

WORKING INSTRUCTIONS

for

"A" & "B" SERIES

"PIONEER"

Motor Road Rollers



BARFORD & PERKINS, Ltd.,
ROCHESTER,
England.

Telegrams :
"Barford's, Rochester."

Telephone :
Strood 7255 (3 lines).

Codes : *Bentley's Second Phrase.*
Bentley's A.B.C. 5th and 6th Edition.

1932 EDITION.

NOTE ON OILING AND GREASING.

For Types "A," "A2½-Ton" and "A3,"
"A4" & "A4Q," "BG" & "BK."

Where greasing recommendations are given on the chart in this book affecting the front rolling wheel nearside and offside, this should read:—

For tropical climates grease.

For temperate climates oil.

Our recommendation is that oil is more satisfactory than grease for lubricating the front roller axles in temperate climates.

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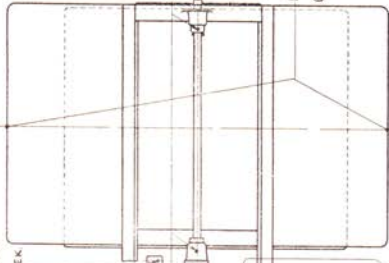
OIL HERE ONCE A DAY

OIL HERE FOUR TIMES A DAY

OIL CLUTCH PEDAL AND BRACKET ONCE A WEEK

OIL HERE ONCE A WEEK

ENGINE LUBRICATION



OIL HERE EVERY FOUR HOURS

OIL STEERING CHAIN ONCE A WEEK.

OIL BRAKE PEDAL AND BRACKET ONCE A WEEK.

OIL HERE ONCE A DAY.

FILL MAIN AXLE OIL

CUPS EVERY FOUR HOURS.

GEAR BOX LUBRICATION

MOBILUBRICANT SOFT } MIX IN PROPORTION OF
 MOBILCOIL "A" } 2 GALLON OF OIL TO
 7 LBS OF GREASE
 REMOVE COVER TO FILL GEAR BOX WITH LUBRICANT

NOTE! OIL ALL PINS & WORKING

JOINTS ONCE A WEEK.

GREASE GUN LUBRICATION

NO.	WHERE TO GREASE	WHEN TO GREASE
1	FAN ON ENGINE	EVERY FOUR HOURS
2	FRONT ROLLER (OFF SIDE)	"
3	" (NEAR SIDE)	"
4	BRACKET FOR OSCILLATING PIN	ONCE A DAY
5	CLUTCH WITHDRAWAL RING	EVERY FOUR HOURS

OILING & CREASING CHART

FOR

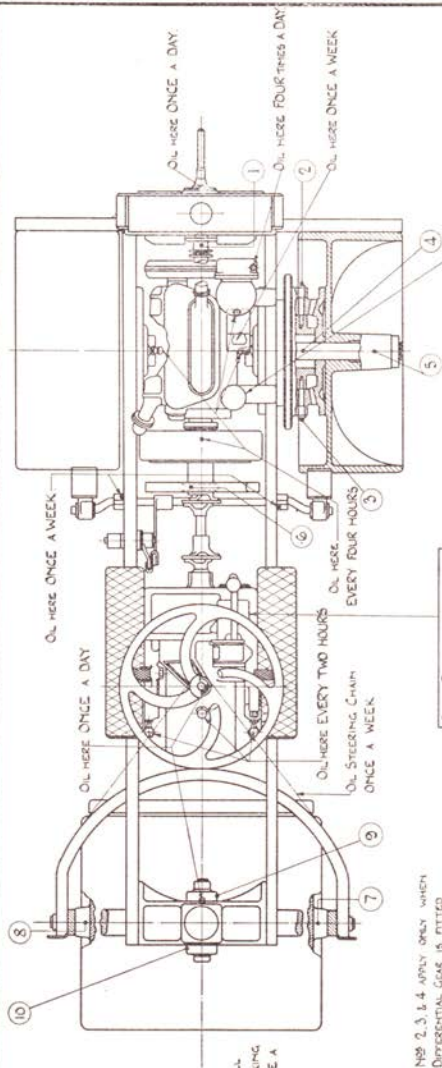
BARFORD & PERKINS' TANDEM MOTOR ROLLERS

TYPES "A4 & A40"

ENGINE LUBRICATION

TEMPERATURE	CLIMATE
SUMMER	WINTER
VACUUM "B"	VACUUM "A"
CASTROL "X L"	CASTROL "A"
TRIPLE SHELL	DOUBLE SHELL
MOTORINE "C"	MOTORINE "D"
TROPICAL CLIMATE	
VACUUM "B"	CASTROL "XL" OR "C"
TRIPLE SHELL	MOTORINE "C"

O2016.



NOTE!
OIL ALL
PINS & WORKING
JOINTS ONCE A
WEEK.

NOTE NOS 2, 3 & 4 APPLY ONLY WHEN
DIFFERENTIAL GEAR IS FITTED

GREASE GUN LUBRICATION

No.	WHERE TO GREASE	WHEN TO GREASE
1	Pin on Engine	Every Four Hours
2	Differential Pinion	Once a Day
3	"	"
4	Differential Wheel Centre	"
5	Main Axle (Dirt Side)	Twice a Day
6	Control, Sprockets and Ring	Every Four Hours
7	Front Roller (Inside Side)	"
8	" (Opp Side)	"
9	Bracket for Oscillating Pin	Once a Day
10	"	"

GEAR BOX LUBRICATION

Mobillicent 507 } Mix in proportion of 1/2 Gallon
Mobilol "A" } of Oil to 7 Lbs. of Grease
Remove Cover to Full Gear Box with Lubricant

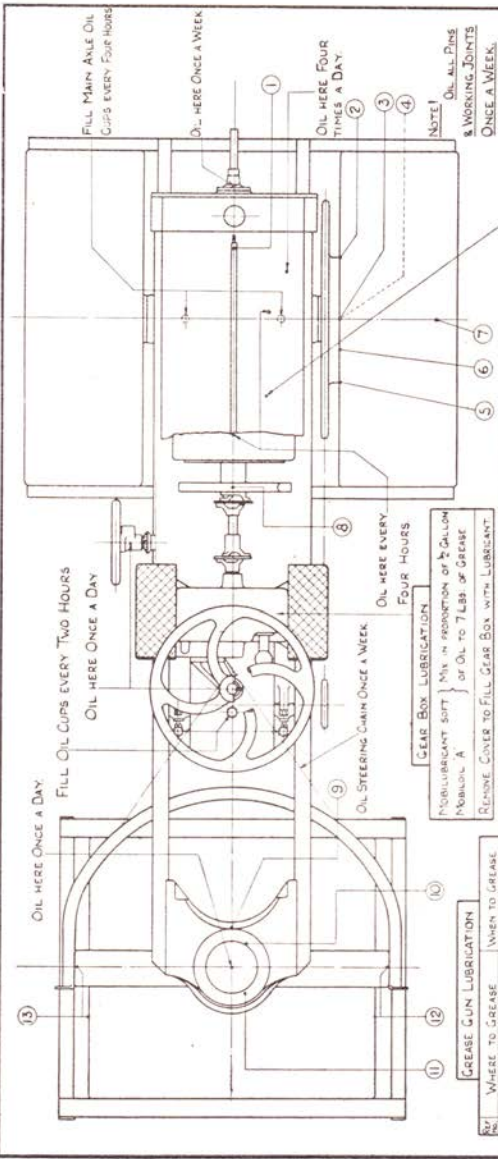
ENGINE LUBRICATION

TEMPERATURE	CLIMATE
Summer	Winter
Mobilol B.B.	Mobilol "A"
Castrol "X.L."	Castrol "A"
Triple Shell	Double Shell
Mobilol "C"	Mobilol "D"
TROPICAL CLIMATE	
Mobilol B.B.	Castrol "X.L." or "C"
Triple Shell	Mobilol "C"

OILING & GREASING CHART

FOR

**BARFORD & PERKINS' THREE WHEEL MOTOR ROLLERS
TYPES "A," "A2 1/2 TON" & "A3"**



OIL HERE ONCE A DAY.

FILL OIL CUPS EVERY TWO HOURS

OIL HERE ONCE A DAY

FILL MAIN ANGLE OIL CUPS EVERY FOUR HOURS

OIL HERE ONCE A WEEK

OIL HERE FOUR TIMES A DAY.

OIL STEERING CHAIN ONCE A WEEK

OIL HERE EVERY FOUR HOURS

GEAR BOX LUBRICATION

MOBILUBRICANT SOFT } MIX IN PROPORTION OF 2 GALLON
MOBILGOL A } OF OIL TO 7 LBS. OF GREASE

REMOVE COVER TO FILL GEAR BOX WITH LUBRICANT.

