3.3 Pilgrim Pumps

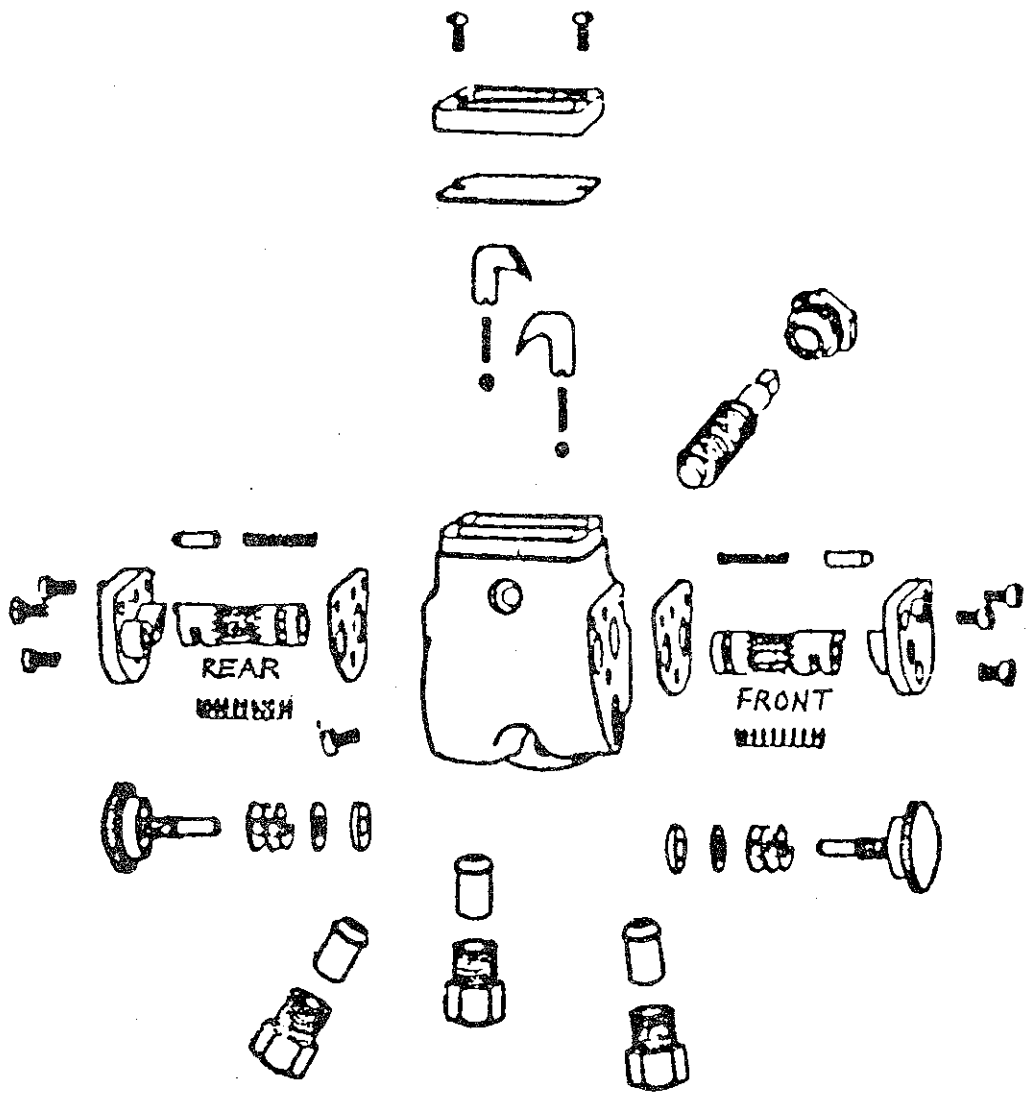
THE PILGRIM DUPLEX OIL PUMP

John Underhill

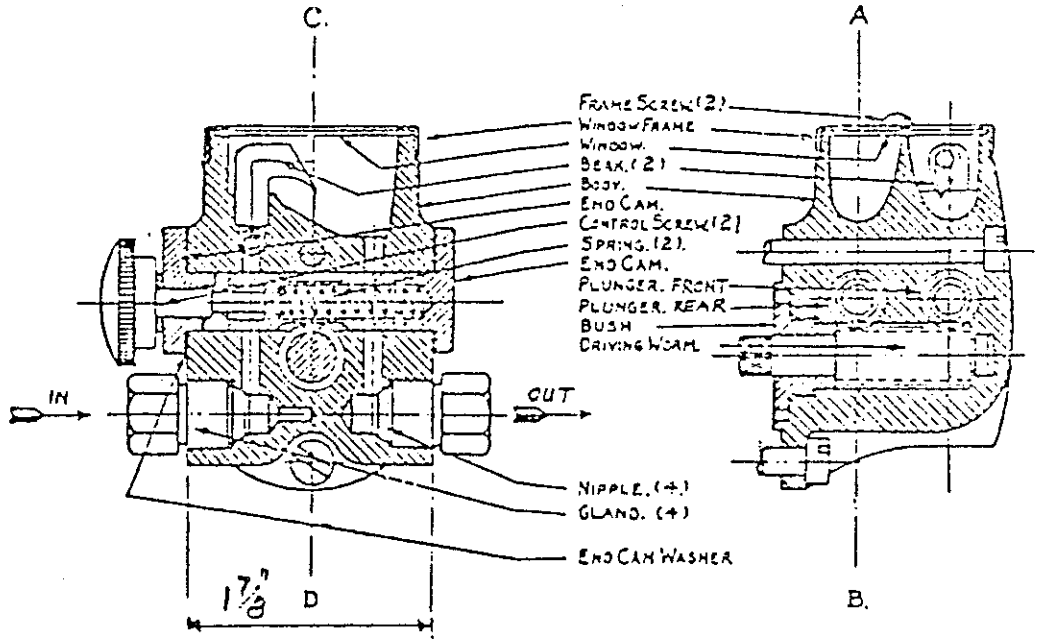
The Pilgrim Duplex Oil Pump was manufactured by The Pilgrims Way Engineering Co. Ltd., Farnham, Surrey, and was fitted to all twin-cylinder Scott motor cycles produced from 1928-1951 and to subsequent Birmingham models, with the exception of some 1933-1934 models, which were arranged with Scott's own swashplate pump.

The pump was mounted in two alternative positions dependent upon year and model:

COMPONENT PARTS

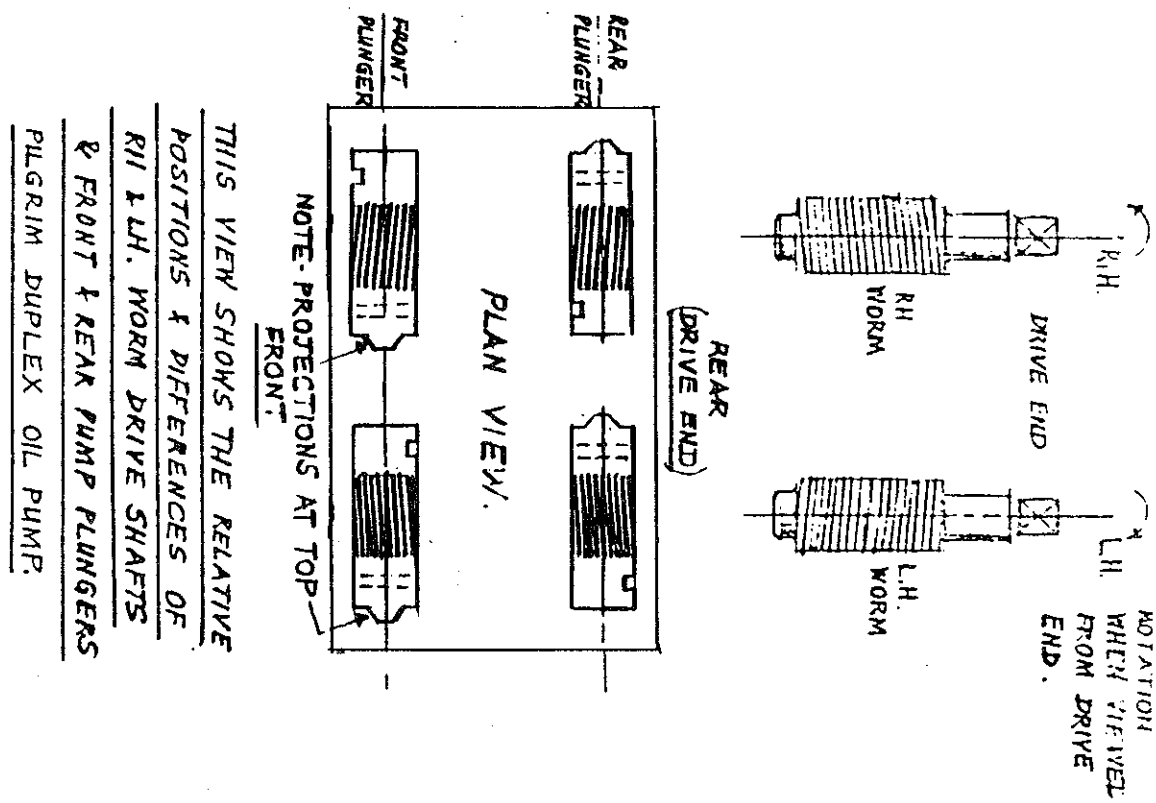


PILGRIM DUPLEX OIL PUMP.



