

**H. V. MCKAY, MASSEY HARRIS PTY. LTD.**

(Incorporated in Victoria)

**SUNSHINE HARVESTER WORKS, SUNSHINE, VIC.**

Manufacturers of

**SUNSHINE FARM MACHINERY**

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**SERVICE  
MANUAL**

**SUNSHINE  
MASSEY HARRIS  
REAPER & BINDER**  
6 FT. AND 8 FT. CUT.

**POWER-TAKE-OFF.**

**GROUND-WHEEL DRIVE.**

Service Manual

**SUNSHINE  
MASSEY HARRIS  
No.6B**

**Reaper & Binder**

**6 FT. CUT**

**8 FT. CUT**

**GROUND-WHEEL DRIVE**

*(Power-take-off Binders refer pages 36-41.)*

**FOREWORD**

This book of instructions has been compiled to help you obtain from your Binder the many years of trustworthy service characteristic of Sunshine products.

We have endeavoured to make the Booklet comprehensive for both the new and experienced user. It is, of course, impossible to cover all conditions likely to be met, and if there is any further information you require we will do our best to help you.

Read these instructions carefully before operating the machine; they will help you to save time and labour.

**Diagram Code**—A simple diagram code, consisting of a numeral and a letter, is used to locate points on the diagrams referred to in the instructions, e.g., "6A" refers to point "A" on diagram 6.

## SAFETY FIRST

Most farm accidents, like industrial, home and highway accidents, are the result of failure to observe simple precautions. Farm accidents can be prevented by recognizing their causes and guarding against them before an accident occurs. Sunshine Farm Machinery is made to be as safe in operation as possible, consistent with good accessibility and efficiency.

Keep all safety guards in place.

Never attempt to clean, oil or adjust a machine in motion.

A careful operator is the best insurance against accident.

The REGISTERED NUMBER of the machine will be found stamped on the rear end of the seat board and on the angle support directly beneath the seat. Always quote this number when ordering duplicate parts.

"All references to the NEARSIDE refer to the left side, and to the OFFSIDE the right side when sitting on the seat or viewing the machine from the rear."

## TRANSPORTING

Certain parts have been wired to the binder platform for convenience of transport. With the exception of the swings (where used) it is best to leave them packed until arrival at the farm.

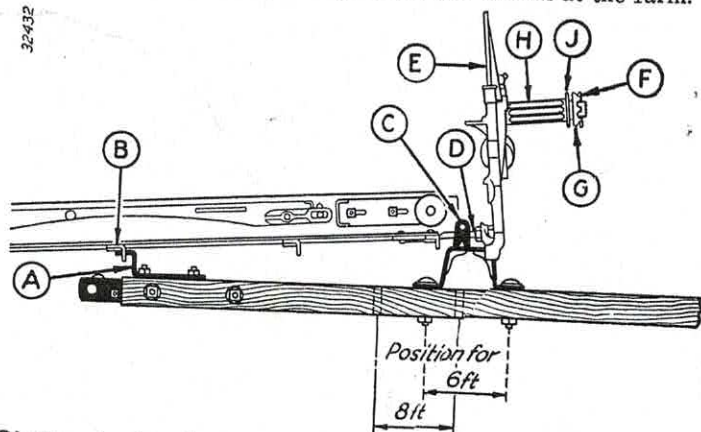


Diagram 1—Attach the pole or tractor hitch for transporting as shown.

## Fitting Pole:

First place the pole or tractor hitch in position by raising the platform and sliding the pole under until the bracket on the end (1A) fits into the slot in the third from end angle support (1B). Couple the main bracket on the pole (1C) to the grain wheel bracket strap (1D) by means of the plunger bolt as shown and then screw the slide (1E) down firmly against the pole.

Fit the swings as shown in Diagram 8.

Attach the neckyoke.

## Fitting Forecarriage:

The No. 2 forecarriage is attached in the same manner with the addition of a hook bolt (2A) securing the stay between forecarriage beams (2B) to nearside of platform back sill (2C).

Fit pole and the swings as shown in Diagram 8, noting that the hook (8A) is used for transport purposes only.

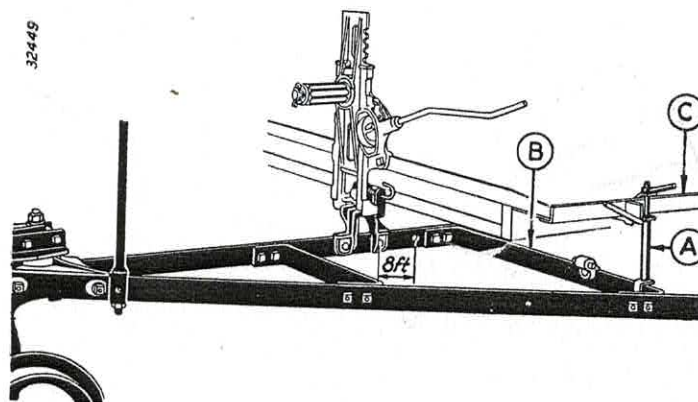


Diagram 2—Attach the No.2 Forecarriage as shown for transporting.

Attach the neckyoke.

NOTE.—When the grain wheel is already fitted it need not be removed to place the pole, stub pole or forecarriage in position for transporting.

## LUBRICATION

The machine is oiled throughout by the pressure system of lubrication. For this reason we recommend the use of Sungeoil or other good quality of semi-fluid lubricant.

### DO NOT USE SOLID GREASES.

Always see that some lubricant is forced out of each bearing (except ball bearing housings). A few shots of the gun are not always sufficient.

Oil the binder every four hours.

The following fast moving parts require more frequent oiling—approximately every two hours:—

- Knotter assembly.
- Knife head and slides.
- Pitman crank.
- Packers.
- Buttor crank.
- Compressor quadrant roller.
- Elevator chain and sprockets.

Check the following oiling points which can be overlooked:—

- Bottom front end of upper and lower elevator rollers.
- Nipple underneath enclosed gears of top rollers.
- Nipple in compressor quadrant roller.
- Front bearing of packer crank under deck.
- Rear end of upper roller under guard.
- Tension sprocket for main driving chain.
- Knotter cam tracks.
- Drive dog pinion (nipple in recess in flange).

Keep OIL BATH filled to plug level with Sungeoil.

REMEMBER—OIL IS CHEAPER THAN BEARINGS.

## ASSEMBLING THE MACHINE

Read the instructions on lubrication (page 4) carefully and then thoroughly oil the machine during the process of assembling. This will enable the oil to penetrate the bearings and ensure a good start.

Unpack all loose parts on the machine. Unroll the canvases and lay them out in the sun to stretch. Note that the reel arms and beaters on 6ft. machine are packed under the diagonal platform stay. To get these out easily loosen the stay at the elevator end. Spare bolts, tools, etc., are packed in a tool equipment case on the platform.

### Grain Wheel:

First remove pole, tractor hitch or forecarriage if fitted for transport. Tilt platform upwards and remove cotter pin (1F), collar washer (1G), thrust washer (1J), and roller bearing (1H). Note washer placed between bearing and slide. Place bearing in wheel hub. Place wheel on axle with open end of sleeve facing outwards. Fit thrust washer and collar washer and secure with cotter pin.

### Outside Grain Divider:

Remove tie rod (3A), trunnion (3B), and bolt for trunnion from corner of platform and replace with divider in position as shown, locking divider in position by spring plunger on outer end of finger bar extension (3D.) Unbolt fender rod (3C), which has been turned back for safety in transit, then fit as shown.

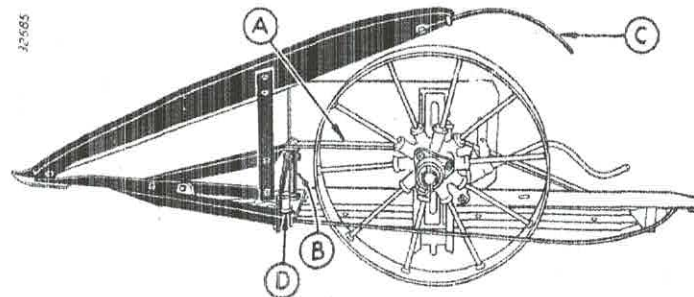


Diagram 3—Assemble the outside grain divider as shown.

### Inside Divider:

Attach at points R and S as shown on Diagram 4, swing outwards and secure to lower gear bracket with hook bolt provided.

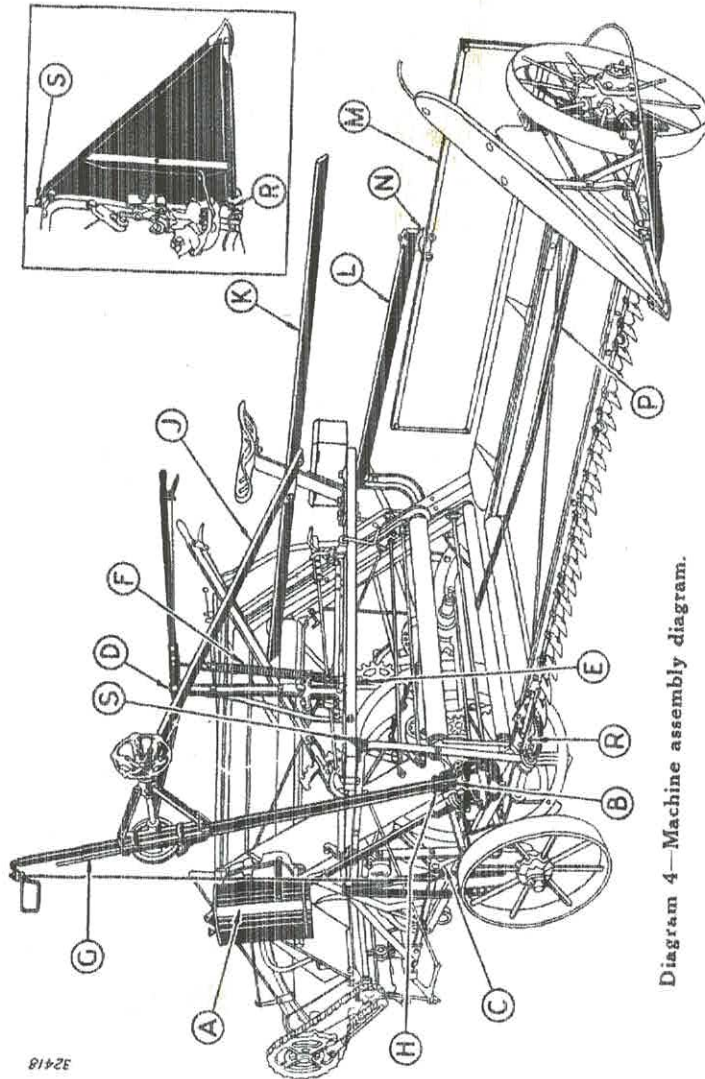


Diagram 4—Machine assembly diagram.

32418

#### Twine Can:

Attach as shown (4A), bolting upper bracket to tie rod at top of upper elevator and lower brackets to casting housing gear assembly.

#### Reel (6ft.):

Place end of reel pipe in socket (4B), fasten brace for reel pipe to bracket on upright centre front post (4C). Bolt pipe and brace firmly. Draw lever backwards and bolt to top of standard (4D). Release nuts on hook bolt (4E) in seat plank and couple spring (4F) to reel lever and hook bolt as shown. Tighten up hook bolt when spring is in position until reel is balanced (when reel arms and beaters are fitted). Attach reel arm (4J) and beaters (4K) as shown. Make sure by rotating that they are square with the finger bar. Slotted holes in beaters provide for end adjustment. Raise reel to highest point and slip square driving shaft (4G) into top driving pinion. Connect bottom of shaft to universal coupling (4H), with pin provided.