NOTE! NOS 2,3,4,5 & 6 APPLY ONLY WHEN DIFFERENTIAL GEAR IS FITTED

GREASE GUN LUBRICATION

NO.	WHERE TO GREASE	WHEN TO GREASE
1	ON DR ENGINE	EVERY FOUR HOURS
2	DIFFERENTIAL POSITION	ONCE A DAY
3	"	"
4	"	"
5	"	"
6	"	"
7	WHEEL CENTRE	"
8	MAIN ANGLE (OFF SIDE)	ONCE A DAY
9	CLUTCH & THROTTLE RINGS	EVERY FOUR HOURS
10	HEAD BUSH	"
11	BRACKET FOR OILMATING PIN	ONCE A DAY
12	FRONT ROLLER (NEAR SIDE)	EVERY FOUR HOURS
13	" (OFF SIDE)	"

ENGINE LUBRICATION

TEMPERATURE	CLIMATE
SUMMER	WINTER
VACUUM "B.B."	VACUUM "A"
CASTROL "X.L."	CASTROL "A.A."
TRIPLE SHELL	DOUBLE SHELL
MOTORINE "C"	MOTORINE "D"
TROPICAL CLIMATE	
VACUUM "B.B."	CASTROL "X.L. ORC"
TRIPLE SHELL	MOTORINE "C"

OILING & GREASING CHART

FOR

BARFORD & PERKINS' THREE WHEEL MOTOR ROLLERS

TYPES "BC" & "BK"

INTRODUCTION.

THIS little booklet has been written to assist the drivers in the care and upkeep of our SERIES " A " and " B " Motor Rollers.

While it is not necessary for the operator to be an expert mechanic, it is very important that he knows the machine thoroughly. The knowledge of proper speeds for different operations, of proper method of lubrication, the use of the proper lubricant and the necessary adjustments, are all matters of vital importance.

There is nothing complicated about our rollers either in design or operation, therefore they will be found extremely simple to operate, to care for, repair, and with the aid of this instruction book most repairs and adjustments can be made without expert help.

Towards the end of this booklet you will find a specification for our " A " and " B " series Patent Motor Rollers. We hope that they will serve a dual purpose. Firstly, that they will enable the driver to gain a more comprehensive knowledge of the Roller ; secondly, that the headings of each paragraph will serve as a guide in systematic inspection of the Roller. If there is any point on which you desire information, please do not hesitate to write us. Our interest in our Rollers does not cease when they are bought, and we shall, at all times, be very pleased to hear from you.

BARFORD & PERKINS, Ltd.

BARFORD & PERKINS, Ltd.,

MOTOR ROAD ROLLERS.

Types **A-A2 $\frac{1}{2}$ Ton-A3-A4-A4Q-BG-BK** (2 speed) with 4
Cylinder " **BBB** " Engine.

GENERAL INSTRUCTIONS.

PRELIMINARY.

Keep the Roller clean. Cleaning should be done regularly as it will keep all parts in their best working condition. Appearance of the machine also reflects on the operator. Make a careful examination of the machine every day. It is in your interest as well as your employer's to have an efficient Roller giving the least amount of trouble, **ready for service when required, and reliable in working.** To this end it is necessary **that an inspection of the machinery should be made daily**—preferably before starting work—to make sure that all adjustments are correct, nuts tight, sufficient water in the radiator, and the proper quantity of oil in the engine, etc. Do this every day systematically, it is time well spent.

KNOCKING.

Should a knock develop in the engine it is most essential that an investigation be made at once to ascertain the cause. If it is not attended to immediately, serious results will follow, involving a heavy repair bill.

DISTINGUISHING A LOOSE BEARING.

A loose main bearing is distinguished by a dull thud rather than by a sharp knock and generally is apparent when the motor is pulling hard or when the throttle is opened suddenly.

ENGINE CONTROL.

Do not continue to work the roller if the engine fires on only two or three cylinders. Trace the cause and remedy it. Usually, cleaning the sparking plugs will put the matter right. It is also a good thing to inspect the wiring for faulty insulation.

Do not, under any consideration, race the engine. It is very harmful and must at all times be avoided. The correct Engine speed is 1100 R.P.M. Reduce engine speed, when standing, by closing throttle. By doing this you not only save fuel, but reduce wear and tear to a minimum. **Very often Rolling can be done in Top Gear with Engine Throttled down to 600 or 700 R.P.M., which also results in economy in fuel.** Never run an engine for more than a few seconds with clutch disengaged and gears in mesh. It is much better to move gear lever to NEUTRAL and engage clutch. This will eliminate any chance of the Roller being put in motion unexpectedly and also prevents wear of the clutch collar.

PREPARING THE ROLLER FOR WORK.

This applies more particularly when the roller is first received, but certain points apply when starting up the roller for its daily work.

A new machine requires careful attention before starting up, and should be used with special care until all working parts are thoroughly run in. This will lead to satisfactory working and long life.

FOR EXPORT.

When the Roller is dispatched from our works, all water, fuel and oil is drained from the engine and tanks ; it will therefore be necessary to refill the machine with these essentials. After unpacking, clean off all dirt, grease, etc., and see that all working parts are free from grit which may have accumulated in transit.

Remove Contact breaker from the Magneto and clean off any grease. Then replace Contact Breaker, taking precautions in seating the key correctly in keyway.

HOME.

Water is drained from the Engine and Radiator. Fuel is drained from the tank.

LUBRICATION.

See that all oilways and the oil holes are clear, and that all working parts receive a liberal supply of clean lubricant. Fill all oil cups with a good quality oil. Use the grease gun regularly.

The oil recommended for this engine is:—Temperate Climates (Summer) Mobiloil "BB," Wakefield Castrol "XL," Triple Shell. (Winter) Mobiloil "A," Wakefield Castrol "AA," Double Shell, Price's Motorine "D," and for Tropical Climates—Mobiloil "BB," Wakefield Castrol "XXL," or "C," Triple Shell, Price's Motorine "C."

The quantity of oil required may be determined by testing with the dip-stick in the crank-case when the engine is at rest. It is advisable after replenishing to run the engine for a minute or so, and again check the level in the sump, as a considerable quantity is required to fill up the lubricating system. An oil pressure indicator is fitted alongside the seat so that the driver can see at a glance if the oiling system is working satisfactorily. In cold weather the oil indicator may not always register when the engine is started from cold, due to the oil being much thicker at low temperatures. To prevent any risk of seizure, the engine, should after running for a few minutes, be switched off, and allowed to stand for a short time. The heat generated by the engine will thin the oil in the pipes and sump, and on starting up again, no further trouble is likely to be experienced.

Engine trouble is often wrongly attributed to faulty design or workmanship, when actually it is caused by neglected lubrication, or the use of dirty or poor quality oil.

The engine oil should be renewed every 500 working hours. Take great care to keep your oil free from water and dirt. Wipe around the mouth of container before commencing to pour in the oil and always use a clean strainer when adding oil.

GEAR BOX LUBRICATION.

See that the gearbox contains the right amount of oil. There should be sufficient lubricant for the lower gear to dip into it. This is important because there are certain bearings in this gear box which require oil for lubrication as distinct from grease. The gear box should contain a mixture in the proportion of $\frac{1}{2}$ gallon of Mobiloil "A" or equivalent quality oil, and 7lbs. of Mobilubricant Soft or equivalent quality grease. If grease alone is put into the gear box without oil the bearings mentioned above will not be lubricated and trouble will ensue.

DRIVING CHAIN.

The driving chain should not be lubricated externally, as oil or grease applied to the outside only collects dust. Every three months (according to the amount of work done) the chain should be removed, soaked in paraffin to remove dirt, hung up to drain, and afterwards soaked in hot grease. A chain adjusting device is fitted to all rollers with which it is quite easy to tighten the chain. The chain should be kept fairly tight.

BRAKES.

The foot operated band brake acting on the driving pinion shaft drum is fabric lined and does not require lubricating. If, however, it becomes dry and noisy it should be washed out with paraffin.

Keep the brake block free from small stones which may be picked up from the rolling wheels.

FUEL.

All fuel should be strained to prevent water or dirt from passing into the tanks. Carelessness in this direction is liable to cause trouble due to obstruction in the pipe lines. A filter is provided in the fuel system. Drain any foreign matter which may have accumulated in the pipes, by occasionally opening the tap at the bottom of the filter chamber. The filter gauze should be removed and cleaned out frequently.

See that the small vent hole in each filler cap is not choked up—this would prevent the fuel from flowing freely to the carburetter. **When filling tank be sure there is no naked flame near. Always fill tanks in the open, petrol vapour is heavy and remains near the floor of closed buildings.**

COOLING SYSTEM.

