressure is kept on the pedals, if the engine is not running.

Thus this simple locking action provides a means of turning over the engine by the pedals for starting; and also, if the engine is running, it is possible to assist it if necessary (e.g. on a steep incline) by pedalling, with the pedal drive automatically disengaging in both cases when pressure on the pedals is released. For starting purposes the engine would be in neutral gear position, but equally it will be seen that the pedals will drive the engine in any gear position selected. In either 1st or 2nd gear position, it will also drive the rear wheel via the gearbox mainshaft, sprocket and chain with the engine not running. This, of course, requires considerable effort since the pedal drive has also to turn the engine over against compression, but if it is necessary to pedal the machine with the engine "dead," disengaging the clutch will disengage the engine from the gearbox and thus the pedal drive is relieved of this extra work. For emergency pedal-driving, in fact, a locking clip is provided on the handlebars to hold the clutch lever fully in.

Back-pedalling Brake. The pedal crank spindle assembly also provides an entirely different action initiated by back-pedalling. A back-pedalling movement throws the driver away from the central gear. It moves it farther to the left along the quick start thread and forces the outer serrated face against the serrated face of the brake bush mounted in the crankcase cover. The driver is now locked to this bush. The outer portion of the brake bush is splined and on it is fitted the brake lever, also splined, so that brake lever and brake bush are locked together. Thus, when the driver is locked to the spindle, it is also locked to the brake bush and because it is still on the thread the back-pedalling movement is transmitted directly to the brake lever which is rotated in a similar direction and so pulls the brake rod or brake cable to operate the rear brake. The action is illustrated in simplified form in Fig. 8 and again is quite easy to understand.

Chain Drive. The final drive between the sprocket on the gearbox mainshaft and a similar (but larger) sprocket on the rear wheel hub is by roller chain, identical in this respect to a bicycle chain except that the chain is of sturdier construction. As can be followed, the drive can be either from the engine through one of two selected gears, or by pedals with the engine side of the drive fully disengaged by the clutch, and with the gear change

in the second position for a favourable ratio. More detailed descriptions of these various components for the purpose of dismantling, replacement, etc., will be found in Chapter V, Section 8.

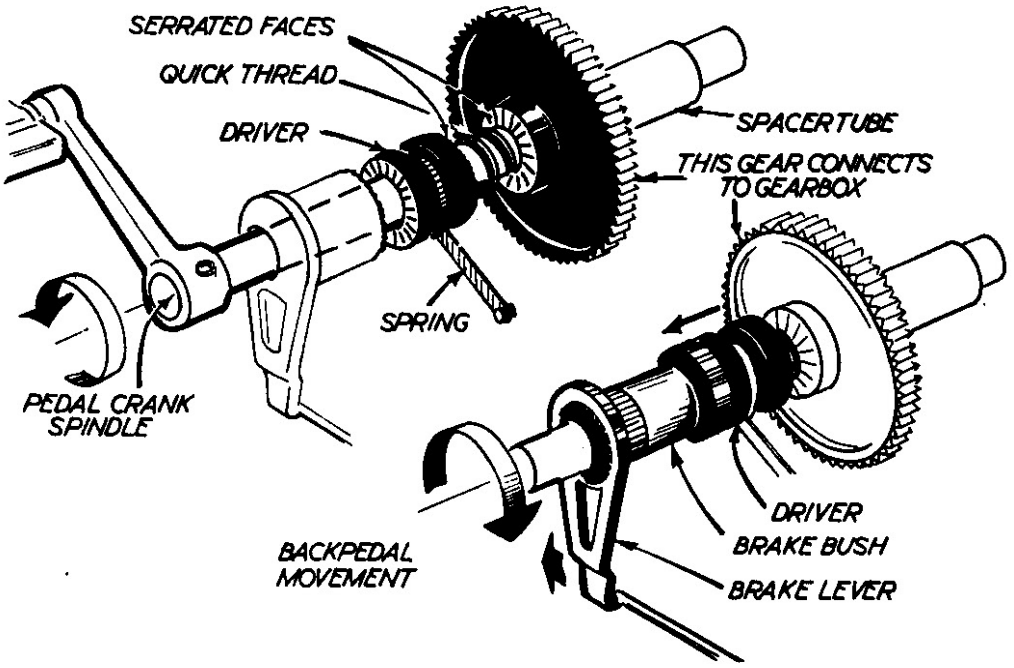

FIG. 8. SIMPLIFIED DRAWING OF THE PEDAL CRANK SPINDLE ASSEMBLY
In the left hand (*top*) sketch the stationary position is shown. Pedalling brings the driver in engagement with the large gear. Back-pedalling (*bottom right*) engages the brake bush with the driver and actuates the brake lever.

EQUIPMENT

It is no more difficult to ride and handle the Quickly than it is to ride a pedal bicycle. In fact, in some respects it is easier—and certainly far more effortless! The main features of the complete machine are shown in Figs. 9 and 10. Details differing from an ordinary pedal bicycle (apart from the engine and tank) are: the toolbox incorporated in the front forks underneath the headlamp and opened by unscrewing the screw at the bottom; the handlebar lock working on the front forks with the key position just above the screw just mentioned; the carrying handle fitted to the right-hand side of the engine and frame, which will be found most useful for lifting the machine up or down steps; the provision of a sprung stand under the engine and an additional side-prop stand on the S and L models; and the position of the pump (on the right-hand side of the luggage carrier on the N and S models, and in front of the frame on the L model).

Before attempting to ride the machine for the first time the saddle position should be checked for a comfortable riding position and, if necessary, adjusted. The saddle tube is split at the lower end. The long clamp bolt, with the head visible at the upper end of the saddle tube, has a

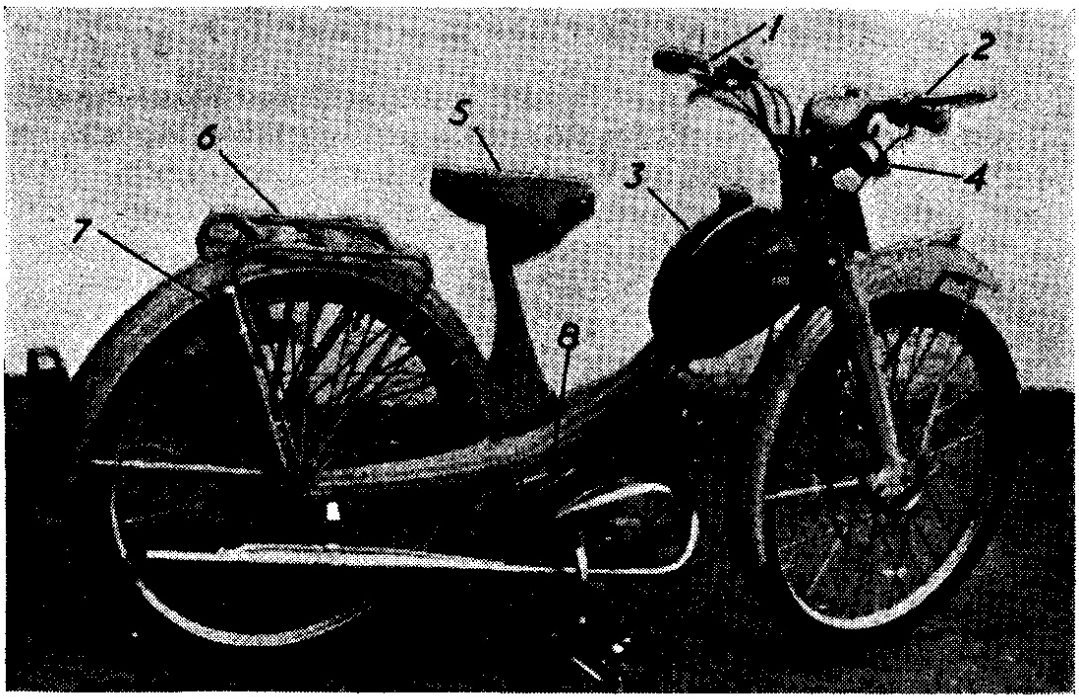

FIG. 9. QUICKLY-N MODEL (S IS BASICALLY SIMILAR)

1. Control group (clutch gearchange, decompressor)
2. Control group (throttle and front brake)
3. Tank for petrol/oil mixture
4. Horn
5. Saddle
6. Luggage carrier
7. Pump
8. Handle for lifting
9. Exhaust silencer

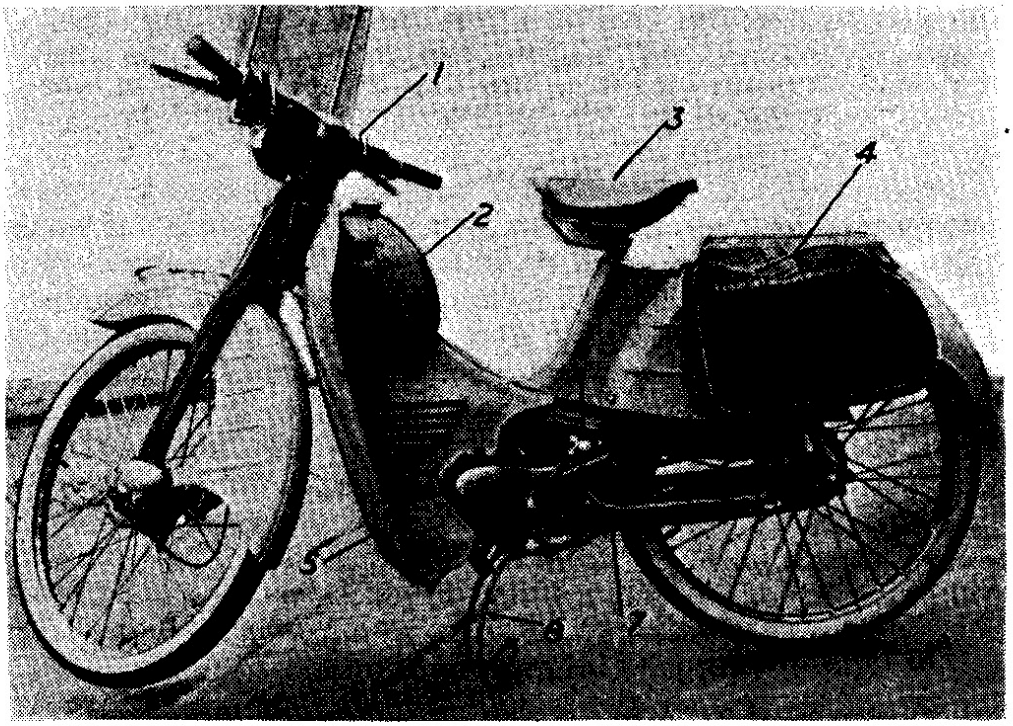

FIG. 10. QUICKLY-L MODEL

1. Handlebars
2. Tank
3. Saddle
4. Panniers (extra equipment)
5. Leg shield
6. Pedal
7. Side-prop stand
8. Central stand

spreader nut fitted at the bottom. Tightening this bolt draws the nut up the split section of the tube forcing it outwards thus gripping the stem tightly in position (Fig. 11). To adjust the height of the stem it is therefore necessary to slacken off the clamp bolt and, if necessary, drive downwards to relieve the "spread" of the tube. Height can then be adjusted as required, and the clamp bolt tightened right up again. The tube must not

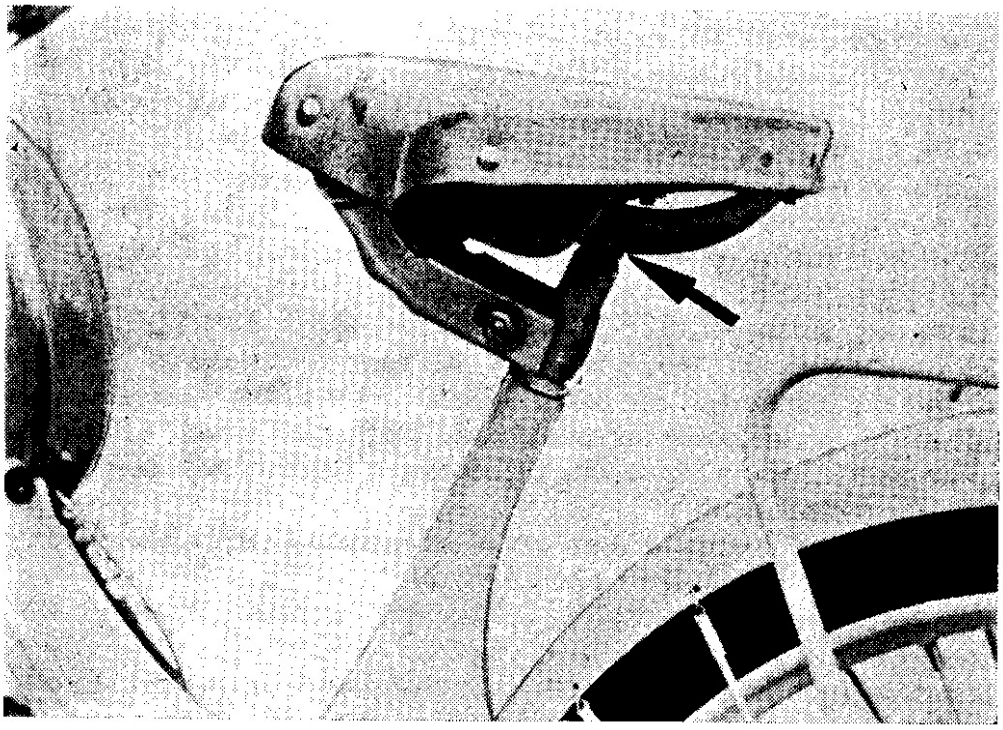

FIG. 11. SADDLE ADJUSTMENT
This can be made by loosening the bolt marked with an arrow.

be withdrawn higher than the point *O* marked on it otherwise there will be insufficient length remaining inside the frame for a proper location.