SECTION THROUGH A.B. SECTION THROUGH C.D.

PILGRIM DUPLEX OIL PUMP



THIS VIEW SHOWS THE RELATIVE POSITIONS & DIFFERENCES OF RH & LH. WORM DRIVE SHAFTS & FRONT & REAR PUMP PLUNGERS

PILGRIM DUPLEX OIL PUMP.

1. On a shaped plate bolted to the side of the magneto platform (which had two ¼" BSF tapped holes for this purpose) being located with pump spigot engaging in hole in plate and secured to the plate by two 5/16" cheese-head screws (one long and one short) through the pump body.

The pump was driven by a cranked arm (usually a brass casting) secured to the square drive-end of the pump by pinch bolt with drive arm engaged in a clearance hole in the magneto-drive sprocket.

Care should be taken when assembling to ensure that magneto-drive sprocket and square drive-end of the pump are concentric and that rotation of the sprocket is not trying to move the pump plate assembly. Slots are provided in the pump mounting plate to provide some adjustment for this purpose.

2. On the side of a special crankcase door to which the pump is spigotted and secured as previously with two cheese-head screws and driven by disc and bushed drive-shaft with slotted end engaging in the square drive end of the pump. A special crankpin screw with a projecting boss engaged in a radial slot in the periphery of the disc and drive-shaft and thus imparted the drive to the pump. This arrangement will tolerate a small degree of eccentricity of pump position.

The pump was available with either clockwise L.H., or anti-clockwise R.H. rotation (when viewed looking at the drive end) and was driven at engine speed.

The majority of pumps fitted to Scotts were anti-clockwise or R.H. rotation, although L.H. rotation pumps were fitted to three-speed Supers (1928), Sprint Specials, and single down tube models where the magneto was driven from the clutch sprocket, and Clubman Special models which were fitted with two pumps, R.H. and L.H.

The pump comprises the following main component parts:

* Pump body
* Driving worm
* Driving worm bush (Hexagon head)
* Front plunger
* Rear plunger (nearest drive end)

End plate and Cam (two-off)
Adjusting screw (two-off)
Window frame and Window
Pump beaks (two-off)
Various screws, washers, springs, balls, plungers and gaskets.

* **Note:** There are IMPORTANT differences in these components between L.H. and R.H. pumps, AND THEY MUST NOT BE MIXED. The pump body was tapped (L.H. thread for R.H. rotation and R.H. thread for L.H. reduction) for the driving-worm bush and care should be taken when removing. Other differences are shown on the accompanying text.

How the Pump Works

The pump is mechanically driven as previously described and rotation of the driving worm will result in rotation of the front and rear pump plungers, the projections of which will contact the face cam of the end plates and impart a reciprocating movement also. The plungers are spring loaded towards the end cam plates. The two slots (or ports) on each plunger are radially timed to provide a positive delivery of oil to

the well *via* a spring loaded ball-valve and beak, and also to empty the well mechanically and thence feed the individual main bearings (or cylinder walls in the case of the Clubman Special).

The only adjustment provided is the adjusting screw in each end cam plate which will vary the stroke of the plunger. The adjusting screws would be screwed in to reduce the plunger stroke and supply of oil. The early type of adjusting screw had a lock nut, and adjustment was a bit fiddly, whilst later types had a spring-loaded plunger and serrated screw head which facilitated accurate and quick incremental adjustment.

Notes on Dismantling and Re-assembly

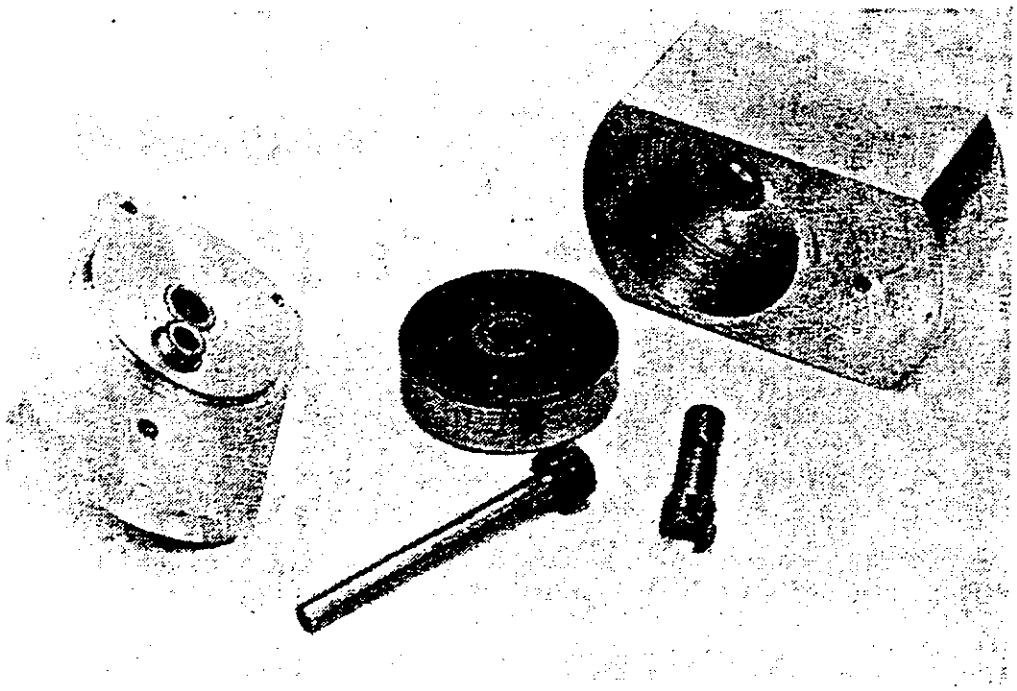
1. The pump driving worm bush and worm shaft *must first be removed before any other dismantling is done.* Note L.H. or R.H. thread on worm bush dependent upon rotation of pump.
2. Take care when removing end cam plates and beaks as these are usually a tight fit and prone to breakage, as the originals were made of MAZAK. Examine cams for wear. Gerry Howard offers improved versions of both components.
3. On re-assembly note that front and back pump plungers are different to each other and must be fitted to the correct bores in the pump body. They must also be fitted in the correct radial relationships, i.e. with projections at the top and in line with the end plate cams.
4. On re-assembly all components, including ball-valve seat and spring (under the beaks) and all oil passages, should be thoroughly cleaned. With modern oils it is also best to remove any paint in the oil wells which were originally white enamelled.
5. Make a good job of all the oil pump connections, with pipes and nipples carefully fitted to the seatings which should be air tight, but do not over-tighten for fear of stripping threads in the pump body.

A Few Observations

The Scott engine will function perfectly satisfactorily with a small amount of lubricating oil, but problems arise as a consequence of the pump running at engine speed. In order to reduce the supply of oil to a satisfactory level, the pump adjusting screws would be screwed in until a point was reached where the plunger was barely moving and in these circumstances, dependent upon the pump condition, the oil supply becomes intermittent. Screw out the adjuster screws and the pump begins to function properly, but over-oiling is the result and the pump is blamed. Many years ago this problem was recognised by concerned Scott owners and led to experiments using components from Sturmey-Archer three-speed cycle hubs to reduce the speed of the pump by interposing epicyclic reduction gearing between the drive elements. We now have the present well-engineered reduction gear set-up offered by Gerry Howard.

Other factors which affect pump adjustment include:

1. Grade and viscosity of oil — I always use the same oil — the cheapest straight 40 mineral oil I can obtain.
2. Ambient temperature.
3. Pump mounting — Crankcase mounted pumps are affected by heat conduction.



The internals of George Reeves' Pilgrim pump reduction gear. Photograph: Alan Burman.