The Engine is cooled by Thermo-Syphon system in conjunction with a gilled tube radiator which in turn is cooled by a belt-driven fan. It is important that rain water or soft water should be used in the cooling system. In filling the radiator, care should always be taken to use clean water, as sediment such as straw, sand or foreign matter, will cause trouble. The cooling system should be flushed frequently and thoroughly cleaned. In order to do this, dissolve one pound of

washing soda in a pail of lukewarm water and put it into the radiator. Then finish filling the radiator with clean cold water. Run the engine for 15 to 20 minutes. Drain and refill the radiator with clean cold water. Run the engine again for 15 to 20 minutes, so as to clean out all sediment in the system which the soda has loosened. Drain the cooling system and again fill with clean water. Keep the cooling system full of water at all times when in operation. Keep all the hose connections and flanged joints tight. Keep the cylinder head nuts tight. See that the fan belt is running true at all times and is reasonably tight. The efficient operation of the fan is dependent upon this belt. Drain the cooling system in cold weather by unscrewing the plug or drain cock at the bottom of radiator unless some anti-freeze mixture is used (see page 8). Drain the cylinder block. Be sure the roller is standing in a level position when the cooling system is being drained.

Do not pour cold water into the radiator when the engine is over-heated. If the water level has been allowed to get too low always wait until the cylinders have cooled down, otherwise there is risk of fracture occurring.

IN FROSTY WEATHER great care should be taken to see that the water in the engine does not freeze. Where the temperature is extremely low and it is essential to work the Roller, an anti-freeze solution can be used. Before any anti-freeze solution is used the water circulation system should be drained thoroughly, flushed, and all leaks repaired. Use no anti-freeze solution that contains calcium-chloride or any similar compound, as they corrode the inside of the radiator. If the radiator reaches the boiling point soon after starting the engine on a cold morning, it is a sign that the cooling solution has congealed and does not circulate. This indicates the solution is not strong enough.

Under such conditions the Roller should not be started working at once, but the engine allowed to run for some time, when it will be noted that the temperature begins to drop. This proves that the mixture has again become fluid and that circulation has started. The Roller may be used, but more anti-freeze solution should be added as soon as possible. A satisfactory solution is one of alcohol and water, preferably denatured alcohol as it does not contain any acids that will

corrode the radiator. The following is a table showing proportions of alcohol to use for different temperatures and at which degree each mixture will freeze. When replenishing the cooling system use a slightly larger proportion of alcohol.

Denatured Alcohol (by volume) per cent.	Water (by volume) per cent.	Begins to freeze at Degrees Fahrenheit.
10	90	27° above Zero.
20	80	19° " "
30	70	10° " "
40	60	2° below Zero.
50	50	18° " "

Distilled glycerine may also be used in preparing an anti-freeze mixture. The initial cost is greater than alcohol, but it has the advantage of not evaporating, so in a season's running is likely to prove less expensive than alcohol. Use only distilled glycerine—not the ordinary commercial grade.

In using glycerine, mix according to this table :—

Distilled Glycerine (by volume) per cent.	Water (by volume) per cent.	Begins to Freeze at Degrees Fahrenheit.
15	85	20° above Zero.
25	75	10° " "
35	65	0° Zero.
40	60	10° below Zero.

Before filling the cooling system with glycerine solution, it is well to take off the hose connections and see that they are not partially clogged by loosened and decayed inner layers of fabric. Any defective hose should be replaced, using good hose clamps. Hose connections should be kept tight. The connector over which the hose fits should be greased and the clamp should be drawn up tight. Glycerine solution helps to keep the cooling system free from scale and rust.

WATER BALLAST.

In extremely cold weather great care should be taken in using water ballast in the rolling wheels. It is usually wise to empty them.

CARBURETTER.

A Zenith carburetter is fitted and the settings are carefully adjusted to a definite standard on test before leaving the works. These settings have been found by experience to give the best results for both power and economical running. It is of the utmost importance that they should not be altered except on the recommendation of the makers or demonstrator.

For full particulars see the Carburetter Book supplied with each Roller.

JETS.

Should the jets at any time become choked, wash them in petrol and if necessary clear with a very thin copper wire or a brush bristle (a cleaning wire as supplied for Primus Stoves will be found useful) or blow out with a cycle pump. On no account use a reamer or anything which is likely to increase the size of the jet. When replacing the jets see that the fibre washer is in position on its collar, and screw them up tightly with the jet spanner.

The correct method to adjust the pilot jet is to screw it down tightly but not too tight and then unscrew $\frac{1}{4}$ of a turn until the most suitable setting for the engine is found. If the engine still fails to run slowly the small hole in the jet is choked up and requires cleaning (see preceding paragraph).

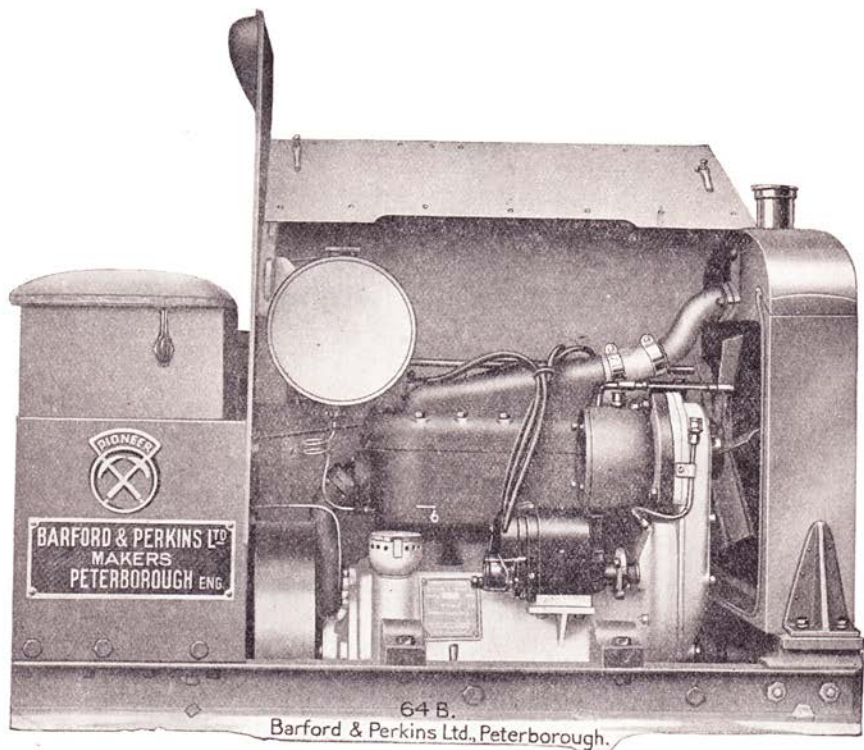
The most suitable size of jet and choke tube is :—

Fuel.	Main Jet.	Compensating Jet.	Choke.
PETROL	80	80	17

These sizes apply to engines fitted in all " A & B " Series Rollers with the exception of the " A4 " and " A4Q " machine the engine of which is fitted with :—

Main Jet.	Compensating Jet.	Choke.
85	85	17

As extreme climatic conditions affect starting and running these sizes may be increased in very cold weather and decreased in very hot weather, and may require modification in high altitudes.



ENGINE.

STARTING AND MAINTENANCE.

1. Flood carburetter by holding up needle valve.
2. Slightly open throttle by hand lever (the best position for starting will soon be found by experience), close air strangler, engage starting handle by pushing in towards engine, and after a preliminary turn or two with the switch " off " to charge the cylinders, a sharp pull up with the switch " on " will start the engine.

When cranking the engine always pull up against compression. Never attempt to crank downwards, and stand clear of the starting handle at all times.

Do not open the throttle suddenly when the engine is cold, very gradual openings should be made until the engine is thoroughly warmed up.

SPARKING PLUGS.

Use a suitable type of sparking plug. The plug found after careful tests to give the most satisfactory all round results is the Lodge, Model C3 (3 point).

Check the setting of the electrodes of the sparking plugs frequently. These should be about .020 inches apart. Examination of the sparking plugs will give a good idea of the general conditions under which the engine is working. If the engine is running on too rich a mixture or is using too much lubricating oil, the sparking plugs will be sooty.

Check compression of each cylinder occasionally.

Check also the firing of each cylinder at the compression cock to see that each one does its fair share of work.

When the engine is started, adjust the throttle lever so that the engine runs slowly for about 10 minutes.

NOTE.—With the throttle lever fully open the engine is controlled by a governor.

SEE THAT :—Engine is not misfiring.

Lubricating system is in order and working.

Water circulating system is in order and working.

VALVES AND VALVE SETTING.

The clearance between the tappets and valve stems should not be less than .004 of an inch and not more than .008 of an inch, for both inlet and exhaust valves. The timing gear at the starting handle end of the engine is driven by a roller chain. Should it be necessary at any time to disturb the valve setting it is so arranged that if the exhaust valves are set to close at top dead centre, the setting of the inlet valves are automatically corrected.

MAGNETO AND IGNITION.

The ignition is by Simms' High Tension Magneto.

The firing order is 1, 2, 4, 3. No 1 Cylinder being nearest to the radiator.

For timing instructions, etc., see Magneto Book supplied with each Roller.

GENERAL INSTRUCTIONS FOR THE MAGNETO.

