

Forestry Commission
North East England Conservancy

THE YORK
LINING OUT PLOUGH
FOR
FOREST NURSERY WORK

OPERATING INSTRUCTIONS, ASSEMBLY
INSTRUCTIONS AND PARTS LIST.

THE YORK LINING OUT PLOUGH

CONTENTS

	<u>Page Number</u>
<u>INTRODUCTION</u>	1
20 <u>PART I OPERATING INSTRUCTIONS</u>	
1. Prior Cultivation and arrangement of boards	2
2. Use of Guide Line	3
3. Setting the Tractor Front Wheels and Markers	4
4. Setting the Tractor Rear Wheels	6
5. Fitting the Plough to Tractor and Trial Run	6
6. Setting of Plough for each row	8
7. The Sixth Row and Auxiliary Wheel	10
8. Replacement of Plough Point or Share	12
9. Instructions to Board Fillers	12
10. Modified Lining Out Boards	13
<u>PART II MAINTENANCE AND SERVICING</u>	14
10 <u>PART III ASSEMBLY INSTRUCTIONS</u>	15
(a) Tool Bar Frame Assembly	16
(b) Ploughing Assembly	22
(c) Bogey Assembly	27
20 <u>PART IV ILLUSTRATED PARTS LIST</u>	30
Sheet No. 1	31
Sheet No. 2	32
Sheet No. 3	33
Sheet No. 4	34
Sheet No. 5	35

INTRODUCTION

The York Lining Out Plough was developed by Head Forester G. A. Sharp in York forest nursery to meet the needs of a large lining out programme in an area of adequate but unskilled labour. It is not claimed that this machine will line out faster or more cheaply than a gang of fully trained men on piece work and hand methods. However, in a normal large nursery where the York plough is fully understood, one or more of the following advantages over handwork can be expected:-

- (a) Easier work. The sweat and backache is taken out of the job; labour can do overtime at peak periods without over strain. Unskilled, juvenile or female labour is satisfactory.
- (b) Lines are very straight and hence the beds much better for subsequent mechanised work - weeding, spraying, undercutting, lifting etc.
- (c) In some nurseries it has sometimes been found possible to line out with the York plough when adverse soil conditions make hand work impossible.
- (d) The plough cuts a furrow deeper than the roots so there is no danger of seedlings being planted with upturned roots.

The Lining Out Plough was built up from a two furrow Massey Ferguson plough making use of the three point hydraulic linkage and Massey Ferguson tool bar frame on which the assembly slides transversely. There are six positions for lines of seedlings at a spacing of eight inches between each line. These six lines are straddled by the tractor without further adjustment to the tractor wheel spacing. For plough in use at No. 1 position see page 9 and No. 6 position page 11.

The first prototype was put in use in 1960. As now made it is a combination of parts supplied by Massey Ferguson; those developed by Harry Potter & Son and of Massey Ferguson parts modified by Potter.

IMPORTANT

The references to parts are as follows. The prefix number indicates Sheet in Parts List and suffix number for item on the Sheet in brackets. As an example Struts Rear with Bolts will be found described on Sheet 1 item 6 i.e. 1(6).

PART I

Operating Instructions

1. Prior Cultivation and Arrangement of Boards

The land to be lined out should be cultivated by any of the recognised methods. Whichever method is used it is important that the cultivation is to the depth at which the lining out plough is designed to operate. This is six to seven inches and this depth ensures that seedling roots do not curl up when transplanted.

If the soil is light and puffy it is necessary to consolidate it by running a tractor up and down to give an initial working strip or the tractor doing the rotovating or cultivating can do this. In any case it is best done before moving any lining out equipment on to the land. Once the ten yard strip has been firmed the lining out tractor can take over any necessary firming on its empty return journeys. It may be found that further firming will not be necessary as the action of the board fillers tramping on the land may be sufficient.

Having moved the equipment on to the area and spaced out the board fillers it is best to place two of the best men at either end with the faster filler of the two at the end where the tractor commences.

In addition to filling his quota of boards the filler at the commencing end will also be responsible for winding the plough across to the new position to start another row as well as maintaining a constant 15' headland.

The other filler at the end of the line has the extra duties of allowing for the end headland of 15' and also removal of the garden line which occurs once in every six-row bed of transplants. On occasion this filler will be required to reset the garden line at the start of a new bed.

The distance which board fillers have to walk with the boards can be reduced if each filler is equipped with a board and screen. The fillers soon realise that they can safely park the screen and trestle within 7' of the tractor and plough for it follows the same track six times in succession.

In placing the boards on the trench an experienced team of fillers will adopt a method which has been found to be beneficial both to themselves and the plants. Instead of filling all the boards before placing any boards on the trench adopt the following procedure:

- (a) Assuming the lining out length is 99 yards net each filler in a team of eleven would have three boards 9' in length.
- (b) On the No. 1 row of the No. 1 bed the fillers find by trial the portion of the trench which each fillers' three boards will cover.
- (c) In dealing with the second row however, each filler only removes one of his three boards. This board is taken to the trestle, filled and placed on the newly opened out second trench exactly in line with the position this board occupied on the No. 1 trench. Thus we now have two boards still on the first trench and one on the second trench.

He then removes the second board off the first trench - the order of removal is matterless since all three can only occupy the same length of trench as before - fills this and places it alongside the No. 1 board on the second trench and again with the third board.

Meanwhile his neighbouring fillers are doing the same thing with their section of trench, with each filler confident that overlapping cannot happen.

This method cuts out any double handling of boards and ensures minimum exposure of the plant roots. In practice with an experienced team this has worked very well when more complicated factors are encountered.

Operating Instructions

2. Use of Guide Line

In laying the guide line it must be appreciated that this line is in the position of what will be the sixth row of transplants in the first bed of six lines. This will be its recurring position on every bed to be lined out.

These six rows should be eight inches apart plus a twenty-four inch alleyway, so the line must be laid five-feet four-inches parallel with the starting edge.

Whether this starting edge be the path or fence or last year's seedbeds or a continuation of the present lining out, then the procedure is exactly the same each and every time a bed of six lines of plants is lined out, provided this edge is straight.

It is necessary to have two measuring rods or stout lathes 5'4" in length at each end of the lining out area.

The line is then laid at this distance from the starting edge and is pulled very tight.

On even surfaces the line should be weighted with a spadeful of earth in the dips. It should not be allowed to remain so slack that it sags into the dips. This will merely create bends which will become very difficult when working on a one hundred and fifty yard length on a foggy day.

The pegs used for securing the line at each end must not protrude more than eight inches above the ground surface or they are liable to catch the underside of the tractor which must pass over them. Allow 15' headland before hammering in the pegs.

The guide line will be used in this position for ploughing out the first and second trenches of each and every bed of six lines.

When the second line of each bed is completed the line must be removed. This is done by the last filler at the tail end and the driver at the other end lifting the line simultaneously and casting it back onto the previously lined out bed. The driver now has a partially completed bed of two rows of plants. Only one of these rows at this stage will have the plants showing, the other row will still have plants in boards.

From this stage until the completion of the six rows the driver, with no guide line, must now use the first row which has the plants showing in order to keep straight.

To enable him to do this the tractor is equipped with a Nearside Marker which the driver folds down - having previously had it folded up so that the marker does not knock off the boards of the first trench - and aligns the tractor so that this nearside marker is directly above the first row of plants.

From here-on until the bed of six lines is completed the driver continues to use the NEARSIDE Marker on the FIRST ROW OF PLANTS.

3. Setting the Tractor Front Wheels and Markers

The Massey Ferguson Model 35 has been designed so that variable track widths of both front and rear wheels can be selected. These settings are referred to by Massey Ferguson as Wheel Centres. This means a measurement taken from the middle of the front (or rear) tyre to the middle of its opposite number. The settings are in 2" multiples and need not be of equal distance at either side of the tractor. The System is very involved and is best studied from the diagrams in the Massey Ferguson Handbook.

To set the front wheels of the tractor in position to accommodate the lining out plough the front end of the tractor should be jacked up and the Front Axle Retaining Bolts be removed.

The wheels are then spaced out so that the distance from the centre of one front tyre to the centre of the other front tyre is 70" with the wheels an equal distance from the centre of the tractor. This setting should only be obtained by extending the axles.

The other method, although approved by the Makers, of using the "dish" of the front wheels is not recommended as it interferes with the drivers view of the Markers attached to the front axle.

In replacing the axle retaining bolts care must be taken to situate the bolts so that the two specially made Markers necessary to the lining out plough can be placed on one of the retaining bolts.

The Markers are hinged so that on meeting a possible obstruction they will fold.

As the front axle of the tractor is radiused the Markers are not inter-changeable and care must be exercised so that the nearside Marker is fitted in position on the Nearside tractor axle.

Setting the Front Wheels and Fitting Markers



Operating Instructions

3. Setting the Tractor Front Wheels and Markers (Continued)

The points to which the Markers are fitted must be such as to make the bottom end of the Nearside Marker 10" from the inside of the nearside front tyre and the Offside Marker 14" from the inside of the offside front tyre. These measurements apply to a Model 35 equipped with normal 400 x 19 tyres. If this has been done correctly the distance between the bottom ends of the Markers will be 40".

Although each Marker is provided with two bolt holes only one is used. This makes the fine sideways adjustment of the Marker possible to suit individual drivers. Final adjustment should be left to the driver since his view of the Markers from the driver's seat will differ slightly from that obtained by measure. This is provided for under the Section headed "Fitting Plough to Tractor and Trial Run" in this Handbook.

In order to make sure that the Markers have been fitted the correct way round, both ends of the Markers should be extended forwards when the same reading of 40" should be obtained. An error of 1" is permissible. Should it be greater than this the bracket of the hinge will require resetting. This is best done with the tractor at hand.