#### Reel (8ft.):

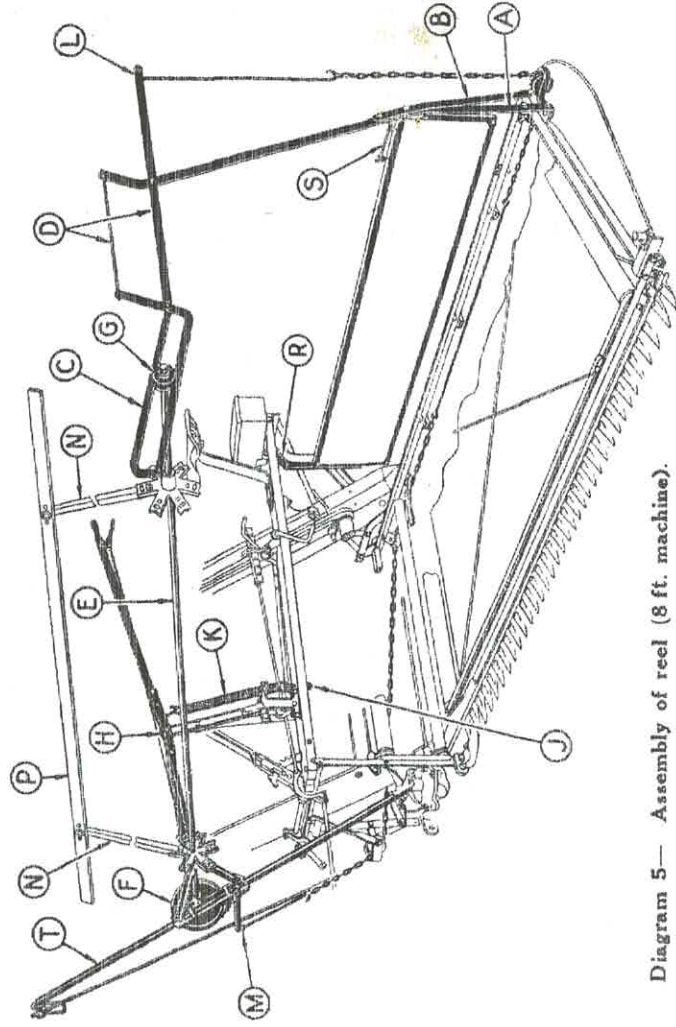
Lay reel assemblies in front of binder. First attach outrigger assembly as follows: Attach post for reel track to nearside end of wood sill (5A), using long bolt supplied and taking care to bolt reel brace (5B) in place at the same time. See that tracks (5C) and connecting tie rods (5D) are coupled together. Run reel pipe (5T) through top of yoke and lift assembly into position (as shown for 6ft. binder), passing the reel shaft (5E) through flanged roller (5G) on outrigger and pinning. Connect reel lever to top of standard (5H), fastening standard between front and rear pieces of lever with a bush on either side of standard. Loosen nut on hook bolt (5J) and couple spring (5K) to hook bolt (5J). Tighten hook bolt until reel is balanced (with reel arm and beaters fitted).

Couple up chain and rods for reel lever (5M) and outrigger (5L) ends as shown. Adjust level of reel by taking up links on chains.

Attach reel arms (5N) and beaters (5P) as shown. Note that the beaters must be secured on the crop side of the reel arms. Make sure by rotating that they are square with the finger bar. A range of holes in the beater provides for end adjustment.

Raise reel to highest point and slip square driving shaft (4G) into top driving pinion. Fasten bottom of shaft to universal coupling (4H) with pin provided.

Wind down main wheel until it takes the weight of the binder. Remove the rear transport wheel and axle. Pull binding attachment back to fullest extent so that the weight is to the rear. Remove the front transport wheel and axle.



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Diagram 5— Assembly of reel (8 ft. machine).

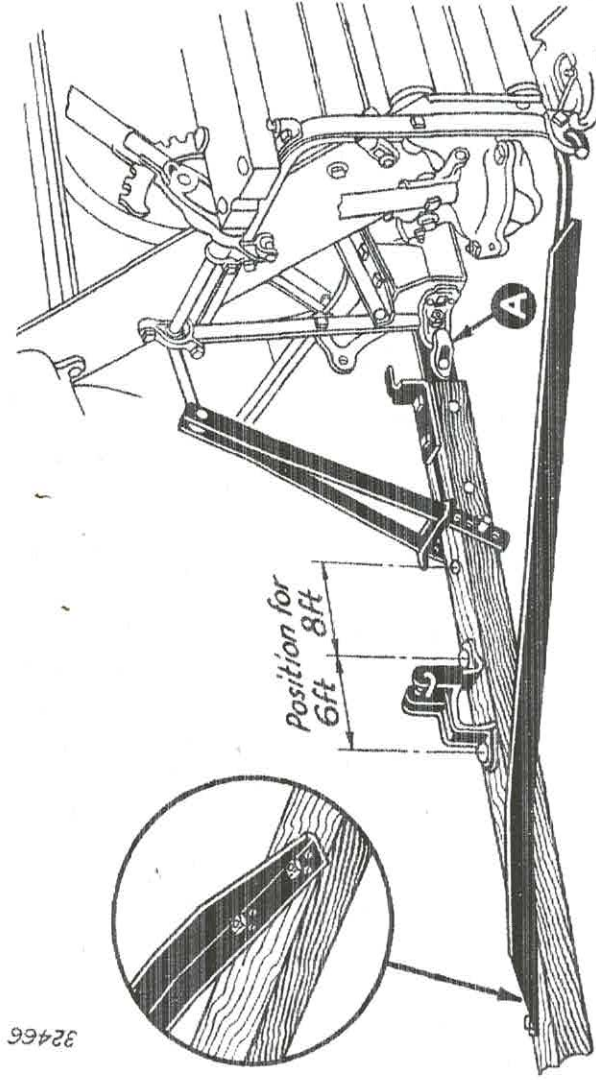


Diagram 6 — Attach pole or stub pole for working, as shown.  
(Inset shows range of holes provided for adjusting lead of pole.)

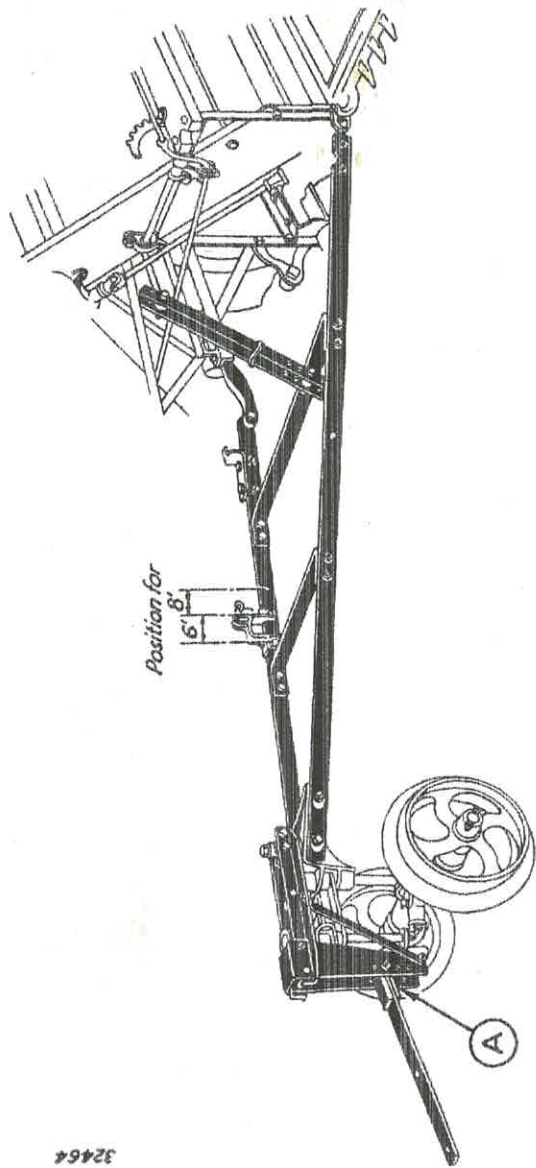


Diagram 7— Attach forecarriage for working, as shown.

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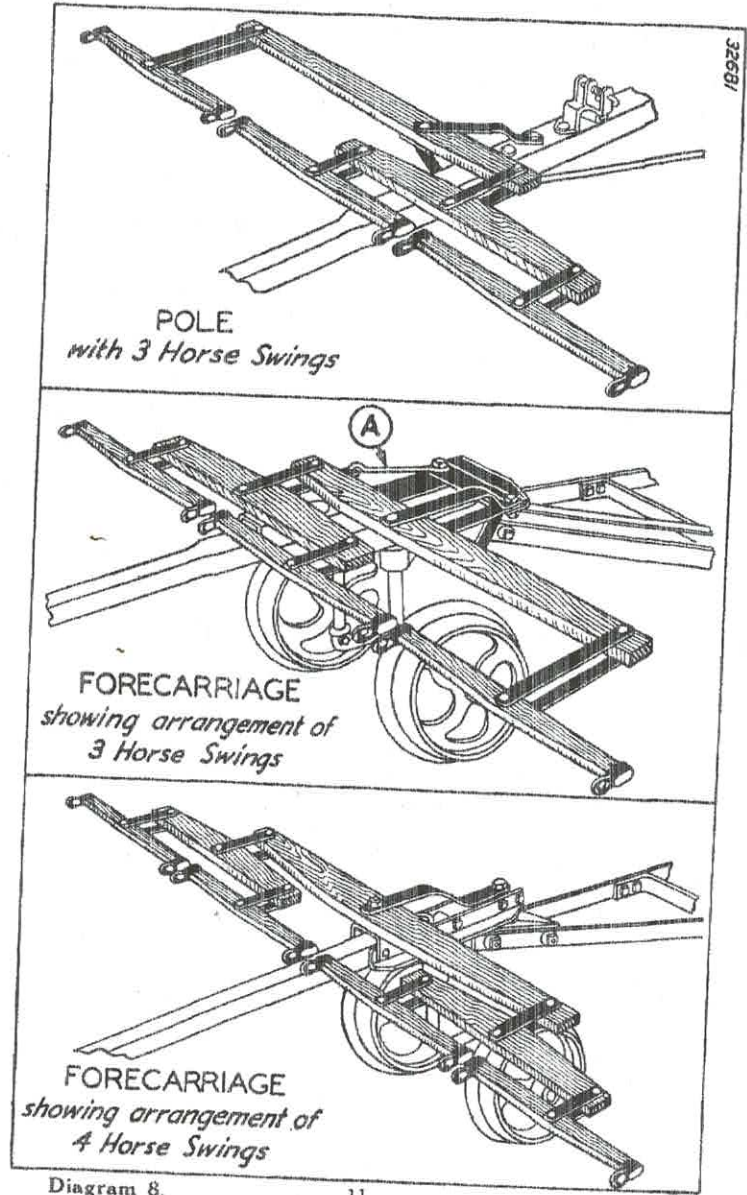


Diagram 8.

### Pole, Swingletrees:

Attach pole or stub pole as shown in Diagram 6, locking the latch (6A) in position with bolt supplied. Inset (Dia. 6) shows range of holes provided for adjusting lead of pole.

