HOWARD ROTAVATOR

SERVICE BULLETIN

Date January 1961

No. A1

SERVICE INFORMATION IN 1961

Commencing with this issue a Monthly Service Bulletin will be circulated to all Distributors.

The first issue is in the nature of a brief summary of the mechanical history of each machine. At the same time, considerable revision of Instruction Books is taking place, and new Price Lists, listing spare parts in strictly numerical order have been produced.

Extra copies of Service Bulletins may be obtained on request. Please inform us if you wish to be forwarded, regularly, more than one copy, and ensure that these bulletins do reach your Service Department.

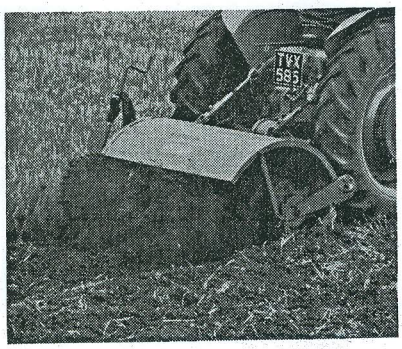
Howard Rotavators

Brief History

Side-drive machines

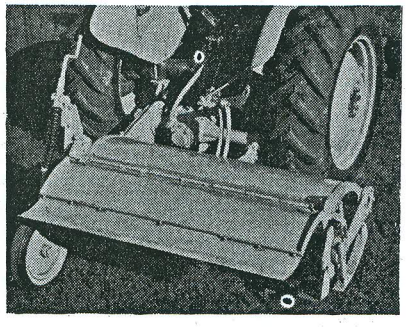
The original tractor mounted Rotavator was designed for the standard Fordson Tractor and later modified to fit the old Fordson Major. These machines were side driven from the Tractor pulley position.

'F' Series



In 1950 a new version appeared, bolting directly to the Tractor rear transmission housing, and driven from the P.T.O. shaft. These machines were equipped with large blades, had a 23½" rotor diameter and used a comparatively slow rotor speed; they were known as the 'F' type machine. The 'F' type machine was made for various other tractors, including the Nuffield and Farmall 'M'. Some models were attached to the tractors by special linkage arms, and driven through a Universal Drive Shaft.

'D' Series

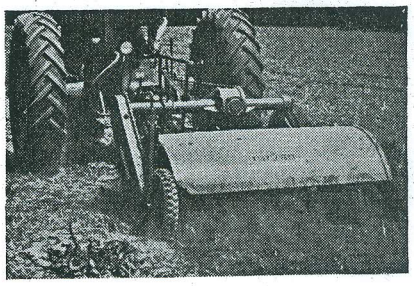


In 1949 a lighter type of Rotavator using smaller blades and a 20½" rotor diameter was introduced for use with Ferguson and Ford "Dearborn" Tractors. This was known as the 'D' type machine and was also bolted to the rear of the Tractor Transmission housing.

Later, the 'D' type machines were mounted to the tractor by special linkage arms (and were known as the 'D' type 4-point linkage tractor attachments). They were adapted for a number of tractors including the David Brown range.

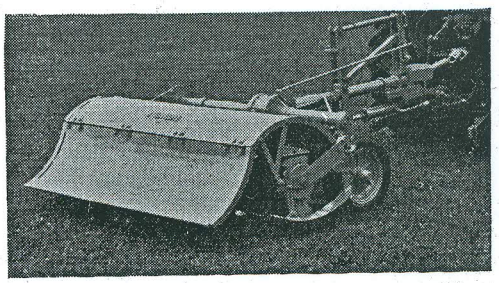
The last 'D' type which bolted directly to the tractor was Serial No. 21356, although many thousands of 4-point linkage machines had been produced before that serial number.

Trailing Rotavators



In 1952 the first Trailing Rotavator appeared which was built to the 'F' pattern and designed for tractors up to 45 h.p. In 1953 the 'D' type of Trailing Rotavator was also introduced, equipped with the same standard of rotor and drive chain etc., as the 'D' mounted machine. In 1953 also a heavier Trailing Rotavator — the 'R' type was built; this had 'F' type blades and characteristics, but strengthened frame, gearbox, etc., so that it could be used with Tractors of up to 80 h.p.