PILGRIM PONDERINGS

George Reeves

I got my first Scott with a Pilgrim pump in 1932. My previous Scotts had all had hand pumps or drip feeds. The 1929 596cc 2-speed Super and sidecar was in mint condition and cost £18. During the next eight or nine years it covered many miles, solo and sidecar, and gave no trouble at all. Many years later, in 1959, I got a box of bits, formerly a 1930 short steering-head model also with a Pilgrim pump. When I finally got it completed and running I joined the S.O.C. and learned all about the troubles I should have had with a Pilgrim pump on a Scott. I must state however that the pumps were driven from the magneto sprocket, away from the heat of the engine, and the machines were not raced. I carried on with the pump until about two years ago when it failed — cams worn out. So I fitted a pair of drip feeds. However, at the 1984 Scott Rally I saw Mr. Howard's new cams and end plates, and meeting him again at the Peterborough Rally I decided to get new cams and refit my pump but with a reduction gear as advised by the experts.

Keeping to my lifelong principle of "don't buy it if you can make it", I inspected the scrap box and found an aluminium off-cut, some oilite bushes, and the internals from a Sturmey Archer three-speed gear. I was in business. Fitting a new blade to my hacksaw, I cut a slice off the end of the aluminium block to make the end cover, marked out the gear centres, spigots, bores, etc, roughly sawed it into shape, and then machined it to the finished sizes. All the machining was done in my lathe — I don't have a milling machine — and in a few hours spread over a few days I had a gearbox.

There is a modification made since the photographs were taken. I machined the base flat and mounted the pump on an angle bracket. This gives a more rigid fitting. It has now been fitted up and a trial run seems all right.

THE PILGRIM SIGHT MECHANICAL OIL PUMPS

This pump was manufactured by the Pilgrims Way Motor Co. of Farnham, Surrey, the Duplex version of the pump featuring on Scott motorcycles, from 1926, whilst the single types were fitted to many motorcycle engines, notably J.A.Ps, for many years.

How the pump works

From the illustration of the parts, it will be seen that the worm No. 5 rotates the plunger No. 2 and the projection on the end of this plunger bears on the face of the Cam No. 4. This imparts a reciprocating movement to the plunger and the two ports in this are timed to operate at the correct moment, passing along a supply of oil in drops through the union connecting the oil pipe to the engine, proportionate in supply to the engine's need. The setting of the regulating screw must be left to the rider of the machine, as this may vary with speed and with different grades of oil under different temperatures, and the Motor Cycle manufacturer's own lubricating instructions usually given in leaflets supplied with the machine. The pump though automatic is not capable of dealing with the wide range of speeds of all sports engines, hence the necessity of regulating the supply as advised by the makers.

Running and care

Little need be given in the way of running instructions, as the inclusion of a sight feed shows exactly what is happening at any time.

TO DISMANTLE THE PUMP. IF THIS IS EVER NECESSARY. FIRST UNSCREW THE DRIVING SPINDLE WORM (R.H. THREAD PART 6) AND SO REMOVE WORM. (FOR ANTI-CLOCK PUMPS THIS WILL BE L.H. THREAD.)

Then remove end plate and plunger can be withdrawn.

On re-assembling, the end cam should first be mounted, then the plunger can be inserted can first so that the two cams are in contact.

Then the return spring should be put in the open end of the plunger at the opposite end to the cam abutment, and this is all closed in by the end plate

Then insert worm and finally screw in the bush.

Oil delivery is varied by means of the control spindle (part 9) Screwing this down has the effect of reducing delivery. Should the glass break it will not in any way prevent the pump working. Caution dictates that the sight be temporarily covered by a piece of paper or some suitable material, but this is purely to keep mud etc., out of the pump internals.

Both suction from tank and feed to engine are cam controlled so the possibility of failure is reduced to a minimum.

Care and attention instructions

When by observation or by feel in the running of the machine the

pump appears to pass its oil erratically or shows signs of 'tailing off' in delivery of oil at high speeds, there are three things to be looked at:—

(1) The oil filter above the tank union should be examined and cleaned. If the level of oil in the tank runs so low that the filter gauze is not entirely submerged, there would be a tendency to draw in air, which naturally "flows" more readily than oil.
(2) Fluff or foreign matter in any of the holes of the pump, or under the beak should be looked for and removed by carefully dismantling (as described later) and thoroughly cleaned.
(3) An air leak in the inlet pipe or at one or other of the unions may give trouble so care should be taken to tighten up firmly without straining.

If the above three points are attended to and the pump thoroughly cleaned and reassembled with plenty of oil, any erratic behaviour should vanish.

Sight feed filling up

Should any small particle or dirt or foreign matter become lodged between the ball valve and its seat, the sight feed will fill up with oil when standing and attention should be given to the ball-valve which is situated in the body of the pump immediately below the beak. The beak from which the oil drips, is a tight push fit into the body of the pump and can easily be moved by careful manipulation with a pair of flat nosed pliers, and when removed the ball valve and spring will be exposed; these, together with the valve seat and all oil passages, should be thoroughly cleaned.

Occasional filling in cold weather is probably only due to viscous oil and a temporary increase in oil setting will overcome this.

N.B. — In connection with this point, please note that if Castrol R is regularly used, the white enamel in the sight chamber should be removed. This necessitates removing the pump and scraping the enamel out with the assistance of benzol or petrol.

Regular and chronic sight feed filling when running under all conditions of oil and temperature can be cured by fitting a new cam plate (under Control knob.)

The pump does not rely on gravity or crankcase suction to get the oil out of sight. Oil is drawn out of the sight chamber of the pump itself and pumped through to the engine with considerable pressure.

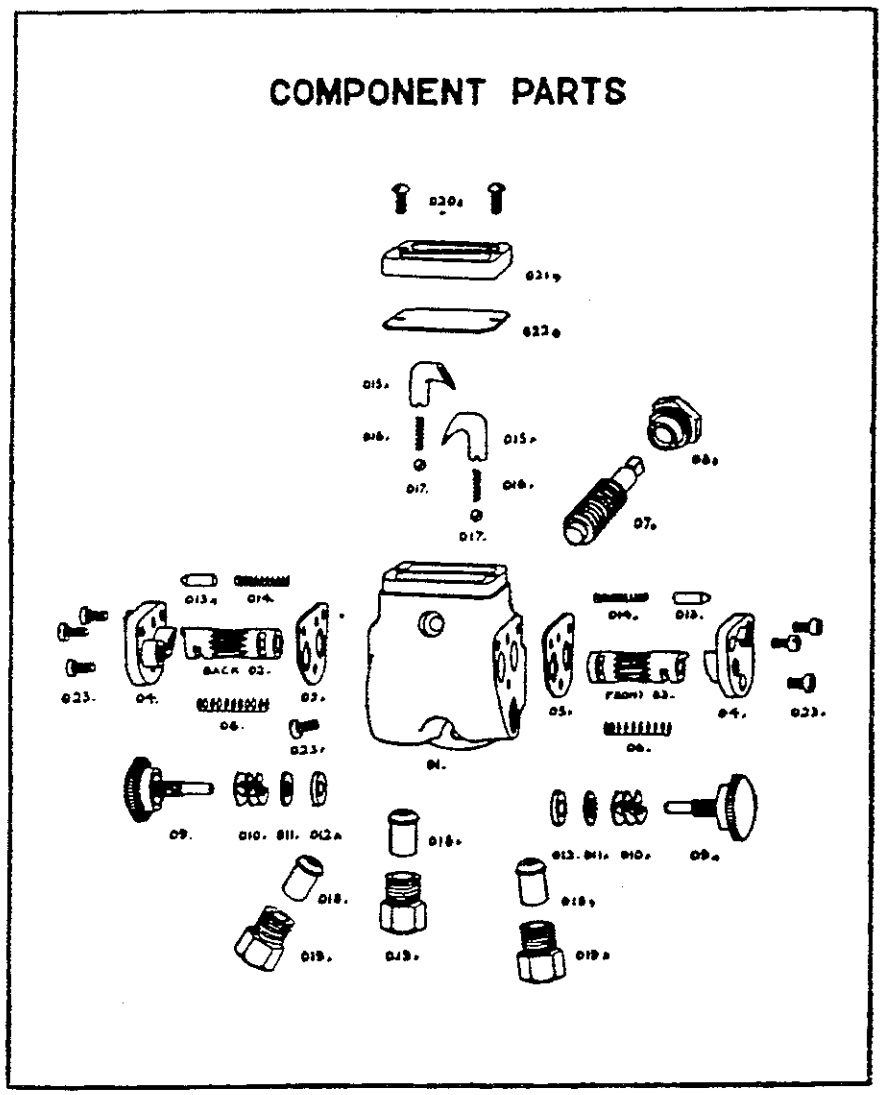
Warning

The pump driving worm must never be rotated with either the end plate or end cam removed from the pump body.

