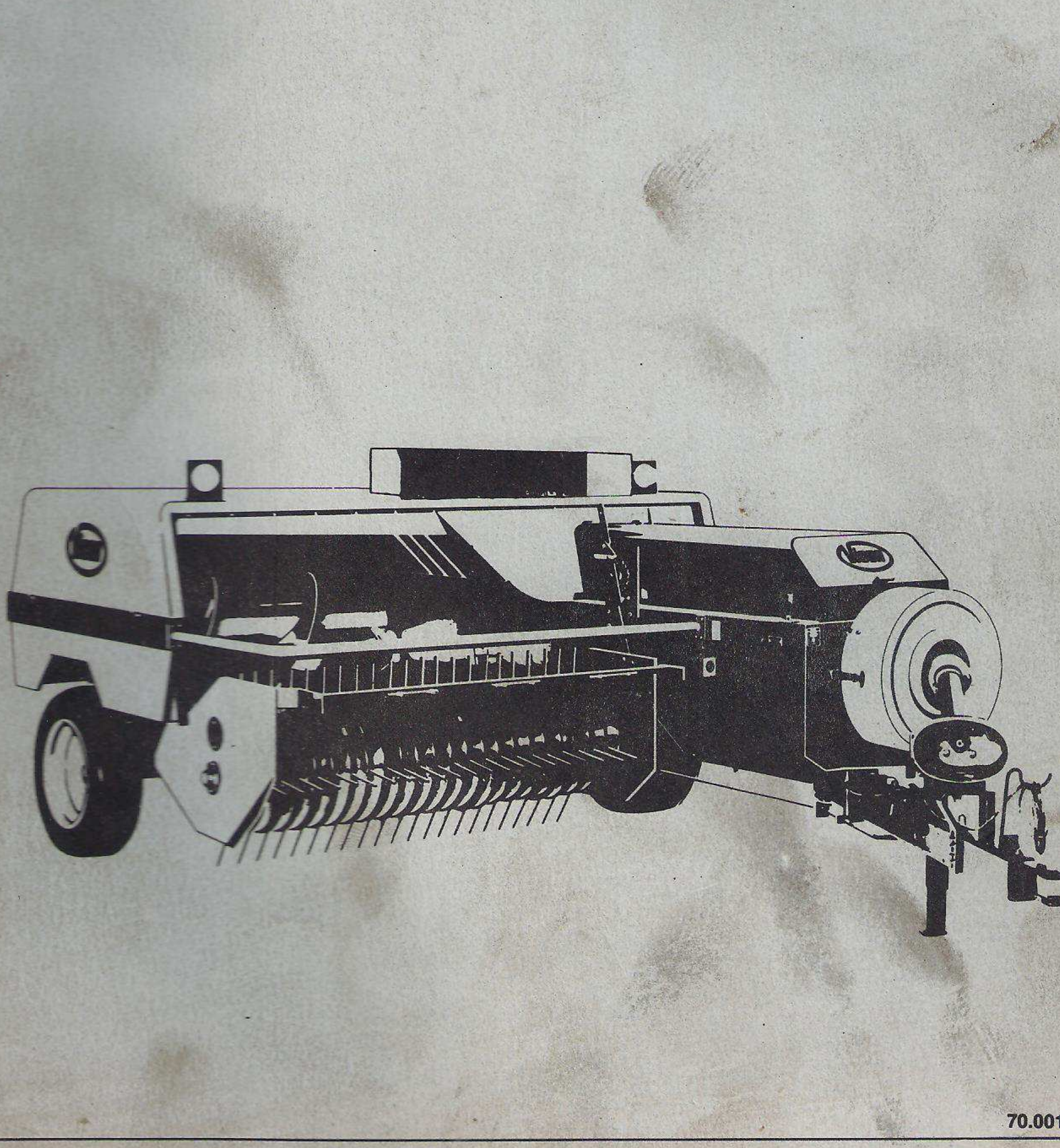
Vicon

service manual

SP 451/461/471/481



70.001.522/1

GROUP 1

GENERAL

1. Baler PTO shaft
2. Baler PTO shaft
3. Flywheel
4. Gearbox
5. Pick-up drive chain
6. Packer drive shaft pinion
7. Packer drive gear
8. Knotter shaft
9. Knotter drive gear
10. Knotter drive bevel gear
11. Needle pitman
12. Knotters
13. Needles
14. Metering wheel
15. Bale tension device
16. Auger drive pinion
17. Packer crankshaft
18. Diagonal brace
19. Twine chest
20. Auger drive shaft
21. Baler support
22. Plunger pitman
23. Pick-up drive coupling shaft
24. Plunger
25. Packer drive bevel gear
26. Pick-up
27. Auger
28. Auger pulley
29. Auger drive belt

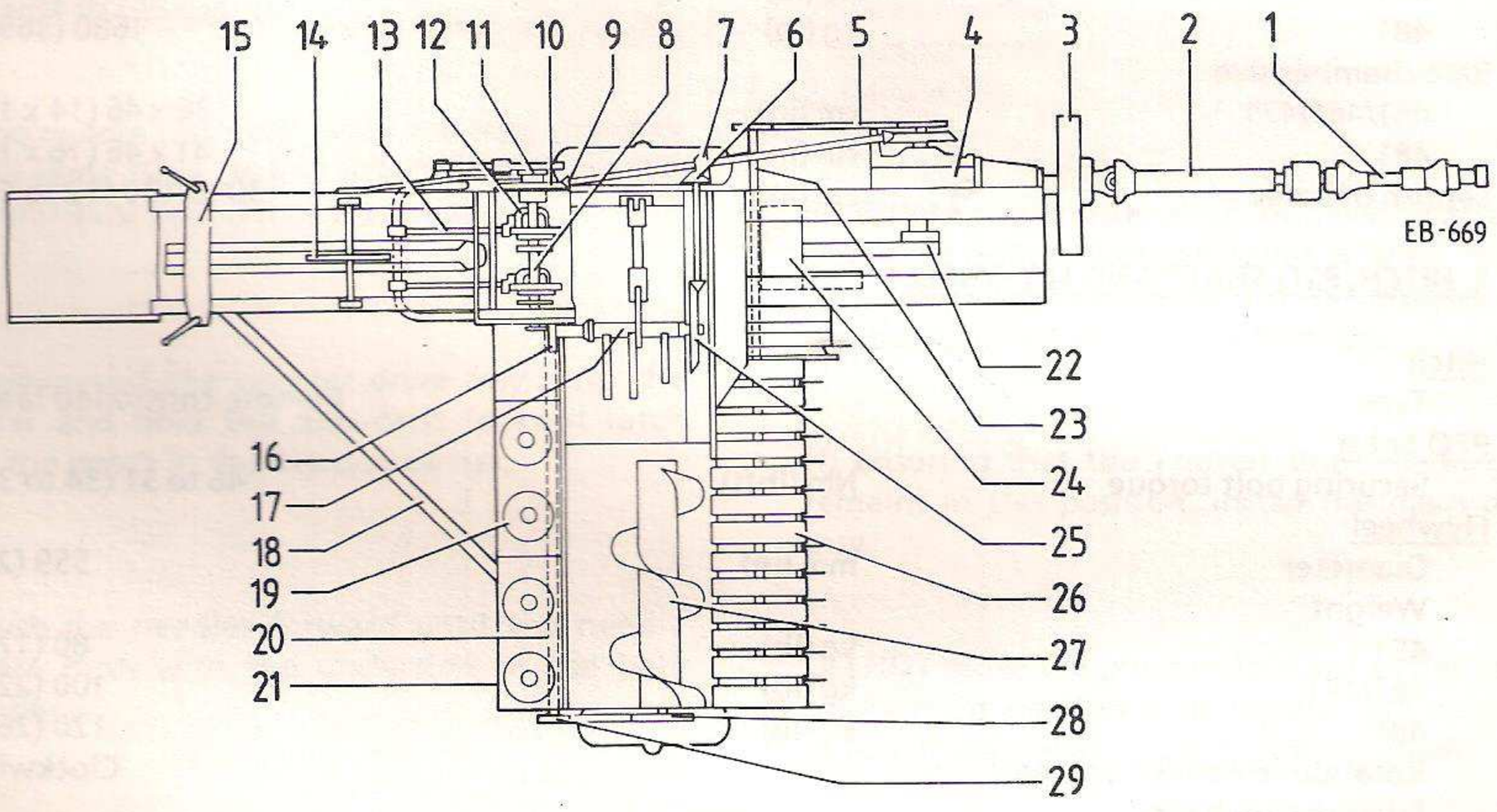


Fig. 1

5. SPECIFICATIONS

The following specifications are listed in GROUP order and identified by the baler model number where applicable. During the overhaul of worn components personal initiative must be exercised to determine whether or not a component is suitable for re-use. It is obviously uneconomical to return worn parts to service with an expectation of life that may involve labour costs at an early date.

1. GENERAL

Overall width		
451	cm (in)	242.5 (96)
461	cm (in)	257 (101)
471/481	cm (in)	271 (107)
Overall length (excl. hitch)		
451	cm (in)	366 (144)
461/471	cm (in)	396 (156)
481	cm (in)	430 (169)
Hitch length		
451	cm (in)	93 (36)
461/471/481	cm (in)	125 (49)
Overall height		
451/461/471	cm (in)	137 (54)
481	cm (in)	142 (56)
Approx. weight		
451	kg (lb)	1360 (2992)
461	kg (lb)	1480 (3256)
471	kg (lb)	1560 (3432)
481	kg (lb)	1680 (3696)
Bale chamber size		
451/461/471	cm (in)	36 x 46 (14 x 18)
481	cm (in)	41 x 46 (16 x 18)
Length of bales	cm (in)	30 to 130 (12 to 51)

2. HITCH, PTO SHAFT AND FLYWHEEL

Hitch		
Type		Remote controlled latch
PTO Shaft		
Securing bolt torque	Nm (lbft)	46 to 51 (34 to 38)
Flywheel		
Diameter	mm (in)	559 (22)
Weight		
451	kg (lb)	80 (176)
461/471	kg (lb)	100 (220)
481	kg (lb)	120 (264)
Rotation (viewed from rear)		Clockwise
Friction clutch slip		
451	Nm	560
461/471	Nm	660
481		850
Spring length setting		
451	mm	35
461/471	mm	32
481	mm	40
Clutch Spring Data		
Free length		
451/461/471	mm	52
481	mm	58

Shear bolt torque	Nm (lbft)	22 to 24 (16 to 18)
Hub retaining nut torque	Nm (lbft)	300 to 400 (220 to 295)

3. GEARBOX

Pinion shaft preload	Nm (lbin)	3 to 4 (25 to 35)
Crankshaft preload	Nm (lbin)	3 to 4 (25 to 35)
Bevel gear backlash	mm (in)	0.18 to 0.30 (0.007 to 0.012)
Packer drive lower gear to wear strip clearance	mm (in)	0.6 to 1.3 (0.023 to 0.051)
Locknut torque	Nm (lbft)	70-90 (51-66)

4. PACKER FINGERS AND DRIVE

Packer drive shaft		
Backlash (all gears)	mm (in)	0.6 to 1.3 (0.024 to 0.050)
Relief rod		
Relief spring (Not 451)		
Free length	mm (in)	142.7 (5.62)
Test length	mm (in)	111.1 (4.375)
Test load	kg (lb)	317.5 (700)
Relief rod length		
461/471	mm (in)	546 (21 to 22)
481	mm (in)	604 (23.5 to 24)
Packer fingers		
Packer spring		
Free length	mm (in)	190
Test length	mm (in)	385.5
Test load	kg (lb)	
Shear bolt torque	Nm (lbft)	22 to 24 (16 to 18)

5. PLUNGER AND BALE CHAMBER

Plunger runner to lower wearing pad clearance	mm (in)	0.2 to 0.5 (0.008-0 02)
Knife to knife clearance	mm (in)	0 to 0.8 (0 to 0.03)
Knives parallel within	mm (in)	0.5 (0.020)
Knife guide to plunger knife clearance	mm (in)	0.3 to 0.80 (0.012 to 0.030)
Upper wearing pad to knife guide clearance	mm (in)	0.5 to 1.5 (0.020 to 0.060)
Right upper block to bale chamber clearance at shear point	mm (in)	0.5 to 1.5 (0.012 to 0.06)
Trip arm rack to spline clearance	mm (in)	3 to 6 (0.12 to 0.24)
Pitman front bearing bolt torque		
451/461/471	Nm (lbft)	65 to 75 (48 to 55)
481	Nm (lbft)	160-170 (118-127)
Plunger roller bolts torque	Nm (lbft)	115 to 122 (84 to 90)

6. PICKUP

Main drive tension	mm (in)	19 to 25 (0.75 to 1.0)
Effective weight of pickup at its lowest position	kg (lb)	18 to 23 (40 to 50)
Slip clutch torque	Nm (lbft)	140 to 160 (103 to 118)

7. AUGER

Speed at PTO drive shaft speed of 540 rev/min.		
451/461/471	rev/min	188
481	rev/min	240
Belt deflection with 9 kg (251 lb) load	mm (in)	14 (0.55)

8. MAINFRAME

Wheel bolt torque	Nm (lbft)	110 (80)

TYRE PRESSURE

STANDARD				
	LEFT		RIGHT	
451	10/80 X 12	3.25	700 X 12	1.50
461	10/80 X 12	3.25	700 X 12	1.50
471	10/75 X 15.3	3.25	10/80 X 12	3.25
481	10/75 X 15.3	3.25	10/80 X 12	3.25

9. KNOTTERS AND NEEDLES

Keeper blade to disc notch overlap	mm (in)	3 (0.125)
Keeper blade setting-load required to pull twine from disc	kg (lb)	25 to 30 (55 to 66)
Knotter hook jaw opening load	kg (lb)	3 to 5 (7 to 12)
Stripper locations-knotter hook tip to stripper flange clearance	mm (in)	8 to 15 (0.3 to 0.6)
Needle to cleaner clearance	mm (in)	2 to 5 (0.08 to 0.2)
Needle mounting plate to bale chamber bottom plate clearance	mm (in)	12 to 16 (0.5 to 0.63)
Tucker finger to needle clearance	mm (in)	2 to 5 (0.08 to 0.2)
Knotter shaft brake load	kg (lb)	22 to 25 (50 to 55)
Needles to enter bale chamber behind plunger deflectors	mm (in)	0 to 50 (0 to 2)
Needle bolt torque	Nm (lbft)	108.5 to 122 (80 to 90)
Twine tension (Plastic or Sisal)	kg (lb)	0.5 to 1 (1 to 2)

GROUP 2

HITCH, PTO SHAFTS AND FLYWHEEL

1.DESCRIPTION

1a. HITCH

The hitch is of rectangular section. A latch allows a transport, or three working positions. The hitch strap may be fitted inside or outside of the top or bottom section of the box type drawbar. The hitch fitted to the baler carries the shaft centre bearing support. This support is adjustable in height to ensure that the bearing is at the same height or slightly higher than the tractor PTO shaft. All hitches carry a PTO shaft support for use when the shaft is uncoupled from the tractor.