Keep contact breaker properly adjusted. The correct gap is 0.4 m/m and should be set to gauge supplied.

On no account allow any oil to find its way on to the platinum contact points.

Keep distributor free from accumulation of carbon brush dust.

It may happen occasionally that the bell crank lever sticks owing to the swelling of the fibre bush, but by slightly easing the bore with fine emery paper wrapped round a match this trouble is easily remedied.

Full instructions on the care of the Simms' Magneto are given in the Magneto booklet sent out with every Roller.

CLUTCH.

CLUTCH TROUBLE AND REMEDIES.

A simple fabric lined cone clutch is fitted, easily accessible and adjustable for wear.

The clutch should be carefully adjusted, the spring pressure being sufficient to drive the Roller without slip when the clutch is fully engaged. Too much spring pressure will cause the clutch to engage fiercely, and the machine will start away with a jerk, which is detrimental to the working of the Roller. Always let in the clutch as lightly as possible and keep the foot off the pedal when working, otherwise wear and slip takes place.

FIERCE CLUTCH.

A fierce clutch may be due to excessive spring pressure, or to the fact that the fabric lining has become dry and clogged with dirt; either case demands immediate attention. The remedy in the first case is obvious, and in the second, trouble can be rectified by thoroughly washing the lining with paraffin. This may be conveniently done by withdrawing the clutch cone to its full extent and pouring or squirting paraffin over the clutch lining. (This must be done with the engine running at about 900 R.P.M.). The clutch should now be engaged and disengaged by means of the foot-lever, at the same time allowing slip to take place between the clutch cone and flywheel. Repeat several times to clean the clutch lining effectively. No further dressing should then be necessary.

SLIPPING CLUTCH.

Clutch slip may usually be traced to the lining becoming saturated with oil or grease and a dressing of powdered Fuller's earth will generally overcome the trouble. If this is ineffective the cause will probably be traced to the fabric lining having worn thin, allowing the rivet heads to come into contact with the flywheel. The remedy is to dismantle the clutch and fit a new lining.

Insufficient spring pressure is another cause of slip, and must be adjusted occasionally as the clutch lining seats deeper in the flywheel.

GEAR BOX AND GEAR CHANGING.

The bevel gears (under gear guard) should be coated with vaseline or gear grease occasionally.

A simple change speed and reversing mechanism is incorporated in the design of the gear box, by means of which all gear changes are performed with a single lever.

Always bring gear levers into the neutral position when stopping the roller (but not the engine), and see also that gears are in neutral before attempting to start the engine.

GEAR CHANGING.

See special instructions on page 14 for "A4Q" Roller. Only one lever is fitted on the "A" and "B" series for both changing speed and reversing. Before attempting to move the change speed or reversing lever depress the clutch pedal to its

fullest extent, wait a second or two until the clutch cone and the parts attached to it come to rest, then pull the gear lever into the required position. Should the gears fail to engage, do not attempt to force them, but return the lever to the neutral position, engage the clutch again slightly and proceed as before. After a little experience, gear changing should present no difficulties to the driver.

TYPES A., A2½ Ton, A3, BG and BK (2 Speed).

BLOCK BRAKE.

When adjusting Block Brake to take up wear, care should be taken to set the cranked bar (Brake Block Stop) a corresponding amount to keep the Brake Block parallel to the surface of the Roller.

SPECIAL FEATURES APPLYING TO THE " A4-Q " **MOTOR ROLLER ONLY.**

The engine is exactly the same as for the other type " A " Motor Rollers and the same general instructional notes apply in both cases with the exception that the " A4-Q " has quick reversing clutches.

REVERSING CLUTCHES.

The clutches are of the Multi-plate type, operated by a declutching bar. The pressure on the clutch is applied by a single spiral spring forcing over a crank, by means of a hand lever. The hand lever is put in the forward position when it is necessary to go forward and to the rear when it is necessary to go in the opposite direction.

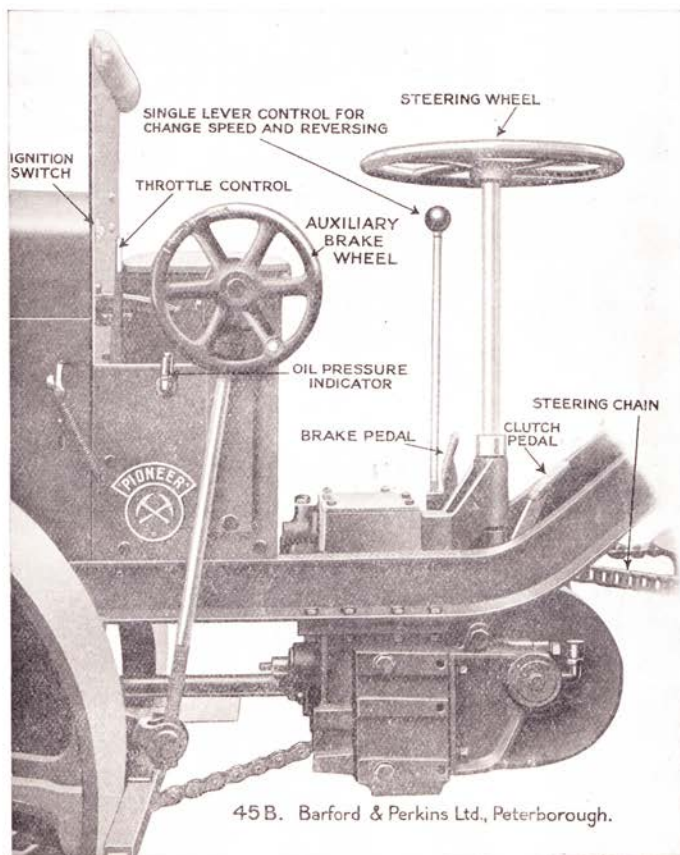
ADJUSTMENT OF CLUTCHES.

Near each end of the declutching bar, a withdrawal ring is clamped by two nuts by means of which a certain amount of adjustment to the operating cones mounted on the shaft can be obtained. These cones actuate the clutch levers, forcing them outwards (" A4-Q " only) thereby applying pressure to the clutch. On other types of " A " Rollers fitted with quick reverse, the clutch levers move inwards. The clutch levers may be adjusted to take up space left by plate wear, by tightening up the set screws which are fitted in the levers.

REVERSING.

When the hand lever has been pushed over to reverse the Roller, it should be allowed to complete its motion steadily under the action of the spring. No extra pressure should be exerted by hand when the clutches are engaged, as the spring is proportioned to give the correct loading, and additionally, if through long usage the spring should become somewhat fatigued it is a simple matter to adjust it to operate perfectly.

NOTE. Several "A2½ Ton" Motor Rollers have been fitted with quick reversing clutch, and the instructions given above are applicable. These Rollers are designated "A2½ Ton Q"



45B. Barford & Perkins Ltd., Peterborough.

ENGINE TROUBLES AND REMEDIES.

Failure to Start :—

Magneto switch in " off " position.

Magneto timing incorrect.

Fuel not turned on.

Short circuit on Magneto switch or switch wire :—

Disconnect switch wire from magneto (repair or replace defective part).

Stoppage in fuel pipe, filter, float chamber (needle valve) or jet caused by dirt or water in the fuel :—

Sparking plug points touching :—

Sparking plug points too far apart :—

Set to correct gap (approx. one sixty-fourth of an inch) to gauge supplied.

Sparking plug porcelain cracked or broken :—

Replace defective plug or plugs.

Sparking plug points dirty or oily :—

Dismantle plugs, scrape off carbon deposit from inside of body and wash in petrol.

Contact breaker rocker arm stuck :—

Ease fibre bush with fine emery paper wrapped round a match.

Platinum points not separating to correct gap :—

Adjust to gauge on magneto spanner.

Carbon dust from brush wear, accumulated in distributor causing short circuit :—

Wipe with a clean cloth dipped in petrol, **then allow to dry** before replacing.

Broken carbon brush :—

Faulty or perished high tension cable insulation :—

High tension cable broken inside insulation :—

Replace.

Engine Chokes :—

Turn off petrol, open compression taps, crank engine over several times with switch off.

Misfiring :—

Mixture too rich :—

Carburettor flooding. Bent Needle Valve. Dirt between needle valve and seat.
Examine for punctured carburettor float.

Mixture too weak :—

Examine for air leaks at carburettor and inlet manifold flanges, replace any defective copper asbestos washers. Examine valve stems and guides, replace any that are badly worn.

Partial obstruction of petrol pipe or carburettor :—

Loose terminals or faulty high tension cable :—

Sparking plugs dirty or oily :—

Platinum points incorrectly adjusted or oily :—

Proceed as for failure to start.

Valve or valves not seating :—

Adjust valve tappets, examine valves for bent stems, clean carbon from stems.

Broken valve spring :—

Replace.

Poor compression :—

Valves require grinding in or worn piston rings require replacing.