The pump plunger must never be removed from the pump body unless the driving worm and bush have first been removed.

Failure to observe these points will immediately render the pump plunger and driving worm liable to serious damage.

(From official pamplet issued by Pilgrims Way Motor Co. Ltd., supplied by Geoff Lee).



Pilgrim Duplex Pump components parts (see diagram

Part No.	Name
01	Body
02	Front plunger
03	Back plunger
04	End cam
05	Cam washer
06	Bush
07	Fibre washer
08	Steel washer
09	Spring washer
13	Nipple
14	Gland for nipple
17	End plate
18	Beak
19	Cam and End-plate screw
20	Cam washer
21	Window frame
22	Window
23	Plug screw
24	Ratchet
25	Ratchet spring
26	Frame screw
27	Ball valve
28	Ball valve spring

PILGRIM PUMPS AND WHAT HASN'T BEEN WRITTEN BEFORE

Les Heath

The article in August issue of *Yowl* on Pilgrims will no doubt be great use to many readers. However after reading this article I have been prompted to include a little more on the practical operation of these much maligned pumps. Regarding the flooding of the sight feed glass whilst stationary, unless this is very severe, say filling overnight, my considered advice is leave well alone. The cause is as stated, failure to seat correctly of the tiny ball valve below the feed beak. The book advice of opening up the regulator I disagree with. Leave the adjuster alone and the oil will disappear in a very short time. My main reason for not attempting to rectify this so called problem unless severe, has a mechanical basis. The offending beak is made of die cast metal and becomes brittle and tight fitting with age and invariably breaks on the removal attempt. Then one's problems become much more involved than the original overdose of oil. Very few Scotts are today in daily use and I personally prefer my pump to build up over a week or two as this not only keeps the pump primed and free of air but provides an excess of oil immediately the engine starts providing super lubrication for cold dry bearings and pistons. My next point is one which was arrived at by much experimenting a good many years ago. Pump failure mainly occurs at lighter speeds on fine settings, any thing beyond a "four to one" setting is definitely suspect regardless of the speed, the risk of failure of course increasing with speed.

These facts may be "old hat" to some members but what is not generally realised is that by using thicker oil to make the pump more consistent in setting, does in fact make the pump prone to failure at high speed, and not necessarily over a long distance. Those who doubt my reasoning can prove this for themselves by removing the inlet feed pipe at the pump and watch the very slow rate at which heavy oil flows out. Hence the pump actually starves for oil when speed demands that it should pump even better. The real cure of course is to fit as large an inlet pipe as possible especially if speed or a worn pump are involved a $\frac{3}{8}$in diameter pipe and drilling out all fittings as large as possible makes the pump totally reliable and and eliminates many of its so called idiosyncrasies.

One major cause of trouble is the loosening of the threaded bush retraining the drive worm. This problem is more common on magneto driven pumps, created no doubt by the unbalanced dog driver. Having ensured that the worm is not ruined and the bush in first class order, clean and 'Loctite" the threads, some are left hand, and tighten firmly. The outer face of this nut is usually slightly below the level surface of the pump body. Before finally mounting the pump on the mounting plate, shim the outside of the nut so that it fits up tight to the plate. There is then little chance of the nut coming loose in service.

The end plate cams do wear (some say they are made of cheese) but can be compensated by the regulator unless almost non-existent. The use of banjo pipe fittings instead of sleeve nipples seems to eliminate most of the usual air leaks. Now to offer some observations on the functioning of the pump. Contrary to common opinion, very little if any pressure is developed by this pump at normal speeds when fitted to a Scott. It acts as a dispensing device and only at speeds around 50 m.p.h. or over does it register any significant pressure and then mainly at larger settings. This then indicates that the depression in the crankcase has a direct effect upon the pump and regularity of the oil feed. This deduction is borne out by the fact that a Scott engine in poor condition invariably has oil pump troubles. The golden rule is still to make sure that the oil gets to the pump in more than ample quantities.

Tich Allen once wrote "convert the main bearings to petroil then with either a single Pilgrim or one side of the duplex feed oil into the engine between the engine and the carburettor, thus giving instant control of the petroil." Clive Waye also used this idea.

ANOTHER APPROACH TO THE PROBLEM

Syd Bartlett of West Worthing thought that lubrications could be the cause of Peter Davenport's problems, and he writes: ——

"I read your letter in Yowl with considerable interest. With regards to going downhill, I wonder if you adjust the carb so that the engine is completely shut off with the throttle closed. A lot of Scott owners do, this does obviate the jerking when going downhill, the jerking is of course caused by the patchy mixture only firing now and again. This is endemic with the Scott due to the deflector pistons. As I'm sure you know most two strokes have loop scavenging and the problem is usually non-existant or less acute.

"Coming to your main problem, from what you say, I would think that carburation and ignition are beyond reproach and I wonder if you have considered that your engine may be getting too much oil. Oil is necessary as a lubricant but unfortunately in a two stroke it appears in the combustion chamber where it is not really wanted, a wisp of gas and a lot of oil does satisfy the symptoms you describe, definitely lowers the octane number of the fuel. I would favour shutting the Pilgrim down very low for three or four miles and see if things smooth out, don't be frightened as a friend of mine adjusts his pump to 1 in 10 and he doesn't exactly hang about.

I would counsel caution about placing a restriction in the exhaust, there is a tendency for the products of combustion to go down the transfer ports and into the crankcase, it depends how severe the restriction is. You can check it out by doing a few miles with the restriction and then whipping off the c/case doors, if the oil in the wells is jet black (and it can be) I would think again, because the big ends do not like it. For this reason I would make sure that the exhaust pipe itself is relatively free of carbon.

"In the context of Scott ownership we are near neighbours, so if you fancy some sea breezes, maybe a couple of jars, why not look me up, my telephone number is at the top of the page, until then."

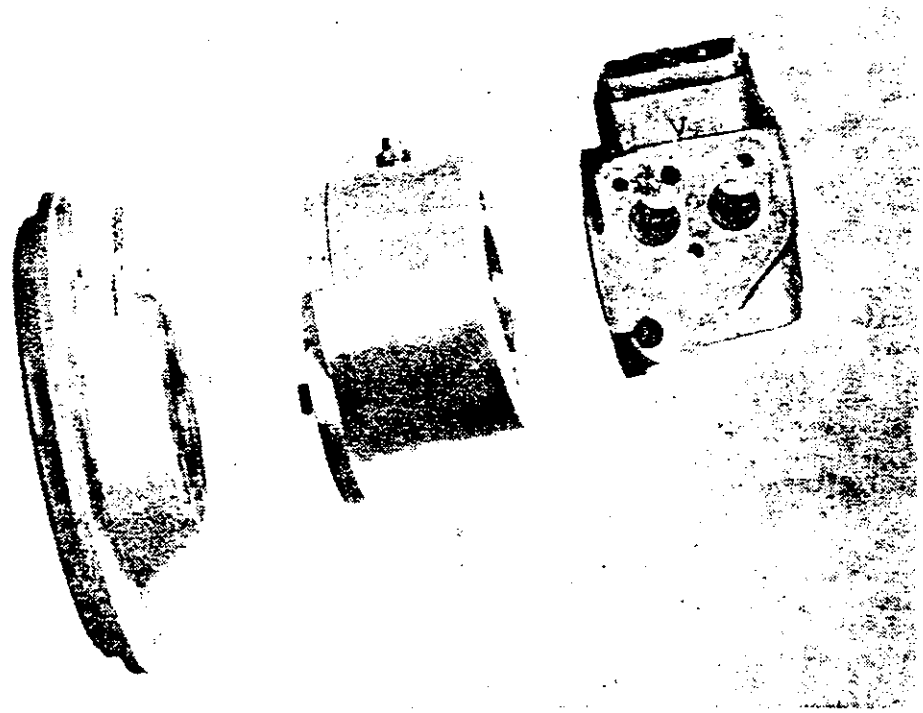
Happy Scotting,
Syd Bartlett

PILGRIM'S PROGRESS
'Potty' Chambers

Most of our lubrication problems have now been solved by Club member Gary Howard of Bishops Stortford. Having been made redundant from his job in instrument engineering, he has turned his fine skills in every sense to Scott oiling problems.