Ib. JACK

The screw type jack supports the front of the baler and can be adjusted to line up the hitch with the tractor drawbar. When the baler is coupled to the tractor the jack can be swung through 90°.

1c. DRIVE SHAFTS

The power drive shaft for the 461, 471, 481 balers consists of a two piece PTO shaft from the tractor to the baler flywheel. The front shaft is a short shaft with a universal joint at either end. The rear shaft has a universal joint at the rear end only.

The 451 has a one piece shaft with a universal joint at each end.

1d FLYWHEEL

The PTO shaft drives the clutch assembly which is bolted to the flywheel, which in turn drives the transmission through a shear bolt. The flywheel contains three protective devices to protect the tractor and baler.

(a) The Friction Clutch. (See item 1 Fig. 15)

This is designed to slip if the baler becomes overloaded.

(b) The Over-running Clutch (2-15)

This allows the flywheel to continue rotating independently of the PTO shaft, thus protecting the drive when the tractor is slowed down.

(c) The Shear Bolt (4-15)

This shears if the baler becomes overloaded, thus allowing the PTO shaft and flywheel to continue rotating.

2 JACK

2a REMOVAL

(a) Support the baler under the hitch.

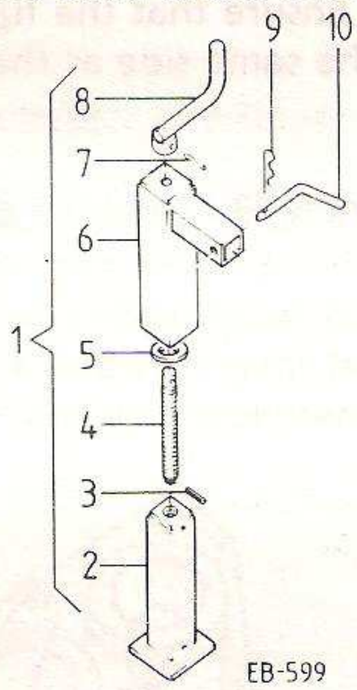


Fig. 1

(b) Remove the spring clip (9-1) from the lock pin (10-1) and remove the lock pin from the jack body (6-1) and remove the jack assy (1-1) from the hitch.

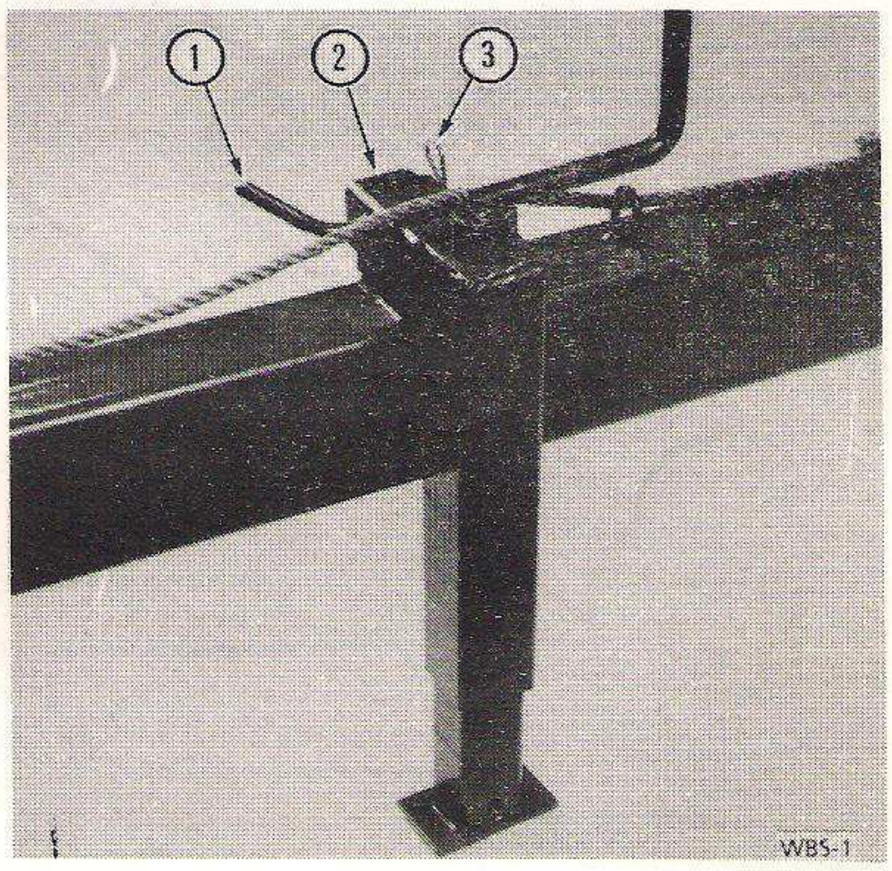


Fig. 2

GROUP 2

HITCH, PTO SHAFTS AND FLYWHEEL

2b DISMANTLING

(a) Remove the roll pin (7-1) from the handle (8-1) and remove the handle from the spindle (4-1). Take off the jack body (6-1) and washer (5-1). Remove the cotter pin (3-1), through the hole in the support, and remove the spindle (4-1) from the jack support (2-1).

2c ASSEMBLY

(a) Locate the spindle (4-1) in the jack support (2-1) and secure the spindle with the cotter pin (3-1). Lubricate the thread of the spindle.

(b) Install the washer (5-1) on the spindle and locate the jack body (6-1) over the jack support and the spindle. Ensure that the flat side of the foot plate is at the same side as the pipe on the jack body.

(c) Locate the handle (8-1) and the roll pin (7-1).

2d INSTALLATION

(a) Locate the jack assy (1-1) on the hitch. Position the lock pin (1-2) in the jack body (2-2) and secure the lock pin with the spring clip (3-2)

(b) Wind down the jack and remove the support from under the hitch.

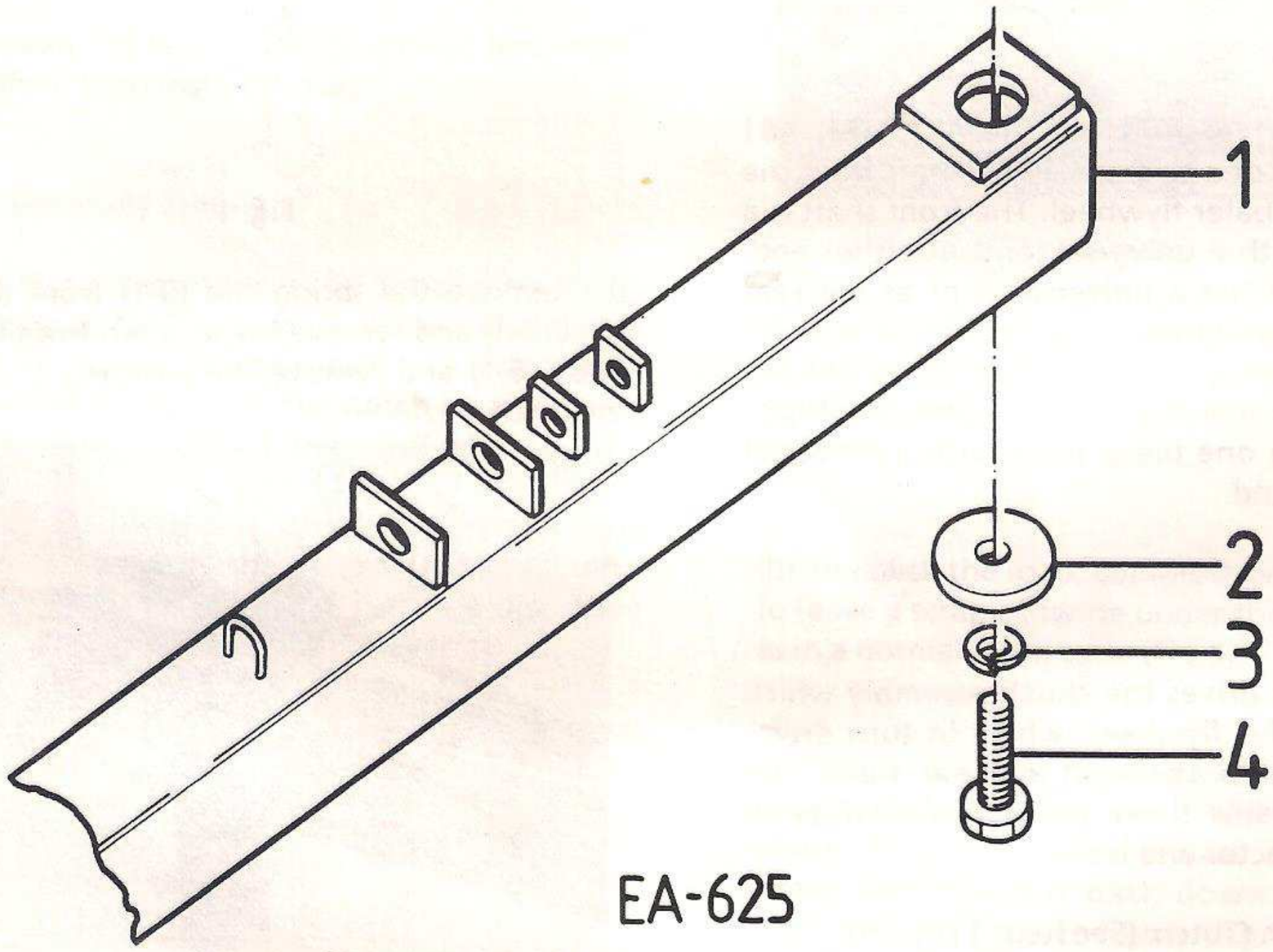
3 HITCH

3a REMOVAL

(a) Support the front of the bale chamber.

(b) Free the centre bearing support from the hitch, taking note which side of the hitch the centre bolt (13-4) is fitted.

(c) Remove the bolt (4-3) with spring lock washer (3-3) ring (2-3) and lift the hitch (1-3) clear.



EA-625

Fig. 3

GROUP 2

HITCH, PTO SHAFTS AND FLYWHEEL

3b DISMANTLING

(a) Remove the jack assembly referring to para 2

(b) To remove the hitch locking pin (19-4) remove the bolt (17-4) and nut (17A-4) then remove the shackle (18-4). Remove the cotter pin (20-4) and withdraw the pin (19-4), then lift the spring (22-4) and washer (21-4) clear.

(c) Remove the two cotter pins (25-4), pin (24-4) and the roller (23-4).

(d) Remove the hitch strap (42-4).

3c ASSEMBLY

(a) Locate the roller (23-4) on the hitch and install the pin (24-4) and cotter pin (25-4). Grease the pin with "Molycote".

(b) Position the washer (21-4) and spring (22-4) on the hitch with the washer at the rear then install the pin (19-4) through the hitch brackets and spring and insert the cotter pin (20-4) into the pin.

(c) Locate the hitch shackle (18-4) on the front of the pin. Secure with bolt (17-4) and nut (17A-4).

(d) Install the jack assembly referring to para 2.

(e) Install the hitch strap (42-4) in the desired position.