### Forecarriage:

Attach forecarriage as shown in Diagram 7.

Adjust height of pulling tongue (7A) as required.

Attach swings (where used) as shown in Diagram 8.

### Knife and Pitman:

Slip knife in from offside along finger bar. Oil liberally and move to and fro until working freely. Couple end of pitman to knife head. Remove combined washer and nut on pitman crank, fit pitman, replace nut and tighten.

### Windscreen (6ft.):

Bolt wooden arm (4L) to seat plank, noting range of holes in plank provided for adjustment. Fit windscreen (4M) to bracket on arm (4N) and secure.

### Windscreen (8ft.)

Two bolts secure windscreen to seat plank at right-hand end (5R). The left end is attached to frame by means of a hook (5S). Ratchet at left end provides for adjustment.

### Guide for Grain on Platform:

Hook grain guide (4P) in required slot on end sill of platform. A range of slots is provided (see page 28).

### Sheaf Carrier:

Slip fingers in finger levers as shown in Diagram 9. Attach finger board as shown making sure that the cleat (9B) is towards machine.

### Arm for Upper Finger of Sheaf Carrier:

Bolt on to hinge casting on top of knottter assembly by means of bolt and pin provided.

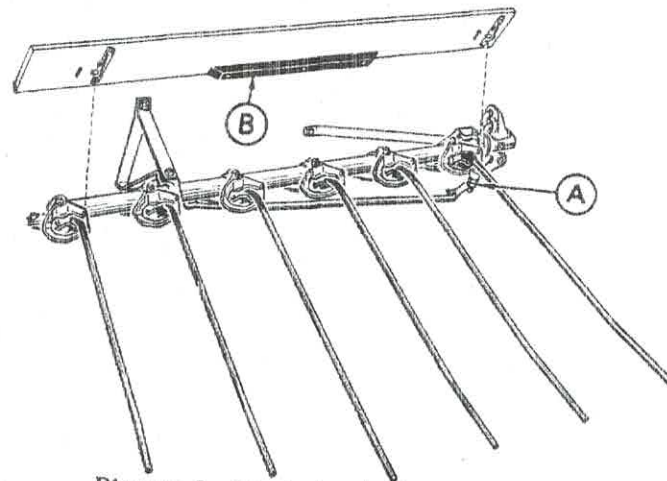


Diagram 9—Attach the sheaf carrier as shown.

### Extra Outside Divider (for use in tangled crops only):

Fit socket casting (10A) (attached) to point of outside divider and then bolt on angle bracket (10B) through holes provided in outside divider.

Bolt fender stick to forward end of extra outside divider by bolt which holds fender rod, and also by bolt through socket (on end of rod). Slots in socket allow of adjustment to required angle.

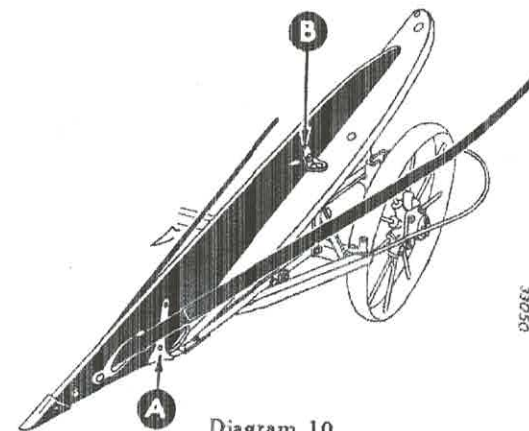


Diagram 10.



## PREPARING FOR THE CROP

Lubricate the Binder thoroughly (refer lubricating chart—page 4.)

Wipe off any surplus grease on knotter parts.

### Fitting the Canvases:

Ease off all slackeners. As each canvas is fitted, turn the machine with the crank handle to make sure that the canvas is running free.

Fit in the following order:—

### Lower Elevator:

Thread the strap end of the canvas under the bottom roller, up past the main wheel, over the top roller and buckle near the top. Lace with thongs provided.

### Upper Elevator:

Pass, buckle first, under the bottom roller, up to and over the top roller. Buckle and lace with thongs.

### Conveyor:

Pass the canvas, straps first, around the end roller, along between guides and bottom of platform, then around inside roller. Buckle and lace with thongs.

TIGHTEN ALL SLACKENERS.

## THREADING THE NEEDLE

Place two balls of twine in the twine can, tying the inside string of the bottom ball to the outside string of the top ball with a sheet bend knot (Diag. 11). Pull knot tight and cut ends close. Push knot down into centre of bottom ball. A little oil dropped into the centre of the ball will assist the twine to run freely.



Diagram 11.  
Sheet-bend knot.

Machines fitted with take-up lever at rear of needle proceed as follows:—

Take the end of the twine from centre of top ball and pass it through the hole (12G) in twine can cover, then through the small guide (12H), the tensioner (12J) and the bracket (12K) on the side of the twine can.

Pass the twine through the guides (12A, 12B, 12C). Remove rear loose cover in deck and pass twine through take-up lever (12D). Press down trip lever and turn discharge arms until needle is three to four inches in slot of breast plate. Pass the twine into entrance to needle groove (12E), up the groove of the needle and out through the eye (12F).

Pull a short length of twine down through the slot in the breast plate and hold firmly. Turn the discharge arms until they lock. Pull the twine off the knotter hook and the binder is now ready for tying. Replace rear loose cover in deck.

Machines fitted with take-up lever at end of attachment proceed as follows:—

Take the end of the twine from the centre of the top ball and pass it through the hole (13A) in twine can cover, then through the small guide (13B), the tensioner (13C) and the bracket (13D) on the side of the twine can.

Pass the twine through the guide (13E), the take-up lever (13F), the guides (13G, 13H, 13J).

Remove rear loose cover in deck and then turn discharge arms until needle is three to four inches in slot of breast plate. Pass twine through aperture in needle (13K), into entrance to needle groove (13L), up groove of needle and out the point (13M).

Pull a short length of twine down through the slot in the breast plate and hold firmly. Turn discharge arms until they lock. Pull the twine off the knotter hook, and the binder is now ready for tying. Replace rear loose cover in deck.

Insert over page 16 Sewing Machine Manual X 341.

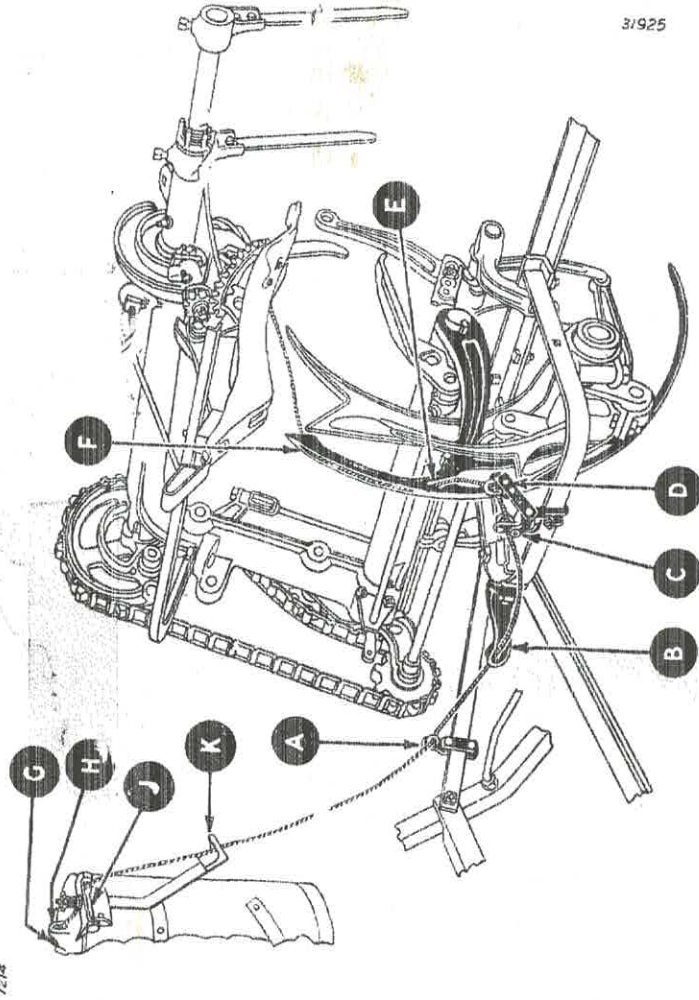


Diagram 12.— Thread needle on machines fitted with take-up lever at rear of needle as shown.

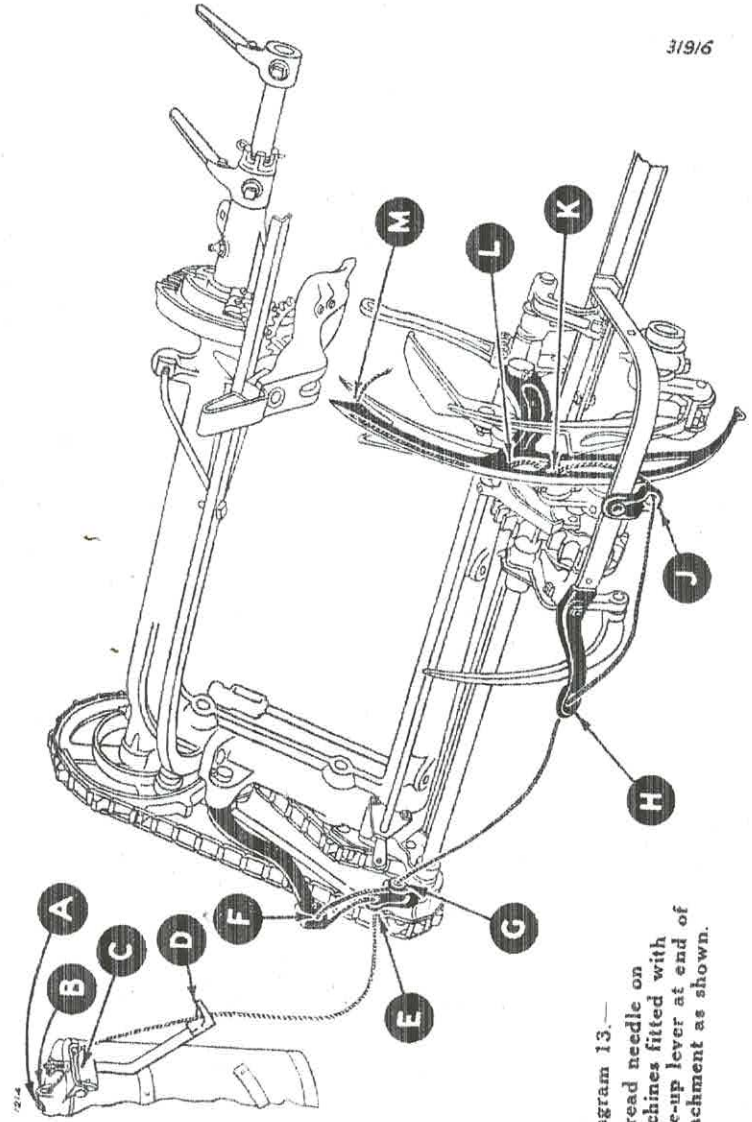


Diagram 13.— Thread needle on machines fitted with take-up lever at end of attachment as shown.