Checking the Accuracy of the Markers



Operating Instructions

4. Setting the Tractor Rear Wheels

The Massey Ferguson tractor Model 35 is usually fitted with 10" section rear tyres. To minimise wheel spin on soft and wet ground conditions the permissible 11" oversize tyres are recommended.

Adjustment of the Rear wheels is carried out by reference to the diagrams in the makers handbook and should be adjusted out so that the Nearside rear wheel, measuring from the centre of the Back Axle housing, is 36" to the tyre centre of the Nearside wheel.

Similarly the Offside rear wheel should be adjusted out so that the measurement from the centre of the back axle housing to the tyre centre is 34" making a total of 70" from the centre of the nearside rear tyre to the centre of the offside rear tyre.

On completion of the rear wheel adjustment it may be found that the track of one tyre is facing the wrong way in which case the tyre must be removed and turned otherwise some loss of ground adhesion will occur.

Liquid ballast in the tubes of the rear wheels may be an advantage under certain soil conditions. In using ballast it should be borne in mind that a full tube will increase the weight of the wheel by 200 lbs. and make removal of the wheel difficult. Technically, there is nothing to prevent partial filling; a mixture of salt and water is recommended by the Massey Ferguson agents.

5. Fitting Plough to Tractor and Trial Run

In fitting the lining out plough to the tractor Brackets 5(4) and Stabiliser Bars 5(6) must be used or the plough will not operate properly.

Having checked that both Bogey Carrier Uprights 4 (3 & 4) are secured with the Bogey Release Handle 3(1 and 11), that the Arrestor Slide 2(10) is in the 'off' position and that the Control Lever 2(7) is fully depressed a new driver should operate the plough on spare land - a twenty five yard length of headland is sufficient for this purpose.

In testing the plough it is necessary for the driver to lay a length of garden line along the length of ground selected and that the line be laid six feet parallel to road, path, fence etc. He should then wind the plough across the frame to the No. 1 row position and secure with the Plough Locking Stirrup 3(12). Having done this remount and manoeuvre so that the Offside Marker attached to the front axle is above the line.

This should bring the nearside wheels of the tractor to within a foot of the road etc. mentioned above and will indicate the correct end of the line to start from.

Lower, not drop, the plough by means of the hydraulic control lever which should always be fully depressed when working and drive forward in Bottom Gear Normal and the engine at 1200 r.p.m. being sure to keep the Offside Marker above the line.

Having driven forward about fifteen yards of the total length of twenty five yards halt and check that:-

- (a) The Control Lever 2(7) is still in the fully depressed position.
If this is not so he should tighten the friction fit nut provided on the lever for this purpose.
- (b) That the bottom edge of the Landside is running on the furrow bottom.
If not the Top Link 5(5) should be lengthened.

5. Fitting Plough to Tractor and Trial Run (Continued)

- (c) That the Single Arm Disc 3(5) is cutting the land in line with the landside. Adjustment to the Disc Assembly 3(5, 6 & 13) is made by turning the Disc Stem 3(13) after having slackened the Stem Eye Bolt Nut 3(13). It is most important that the Disc Stem is not turned to such an extent that the crank is facing backwards as this will have the effect of moving the whole Disc Assembly six and a half inches backwards. This can easily pass unnoticed and, together with bad disc setting, is the most likely reason for the plough failing to function satisfactorily. After setting the disc the Stem Eye Bolt Nut 3(13) must be very tight otherwise the Disc Assembly will turn when the plough is at work.
- (d) That the Landside is pressing lightly against the furrow back. To adjust this release the two nuts on the underside of the Plough Saddle Rest 2(8) and 2(9) when the plough can be swung bodily to increase or decrease pressure exerted by the Landside on the furrow back.

Checking Plough and Tractor Rear Wheels



Having made any necessary adjustments and without disturbing the garden line remount the tractor and continue ploughing to the end of the line when the plough should be lifted out and the outfit driven back to the beginning.

Dismount from the tractor, roll up and remove the garden line, wind the plough from the No. 1 row position to the No. 6 position, check that the Nearside Marker is in the down position, remount and turn the tractor into the same wheel tracks made when ploughing out the No. 1 furrow.

This should bring the Nearside Marker exactly above the edge of the No. 1 trench in which case lower the plough and drive forward keeping the Nearside Marker on to the edge of the No. 1 trench.

Stop the tractor just beyond the point where adjustments were made when ploughing out the No. 1 trench and, without lifting the plough, measure the distance between Nos. 1 and 6 trench. The best measuring point is about two feet behind the stationary plough for, assuming that the tractor was stopped before reaching the end of No. 1 trench after the point where the adjustments could reasonably have created errors, it must be here that an accurate reading can be obtained. This reading must be 40" or five spaces of eight inches between what would have been a bed of six lines of transplants.

Should the reading be greater or less than 40" release the nut holding the Offside Marker and, without taking the Marker off the bolt, swing the bottom end of the Marker to the amount of the error and retighten the nut.

5. Fitting Plough to Tractor and Trial Run (Continued)

Do not move the Nearside Marker to make this adjustment or there will be insufficient room between the rear tyre and the board.

After marker adjustment re-test.

Procedure if rear wheel is too close to boards

If nearside rear tyre is travelling too close to boards it is important NOT to correct this by moving out this wheel. The recommended procedure is to re-set the markers as follows:

To test for this hammer two short pegs into the ground immediately below the markers. Place a brick against the Nearside and inside edge of the rear tyre, reverse the tractor about nine feet.

Move the NEARSIDE Marker by slackening the retaining bolt pulling the END of the Marker two inches towards the centre of the tractor and retighten. Slacken off the OFFSIDE Marker and move the END of this two inches towards the Offside Front Wheel and retighten.

Remount the tractor and drive forward towards the ground pegs. When the Markers are again directly above the pegs the inside edge of the rear tyre will be two inches from the brick. The effect, under working conditions, is that by adjusting the markers, clearance between tyre and board can be increased or decreased at will. In doing this always remember to check that the inside distance between the markers is still 40".

6. Setting of Plough for Each Row

The tractor position in relation to the line is that at the commencement of each and every bed of six rows the guide line must always be used in conjunction with the OFFSIDE Marker. As the line is laid 5'4" from the starting edge, to bring the offside marker of the tractor above the line the following procedure should be adopted.

Aim the inside tractor front wheel at a point midway between the fifth and sixth rows of the previous beds without actually touching the plants.

Reverse the tractor on three quarter lock to the extent of the fifteen feet headland when the straightened up position will bring the tractor square-on to the work and also bring the OFFSIDE Marker in its correct position above the guide line.

Drivers who attempt to drive the tractor into position in one lock usually end up with an untidy curve at the beginning of some of the rows of plants and create unnecessary danger with the scything rear end of the plough.

Operating Instructions

6. Setting of Plough for Each Row (Continued)

After the tractor is in position the following drill should be gone through to make the plough ready for lining out:-

For First Row

- (a) Fold up the Nearside Marker.
- (b) Wind the plough across the frame to the No. 1 row position.
- (c) Release the spring Arrester Slide 2(10). This controls the Firming Wheels 5(3) and Shock Absorber Spring 2(12). As no firming is required on the No. 1 row the pressure on the firming wheel is released with the Spring Arrester Slide.
- (d) Press down the Control Lever 2(7). This lever controls the Main Dozer Blade 2(2). The purpose of the Main Dozer Blade is to return soil to the opened out trench. As there is no soil to return to the No. 1 trench the blade is rendered inactive when the Control Lever is depressed.
- (e) Ensure that the Offside Marker is folded down.
- (f) Remount the tractor and lower the plough by means of the hydraulic lever which must be fully depressed when the plough is working.
- (g) Engage Bottom Gear Normal and drive forward at 1200 r.p.m. always keeping the Offside Marker sighted onto the Guide Line.

Having completed the ploughing out of the first trench drive the outfit back to the point of commencement adopting the same positioning procedure as for the No. 1 trench bringing the tractor to rest in the same wheel tracks as for the No. 1 trench.

The First Row



6. Setting of Plough for Each Row (Continued)

For Second and Subsequent Rows

Dismount from the tractor and make the plough ready for the No. 2 trench as follows:-

- (a) Move the Spring Arrester Slide across so that the Slide is holding down the Shock Absorber Spring.
- (b) Wind the plough across the frame to the No. 2 row position.
- (c) Lift the Control Lever to its highest point. This has the working effect of gathering maximum soil to return to the No. 1 trench. Maximum soil is only required for the first 6' of travel when the Control Lever must be moved to its best operating position, usually midway.
- (d) Remount the tractor and proceed exactly as for the No. 1 row, keeping the Offside Marker sighted on to the guide line.

At the completion of this row the guide line is removed and cast back on to the previous bed. From here on until the completion of the six rows the Offside Marker is inoperative with the driver switching his attention to the Nearside Marker which he should fold down.

Except for winding the plough across to the Nos. 3. 4. 5. and 6 rows and the lifting of the Control Lever to maximum gather for the first six feet and returning it to normal thereafter the plough requires no further attention from the driver.

Without the Guide Line



7. The Sixth Row and Auxiliary Firming Wheel

The plough being designed to fill in one trench and simultaneously plough out another has to be specially adjusted after filling in the fifth row and ploughing out the sixth so that it fills in the sixth trench without ploughing out a seventh.