FUEL AND OIL

The engine is designed to run on a petrol-oil mixture. The only lubrication the engine unit receives internally is the oil in this mixture, so that running on plain petrol would ruin the engine in a very short time. All the time the engine is running, therefore, the quantity of lubricant present is proportional to the engine speed and thus automatically adjusted to requirements. With the throttle fully closed a minimum amount of cylinder lubricant is drawn in. This is perfectly satisfactory when the engine is idling but may give marginal lubrication when the throttle is fully closed and the engine is being driven faster than normal idling speed, e.g. when descending a long, steep hill. Hence under such circumstances it is generally advisable to give an occasional burst of throttle to increase the flow of oil to the engine.

Fuel Mixture. The recommended proportion of oil to petrol is 1 to 25, equivalent to one-third of a pint of oil to every gallon of petrol. This is a somewhat lower proportion of oil than that commonly used with two-stroke engines but is entirely adequate provided a good quality oil is always used of the correct grade. The manufacturers specify a relatively heavy oil for the petrol-oil mixture, designated as SAE 50. The SAE rating of oils is based on their viscosity or thickness, the higher the SAE viscosity number the thicker the oil, and vice versa. The SAE number is not necessarily a measure of the *quality* of the oil. Thus it is strictly advisable to insist on using a known brand of oil, as well as specifying the SAE number required.

It should not be necessary to increase the proportion recommended even with a brand new engine, although a small increase will have no effect on performance. The main trouble which can arise from using too high a proportion of thick oil "to be on the safe side" is that it may tend to settle out of the petrol as a separate layer at the bottom of the tank while standing so that the carburettor fills with oil instead of petrol next time and the engine will not start. Too *little* oil in the fuel mixture will result in the engine receiving inadequate lubrication which will increase wear or even lead to parts seizing or becoming permanently damaged and calling for replacement.

Recommended commercial grades of oil include Castrol XXL, Energol 50, Essolube 50, Mobiloil 50, Shell SAE 50.

The lower part of the engine, i.e. the gearbox unit, is lubricated by running it immersed in oil, the level of which requires periodic topping-up. Other parts such as the cables, driving chain, etc., are lubricated by oil or grease applied at regular intervals as specified in the Lubrication Table and Lubrication Chart (Chapter III).

Petrol Grade. Standard grade petrol is perfectly satisfactory for the Quickly and the use of premium fuels is not recommended. Also the extra expense is quite unnecessary. In fact the engine may not run so well on "premium" grades. Tank capacity is 3·1 litres or approximately $5\frac{1}{2}$ pints on early models, and 4·45 litres or a gallon on later models, of which $\frac{3}{4}$ pint is retained as a reserve supply until the fuel tap is turned to the "reserve" position. As normal "refill" capacity, therefore, is only $4\frac{3}{4}$ or 7 pints (depending on the model) it is not always convenient to refill direct at a garage. A better proposition usually is to have a one gallon can for collecting mixture for refilling in which the mixture is made up. It can then be transferred to the tank via a funnel, with the balance normally kept at home.

Reserve Tap. The fuel tap is the same on all models, located at the bottom of the tank on the right-hand side (Figs. 12 and 13). With the handle in the forward position (exposing the letter *Z*) the tap is switched

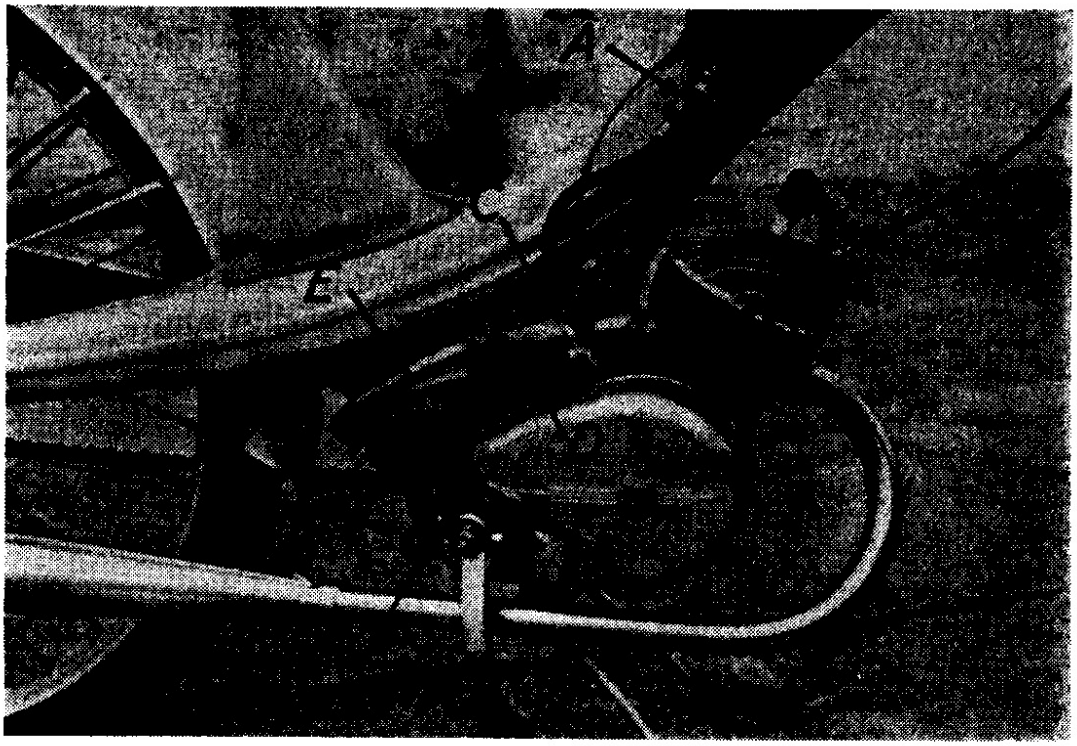

FIG. 12. DETAILS OF QUICKLY-N AND -S

A. Fuel tap (off position shown)
B. Carburettor
C. Tickler
D. Rubber elbow connecting to air filter
E. Lifting handle
F. Screw holding cover plate
G. Gearbox oil filler plug

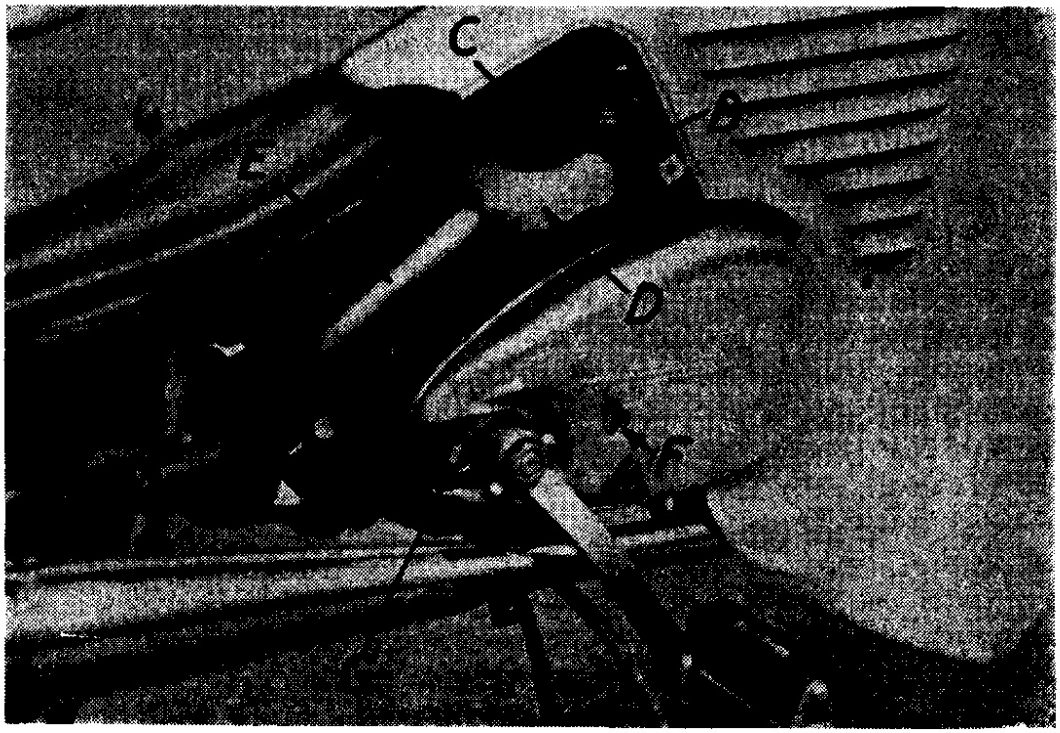

FIG. 13. DETAILS OF QUICKLY-L

Key applies as for Fig. 12.

to the "off" position. In the vertically down position (in line with the pipe) the tap is in the normal "on" position, but leaving a remainder of about ¾ pint of fuel in the tank when run "dry" in this position. By switching the tap to the rearward position (exposing the letter *R* uppermost), this further ¾ pint can be drawn on as a reserve. Since the average performance of the Quickly is 120–150 miles per gallon (depending on how it is driven), a normal full tank of fuel can be relied upon for about 100–120 miles of driving, with a further safety margin of 15–20 miles given by the reserve capacity of the tank.

The value of having such a reserve is obvious and it should be kept in hand for an emergency, or a warning that a refill is necessary. It is bad practice to get into the habit of switching the tank tap to the reserve position for running with the tank full.

Filling the Tank. Failing a garage which dispenses "ready mixed" petrol fuel, it is usually more convenient to buy fuel in gallon cans and refill the tank at home. The correct way to make up a petroil mixture is to turn the petrol tap "off," then add the oil first (to the tank or container) and then pour the petrol on top. Shaking the tank, or turning the container end over end a number of times, will then ensure uniform mixing. Petrol should never be poured first into the tank as it will tend to fill the pipe to the tap and not mix with added oil. Hence the first supply to the carburettor will be pure petrol, which will contain no lubricant when drawn through into the engine. Before refilling a tank from a prepared mixture which has been standing for some time it is always advisable to shake the mixture first.

OPERATING THE ENGINE

Controls. Engine and front brake controls are mounted on the handlebars in identical positions on all models. (*See* Figs. 14 and 15.) The only difference between the N and S and the L machines is the shape of the clutch lock and decompressor lever, and the shape and position of the combined headlamp-dipswitch-horn button.

The other controls used for starting are the "tickler" on top of the carburettor (Figs. 12 and 13) and the choke, the latter being located on the frame at the bottom left-hand side just above the engine crankcase (Fig. 16).

Tickler. The tickler operates directly on the float in the carburettor chamber (*see* Figs. 12 and 40) and when depressed pushes the float down and ensures that the float chamber is quite full of fuel. If the tickler is held down the float chamber will overflow so that excess petrol runs into the carburettor, which will make for difficult starting. Thus the tickler should only be used in moderation when the engine is to be started from cold, and depressed only until the first trace of overflowing fuel appears on top of the carburettor through the small hole in the top—never longer.

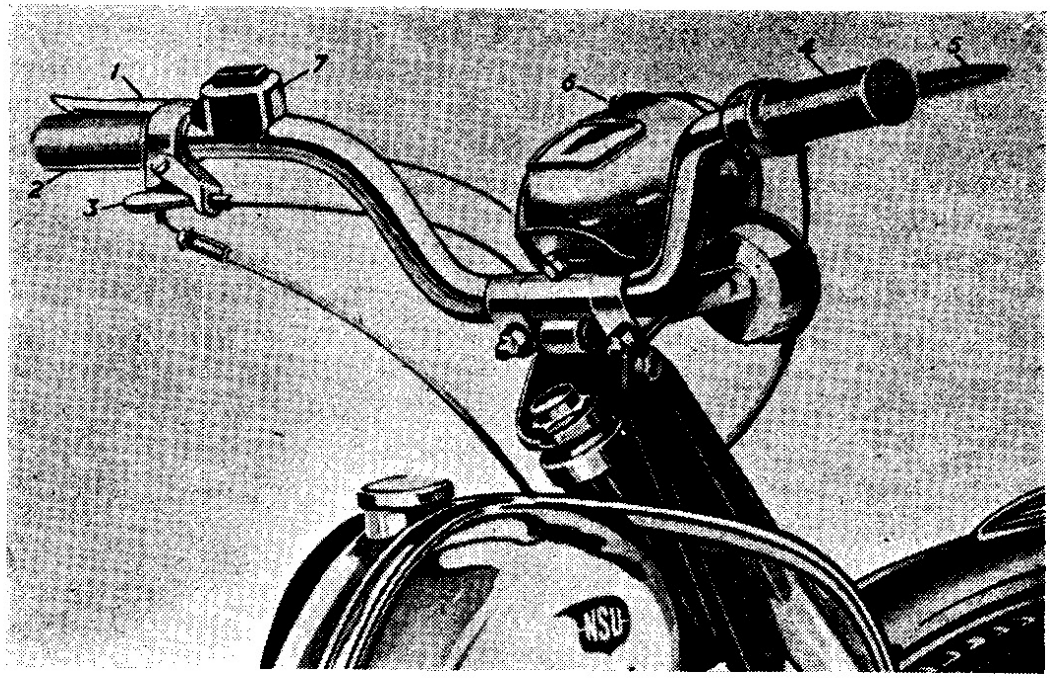

FIG. 14. N AND S MODEL HANDLEBARS

Showing clutch lever (1), gearchange twistgrip (2), decompressor lever (3), throttle twistgrip (4), front brake lever (5) and light switch (6), horn button and dip switch (7).