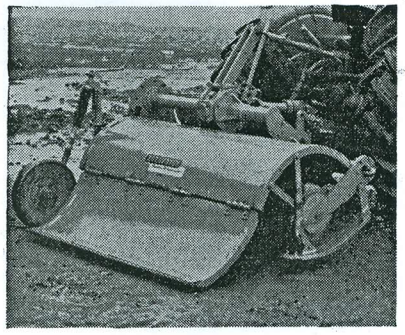
'E' Series



In 1953 the first 'E' Trailing Model Rotavator was introduced. This incorporated the popular tilth making characteristics and reduced power requirements of the 'D' Series with a Transmission and Chain Drive stressed for tractors of up to 45 h.p.

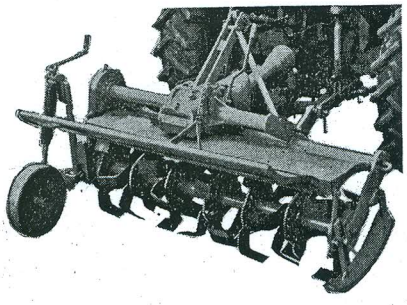
3-Point Linkage

Series I.



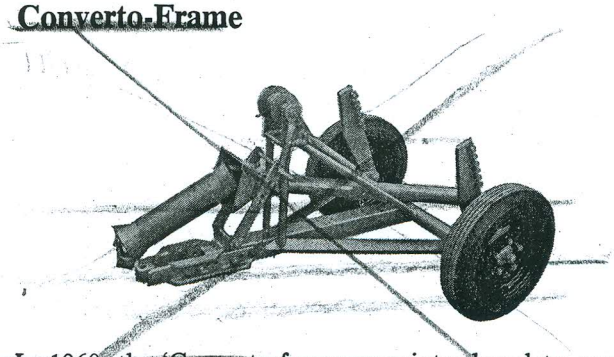
In 1954 the 'E' Mounted Rotavator appeared. This was the first Universal Mounted Machine capable of attachment to most farm tractors with 3-point linkage, and thereby superseded many special 'D' and 'F' type Rotavators which were built for individual tractor models.

Series II.



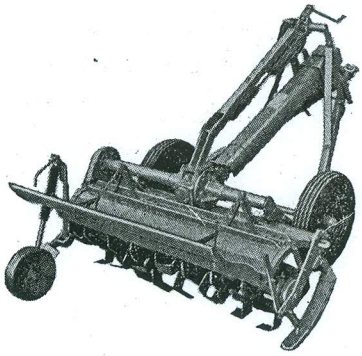
The Series I 'E' Type Rotavator ran to Serial No. 11628 and in 1958 the Series II machine commenced (Serial No. 11629). In this series the famous **Selectatilth gearbox** was introduced as an alternative to the single speed gearbox.

Converto-Frame



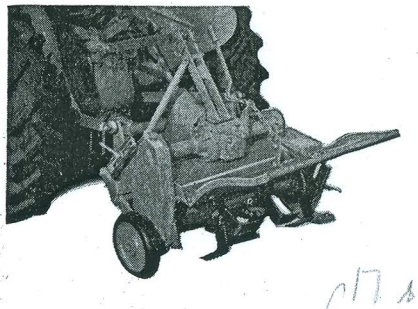
In 1960, the 'Converto-frame was introduced to enable 'E' Mounted Series II machines to be used as Trailing Rotavators.

'H' Series



In 1955 the demand for a Trailing Rotavator giving the characteristics of the 'E' Type, but suitable for tractors up to 65 h.p. was met by the introduction of the 'H' Type machine.

'P' Series



In 1958 the range of Tractor Mounted Rotavators was completed by the introduction of the 'P' Mounted model, suitable for tractors from 15—25 h.p. This was equipped with the same blade as used on the Gem hand-controlled Rotavator, and with a rotor diameter of 18".

Specials

In addition to the above-mentioned machines, special models were made for the following tractors, although, for the main part, they incorporated standard 'D', 'E', or 'F' components. These tractors included:— Ransomes M.G.6 Crawler, B.M.B. President, 'Ota' and 'Monarch', Fiat, Continental, Vierzon, A.D.N., Steyr, Renault, Uranus, Caterpillar D.4., Caterpillar D.7., and International TD.18.