7. The Sixth Row and Auxiliary Firming Wheel (Continued)

To adjust the plough so that only the sixth and final row in a bed is filled in proceed as follows:-

- (a) Raise the plough on the hydraulic three point linkage.
- (b) Slacken Bogey Release Handles 3(1 and 11) taking care to keep the feet away from the Stabilising Disc 4(5 & 6).
- (c) Wind the plough to No. 3 position on the frame.
- (d) When the Bogey Carrier Uprights 4(3 & 4) have descended to the limit of the Stop Bolt situated at the top of the Upright retighten the Bogey Release Handle.
- (e) Remove the Nearside Land Wheel 5(3) and fit this to the Auxiliary Firming Wheel Axle 2(4). The legs of the split pin holding this wheel are not splayed so as to make removal easy.
- (f) Fit the Stub of the Auxiliary Dozer Blade 2(1 & 3) into the Socket 4(4) in the Auxiliary Dozer Blade Arm 4(4). No securing device has been made for the Auxiliary Dozer Blade as the pressure of soil will keep it in place.
- (g) Lay the guide line 5'4" from the boards on the open sixth trench. This line in addition to serving as a guide to fill in the sixth trench will also be used in this position to plough out Nos. 1 and 2 trench of the next bed. The line should therefore be pulled tight and straight.
- (h) Square the tractor on the line as for lining out except that the guide line must be used as such at a point under the tractor to be found on experiment by the driver. This point will be decided when the Auxiliary Dozer Blade and Firming Wheel are in the correct position to fill in firm the sixth row. The idea of providing a third marker for this purpose was rejected as unnecessary.

To return the plough to normal:-

- (a) Lift off and store on the plough frame, the Auxiliary Dozer Blade.
- (b) Take off the Auxiliary Firming Wheel and return to its Land Wheel position.
- (c) Lift the Nearside and Offside Bogeys to the stop provided and secure with the Bogey Release Handle. The plough is now ready for the adjustments relative to ploughing out of the No. 1 trench

Plough Converted to Filling in 6th Row



Auxiliary Firming Wheel

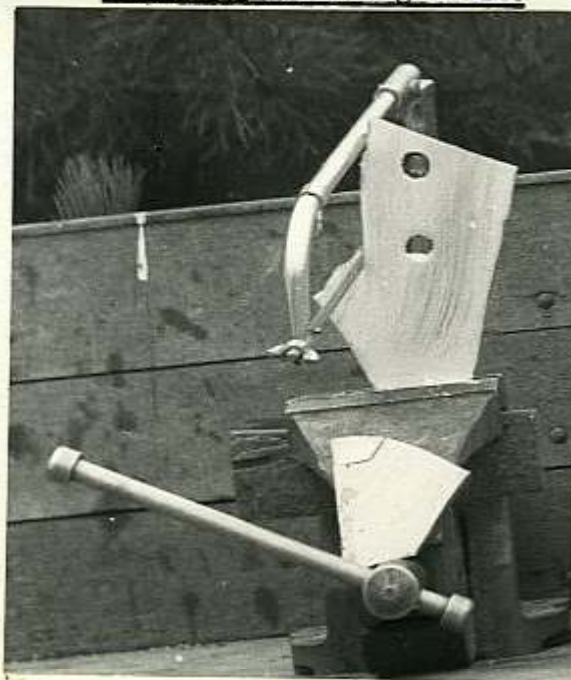


Operating Instructions

8. Replacement of Plough Point or Share

The Massey Ferguson plough point (or Share) used is as fitted to the normal 10" plough. It is the 'round-nosed' type. Modification of the point to suit the lining out plough is done by removing the wing of the point. To do this a high speed steel hack saw blade is used with the plough point gripped by its nose end in the vice.

Modifying the Plough Point



9. Instructions to Board-Fillers

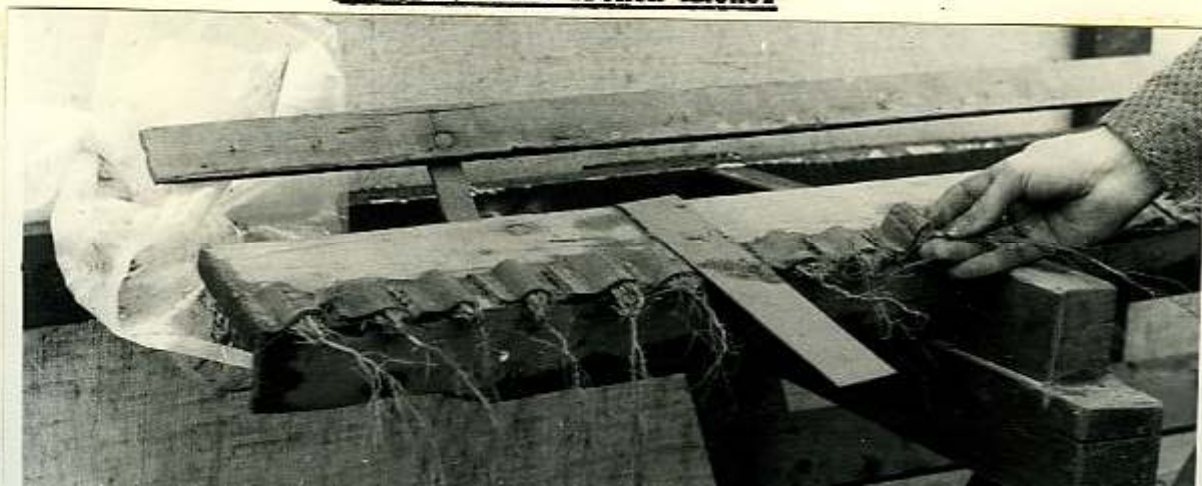
Board filling is much the same as practiced in standard procedure. In carrying the board to the trench however the fillers must remember to step over the tractor Guide Line for the first two rows. They must also scoop soil against the boards on the first row only. This will prevent the vibration caused by the tractor passing near the boards dislodging them.

On some lining out lengths, especially those with converging ends, the board fillers must maintain the 15' headland necessary for the tractor to manoeuvre into position. In such cases the use of a specially short board at the tail end of the line can be available but where the gap is less than a few feet this must be shared out along the lines of boards.

In filling the new type rubber clip boards, seedlings must be placed in the boards with the root collars $\frac{3}{4}$ " below the rubber clips.

Four inch spacing is achieved simply by not filling every other rubber clip.

Showing Root Collars Below Clips and Hoop Iron Trench Anchor



Operating Instructions

10. Modified Lining Out Boards

In place of the usual method of gripping the plants between lengths of Sorbo rubber fixed to the boards, clips cut out from worn cycle tubes are used at York.

Removal of the wire edge of the tyre is done by 'surforming' or rasping the canvas holding the wire. Cutting of the tyre on the inside of the wire in order to effect removal of the wire renders the tyre useless for making clips.

The transverse cutting to make the clips is simplified by using a pair of modified Garden Shears. One handle of the shears is removed and the exposed steel core bent down at right angles. This is made fast in a block of wood, which in use, is gripped in the vice. Operation of the remaining handle effectively guillotines the tyres into $1\frac{3}{4}$ " lengths; each length being subsequently halved down the centre to make two clips.

Assuming an average spacing of 2" between plants then with a 10 foot board the clips are nailed to the edge of the board at $1\frac{7}{8}$ " spacing using two $\frac{5}{8}$ " galvanised nails to each clip. The shorter divisions between clips makes up for space lost by trench anchor i.e. the 10 foot board will contain 60 plants at $1\frac{7}{8}$ ". The bottom of the board which lies on the soil when the board is in position is not greater than five to six inches in width otherwise there is insufficient room between the board and the tractor tyre.

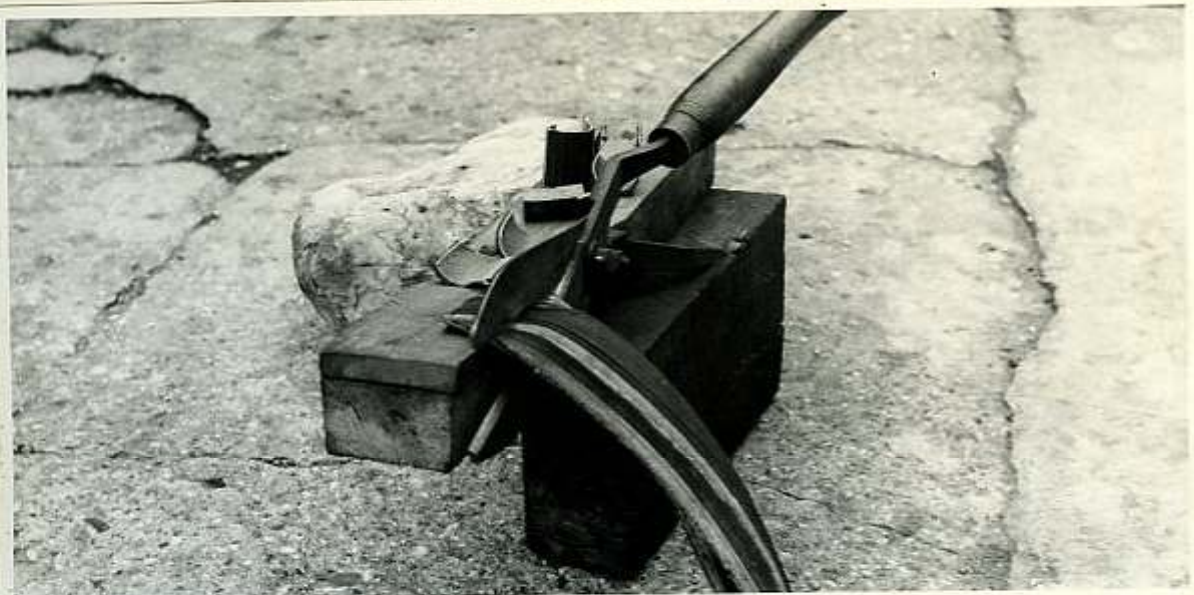
When filling in the trench with the boards in position the weight of the soil is liable to move the board. To prevent this two 11" lengths of hoop iron are bolted to the front of the board in place of two rubber clips eight to ten inches from either end of the board.

In use the board is placed on the trench with the hoop iron anchor resting against the back of the trench. It is unnecessary to use any other form of keeping the board in place on the trench e.g. steel pegs etc. (See photograph on page 12).