Reduction Gears

Gerry makes and markets fully enclosed 3-to-1 reduction gears using Sturmey Archer parts. His Mk 1, as illustrated, is simply a bolt-on goody which goes between the drive and the pump. On my Reynolds Special the fitting took ten minutes as I did not have to alter the oil pipes. It easily cleared the footchange lever, but late Shipley and Brum Scott levers may have to be bent slightly. As the reduction gear is slightly off-centre, the pump can be fitted in one of four positions on the door. I fitted mine in the top position which has several advantages for, as well as putting the pump in a more prominent position, it ensures better lubrication of the gearing with a minimum of oil in the unit.



Gerry Howard's Mk. 1 fully-enclosed bolt-on reduction gear.

I fitted another Mk 1 to my 1929 Flyer. This involved a little more work as I had to make up extended oilpipes and a simple support strip of metal to go between the bottom bolt head on the pump and the mag platform rear bolt. This last modification is essential as the extra overhang of the unit induces a sympathetic vibration within a very small rev range as the engine speeds up or slows down, and this causes the pump drive-peg to come out. Since fitting the strip I have had no problems. If your Flyer has an alloy shield this will have to be removed or modified to accommodate the pump which will stick out about 1¼in further.

Gerry is hoping to produce a special Flyer model in the future which

can be accommodated within the shield and which incorporates the mounting plate as part of the body and has its own drive (doing away with the 'crank handle' drive-peg). This should not need the support strap I had to fit.

Mk II pumps are made for crankcase mounting on any pre-distributor drive model and they incorporate their own driving disc and door as a complete assembly. This makes a narrower, neater mounting than the Mk 1.

I have been using the two Mk 1 units for several months now. Each unit has covered at least 2000 miles and the results have been superb. Worry about oiling has disappeared. One slight modification I did to the unit was to drill and tap a drain/level hole slightly offset from the bottom so that I could fill the oil-tight case to a level just above the mesh of the gears. Using '3 in 1' oil, I checked the level after 1,000 miles. To my amazement, out came a small quantity of bright red (the new colour) Silkolene Super Two 40, thus proving that the unit was receiving oil from the oil pump or the engine, probably the pump. I don't think that a slight build up of oil will matter as I am sure that too much will cause it to go into the crankcase on door-mounted units. I have been unable to detect any leak on the mag-mounted unit, but there is so much chain oil flung about that it would not matter anyway.

In theory, with a 3-to-1 reduction, the pump should now run at two spits to a drop instead of my old six spits to a drop, but at this setting the engines are getting far too much oil. The reason is that at slower speed but greater feed, each drop is bigger, so I have set both my pumps to one drop in three. On the Reynolds this seems just right as the big bike only just smokes on hard acceleration. The Flyer produces a little more smoke; not, however, as much as Scotts did before Super Two 40, so I might cut it down a little more.

I do not know how the unit will perform on Super Two 30 in the winter yet, but surmise that on my few winter journeys on a Vintage bike all will be well.

Pilgrim Pump modifications and repairs

As well as making reduction gears, Gerry overhauls and repairs Pilgrim pumps and provides spares. In particular he makes new all-hardened-steel end cam plates, or will put new hardened steel cams in your old end plates.

I fitted two new end plates in my Flyer and found that, although the zinc cams were only slightly worn, great lumps of the chrome plating on the cams were flaking off. Gerry is now putting new inserts in these and they will then go on the Reynolds before any more flakes go into the system. Warning: 'MAZAK' end cams can damage your Scott's health. Also, do not forget that you must *not* try to remove the pump plungers without first removing the worm drive. These new or modified end plates mean that the old-type pump is now as good if not better than the peg-ype.

Drip-feeds

Gerry is making new superbly finished and nickel-plated drip-feeds, indistinguishable from original ones. These have to be seen to appreciate the quality.

New Projects

Rebuilding or repair of veteran or early frame-fitted pumps — Gerry might even be tempted to make the odd new one from scratch.

Special mag platform reduction gears for Flyers so that the shields will still fit. This item is some way off yet, so can we suggest a Mk II pump on the door for those not too worried about 100 per cent originality. Don't forget to state door size.

Please note, Gerry is *not* planning to do anything with Best & Lloyd mechanical pumps.

Prices

Mk 1 Reduction gear, complete with screws, etc	£25.00
Mk II Reduction gear, mounted in door with driving disc, etc	£35.00
Pump end plates in hardened steel	(Each) £5.00
Hardened steel cams fitted to your own plates	(Each) £2.50
Drip-feeds finished in polished nickel	(Pair) £35.00

New oil pump male-type unions (prices on application as quantity production costs not yet worked out).
All applications to: Gerry Howard, 7 Orchard Road, Bishop Stortford, Herts CM23 2AS. Telephone: Bishop Stortford (0279) 52992.

V11/10 June 1980

ON OIL PUMPS

Many old Scotts have a tap fitted in the main pipe, and many riders think the disadvantages out weigh the advantages. On the debit side, forgetting to turn on can wreck an engine, but many old Pilgrims gradually fill their sight glasses if the bike is not used every day. Under these circumstances the tap becomes really useful. The thing to do is to use a drill that becomes habit forming "oil on — petrol on — flood — ignition on" Certainly it ensures that you do not move away followed by a smoke screen not a very good advert for Scotts.

Five spits then a spot of oil we are told is correct for fast touring, but many Pilgrims behave perfectly on one side, but dribble the oil down the beak on the other, so to be safe the oil is usually turned up on this side.

I have a Silk twin contact breaker fitted between the crankcase and the oil pump. So to facilitate pump removal I have cut the metal oil pipes and inserted short pieces of clear plastic. The slugs of oil can be clearly seen travelling towards the main bearings. Much more reassuring than spit, spit, spit, spit, spit, blob. The two slugs of oil can be synchronized quite easily.

V16/7 Dec. 1989

MARSHALL'S MEANDERINGS (6)
(Pilgrim's Progress)

Over the years there have probably been more words penned about lubricating Scott engines than any other subject in *Yowl*. Many members will not have seen any of the earlier articles that appeared over the years, and I therefore thought that the time was right to try and bring together bits & pieces from many of those articles, plus a few thoughts of my own.

After a lot of thought I have not given an enormous amount of attention to the radical lubrication conversions carried out by "Mavro", Clive Waye, Lofty Avis, Frank Banks, Titch Allen, and many others. Admirable as they may be, most people these days are very anxious to keep their Scotts as original as possible; at least visually so, and attitudes today are very different from what they were 15, and 20 years ago when modification and "special" building were fully acceptable. Originality is so important, if and when you sell or exhibit your Scott these days.

* * * *

There is not a lot one can say about the oil drippers fitted to veteran and early vintage machines. No moving parts to go wrong or wear out, and therefore very simple and efficient. They have their snags of course, and some incorporate a plunger hand pump to give a 'head' of oil when the drippers are mounted in a relatively high-up position compared to the oil level in the tank or frame tubes. Most disasters seem to be attributable to two (human!) failings:- i.e. Forgetting to turn the oil on or off. The results of failing to turn the oil on are predict-

able and obvious, failing to turn it off much less obvious. You might think that oiled plugs and/or big clouds of blue smoke are the only consequences, but cases are on record where a large quantity of oil in the crankcase has caused a hydraulic lock, and then a broken or bent gudgeon pin and con. rod! Variations in oil flow with drippers can be caused by factors such as the ambient temperature altering the viscosity of the oil, and by a falling oil level in the tank or frame reducing the gravity "head".

* * * *

In the late vintage period the Best & Lloyd MkII oil pump made it's appearance on motorcycles (and also on lathe headstocks). Unlike the Pilgrim pump the B & L really does *pump* oil and produce a measurable pressure. In other words it does not entirely rely on the ascending piston to create suction and pull the oil in. It is a piston pump in which the piston and cylinder rotate together through a 35:1 reduction worm and wheel. The axial motion of the piston is obtained from a stationary ring which has a cam profile cut on its inside diameter. A pin on the piston engages with the cam. The cylinder is provided with a single port for oil flow, which for half a revolution is open to the oil inlet, and for the other half revolution to the oil outlet. The piston motion is timed such that it is moving up while the inlet is connected to the cylinder, and down when the outlet is open.This condition, unfortunately, gives far more oil than is necessary for the Scott.

To enable the flow to be reduced the piston drive cam is made adjustable. This makes it possible to time the cylinder port relative to the piston movement such that flow in either direction is caused. It can be seen that if for half the piston stroke in each direction the inlet (or outlet) is open, then the quantity of oil drawn in will also be pumped back the way it came in, and hence the net flow will be zero. This means that it is possible to set the pump to give a net flow of any desired amount between zero and maximum, and that (unlike the Pilgrim pump) the mechanical action remains unaltered.