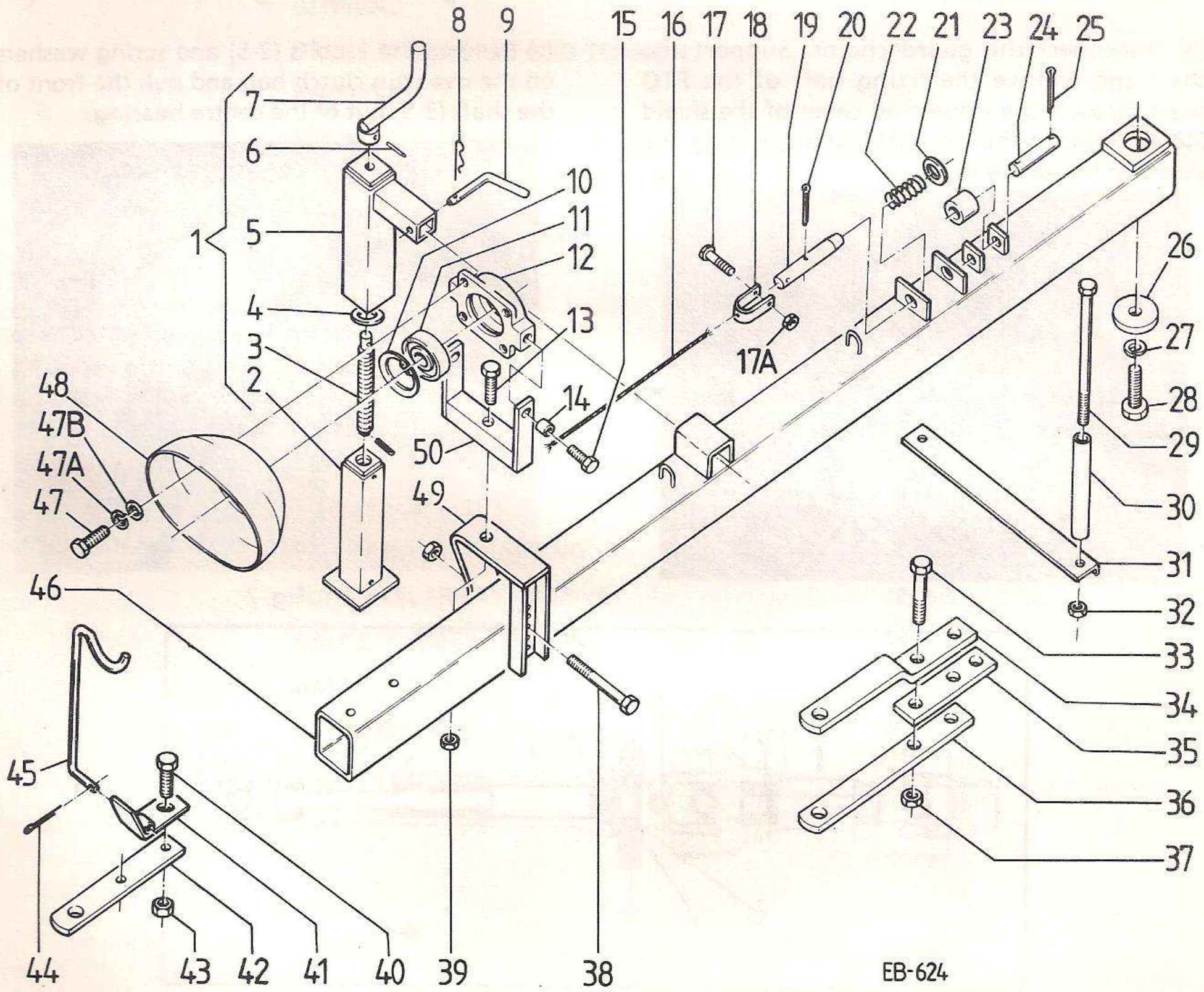


Fig.4

3d INSTALLATION

(a) Locate the hitch assembly under the baler with the lock pin engaged in one of the three positions then secure the hitch with ring (26-4), spring lock washer (27-4) and bolt (28-4) to a torque of 210 Nm.

(b) Position and secure the PTO centre bearing support with the bolt (15-4) ensuring the bolt (13-4) is located on the right of the hitch.

(c) Check that the hitch engages in all three positions then screw down the jack and remove the support from under the bale chamber.

4. PTO SHAFT

4a REMOVAL

I.Three Joint Shaft. (Fig. 5) 461/471/481

(a) Disconnect the guard chains. Support the shaft and remove the fixing bolt of the PTO shaft through the inspection cover of the shield (48-4). Remove the front PTO shaft, noting the shims on the spline shaft.

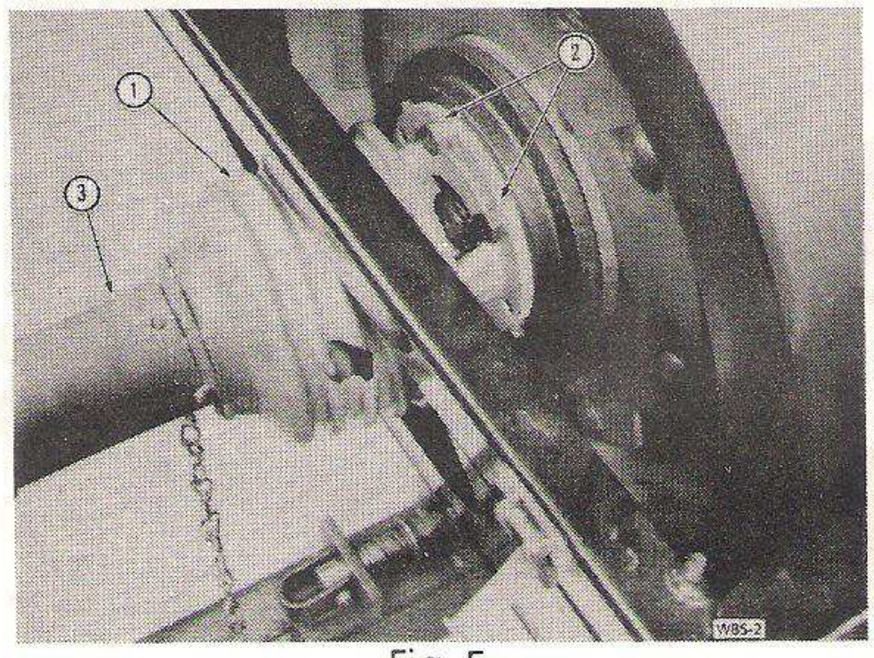


Fig. 5

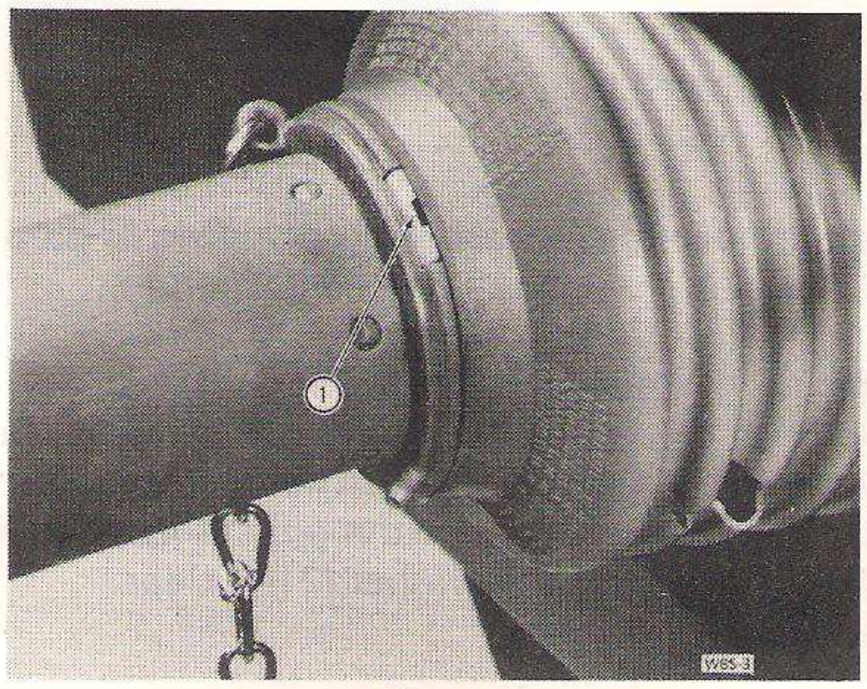


Fig. 6

(b) To remove the rear PTO shaft insert a special tool (2-7) under the locking tab (1-6) then raise the special tool to withdraw the bearing tag (1-7). Repeat this operation on the opposite bearing tag, then with a twisting motion slide the half guard (1-5) along the shaft.

(c) Remove the bolts (2-5) and spring washers on the over run clutch hub and pull the front of the shaft (3-5) out of the centre bearing.

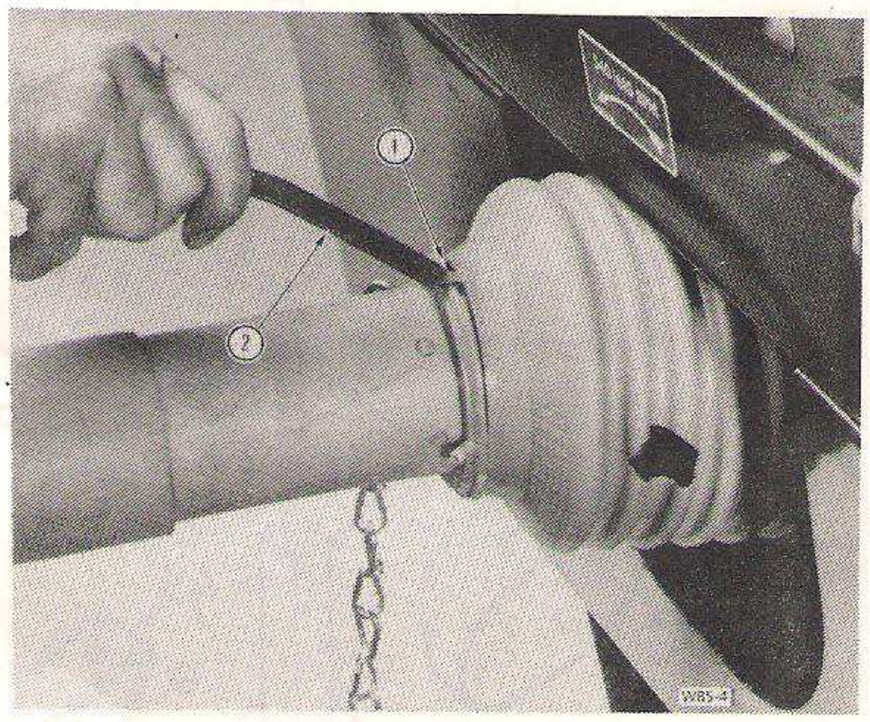


Fig. 7

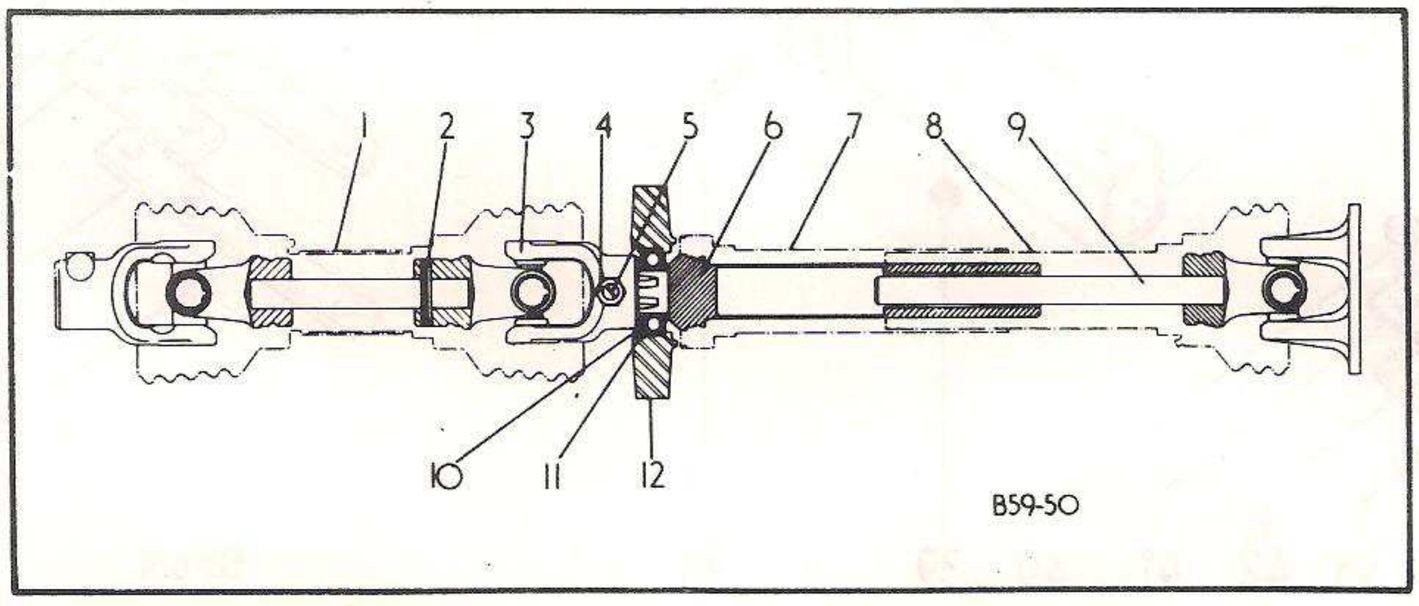


Fig. 8

2. Two Joint Shaft. 451

(a) Disconnect guard chains.

(b) Remove the bolts securing the yoke to the flywheel and lift the PTO shaft clear of the baler.

4b DISMANTLING

1.PTO Front Shaft. 461/471/481

(a) Slide the rear shield down the shaft and drive out the roll pin (2-8).

(b) Slide the universal joint assembly (3-8) off the shaft and slide off both half guards.

2. PTO Rear Shaft. 461/471/481

(a) Slide the rear (inner) half of the shaft (9-8) out of the front tube.

(b) Slide the half guards (7 & 8-8) from the front tube.

(c) Press the PTO shaft (6-8) out of the centre housing (12-8).

(d) Remove the circlip (11-8) then press the bearing from the housing.

3. Two Joint Shaft. 451

(a) Slide the front (inner) half of the shaft out of the rear tube.

(b) Remove the half guards from both inner and outer tubes.