'E' Mounted Rotavators

The Series I 'E' Mounted Rotavator differed from the Series II machine in the following main features:—

1. Linkage pins and Adaptor plates for mounting the machine.
2. The angle of the whole machine and chaincase in relation to the Tractor.
3. The length of the Universal drive shaft.
4. The position of the safety clutch which was on the drive end of the rotor. On the Series II machine it is in front of the gearbox.

Although a number of parts are interchangeable on both machines, they should not be confused.

'E' Mounted Series I Rotavator

Universal Joint Assemblies.

A number of splined Universal Joint Assemblies were used on the Series I machine manufactured both by Rotary Hoes Limited and Hardy Spicer Limited, and these were detailed in the 'E' Mounted Model Owner's Handbook Publication TPC/3/57. However, the splined shaft was superseded by square shaft assemblies, the numbers being 52084 HS. Universal Joint Assembly (17½") using 1⅜" yoke, and 52083 HS. Universal Joint Assembly (17½") using the 1⅛" yoke.

The following parts of these assemblies are interchangeable with similar parts on the splined type:—

Yoke P.T.O. End 1⅜" K3.4GB.1631
Yoke P.T.O. End 1⅛" K3.4GB.1851
Yoke Attachment End K3.4GB.1731
Spider Assembly K3.5GB. 148

as well as clamp bolt, nut and washer. The whole assembly is, of course, interchangeable with the splined type.

Gearbox Support Stays.

Series I 'E' Mounted Rotavators from Serial No. 10785 were fitted with support stays from the staytube to the Gearbox topmast. The parts involved were as follows:—

Part No.	Description	Quantity
54373	Tube Support	2
54336	Hexagon Spacer	1
52728	Spacer	2
	Bolt ¾" UNF. × 1¾"	2
	Nut ¾" UNF.	2
	Spring washer ¾" dia.	2

Longer bolts (⅝" UNF. x 2½" long) were used to anchor the lower end of the tube supports, and two special washers (Part No. 51619) used with these longer bolts replaced the standard ⅝" flat washers on the adaptor plates.

Back Plate Assembly. (Series I)

From Serial No. ME.7074 a new type Back plate was fitted as follows:—

Part No. 52779	—	Backplate rivet and Weld Assy.	1
„ „ 52708	—	Backplate	1
„ „ 52868	—	Jackshaft Bearing Housing	1
		Rivet ½" dia. × ⅞" long Pan Hd.	8
„ „ 52878	—	Thickening Pad	1
		Rivet ⅜" dia. × ⅞" long Pan Hd.	8

With this Backplate Assembly the thickening pad was rivetted to the backplate instead of being welded, and the Jackshaft Bearing Housing had 8 rivet holes instead of 16, and was secured with larger diameter rivets.

Depth Control Wheel. (Series I Machine).

From Serial No. ME. 7405 a new type of cast iron Depth Control Wheel was fitted in which the hub assembly was integral with the wheel. Parts involved were:—

Part. No.	Description	Quantity
51808	Depth control wheel	1
52441	Welsh Plug	3

Shield Changes (Series I)

From Serial No. ME. 8210 on 60" machines and ME 8540 on 50" machines an 'interim' type of Shield with a slide lock Trailing Board adjustment assembly was fitted. This had the Main Shield similar to the present Series II pattern, but the rear shield was made in two sections, and adjustment was made by a sliding bar and not by chain as on later machines. New parts involved were as follows:—

Part No.	Description	For	Quantity
56485	Shield 60"	use	1
56490	Trailing Board 60"	with	1
56494	Presser Plate 60"	Depth Control Wheel	1
56496	Trailing Board 60"	For	1
56499	Presser Plate 60"	use with Cam operated Skid	1