The B & L MkII is extremely reliable and indeed almost identical pumps are used to provide a small but ultra consistent flow of lubricant to the turbine bearings of jet engines turning at absolutely astronomic revs'.

* * * *

In Sept 1969 the Silk Engineering oil pump made its first public appearance, and this pump is mechanically similar to the B & L MkII. A Bowden cable (connected via a "splitter box" to the throttle twistgrip) adjusts the flow to suit different throttle openings (Early versions were lever controlled, with "Town" and "Country" settings). All this seems the answer to a Scott owner's prayers, but of course there are a few snags. From personal experience I can tell you that they are VERY difficult to set up initially. Doug Wright spent a long time fiddling with the B & L MkII, and latterly a Silk unit, on his Sprint Special. Connecting up the cable to the splitter box upsets the initial setting straightaway, and much head scratching and cable adjusting is necessary to obtain synchronised throttle and oil pump action from tickover to maximum openings, on both carburettor and oil pump simultaneously. If a cable stretches or a cable nipple pulls off you have got BIG problems, and you probably won't know about it until it is too late. The main drawback to these pumps is the single action, which has to be divided at a "Y" piece., The inevitable result is that the cylinder with the most suction gets most of the oil — Scott engines need a duplex pump!

* * * *

All this meandering brings me back to our old friend (?) the Pilgrim Pump. Cursed and distrusted by generations of Scott owners it is in fact a very clever piece of engineering, that gets all the blame instead of the real culprit, which is the way it is driven at engine speed, instead of some greatly reduced speed.

The feed capacity of the duplex Pilgrim pump, from the maker's figures, from both outlets and at full stroke , is one pint of oil every 20 minutes at only 1000rpm or one pint from every 20,000 engine revolutions if driven at engine speed (as on a "standard" Scott). Taking a rough average of say 4000 revs per mile, this works out at *one pint every five miles*!!

Now for normal road use and "normal" oil consumption we need something like only one thirtieth of the above full-bore delivery! The result is that the stroke of the pump has to be cut down by screwing the regulators in, until the plungers are all but lifted right off the cams.

To avoid excess oil consumption and clouds of dense blue smoke the plungers must only be allowed to just touch the tops of the cams (pegs in later pumps). This is a very unsatisfactory state of affairs, resulting in rapid wear of the plungers and cams, and it can now be readily imagined how ultra-critical is the adjustment of the regulators. This critical setting is very easily upset by the minutest variations caused by factors such as oil viscosity, quantity of oil in tank, expansion and contraction due to thermal changes, etc.

I don't know the actual plunger stroke at "correct" flow but I dare say it is only a few thou! Clearly a ridiculous state of affairs. These feeble oscillations, just mere twitches of the plungers, are incapable of doing anything reliably!

The obvious answer, proposed many times over the years, is to open the regulators right up to give a good plunger stroke, and then compensate for this by slowing down the pump to a quarter of the engine speed (or even less).

In March 1959 a Mr Armitage of the Pilgrim Motor Co designed the "PH-170 Pilgrim Double Reduction Pumps", intended for the Aerco "Swift" and the "Bermuda" outboard engine. sadly it never went into production because only prototype Swifts were made and the Bermuda was petroil lubricated. (For anyone interested a drawing of this pump appeared in *Iota* Vol 4 No.8 in October 1965).

All was not lost however, and over the years several S.O.C. members have made their own reduction drives, usually incorporating Sturmey-Archer pushbike hub gears. Our Spares Secretary Gerry Howard now produces his own version of the reduction-gear pump drive, and it really is the solution to all our problems. Without any fears you can cut down the oil flow to give just a faint blue haze in the exhaust. DON'T just buy a reduction gear from Gerry and expect perfect results. Get him to overhaul your pump at the same time, and also make sure that your oil pipes, "banjos", and other connections are free from leaks. It is also worthwhile to clean out your oil tank. (I found a good handful of pebbles and grit in the oil tank of my 1950 Flyer when I bought it. A nasty piece of sabotage).

The units produced by Gerry are very neat and unobtrusive, and can be fitted on crankcase door or magneto platform without difficulty. As you can see from the photograph of my 1929 TT Rep, I had to alter the pipework slightly to clear the centre chainstays. Gerry also makes a version built into a complete crankcase door, and these must be even

less obvious in use. (For more info. and pictures see *Yowl* Vol 13 No.11 P251).

* * * *

Now that your problems are solved we can also take a look at some of the oddities, eccentricities, experiments, and desperate measures tried out over the years.

Probably the biggest white elephant was the Scott swashplate pump produced for the "Grand Prix Scott" of 1933/4 and also fitted to a few TT Rep production bikes for a couple of years.

(It was "Classic Bike" magazine who called it a "swashbuckle" pump and made Errol Flynn turn in his grave!)

I have had a couple of these pumps, (and in fact still own one). They are extremely heavy and very complicated, and it has been said that it was very much a matter of fitting the engine to the pump rather than *vice-versa*!

A usual crankpin/disc drive meshes through a reductive worm gear with the main plunger drive-plate, which runs at right-angles to the main crank, and operates five plungers. The five plungers have different size bores depending on which part of the engine they are to lubricate. The "spare" fifth plunger operates a "feed units" gauge (built-in to the top of the pump) but in practice confirms only the state of the fifth plunger operating it. In other words one or all of the other four can stop working without any problem showing on the pressure gauge! The wobble action of the swashplate is controlled by the throttle *via* a Bowden cable. All in all not a success.

* * * *

Petroil lubrication has some devoted fans, and some very high mileages without major problems have been claimed. The various systems tried usually depend on a pair of "crossover" pipes interconnecting the crankcase "well" on one side of the engine with the mainbearing oil inlet on the other side, together with modifications to the main bearing sealing glands, and sometimes extra big-end oilways. I've no personal experience whatsoever, but I think that we come back to the originality problem, and as far as I am concerned,a Scott without a Pilgrim pump or drippers aint a Scott any more!

They are part and parcel of that "entity" which is the unique Scott, and which sets the Scott apart from all the lesser two-strokes. (Velocette, Levis, and one or two others excepted!)

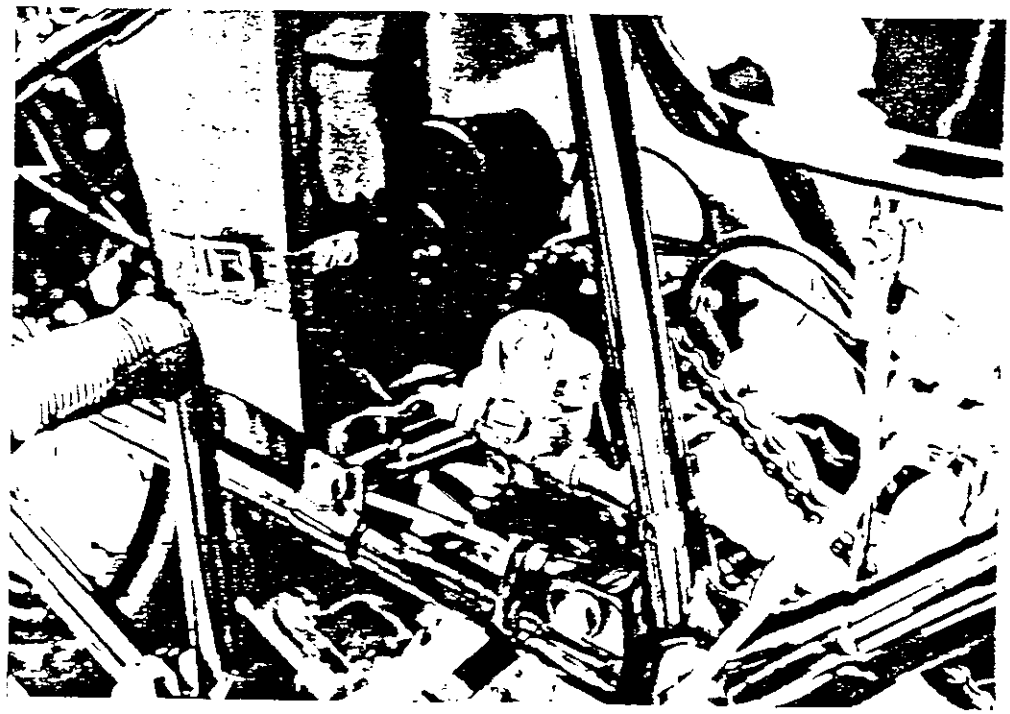
* * * *

Now we come to "Loftylube" devised and proposed donkey's years ago by our best *Yowl* contributor D.W. Avis. This system uses a Pilgrim Pump to both feed and scavenge the engine, with the pump opened well up to feed an excess of oil which is then removed to prevent over oiling. Very satisfactory and reliable in use by all accounts, but quite complicated and requiring various modifications, most of which are visually evident and therefore not popular today. If you want to try it see *Yowl* Volume 4 No.8 and No.11 (1966).