(c) Drive out the roll pins and slide the universal joint assemblies off the tubes.

4c. ASSEMBLY

1 PTO Rear Shaft. 461/471/481

(a) Press the bearing (10-8) into the centre bearing housing (12-8) and secure with the circlip (11-8).

(b) Press the centre bearing assembly onto the splined end of the rear shaft ensuring that the circlip faces the end of the shaft.

(c) Slide the half guards onto the front tube (6-8) then slide the rear half of the shaft (9-8) into the front tube.

2. PTO Front Shaft. 461/471/481

(a) Slide the inner half guard then the outer half guard (1-8) onto the shaft.

(b) Slide the universal joint (3-8) onto the front shaft aligning the roll pin holes, then drive in the roll pin.

3. Two Joint Shaft. 451

(a) Slide the half guards onto the inner and outer tubes.

(b) Slide the universal joints onto the tubes aligning the roll pin holes then drive in the roll pins.

(c) Slide the front half of the shaft into the rear tube.

4d INSTALLATION

1.PTO Rear Shaft. 461/471/481

(a) Position the shaft (3-5) on the flywheel and secure the bolts and lock washers (2-5) tightened to 46 to 51 Nm (34 to 38 lb ft).

(b) Slide the rear half guard (1-8) into position on the shaft, then fully push in the bearing tags (1-7) ensuring the locking tabs (1-6) are behind the tags. Secure the outer shield.

(c) Install the front shaft refering to sub- para 2.

2. PTO Front Shaft. 461/471/481

(a) Locate the centre bearing shield on the shaft.

(b) Place washers to a total of 3 mm on the spline shaft, slide the front shaft onto the rear shaft ensuring that the setscrew holes are in the same plane. Tighten the locking bolt.

(c) Lift the centre bearing into position, install the shield.

3. Two Joint Shaft. 451

(a) Position the shaft (3-5) on the flywheel and secure with the bolts (2-5) tightened to 46-51 Nm (34 to 38 lbft).

(b) Slide the half guard into position on the shaft then fully push in the bearing tags ensuring the locking tabs are behind the tags.

5 UNIVERSAL JOINTS

5a REMOVAL

Experience has shown that, on a shaft with two universal joints, when one of the universal joints fails the other undergoes a strain and may fail within a short time. It is recommended that both universal joints be changed at the same time

(a) Remove the four circlips from the universal joint.

(b) With the universal joint held over a vice use a dolly on one of the bearings to drive the cross through the yoke, refer to Fig 9, until the opposite bearing projects about 7mm ($\frac{1}{4}$in). Grip this projecting bearing in a vice then gently tap the yoke away until the bearing is removed.

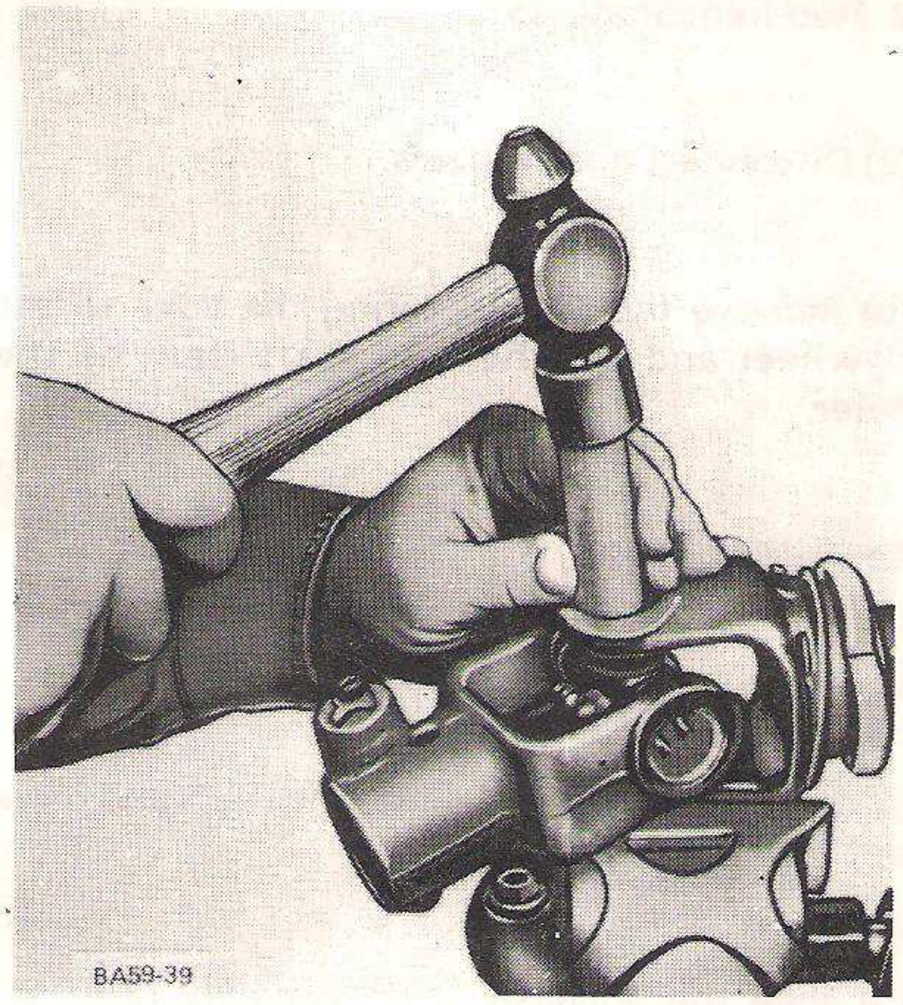


Fig. 9

(c) Using the dolly against the exposed end of the cross, knock the outer bearing through until it projects 7mm ($\frac{1}{4}$ in) Grip the bearing in a vice and tap the yoke until the bearing is free.

(d) Lift the yoke from the cross.

(e) Remove the bearings from the other yoke in a similar manner.

5b INSTALLATION.

(a) Press one bearing cup (1-10) into one yoke until it is just entered.

(b) Install the cross (2-10) then using the dolly and vice, press in the bearing until just past the circlip groove. Install the circlip.

(c) Install the opposite bearing (3-10) onto the cross and press into the yoke bore until just below the face of the yoke.

(d) Install the circlip (4-10) in the bore then, using the dolly, press the bearing fully home remembering that the seals must be compressed before the circlip will enter its groove. When the circlip is opposite the groove a quick release of the vice pressure will allow it to expand into the groove.

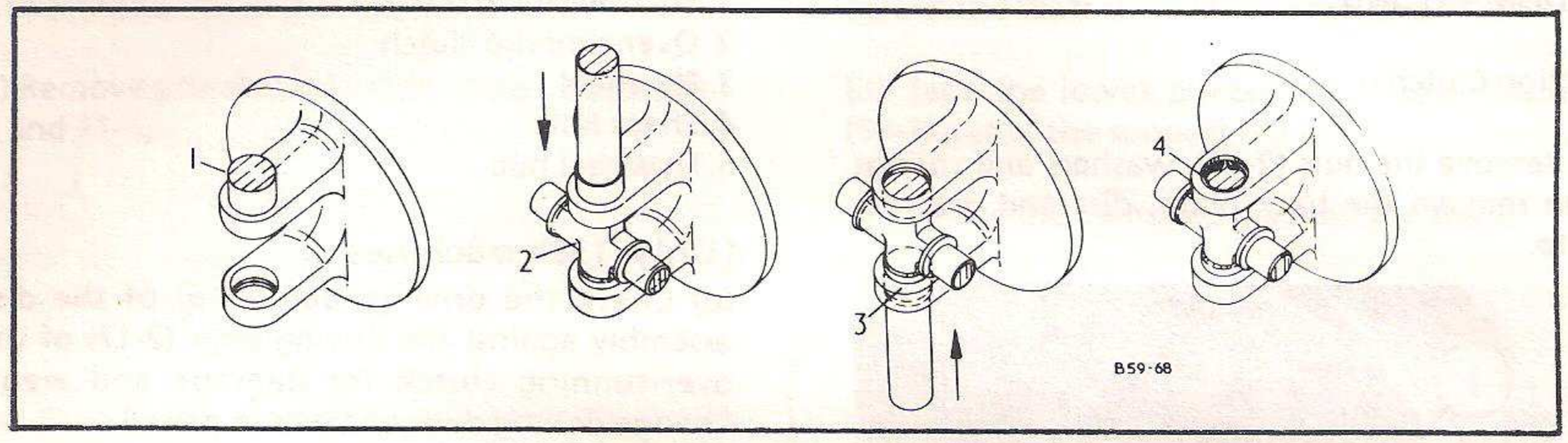


Fig. 10

(e) Assemble the second yoke in a similar manner.

6. FLYWHEEL AND CLUTCH

The flywheel can, if required, be removed with the clutch installed. (Refer para. 2b).

6a. REMOVAL.

1. Friction Clutch.

(a) Disconnect the PTO shaft at the flywheel.
(Only 1984 machines :
(b) Remove cotter pin (1-13), nut and washer (2-13) and take out the over run clutch. Note the sequence and amount of washers.)

(c) Remove the three bolts (1-11) and lift friction clutch assy clear.

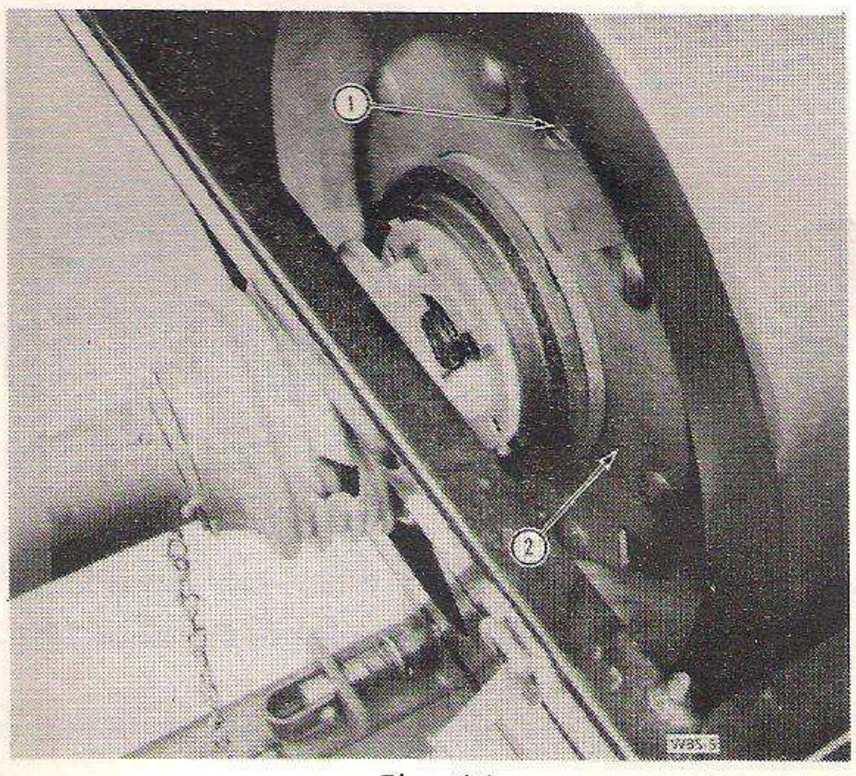


Fig. 11

2. Flywheel

(a) Remove shield (1-12).

(b) Remove the shear bolt (1-14) then sling the flywheel and remove it from the flywheel hub.

(c) Install the washer and nut (1-13) on the pinion shaft to hold the flywheel hub in place and prevent dirt entering the oil seal and bearing.