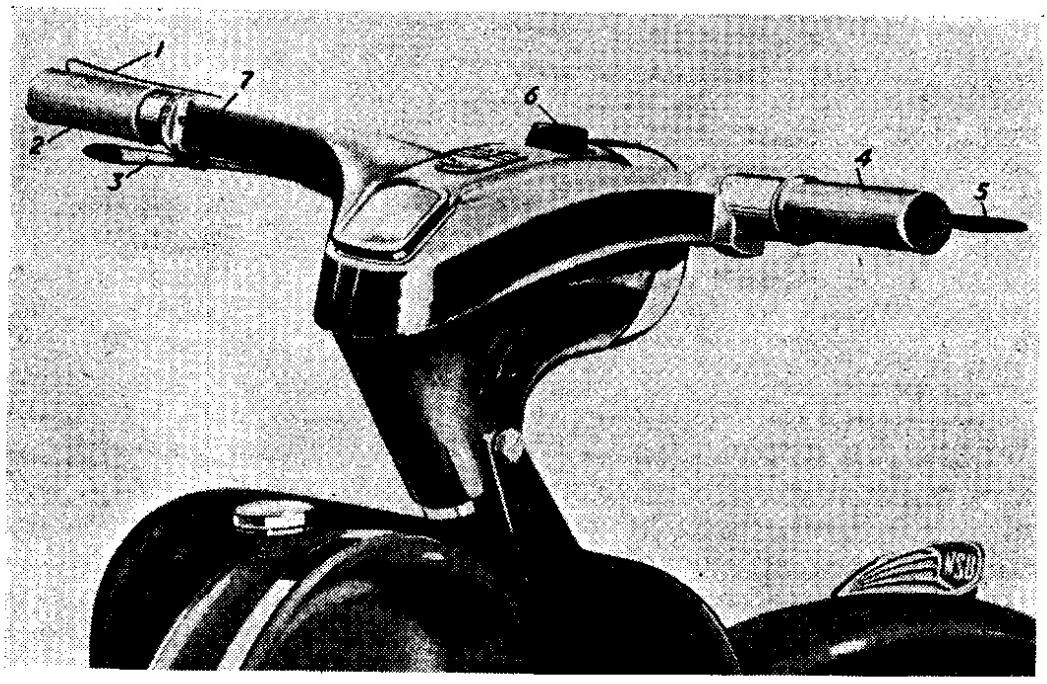

FIG. 15. L MODEL HANDLEBARS

Showing clutch lever (1), gearchange twistgrip (2), decompressor lever (3), throttle twistgrip (4), front brake lever (5) and light switch (6). Dipswitch and horn button (normal position) (7).

Choke. Turning the choke control (Fig. 16) closes a flap over the carburettor air intake which both improves the suction and richens the mixture drawn into the engine (i.e. the mixture consists of a higher proportion of petrol to air). This again is quite drastic in action. The choke is *only* necessary when starting an engine from cold, particularly in cold weather. One of the main causes of difficult starting with small two-stroke engines is an excessively rich mixture, produced by over-priming the carburettor or over-choking. This results in neat petrol

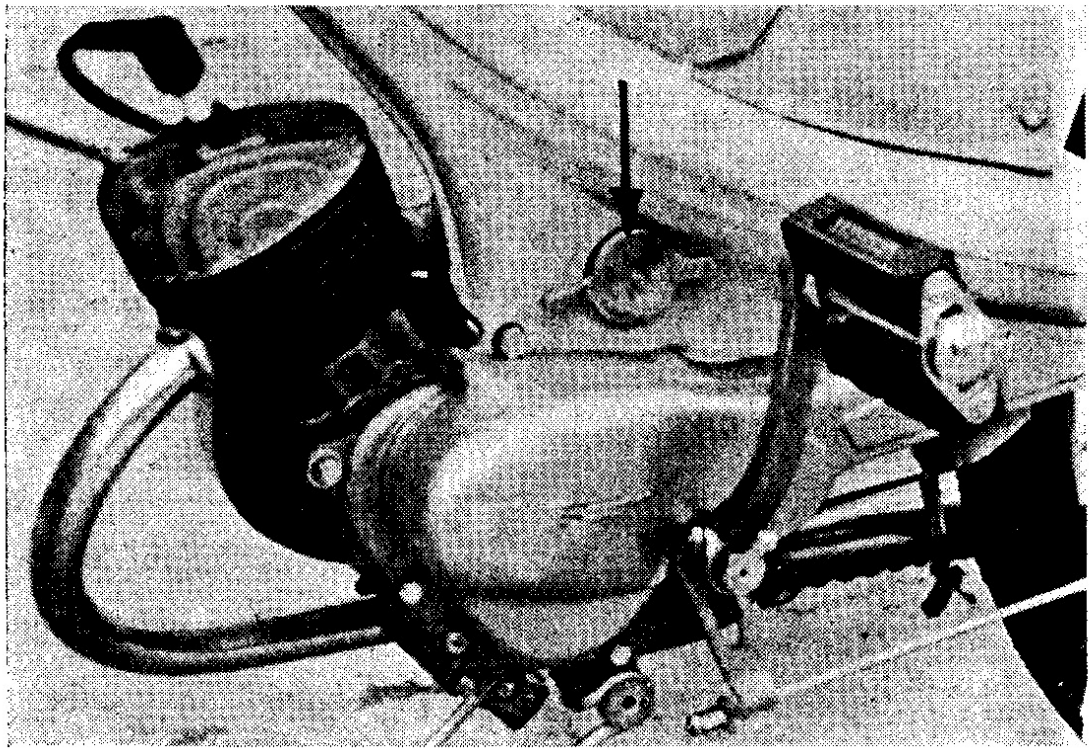

FIG. 16. CHOKE IS OPERATED BY ROTATING CIRCULAR COVER PLATE (ARROWED)

being drawn into the cylinder and thrown onto the plug, and wetting it so thoroughly that it cannot spark. With a little experience it soon becomes easy to recognize whether an engine will not start because it is too "lean" (not enough petrol, calling for choking), or too "rich" (excessive choking). In the latter case no amount of further turning over of the engine will make it start. It will merely make matters worse. The only cure in the case of excessive over-choking is to remove the plug and dry it, open the choke and turn the engine over with the plug still out to help blow out some of the excess fuel, then replace the plug and start again with the throttle set nearly fully open. If the engine is not completely over-choked, opening the choke and turning over with the throttle wide open will often clear it.

Starting-up. For starting, the machine should always be resting on its two wheels, i.e. with the stand (or stands) raised. Make sure that the gearchange twistgrip is in the neutral "*O*" position—if not, pull in the clutch lever and rotate the twistgrip until it is. The pedals provide a "kick-starter" drive, it generally being most convenient to apply pressure to the left pedal, sitting astride the machine, or to the right pedal when standing beside the machine. The appropriate pedal should therefore be turned to a position corresponding approximately to "two o'clock." Releasing the clutch (i.e. pulling the clutch lever in) will enable the pedals to be turned on their own.

PROCEDURE. Starting procedure is then as follows—

1. Turn the petrol tap to the "on" position.
2. If necessary, work the tickler on the carburettor slowly until there is a slight trace of overflow on top of the carburettor. (In warm weather, just depress the tickler once and do not wait for any overflow.)
3. Turn the choke to the closed position.
4. Hold the throttle twistgrip about one-quarter to one-third open.
5. With the left thumb, hold the decompressor lever in and push down on the pedal to turn the engine over. The fact that the decompressor is operated will make the engine spin over readily, *but it cannot start when the decompressor valve is open.* Hence it is essential to release the decompressor over about the last third of the swing of the pedal. The engine will normally start almost immediately the decompressor is released on the speed built up by the previous pedalling action.

Once the engine is running the throttle can be closed. The choke flap should also be opened straightaway. In cold weather this may cause the engine to stall and stop. Re-start the engine with the choke closed again, then open the flap *partially* and let it run for a little while. Then open the choke completely. Never attempt to drive away with the choke flap still closed or partially closed as this will cause the engine to "flood" and run badly, or stop entirely.

Stopping the Engine. To stop the engine, simply close the throttle and operate the decompressor lever. Starting and stopping is the *only* time the decompressor is used. It will produce an effect at driving speeds. For example, running at near full throttle operating the decompressor lever may be effective in causing the engine to slow down, i.e. the decompressor will work like closing the throttle. But the decompressor should *never be used for this purpose* since it is liable to cause serious damage to the piston. Speed control of the engine should be done *entirely* with the throttle.

DRIVING TECHNIQUE

Driving technique is very simple. Sitting astride the machine with the engine running, pull in the clutch lever as far as it will go and rotate the gearchange twistgrip away from you to the first gear position (1). Then

let out the clutch lever gently, at the same time opening the throttle to about one-third to one-half. The reason for letting out the clutch slowly has already been explained. If the engine is allowed to pick up the drive too suddenly the machine will jerk forward, and possibly stop the engine. Very little practice is necessary to get the knack of making smooth starts and once this has been mastered it should become an automatic action, i.e. you do it naturally every time without thinking about it.

Clutch Sticking. Sometimes the first start after the machine has been left standing idle for a few days is jerky, not because the clutch has been let out too rapidly but because the clutch plates are partially stuck together with oil. It is most likely to happen in cold weather. If this condition is bad, i.e. the engine stalls as a consequence, it can be cleared by engaging a gear (engine stopped) and pushing the machine forward. Normally, however, no trouble should be experienced from the clutch sticking, unless it requires adjustment or is badly worn. In this instance even full movement of the clutch lever will not disengage the plates completely, either calling for adjustment of the clutch cable (to get more movement at the clutch end), or replacement of the lined clutch discs (badly worn clutch).

Under certain conditions of starting, e.g. starting on a hill, the pedals can be used to assist the engine to get under way. In other words the machine can be pedalled off like a bicycle, at the same time letting in the clutch to engage the engine with first gear.

Choice of Gear. Running in first gear the Quickly will speed up to about 15 m.p.h. on full throttle. This corresponds to an engine speed of about 5,000 r.p.m. The Quickly engine develops maximum power at 5,200 r.p.m. and so it should not be driven faster in that gear. Nor is it good driving to try to make it go faster. The purpose of the second gear is to provide a higher speed ratio between the engine and the back wheel so that the machine can go faster for the same engine speed. Hence having reached about 10 m.p.h. in first gear you should change up into second gear by pulling in the clutch and closing the throttle simultaneously, engaging second gear by rotating the gearchange twistgrip towards you to position 2 and then letting out the clutch again at the same time opening the throttle slightly. Further acceleration can then be achieved by opening up the throttle with second gear engaged.

Second gear is for normal cruising and running; first gear for starting and "pulling" where you want maximum *turning force* applied to the rear wheel. Just as you can ride a bicycle better up a hill if it is fitted with a three-speed so that you can change into "low" and pedal faster, so changing down to first gear on the Quickly on a hill lets the engine run faster to develop more pull. In second gear, under similar conditions, the engine would "labour," lose speed, and the machine would slow up—in the same way that you lose speed trying to ride a bicycle up a hill in high gear.

These points are illustrated in Fig. 17 which shows the engine speeds corresponding to the same road speed in first and second gear. This diagram underlines a basic requirement in changing down. If in second gear the engine is doing approximately 2,000 r.p.m., at the same road speed in first it would be doing approximately 4,000 r.p.m. To change from second down to first gear at the same speed, therefore means that a simultaneous alteration of engine speed from 2,000 to 4,000 r.p.m. is

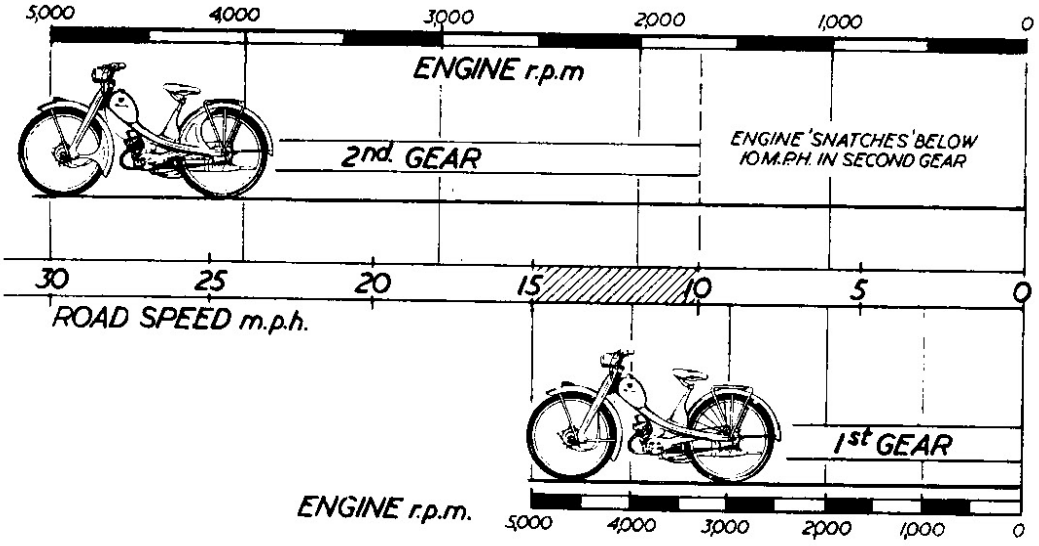

FIG. 17. COMPARISON BETWEEN ENGINE R.P.M. AND ROAD SPEED IN 1ST AND 2ND GEARS

required. In other words after releasing the engine from the drive wheel by pulling in the clutch lever the engine must be speeded up again before it can be re-engaged with the drive in the lower first gear.