Board Hinges

The normal board hinges retaining the wooden flap, which protects the plants against scrubbing by the smoothing plate on the plough, usually stand too high above the board to pass under the tractor when the board is in place. These hinges should be modified so that the total height of the board is no more than seven inches. In carrying out the modifications the two lengths of hoop iron at either end of the board, used for keeping the board on the trench can be extended so that these form the back uprights of the hinges (not shown in photograph). Holes $\frac{5}{8}$ " dia. require to be drilled near the top of the hoop iron to make a free swinging hinge.

Cutting the Rubber Clips (wood block not in vice)



PART II

Daily Maintenance and Servicing By Operator

1. REMOVE ANY SOIL ADHERING TO THE PARTS AND WIPE OVER WITH OILY CLOTH BRIGHT WORKING FACES I.E.
 - (a) Underside of Smoothing Plate
 - (b) Working face of Landside
 - (c) Mould Board
 - (d) Plough Point or Share
 - (e) Main Disc
 - (f) Stabilising Discs
 - (g) Main Dozer Blade
 - (h) Auxiliary Dozer Blade
2. Liberally oil the Slide Tubes using a light grade of oil such as S.A.E.10 or 20. When working in dusty conditions it may be necessary to wash the tubes in paraffin before oiling.
3. Liberally grease the Land and Firming Wheels
4. Check tyre pressure of Land and Firming Wheels
5. Grease Main Disc and Stem and Stabilising Discs
6. Oil Winding Gear Chain and Sprockets
7. Lightly oil 3" x 1" Uprights
8. Oil working parts of Smoothing Plate
9. Oil Main Dozer Slides and Lever parts
10. Oil Hinges on Firming Wheel Swinging Arm
11. Oil Frame Runner Wheel
12. Oil Bogey Release Handles

PART III

Assembly Instructions

The Lining Out Plough is designed so that it can be assembled in three main stages.

- These are:-
- (A) Tool Bar Frame Assembly
 - (B) Ploughing Assembly
 - (C) Bogey Assembly

To assist further in the construction these three main stages are described in seven separate operations beginning with a list of components required at each stage.

(A)

Stage 1 Tool Bar Frame Assembly

Dealing with:- Tool Bar Frame 86" - Frame Struts - Frame Brackets - Mid and Nearside Bolsters - Nearside Chain Sprockets.

Stage 2 Tool Bar Frame Assembly

Dealing with:- Slide Tubes - Runner Wheel - Plough Saddle - Chain Anchor - Frame Pillar - Frame Runner - Swivel Bolt - Chain Anchor Plate.

Stage 3 Tool Bar Frame Assembly

Dealing with:- Offside Bolster - Offside Winding Gear - Release Handles - Winding Chain - Locking Devices.

(B)

Stage 4 Ploughing Assembly

Dealing with:- Plough Beams - Plough Beam Spacer - Plough Saddle Rests - Pressure Spring Guides and Slides.

Stage 5 Ploughing Assembly

Dealing with:- Plough Bottom - Mould Board - Landside - Main Dozer Bars - Lever Linkage.

Stage 6 Ploughing Assembly

Dealing with:- Dozer Control Lever - Firming Wheel Swinging Arm - Pressure Spring - Smoothing Plate - Single Arm Disc.

(C)

Stage 7 Bogey Assembly

Dealing with:- Bogey Carriers - Aux: Dozer Blade - Plough Depth Adjustment - Stabilising Discs and Adjustment - Firming Wheel Platform - Dunlop Land Wheels - Stabilising Bars - Rear Axle Housing Brackets.

In the following instructions the figures behind each part description refers to the Illustrated Parts List. As an example Struts Rear with Bolts will be found described on Page 1 item 6 and illustrated in photograph 1 with the number 6 beneath.

(A) TOOL BAR FRAME ASSEMBLY

Stage 1 To complete this stage of the Tool Bar Frame Assembly the following components are required:-

- Tool Bar Frame 86" with strengthening Channel and Tie Bars 4(2)
- Struts Rear with Bolts 1 (6)
- Struts Front with Spacer, Pin Stopper Lug and Bolt 1 (7)
- Pins with Nuts and Washers 1 (1)
- Brackets Front with Bolts and Nuts 1 (2)
- Brackets Rear with Nuts and Bolts 1 (5)
- Nearside Bolster with Bogey Release Handle 3 (1)
- Mid Bolster with Chain Sprocket Retaining 3 and Adjusting Fork 3 (8)
- Winding Gear Chain Sprocket with Washer and Retaining Nuts 3 (9)

Method of Assembly

Support the Tool Bar Frame on two oil drums using the Strengthening Channel as the front of the Frame with the Tie Bars to the top.

Bolt on tightly the Brackets Front and Rear to the Channel in the gaps cut for the purpose. It is important that the bolts holding the Brackets to the Frame be inserted through the Frame and then through the Brackets otherwise the extra width of the spring washer and nut will interfere with the transverse action of the plough.

Loosely bolt on the Front and Rear Struts to the insides of the Brackets making sure that the Pins used to secure the Front Brackets have the stubs facing outwards and keeping the holes near the Pin ends vertical.

While the Struts are still loosely bolted bring the four unattached ends of the Struts together to form an apex. Feed the Pin Stopper Lug on to the apex bolt and insert the bolt into the offside pair of holes in the Front and Rear Struts in that order.

Place the Spacer on to the apex bolt protruding through the Struts and follow with the Rear and Front Struts in this order. Loosely apply Nut.

Test that the tractor Top Link will enter the gap in the Struts created by the Spacer after the Apex bolt is temporarily tightened. The Top Link should be an easy fit without excessive side play.

Slacken off the apex nut and thoroughly tighten the bolts and Pins left loose in the Struts. Should the apex bolt be tightened before the Strut bolts and Pins the Struts will probably work loose due to a bad matching face between Bracket and Struts and as the Pins are subjected to great strain by the draw bar pull of the tractor it is important that they be tight.

Bolt on the Mid Bolster to the underside of the Frame using the 16th and 20th holes in the Frame as counted from the nearside keeping the Chain Sprocket Retaining and Adjusting Fork on the nearside.

Assembly Instructions

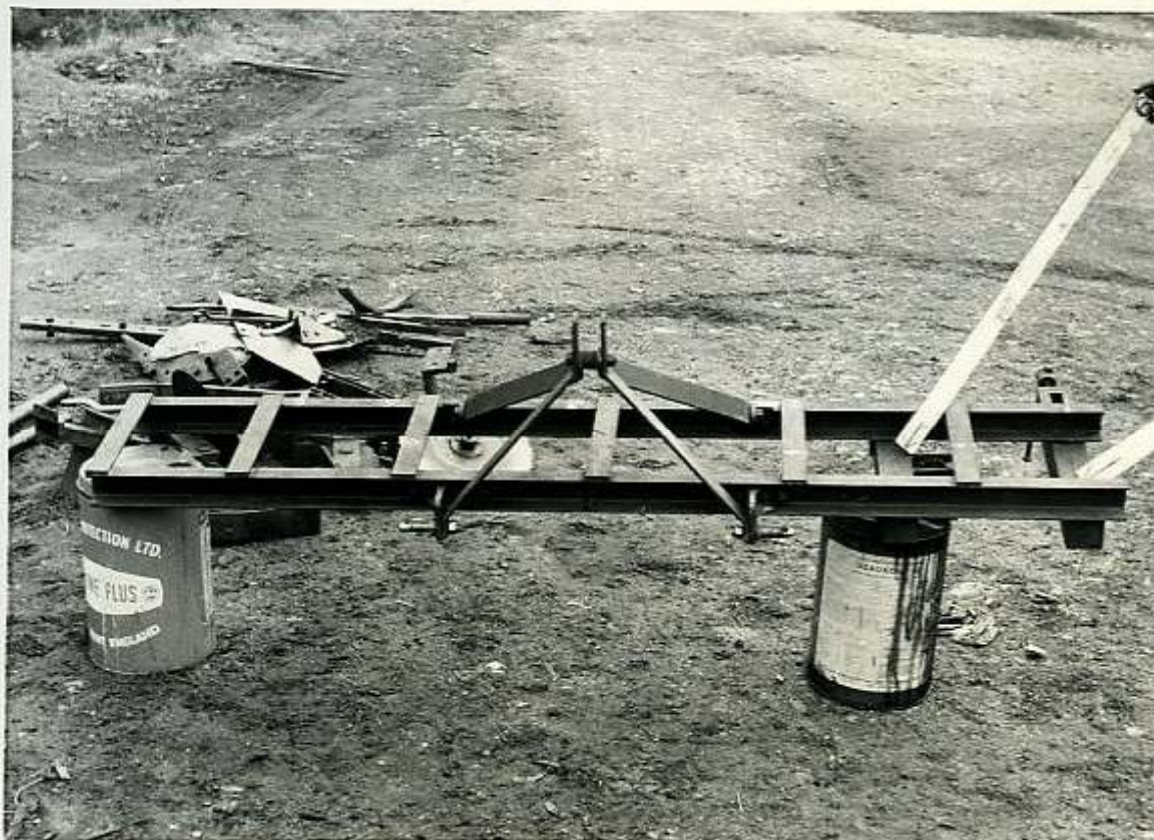
Stage 1 Method of Assembly (Continued)

Thoroughly tighten the Bolster bolts.

Loosely fit the Chain Sprocket into the Adjusting Fork.

Tightly bolt on the Nearside Bolster to the underside of the Frame using the 1st and 5th holes in the Frame as counted from the nearside keeping the Bogey Release Handle and the 3" x 1" slot in the Bolster to the rear.

Showing Tool Bar Frame and Front and Rear Struts with Mid and Nearside Bolster



Stage 2 Tool Bar Frame Assembly

To complete this stage the following components are required:-

Two Plough Slide Tubes 4 (1)

Tool Bar Frame Runner Wheel complete with Axle and Nut 3 (2)

Sliding Plough Saddle comprising Tube holes for Plough Slide, Tool Bar Frame Runner Wheel Bracket (upright at rear with holes), Locking Spring Retaining Stub (small rear), Plough Fixing Lug (flat rear with hole), Chain Anchor (centre with four bolts fitted), Rear Frame Pillar (welded on to Saddle behind Chain Anchor), Fixed Frame Runner (in front of Chain Anchor) Swivel Bolt (front centre) complete 3 (3).