Part No.	Description		Quantity
56450	Shield 50"		1
56458	Trailing Board 50"	For use with	1
56464	Presser Plate 50"	Depth control Wheel	1
56477	Trailing Board 50"	For use with	1
56481	Presser Plate 50"	Cam operated Skid	1
56465	Reinforcing Strip		2
	Bolt ⅜" UNF. × 1¼" long	— 50"	3
		— 60"	5
	Bolt ⅜" UNF. × ⅞" long	— 50"	4
		— 60"	5
	Nut ⅜" UNF.	50"	7
		— 60"	10
	Spring Washer ⅜"	50"	7
		— 60"	10
56473	Shield Support L.H. (For Depth control wheel type)		1
56482	Shield Support L.H. (For Cam operated Skid type)		1
56483	Shield Support R.H.		1
56475	Trailing Board Adjustment Assembly comprising :		1
56467	Pivot tube		1
56468	Centre Stay		1
56469	Support Bracket R.H.		1
56470	Support Bracket L.H.		1
56471	Adjusting Tube		1
56472	Pin		1
	Bolt ⅜" UNF. × 1⅝" long		2
	Nut ⅜" UNF.		1
	Spring washer ⅜" Dia.		1
	Nyloc Nut ⅜" UNF. (NT/D/126)		2
56500	Pivot tube		1
56503	Collar		1
3912	Hook		1
56504	Chain		1
	Nut ½" UNF. (NT/D/166)		1
	Washer ½" dia.		1
	Grover Pin ⅜" × 1¼" long		1
	Bolt (Centre stay) ⅜" UNF. × 1" long		1
	Nut ⅜" UNF.		1
	Spring washer ⅜" dia.		1

R.H. Sideplate — Part No. 50655 was modified by adding a lug to accommodate Trailing Board Adjustment Assembly.

Trailing Board Adjustment (Series I)

From Serial No. ME. 8791 the slide lock Trailing Board Adjustment Assembly — Part No. 56475 — was superseded by a Chain Lift type Trailing Board Adjustment Assembly — Part No. 53660, with interim type Shields from Machines M.E. 8210 (60") and ME. 8540 (50").

Part No.	Description	Quantity
53660	Trailing Board Adjustment Assembly, comprising :—	1
53661	Centre Stay	1
53663	Side Stay — L.F.	1
53664	Side Stay — R.H.	1
	Bolt ⅜" UNF. × 1" long	1
	Nut ⅜" UNF.	1
	Spring washer ⅜" dia.	1

The Gearbox Adaptor (topmast) — Part No. 50770 was modified with a clip added in which to hook the adjuster chain, having a bolt 5/16" UNF. x 1¼" long with nut and spring washer.

Further Shield Changes (Series I)
In March 1958 (Machine Serial numbers detailed below) a further modification to the Shield was introduced, making this assembly two sections only — the Main Shield and the Trailing Board. The Trailing Board was controlled by means of the Chain Adjuster which had been incorporated in the later versions of the 'interim' type Shields.
The new part numbers were as follows:—

60" Offset Field. — From Serial No. EMO. 9354 incl. were fitted with:—

Part No.	Description
53670	Shield
54000	Trailing Board (for use with Depth control wheel).
54004	Trailing Board (for use with Cam operated Skid).

60" Centrally mounted — From Serial No. EMC. 9548 incl. were fitted with:—

53670	Shield
53672	Trailing Board (for use with Depth control wheel.
53675	Trailing Board (for use with Cam operated Skid).

60" Fully Offset (Orchard) — From Serial No. EMG. 9568 incl. were fitted with:—

53670	Shield
54011	Trailing Board (for use with Depth control wheel).
54016	Trailing Board (for use with Cam operated Skid).

50" Offset Field — From Serial No. EMO. 9502 were fitted with:—

53688	Shield
53685	Trailing Board (for use with Depth control Wheel).
53682	Trailing Board (for use with Cam operated Skid).

50" Centrally Mounted — From Serial No. EMC. 9528 incl. were fitted with:—

53688	Shield
54021	Trailing Board (for use with Depth control wheel).
54026	Trailing Board (for use with Cam operated Skid).

The above shields required new type Shield supports as follows:

53666	Shield support R.H.
53667	Shield support L.H.
53668	Shield support L.H. (For Cam operated Skids).

The same Trailing Board Adjustment Assembly Part No. 53660 as fitted from Machine Serial No. ME. 8791 was used with the later type Shields.