Smooth Gear Change. In practice it is not necessary to be exact for the design of the gearbox unit allows considerable latitude. But to change down smoothly it is necessary to *open the throttle* on releasing the clutch with the first gear engaged. Otherwise there will be a sharp jerk as the drive takes up in the lower gear. This again is a knack readily acquired with a little practice. It is well worth understanding these points and endeavouring to make smooth gear changes always, not only for the satisfaction of good driving technique but also because smooth riding puts less strain on the engine, clutch, gearbox, chain and rear wheel and gives them a longer working life.

Changing-down can also be used as a method of braking or losing speed. The faster your speed in second gear the more you will have to accelerate on letting out the clutch with first gear engaged to change smoothly. Then *closing* the throttle will make the engine act as a brake since, in effect, the rear wheel is trying to drive the engine.

Braking. This, however, does put most of the strain on the chain. For most normal braking requirements the engine will be left in second gear and braking achieved by applying both the front and rear brake together, slowly but firmly. The front brake is worked by the lever on the right-hand handlebar and the rear brake by back-pedalling. On wet or slippery roads, particularly on greasy curves, use the rear brake only for safety. Under all other circumstances use both brakes. Descending a long hill front and rear brakes can be used alternately to prevent either overheating. Another point to remember in descending a long hill is that with the engine running slowly there may be a tendency for it to become starved of oil, so pull in the clutch occasionally and give the engine a quick burst of throttle to suck in more mixture.

On ascending slopes, or where it has been necessary to slow right down, the engine may begin to labour if left in second gear and so the drive must be changed down to first gear. It is seldom advisable, for instance, to attempt to drive at a speed of below 10 m.p.h. in second gear, or below 15 m.p.h. on a hill without changing down otherwise the engine may tend to "snatch." Also where it is necessary to proceed slowly, such as in traffic, always change down in good time.

Slipping the Clutch. It is very bad practice to "slip the clutch" on short hills, i.e. let out the clutch just enough to make it slip so that the engine runs faster instead of labouring and still continues to drive. You may get over the hill in this way but the resulting wear on the clutch in that short distance achieved may be greater than that for thousands of miles of normal driving. Always change down under such circumstances, if in second gear. If the hill is so steep that even first gear still makes the engine struggle, simply assist the engine with pedalling.

Economy Driving. Other rules for economical driving are: drive in second gear all the while you can (i.e. while you can maintain a speed of 15 m.p.h. or greater); and on the open road cruise at about three-quarters maximum throttle (which will give you minimum fuel consumption). When you have to stop, always return the gear change to neutral (*O*) and let the clutch out. Keeping the machine stationary in gear with the clutch pulled in will result in wear on the clutch plates. At the end of a run, turn off the fuel tap as soon as you have stopped the engine. This will both prevent wastage of fuel and make for easier starting next time since the carburettor cannot become flooded. It is best, in fact, to turn off the fuel tap some two or three hundred yards *before* the end of a run so that this distance is completed on fuel drawn from the carburettor itself. This will leave the curburettor dry so that there is no chance of oil settling out from the fuel inside it and blocking the jet. Alternatively, having come to a standstill at the end of the run, turn off the fuel tap and let the engine run itself dry and stop.

Emergency Pedalling. In an emergency the Quickly can be pedalled like an ordinary bicycle by engaging second gear and holding the clutch lever in and locking it in this position with the small wire catch on the handlebars (*see* Figs. 14 and 15). This will then get you home if you have run out of fuel or the engine will not run and you cannot find the cause on the spot. With this setting, the pedals are connected to the back wheel via the second gear and the chain and only the "driven" side of the clutch is being turned. There may, however, be some rubbing contact of the clutch plates and so it is not advisable to pedal the machine in this condition for any longer period than is necessary.

CHAPTER III

REGULAR MAINTENANCE

RUNNING-IN AND LUBRICATION

Running-in. On any new engine components are set up to close fits. Also the finishes obtained from machining operations, etc. do not necessarily correspond to the best "running fits." The latter are established by letting the engine run under its own power and so "bed down" or "run-in" all rubbing surfaces to a highly satisfactory finish. During this period individual high spots are rubbed down and the surfaces polished by friction. Close initial fits are essential for this to occur, which is why a new engine is often said to be stiff, but they also mean that a fair amount of extra heat may be developed in parts of the engine due to this excess friction.

Hence it is never good practice to race a brand new engine, or to let it run for long periods at the same speed. Two-stroke engines are generally more robust than four-stroke engines in this respect and normally like working hard. Thus running-in is far less critical than, say, a car engine. Also the construction of the Quickly engine with aluminium piston and cylinder considerably lessens any risk of seizure due to overheating.

The main thing to remember with a new Quickly engine is not to open the throttle more than about three-quarters for running during the first 200–250 miles. Also it will help the engine run-in properly if you drive at varying speeds, rather than hold a strict throttle setting for cruising. During the period 250–500 miles you can cruise at a faster rate and short bursts of full throttle will do good, not harm.

During the whole of this period—up to 500 miles—never let the engine "labour," especially climbing hills. Then, provided you have followed these simple rules the engine should be completely run-in and bedded down at about the 500 mile mark and will run consistently at any speed you want. Its life will be greatly improved if you change the gearbox oil completely at this stage since the original oil may contain metal particles ground off during the running-in period which, if re-circulated with the oil, can cause harm. This is covered in the Lubrication Chart (Chapter III). Other parts require inspection and attention, if necessary, at this stage—particularly the engine mounting bolts (*see* Inspection Chart, Chapter III).

Lubrication. Lubrication points are shown in Fig. 18, which also indicates which points are lubricated by grease gun, oilcan, etc. The engine unit

has an oil reservoir (gearbox unit) which has three removable plugs, the one at the rear and on the right-hand side being the filler plug (through which oil is added); the one at the front, bottom left is the check plug and the one behind it and slightly lower is the drain plug. Oil recommended for the gearbox is SAE 30 for summer and SAE 20 for winter. Actually a SAE 30 oil would be satisfactory all the year round but since a complete oil change in the gearbox is recommended every two-three

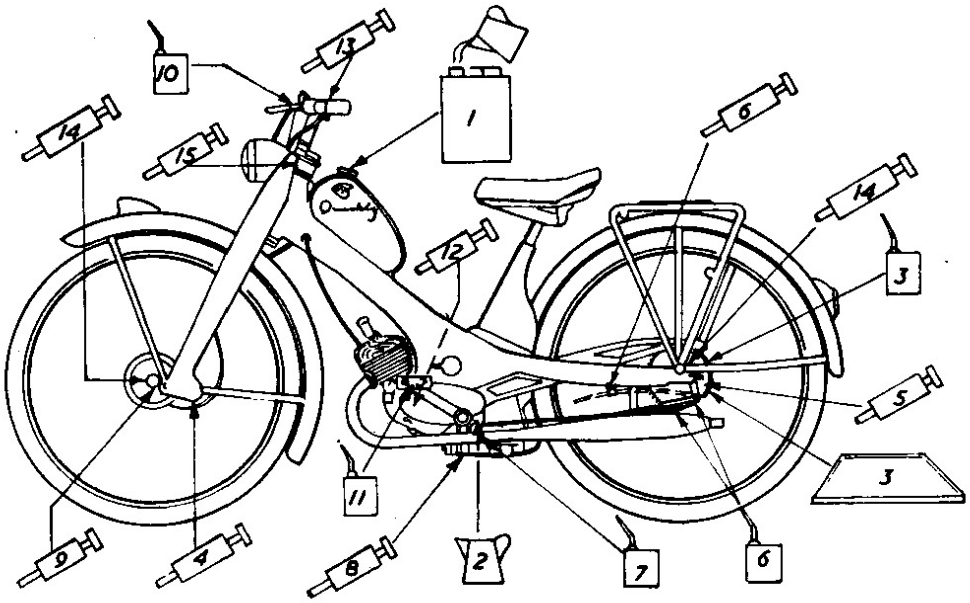

FIG. 18. LUBRICATION CHART (NUMBERS REFER TO POINTS LISTED IN LUBRICATION TABLE)

Note that points 2 and 12 are reached from the right-hand side of the machine.

months there is some advantage in changing the grade, say, in October and April.

On a new engine the gearbox oil should *invariably* be changed, flushed out and refilled with fresh oil after the running-in period (500 miles). The meticulous owner would carry out this operation twice—the first time at about 300 miles on a new engine, and then again after 600 miles. Subsequently the manufacturers recommend changing the oil every 1,200 miles, although changing it at three-monthly intervals is probably more satisfactory if the monthly mileage does not greatly exceed 500 miles.

The gearbox oil should always be changed when the engine is warm, i.e. after the engine has been run for some time. A tin or suitable receptacle with a capacity of at least $\frac{1}{4}$ pint should be placed under the drain plug position and the drain and filler plugs removed by unscrewing, using a screwdriver to start them, then unscrewing with the fingers. Oil in the box will then drain off into the can. This old oil is of no further use and should be thrown away.

Flushing is always advisable before refilling with new oil, although many people do not consider it necessary. The object of using a flushing oil is simply to remove any solid or semi-solid particles etc., remaining in the gearbox which have not drained out with the old oil. The gearbox should *always* be flushed when changing the oil after the running-in period, and *at least* once a year thereafter at an appropriate oil change. Flushing at every oil change will ensure maximum protection and long engine life.

To flush the gearbox, the drain plug is replaced when all the old oil has drained out, the check plug removed and flushing oil added until it begins to spill out of the check plug hole. Replace check plug and filler plug and start and run the engine for a minute or so to circulate the flushing oil. Then remove all three plugs and let the flushing oil drain off completely. This also is waste oil, to be thrown away.

Finally, replace the drain plug, making sure that it is done up tightly. Fill with new engine oil of the recommended grade until it just begins to flow out of the check plug hole and finally replace check and filler plugs tightly.

The driving chain should receive frequent lubrication with an oilcan filled with ordinary light machine oil, applying the oil quite generously to the rollers. The chain should never be allowed to run dry as this will greatly increase the rate of wear.

Since the chain is exposed and operated in an oily state it will tend to pick up grit and dirt, so fairly frequent cleaning is recommended. The manufacturers specify that this should be done every 600 miles, so make it a regular monthly or three-monthly job, depending on your mileage.

To remove the chain, first rotate the pedals until the spring link is in a convenient position and spring the clip holding this link off with a screwdriver (Fig. 19). The other part of the link can then be withdrawn and the chain "broken" so that it can be taken off. Drop the chain in a tin of petrol or paraffin and, using a stiff brush, clean each link thoroughly of all dirt and grit. Follow by swilling the whole length of chain through the petrol (or paraffin) and lay on a clean surface, such as old newspaper.

To re-grease the chain, chain grease should be put in a tin and heated until it is quite liquid. Then, holding each end of the chain, run it through the liquid grease until each link has received a generous coating (including the end links being held). Hold the chain by one end and let it hang so that surplus grease drips off. Then replace the chain in position on the machine making sure that the spring link is assembled the *right way round*, i.e. with the open end pointing *away* from the direction of travel of the chain. (*See* Fig. 20.)

Other details of lubrication are covered under the separate maintenance headings which follow.

Maintenance after Running-in Period on New Engines. Gearbox oil should be drained, the gearbox flushed and refilled with new oil at the conclusion of the first 500 miles; or at 300 miles and 600 miles, if preferred.