## HINTS TO OPERATORS

1. Keep to a steady speed of 2½—2¾ miles per hour.
2. Use steady and evenly matched horses.
3. Use the tilting lever to avoid obstructions in front of the knife.
4. Make proper use of the reel adjustments to ensure neat, tidy sheaves (refer page 28.)
5. Adjust the binding attachment and buttor board as required to follow crop irregularities so that each sheaf is tied about one-third of the way up from the butt (refer page 29.)
6. Do not overload the sheaf carrier (refer page 31.)
7. Use the hand trip lever when hay chokes on the binder deck.
8. Keep all chains at correct tension.
9. Watch the twine in twine can through inspection holes.
10. At end of day slacken off canvases and clean and oil the knife and finger bar.

## PNEUMATIC TYRES

The recommended tyre pressures (which should be maintained) are:—

MAIN WHEEL	..	..	7.50 x 20 x 6 ply	..	25 to 35 lb.
GRAIN WHEEL	..	..	4.00 x 18 x 4 ply	..	25 to 28 lb.
TRANSPORT WHEELS	..	..	4.00 x 18 x 4 ply	..	45 to 50 lb.

In sandy conditions lower the pressure.

## OPERATING ADJUSTMENTS

The BINDER is constructed to work at a speed of 2½—2¾ miles per hour and this speed should not be exceeded. The speed can easily be checked by tying a piece of cloth or daubing a spot of paint on the beater, then, using the second hand of a watch, count the number of revolutions per minute, this should be for a 6ft. binder 25 r.p.m., and for an 8ft. binder 22 r.p.m. on a ground-driven machine moving at 2¾ m.p.h.

### The Binder Attachment:

The Binder Attachment contains the most sensitive parts, and their construction and functions should be clearly understood by the operator. A brief description is as follows:—

Hay is carried up between the upper and lower elevator canvases and delivered over the seventh roller to the packers.

The packers pass the hay into the space formed between the deck, the breast of the knotter and the compressor finger, while the buttor board levels the butt of the sheaf.

When sufficient hay is packed in, its weight forces down the trip lever to release the drive dog and throw the tying mechanism into gear. At this stage the twine extends from the cord holder ring under the sheaf to the needle eye. The needle rises to carry the twine around the sheaf and into a notch in the cord holder ring. In rising it compresses the sheaf against the compressor finger so that the sheaf is drawn up tight, with a loop of twine around it with both ends held in a notch in the cord holder ring. Then the knotter hook revolves so that the twine is looped around it and the twine is grasped between the bills of the knotter hook. The twine knife severs the twine, the discharge arms come around to eject the sheaf, and in doing so pull the twine off the knotter hook, so drawing the ends of the twine through the loop on the hook to form and pull tight the knot.

### Size of Sheaf (adjustment):

The size of sheaf is regulated by the compressor finger (14A) and the trip lever (14B). To tie a large sheaf, move the compressor finger out and lower the trip lever. To tie a smaller sheaf reverse the procedure.

The tightness of the band is regulated by the trip spring tension. Turn the rose nut (14C) up for a tight band, down for a loose band.

Note that as the compressor finger is moved out, more of the trip lever comes in contact with the hay; the leverage on the trip lever is longer and it trips more easily. Thus to retain the band tension correctly the trip lever spring must be tightened. Similarly, when moving the compressor finger in for a smaller sheaf, reduce the spring tension or the band may be too tight.

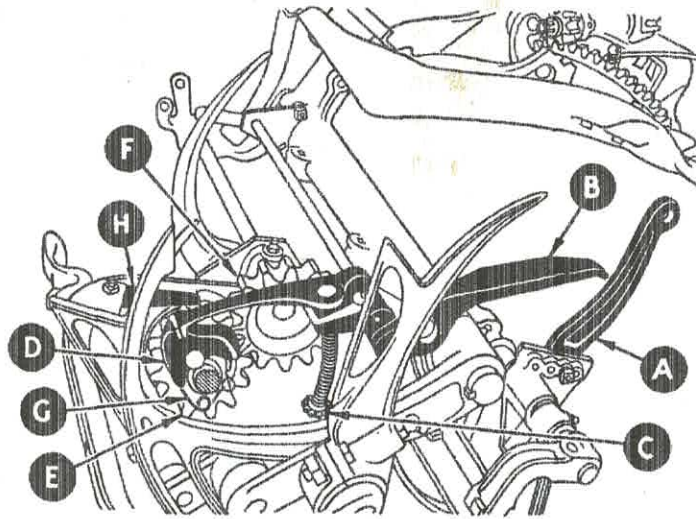


Diagram 14.— The Binding Mechanism.

The tightness of binding cannot be adjusted by the twine can tension, the cord holder tension, or the knotter bill tension, and to interfere with these will upset the working of the knotter.

Do not set the compressor finger in the innermost hole for wheaten or oaten hay, as there is not enough space under the knotter to contain the sheaf and undue strain will be imposed on the mechanism.

Do not set the binder to tie too large or tight a sheaf. This may save a little twine but is likely to cost more in strain on the machine.

Normal setting is with the compressor finger in the third hole out, and the trip lever in the middle of its range.

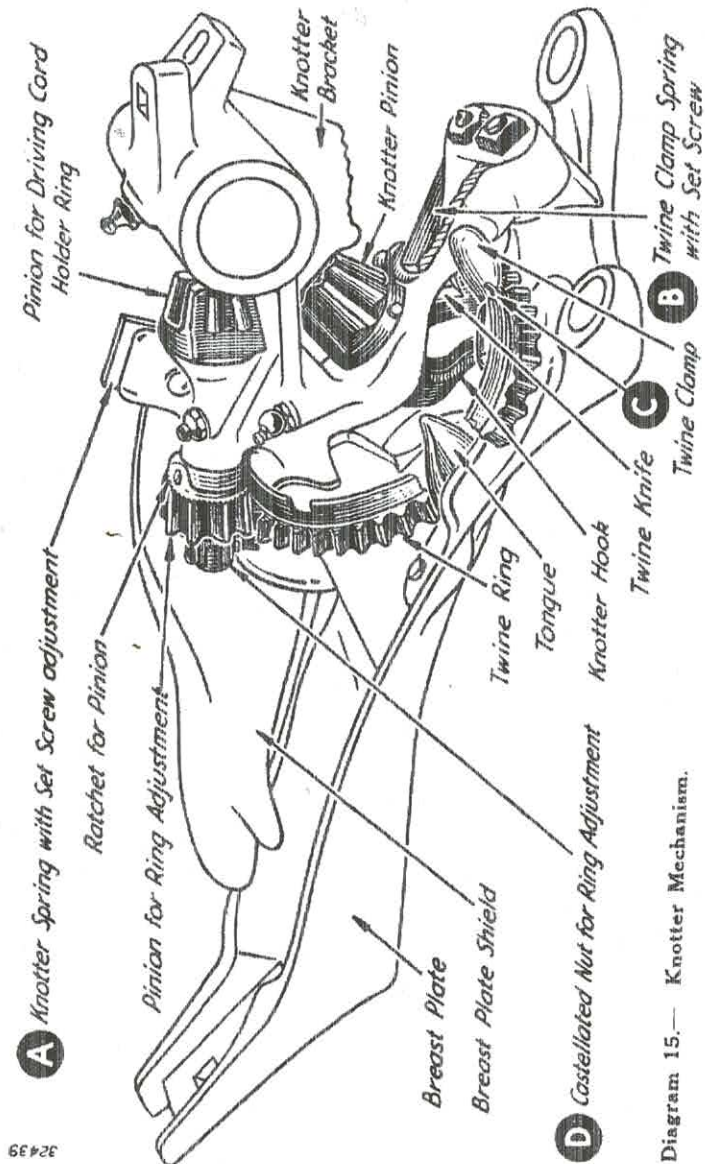


Diagram 15.— Knotter Mechanism.

### Knotter (Adjustments):

The knotter is correctly adjusted when it leaves the factory. Wear may upset the correct timing of the parts. The following notes give the correct positions:—

1. **Needle:** The underside of the eye of the needle should clear the cord holder ring by  $\frac{1}{32}$  in. to  $\frac{1}{16}$  in. when the needle moves forward. The needle is of malleable iron and can be set up or down to the correct clearance by bending.

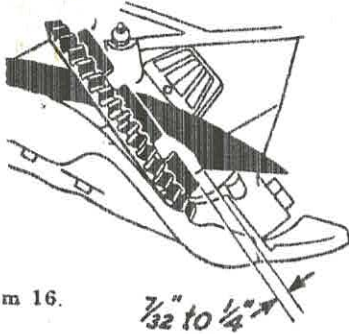


Diagram 16.

In moving through the knotter the needle should press lightly against the tongue (Diagram 15).

The point of the needle should be kept sharp by filing as a blunt point may carry straw into the knotter hook with the twine.

**NOTE.**—An uncommon fault is for a twisted needle to strike the deck or breastplate as it comes over. This pinches the twine sufficiently to break one or two strands and so cause the band to break when the sheaf is discharged. This fault is indicated if the break is not close to the hook. The remedy is to set the needle correctly by the use of a pinch bar.

2. **Needle Pitman:** If too short the needle may fail to lay the twine in the notch of the cord holder ring correctly. Adjust by turning the discharge arms over until the first tooth of the cam (SA 351) is just engaged with the first tooth of the pinion (SA 368). In this position the distance from the back of the eye of the needle to the outer machined surface of the cord ring (SA 6) should be approximately  $2\frac{5}{16}$ ". Adjust the length of the needle pitman assembly to bring the needle to the correct position.

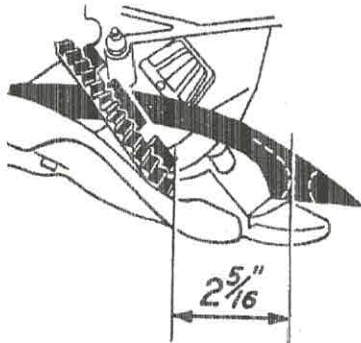


Diagram 17.

3. **Twine Can Tension:** This should be just tight enough to keep the twine taut in the needle. It should require a pull of from 8 to 12 lb. to move the twine in the guides.

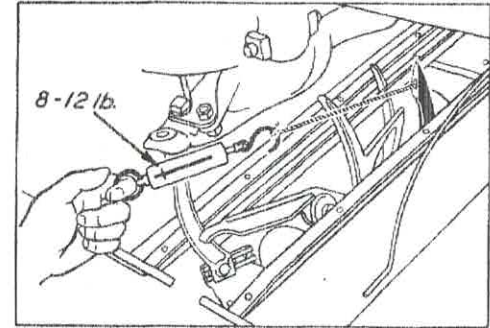


Diagram 18.

**WARNING:** You cannot tie a tighter sheaf by increasing the twine can tension. This has no effect on the sheaf tightness and only results in broken twine.

4. **Knotter Hook Tension:** The grip of the bills on the twine is adjusted by altering the tension of the knotter hook tension spring. When correctly adjusted it requires a tension of about 15/20 lb. to pull the twine out of the bills.

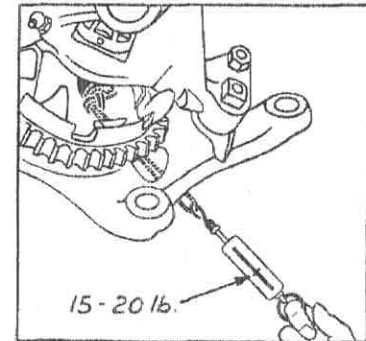


Diagram 19.