Water in fuel :—

Air vent in Tank filler cap stopped up :—

Loss of Power :—

Poor Compression :—

Proceed as for misfiring.

Incorrect clearance between valve stems and tappets :—

Set to clearance given in engine instructions.

Weak valve springs :—

Replace.

Piston and Combustion chambers heavily coated with carbon :—

Remove cylinder head and scrape away carbon deposit from head and pistons.

Valves sticking in guides :—

Examine for bent valve stems, clean carbon off stems.

Exhaust pipe or silencer (or both) choked with carbon :—

Dismantle and remove carbon deposit.

Unsuitable sparking plugs causing pre-ignition :—

Replace with plugs as recommended for the engine.

Engine will run slowly but will not accelerate when throttle is opened (see under loss of power) :—

PERIODICAL ATTENTIONS—DAILY (before commencing work).

- (1). Examine water in Radiator and fill up as required.
- (2). Examine oil level in Engine and fill up to proper level if necessary.
- (3). Examine fuel in tanks—fill up if required, and see that sufficient fuel is carried for the day's work.
- (4). Fill up all oil and grease cups ; use grease gun.
- (5). Run engine slowly for a few minutes and see that it is not misfiring, that lubricating system is functioning correctly, and that the water circulating system is in order and working.

WEEKLY.

- (1). Give roller a thorough clean down and tighten up any loose bolts.
- (2). Adjust brakes and see that they are in good working order. Oil all pins and working joints. gun. (See note inside front cover).
- (3). Grease Front Rollers frequently by means of grease gun.
- (4). Locate any fuel, oil or water leaks and attend to them.
- (5). Adjust valve tappets if necessary.
- (6). Adjust Fan belt if necessary.
- (7). Remove and clean oil strainer in engine.

MONTHLY.

- (1). Thoroughly examine all mechanical parts. Look out for approaching troubles and forestall them. Tighten up any loose bolts, and see that no springs are broken.
- (2). Examine lubricant in Gear Box—do not put too much in; as long as Gear Wheel nearest to bottom of the Box is dipping in well it is quite sufficient. Use a mixture of oil and grease, as described on page 5.
- (3). Clean Petrol Filter.
- (4). Oil and grease Steering Gear.
- (5). Give a few drops of oil to each lubricator on Magneto and clean contact breaker and brushes.
- (6). Remove all syphon wicks from oil boxes and wash in paraffin.
- (7). Adjust Driving Chain if necessary.

GENERAL UPKEEP.

- (1). About every six to eight weeks' work drain oil from Engine sump and wash out with paraffin (taking care that all paraffin is drained off before refilling with oil). Clean oil strainer and recharge sump with the necessary amount and grade of oil as recommended in the Engine instructions, page 5.
- (2). After every six months' work grind in valves with fine emery powder, taking care that all traces of emery are removed when finished. Adjust tappets after grinding in valves (refer to engine instructions for clearances), page 11.
- (3). Decarbonize cylinders and pistons about twice a year.
- (4). Keep the outside of the engine clean. When cleaning the engine various detail defects may be discovered before they have a chance to become serious.

A GOOD DRIVER.

Is never flurried.

Never races his engine.

Does not keep his foot on clutch or brake pedal.

Has small bills for fuel and repairs.

Always keeps his machine clean.

Changes gear quietly.

Never uses his brakes harshly.

Always drives his roller steadily over stone setts, or rough ground.

Turns his roller round where possible in reverse motion.

Always put his gear in before opening the throttle.

Takes an interest in his work and rolls methodically.

Barford & Perkins' Patent Motor Rollers, 3 wheel design, for
Footpaths, School Playgrounds, Light Road work, etc.

PETROL ONLY.

TYPES " A " & " A2½ Ton."

ABRIDGED SPECIFICATION.

Approximate Weight	:—TYPE " A," 38 cwts. TYPE " A2½ Ton." 2½ Tons.
Engine Type BBB	:—Four cylinder vertical, 70 m/m Bore 109·5 m/m Stroke, develops ing 13·25 B.H.P. at a normal speed of 1100 R.P.M.
Water Circulation	:—Thermo-Syphon.
Engine Oiling System	:—Full pressure by means of pump.
Carburetter	:—Zenith.
Magneto	:—Simms High Tension.
Governor	:—Centrifugal Type.
2 Back Rolling Wheels	:—Each 30 ins. diameter x 13 ins. wide.
Front Rolling Wheel (in 2 parts)	:—27 ins. diameter x 30 ins. total width.
Rolling Width	:—4 ft.
Overlap of Rolling Wheels	:—3⅝ ins. (mean overlap).
Speeds (2)	:—Approximately 2 and 4 miles per hour, both forward and reverse.

Supplied at an **EXTRA** charge.

Awning

Side Curtains

Drawbar (a). Offset for Mower.
(b). Central for hauling light loads.

Driving Pulley

Sprinkling Water Tank

Interchangeable Back Rolling Wheels for Grass
for converting to type " A3 "

Interchangeable Back Rolling Wheels
for converting " A " to " A2½ ton " or vice-versa.

Barford & Perkins' Patent Non-Water Ballast Motor Roller.
3 wheel Design, for Grass.

PETROL ONLY.

TYPE "A3."

ABRIDGED SPECIFICATION.

Approximate Weight	:— $2\frac{1}{4}$ Tons.
Engine, Type BBB	:—Four Cylinder Vertical, 70 m/m Bore x 109.5 m/m Stroke, developing 13.25 B.H.P. at a normal speed of 1100 R.P.M.
Water Circulation	:—Thermo-Syphon.
Engine Oiling System	:—Full pressure by means of pump.
Carburetter	:—Zenith.
Magneto	:—Simms High Tension.
Governor	:—Centrifugal Type.
2 Back Rolling Wheels	:—Each 30 ins. diameter x 25 ins. wide.
Front Rolling Wheel (in 2 parts)	:—27 ins. diameter x 30 ins. total width.
Rolling Width	:—6 ft.
Overlap of Rolling Wheels	:— $3\frac{5}{8}$ ins. (mean overlap).
Speeds (2)	:—Approximately 2 and 4 miles per hour, both forward and reverse.

Supplied at an EXTRA charge.

Awning

Side Curtains

Drawbar (a). Offset for Mower.
(b). Central for hauling light loads.

Driving Pulley

**Barford & Perkins' Patent Water Ballast Motor Roller.
Tandem Pattern.**

PETROL ONLY.

TYPES "A4" and "A4Q."

ABRIDGED SPECIFICATION.

Approximate Weight	:—Empty $2\frac{1}{4}$ tons. Full $2\frac{1}{2}$ tons.
Engine, Type BBB	:—Four Cylinder Vertical, 70 m/m Bore x 109.5 m/m Stroke, developing 13.25 B.H.P. at a normal speed of 1100 R.P.M.
Water Circulation	:—Thermo-Syphon.
Engine Oiling System	:—Full pressure by means of pump.
Carburetter	:—Zenith.
Magneto	:—Simms High Tension.
Governor	:—Centrifugal Type.
Back Rolling Wheels	:—30 ins. diameter x 36 ins. wide.
Front Rolling Wheels (in 2 parts)	:—27 ins. diameter x 30 ins. total width.
Rolling Width	:—3 ft.
Speeds (2)	:—Approximately 2 and 4 miles per hour, both forward and reverse.
Multi-Plate Clutches (A4Q only)	:—For quick and smooth reversing.

Supplied at an EXTRA charge.

**Awning
Side Curtains**

**GENERAL SPECIFICATION OF BARFORD & PERKINS'
PATENT MOTOR ROLLERS.**

“ A ” Series.

(With 2 Speed Gear Box).

**Engine
Type BBB.**

The workmanship is of the highest standard and the engine is thoroughly reliable requiring the minimum of attention. Being governed to run at a moderate speed and the work for the most part being only a small part of the power available the maintenance costs are very light. There are four cylinders 70 m/m bore x 109.5 m/m stroke. 1685 c.c. giving off 13.25 B.H.P. maximum load when running at 1100 R.P.M. Fuel consumption averages 2 to 3 Imperial gallons for one working day.

Cylinders.

A “ monobloc ” casting of close grain cast iron is used. Extreme care is exercised in making and machining the castings for the motor block, with the result of exceptional uniformity of the metal thickness. Care of this kind in the beginning assures uniformity of wearing surfaces, uniformity of expansion under normal operating temperature of the motor and uniform cooling effects of the circulating water. Size and shape of combustion chambers are uniform and their smoothness of surfaces retard carbon deposits. Care and accuracy at this point contribute to uniform explosions pressures and consequently to a smoothness of operation impossible to obtain otherwise. Sparking plugs are placed to receive the maximum benefit of the cooling and cleaning qualities of the incoming petrol vapour, and to ensure rapid flame propagation.

Crankshaft.

The Crankshaft is accurately balanced and treated throughout the entire manufacturing process on the basis that it is nearly the most important feature of the engine. The crankshaft is carried in two lined brass bearings.