'E' Mounted — Series II

Amendment Sheet.
Please note that an amendment sheet to Owner's Handbook Refs. TSP/EM2/7/3/59, TSP/EM2/1B/11/59, and TSP/EM2S/1B/4/59 was issued in June, 1960, which reads as follows:—

1 **Section** Brief Specification. **Heading:** Oil Capacity.
Gearbox — Selectatilth model — should read 3½ pints (2 litres) not 2½ pints.
Gearbox — Standard model — should read 2 pints (1.1 litres) not 1½ pints.
Chaincase — both models — should read 2 pints (1.1 litres) not 1½ pints.
Note: In checking the oil level in the Rotavator gearbox, the dipstick plug should be screwed fully home before a reading is taken.

2. **Section** — Safety Clutch — Setting.
After tightening all the clutch nuts until the springs are coil-bound, the nuts should be slackened off 3 FULL TURNS (Not half a turn).
The clutch slips at this setting at a torque loading of 750-ft. lbs. (not 3,750 lbs.).

3. **Section** Lubrication and Maintenance.
Weekly Lubrication. The two sections of the universal drive shaft should be separated, cleaned and well smeared with graphited or molybdenum di-sulphided grease.

Note: Universal drive shaft — needle bearings.
It is essential that the needle bearings of the universal drive shaft have sufficient lubricant. A minimum of 60 strokes of an average grease gun (filled with gear oil S.A.E.90 or 12% lithium based grease) is needed to fill each assembly from dry and sufficient strokes must be given daily to maintain a fully lubricated condition.

4. **Section** — Parts List.
I11. No. 80 Front Extension Shaft Bearing — should read BRM.035, Ballbearing 35 mm. i.d. x 80 mm. o.d. x 21 mm. w.
I11. No. 80 Rear Extension Shaft bearing — should read RRM.035 LL. Roller bearing, 35 mm. i.d. x 80 mm. o.d. x 21 mm. w. Double Lip.
I11. No. 86 Rear Pinion Shaft Bearing — should read RRM.035 LL — Roller Bearing 35 mm. i.d. x 80 mm. o.d. x 21 mm. w. Double Lip.
Additional copies of this Amendment sheet are available on request.

Massey-Ferguson Tractors.
Since the P.T.O. shaft on the Massey-Ferguson range of Tractors does not conform to the standard SAE. pattern, the full length of spline on the yoke of the Rotavator Universal Drive Shaft is not engaged.
This is overcome by ensuring that the yoke is pushed fully on to the Shaft until the entire spline length is engaged, and then filing a groove across one spline land on the P.T.O. shaft to allow the clamp bolt to be fitted at this point (i.e. 7/16" in front of the existing groove on the shaft). This new groove should always be used for rotavating.

Safety Clutch Assembly. (Series II)
From July 1959 'E' Mounted Clutch Assemblies were fitted with strengthened Clutch Plates — Part No. 52744. From August 1959 the lipped friction disc — Part No. 52743 has been manufactured as a pressing. This new pattern disc will not fit correctly to the earlier Clutch Plate (Part No. 52744) due to the radius necessary when the lip is pressed out.
To accomodate the pressed friction disc, a .12" chamfer at 45° should be filed round the edge of the centre hole of the Clutch Plate on its back face to allow the disc to seat correctly.

Gearbox Assembly (Series II) — Selectatilth Gear compartment.

Before Serial No. 12269 gearbox Cover Plate — Part No. 53912 and Gear Support — Part No. 53194 were supplied as two separate castings.
From Serial No. 12270 the gear supports were cast integral with the Cover (53192).
From Serial No. 14725, a Mills Pin was inserted through one of the gear support pegs to stop any tendency for the reserve pair to turn when the Rotavator is lifted.

Gearbox Assembly (Series II) — Selectatilth machines. Up to Serial No. 12449, the gearbox embodied the following:—

Description	Part No.
Gearbox	53181
End Plate	53190
End Plate gasket	53191
Circlip 3″ internal	—
Extension Shaft	53182
Front extension Shaft ball bearing LS. 12½ — R.S.V.2.	