This spring is correctly set at the factory and should not be altered unless it has clearly got out of adjustment. Turn the stud (15A)  $\frac{1}{8}$ th turn at a time and note results.

5. **Cord Holder Clamp:** This should be adjusted to hold the twine so that a tension of 30/35 lb. is required to pull it out of the clamp. The adjustment is made by turning stud (15B)  $\frac{1}{4}$ th of a turn at a time.

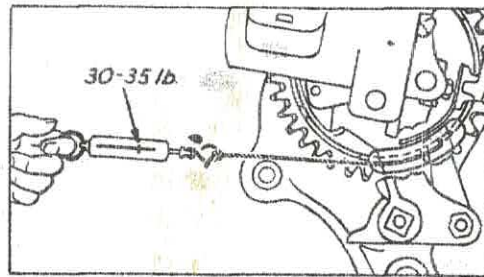


Diagram 20.

**NOTE.**—These tensions may need to be increased slightly for P.T.O. machines.

6. **Cord Holder Ring** should be adjusted so that one of the notches enters beneath the cord holder clamp (15C), leaving from  $\frac{1}{8}$  inch to  $\frac{3}{8}$  inch of the notch exposed. This can be adjusted by loosening the castellated nut (15D), freeing the serrated pinion from the serrated collar and rotating the pinion right or left until the correct adjustment of the cord holder ring notch is obtained.

7. **Twine Knife** should be kept sharp by honing. A blunt knife is a frequent cause of missed sheaves. The cutting edge of the knife should run  $\frac{1}{8}$  inch to  $\frac{1}{4}$  inch clear of the twine holder clamp.

8. **Knotter Frame Assembly:** This should be aligned so that the needle clears the slot in the breast plate on both sides and lightly rubs against the chilled boss on the knotter frame. The malleable needle can be bent to obtain this adjustment. The clearance between the knotter cam (Part No. SA 351) and knotter pinion (Part No. SA 366) is adjusted by taking the cotter pin out of the knotter shaft, loosening set screw in discharge arm, and screwing up the castellated nut until adjustment is correct. Tighten set screw and replace cotter pin.

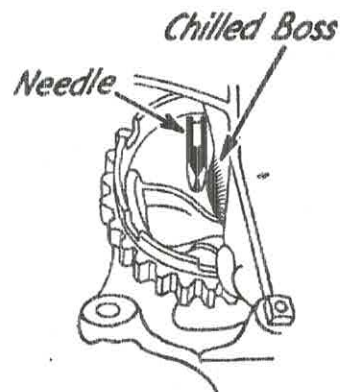


Diagram 21.

## KNOTTER (TYING ADJUSTMENTS.)

The knotter is carefully adjusted and tested by actual tying of sheaves at the factory before despatch. The parts are protected by grease to prevent corrosion in transit or storage (refer page 14).

If, when first starting, the binder misses a few sheaves, allow time for machine to settle down before attempting adjustments. Until the smooth surfaces of the knotter are polished by the action of the twine in running through them a few loose sheaves may be thrown. A little light machine oil in the centre of the ball of twine will help considerably in preventing loose sheaves when first starting. A loose sheaf may also be caused by loose straw or grain under the knotter bills. Wait until you are sure that the knotter is out of adjustment before making adjustments.

Inspection of the broken or loose band on the sheaf will indicate what is at fault. Illustrations of typical bands are described below with their associated causes.

### BAND No. 1

A slip noose is tied around the sheaf and the twine extends from the discharged sheaf back to the needle eye.

- Causes—(a) Cord ring notch insufficiently exposed (refer para. 8 page 27).  
 (b) Needle too high above cord ring (refer para. 7 page 27).  
 (c) Needle does not breast the tongue properly (refer para. 7 page 27).



Diagram 22

### BAND No. 2

The free end is slightly frayed (having been broken) and the opposite end remains on the hook.

Cause—Too much tension on the cord holder spring (refer para. 3 page 27.)



Diagram 23

### BAND No. 3

The band is found on the sheaf with both ends cut but not knotted together.

- Causes—(a) Notch in cord ring too wide, (refer para. 9 page 27).  
 (b) Worn hook (refer para. 12 page 27).



Diagram 24.

#### BAND No. 4

Found on hook with ends frayed instead of cut.

Causes—1. Knot low on hook (26A).

(a) Too much spring tension on knotter hook (refer para. 5 page 27).

2. Knot high on hook and both strings over jaw.

(a) A weak spot in the twine. ☒

(b) A dull knife (refer para. 2 page 27).

3. Knot high on hook but only one string over jaw (27B)

(a) Too large a sheaf or too much tension at twine can (refer para. 1 page 27).



Diagram 25

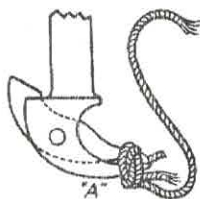


Diagram 26

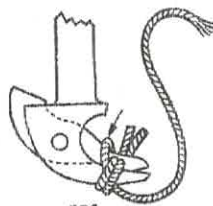


Diagram 27

#### BAND No. 5

Found on knotter hook with free end cut.

(a) No waste end in cord holder.

Cause—Insufficient tension at cord holder (refer para. 4 page 27).

(b) Waste end in cord holder.

Causes—(1) Tangled hay, in which case fault is not repeated.

(2) Twine brought round by needle rides too high on tongue (SA 2), (refer para. 10 page 27.)

(3) First string slips off tongue (refer para. 11 page 27).

(4) Knotter worn causing twine to loop too low on hook (refer para. 12 page 27).

#### BAND No. 6—(Similar to Band No. 5).!

One end of twine in cord holder and a knot in other end. If the following sheaf is discharged, the loose twine is in the next band and can be pulled out.

Cause—String slips off tongue (refer para. 11 page 27).



Diagram 28

THE MAIN CAUSES OF LOOSE SHEAVES ARE AS FOLLOWS:—

1. The twine can tension is too great. (Adjust as shown on page 23.)
2. The twine knife is too blunt and fails to cut the twine, or cuts it too late so that the twine breaks as the sheaf is discharged because the knot cannot leave the knotter hook in time.
3. The cord holder is too tight. The twine breaks instead of drawing out from under the cord holder when the knotter hook revolves. (Adjust as shown on page 24.)
4. The cord holder is too loose. The twine pulls right out of the cord holder when the knotter revolves. (Adjust as shown page 24.)
5. The spring tension on the knotter bills is too heavy so that the twine breaks when the sheaf is discharged instead of the knot pulling off the hook. (Adjust as shown page 23.)
6. The spring tension on the knotter bills is too loose so that the twine slips off the hook when the sheaf is discharged, without the ends being pulled through the loop to form a knot. (Adjust as shown page 23.)
7. The needle does not come through far enough, or in the correct position to place the twine in the notch of the cord holder ring. (Adjust as shown page 22.)
8. Not enough of the notch in the cord ring is exposed from under the cord holder to receive the twine properly as the needle brings it over. (Adjust as shown page 24.)
9. Too much of the notch in the cord holder ring is exposed by the cord holder and the hook is unable to pick-up the twine properly when it revolves.
10. The tongue (Part No. SA 2) is grooved so that the twine is held out of position. File smooth and replace.
11. The tongue (Part SA 2) is worn so that one string slips off and is not picked up by the knotter hook. Replace the worn tongue.
12. The knotter hook, the bills or the bill opening track is so badly worn that the knot forms too low on the hook, or the bills do not open sufficiently to receive both strings. Replace worn parts.

Knotter working continuously is due to the drive dog spring (14G) being broken. (Refer page 34.)

Quivering and staggering of the Discharge Arms is caused by the drive pinion stop spring (14H) being incorrectly adjusted, and allowing the dog to catch on the driving plate. Adjust by slackening the bolt and moving the spring along until the heel of the spring is  $\frac{1}{8}$  inch from the step in drive dog pinion (14E), when the discharge arms are pressed upwards.

This fault can also be caused by the binding attachment drive chain being too slack.

## FIELD ADJUSTMENTS

### Reel:

The reel has a wide range of adjustment. Uniformity of the sheaves depends a good deal upon correct adjustment of the reel. The reel must be set to ensure that the cut crop falls evenly on the platform.

It is essential to constantly adjust the reel to follow the variations in height and condition of crop if good work is to be done.

As a rule the reel should be set to strike the crop about six inches below the heads. For tall crops the reel should be set further forward than for short crops. If the reel is too low it will push the crop away from the platform.

If the reel is too far forward the crop will tend to fall askew on the platform, and if set too low or too far back the crop will fall with the butts too far in on the platform.

When the crop leans away from the binder the reel should be set forward and low to pick it up before the knife, when the crop leans to the binder the reel can be set back and above the crop as little assistance is required to get it on the platform correctly.

In down and tangled crop the reel may be used to lift the crop to the knife, and the extra divider should be fitted. (Diag. 10.)

Grain Guide on Platform is used to prevent the heads going up the elevator before the butts. It should lie just below the heads, and can be adjusted in the range of four slots provided to suit the height of crop.

### Binding Attachment and

Buttor Board: The binding attachment should be set to tie the sheaves about one-third of the way up from the butt and in an uneven crop it must be adjusted to follow the height of the crop as the crop varies. For small variations the buttor board can be used, but the buttor

board works best when it is square with the canvases and should not be left for long periods in an extreme forward position. Alter the position of the binding attachment instead. For very short crops, when the range of adjustment on the binding attachment is insufficient, the buttor board can be brought in closer by putting the bearing for link (29A) on the other side of the supporting member, and shifting the support (29B) into the second hole.

If the buttor board sags down at the end, loosen the bolts in slotted casting (29C), raise board to correct level and retighten.

### Header Board:

Is used to prevent medium and short hay from falling away from the buttor board while the sheaf is being packed.

For a tall or tangled crop it should be set horizontal and out of the way above the deck.

**Knife and Cutter Bar:** Always keep the plain knife sharp. Blunt knives cause increased draught as well as poor cutting and excessive wear on the machine. Always keep a spare plain knife and change and resharpen at regular intervals. From time to time rinse the cutter bar with water to wash off the gummy sap. Replace bent or broken fingers as soon as they are noticed. See that the knife is not bent or bowed and that the fingers are properly in line.

### Canvases:

These are provided with slackeners to loosen them when the binder is not working.

If the canvases run out of true, either they are creeping on the rollers or the elevator frames are not square.

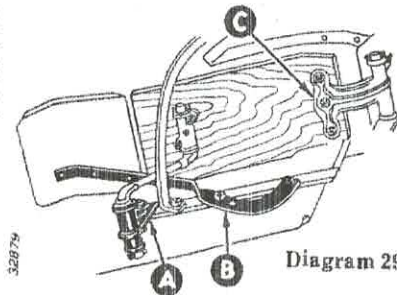


Diagram 29.



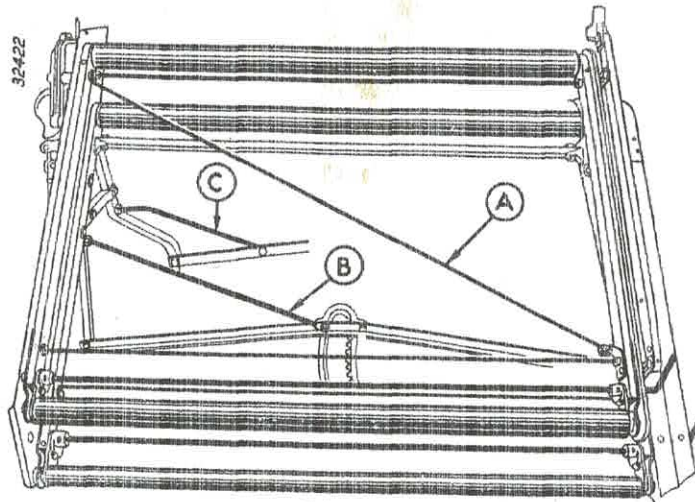


Diagram 31

If creeping loosen the slackeners and tighten the buckles evenly, then reset the slackeners.