Chain Anchor Plate (four holes) 3 (4)

Assembly Instructions

Stage 2 Tool Bar Frame Assembly (Continued)

Method of Assembly

For safety and convenience the partially assembled Frame as described in Stage 1 should now be mounted on the tractor 3 point linkage.

With the Frame lifted as high as possible on the tractor hydraulics proceed by placing the Sliding Plough Saddle on the ground mid way along the length of the Frame resting on the large Swivel Bolt which should be towards the tractor.

Slide the interchangeable Plough Slide Tubes through the holes provided in the Plough Saddle until roughly mid way along the Tubes.

The Tool Bar Frame Runner Wheel should now be slipped on to its axle and fitted to the inside of the Runner Wheel Bracket keeping the Wheel Rim against the Bracket. The head of the Runner Wheel Axle has been specially reduced in width in order to miss the Frame Bracket bolt heads when the Plough Saddle is wound across the Frame.

Remove the Nuts and Washers from the four Bolts in the Chain Anchor and place the Chain Anchor Plate on to the Bolts leaving the Plate as loose as the Bolts will permit.

Tool Bar Frame on 3 Point Linkage



Assembly Instructions

Stage 3 Tool Bar Frame Assembly

Additional components necessary for the completion of the Tool Bar Frame Assembly are:-

Offside Bolster complete with Offside Winding Gear Chain Sprockets and Winding Gear Handle 3 (10)

Offside Bogey Release Handle 3 (11)

Winding Gear Chain Motorcycle with Spring Link 3 (7)

Locking Spring and Locking Lever 3 (4)

Locking Stirrup 3 (12)

Method of Assembly

With the aid of two mechanics one at either end of the Slide Tubes lift the Tubes complete with Saddle taking care to avoid tilting the Tubes as injury could occur if the Saddle happened to slide quickly down steeply angled Tubes.

Still supporting the Tubes manipulate the Runner Wheel and Fixed Frame Runner over the offside ends of the Tool Bar Frame.

The Runner Wheel is designed to travel along the line of holes drilled at 1" intervals in the rear Frame angle, and the Fixed Frame Runner along similar holes in the front Frame angle.

As soon as the Runner Wheel and the Fixed Frame Runner are entered on to the Frame angles the Tubes and Saddle can be pushed along the Frame until the nearside ends of the Tubes enter the holes provided in the Mid Bolster.

The use of a wooden mallet to drive the Tubes firmly into the holes is recommended since any burring caused by hammer blows on the offside ends of the Tubes will cause difficulty in fitting the Offside Bolster.

Fit the Offside Bolster, which includes the Winding Gear Handle, to the offside ends of the Tubes with the Winding Gear Handle and the 3" x 1" slot in the Bolster to the rear of the Frame. Should this prove difficult because of the fixed bolts protruding through the Offside Bolster this can be overcome by sliding the Saddle close to the Mid Bolster. This will have the effect of allowing the Tubes to sag sufficiently to make the fitting of the Bolster easy.

Assembly Instructions

Stage 3 Tool Bar Frame Assembly (Continued)

Bolt the Offside Bolster into its position on the Frame using the 5th and 9th holes in the Frame as counted from the offside.

Lightly screw the interchangeable Bogey Release Handle into the hole provided in the end of the offside Bolster.

Slide the Plough Saddle towards the offside to within approximately 12" of the Offside Bolster preparatory to fitting the Winding Gear Chain.

Lower the Frame by means of the hydraulics to approximately mid way.

Engage one end of the Chain between the Chain Anchor and the Chain Anchor Plate until not more than 4" of the Chain protrudes through the nearside of the Anchor.

With the Chain held against the bottom edge of the upper pair of bolts tighten the Chain Anchor Plate by means of the four bolts. The Plate should now be gripping the Chain by means of the Chain rivets.

Fitting the Winding Gear Chain to the Chain Anchor Plate



Assembly Instructions

Stage 3 Tool Bar Frame Assembly (Continued)

The long end of the Chain must now be worked over the Offside Chain Sprocket then through the hole made for the purpose in the Offside Bolster, back over the Saddle immediately below the anchored end of the Chain, through the hole made for the purpose in the Mid Bolster, over the Adjustable Chain Sprocket to join up by means of the Spring Link to the 4" trailing end left protruding through the Chain Anchor.

The correct Chain tension may now be obtained by levering the Adjustable Sprocket and thoroughly tightening the Sprocket Axle Nuts.

By means of the Winding Gear Handle it should now be possible to test the Winding Gear by turning the Handle attached to the Offside Bolster. This will have the effect of sliding the Plough Saddle backwards or forwards along the Tubes. In the process, oiling of the Tubes, Chain Sprockets and Winding Handle bearing can be undertaken.

Engage the Plough Locking Lever between the lugs welded on to the Plough Saddle and bolt to a friction fit.

Press the Locking Spring between the Locking Spring Retaining Stub welded to the Plough Saddle and the Stub welded to the Locking Lever.

Test the Lever for efficiency by inserting the Plough Locking Stirrup in holes in the rear Frame angle about 12" from the Offside Bolster and on the offside of the Plough Saddle when, by winding the Plough Saddle along the Tubes the Locking Lever will snap into the gap cut for the purpose in the Locking Stirrup.

Mounting the Sliding Plough Saddle using the Plough Slide Tubes



Assembly Instructions

(B) PLOUGHING ASSEMBLY

Stage 4 Ploughing Assembly

The following components are required for the completion of this stage:-

Plough Beam Long with Bolts 1 (3)

Plough Brace Beam with Bolts 1 (4)

Plough Beam Spacer 2 (5)

Plough Beam Saddle Rest (Brace Beam Side) with Control Lever Depth Adjuster Lug and Slot (with separate Bolt) and Control Lever Fulcrum (with Bolt in position) 2 (8)

Plough Saddle Rest (Main Beam Side) with Main Firming Wheel Spring Bar Slot and Pressure Spring Arrestor Slide Guides 2 (9)

Pressure Spring Arrestor Slide 2 (10)

Method of Assembly

Loosely bolt the Plough Beam Spacer between the Long Beam and the Brace Beam keeping the large Swivel Bolt hole to the Front. For ease of subsequent tightening the two front bolts should be put through from the inside.

By means of an oil drum support the assembled Plough Beam Spacer and Beams in an upright position.

Push the Pressure Spring Arrestor Slide into the Pressure Spring Arrestor Slide Guides - it is not possible to do this after bolting the Plough Saddle Rests to the Plough Beams.

At one operation and using the two long bolts fit the Saddle Rest, (Main Beam Side), the Main Beam, Brace Beam, and Saddle Rest (Brace Beam Side) on to the two Long Bolts.

Thoroughly tighten the four bolts in the Beam Spacer and the two long bolts through the Saddle Rests.

Main Beam and Brace Beam Assembly



Assembly Instructions

Stage 5 Ploughing Assembly

Components necessary for the completion of this stage are:-

Plough Bottom with Bolts 1 (8)

Mouldboard with Bolts 1 (9)

Landside with Bolts 1 (10)

Smoothing Plate Spring Adjuster Lug 2 (15)

Landside Rib and Bolts 1 (12)

Main Dozer Bars L and R (right with Dozer Blade Stop) 2 (6)

Mouldboard to Landside Stay 1 (13)

Lever Linkage and Bolts 2(7)

Method of Assembly

Bolt the Plough Bottom loosely to the nearside of the Main Beam using the one central bolt only. This bolt, in having a hexagon head, must be inserted through the Plough Bottom and then through the Main Beam in this order. Before screwing on the nut of this bolt include the Smoothing Plate Spring Adjuster Lug.

Loosely bolt on the Landside using the long cup square bolt at the top. This bolt, together with the shorter cup square bolt at the Landside bottom secures the Landside to the Main Beam via the Plough Bottom.

Insert the small cup square bolt holding the nose of the Landside to the Plough Bottom only.

Follow by tightening the hexagon headed bolt securing the Plough Bottom to the Main Beam first as, with the bolt head situated between the Landside and the Plough Bottom, it will be difficult to hold the bolt head with the normal spanner if the cup square bolts are tightened before this.

In order to make a flush fit of the two cup square bolts holding the Landside to the Plough Bottom and Beam it will probably be necessary to hammer the cup heads at the same time tightening the nuts.

The small cup square bolt in the nose of the Landside can now be gently tightened.

The Landside Rib can now be bolted on to the top edge of the Landside. The centre bolt should be left slack and is the longest of the three bolts. This bolt will be used later for the additional purpose of attaching the Smoothing Plate Bracket.

Bolt on the Mouldboard, Mouldboard to Landside Stay and tighten all together.

Assembly Instructions

Stage 5 Ploughing Assembly (Continued)

Insert the Main Dozer Bars into the square holes provided in the Beam Spacer with the offside Bar to which is welded the Main Dozer Blade Stop having the Stop facing rearwards.

Careful fitting of the nearside Bar is required in seeing that the retaining bolt hole in the Bar is lined up with the hole in the square socket.

Insert the two retaining bolts and tighten.