From Serial No. 12449 the gearbox embodied the following:—

Gearbox	53245
Extension Shaft	53247
End Plate W/A	53224
Gasket	53248
Circlip 80 mm. internal	—
Front Extension Shaft Ball bearing	BRM.035

From Serial No. 12535 the following changes were introduced:—

Description	New Part No.	Old Part No.
Pinion Shaft	53249	54183
Thrust washer	53254	added
Circlip 1″ external	—	added

From Serial No. 12496 a modified topmast (Part No. 54374 unchanged — interchangeable with old) was introduced together with:—

Description	New Part No.	Old Part No.
Spacer	54796	51946
Tube Supports	54895	54224

Backplate Chaincase & Chainskid, etc. (Series II)
'E' Mounted machines from Serial No. 26217 have been fitted with a new type Backplate Assembly to permit greater penetration of the blades before the Backplate and ground skid touch the ground.

Description	New Part No.	Old Part No.
Backplate W/A	61812	52704
Chaincase W/A	61814	51939
Ground Skid	61818	24848
Gasket	61816	24831
Stiffener	61817	24223

IMPORTANT. Mistakes could easily be made in supplying replacement parts, since the latest type components specified above were shown in the Owner's Handbook for some time before the modification was introduced.
Ensure that the customer states his Machine Serial No. when ordering spares.

Mounting Plates and Pins (Series II)
All machines from Serial No. 25937 have been fitted with two position Mounting Plates and detachable Mounting pins as follows:—

Part No.	Description	Quantity
53756	Mounting plate	2
53759	Mounting pin	2
3155	Tab washer	2
	Nut ⅞″ UNF.	

Lubricants: (ALL ROTAVATORS)

As stated in the Amendment Sheet (see above) it is permissible to use Lithium based grease on the Drive Shaft Spider bearings as well as on other lubrication points. The specification of this grease is as follows:—
Base — Lithium
Soap Content 8 % — 12 %
Penetration worked — N.L.G.I. — Classification No. 2.
Brand names recommended by Hardy Spicer Ltd., include:—

Esso Multipurpose Grease M.	Esso
Esso T.M.D. 1110	
Gulfsil Grease G.78 — 2	Gulf Oil
„ „ G.64A — 2	
Super Lithium 'Filtrate'	Edward Joy
„ „ 'Filtrate' EP3	
Almarine HS Grease	Fletcher Miller
Maxines Lithium Grease	Maxine
Mobil Grease M.P.	Mobil Oil
„ „ Larital No. 2	
Oilith 3	Oiline
„ Lithium L.24	
Fina Marson BTL.2	Petrofina
„ „ E.L.2	
Marfak Multipurpose 2	Regent
„ EP.2	
Shell Retinax A	
„ Alvania Grease 2	Shell
„ Alvania Grease 3	
Sternol Ambroline LRT.	Sternol
Sternoline	
Valvoline FV. 73 EP.	
„ FV. 72 Lithium Grease No. 2	Valvoline
Evco BB. No. 3 Grease	Edgar Vaughan
„ MLI. Grease	
Castroline LM.	Wakefield
Spheerol APT. 2	

'H' Type Rotavator

Depth Limit Skid
From Serial No. 7939 'H' type Rotavators were fitted with modified Depth Limit Skid Adjuster:—

Description	New Part No.	Old Part No.
Adjuster Bar	62036	2820
Stop	62037	—
Skid	62038	—
Lever	54228	—

Depth Wheel.
From Serial No. 8069 a new type Depth control Wheel Arm and Scraper were fitted:—

Description	New Part No.	Old Part No.
Wheel Arm	62521	24650
Scraper	62526	52438
Clamp	62525	2391

Alternative Shield Assemblies have been introduced in which the Main Shield is in two sections, the rear section being adjustable by choosing alternative holes in the adjusting bar type shield supports. The Rear Trailing Board is adjusted by the tripod mounted Chain Assemblies. New Part numbers are as follows:—

Rotavator	Main Shield (Front)	Main Shield (Rear)	Trailing Board
60″	61691	61688	54736
70″	54760	54766	54730
80″	61684	61681	54733

Front Tripod Assembly (2 off) consisting of Centre Stay 54759 and Side Stay 54757 (2 off).
Rear Tripod Assembly (2 off) consisting of Centre Stay 54726 and Side Stay 54396 (2 off).
and
Shield Supports consisting of:— Front Stay R.H. — 54872
„ „ L.H. — 54873
Adjusting Bar R.H. 54870
„ „ L.H. 54871
are common to all Machines.