To square the upper elevator adjust the diagonal tie rod (31A) until the distance from offside of upper roller to nearside of lower roller is the same as from nearside of upper roller to offside of lower roller.

To square the lower elevator adjust the stay (31B) from main frame to front post of lower elevator. Note that as stay (31B) is adjusted, stay (31C) must also be adjusted.

Adjust the top floating elevator so that it is square with the lower elevator by means of the slotted adjustment (32A).

**Warning:** Do not attempt to square the elevators when on the transport wheels; the main wheel must be on the ground when these adjustments are made.

Always adjust the lower elevator first.

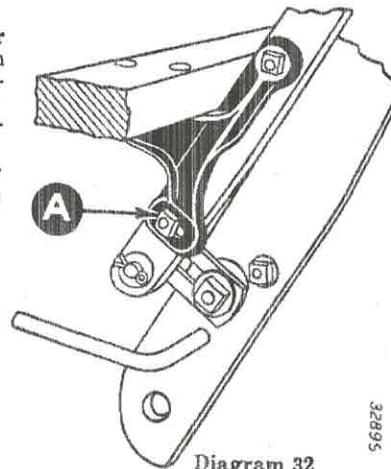


Diagram 32

### Sheaf Carrier:

Do not overload the sheaf carrier. Dump sheaves in fours or fives. If the sheaves tend to fall off the carrier, raise the fingers by screwing up both nuts (9A) on the eye bolt at front of carrier pipe.

Hand Crank is used for raising and lowering the main wheel and for testing the mechanism. When not in use keep locked on square shaft.

Chains are provided with tensioners which must be adjusted so that the chains are not too slack, or the machine will develop a jerky motion. The adjustment of the main chain tightener is by means of a plunger locating in a range of holes.

Diagram 33 illustrates the method of fitting main and elevator chains on the sprockets.

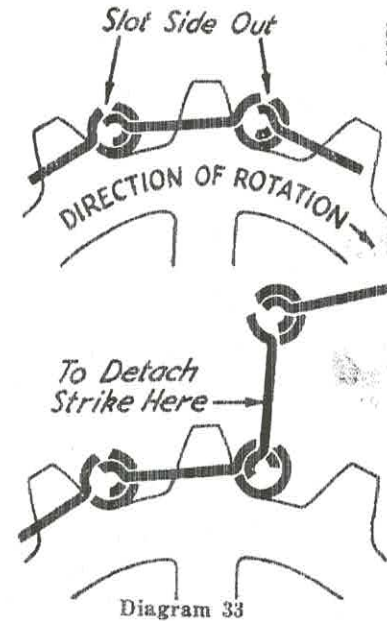


Diagram 33

### END OF SEASON

- Remove canvases and store in a dry place.
- Clean and oil machine thoroughly.
- Tighten up all nuts, bolts, stays, etc.
- Replace any worn parts.
- Remove the knife, wash clean and brush with clean oil.
- Grease knottter assembly and needle point.
- Remove roller chain (if equipped), wash with petrol, place in a tin and cover with clean oil.

Save delay—Order duplicates immediately the harvest is over.

## REPAIR INSTRUCTIONS

### Chain for Binding Attachment:

Both sprockets for this chain have an arrow cut into their side and it is most important that there are fourteen links between these arrows when the small sprocket is locked in the position indicated (Diag. 34).

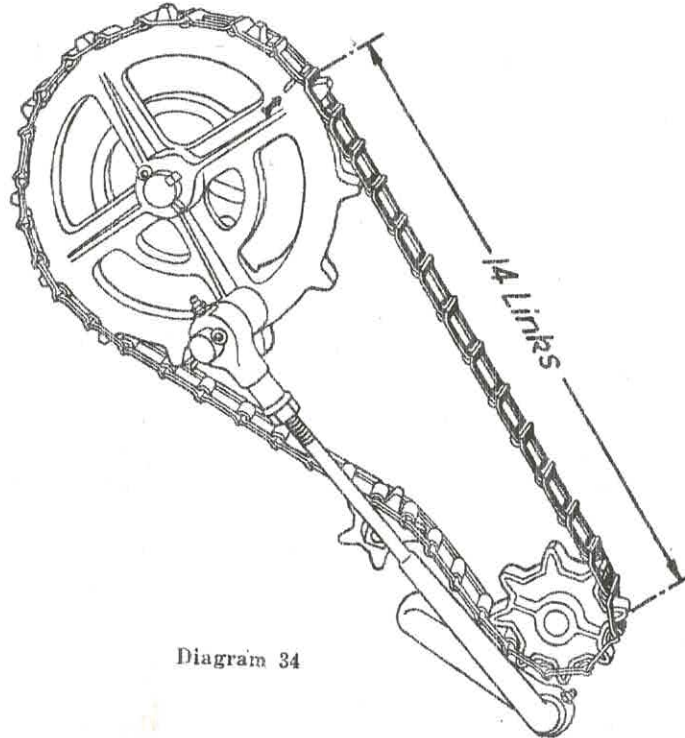


Diagram 34

### Meshing of Bevel Pinion and Bevel Wheel (Diag. 35):

A set screw in the end of the box of the bevel wheel shaft provides adjustment for meshing. They should mesh fully without bottoming. To adjust, first remove cotter pin securing washer between spring and roller bearing on cross shaft. When the adjustment is made, rotate the washer until the hole in shaft is visible. Replace cotter pin and do not forget to tighten lock-nut.

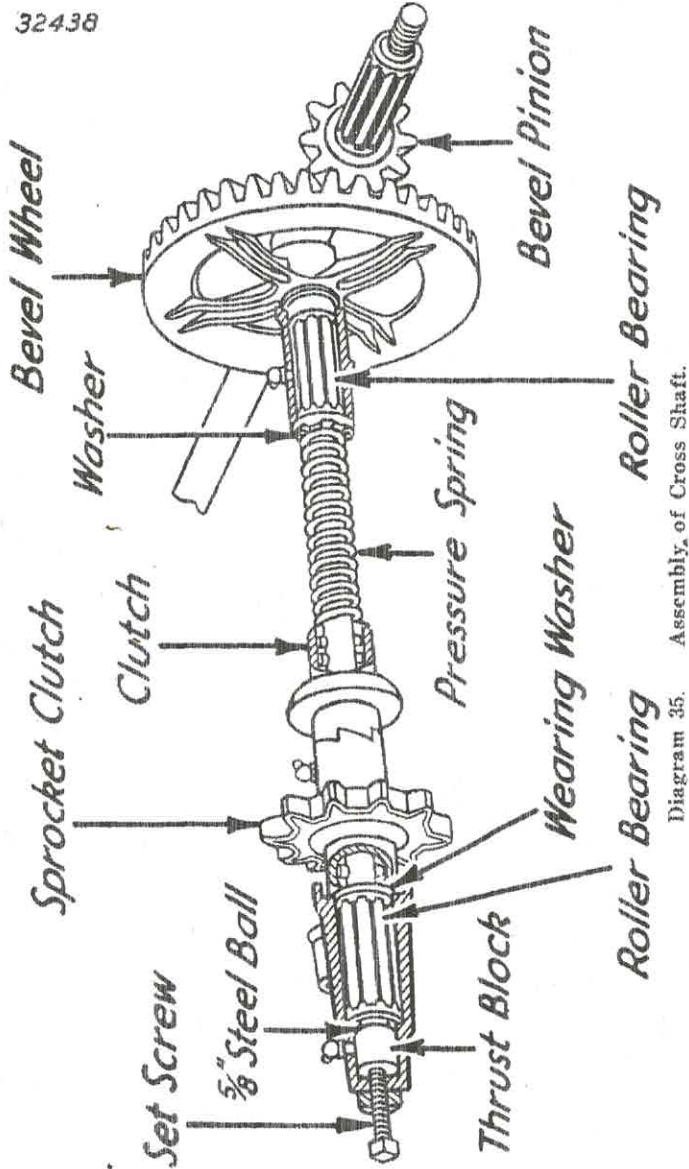


Diagram 35. Assembly of Cross Shaft.

#### Removing Knotter:

Slacken set screw and slide off rear discharge arm. Remove cotter pin, castellated nut, and second discharge arm. Take off extension for upper finger, then undo bolt on side of knotter which secures the shield to the knotter bracket. Take out twine knife and  $\frac{3}{8}$ " bolt securing breast rail to breast plate. The knotter complete can then be slid off to the rear. Assemble in reverse order.

#### Drive Dog for Binding Attachment:

First remove cotter pin and withdraw square shaft, then disconnect rods joining packer arms to crank. Undo bolts holding front and rear bearings to frame. Lift out crank complete. Remove third packer, then take out pin holding third packer crank spindle to main crank and slide off crank. Remove gear and drive dog (14D) complete. Assemble in reverse order, making sure that the indent tooth of drive dog gear (14E) goes between the indents on teeth of intermediate gear (14F).

#### Drive Dog Spring (14G):

When replacing this spring move drive dog (14D) opposite groove in drive dog pinion (14E). The spring can then be locked on the drive dog.

#### Removing Packer Crank:

Proceed as for removing drive dog, but remove both front and rear bearings, thus allowing the crank to be lifted out. Assemble in reverse order, bearing in mind that indent on tooth of drive dog goes between indents on teeth of intermediate gear.

#### Removing Main Wheel:

Remove the two foremost beaters and arms to prevent damage when tipping the binder forward. Unclip both dividers, turn back and secure with wire or twine. Remove main chain, screw down main and grain wheels. Remove bolts at bottom of main wheel hangers and bolts connecting shaft guide to frame. Take out shaft guide. Disconnect the support arm for main chain at wheel end and then take out chain. Tip machine up on finger bar and place a prop under the seat plank. Take the wheel out from the rear.

Replace in reverse order, making sure that both raising pinions are in the first notch of the hangers.

#### Removing Bevel Gear and Cross Shaft (Diag. 35):

First remove housing for bevel gears, then front and rear cross shaft brackets. Take out cotter pin holding washer against bevel wheel bearing, remove pin from sprocket clutch wheel, then pull bevel wheel and cross shaft forward until both pins holding clutch are visible. Drive out pins and withdraw shaft.

When replacing make sure that the thrust block is seated in the box of the bevel wheel shaft and that the steel ball is located between shaft and thrust block. A set screw in the end of the box provides the necessary adjustment to mesh the bevel wheel and pinion.

## SUNSHINE MASSEY HARRIS No. 6B POWER-TAKE-OFF REAPER AND BINDER

(Special instructions to be read in conjunction with previous instructions on No. 6B Ground Drive Binder.)

For TRANSPORTING attach the tractor hitch as shown in Diagram 1.

For WORKING attach the tractor hitch as shown in the leaflet which is packed with the power-take-off coupling.

The SUNSHINE No. 6B POWER-TAKE-OFF BINDER is a sturdily constructed machine, which with ordinary care will give many years of trouble free service. However, it is not always appreciated how easy it is to overload a power-take-off binder by careless operation in a heavy crop, and so cause serious damage to the machine.