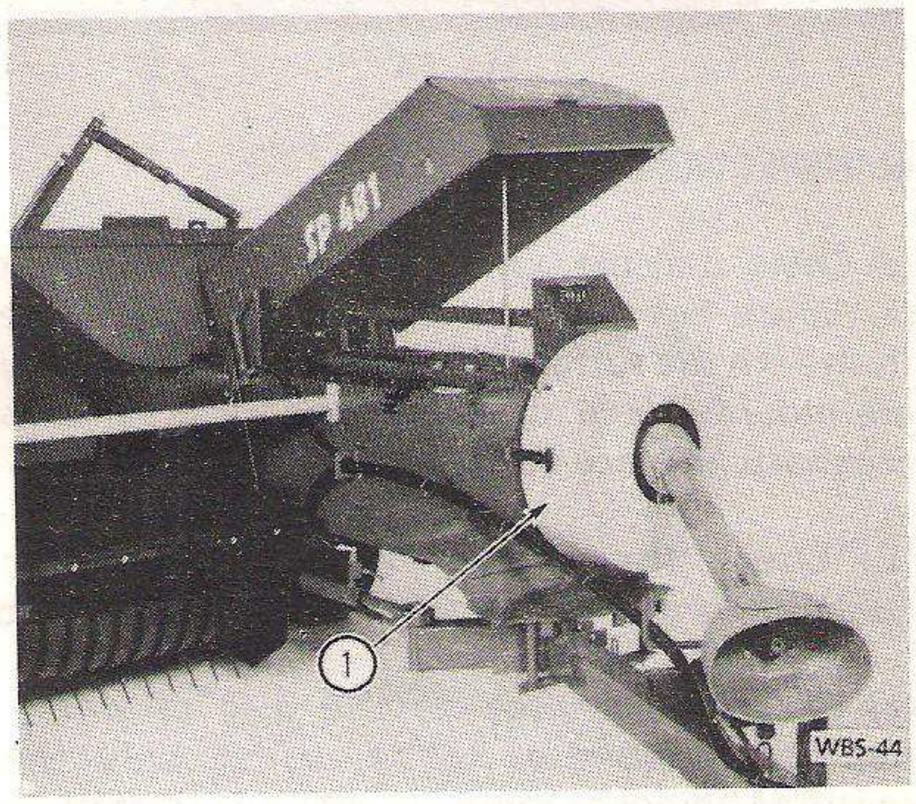


Fig. 12

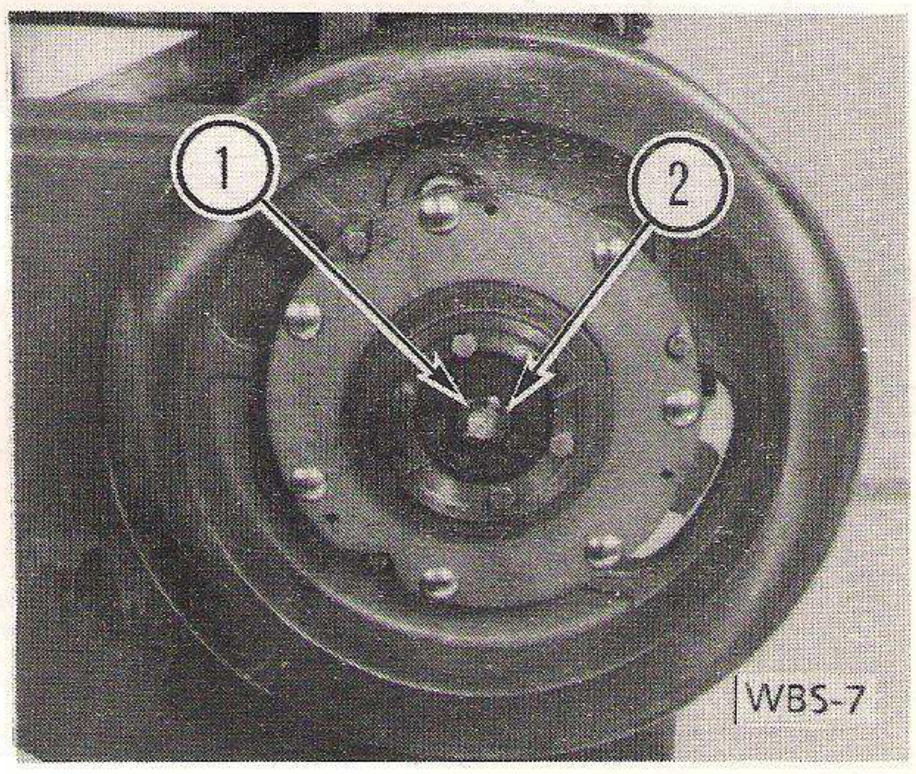


Fig. 13

GROUP 2

HITCH, PTO SHAFTS AND FLYWHEEL

6b DISMANTLING

Friction Clutch

(a) Remove the nuts (2-14), washers and springs then remove the back plate, disc and pressure plate.

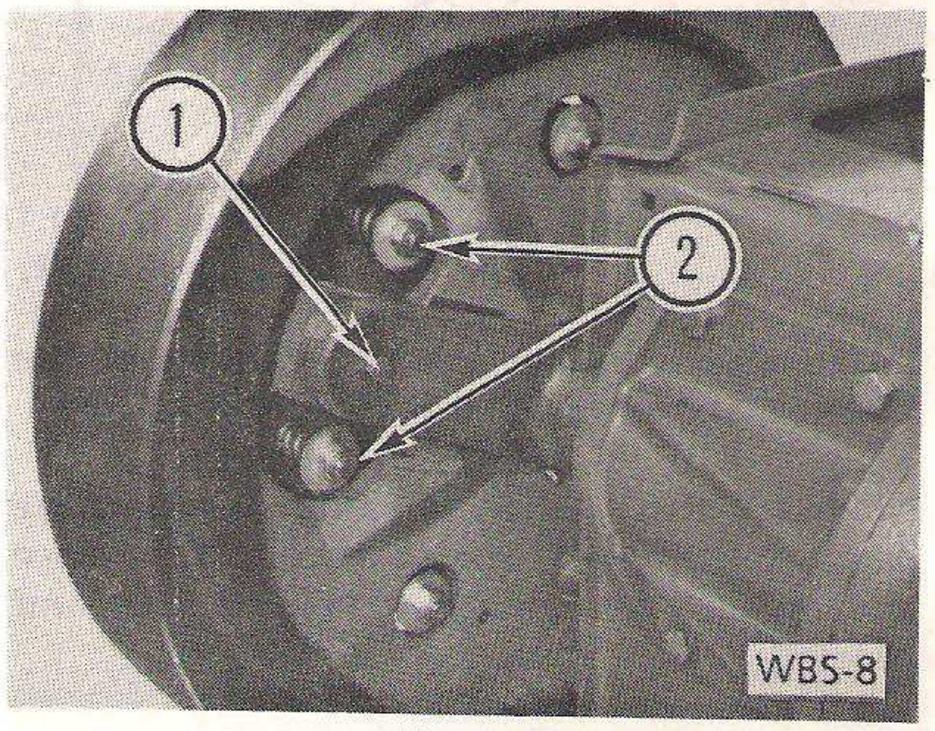


Fig. 14

6c INSPECTION

(a) Check that the bushes around the shear bolt (4-15) are tight in their locations, that they are flush with the surfaces of the parts in which they are mounted and that their shearing surfaces are sharp. Replace dull (blunt) bushes.

(b) Check the friction clutch springs to Specifications.

(c) Check the linings on the disc assembly. Replace if worn or loose, using only the specified linings as these are specially treated.

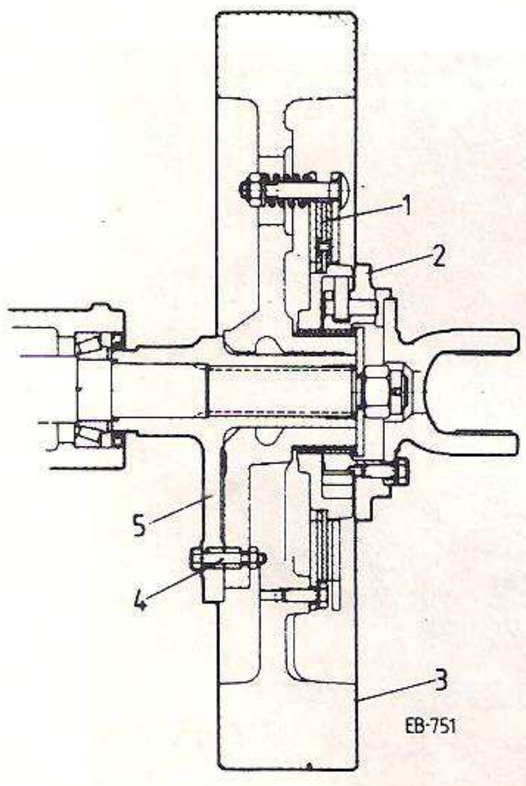


Fig. 15 1984

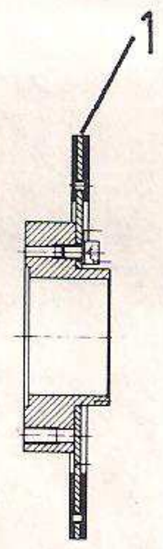


Fig. 15a from 1985

1. Friction clutch disc
2. Over-running clutch
3. Flywheel
4. Shear Bolt
5. Flywheel hub

(Only 1984 machines:
(d) Check the driving lugs (5-16) of the disc assembly against the driving dogs (2-17) of the over-running clutch for damage and wear. Change driving dogs and pins in pairs.)

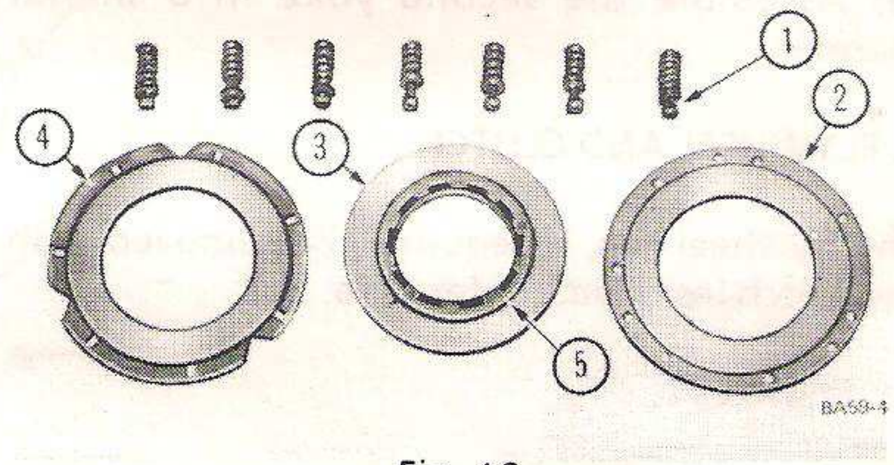


Fig. 16

(Only 1984 machines:
(e) Check the bush (3-17) in the over-running clutch and its mating bush on the flywheel for wear and overheating. Excessive wear of these bushes indicates incorrect shimming of over run clutch. (Para. 6e 1 d).)

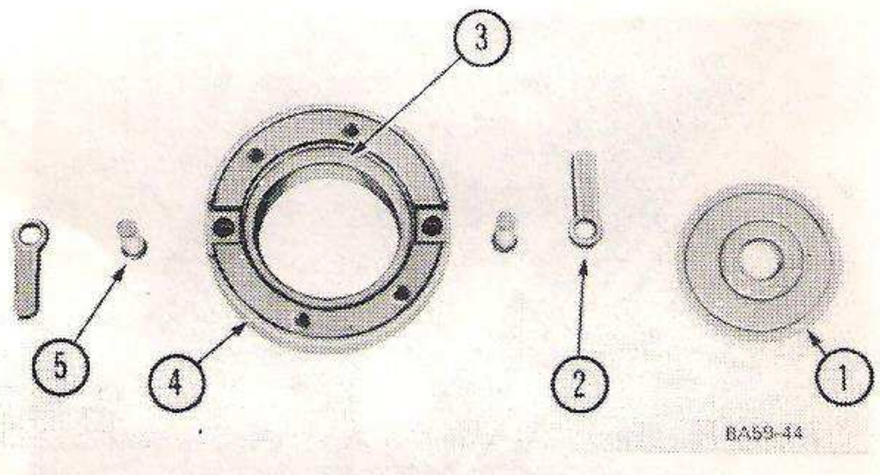


Fig. 17

6d ASSEMBLY

Friction Clutch

(a) Install the bolts (1-16) in the pressure plate (4-16) then install the disc (3-16) with the driving lugs towards the pressure plate. Install the backplate (2-16) onto the bolts then install the springs, washers and nuts.

(b) Tighten the nuts alternately and evenly until each spring length is 35 mm (1.3in.) for 451 balers, 32 mm for 461/471 and 40 mm (1.28in.) for 481 balers.

6e INSTALLATION

1. Flywheel

If friction clutch was removed, re-install to flywheel.

(a) Remove the nut and washer from the pinion shaft then using a hoist lift the flywheel into position on the flywheel hub.

(b) Secure the flywheel to the hub with the shear bolt (1-14) ensuring that the head is to the rear

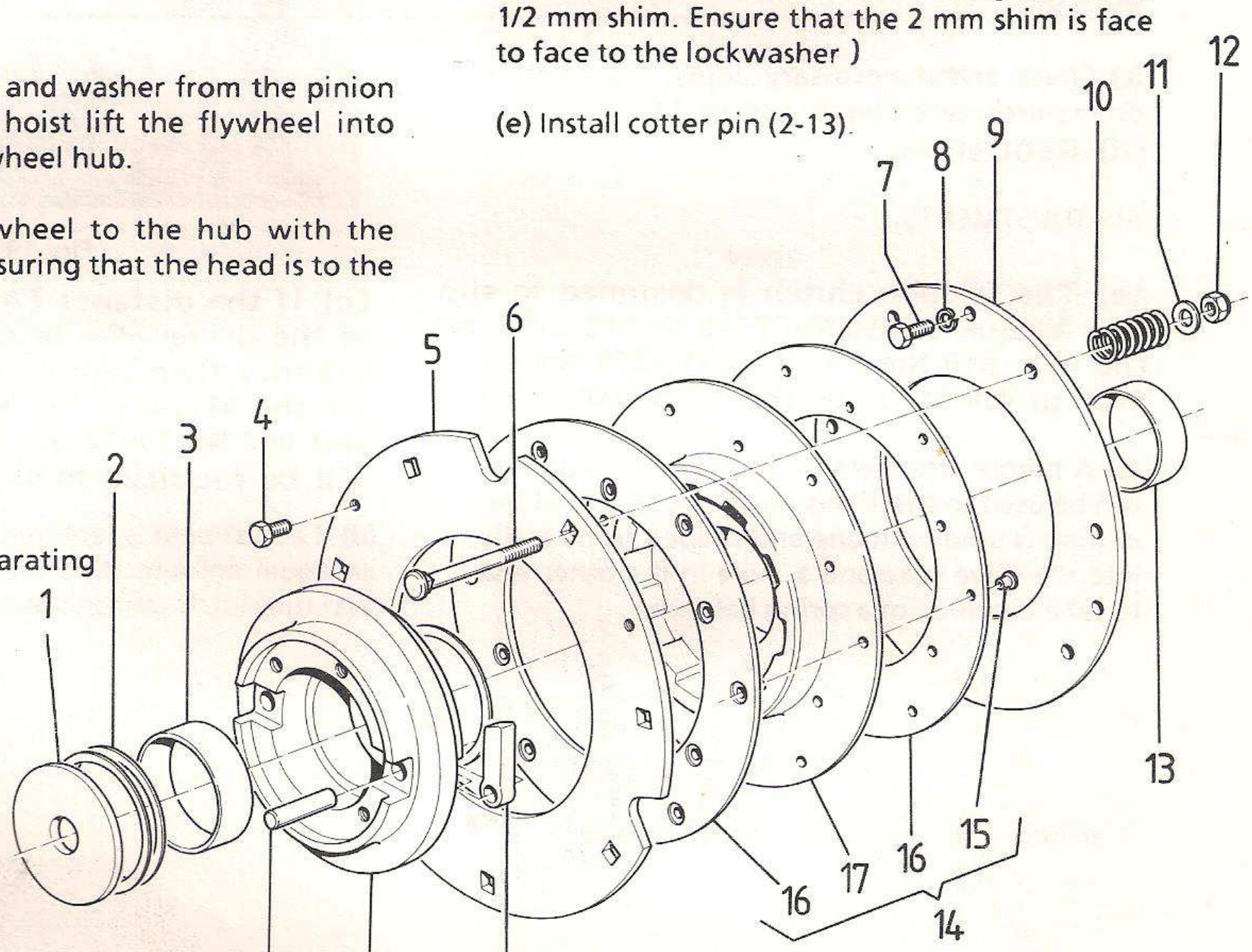
(Only 1984 machines:

(c) Locate the dogs (2-17) in the carrier, if these were removed, ensuring that the longest part of the leg is to the outside, then install the pins (5-17).