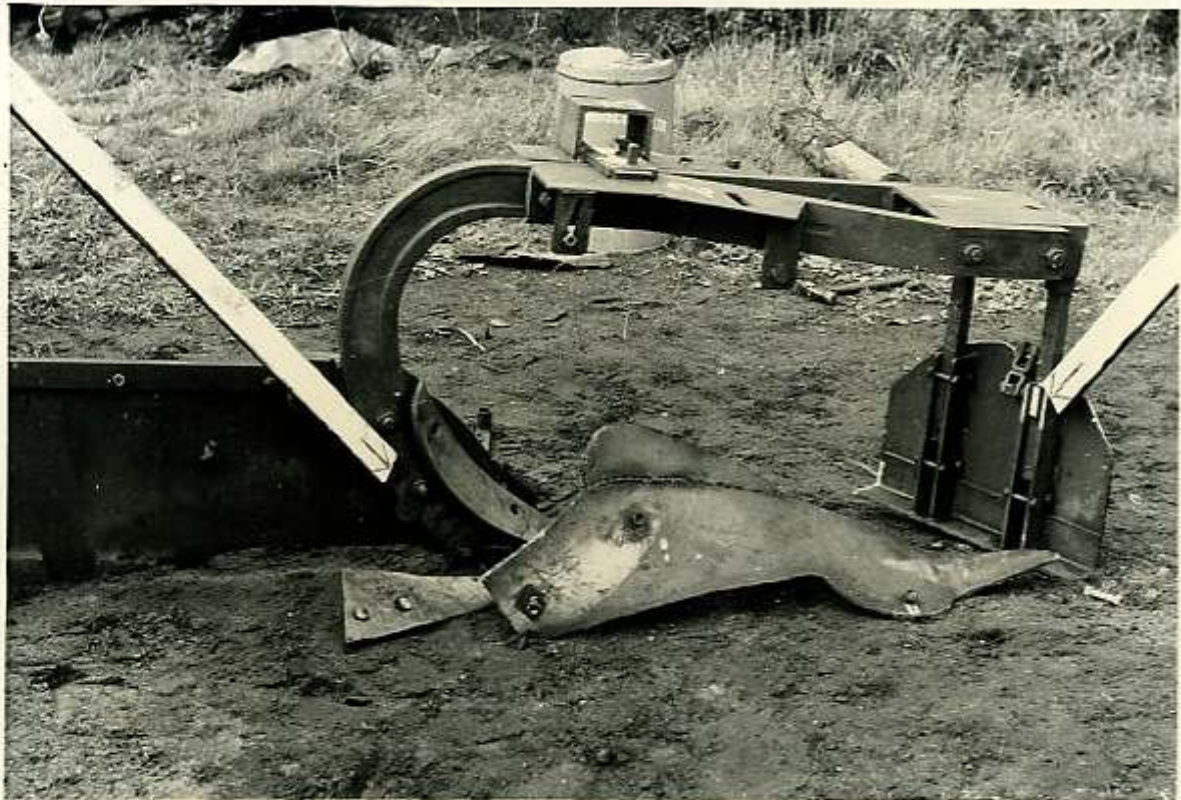
Fit the Lever Linkage to the stub on the Main Dozer making a friction fit.

Take out the one easily removable bolt from the Main Dozer Blade, it being only necessary to remove this particular bolt in order to slide the Blade up the Bars with the other Blade bolts in place.

Move the Blade up the Bars sufficiently for the bolt hole in the Dozer slide to clear the Dozer Blade Stop and insert the bolt and tighten.

It is undesirable at this stage to fit the plough Point.

Plough and Main Dozer Blade



Assembly Instructions

Stage 6 Ploughing Assembly

Necessary components to complete this stage are:-

Main Dozer Blade Control Lever 2 (7)

Main Firming Wheel Swinging Arm and Stub Axle with Main Pressure Spring Plunger Bar and Bar Collar with Washers and Split Pin 2 (13)

Main Firming Wheel Swing Bar Hinged Adjuster and Bolt 2 (11)

Motor Cycle Shock Absorber Spring 2 (12)

Smoothing Plate with Swing Bar, Tie Chain, Bracket, Bolt and S/P 2 (14)

Smoothing Plate Down Pressure Spring, Side Pressure Spring, Swinging Bar Collar and Lug 2 (15)

Single Arm Disc Stem and Split Pin, Stem Clamp, Stem Eye Bolt with Nut and Washer, Stem Clamp Bolt and Nut 3 (13)

Single Arm Disc Arm, Disc Bush, Washer and Set Bolt 3 (5)

Method of Assembly

Fit the centre hole in the Dozer Blade Control Lever to the stub bolt on the Brace Beam Saddle Rest with the Bend at the forward end of the Lever upwards.

Manipulate the Lever Linkage attached to the Main Dozer Blade and bolt the Linkage to the Lever making a friction fit.

Match up the bolt hole nearest the handle of the Lever to the slot on the Lug welded to the Brace Beam Saddle and insert bolt to friction fit.

Tightly bolt the Main Firming Wheel Swinging Arm Hinged Adjuster to the underside of the Main Beam Saddle Rest leaving approximately $\frac{1}{2}$ " of the Adjuster showing. The bolt securing the Adjuster to the Rest must be inserted downwards otherwise the plough cannot be fully wound to the No. 1 row position.

Place the Shock Absorber Spring on to the Pressure Spring Plunger Bar and follow with the Bar Collar.

Push the Plunger Bar up through the Spring Bar Slot in the Plough Saddle Rest at the same time pushing the Swinging Arm into the gap of the Hinged Adjuster. The head of the Adjuster bolt has been reduced to prevent scrubbing on the Firming Wheel tyre.

Fit Nut and Washer to the Plunger Bar Protruding through the slot in the Plough Saddle Rest.

Push the Swing Bar of the Smoothing Plate through the lower of the two exposed holes in the Plough Bottom and place on to the protruding end of the Bar the Swing Bar Collar and Lug.

Insert bolt and tighten.

Fit the Smoothing Plate Spring to a hole in the Swing Bar Lug and a hole in the Spring Adjuster Lug attached to the centre bolt on the Plough Beam.

After fitting keep the Spring taut by raising the Smoothing Plate and while raised fit the Tie Chain Bracket to the long bolt left slack in the centre of the Landside Rib.

Fit the Side Pressure Spring to the two stubs on the Smoothing Plate. Should this Spring have been lost or mislaid a temporary effective fit can be arranged by using two $\frac{1}{2}$ " rubber bands cut from a cycle inner tube.

Loosely bolt the Stem Clamp to the Main Beam nearside and insert the Eye Bolt through the slot in the Clamp, on through the Main Beam and apply spring washer and Nut but do not tighten.

Assembly Instructions

Stage 6 Ploughing Assembly(Continued)

Fit the Disc Bush on to the Main Disc Stub and secure with Washer and Set Screw.

Push the Disc Arm on to the Disc Bush being extremely careful to align the retaining cup in the Bush to the Set Screw hole in the Disc Arm.

On insertion of the Bush carry out a visible check that the Bush Cup has lined up with the Set Screw hole otherwise loss of the Disc and small parts will occur when working.

Insert Set Screw.

With the Disc held upright swing the Disc Arm up to an angle of approximately 45 degrees and insert Disc Stem and Split Pin. This method will prevent the Stem being put on upside down.

Temporarily fit the Plough Point.

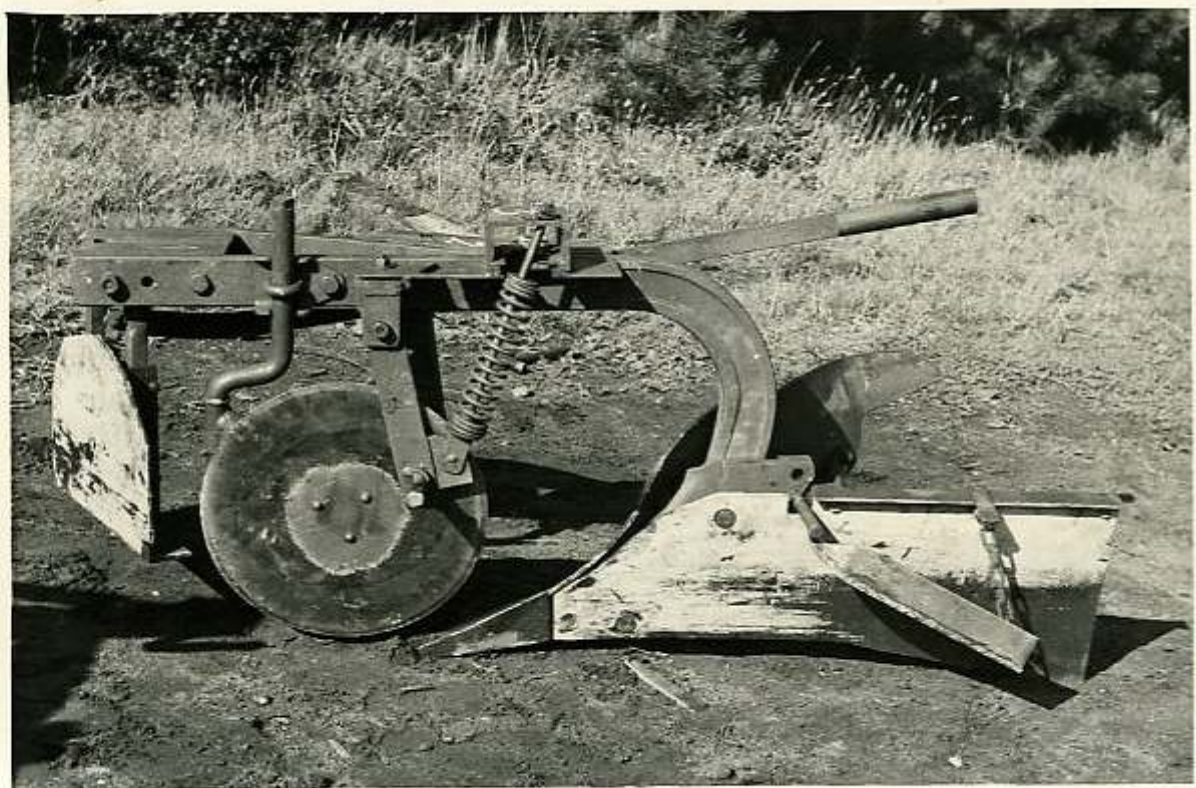
Push the Disc Stem through the Eye Bolt on the Main Beam with the crank of the Stem facing forwards.