For satisfactory results, it is essential that proper attention be paid to the following points:—

- (1) The mechanism must not be driven by the tractor power-take-off at an excessive speed.
- (2) The binder must not be drawn through the crop at a greater speed than three miles per hour.
- (3) The Overload Release Clutch must at all times be properly adjusted.
- (4) The binding mechanism must not be adjusted to tie an excessively large sheaf.
- (5) The knife must be kept sharp and the cutter bar true and free from sap (refer page 29).

### Speed of Power-take-off Shaft:

The speed of rotation of a power-take-off machine remains constant whatever the forward speed of the tractor. The mechanism of the Sunshine Power-take-off Binder is designed to operate through a tractor power-take-off shaft rotating at 545 r.p.m.

The power-take-off shaft of most tractors operates at this speed when the tractor is in correct adjustment and under normal working load.

A few tractors have power-take-off shafts which operate at different speeds, and change sprockets are provided to adjust the binder drive accordingly.

The easiest way to check the speed of the binder mechanism is to operate the binder in the crop with the tractor engine at full governed speed, and count the revolutions per minute made by the reel with the binder under load. For this purpose one batten of the reel is marked by a spot of black paint; if this is missing tie a rag to or otherwise mark one batten. Count the r.p.m. of the reel using the second hand of a watch.

At the correct P.T.O. speed the reel of a six-foot binder makes 29 r.p.m. The reel of an eight-foot binder (which is of larger diameter) makes 26 r.p.m. It is wise to recheck the reel speed from time to time as the tractor P.T.O. speed may change as time goes on.

### Change Sprockets:

If the tractor cannot be adjusted to give the correct reel speed, the roller chain sprocket at the rear end of the binder drive shaft must be changed to adjust the binder to the new P.T.O. speeds—

A difference of one tooth in the size of this sprocket will make approximately one r.p.m. difference to the speed of the reel.

The following change sprockets are available:—

Catalogue No.	Number of Teeth	Suits Tractor Tailshaft speed
SB.2081 .. .. .	.. 14	579
SB.2080 (Standard sprocket supplied) ..	.. 15	545
SB.2015 .. .. .	.. 16	515
SB.2009 .. .. .	.. 17	484
SB.2016 .. .. .	.. 18	453

A larger sprocket will increase the speed of the binder mechanism (i.e., use a larger sprocket if the tractor P.T.O. speed is too low).

### Speed of Binder in Crop:

The binder should on no account be drawn through the crop at a greater speed than three miles per hour. (No responsibility can be accepted by the Company for damage resulting from a higher operating speed). This corresponds with 1st gear on many modern tractors. In a heavy crop (over 2½ tons per acre) it is an advantage if the forward speed can be reduced.

As an illustration of the possible variation in load on the binder mechanism, the following table shows the weight of crop handled per hour by an 8ft. binder travelling at 3 M.P.H. in various crops:—

Weight of Crop (cwts.)	Speed (m.p.h.)	Throughput (tons per hour)
20	3	3
40	3	6
60	3	9

At a throughput of 9 tons per hour the binder is at the upper limit of its capacity, with an increased risk of damage. In a crop of this size it is much more satisfactory to proceed at a slower speed, especially if the crop is at all tangled.

### OVERLOAD RELEASE CLUTCH

(Diagram 36).

This clutch is built into the drive shaft of the binder for the purpose of limiting the amount of power that can be transmitted to the mechanism from the tractor engine. All but the smallest tractors can develop considerably more power than is needed to operate the binder even in the heaviest crop. In the event of an obstruction to the knife or the binding mechanism the full power of the tractor engine would be applied to the binder and something may break, unless the release clutch operates correctly.

The release clutch must be adjusted so that it is no more than just tight enough to drive the binder in the heaviest parts of the crop.

#### To Adjust the Clutch:

Slacken off all the adjusting nuts until the friction surfaces are entirely free and the clutch ceases to drive at all, then tighten the nuts evenly, a half turn each, one after the other, until the clutch is just tight enough to drive without slipping. If clutch slip is suspected, feel the clutch with the back of the hand after the binder has been operating for a while. It should not show any sign of heat. If it is heated, tighten each nut a quarter turn at a time, until the clutch is operating without heating. **BE CAREFUL NOT TO OVERTIGHTEN.**

If the clutch begins to release frequently, do not tighten until careful examination of the machine shows that no fault has developed in the mechanism which might throw a heavier load on the clutch. If it becomes necessary to tighten the clutch to deal with an extra heavy or tangled crop, do not forget to slacken it again after the difficult crop has been cut.

3424

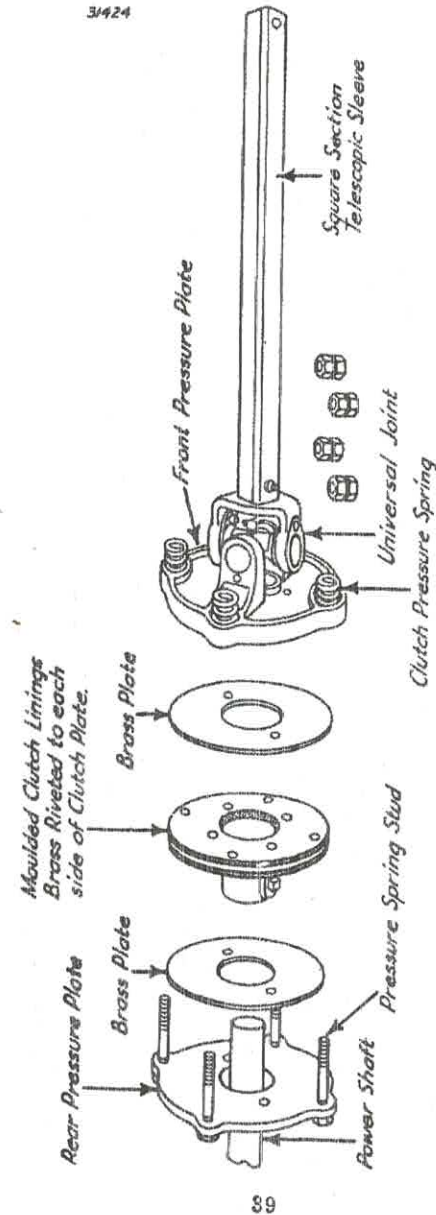


Diagram 36— Overload Release Clutch.

#### Size of Sheaf:

Do not adjust the binder to tie an excessively large sheaf. This may save a little twine, but is likely to cost far more in undue strain on the binding mechanism.

If a ground-drive binder is adjusted to tie too large a sheaf, the drive wheel usually slips a little as the needle comes over, and so prevents damage to the mechanism. This does not occur with a P.T.O. binder (even though the safety clutch is fitted) and serious damage may result. Indications of too large a sheaf are a tendency for the needle to brush against the cord holder ring when bringing the twine around the sheaf. If this is noticed, the trip lever should be raised and the compressor finger moved in to give a smaller sheaf (refer page 19).

#### Care of Cutting Mechanism:

The driver of a horse drawn binder soon observes from the behaviour of the team when the knife should be sharpened and the cutter bar cleared of sap. No such ready indication is given to the driver of the tractor drawn machine, and a careless driver can go all day with a blunt and sticky knife.

Unless the knife is kept sharp and free a heavy strain is thrown on the crank shaft, bearings, pitman and knife head.

In ordinary conditions a plain knife should be changed every four hours and the cutter bar sluiced with water to wash off the sticky sap. A sickle knife does not need re-sharpening, but it must be kept in good condition and all worn blades replaced when necessary.

The combination of a big tight sheaf, with a blunt and sticky knife may require the safety release clutch to be adjusted so tightly to maintain the drive that it becomes useless as a safety device, particularly if at the same time the binder is driven at an excessive speed. Under these conditions the rate of break-ages through accidental obstruction of the knife and binding mechanism can be considerable.

Always clean, wash and oil the knife at the end of the day. A gummy knife, left in the finger bar overnight, will become set and difficult to move.

#### Roller Chain:

The roller chain is correctly tensioned when the slack side of the chain can be deflected a little (about  $\frac{1}{2}$ — $\frac{3}{4}$  inch) when pushed inwards midway between the sprockets. Before completing the tension adjustment, turn the mechanism slowly into one or two fresh positions and check the slack to make sure the chain has sufficient freedom to run properly in all positions.

A roller chain with too little slack will be rigid on both the driving and slack sides. A chain with too much slack will whip badly on the slack side when running, and may slip over the sprocket teeth when the load is heavy.

Check the chain frequently and adjust the tension as necessary.

USE A GOOD QUALITY SAE 50 OIL FOR THE  
ROLLER CHAIN.

#### EXTRA EQUIPMENT

Double Fingers for use in stony country.

Leather Bound Canvases give longer service and greater economy.

Rotary Buttor can be obtained for use where a rotary buttor is preferred to the standard vibratory type.

Double Stripper Bales for use in especially tangled crops.

Pneumatic Tyres, for main wheel, grain wheel and transport wheels.

Steel Transport Wheel (Roller Bearing) for use when travelling long distances between jobs.

Combined 3rd and 4th Discharge Arms ensure positive discharge and cleaner separation in long, heavy crops.

Flax Equipment, comprising pipe divider, double stripper bales, guards for rear chains, sprocket to increase knife speed, plain knives and serrated ledger plates.

# INDEX

	Pages
Assembling the Machine .. .. .	5-13
Bands—types .. .. .	25-26
Beaters—6ft.—assembling .. .. .	7
Beaters—8ft.—assembling .. .. .	7
Bevel Gear—removing .. .. .	35
Bevel Wheel—meshing .. .. .	32
Bevel Pinion—meshing .. .. .	32
Binder Attachment—description .. .. .	19
Binder Attachment—working adjustments .. .. .	29
Binder—power-take-off—special instructions .. .. .	36-41
Buttor Board—adjustments .. .. .	29
Canvases—adjusting .. .. .	29-30
Canvas—conveyor—fitting .. .. .	14
Canvas—lower elevator—fitting .. .. .	14
Canvas—upper elevator—fitting .. .. .	14
Chains—adjustment .. .. .	31
Chain—roller .. .. .	40-41
Clutch—overload—description .. .. .	38
Clutch—overload—adjusting .. .. .	38
Cord Holder Clamp—tension .. .. .	24
Cord Holder Ring—adjustment .. .. .	24
Crank Handle—use .. .. .	31
Cross-shaft—removing .. .. .	35
Cutter Bar—care of .. .. .	29
Cutting Mechanism—care of .. .. .	40
Discharge Arms—quivering of .. .. .	28
Divider—extra outside .. .. .	13
Divider—inside .. .. .	5
Divider—outside .. .. .	5
Drive Dog—replacing .. .. .	34
Drive Dog Spring—replacing .. .. .	34
End of Season .. .. .	31
Equipment—extra .. .. .	41
Fender Rod .. .. .	5
Fender Stick .. .. .	13
Field Adjustments .. .. .	29-31
Finger Arm, upper—sheaf carrier .. .. .	12