(d) Install 1 mm shim on the flywheel. Install the over-run clutch with a 2 mm shim in front of it. Fit the lockwasher and crown nut and apply a torque of 204-406 Nm and check the end play, if this is more than 1/2 mm reshim using a 1 mm or 1/2 mm shim. Ensure that the 2 mm shim is face to face to the lockwasher)

(e) Install cotter pin (2-13).

1. Washer
2. Shim
3. Bushing
4. Bolts, plate separating
5. Plate
6. Bolts
7. Bolts
8. Washers
9. Plate
10. Springs
11. Washers
12. Nuts
13. Bushing
14. Set of plates
15. Rivet
16. Lining
17. Plate
18. Carrier
19. Pawl
20. Carrier
21. Pin



1984

Fig. 18

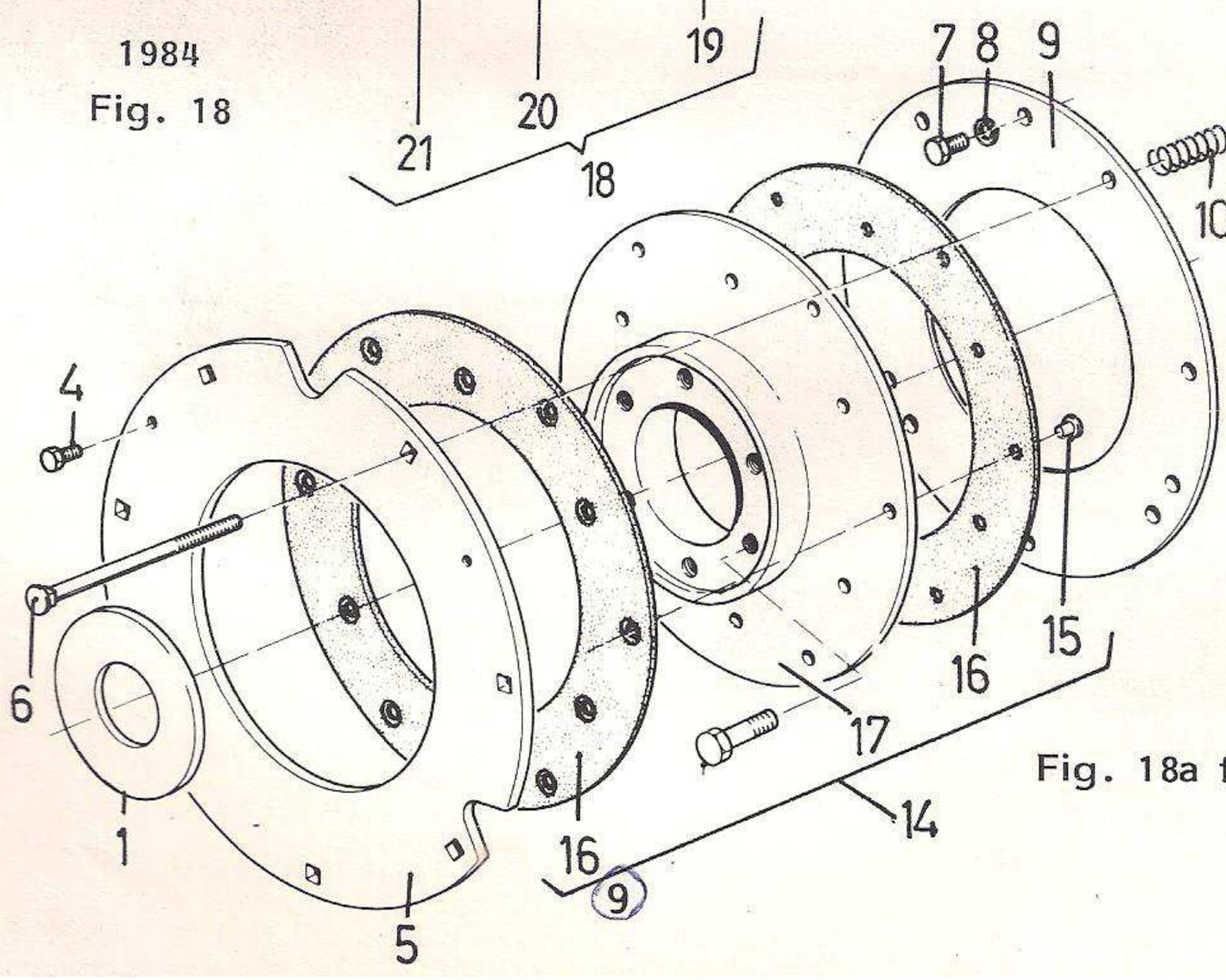


Fig. 18a from 1985

2. Friction Clutch

The friction clutch must be installed before the over run clutch.

(a) Position the friction clutch assembly (2-11) on the flywheel and secure with the three bolts (1-11) (from 1985 marth three 7 mm bushings under base clutch plate.)
(b) Connect the PTO shaft to the flywheel with the bolts (2-5).

(c) Check and if necessary adjust the friction drive clutch, referring to group 11
(d) Refit shield.

6f ADJUSTMENTS

(a) The friction clutch is designed to slip at a torque of 560 Nm (398 to 413 lbft) for the 451, 610 Nm for 461/471, 850 Nm (428 to 450 lbft) for the 481 baler.

(b) A simple arrangement as shown in figure 19 can be used to check this torque. A length of bar or pipe is used with one end shaped to fit easily into the drive yoke and a hole in the other end to take the hook of a spring balance.

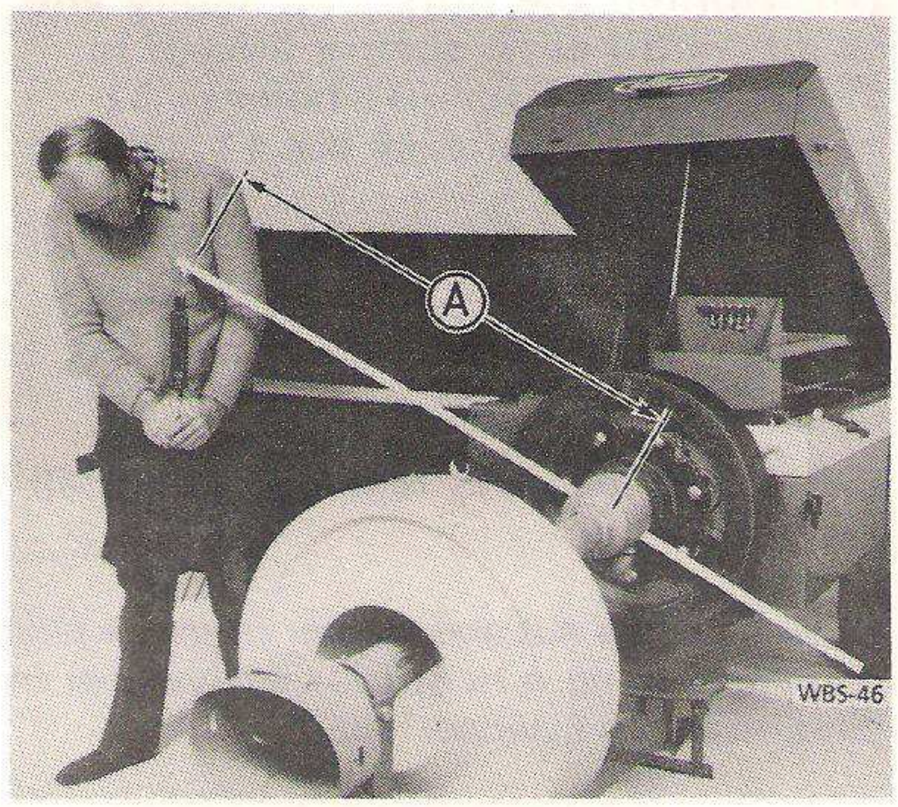


Fig. 19

(c) If the distance (A-19) from the centre of the drive yoke is made 1.85 metres (75 in.) then a pull of 303 N (65-68 lb) for the 421/451, 357 N for 461/471 and 460 N (70-74 lb) for the 481 will be required to slip the clutch.

(d) If adjustment is required turn each nut (2-14) an equal amount then recheck the slip. Check that the clutch springs are equally tensioned.

GROUP 3

GEARBOX

1. DESCRIPTION.

The gearbox consists of a two piece box, housing a matched bevel gear and pinion running in oil.

Figure 1 shows a cross section of the gear box and crank.

Both the bevel gear and pinion are mounted on tapered roller bearings. The pinion shaft is splined to mount the flywheel hub while a bevel gear is splined to the crankshaft. A bevel gear is also driving the packer drive and the knotter drive via a drive assy. A sprocket drive is mounted to drive the pick-up.

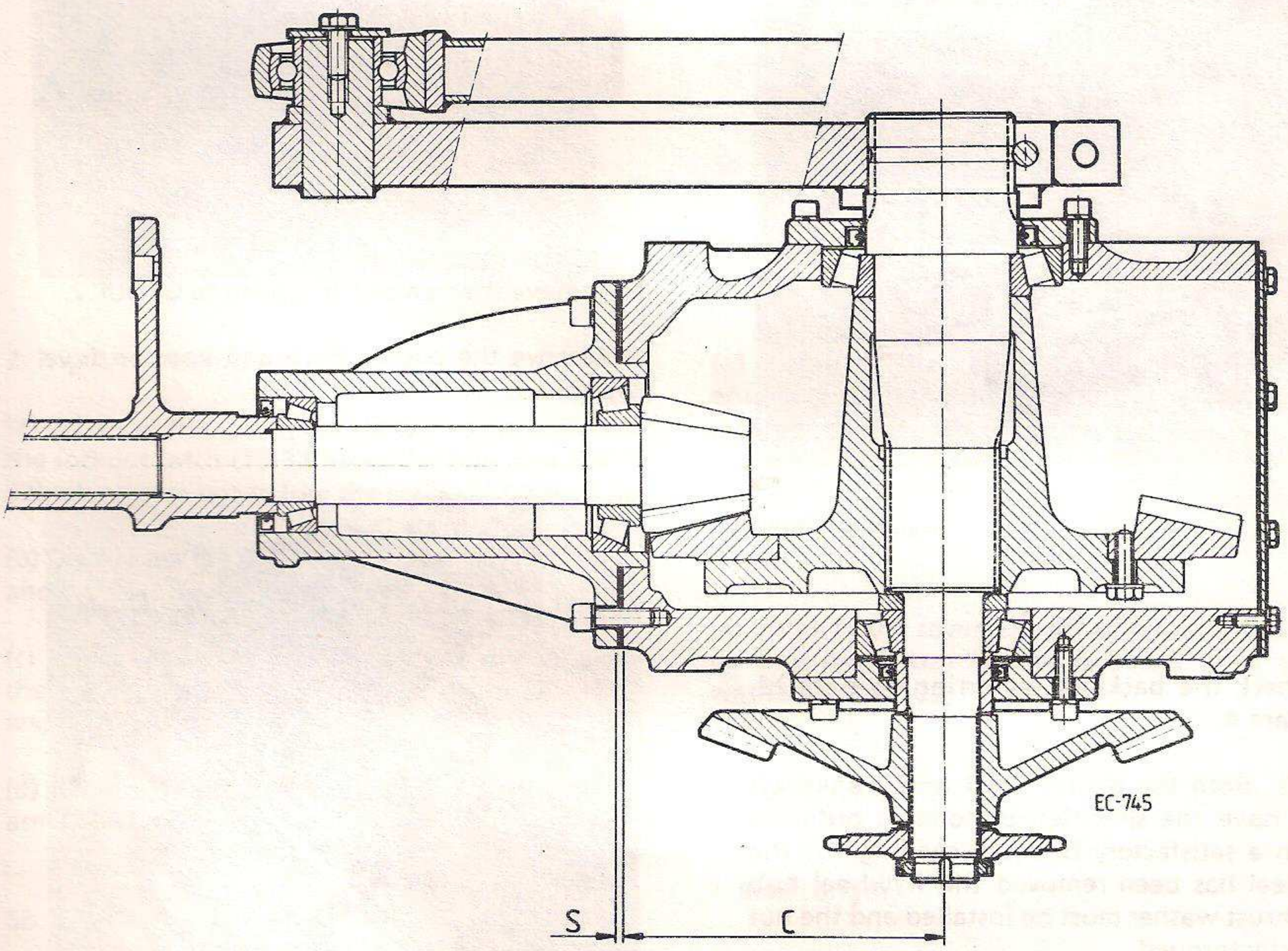


Fig. 1

2. GEAR BOX

2a. PRELIMINARY INSPECTION

(a) Drain the oil, remove the end cover, refer to Figure 2, and inspect all the bevel gear teeth for correct tooth contact pattern referring to Figure 13.