* * * *

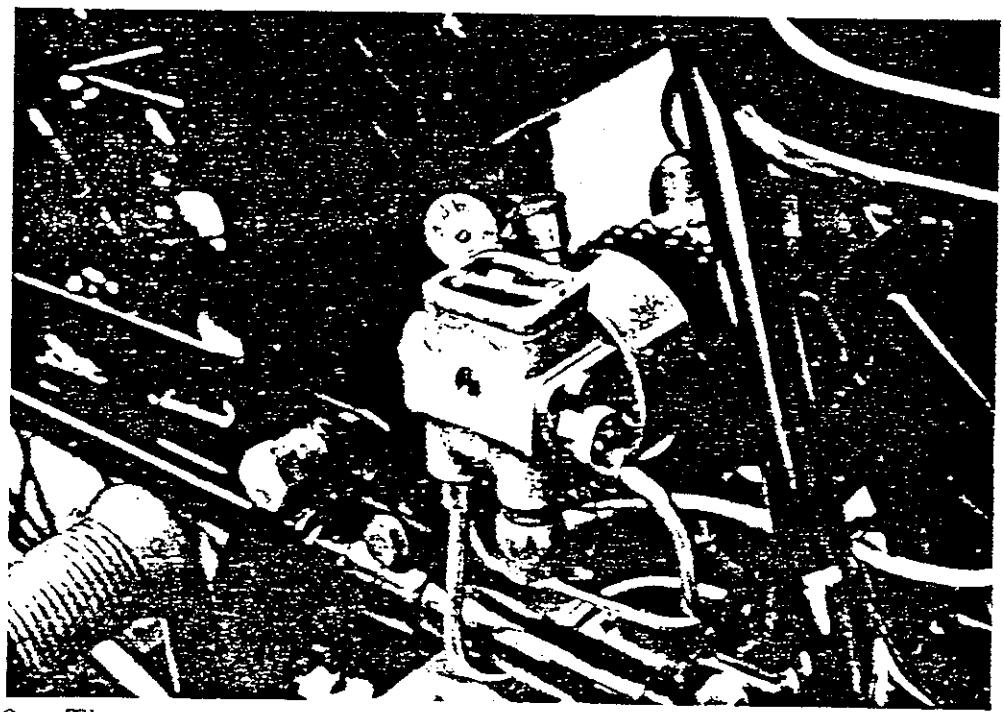
In conclusion I only hope that my article might prevent a little atmospheric pollution, or even a few blue big-end bearings; perhaps even a wrecked engine or two. Many older and experienced members will probably have yawned and gone to sleep by now. They have read it and seen it all before. Talking about teaching your grandmother to suck eggs!

B.M.

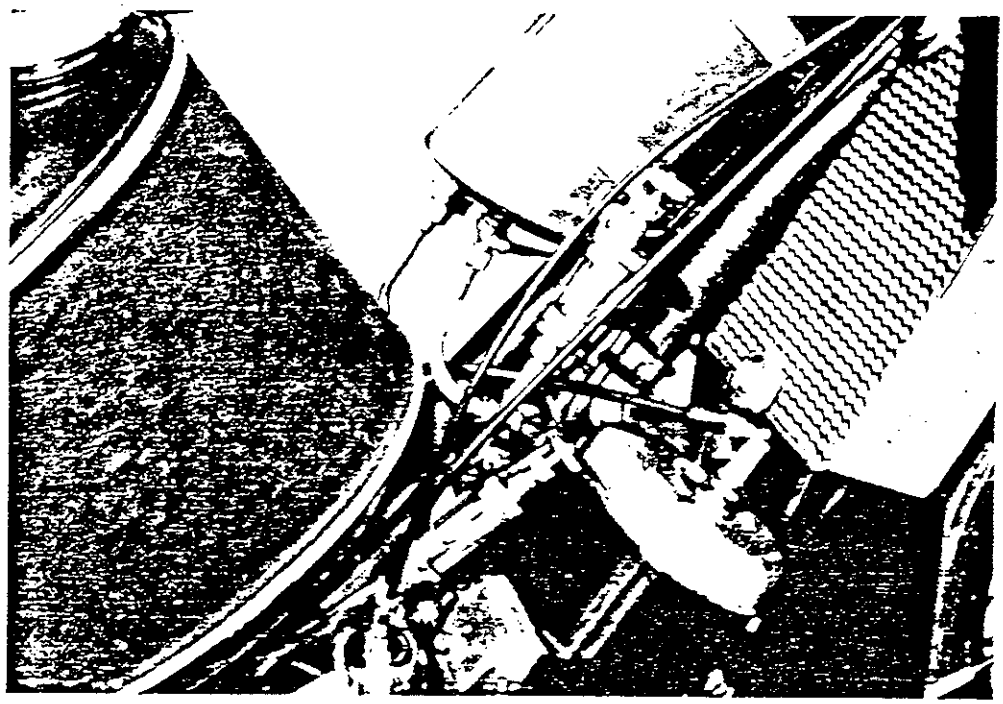


CAPTIONS TO OIL PUMP PHOTOGRAPHS
(See "Pilgrim's Progress" article)

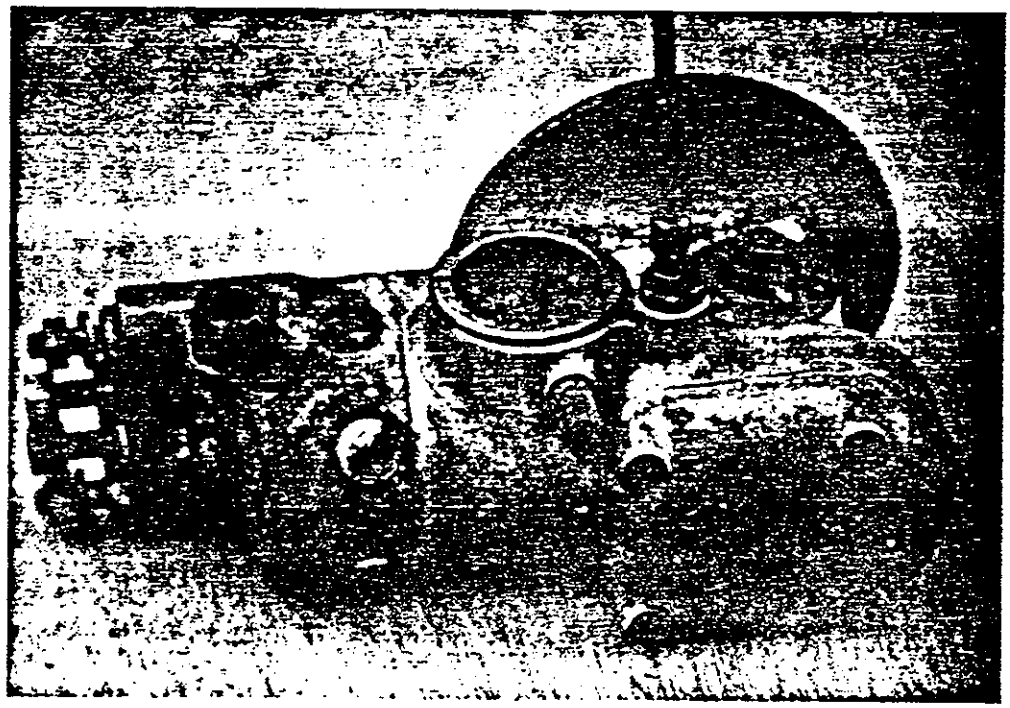
1. Neat installation of Best & Lloyd MKII oil pump on magneto platfrom of Jim Best's ex-Jack Dodds 1927 Flying Squirrel, at Banbury Run on June 18th 1989. With Jim's surname he didn't have any choice I suppose.



2. The answer to your prayers! Pilgrim pump on magneto platform of your editor's 1929 TTReplica, driven via one of Gerry Howard's reduction gear devices. Minor modification to run of oil pipes, and vintage Enots oiler cup added to casing to "age" it slghtly.



3. A multitude of drippers. There were two more on the other side! John Thompson's 1926 2-speeder at Banbury Run 1989. I didn't have time to examine it more closely to see why he needs four! (This machine's oiling was mentioned by Dick Platt in June 86 *Iota* but a promised explanation seems never tohave arrived).