'P' Mounted Machine

Drive Shaft: — Moss Gear Universal Joint Assemblies have been introduced to 'P' Mounted Rotavators with 1.3/8" Yokes from Serial No. 1025. For the time being 'P' series Rotavators requiring 1.1/8" Yokes will continue to be fitted with Hardy Spicer Drive Shafts. To identify the Shaft the words — "Moss Gear" appear on the lip of the Yoke on Moss Gear made shafts, while Hardy Spicer made shafts bear the letters 'H.S.'.

Assembly numbers are as follows:—

Description	Hardy Spicer Assy.	Moss Gear Assy.
1.3/8" Shaft (without Clutch)	61008 H.S.	62535 M.G.
1.3/8" Shaft (with Clutch)	Not available	62529 M.G.
1.1/8" Shaft (without Clutch)	61186 H.S.	62528 M.G.
1.1/8" Shaft (with Clutch)	Not available	62551 M.G.

Parts for the Moss Gear Shaft (1.3/8" Yoke) are as follows:—

Yoke P.T.O. End	— 3A.8D
Spider Kit	— 3A.SA.17
Yoke Att. End	— 3A. 8BB (62536)
Yoke Bar (square shaft)	— 3A. 7G.
Tubular Shaft W/A	— 3A. 7J/3A.21P
Outer Guard Tube	
Inner Guard Tube	

Safety Clutches.
Safety Clutches can only be fitted to 'P' type machines equipped with 'Moss Gear' Drive Shafts. (i.e. after Serial No. 1025). Should a customer with an existing Hardy Spicer shaft require a Safety Clutch, the whole Moss Gear Assembly must be supplied. Clutch parts are as follows:—

PART NO.	DESCRIPTION	QUANTITY
5025	Clutch Spring	6
56184	Friction Disc Lipped	1
56185	Wearing Disc	2
61159	Pressure Plate W/A	1
61651	Clutch Disc	1
61652	Friction Disc	3
61658	Clutch Cover	1
	Washer 1/2" diameter	6
	Nut 1/2" UNF.	6

Chains

'D' SERIES. On the 'D' type Rotavator 1.1/4" pitch chains were used, of several makes, including Renolds (1001-4660), Baldwin (4661-4933), Renolds (4934-6737), various German Chains (Kobo. Wipperman, Karl Moll etc.,) (6738-14620), Kobo (14621-18378) and Renolds 100 ASA (18379 onwards).

'F' SERIES. On the 'F' type Rotavator 1.1/2" pitch chains were used of two types — RENOLD B.S.S. and RENOLD A.S.A.

'H' SERIES. On the 'H' type Rotavator RENOLD Extra Strong 1.1/2" pitch chains are used.

RENOLD E.S. Link Part Numbers:

Inner Link	2215
Outer Link	2241
Connecting Link	2181
Cranked Link	2213

These extra strong links can be identified by the letters ES as well as the name Renold.

'E' SERIES. On 'E' Mounted machines up to Serial No. EM 9887 the same type of Renold ES chain was used as on the 'H' type Rotavator apart from 430 Heitmann and Bruun chains used on Serial Nos: 1977-1986 and 1997 onwards except for machines despatched to Sweden and the U.S.A.
From Serial No. EM 9888 to Serial Number 22137 both the Renolds ES Chain and a Morse 1.1/2" pitch chain were supplied. A transfer is affixed to the chaincase on all 'E' Mounted machines stating which make of chain is used.

Morse Link Part Numbers:—

Inner Link	54471
Outer Link	54472
Connecting Link	54473
Cranked Link	54474

These chains have the name MORSE stamped on the side plates of the chain links.
From Serial Number 22138 'E' Mounted Rotavators continued either with the Morse chain or with a NEW type of Renold chain. These new Renold chains have only the word 'RENOLD' stamped on the side plates of the links and have no identifying number.

New RENOLD Link Part Numbers:

Inner Link	60485
Outer Link	60486
Connecting Link	60487
Cranked Link	60488

Although complete chain assemblies of all three patterns can be fitted to any 'E' Mounted machine, individual links are not interchangeable and care should be taken in identifying the type in use when spare links are supplied.