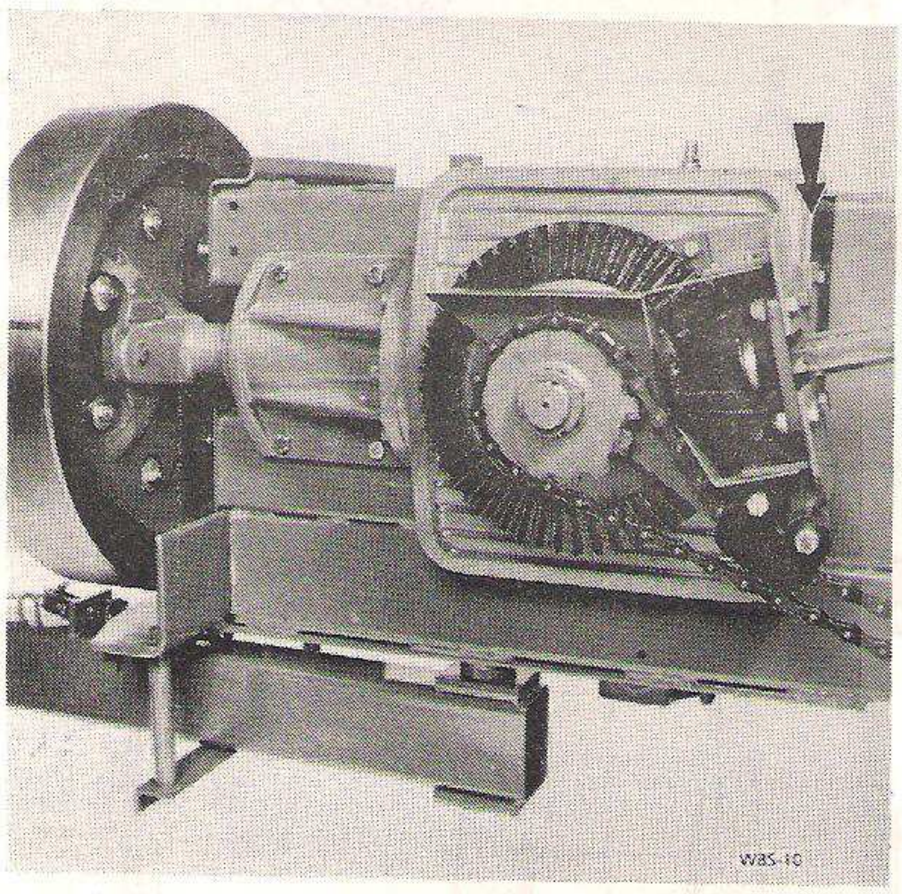


Fig. 2

(b) Check the backlash, referring to para.2d, sub-para.4.

NOTE! Both the pinion shaft and crankshaft must have the specified preload in order to obtain a satisfactory backlash reading. If the flywheel has been removed the flywheel hub and thrust washer must be installed and the nut correctly torqued.

2b. REMOVAL

(a) Turn the flywheel in the normal direction of rotation until the pitman bearing securing bolts (1-3) can be removed. Push the plunger clear, but ensure the plunger face is forward of the front packer finger.

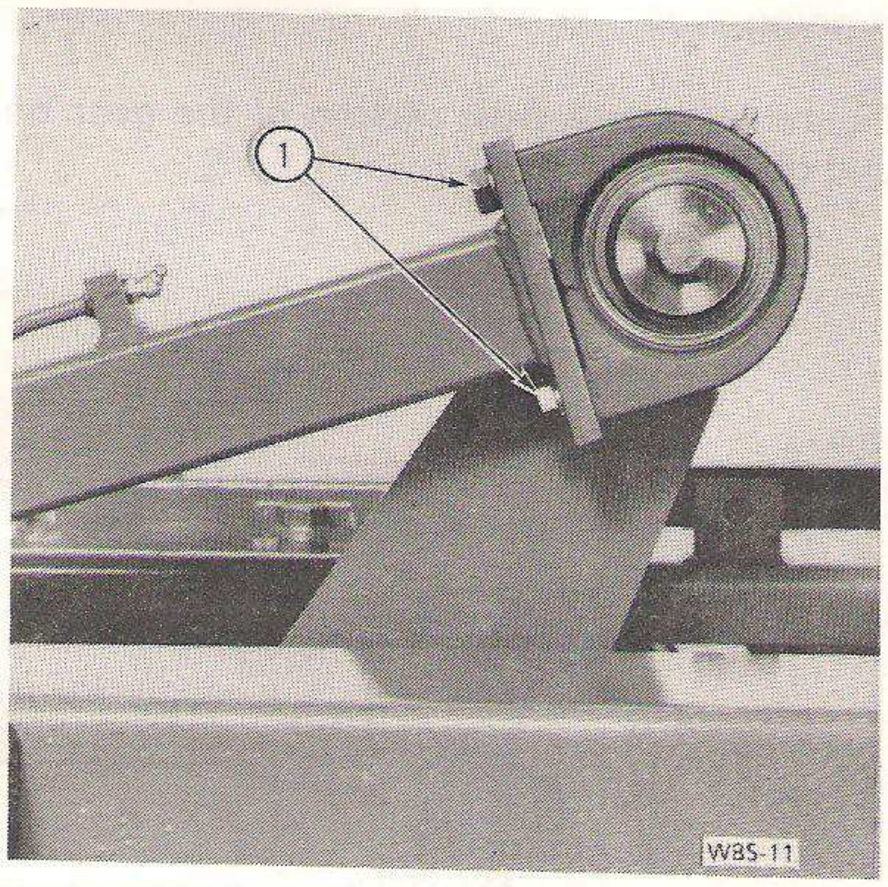


Fig. 3

(b) Remove the flywheel referring to GROUP 2.

(c) Remove the packer drive and knotter drive assy. shield.

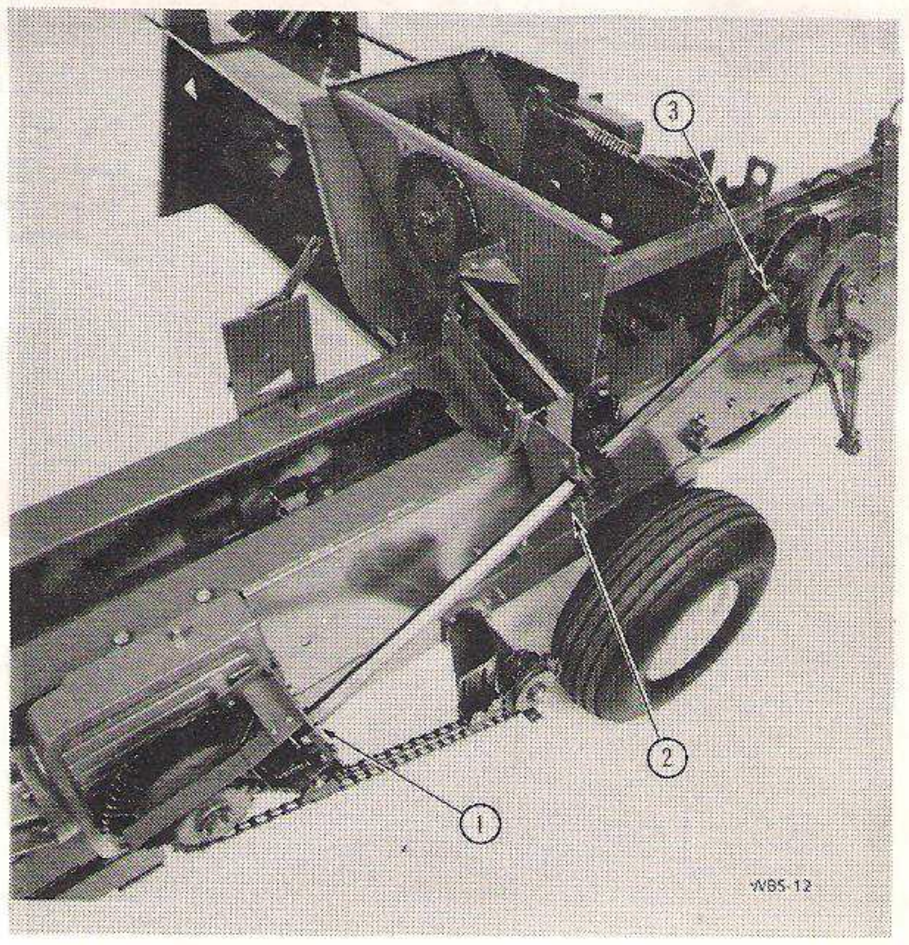


Fig. 4

GROUP 3

GEARBOX

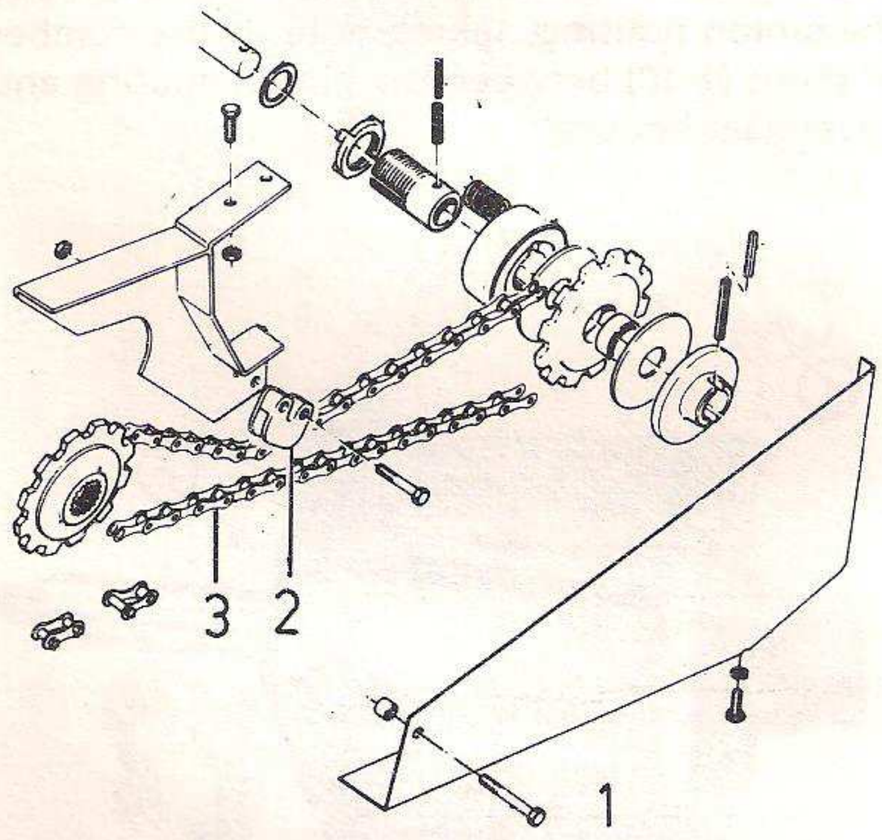


Fig. 5

(d) Remove the pickup drive shield (1-5). Slacken the pickup chain tensioner (2-5) and move the tensioner to slacken the chain (3-5) then lift it off the gearbox sprocket.

(e) Remove the bolts (1-4) to free the pinion drive assy. bearing from the bracket, also the bolts (2-4) for the pinion packer drive assy. bearing and the bolts (3-4) for the pinion knotter drive assy. bearing.

(f) Pull the shaft and pinions out of mesh.

(g) Remove the nut (3-14) with the bolt (2-14) of the plunger crank to free the shaft of the gearbox (4-14).

(h) Remove the crank with the pitman bearing attached. Before taking off the crank, mark the crank and the shaft because of plunger-fork timing.