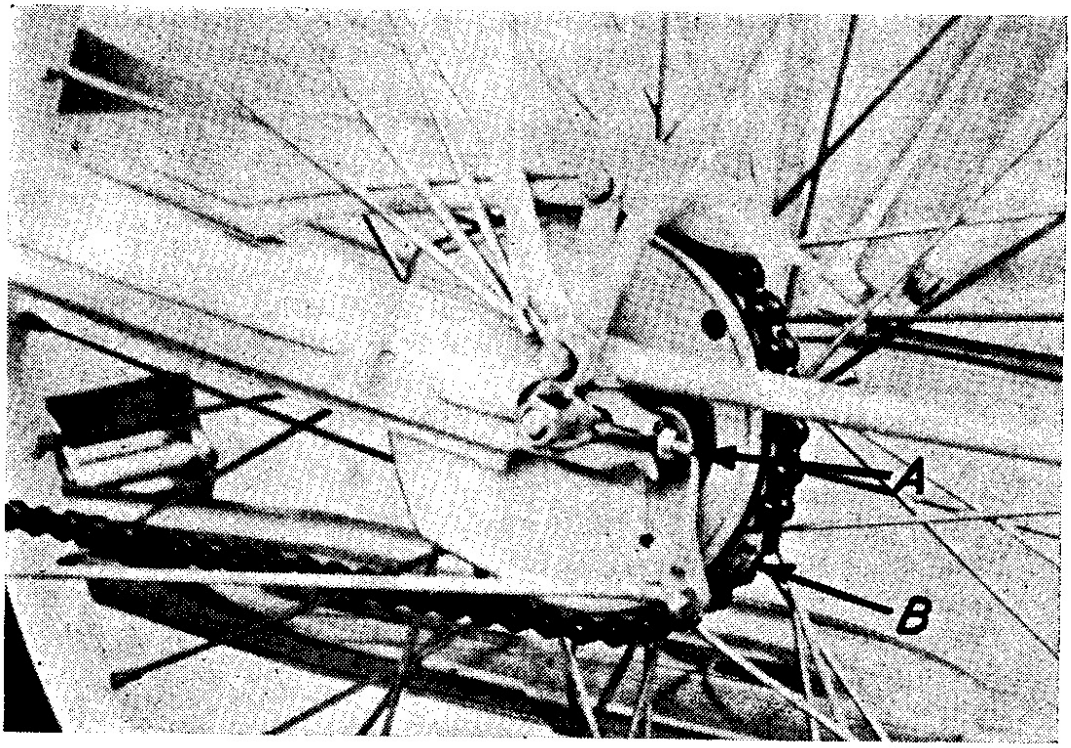

FIG. 19. DETAILS OF CHAIN ON REAR SPROCKET

A. Chain tension adjuster (one each side)
B. Spring link on chain

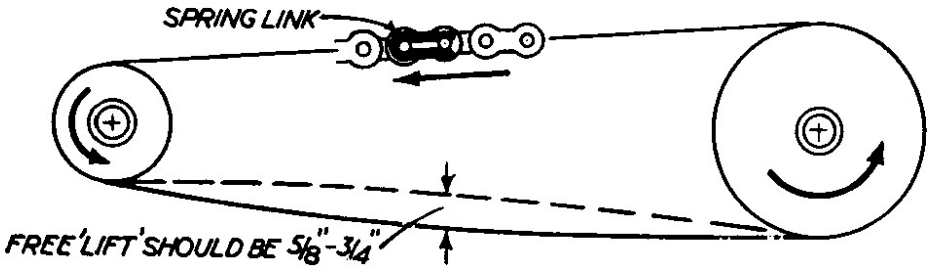

FIG. 20. CHAIN TENSION

Correct chain tension is determined by the amount of "sag" illustrated. Note that the spring link must always come on the outside of the chain, fitted the way round shown.

The engine mounting bolts should be checked and re-tightened if they show the slightest signs of having slackened off.

ROUTINE MAINTENANCE

Regular Weekly Maintenance. The tyre pressures should be checked weekly. The tyres should be pumped up hard so that it is just possible to press in with the thumb. The inner tube valve is of the bicycle type and will not work a conventional tyre pressure gauge as used for motor-cars.

8. Check all screws and bolts for tightness, particularly the engine mounting bolts, engine head nuts, etc. Also the silencer mounting, and fastenings for accessories.

9. The performance of the engine will probably be improved by decarbonizing the silencer at this point. (*See* Chapter V, Section 10, for details.)

IN SUMMER. Cleaning and re-greasing of the drive chain can be delayed until this interval.

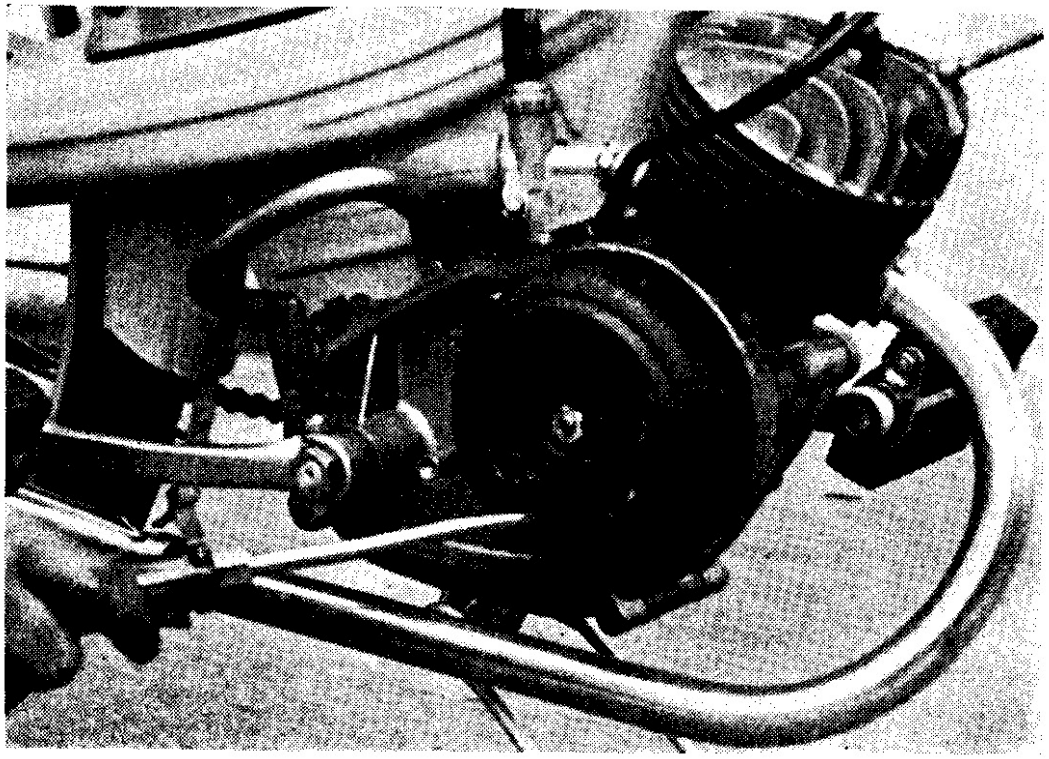

FIG. 22. THE FLYWHEEL

Contact breaker points are readily accessible once right-hand cover plate is removed. Rotate flywheel by hand to expose contact breaker under flywheel cut-out.

Six-monthly Maintenance

1. Remove, clean and grease throttle and gearchange twistgrip controls (Lubrication Chart, point 13).

2. Dismantling, cleaning and repacking with fresh grease is advisable for the front and rear wheel bearings (Lubrication Chart, point 14 and *see* Chapter V, Section 3).

3. Adjust steering head, if necessary, cleaning and replacing grease. (Lubrication Chart, point 15. *See* Chapter V, Section 4.)

4. Decarbonizing of the engine may be advisable at this stage, depending largely on the mileage covered and how the machine has been driven. *See* Chapter V, Section 8 and Section 10 for complete details of this operation.

5. Re-grind the decompression valve in its seat—usually done when decarbonizing. (*See* Chapter V, Section 10.)

6. All electrical leads should be checked. The state of the contact-breaker points should be examined and the gap adjusted, if necessary. (*See* Chapter V, Section 7, and Fig. 22.)

TYRE CHANGES

Removal of the front or rear wheel is detailed in Chapter V, Section 3. This is usually the most convenient preliminary move in dealing with a punctured tube. The wheel can then be laid flat on the ground and the outer cover removed with tyre levers, as in the case of an ordinary bicycle.

To remove a tyre the inner tube must be completely deflated. Press the wall of the tyre right in as far as it will go at one side then raise the diametrically-opposite part of the wall sufficiently for it to be prised (with tyre levers) or merely lifted by hand over the rim, when it is a simple matter to pull out the remainder of the tyre wall and so gain access to the inner tube. Replacing the tube and tyre follows the same procedure in reverse. The real art of doing the job is "knack"—not brute force. Excess force must be avoided at all cost as otherwise damage may be done to the rim (using heavy levers), or to the cords of the tyre. In the latter case the tyre is no longer serviceable.

LUBRICATION TABLE

For convenience of reference items needing attention are grouped under logical period headings. Where alternative headings are shown, e.g. monthly or 1,000 miles, the *shortest* interval should be taken as applying. It should also be appreciated that the longer period check items are in addition to any regular short-period items scheduled for attention at that same time. For example, at the "monthly" period the "weekly" items are also included for attention, and so on.

Once again it can be emphasized that regular and adequate lubrication is probably the most important feature of maintenance; the life of the machine—certainly the life of vital components—is directly related to the degree of regular attention it receives. A film of lubricant over working surfaces not only reduces friction and makes for easier movement, but also provides a degree of protection against corrosion. Rust, once started, is progressive and eats into the surface of ferrous metals so that, even if subsequently cleaned, the surface is no longer smooth. A rust coating, too, expands as it grows, which is why rust causes nuts to "seize" on bolts, etc. It is equally important to keep the machine parts as clean as possible. Grit and similar particles adhering to an oily surface can form an abrasive mixture—promoting a high rate of wear on, for example, the chain if this component is given little or no attention.

When	Ref.	Part(s) to be Lubricated	Lubricant (and Remarks)
Weekly	1	Engine	Continuously lubricated by oil mixed with petrol in the tank.
	3	Chain	Oil rollers.*
	4	Front fork swinging links	High-pressure grease.
	6	Bowden cable rear brake (model L)	Light machine oil.*
	5	Swinging link, rear suspension (model L)	High-pressure grease.
Monthly or 1,000 Miles	2	Gearbox	Check level and refill, as necessary.
	7	Brake rod ends (models N and S)	Light machine oil.*
	8	Centre stand and side stand	Clean bearings and smear with grease.
	3	Chain (in winter)	Clean and re-grease with chain grease.
	10	Bowden cable ends	Release and oil ends with light machine oil.*
Three-monthly or 3,000 Miles	2	Gearbox	Drain and refill (SAE 20/30 oil).
	10	Bowden cables	Disconnect and grease ends (or use Bowden cable lubricator).
	9	Speedometer drive	High-pressure grease.
	11	Pedal bearings	Light oil.*
	12	Contact-breaker cam	Apply bearing grease or high-pressure grease to felt pad.
	10	Control lever pivots	Oil with light machine oil.*
	3	Chain (summer)	Remove, clean and re-grease with chain grease.
Six-monthly or 5,000 Miles	13	Twistgrips	Clean and smear with high-pressure grease.
	14	Wheel bearings	Clean and re-pack with high-pressure grease.
	15	Steering head	Clean and re-pack with high-pressure grease.

* SAE 20 engine oil is a satisfactory light oil for general lubrication.

INSPECTION TABLE

When	Routine Check and Action
Weekly	Check tyre pressures. Check brakes—adjust cables as necessary. Check cable clamping bolts on headlamp and rear lamp—tighten as necessary. Check engine-mounting bolts (this is important!).
Monthly	Check chain tension—adjust as necessary. The chain sag should be approximately $\frac{3}{4}$ in. (machine unloaded, standing on its wheels, gear in neutral). Remove and clean sparking plug. Check electrode gap and adjust as necessary.
Every Two Months	Adjust clutch cable as necessary—play in the cable should be 2–3 mm. Adjust gearchange cable tension, if necessary. Check engine-mounting bolts, nuts on cylinder head and all other screwed fastenings for tightness. Tighten up where necessary.
Every Three Months	Check play in steering head and take up, if necessary. Check all electrical wiring and connexions. Check contact-breaker gap—should be 0·008 to 0·012 in. Decarbonizing of the cylinder, cylinder head and silencer is also to be recommended at this stage, or after every 1,500 miles.

CHAPTER IV

FAULT FINDING

MANY apparent faults can be due to inexperience, or mishandling, whilst others may develop through neglect. Regular maintenance along the lines covered in the previous chapter will minimize the chance of faults developing. Another important point is always to use recommended lubricants, particularly in the case of the oil mixed with the petrol.

The following table is intended as a general guide for "trouble shooting." Faults of a minor nature can readily be cured with a little common-sense application. More serious faults may require professional attention at a local service station. Even then, however, most of the work involved is well within the capabilities of the average owner who takes the trouble to find out how his (or her) machine works. The chapter on detailed maintenance will be particularly helpful in this respect.

Symptom	Possible Cause	Remedy or Check
Engine will not start	1. Lack of petrol	Check that petrol tap is turned to "on" position ("reserve," if little fuel in tank). Check that there is fuel in tank. Check that choke is operated in starting from cold. Carburettor may be blocked with oil separated out on standing. Carburettor jet may be clogged (clean with bristle).
	2. Too much petrol (strong smell of petrol at carburettor)	Flooding caused by excessive choking, or excessive use of tickler. Try opening throttle right up for starting. If badly flooded it may be necessary to remove and dry plug. Turn engine over with fuel tap off and plug out to clear (choke open, not shut).
	3. No spark	Plug wet through excessive choking (*see* above). Plug fouled up (wants cleaning). Plug electrode gap wrong (check that it is not too large, or too small). Plug lead disconnected. Magneto coil faulty (rare).
	4. Wrong technique	Throttle not opened $\frac{1}{4}$–$\frac{1}{8}$ position. Decompressor not released in time.
Engine starts, then stops		
1. Almost at once	Too lean	Choke not closed, or should be left partially closed until engine has warmed up.
2. After a short run	Too rich	Choke left open (smell of petrol around carburettor).
3. After a fair run	No fuel	Petrol tap in "off" position. No more fuel in tank.