4. Your editor's swashplate oil pump, stamped S.M.C.Co. Ltd (upside down!) and T.T. What tales could it tell? Does anyone actually use one these days, apart from Colin Bradshaw?

photos: B. Marshall

POTTY PONDERS ON PILGRIM PROGRESS

It was nice to read the good comprehensive article on Pilgrim pumps by John Underhill. However, Potty has a few Pertinent Points to Pontificate on regarding Pumping Pigrim Problems.

Although the pump illustrating John's article is the one shown in the *Book of the Scott* and was fitted to a few of the early Scotts so pumped, the majority of all Scotts, early or late, had their inlet and/or deliveries in different positions. The most common layout is shown here; some even had dual deliveries from one side, but most of these had a blanking plug in one of them.

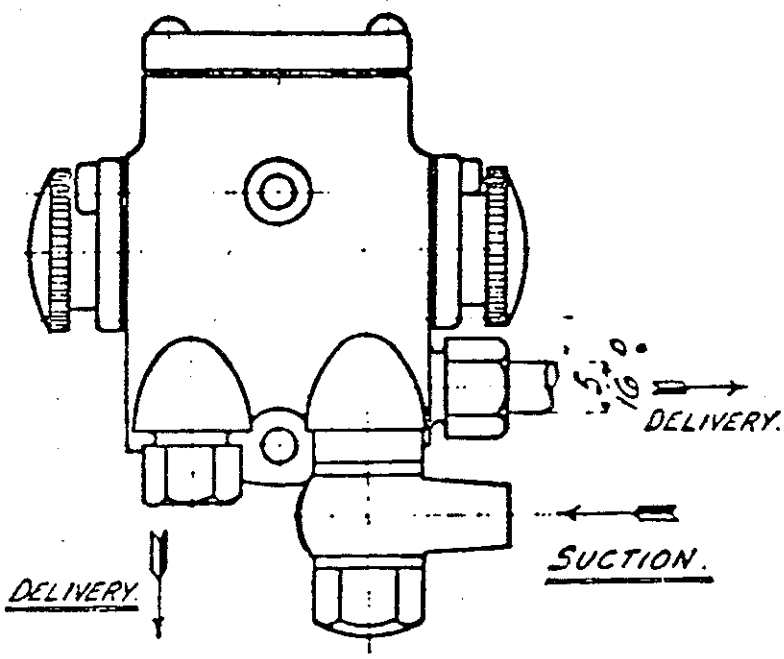
Late-type Pilgrim pumps had peg operation instead of end-plate cams for the plungers. In these pumps the plungers had gradual ramps instead of knibs to make them reciprocate. The high spot of these ramps is 90° disposed from the knib-type for the same porting, so you cannot use the one type of cam in the other type of pump without modification to the body or end- plate.

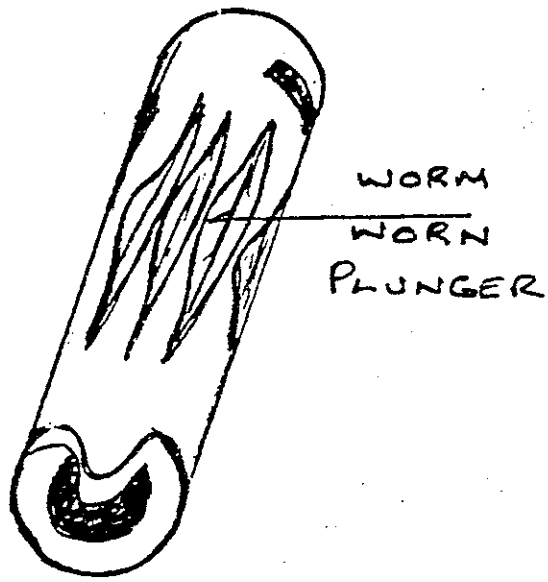
At one time it was thought that the peg-type was superior to end-cam type. However, with a set of Gerry's (Dickens Motor Cycle Parts) steel cams, the end-cam is as good if not better than the peg-type — note that Gerry has now moved from Bishops Stortford to Norfolk, but I have been assured that he will soon be in a position to manufacture pump spares or overhaul complete pumps.

As John points out, the Scott engine will function on a very small amount of oil, one spit in ten would be perfectly adequate for normal use if you could always rely on it. Very few pumps will operate reliably at about one in six. A three to one reduction gear with the pump at one in four is a good compromise and the relatively longer stroke helps in another way.

Pumps working on a very short stroke of the plungers (it's more like a vibration), besides being unable to clear an air bubble, cause rapid wear of the teeth on the plunger in just one place, where the work of alloy or bronze touches it. Funnily the worm does not seem to wear much (see drawing). Having worn, the plungers stop their slow vibration, and opening up the adjuster fails to restore matters as the plungers are trapped against the worm. A new set of plungers from Gerry is the only answer.

One last point; don't forget to use Super II 30, and not 40, for winter use and in a large delivery pipe when the ambient temperature is low. I cannot agree with John that any old oil will do — modern two-stroke oils are so much superior to 'straight' oil these days, especially with regard to ring sticking, plug problems and ash/carbon deposits. Read John's article on dismantling before you take the pump to pieces.


DELIVERY.
SUCTION.
DELIVERY.


WORM
WORN
PLUNGER

PERFIDIOUS PILGRIM

Titch Allen

Most of you must have been asked (if using a vintage Scott) what the bars on the side of a crankcase are for and why they remain still when the engine starts. When I was a schoolboy I really did think they were con-rods, but then again I only saw Scotts at rest or tilling by and not very often. I gave much thought to the problem when I should have been concentrating on academic matters and before the onset of puberty caused a shift of interest It was a long time before I discovered that this distinguishing feature of Scott engines was no more than a quick release device for the crankcase door. I did idly wonder why such a facility was provided for an operation which, on other two-strokes, involved a complete engine-out strip. It was not until I had my first Scott, a 1930 Deluxe Flyer and set out on a pre-embarkation (to Normandy) leave holiday with my wife on the pillion, that I came to appreciate the worth of the design...and the perversity of the Pilgrim pump .

We headed south with a song in our hearts and a reassuring trail of blue behind (I always used a generous setting) and had gone about 50 miles when there was the familiar, but dreaded sound of a boy running a stick along railings. You don't hear this sound much these days. They kick Coke tins about instead and that is not the right sound, though it may be more in tune with Japanese two-strokes disembowelling themselves. I knew only too well that it was a big-end gone. Thanks to Alfred's thoughtfulness it was the work of a moment to find out which big-end was to blame. There was no argument because one had blue rollers. Now, at times like this, human ingenuity comes into its own and the brain works overtime. Recalling that late vintage Villiers engines often had alternate big-end rollers of bronze to act as spacers, I fished out the rollers from both sides with a hairpin (very useful device, alas no longer used by ladies to keep their hair in place. I think they use glue o it blow about regardless). I then built up the big-ends using the blued ones as spacers and we were on our way. Not before I had decanted some oil from the tank into the petrol, for it was obvious from the state of the innards that the smoke trail had come from one cylinder only and the perfidious Pilgrim had led me up the garden as it were. Turned up two or three notches it functioned, but I never trusted one again and always had a dollop of oil in the petrol. We ran for a couple of thousand miles on multi-coloured rollers until the war was over and flushed with the unaccustomed wealth of an army gratuity (the government's appreciation of you giving some of the best years of your life to the service of your country), £55, I had the engine overhauled by two cheerful Scott specialists, their name escapes me, who were in business at Blaby on the outskirts of Leicester. The thing I remember is that when I collected the machine they 'bedded it in' by running it at a fast tickover while spraying Brasso into the carburettor. It seemed rather drastic, but the Flyer ran beautifully thereafter and served me well as a long-distance transport when I was getting the V.M.C.C. off the ground.

You will judge of my joy when my next Flyer, the ex-Frank Banks one, came with Swabey-Jenks petroil conversion, which it had enjoyed since 1931 and on which it is reputed to have done at least 200,000 miles and is still going strong. I had a brief encounter with a Pilgrim on my later lang-stroke Flyer which I have only used as a racer. It was mounted on the crankcase door and, thinking somehow it might be more reliable there (and could be seen) I left it there for my first outing at Mallory Park. In practice the sight feeds filled up to the brim and I did not know whether it was going into the engine. I bunged oil in the petrol and rearranged the pipes to the mains so I could fill them before a race with an oil can. Out of that trauma my fail-safe wick-fed mains, no fuss petroil system was born and I have never had any more lubrication trouble. My racing Squirrel, of course, has twin gravity feeds, which I used to turn full on after the first bend and the initial smoke had cleared. Alfred knew best. Gravity drip in the early days and petroil on his last design (the Sociable).