	Pages
Forecarriage—fitting for transport .. .. .	3
Forecarriage—fitting for working .. .. .	12
Grain Wheel—assembling .. .. .	5
Grain Guide—attaching .. .. .	12
Grain Guide—positions .. .. .	28
Header Board—adjustments .. .. .	29
Hints to Operators .. .. .	18
Knife—care of .. .. .	29
Knife—fitting .. .. .	12
Knotter—adjustments .. .. .	22-27
Knotter—removing .. .. .	34
Knotter—working continuously .. .. .	23
Knotter Hook—tension .. .. .	23
Knotter Frame—adjustment .. .. .	24
Lubrication .. .. .	4
Main Wheel—removing .. .. .	34
Nearside—description .. .. .	2
Neck yoke .. .. .	3
Needle—adjustment .. .. .	22
Offside—description .. .. .	2
Operating Adjustments .. .. .	19-28
Packer Crank—removing .. .. .	34
Pitman—fitting .. .. .	12
Pitman—adjustment for needle .. .. .	22
Pole—fitting for transport .. .. .	3
Pole—fitting for working .. .. .	12
Power-take-off Shaft—speed .. .. .	36-37
Preparing for the Crop .. .. .	14
Reel—6ft.—assembling .. .. .	7
Reel—8ft.—assembling .. .. .	7
Reel—speed—ground drive .. .. .	19
Reel—speed—power-take-off .. .. .	37
Reel—adjustments .. .. .	28
Reel Arms—6ft.—assembling .. .. .	7
Reel Arms—8ft.—assembling .. .. .	7
Registered Number .. .. .	2
Repair Instructions .. .. .	32-35
Safety First .. .. .	2
Sheaf—adjustment size .. .. .	19-20
Sheaf Carrier—attaching .. .. .	12

	Pages
Sheaf Carrier—adjustments .. .. .	31
Sheaves—loose—causes .. .. .	27
Sheet Bend Knot .. .. .	14
Speed in Crop—ground drive .. .. .	19
Speed in Crop—power-take-off .. .. .	37
Sprockets—change .. .. .	37
Swings—fitting .. .. .	3
Threading the Needle .. .. .	14-17
Tractor Hitch—fitting for transport .. .. .	36
Tractor Hitch—fitting for working .. .. .	36
Transporting .. .. .	2-3
Tying—adjustments .. .. .	25-27
Tyres—pneumatic .. .. .	18
Twine Can—attaching .. .. .	7
Twine Can—tension .. .. .	23
Windscreen—attaching .. .. .	12

— NOTES —



## POWER-TAKE-OFF ASSEMBLING INSTRUCTIONS.

*(Illustrations on back.)***SUNSHINE MASSEY HARRIS No. 6B  
POWER-TAKE-OFF REAPER AND BINDER**

The assembly of the tractor section of the power-take off and the tractor drawbar plates should be done as indicated on the Sunshine Header Instruction Leaflet. These leaflets are printed for the various makes and models of tractors. The written instructions on this leaflet referring to the Header should be ignored.

**IMPORTANT WORKING INSTRUCTIONS**

1. On no account engage the tractor clutch to drive the double universal joint without it being coupled to the binder, otherwise much damage to the universals will be done as well as possible bodily injury to the operator.
2. **THE SAFETY CLUTCH** The overload clutch near the twine box should be **evenly** adjusted on the four pressure springs just sufficiently to function the binder. If this clutch is over-tight, a blockage in the binder would meet with the full power of the tractor engine, thus causing major breakages. The best method of adjusting this clutch is to let it slip for a start, then gradually take up springs until they drive the binder in the heaviest part of the crop. Give periodical attention to this clutch to make sure that it is free to operate. The slightest trace of warmth in either of the outer clutch plates is an indication of slippage.
3. Always engage the tractor clutch gently to avoid undue strains on the binder.
4. **SPEEDS**—The correct working speed of the crankshaft is 403 r.p.m. This figure must not be exceeded. A countersink is provided in the rear end of this shaft for the purpose of using a revolution counter. If a counter is not available, then the speed can be determined by tying a piece of rag or twine on one of the battens of the binder reel and counting the revolutions, using the minute hand of a watch.

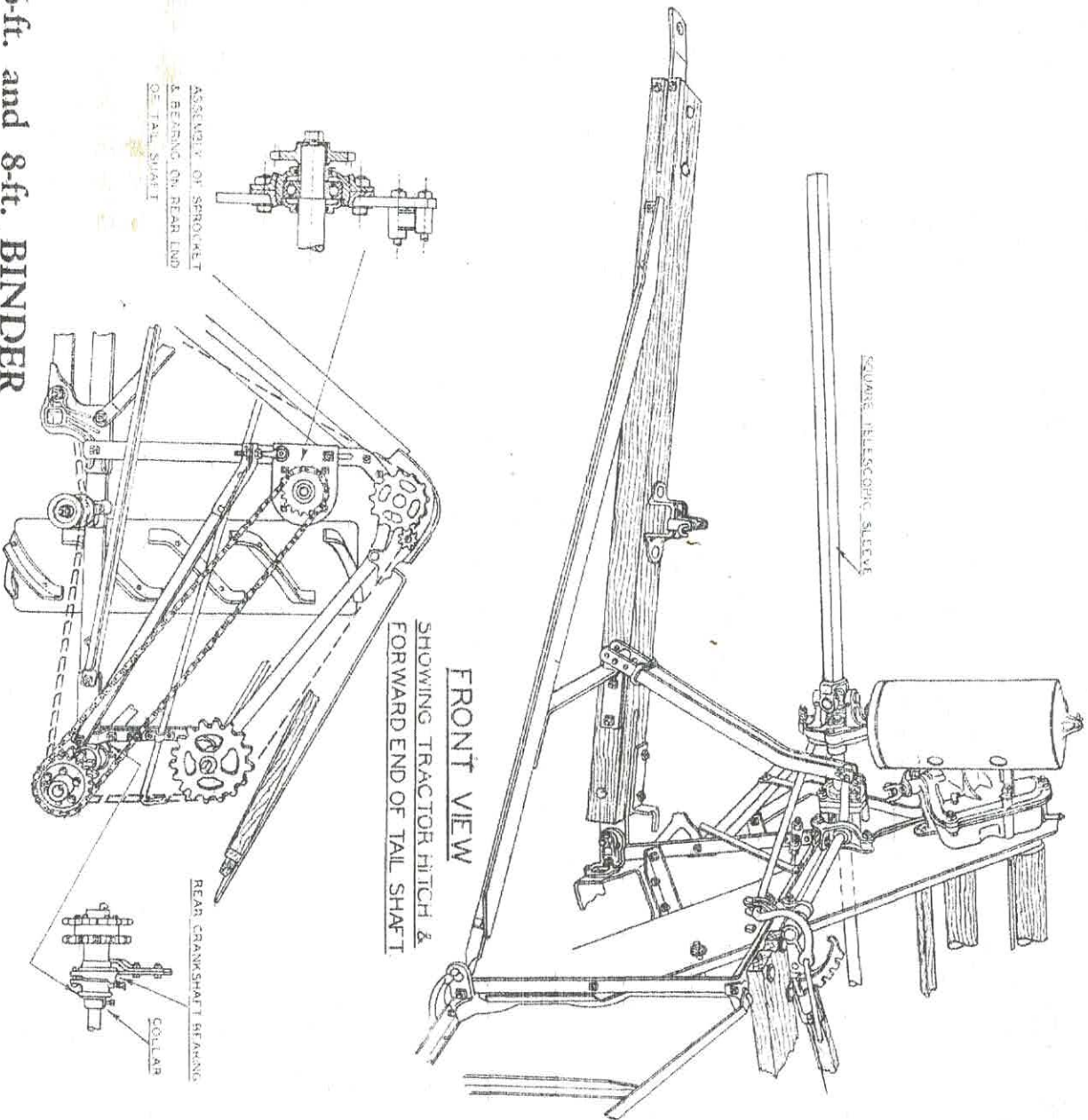
**THE REEL SPEED OF THE 6-FT. IS 29½ R.P.M. AND 8-FT., 26½ R.P.M.****Do not exceed these figures.**

The standard roller chain sprocket on the rear end of the tail shaft is 17 tooth. This is supplied with the machine, but 16 tooth and 18 tooth sprockets are available as an extra to suit tractors which may vary from the usual P.T.O. speed of 545 R.P.M. The 16 tooth would suit tractors which have a higher tail shaft speed than 545 and the 18 tooth, a lower tail shaft speed.

<i>Catalogue No.</i>	<i>No. of Teeth</i>	<i>Suits Tractor P.T.O. speed of</i>
<i>SB 2015</i>	<i>16</i>	<i>579 R.P.M.</i>
<i>SB 2009</i>	<i>17</i>	<i>545 "</i>
<i>SB 2016</i>	<i>18</i>	<i>515 "</i>

Tractors which are out of the range of these figures could be catered for by adjusting the throttle to give the required speed for the binder.

5. **TRAVELLING SPEED**—To avoid abusing the binder, the travelling speed of 3 m.p.h. should not be exceeded.



**6-ft. and 8-ft. BINDER**  
 (Machine Section)  
**POWER-TAKE-OFF ASSEMBLY.**

REAR VIEW

FRONT VIEW

SHOWING TRACTOR HITCH &  
FORWARD END OF TAIL SHAFT

ASSEMBLY OF SPROCKET  
& BEARING ON REAR END  
OF TAIL SHAFT

REAR CRANKSHAFT BEARING

COLLAR

SUNSHINE HARVESTER WORKS, SUNSHINE.

POWER-TAKE-OFF ASSEMBLING INSTRUCTIONS

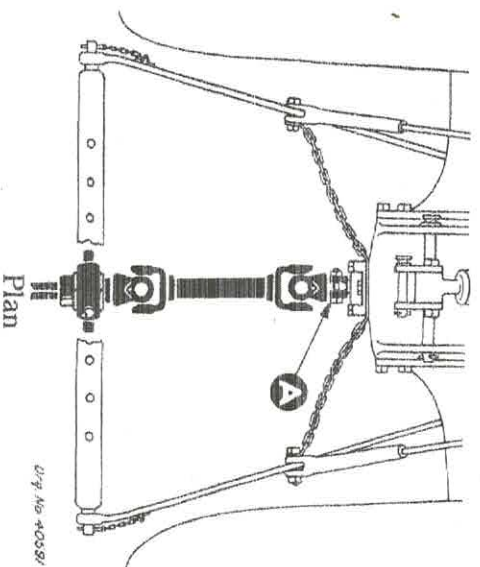
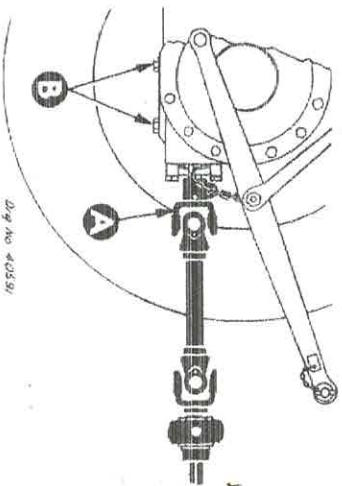
X 266

# FERGUSON TRACTOR

in conjunction with

Sunshine No. 6B P.T.O. Reaper and Binder

## TRACTOR SECTION



Side elevation

Raise the lifting link with drawbar attached to highest position. These parts are not used in conjunction with the binder.

Remove the cap over the rear end of the tractor power-take-off shaft.

Attach the universal assembly complete (as packed) securing the universal fork (A) to the tractor power-shaft with the rivet-pin supplied. Tighten the clamp bolt.

## DRAWBAR SECTION

Remove and discard the four set-screws (B) located under rear housing. Place drawbar (C) in position as shown, securing with the four  $1\frac{3}{4}$ " x  $\frac{5}{8}$ " set-screws and spring washers provided.