Table contd.—

Symptom	Possible Cause	Remedy or Check
4. Suddenly, after running normally	No fuel	Check as above.
	Spark plug fouled	Plug may have "whiskered" up—remove and clean.
	No spark	Lead disconnected.
Engine will not stop	1. Decompressor fault	Decompressor valve not opening (cable seized or broken).
	2. Engine carboned up	Engine requires decarbonizing (only likely after a relatively long life without previous attention).
Engine runs badly	*Note:* two-strokes will not "idle" perfectly smoothly like a car engine, so do not confuse a natural roughness with definite faulty running	
Idling	1. Mixture too lean	Air leak on carburettor.
		Air filter blocked (dirty).
		Vent in petrol filler cap blocked.
		Check carburettor adjustment.
	2. Mixture too rich	Choke left closed or partially closed.
		Carburettor jet enlarged.
		Carburettor float stuck or punctured.
		Check carburettor adjustment.
	3. Indeterminate	Plug fouled.
		Contact-breaker points dirty or gap incorrect.
		Spark plug gap incorrect.
		Cylinder head loose.
		Check carburettor adjustment.
Under load	1. Poor carburation	Check carburettor, and as above for "too lean" and "too rich."
	2. Poor ignition	Check condition of plug.
		Check contact-breaker gap and condition of points.
	3. Mechanical	Decompressor valve not seating properly (seat may need re-grinding).
		Cylinder head nuts loose.
		Engine-mounting bolts loose.
Engine lacks pulling power	1. Wrong mixture	Choke left closed.
		Check carburettor adjustment and condition.
	2. Poor ignition	Check as above.
	3. Incorrect timing (retarded)	Check timing. (*See* Chap. V, Section 7.)
	4. Engine or silencer carboned-up	Decarbonize silencer.
		Decarbonize cylinder head and piston.
	5. Unintentional back-pedalling whilst riding	This applies the back brake.
Unusual engine noise		Try to trace the region from which the noise is coming. A different noise from normal engine noise is usually a sign of trouble, or of something loose.
1. Engine very loud	Silencer "blown" or baffle broken	Replace silencer.
2. Rattling noise	Probably something loose, e.g. silencer fastening, engine mounting bolts, accessory clips, etc. May simply be loose tools in tool box	Check that wheels are not loose.
		Check chain sag.
		Check that engine-holding bolts are tight.
3. Engine "knocks"	Incorrect timing	Spark too far advanced. (*See* Chapter V Section 7.)
4. Engine "whines"	Wear or excessive clearance on engine gears or gearbox	Strip and check.
5. Squeaks	Lack of lubrication	Grease suspension grease nipples.
Clutch trouble	1. Does not disengage	Cable requires adjustment.
		Cable seized (lack of lubrication).
		Cable broken.

Table contd.—

Symptom	Possible Cause	Remedy or Check
		Clutch plates stuck (oily).
	2. Slips when in gear	Cable adjusted too tightly.
		Clutch plates worn.
		Clutch spring broken.
		Cable partially seized.
Brake trouble	1. Brakes poor	Need adjustment.
		Oil or grease on linings (clean with petrol).
		Need new linings (no further adjustment available).
	2. One brake more effective than the other	The front brake will seem more effective for stopping on dry surfaces, and more drastic in action on wet surfaces. A poor performance on one brake usually means that this brake is used most and consequently receives the most wear, requiring more frequent adjustment and earlier replacement of lining. The correct method of braking is to apply both brakes equally (except on treacherous surfaces where the rear brake only should be used).
	3. Brakes stiff to operate	Cable partially seized through lack of lubrication.
	4. Brakes snatch	Linings worn right down, and adjusted "tightly." Replace linings and readjust.
Throttle control trouble	1. Stiff to operate	Cable partially seized due to lack of lubrication.
		Friction bolt on twistgrip body too tight.
	2. Too loose	Tighten friction bolt on twistgrip body.
Gearchange trouble	1. Does not select gears properly	Cable stretched and requiring readjustment. (*See* Chapter V, Section 1.)
		Wear in gearbox.
	2. Stiff to operate	Cable partially seized due to lack of lubrication.
No lights (engine running)	1. Disconnexion	Check for broken wires.
	2. Broken bulb	Check and replace if necessary. (It is a good idea to carry spare bulbs in the tool kit when night driving.)
	3. Wiring fault	Bared wires touching frame. Tape up with insulating tape or renew.
	4. Switch faulty	Contact arm broken or bent.
	5. No current from lighting coil	Faulty lighting coil or broken connexion on backplate.
Poor lights	1. Wrong bulbs	Check bulb voltage and rating.
	2. Partial earth	Check wiring for frayed portions which may be touching frame.
	3. Weak generator	Faulty lighting coil, or weak flywheel magnets
No horn	1. No connexion	Broken wire or switch.
	2. Weak generator	Faulty lighting coil.
Steering poor	1. Buckled wheel	Check by rotating.
	2. Wheel loose	Check.
	3. Wheel mis-aligned	Check.
	4. Frame buckled	This damage is only likely to result from a crash. A replacement frame will be necessary.
	5. Tyre pressures very low	Pump up hard—check for slow puncture; check valve for leak.
	6. Steering head bearings loose	Readjust and tighten.
High fuel consumption	1. Wrong mixture	Mixture too rich—check carburation.
		Choke partially closed.
		Very dirty air filter.
	2. Faulty driving technique	Cruising at full throttle instead of three-quarter throttle.
		Excessive amount of first-gear driving.

CHAPTER V

DETAILED MAINTENANCE

1. CABLES AND CONTROLS

THE best safeguard against control cables sticking or seizing in their sleeving is adequate and regular lubrication. With the exception of the clutch end, all cable ends are readily accessible and should be disconnected and freely oiled about every one-thousand miles. It is also an advantage to grease the ends of the cables lightly where they enter the sheathing, or use a special Bowden cable lubricator for this job (available from most motor accessories shops). The clutch end of the clutch cable can be reached for the purpose of lubricating simply by removing the left-hand engine cover plate.

Adjustment of all cables is quite straightforward. First unscrew the locknut and then adjust the length of the cable by tightening (or unscrewing) the adjusting nut until the desired degree of adjustment has been achieved. (*See* Figs. 37 and 38.) The locknut is then tightened up again strongly to hold this setting. Check the operation of the control again to make sure that this has not altered with the tightening up of the locknut.

In the case of the front brake cable, adjust until the front wheel just spins freely without binding but the brake is brought into operation with a reasonably small movement of the brake lever. The rear brake is adjusted in a similar manner at the cable end on the L model. In the case of the models N and S the rear brake is rod-operated and adjustment is made at the pedal end of the rod (i.e. where it fits in the brake lever arm). The principle of adjustment is exactly the same, shortening the length of rod by means of the adjuster nut (with locknut free) to take up the brake, and vice versa. Where no further adjustment can give effective braking but the visible action is obviously satisfactory, then the brake linings require renewing. (*See* Section 2.) In the case of the model L, apparent premature wear of the rear brake linings may in fact be due to adjustments having led to the brake lever and Bowden cable being no longer roughly at right angles to each other, so that much of the effective pull is lost. This can be readjusted by slackening off the hexagon nut locking the brake lever in place, pulling the lever off and rotating one or two notches (teeth) to realign them properly.

Adjustment of the clutch cable is necessary as soon as the clutch shows signs of slipping, or failing to disengage properly. The correct amount of play in the clutch cable is about $\frac{1}{16}$ in. (2–3 mm.). Adjustment is made

at the handlebar end in exactly the same manner as with the front brake cable.

The gearchange cable is a little more tricky to adjust since it has to be done by feel. The twistgrip is rotated towards first gear until the dogs in the gearbox are just felt to be engaging. This position is then marked on the grip and a similar position found, and marked, for the beginning of engagement of second gear. The mid-point between these marks is then the correct position of the grip for neutral. Adjustment of cable tension is then made so that this mid-position corresponds to the correct neutral position of the twistgrip, relative to the handlebar mark.

The throttle cable length is adjusted so that when the throttle twistgrip is fully closed the engine continues to tick-over. This is done at the carburettor end, the adjuster being exposed by sliding back the roller sleeve. (*See* Figs. 23 and 24.) The twistgrip should stay in any position to which it is rotated, return movement under spring action being opposed by friction governed by the bolt shown in Fig. 24. Tightening up this bolt will improve the "self-locking" action of the twistgrip.

The decompression control cable should have only a fraction of end play (about 1 mm); adjustable at the handlebar lever in the case of the N and S, and at the point where the cable emerges from the shroud immediately under the headlamp fairing in the case of the model L.

Front brake cables are readily removed, when necessary, by disengaging them at both ends, opening the clip inside the front fork, holding the sheath, and then withdrawing the cable downwards through the handlebar shroud. New cable should be fed back in the reverse direction. The rear brake cable (L model) is released by disengaging the nipple from the brake arm, unscrewing the adjuster out of its bracket and then releasing it from the pedal lever end.

When renewing a clutch cable, remove the chain guard and push the clutch lever in to remove the cable nipple. The front end is released from the handlebar lever. Then a 5–6 ft length of thin wire should be joined to the lower end of the cable by twisting it round the nipple and pulling it through as the cable is withdrawn from the handlebar end. The lower nipple of the new cable is then attached to this wire and pulled back through.

A similar technique is employed when replacing a gearchange cable. To release the cable from the twistgrip end the decompression cable should be released from the decompressor valve (*see* later), the twistgrip released by unscrewing the locking screw (*see* Figs. 25 and 26) and slide outwards off the handlebars. The rubber sleeve on the grip can then be prised up carefully to release the nipple. The bottom end is released by removing the right-hand engine cover and disconnecting from the gearchange lever. A length of thin wire is then attached to the lower nipple and the cable withdrawn upwards from the handlebar end. The lower nipple of the new cable is then attached to the wire and drawn back

downwards into position. It is particularly important to ensure on reassembly that the nipple is properly engaged in the twistgrip.

When changing a throttle cable, unscrew the adjuster locknut (carburettor end) and then screw the adjuster right home. Unscrew the top

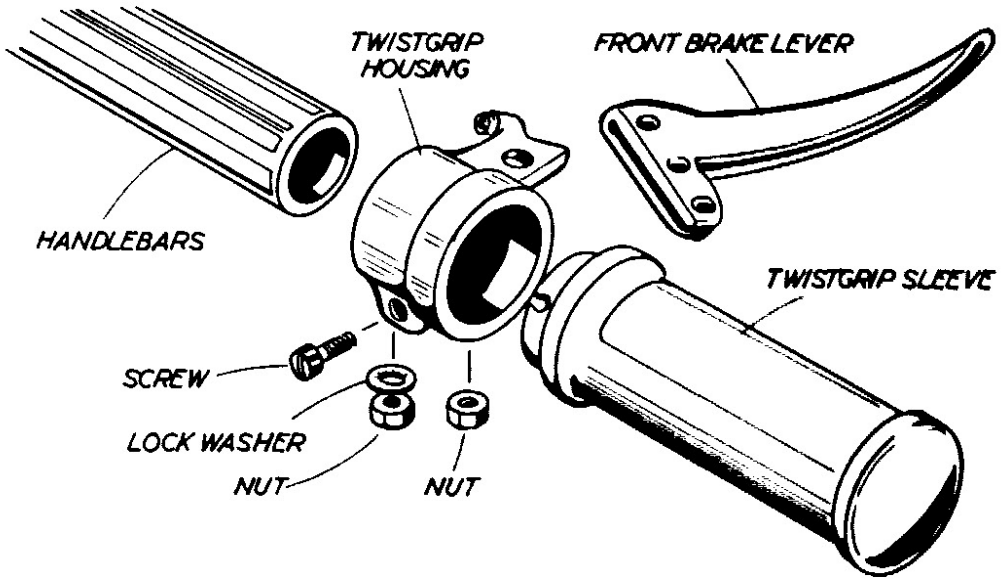

FIG. 23. THROTTLE TWISTGRIP ASSEMBLY ON N AND S MODELS

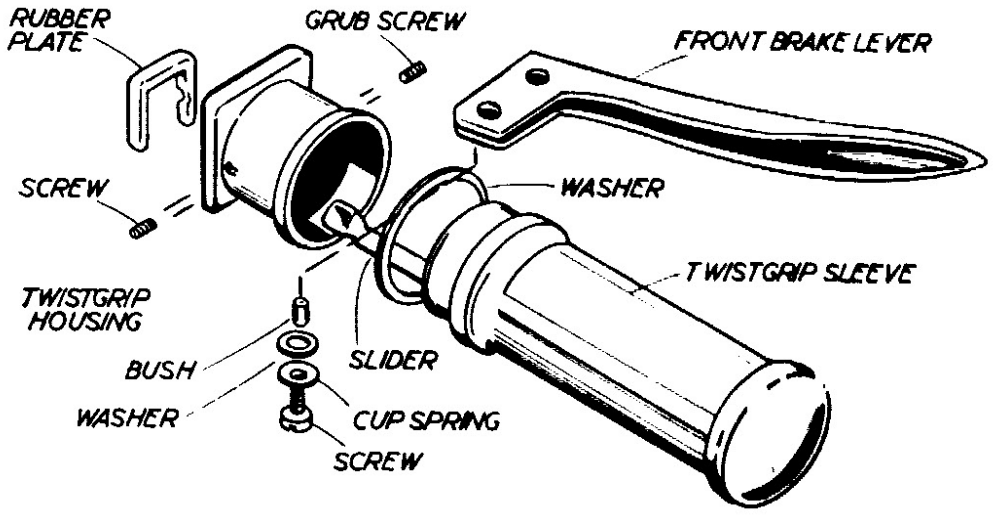

FIG. 24. THROTTLE TWISTGRIP ASSEMBLY ON L MODEL

of the carburettor and remove together with the throttle slide attached to the cable. Release the cable from the slide and set the carburettor parts down on a clean surface. The throttle twistgrip should then be removed completely from the handlebars by unscrewing the holding screw (*see* Figs. 23 and 24) and sliding it off the handlebars, when the cable can be released. To assist in easy withdrawal of the cable and to replace it with

a new length, it will be found necessary on some models to slacken off the strap holding the fuel tank in place to take pressure off the rubber blocks acting as a cable clamp.