Adjust the Stem so that the bottom edge of the Disc is $1\frac{1}{2}$ " above the Plough Point and $\frac{3}{4}$ " outside the Point.

Thoroughly tighten the Stem Clamp Bolt and the Eye Bolt but be prepared to adjust finally the set of the Disc under actual working conditions.

Remove the Plough Point.

Plough with Disc Assembly etc.



Assembly Instructions

(C) BOGEY ASSEMBLY

Stage 7 Bogey Assembly

Components necessary for the final stage of construction are:-

Offside Bogey Carrier comprising Carrier Upright 3" x 1" with Land Wheel Adjustment holes, Plough Adjustment holes, Stabilising Disc Fork 4 (3).

Nearside Bogey Carrier comprising Bogey Carrier Upright 3" x 1", Land Wheel Adjustment holes, Plough Depth Adjustment holes, Stabilising Disc Fork, Auxiliary Dozer Blade Arm and Socket, Auxiliary Firming Wheel Platform Gate, Auxiliary Firming Wheel Adjuster Bar Mounting 4 (4).

Two Stabilising Discs with Disc Bushes, Hub Caps, Axle and Nuts 4 (5 & 6)

Auxiliary Dozer Blade 2 (1).

Auxiliary Dozer Blade Adjustable Plate and Stub 2 (3).

Auxiliary Firming Wheel Adjuster Bar, Auxiliary Firming Wheel Platform and Axle, Auxiliary Firming Wheel Platform Follower 2 (4).

Dunlop Pneumatic Wheel 20 x 3 with Roller Bearing, Cap and Set Screws 5 (1).

Dunlop Pneumatic Wheel 20 x 3 with Wheel Axle, Distance Piece, nut, Spring Washer, Split Pin 5 (2).

Dunlop Pneumatic Wheel 5 (3) all Wheels interchangeable.

Tractor Top Link 5 (5)

Tractor Stabilising Bars 5 (6)

Tractor Rear Axle Housing Brackets, Long Fender Bolts and Pin 5 (4)

Final Stages of Assembly



Assembly Instructions

Stage 7 Bogey Assembly (Continued)

With the Tool Bar Frame Assembly lifted as high as possible on the tractor hydraulics fit the 3" x 1" Upright of the Nearside Bogey Carrier up through the 3" x 1" slot in the Nearside Bolster with the Stabilising Disc Forks rearwards.

Insert the bolt in the hole at the top of the Upright and tighten.

Fit the bolt in the second hole down of the four holes below the Nearside Bolster and make finger tight.

Lift the Bogey Carrier until the finger tight bolt comes up against the underside of the 3" x 1" slot.

Fasten the Bogey Carrier in this position by tightening the Bogey Release Handle.

Insert the Auxiliary Firming Wheel Platform into the Gate of the Nearside Bogey Carrier, fit the axle bolt and tighten.

Fit the Firming Wheel Adjuster Bar with the single hole end down through the Auxiliary Firming Wheel Adjuster Bar Mounting and on into the Platform slot, insert bolt and tighten.

Insert the end of the Curved Follower into the gap of the Platform, fit bolt and tighten.

Push the assembled Stabilising Disc into the Disc Fork, insert Axle bolt and tighten.

Fit the 1" diameter Dunlop Pneumatic Wheel axle into the bottom of the four Land Wheel Adjustment holes, apply Spring Washer and Nut and tighten. To compensate for a worn Stabilising Disc the Wheel Axle should be fitted in one of the four holes dependent on the amount of Disc wear.

Push on the Wheel Distance Piece and follow this with the Wheel. Insert the Split Pin but do not splay out the legs of the Pin.

Push the 3" x 1" Upright of the Offside Bogey Carrier up through the 3" x 1" slot in the Offside Bolster and insert bolt in the single hole at the top of the Upright.

Fit the bolt in the second hole down of the four in the Upright and make finger tight.

Continue pushing the 3" x 1" Upright up through the Slot in the Bolster.

On reaching the bolt in the second hole of the four in the upright secure the Upright by screwing in the Bogey Release Handle.

Fit the 1" diameter Dunlop Pneumatic Wheel Axle into the bottom of the four Land Wheel holes apply Washer and Nut and tighten.

Push on Wheel Distance Piece, follow this with the Wheel and insert Split Pin splaying out the legs of the Pin .

Fit Stabilising Disc as for the Nearside.

Assembly Instructions

Stage 7 Bogey Assembly (Continued)

Prop the assembled plough into its working position and facing the assembled Frame on the tractor hydraulics about mid way of the Frame.

Wind the Plough Saddle across the Frame until it is estimated that the Saddle is in line with the Beam Spacer on the Plough.

Reverse the tractor gently until the Frame is over the Plough.

Gently lower the Frame and manipulate the large Swivel Bolt welded to the Saddle into the large hole in the Beam Spacer.

Apply Washer and Nut.

Continue lowering the Frame until the Frame sits squarely on to the plough.

Insert bolt down through the hole in the Saddle and the slot in the Nearside Saddle Rest and apply washer and nut, similarly with the Offside Saddle Rest.

Tighten the large Swivel Nut thoroughly and insert Split Pin.

To the bolt through the Offside Saddle Rest attach the Disc Tie Chain.

Temporarily tighten the nuts of the bolts through the Nearside and Offside Saddle Rests. Final tightening to be left until after working test.

To fit the Main Firming Wheel the plough may now be lifted by means of the Hydraulics. In fitting the Main Firming Wheel the retaining Split Pin should not be allowed to protrude below the bottom edge of the Wheel Axle.

Fit the Adjustable Plate and Stub to the Auxiliary Dozer Blade and store on the nearside framework. Final Adjustment of the Plate and Blade must be done under actual working conditions and in relation with the Auxiliary Firming Wheel Adjuster Bar.

Fit the Rear Housing Tractor Brackets and follow by fitting the Stabiliser Bars between Plough and Tractor.

Fit the Plough Point.

PART IV

ILLUSTRATED PARTS LIST

There are five pages or "Sheets" of components, each sheet comprising a list of parts with Maker's number and a photographic illustration. The cross reference to parts described in Operating and Assembly Instructions is by prefix number which indicates sheets in Parts List and by suffix number for item on the sheet in brackets. As an example Struts Rear with Bolts will be found described on sheet 1 item 6, i.e. 1 (6).

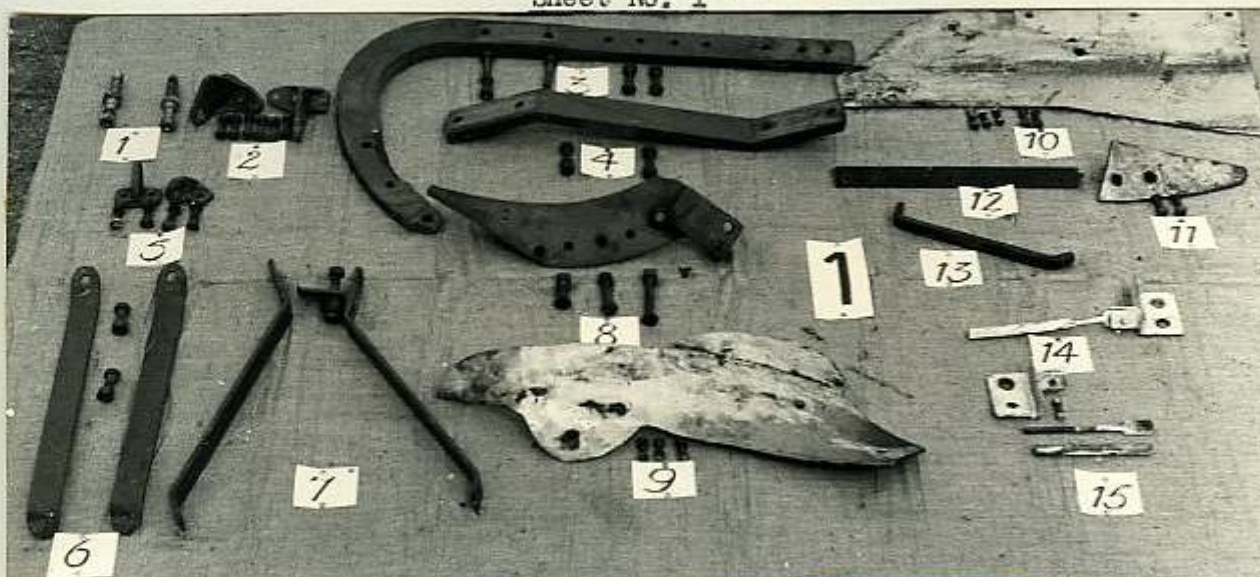
The plough is manufactured by Harry Potter & Son, Elvington, York, England from whom component parts can be obtained. Where applicable Massey Ferguson parts can be obtained under M/F part number from their agents. The manufacturer's parts number is shown after the description of each item.

Key to Abbreviations

M/F	-	Massey Ferguson
H.P. & S.	-	Harry Potter & Son
Pt. No.	-	Part Number
R/H	-	Right Hand
L/H	-	Left Hand
Mod.	-	M/F Parts Modified by H.P. & S.

Illustrated Parts List

Sheet No. 1



1. M/F Pins Pt. No. 195427M1. With Nuts and Washers.
2. M/F Brackets (Front) Pt. No. R/H 686191M1. L/H 585192M1. With Bolts and Nuts.
3. M/F Plough Beam Long Pt. No. AE-A7802 Mod. H.P. & S. With Bolts.
4. M/F Plough Brace Beam Pt. No. 10. AE-A7804. With Bolts.
5. M/F Brackets (Rear) Pt. No. 686193M1. With Bolts and Nuts.
6. H.P. & S. Struts Rear with Bolts.
7. M/F Struts Front Pt. No. 810297. Spacer Pt. No. 660224M1. Pin Stopper Lug Pt. No. 660351M1. and Bolt.
8. M/F Plough Bottom Pt. No. 815637M1. Mod. H.P. & S.
9. M/F Mouldboard Pt. No. 815693M1. Mod. H.P. & S.
10. H.P. & S. Landside.
11. M/F Plough Point Round Nosed Pt. No. 815757 Mod. H.P. & S.
12. H.P. & S. Landside Rib.
13. H.P. & S. Mouldboard to Landside Stay.
14. H.P. & S. Nearside Tractor Front Axle Marker.
15. H.P. & S. Offside Tractor Front Axle Marker exploded view comprising (from the top) Angle Bracket, Bolt, Marker Rod, Rubber Tube Extension.