Flywheel.	A cast iron flywheel of correct size, distribution of weight and design is used. All these bear an important relationship to the operation of the engine. The flywheel is carefully balanced.
Camshaft.	High quality steel is selected for the camshaft and is then forged, machined accurately and hardened. The cams are forged solid with the shaft. Ample bearings are provided.
Timing Gears	Sprockets and roller chain fitted with a tightening device are used, arranged so that tooth pressures are equalized. This affords a great degree of quietness and efficient operation.
Governor.	A reliable centrifugal governor is an integral part of the engine, ensuring smooth running at normal speed irrespective of load.
Magneto.	" Simms " High tension magneto with flexible coupling to timing gear.
Carburetter.	Zenith. A sediment trap with a filter on the fuel feed line permits the water and foreign matter in the fuel to be drained out before entering the carburetter.
Engine Controls	Throttle control lever is fitted to the side of the driver's seat. This lever is interconnected with the carburetter throttle, and the engine governor. These give a delicate control of the engine at all loads, and causes economical use of fuel. Ignition switch is adjacent to control lever.
Water Cooling System	The cooling system is " Thermo-Syphon." A radiator with the usual gilled tube core of correct capacity for efficient cooling is used. The Fan is driven by a leather link belt. This type of belt permits the minimum of stretch and is superior to the plain leather or fabric belt. The belt can be tightened by a compact eccentric style of tightener.

Lubrication of Engine

One of the foremost features of design that is responsible for the performance of the engine is its regulated full pressure oiling system. Oil from the lower half of the crankcase is drawn through a strainer into a gear pump situated in the base of the oil sump which delivers oil through a filter to the camshaft bearings and to the main crank shaft bearings. The oil is then led from the main bearings to the crank pins by means of oil-ways in the crank shaft. The pressure is controlled by an oil release valve which by-passes surplus oil back to the sump. Cylinders, pistons, etc., are lubricated by oil splash and spray. An oil indicating gauge is fitted alongside the driver's seat. The lower half of the crankcase is finned to secure maximum cooling, enabling the oil to remain at the correct viscosity for perfect lubrication. At the side of the crank case is fitted an oil depth gauge. The average oil consumption is 3 pints per week.

Lubrication of Roller.

Grease Gun Lubrication to Front Rolling Wheel, steering fork, differential gear, Back Rolling Wheels and clutch withdrawal ring.

Manifolds.

The inlet and exhaust manifolds are grouped in a single casing, so arranged that the incoming petrol vapour is heated to the right temperature for securing the utmost value from the fuel.

Clutch.

The clutch is a simple cone type, faced with fabric, having a large friction area designed to prevent slipping or grabbing with the consequent overstressing of the engine, transmission, and driving chain. The clutch is operated by a foot pedal.

Flexible Couplings.

The clutch is connected to the transmission by means of two disc type couplings. This coupling requires no lubrication, is perfectly silent and has no wearing parts.

- Transmission.** A sturdy selective sliding gear transmission is used and is so arranged that, with load, the maximum effort is secured without racing the engine. Perfect lubrication is attained because the gears are running in an oil bath, and having extra large bearings, can carry heavy loads without injury to transmission parts. Compactness and accessibility are outstanding features of this transmission. All gear changes are effected by one lever with a comfortable ball grip, through a selector fitted with a locking device to prevent the gears jumping out of engagement.
- Transmission Gears** The gears are arranged to give two speeds forward, and two in reverse. All gears are of high grade steel with machine cut teeth of first class workmanship to ensure quiet and smooth running.
- Chain.** The final drive is by hardened steel roller chain with a breaking strain of $6\frac{1}{4}$ tons.
- Steering.** By means of a handwheel, sprocket and bush chain to steering fork. The bush chain is far superior to the common link chain used on most Rollers, being stronger, more compact, and presenting the minimum of frictional surface, making for ease in steering. Furthermore, there is far less slackness in the chain than in the drum type of steering used on many Rollers. The front rolling wheels are in two sections, permitting a differential action of the rollers when turning and preventing undue strain on the operator when steering. The turning radius, measured to the outside of the Roller is approx. 10 ft. for "A," "A2 $\frac{1}{2}$ ton" and "A3" rollers. For the "A4" and "A4Q" it is 7 ft. 6 ins.
- Brakes.** A foot operated band brake, acting on the driving pinion shaft drum is provided, also a block brake acting on both of the driving rollers. The latter brake is actuated

by a hand lever working in a ratchet for holding on the brake. A simple adjustment is provided taking but 3 or 4 minutes to effect.

Frame.

The frame is of channel section steel of simple but substantial construction and design. The component parts making up the Roller are so secured in the frame as to make a strong unit, braced in every direction. The front end of the frame is firmly bolted to a box type cross member which embodies our "Patent Spring Steering Head." Should a spring in this head give trouble, which is unlikely, it is only necessary to remove the cap to make a change instead of dismantling the whole fore-carriage.

Patent Spring Steering Head.

This head is designed to protect the frame and attached mechanisms from shocks transmitted from rough road surfaces. The head allows a certain movement of the front part of the frame (both upwards and downwards), relieves the strain on engine, gearing and driving chain when the roller is started from rest, thus providing in simple form all the advantages of a spring drive.

Steering Fork

The steering fork for the front rolling wheels is pivotally attached to the spring head to secure all lateral angles essential in operation under any condition and in any steering lock. The combination of Patent Spring Steering Head and Steering Fork forms a simple and perfect universal joint, giving absolute freedom of movement and enables the operator to steer easily over uneven surfaces.

Rolling Wheels

TYPES "A," and "A2½ ton." The front and back rolling wheels are made of close grained cast iron of the correct hardness without being brittle, but with the best wearing qualities. The "A3" back rolling wheels are made from steel plate.

The front rollers have rounded edges, eliminating cutting of the rolled surface and giving ease in steering.

Type " A," " A2½ ton," or " A3 " Rollers are of the 3-wheel type.

Type " A4 " and " A4Q " are Tandem Rollers with cast iron front and back rolling wheels. The back rolling wheels are equipped for water ballast.

The " A " " A2½ ton " Rollers can be converted to Type " A3 " for grass work by changing the back rolling wheels. Type " A " roller can be changed to Type " A2½ ton " or " A3 " or vice-versa by changing the back rolling wheels.

A generous amount of overlap of front over rear rolling wheels is allowed to secure a smooth finished surface.

Bonnet.

A hinged bonnet of the conventional car type fitted with simple fasteners, completely covers the engine.

Fuel Tank

A strongly constructed petrol tank is secured to the dash under the bonnet, with a capacity of 3 Imperial gallons and is placed well above the engine, ensuring a satisfactory gravity flow of petrol. This tank holds sufficient fuel for at least one full day's work.

Comfort of Operator.

All controls are grouped conveniently for ease of operation and access. The driver sits on a well upholstered seat with a comfortable back rest.

Scrapers.

Adjustable scrapers are fitted to both front and rear rolling wheels.

Rear Springs.

Substantial spiral springs are fitted over the back axle to absorb shocks transmitted from the road surface.

Speeds (2).

Approximately 2 miles per hour slow speed and 4 miles per hour fast speed, either forward or reverse, at normal engine speed.

**Axles and
Differential
Gear.**

The axles are made from special Steel Bar of correct proportions. The rear axle carries the differential gear in combination with the final drive chain wheel. The teeth of this chain wheel are machined so that the chain seats itself correctly. The differential pinions are made from steel castings. The "A4" and "A4Q" Rollers have no differential, being tandem machines.

**Differential
Locking Pin.**

A locking pin is provided to enable the differential gear to be locked when working on steep hills, or in any case where greater adhesion is required.

Finish.

The Road Roller is well rubbed down, primed, painted in an attractive colour and varnished, all the materials used being the best procurable.

**Extra : Driving
Pulley.**

A driving pulley can be supplied for driving belt driven machinery, as an extra on Types "A," "A2½ ton" and "A3" only. Sizes of pulley 8 ins. diameter x 5 ins. face, R.P.M. 250 in slow gear and 500 in fast gear, running in one direction only. All the above Rollers are drilled ready for pulley attachment.

Extra : Drawbar.

Either a straight pull drawbar or an offset drawbar can be supplied. The latter is most suitable for hauling lawn mowers, thereby preventing the possibility of the grass being pressed down before cutting. The "A," "A2½ ton" and "A3" rollers have the necessary lugs attached for drawbar fittings.

**Extra : Sprink-
ling Water
Tank.**

This tank is supplied, at an extra charge, with the necessary piping for Front and Rear Rolling Wheels. Piping is such that the Rolling Wheels can be sprinkled separately or simultaneously. For Types "A" and "A2½ ton," the capacity of this tank is 20 Imperial gallons. For the Types "A4" and "A4Q" the tank

has a capacity of 25 Imperial gallons. A large cover to facilitate cleaning and washing out is fitted on the tank.