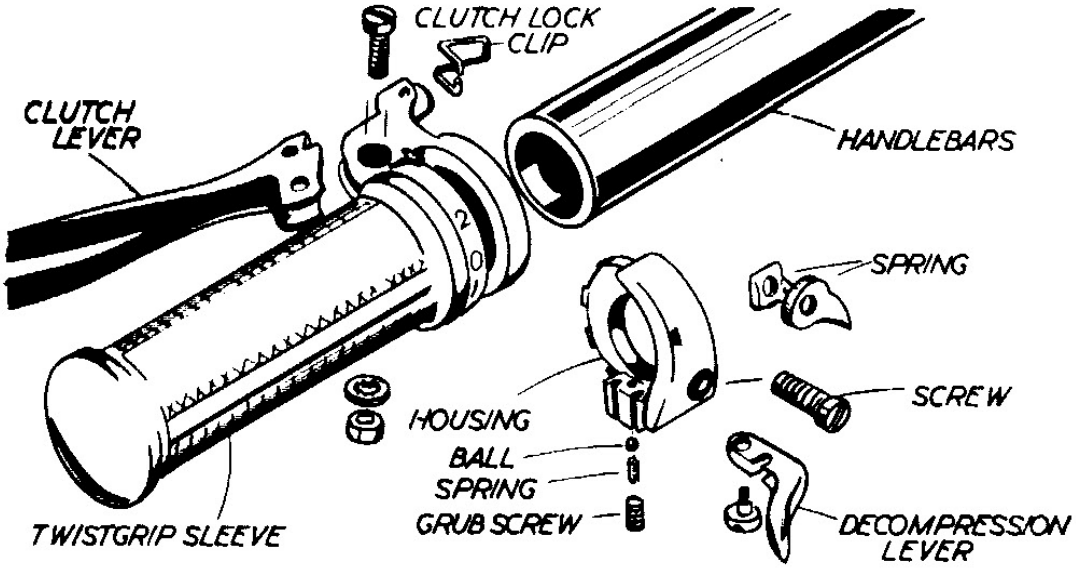

FIG. 25. GEARCHANGE TWISTGRIP ON N AND S MODELS

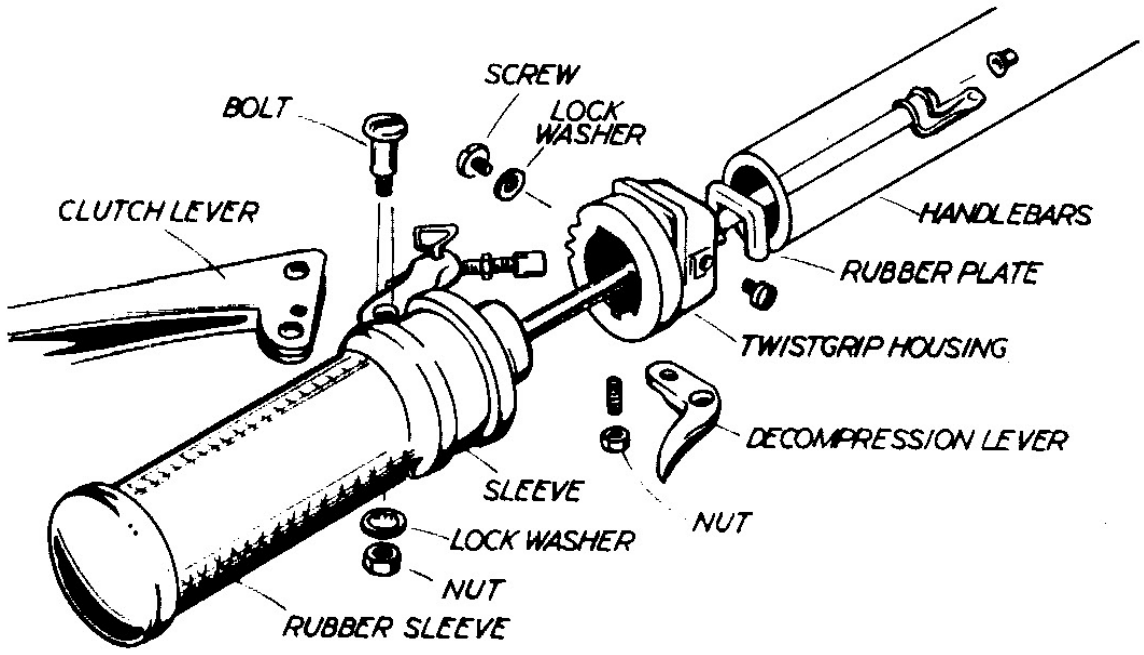

FIG. 26. GEARCHANGE TWISTGRIP ON L MODEL

The decompression cable is released from the valve end by first pressing down the valve with a screwdriver or similar tool, and then disengaging the cable. The upper end of this cable has a solderless nipple locked with a small screw which if released will enable the cable to be withdrawn. In fitting a new cable the solderless nipple is first attached to the cable tightly, allowing about $\frac{3}{8}$ in. of cable to protrude (Fig. 27). Pass the lower

end of the cable down through the sheath when the lower nipple can be engaged properly by pressing it in place with a screwdriver.

Brake and clutch levers are removed by first detaching the cables, then unscrewing the nuts, and withdrawing the pivot bolts. In replacing, check that the spring washer is included in its proper position (under the nut next to the twistgrip body).

Removal of the throttle twistgrip follows the method already described for replacing a throttle cable. (*See also* Fig. 23.)

Note. Refer also to Figs. 37 and 38 for cable details.

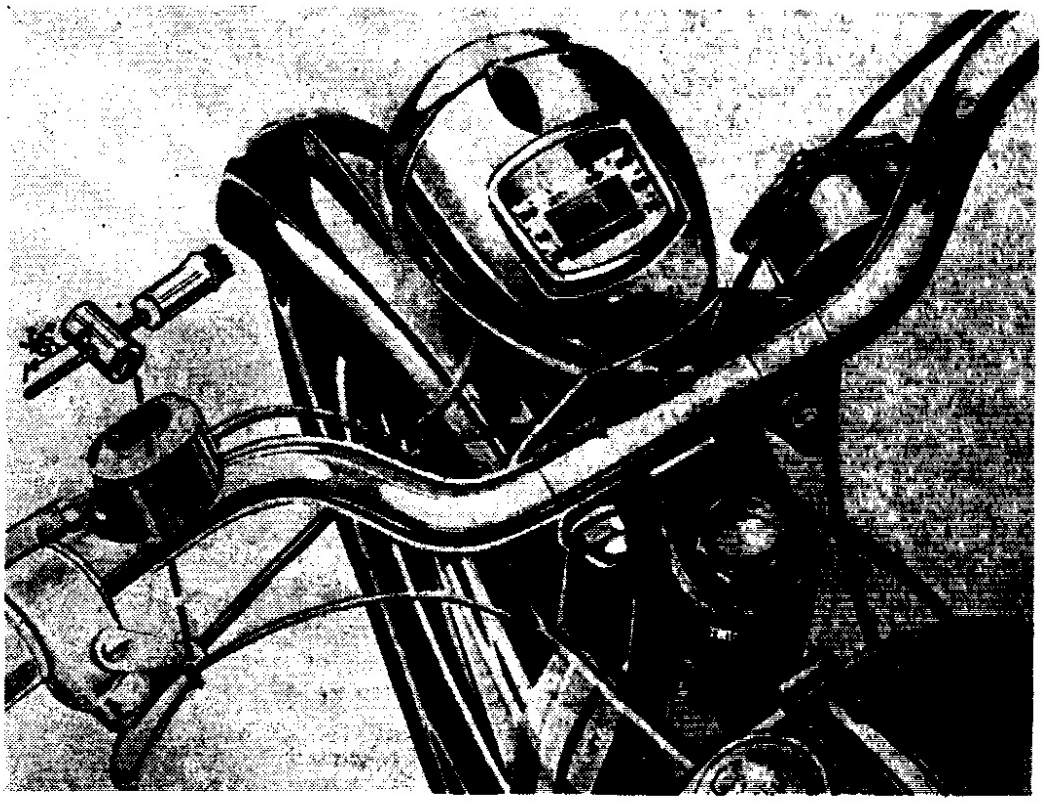

FIG. 27. THE DECOMPRESSOR CABLE

This terminates in a solderless nipple at handlebar end. Cable should protrude ⅛ in. through end fitting.

2. FRONT AND REAR BRAKES

For the renewal of brake linings the wheel must be removed from the frame (*see* Section 3) and the brake backplate detached from the wheel. The brake backplate on the front wheel can be removed by holding the brake lever and unscrewing the hexagon nut on the backplate with a spanner. Striking the right-hand bearing cone with a rubber hammer or block of wood should loosen the backplate, which can then be removed. The action is essentially similar in the case of the back wheel except that the first step is to remove the large circlip in the hub.

The front wheel assembly differs on models up to 482 754/522 989 and subsequent models. (*See* Figs. 28 and 29.) The two types can be identified from the fact that the spindle in the former case is in the form of a long bolt while in later models there is a rod threaded for a nut at each end.

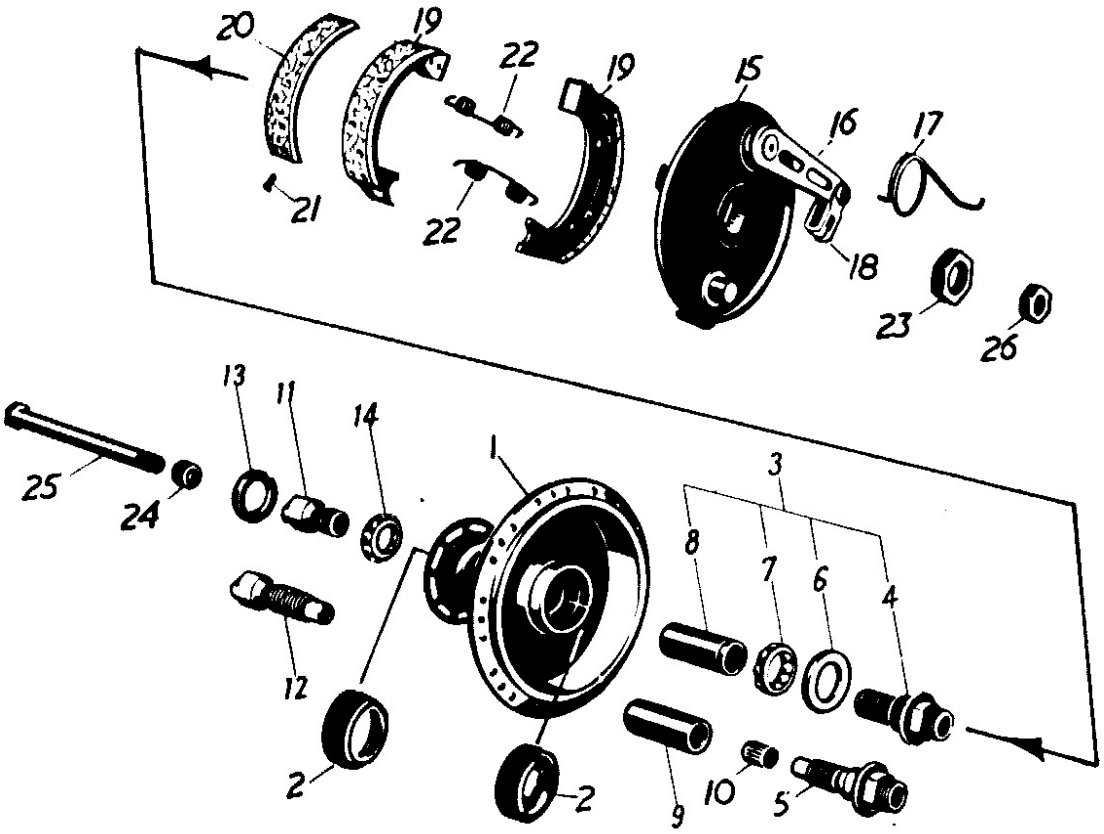

FIG. 28. FRONT HUB ASSEMBLY (UP TO MODEL 482 754/522 989)

1. Hub
2. Ball race cups
3. Cone assembly
4. Cone (early models)
5. Cone (late models)
6. Seal ring
7. Ball cage and balls
8. Spacer (early models)
9. Spacer (late models)
10. Tolerance ring
11. Cone (early models)
12. Cone (late models)
13. Seal ring
14. Ball cage and balls
15. Brake plate
16. Brake lever
17. Spring
18. Yoke
19. Brake shoe
20. Brake lining
21. Rivets (16)
22. Spring
23. Nut
24. Ring
25. Spindle
26. Nut

Main differences from the point of brake lining renewal are the springs and different part numbers for the shoes and linings. Similar differences are observed in the case of the rear wheel brakes. (*See* Figs. 30 and 31.)