Illustrated Parts List

Sheet No. 2

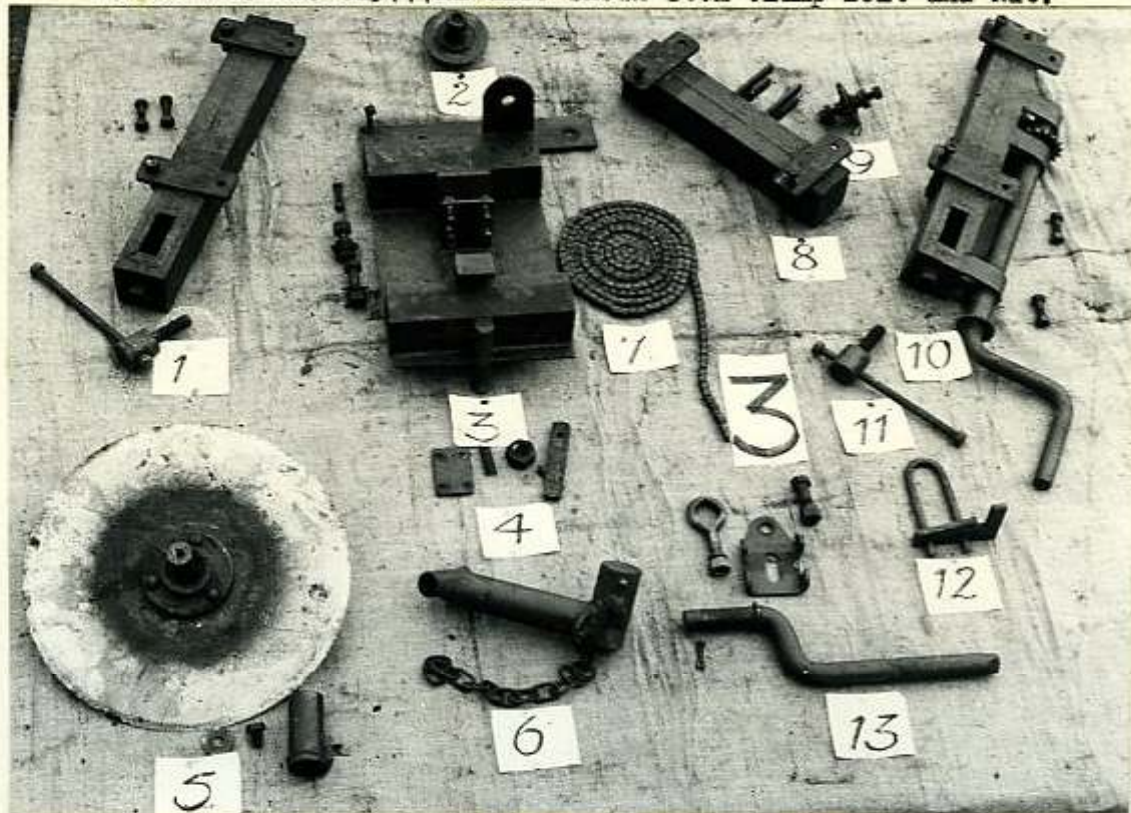
1. H.P. & S. Rear View of Auxiliary Dozer Blade with Stub Bolts and Nuts.
2. H.P. & S. Rear View of Main Dozer Blade cmp: with Runners and Rollers.
3. H.P. & S. Rear View of Auxiliary Dozer Blade Adjustable Plate with Stub.
4. H.P. & S. L to R. Auxiliary Firming Wheel Adjuster Bar.
" " " " " Bolts.
" " " Platform and Axle.
" " " Follower (Curved)
5. H.P. & S. Plough Beam Spacer.
6. H.P. & S. Main Dozer Bars L & R latter with Main Dozer Blade Stop.
7. H.P. & S. Main Dozer Blade Control Lever with Links and Bolts.
8. H.P. & S. Plough Saddle Rest (Brace Beam Side) with Control Lever Depth Adjuster, Lug and Slot (with separate bolt) and Control Lever Fulcrum (with bolt in position).
9. H.P. & S. Plough Saddle Rest (Main Beam Side) with Main Firming Wheel Spring Bar Slot & Pressure Spring Arrestor Slide Guides.
10. H.P. & S. Pressure Spring Arrestor Slide.
11. H.P. & S. Main Firming Wheel Swinging Arm Hinged Adjuster and Bolt.
12. B.S.A. M/Cycle Shock Absorber Spring (165 lb. load).
13. H.P. & S. Main Firming Wheel Swinging Arm & Stub Axle with Main Pressure Spring Plunger Bar & Bar Collar, Washer and S/P.
14. H.P. & S. Smoothing Plate with Swing Bar, Tie Chain & Bracket, Bolt and S/P.
15. H.P. & S. L to R. Smoothing Plate Down Pressure Spring, Side Pressure Spring, Spring Adjuster Lug & Swing Bar Collar & Lug.



Illustrated Parts List

Sheet No. 3

1. H.P. & S. Nearside Bolster with (separate) Bogey Release Handle.
2. H.P. & S. Tool Bar Frame Runner Wheel complete with Axle and Nut.
3. H.P. & S. Sliding Plough Saddle Comprising Plough Slide Tube holes (2) Tool Bar Frame Runner Wheel Bracket (upright at rear with holes), Locking Spring Retaining Stub (small rear) Plough Fixing Lug (flat rear with hole), Chain Anchor (centre four bolts fitted), Rear Frame Pillar (behind Chain Anchor) Fixed Frame Runner (in front of Chain Anchor) and Swivel Bolt (front centre).
4. H.P. & S. (L to R) Chain Anchor Plate (4 holes), Locking Spring, Swivel Bolt Nut, Locking Lever.
5. Fordson. Single Arm Disc M/F equivalent Pt. No. 815865M1 (complete assembly), Disc only Pt. No. 815856M1. Also shown Disc Bush, Washer and Set Bolt.
6. H.P. & S. Single Arm Disc Arm with Tie Chain attached.
7. Second-hand Winding Gear Chain $\frac{1}{2}$ " or $\frac{5}{8}$ " Motorcycle Chain with Spring Link.
8. H.P. & S. Mid Bolster with Chain Sprocket Retaining and Adjusting Fork.
9. H.P. & S. Winding Gear Chain Sprocket with Washer and Retaining Nuts.
10. H.P. & S. Offside Bolster, Offside Winding Gear Chain Sprocket & Winding Gear Handle (not detachable).
11. H.P. & S. Bogey Release Handle (Interchangeable).
12. H.P. & S. Plough Locking Stirrup.
13. M/F Single Arm Disc Stem Pt. No. 815848M91, Stem Clamp (Mod. H.P.S.) Pt. No. 815767M1, Stem Eye Bolt with Nut and Washer Pt. No. 815777M1 also shown Stem Clamp Bolt and Nut.



Illustrated Parts List

Sheet No. 4



1. H.P. & S. Plough Slide Tubes (interchangeable).
2. M/F Tool Bar Frame 86" Pt. No. 646701M1. Strengthening channel and Tie Bars incorporated H.P. & S.
3. H.P. & S. Offside Bogey Carrier comprising carrier upright 3" x 1" bar 2' long. Landwheel Adjustment holes $\frac{3}{4}$ " Dia. (4), Plough Adjustment Holes $\frac{1}{2}$ " Dia. holes (4) and Stabilising Disc Fork.
4. H.P. & S. Nearside Bogey Carrier comprising bogey carrier Upright. Land Wheel Adjustment holes (not seen) $\frac{3}{4}$ " Dia: (4), Plough Depth Adjustment holes (4) $\frac{1}{2}$ " Dia. Stabilising Disc Fork with $\frac{1}{2}$ " Dia. holes, Auxiliary Dozer Blade Arm & Socket, Auxiliary Firming Wheel Platform Gate with $\frac{1}{2}$ " holes (2), Auxiliary Firming Wheel Adjuster Bar Mounting showing one $\frac{5}{16}$ " hole.
5. M/F Stabilising Disc (2 similar) Pt. No. 815731M1, Disc Bosses (rivetted to Disc) (4) Pt. No. 815631M1. Disc Bush shown Pt. No. 660382, Hub Caps (on axle) Pt. No. 815742M1, Axle with Nuts Pt. No. 353589X1.
6. As 5.

Illustrated Parts List

Sheet No. 5

1. Dunlop Pneumatic Wheel with Roller Bearing, Roller Bearing cap. Three countersunk set screws which hold the Cap in place not shown.
2. Wheel as above also showing Split Pin, Distance piece, 1" Dia. Wheel axle with Nut and Spring Washer.
3. As 1 and 2. The whole comprising two Land Wheels (1 of which is also Auxiliary Firming Wheel and 1 main Firming Wheel) (All interchangeable).
4. M/F Tractor Rear Axle Housing Brackets R/H Pt. No. 818661M93. L/H Pt. No. 818662M93, Bracket Pin Pt. No. 646101M1, Long Fender Bolt with Nut (four necessary) Pt. No. 353648X1 (Existing Bolts on Model 35 have been made long enough to take Brackets).
5. Top Link. M/F equiv. Pt. No. 180855M91. Existing M/F links need not be replaced with this type.
6. M/F Stabiliser Bars Pt. No. 646102M1. (Stabiliser assembly i.e. Brackets, Bars, Pins, etc. complete Pt. No. MC 557706.)