Extra : Awning.

A detachable awning of sheet steel carried from the main frame can be supplied at an extra charge if required. The awning is made with lining and air space to suit extreme temperature conditions. Provision can be made for attaching curtains round all sides.

All Rollers sent out are drilled for the awning supports.

Tools.

A complete set of Tools is provided with each machine, including all the necessary spanners, wrenches, grease gun, grease nipples, oil can and small wearing parts, enclosed in a box under the driving seat.

Test.

The engine undergoes a thorough bench and dynamometer test before assembly in the Roller. The complete Roller is tested on the road for at least two days.

A4Q.

TYPE "A4Q" Motor Roller is a Tandem machine identical with "A4" with the addition of Multi-Plate reversing clutches for quick and smooth reversing of the roller without gear changing.

The Motor Rollers described herein are capable of working fully loaded on an incline of 1 in 7 and up 1 in 5 with steel plated back rollers (**under ordinary working conditions**). All wearing parts and especially the gears are designed with exceptionally ample surfaces to enable them to meet the stresses imposed by heavy work for many years.

Exhaustive research, experiment and analysis of past experience extending over 28 years have combined to make our Rollers a sound proposition of proved economical performance, built in accordance with modern engineering practice and up-to-date Roller requirements.

Barford & Perkins' Patent Motor Rollers, 3 wheel Design
for Light Road work etc.

PETROL ONLY.

TYPE " BG."

ABRIDGED SPECIFICATION.

Approximate Weight	:—3 tons.
Engine, Type BBB	:—Four cylinder vertical, 70 m/m Bore x 109.5 m/m Stroke, develop- ing 13.25 B.H.P. at a normal speed of 1100 R.P.M.
Water Circulation	:—Thermo-Syphon.
Engine Oiling System	:—Full pressure by means of pump.
Carburetter	:—Zenith.
Magneto	:—Simms' High Tension.
Governor	:—Centrifugal Type.
2 Back Rolling Wheels	:—Each 42 ins. diameter x 15 ins. wide.
Front Rolling Wheels (in 2 parts)	:—33ins. diameter x 36 ins. total width.
Rolling Width	:—4 ft. 6 ins.
Overlap of Rolling Wheels	:—4½ ins.
Speeds (2)	:—Approximately 1¾ and 3½ miles per hour, both forward and reverse.

Supplied at an **EXTRA** charge.

Awning

Side Curtains

Drawbar

Differential

Driving Pulley

Sprinkling Water Tank

Interchangeable Back Rolling Wheels 19½ ins. wide
for converting to rolling width of 5ft. 3 ins.

Interchangeable Back Rolling Wheels 24 ins. wide
for converting to rolling width of 6 ft. 0 ins.

Barford & Perkins' Patent Motor Rollers, 3 wheel Design
for Light Road work etc.

PETROL ONLY.

TYPE " BK."

ABRIDGED SPECIFICATION.

Approximate Weight	:—4 tons.
Engine, Type BBB	:—Four cylinder vertical, 70 m/m Bore x 109.5 m/m Stroke, developing 13.25 B.H.P. at a normal speed of 1100 R.P.M.
Water Circulation	:—Thermo-Syphon.
Engine Oiling System	:—Full pressure by means of pump.
Carburetter	:—Zenith.
Magneto	:—Simms' High Tension.
Governor	:—Centrifugal Type.
2 Back Rolling Wheels	:—Each 42 ins. diameter x 15 ins. wide.
Front Rolling Wheels (in 2 parts)	:—33ins. diameter x 36 ins. total width.
Rolling Width	:—4 ft. 6 ins.
Overlap of Rollers	:—4½ ins.
Speeds (2)	:—Approximately 1¾ and 3½ miles per hour, both forward and reverse.

Supplied at an EXTRA charge.

Awning

Side Curtains

Drawbar

Differential

Driving Pulley

Sprinkling Water Tank

Interchangeable Back Rolling Wheels 19½ ins. wide
for converting to rolling width of 5ft. 3 ins.

Interchangeable Back Rolling Wheels 24 ins. wide
for converting to rolling width of 6 ft. 0 ins.

GENERAL SPECIFICATION OF BARFORD & PERKINS' PATENT MOTOR ROLLERS.

“ B ” Series.

(With 2 Speed Gear Box).

Engine Type BBB.

The workmanship is of the highest standard and the engine is thoroughly reliable requiring the minimum of attention. Being governed to run at a moderate speed and the work for the most part being only a small part of the power available the maintenance costs are very light. There are four cylinders 70 m/m bore x 109.5 m/m stroke, giving off 13.25 B.H.P. maximum load when running at 1100 R.P.M. Fuel consumption averages $3\frac{1}{2}$ to 4 Imperial gallons for one working day.

Cylinders.

A “ monobloc ” casting of close grain cast iron is used. Extreme care is exercised in making and machining the castings for the motor block, with the result of exceptional uniformity of the metal thickness. Care of this kind in the beginning assures uniformity of wearing surfaces, uniformity of expansion under normal operating temperature of the motor and uniform cooling effect of the circulating water. Size and shape of combustion chambers are uniform and their smoothness of surfaces retard carbon deposits. Care and accuracy at this point contribute to uniform explosion pressures and consequently to a smoothness of operation impossible to obtain otherwise. Sparking plugs are placed to receive the maximum benefit of the cooling and cleaning qualities of the incoming petrol vapour, and to ensure rapid flame propagation.

Crankshaft.	The Crankshaft is accurately balanced and treated throughout the entire manufacturing process on the basis that it is nearly the most important feature of the engine. The crankshaft is carried in two lined brass bearings.
Flywheel.	A cast iron flywheel of correct size, distribution of weight and design is used. All these bear an important relationship to the operation of the engine. The flywheel is carefully balanced.
Camshaft.	High quality steel is selected for the camshaft and is then forged, machined accurately and hardened. The cams are forged solid with the shaft. Ample bearings are provided.
Timing Gears	Sprockets and roller chain fitted with a tightening device are used, arranged so that tooth pressures are equalized. This affords a great degree of quietness and efficient operation.
Governor.	A reliable centrifugal governor is an integral part of the engine, ensuring smooth running at normal speed irrespective of load.
Magneto.	" Simms " High tension magneto with flexible coupling to timing gear.
Carburetter.	Zenith. A sediment trap with a filter on the fuel feed line permits the water and foreign matter in the fuel to be drained out before entering the carburetter.
Engine Controls	Throttle control lever is fitted to the side of the driver's seat. This lever is interconnected with the carburetter throttle, and the engine governor. This gives a delicate control of the engine at all loads, and causes economical use of fuel. Ignition switch is adjacent to control levers.
Water Cooling System	The cooling system is " Thermo-Syphon." A radiator with the usual gilled tube core of correct capacity for efficient cooling is used. The Fan is driven by a leather link belt.

Lubrication of Engine

This type of belt permits the minimum of stretch and is superior to the plain leather or fabric belt. The belt can be tightened by a compact eccentric style of tightener.

One of the foremost features of design that is responsible for the performance of the engine is its regulated full pressure oiling system. Oil from the lower half of the crankcase is drawn through a strainer into a gear pump situated in the base of the oil sump which delivers oil through a filter to the camshaft bearings and to the main crank shaft bearings. The oil is then led from the main bearings to the crank pins by means of oil-ways in the crank shaft. The pressure is controlled by an oil release valve which by-passes surplus oil back to the sump. Cylinders, pistons, etc., are lubricated by oil splash and spray. An oil indicating gauge is fitted alongside the driver's seat. The lower half of the crankcase is finned to secure maximum cooling, enabling the oil to remain at the correct viscosity for perfect lubrication. At the side of the crank case is fitted an oil depth gauge. The average oil consumption is 3 pints per week.

Lubrication of Roller.

Grease Gun Lubrication to Front Rolling Wheel, steering fork, differential gear, Back Rolling Wheels and clutch withdrawal ring.

Manifolds.

The inlet and exhaust manifolds are grouped in a single casting, so arranged that the incoming petrol vapour is heated to the right temperature for securing the utmost value from the fuel.

Clutch.

The clutch is a simple cone type, faced with fabric, having a large friction area designed to prevent slipping or grabbing with the consequent overstressing of the engine, transmission, and driving chain. The clutch is operated by a foot pedal.

**Flexible
Couplings.**

The clutch is connected to the transmission by means of two disc type couplings. The coupling requires no lubrication, are perfectly silent and has no wearing parts.

Transmission.

A sturdy selective sliding gear transmission is used and is so arranged that, with load, the maximum effort is secured without racing the engine. Perfect lubrication is attained because the gears are running in an oil bath, and having extra large bearings, can carry heavy loads without injury to transmission parts. Compactness and accessibility are outstanding features of this transmission. All gear changes are effected by one lever with a comfortable ball grip, through a selector fitted with a locking device to prevent the gears jumping out of engagement.