The shoes can be removed by unclipping the springs or spring with pliers. The old linings can then be removed by cutting off the heads of the rivets inside the linings and being punched out clear. The new linings are

assembled by fitting and clenching them over the centre rivets first, then working outwards to each end making sure that the whole length of lining is bedded down flat on the shoe.

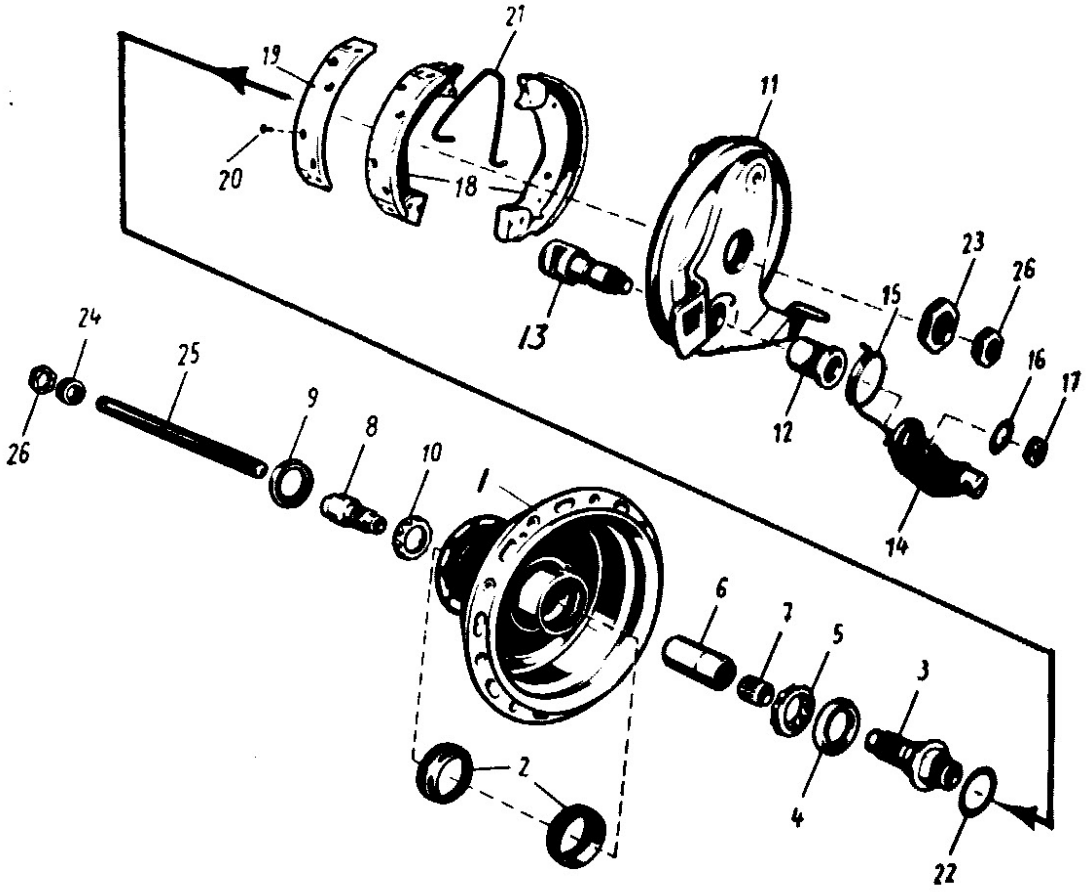

FIG. 29. FRONT HUB ASSEMBLY (MODELS SUBSEQUENT TO 482 755/522 990)

1. Hub
2. Ball race cups
3. Cone
4. Seal ring
5. Ball cage and balls
6. Spacer
7. Tolerance ring
8. Cone
9. Seal ring
10. Ball cage and balls
11. Brake plate
12. Bush
13. Brake operating cam
14. Brake lever
15. Spring
16. Spring washer
17. Nut
18. Brake shoe
19. Brake lining
20. Rivets (16)
21. Spring
22. Shim
23. Nut
24. Ring
25. Spindle
26. Nut

Assembly of the two-spring unit is best done by attaching one spring to both shoes at the pivot end, then fitting the shoes in place, and finally engaging the second spring (which may already be hooked into one shoe for convenience). With the single-spring unit it will usually be found easiest to hook the spring in one shoe, fit both shoes in place and then engage the spring in the second shoe with pointed-nose pliers.

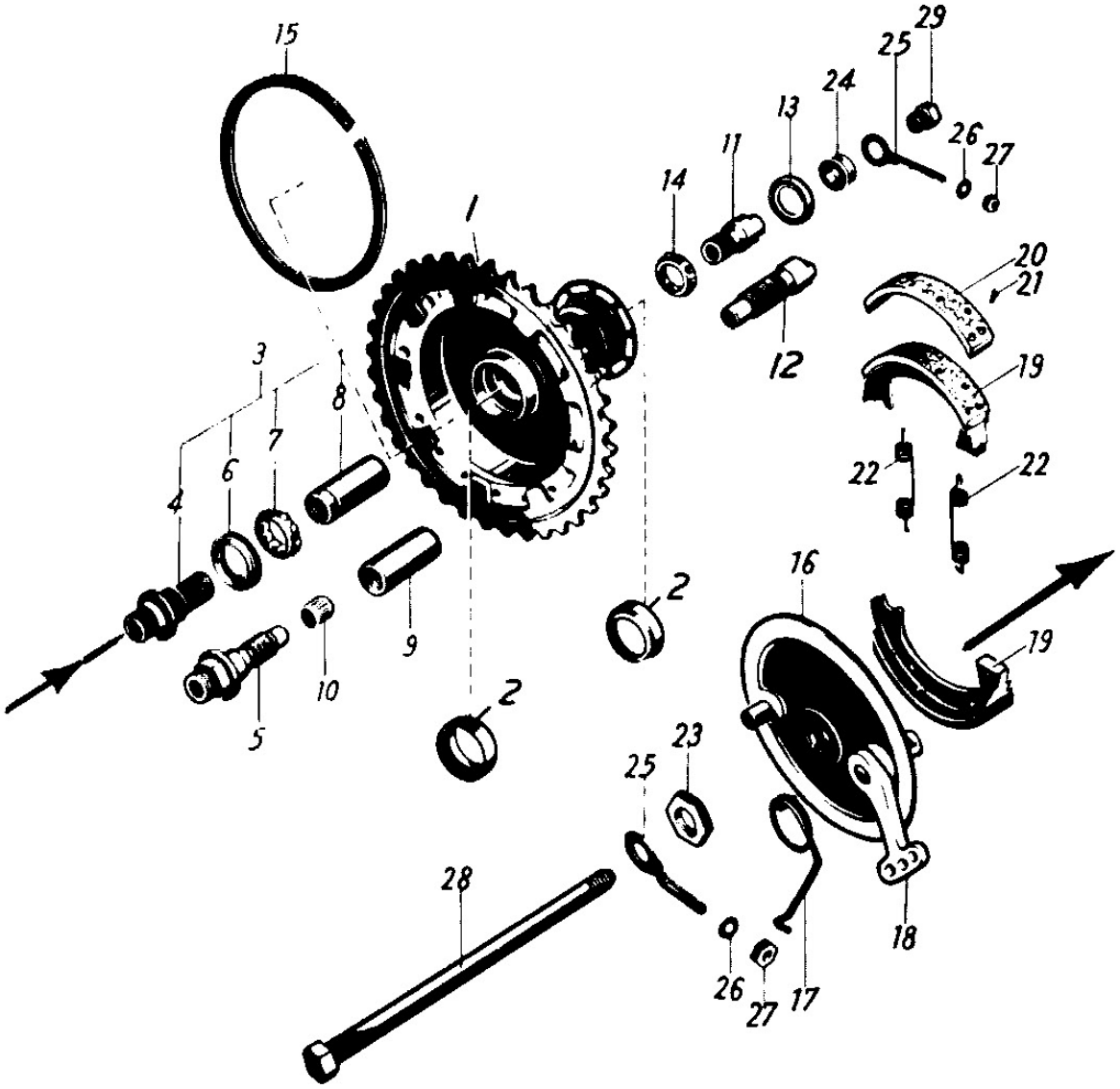

FIG. 30. REAR HUB ASSEMBLY (MODELS UP TO 482 754/522 989)

1. Hub
2. Ball race cups
3. Cone assembly
4. Cone (early models)
5. Cone (later models)
6. Seal ring
7. Ball cage and balls
8. Spacer (early models)
9. Spacer (late models)
10. Tolerance ring
11. Cone (early models)
12. Cone (late models)
13. Seal ring
14. Ball cage and balls
15. Circlip
16. Brake plate
17. Spring
18. Brake lever
19. Brake shoe
20. Brake lining
21. Rivets (16)
22. Spring
23. Nut
24. Spacer
25. Chain adjuster
26. Spring washer
27. Nut
28. Spindle
29. Nut

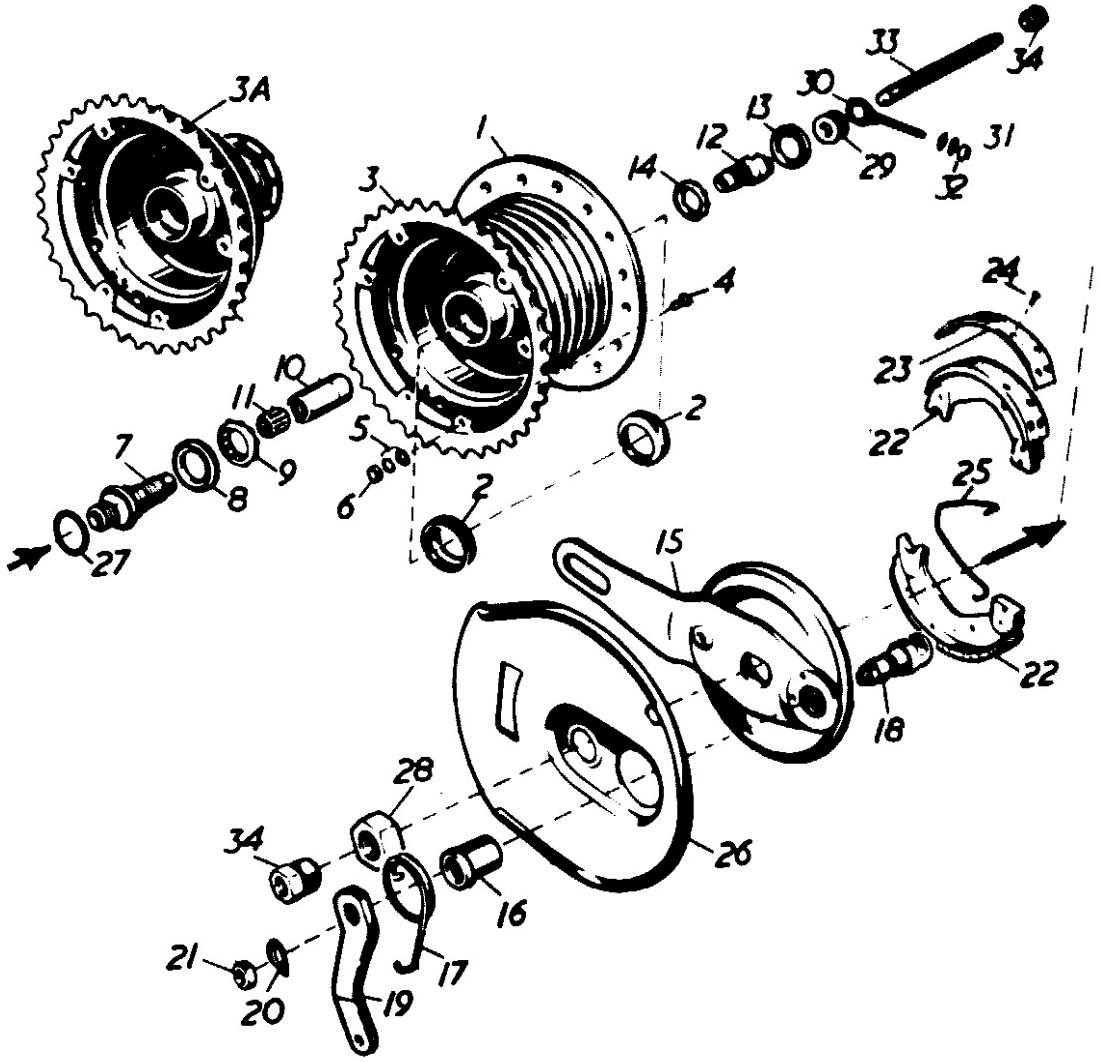

FIG. 31. REAR HUB ASSEMBLY (MODELS SUBSEQUENT TO 482 755/522 990)

1. Hub
2. Ball race cups
3. Sprocket (L model)
3a. Sprocket (N and S models)
4. Bolt
5. Spring washers
6. Nut
7. Cone
8. Seal ring
9. Ball cage and balls
10. Spacer
11. Tolerance ring
12. Cone
13. Seal ring
14. Ball cage and balls
15. Rear plate
16. Bush
17. Spring
18. Brake operating cam
19. Brake lever
20. Spring washer
21. Nut
22. Brake shoe
23. Brake lining
24. Rivets (16)
25. Spring
26. Cover
27. Shim
28. Nut
29. Spacer
30. Chain adjuster
31. Spring washer
32. Nut
33. Spindle
34. Nut