**Transmission
Gears**

The gears are arranged to give two speeds forward, and two in reverse. All gears are of high grade steel with machine cut teeth of first class workmanship to ensure quiet and smooth running.

Chain.

The final drive is by hardened steel roller chain with a breaking strain of 10 tons.

Steering.

By means of a handwheel, sprocket and bush chain to steering fork. This chain is far superior to the common link chain used on most Rollers, being stronger, more compact, and presenting the minimum of frictional surface, making for ease in steering. Furthermore, there is far less slackness in the chain than in the drum type of steering used on many Rollers. The front rolling wheels are in two sections, permitting a differential action of the rolling wheels when turning and preventing undue strain on the operator when steering. The turning radius, measured to the outside of the Roller is 13 ft. 0 ins.

Brakes.

A foot operated band brake, acting on the driving pinion shaft drum is provided. A powerful Block Brake on the inside rim of one Back Rolling Wheel is fitted. The latter brake is of the screw down type. A simple adjustment is provided taking but 3 or 4 minutes to effect.

Frame.

The frame is of channel section steel of simple but substantial construction and design. The component parts making up the Roller are so secured in the frame as to make a strong unit, braced in every direction. The front end of the frame is firmly bolted to a box type cross member which embodies our "Patent Spring Steering Head." Should a spring in this head give trouble, which is unlikely, it is only necessary to remove the cap to make a change instead of dismantling the whole fore-carriage.

Patent Spring Steering Head.

This head is designed to protect the frame and attached mechanisms from shocks transmitted from rough road surfaces. The head allows a certain movement of the front part of the frame (both upwards and downwards), relieves the strain on engine, gearing and driving chain when the roller is started from rest, thus providing in simple form all the advantages of a spring drive.

Steering Fork

The steering fork for the front rolling wheels is pivotally attached to the spring head to secure all lateral angles essential in operation under any condition and in any steering lock. The combination of Patent Spring Steering Head and Steering Fork forms a simple and perfect universal joint, giving absolute freedom of movement and enables the operator to steer easily over uneven surfaces.

Rolling Wheels.

A steel-plate front Rolling Wheel with cast iron spoke ends is fitted. The back Rolling Wheels are made of a special steel and cast iron mixture of the correct hardness without

being brittle but with the best wearing qualities. The front Rolling Wheels have rounded edges, eliminating cutting of the road surface and giving ease in steering. A generous amount of overlap of front over rear Rolling Wheels is allowed to secure a smooth finished surface.

Bonnet.

A hinged bonnet of the conventional car type fitted with simple fasteners, completely covers the engine.

Fuel Tank

A strongly constructed petrol tank is secured to the dash under the bonnet, with a capacity of 3 Imperial gallons and is placed well above the engine, ensuring a satisfactory gravity flow of petrol. This tank holds sufficient fuel for at least one full day's work.

Comfort of Operator.

All controls are grouped conveniently for ease of operation and access. The driver sits on a well upholstered seat with a comfortable back rest.

Scrapers.

Adjustable scrapers are fitted to both front and rear rolling wheels.

Rear Springs.

Substantial spiral springs are fitted over the back axle to absorb shocks transmitted from the road surface.

Speeds (2)

Approximately $1\frac{3}{4}$ miles per hour slow and $3\frac{1}{2}$ miles per hour fast, either forward or reverse, at normal engine speed.

Axles.

The axles are made from special steel bar of correct proportions.

Differential Gear (Extra).

The rear axle carries the differential gear in combination with the final drive chain wheel. The teeth of this chain wheel are machined so that the chain seats itself correctly. The differential pinions are made from steel castings.

Differential Locking Pin (Extra).

A locking pin is provided to enable the differential gear to be locked when working on steep hills, or in any case where greater adhesion is required.

- Finish.** The Road Roller is well rubbed down, primed, painted in an attractive colour and varnished, all the materials used being the best procurable.
- Extra :
Driving Pulley.** A driving pulley can be supplied for driving belt driven machinery. Size of pulley 8 ins. diameter x 5 ins. face. R.P.M. 250 in slow gear and 500 in fast gear.
- Extra : Drawbar.** A straight drawbar pull can be supplied.
- Extra :
Sprinkling
Water Tank.** This tank 35 Imperial gallons capacity, is supplied at an extra charge with the necessary piping to the Front and Rear Rolling Wheels. Piping is such that the rolling wheels can be sprinkled separately or simultaneously.
A large cover to facilitate cleaning and washing out is fitted on the tank.
- Extra : Awning.** A detachable awning of sheet steel carried from the main frame can be supplied at an extra charge if required. The awning is made with lining and air space to suit extreme temperature conditions. Provision can be made for attaching curtains round all sides.
All Rollers sent out are drilled for the awning supports.
- Extra :
Interchangeable
Back Rolling
Wheels.** At an extra price we can supply back rolling wheels to give rolling widths of 5 ft., 3 ins. or 6ft. 0 ins.
- Tools.** A complete set of Tools is provided with each machine, including all the necessary spanners, wrenches, grease gun, grease nipples, oil can and small wearing parts, enclosed in a box under the driving seat.
- Test.** The engine undergoes a thorough bench and dynamometer test before assembly in the Roller. The complete Roller is tested on the road for at least two days.

The Motor Rollers described herein are capable of working fully loaded, **under ordinary working conditions**, on an incline of 1 in 7 and up 1 in 5 with steel plated back rolling wheels. All wearing parts and especially the gears are designed with exceptionally ample surfaces to enable them to meet the stresses imposed by heavy work for many years.

Exhaustive research, experiment and analysis of past experience extending over 28 years have combined to make our Rollers a sound proposition of proved economical performance, built in accordance with modern engineering practice and up-to-date Roller requirements.

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NOTE.—In ordering spare parts please give Reference Number of Roller, and refer when possible to the Number on the detail.

List of Spares and Tools Supplied

(For all "A" Type Rollers)

- 1 Set of 5 Spanners:— $\frac{1}{4}$ " \times $\frac{3}{16}$ ", $\frac{5}{16}$ " \times $\frac{3}{8}$ ", $\frac{7}{16}$ " \times $\frac{1}{2}$ ", $\frac{1}{2}$ " \times $\frac{9}{16}$ ", $\frac{1}{2}$ " \times $\frac{5}{8}$ ".
- 1 Special Spanner $\frac{3}{4}$ " \times 1".
- 1 Oil Feeder.
- 1 Screw Wrench and Screwdriver.
- 1 Hand Hammer.
- 1 Flat Chisel.
- 1 Pair Pliers.
- 12 Assorted Split Pins.
- 6 Copper and Asbestos Joints for High Tension Plugs 1423.
- 1 Sponge Cloth.
- 1 Box Spanner for Valve Plugs.
- 1 Jet Spanner.
- 1 Spanner for Magneto.
- 1 Padlock and Key.
- 1 Cover.
- 1 Petrol Funnel.
- 1 Water Funnel (for W.B. Roller Only).
- 1 Back Roll Key (for W.B. Roller Only).
- $\frac{1}{2}$ Gallon of Oil (for Home orders put in Crankcase).
- 1 Tin of Grease.
- 1 Cone Spanner.
- 1 Box Spanner $\frac{5}{16}$ " \times $\frac{3}{8}$ ".
- 1 Tommy Bar.
- 1 Brush for Cleaning Sparking Plug.
- 3 Grease Nipples.
- 1 Adaptor.
- 1 Grease Gun.
- 2 Small Padlocks.

List of Spares and Tools Supplied

(For BG & BK 2-Speed Motor Rollers).

- 1 Set of Double Ended Spanners—
 $\frac{1}{4} \times \frac{3}{16}$ ", $\frac{5}{16} \times \frac{3}{8}$ ", $\frac{7}{16} \times \frac{1}{2}$ ", $\frac{1}{2} \times \frac{9}{16}$ ", $\frac{1}{2} \times \frac{5}{8}$ ", $\frac{3}{4} \times 1$ "
- 1 Oil Feeder
- 1 Screw Wrench
- 1 Screwdriver
- 1 Hand Hammer
- 1 Chisel
- 1 Pair Pliers
- 12 Split Pins Assorted
- 4 C.A. Joint Rings
- 1 Sponge Cloth
- 1 Box Spanner for Valve Caps (if Type " O.E.E." Engine is Fitted)
- 1 Jet Spanner
- 1 Spanner for Magneto
- 3 Padlocks and Keys
- 1 Cover
- 1 Petrol Funnel
- 1 Can of Mobiloil (for home orders put in crankcase)
- 1 Tin of Grease
- 1 Box Spanner and Tommy Bar $\frac{5}{16}$ " x $\frac{3}{8}$ "
- 1 Brush for Sparking Plugs
- 3 Grease Nipples
- 1 Adaptor
- 1 Grease Gun
- 1 Awning Spanner (when Awning is Fitted)
- 2 Locking Rods for Bonnet