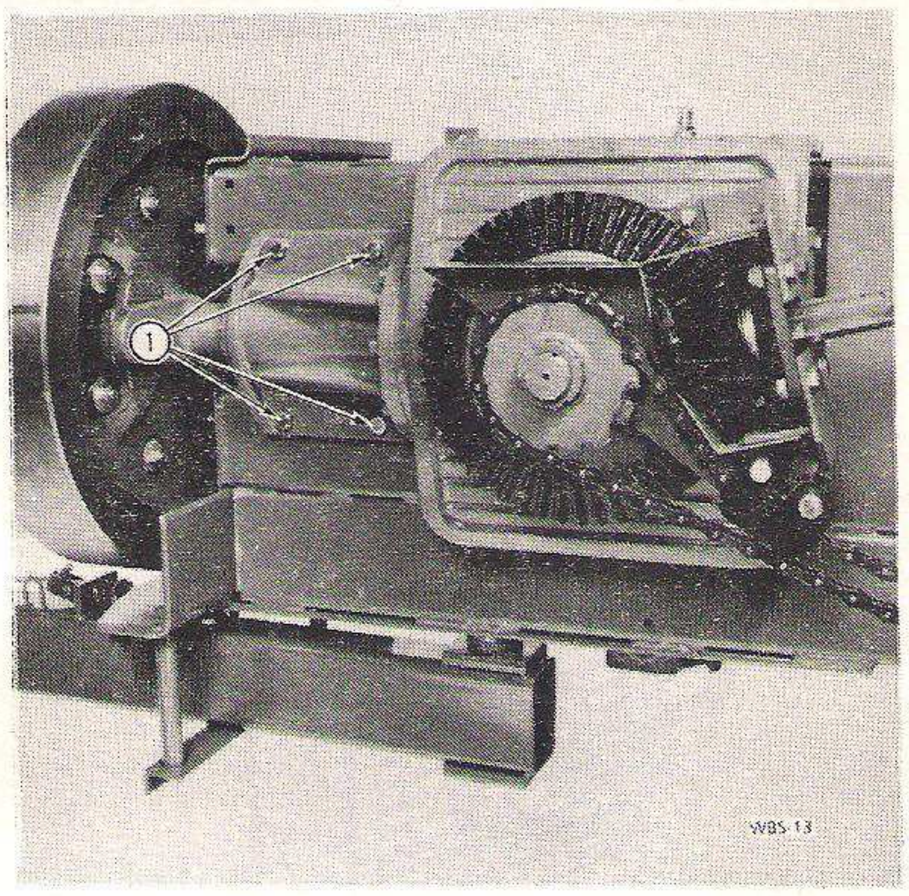


Fig. 6

(i) Remove the bolts (9-14) and washer (10-14).

(j) Support the gear box with a suitable hoist through an eye bolt screwed into the filler plug hole (M18x1.5 thread). Refer to Figure 8.
Remove the nuts and bushings bolts, (1-6) and lower and upper bolts /1-7).

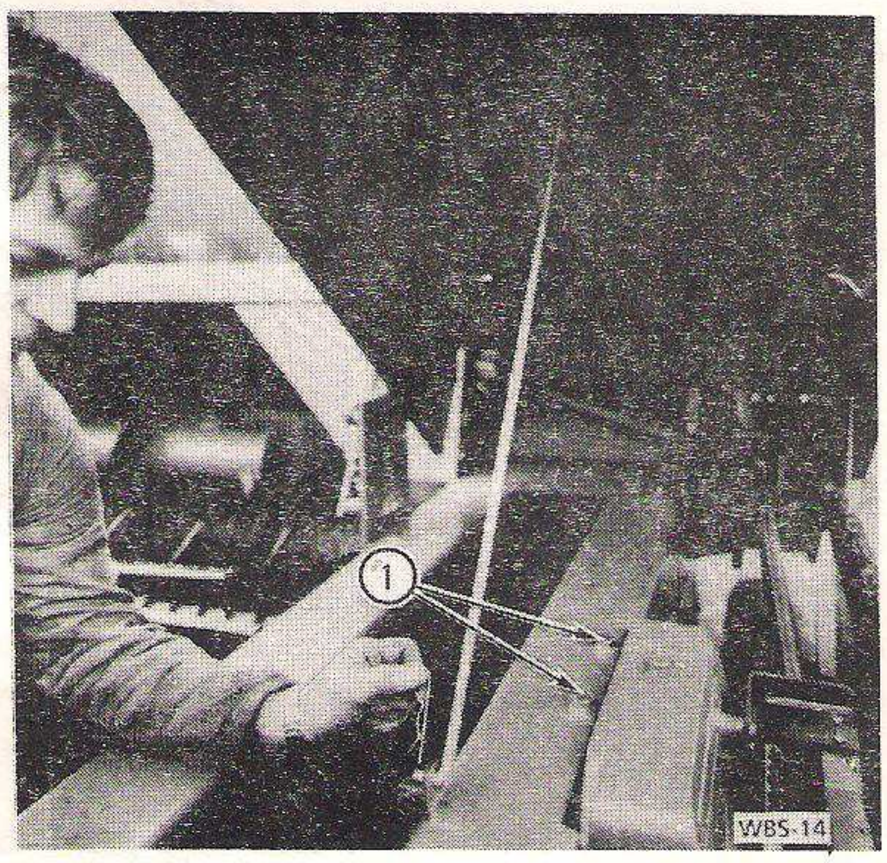


Fig. 7

(k) Keep the gear box level, and lift clear

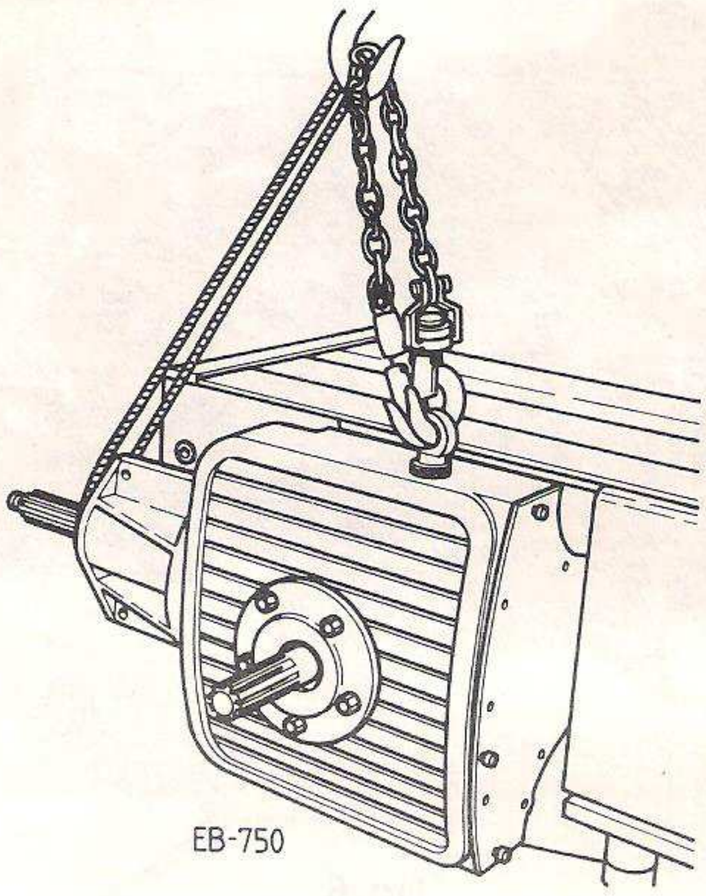


Fig. 8

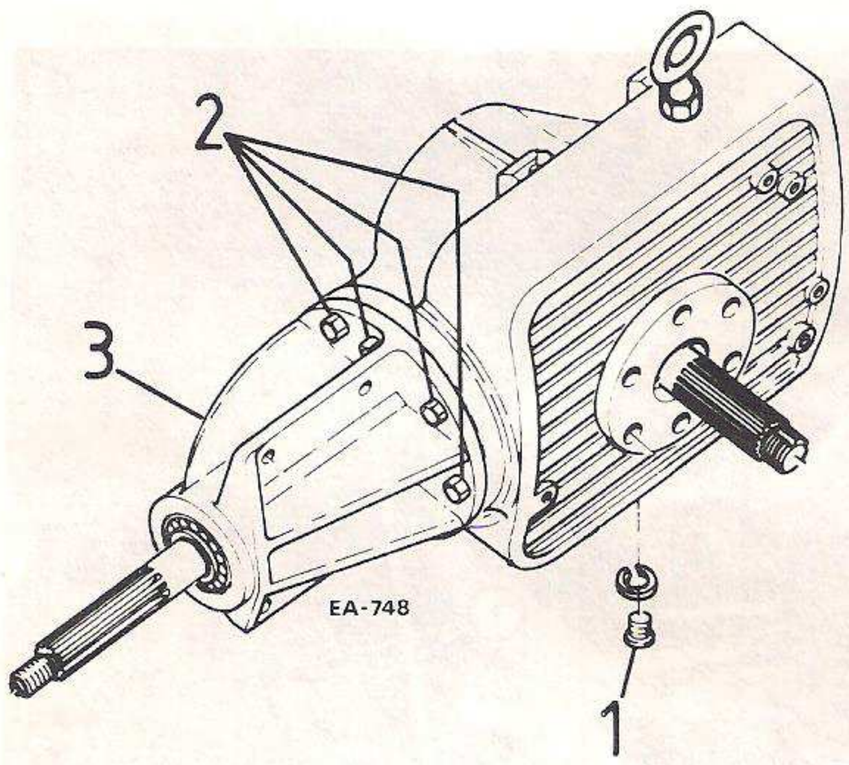


Fig. 9

2c. DISMANTLING

(a) Remove the drain plug (1-9) and allow the oil to drain from the gear box.

(b) Remove the bolts (2-9) securing the pinion housing to the bevel gear housing and remove the pinion housing, taking note of the number of shims (1-10) between the pinion housing and bevel gear housing.

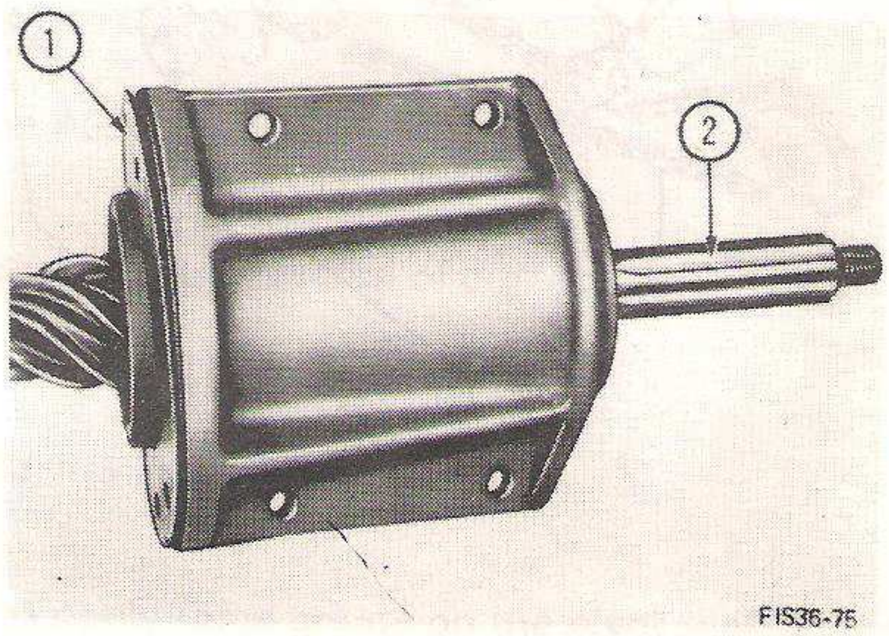


Fig. 10

(c) Remove the flywheel hub, if not previously removed, then remove the "0" ring and oil seal from the pinion shaft.

(d) Press the pinion shaft from the pinion housing, taking note of the shims, the rear bearing cone (54-14) will remain on the shaft.

(e) Remove the oil seal and front bearing cone from the pinion housing.

(f) Press the bearing cups (1 & 3-11) from the pinion housing and the rear bearing cone (2-11) from the shaft.

(g) Remove the end cover (14-14) from the bevel gear housing (35-14).

2d. ASSEMBLY

1. Pinion housing.

(a) Press the cups of the front and rear bearing (1-11 and 3-11) into the housing until seated against the shoulder.

(b) Put the rear bearing cone (2-11) in the cup and determine dimension "A" (fig. 11). This should be approximately 12.05 mm.

(c) Press the cone on the pinion shaft against the shoulder.

(d) Put the shaft inside the housing, and add shims with a thickness of 3mm around the shaft (5-11).

(e) Press the front bearing cone (4-11) on the shaft, leave the oil seal out, and mount the flywheel hub, washer and crown-nut, and torque this up to 300-400 Nm.

(f) To check the preload wrap a piece of string around the shaft. Pull the string using a spring balance with a force of 110-150 N, which is equivelant to a torque of 3-4 Nm. This pull should rotate the shaft.

Shims are available in sizes 0.20, 0.25, 0.35, 0.5, 1 and 2 mm.

The adding of shims means a lower preload will be achieved.

(g) If the preload is correct take the crown nut, washer and flywheel hub off. Install a new oil seal and o-ring and assemble the hub, washer and crown nut again with a torque of 300-400 Nm.

2. Pinion mounting distance.

(a) The pinion mounting distance is the distance between the centre line of the crankshaft and the rear of the pinion head (B-11). This is exactly 190 mm on 451, 461 and 471 balers and 212 mm on the 481 baler.

(b) Stamped on the bevel gear housing is the actual dimension (C-1) from the crank centre line to the machined face of the housing (approx. 201.3 for 451, 461 and 471 and 236.5 for the 481)

(c) The number of shims needed between the pinion and bevel gear housing is calculated with the formula

S (shim thickness) = A + B-C

e.g.

A (measured)	=	12.05mm
B	=	190.00mm
		202.05mm
Stamped on the housing C	=	201.30mm
Shims required S	=	0.75mm

Available are shims of 0.2
0.25 and
0.35 mm

NOTE: The pinion housing should not be mounted to the bevel gear housing until the bevel gear is set in its housing.

3. Setting the bevel gear

(a) Mount the bevel gear to its hub (5-12) using new spring washers and equally torque up the bolts (6-12) to 70-80 Nm

(b) Position the assembly in the housing.

(c) Press the bearing cone (7-12) on the main shaft (4-12) against the shoulder.

(d) Install the shaft in the bevel gear housing through the bevel gear hub (5-12), for 555 balers firstly put the spacer dia. 120/90 x 16 mm on the main shaft.

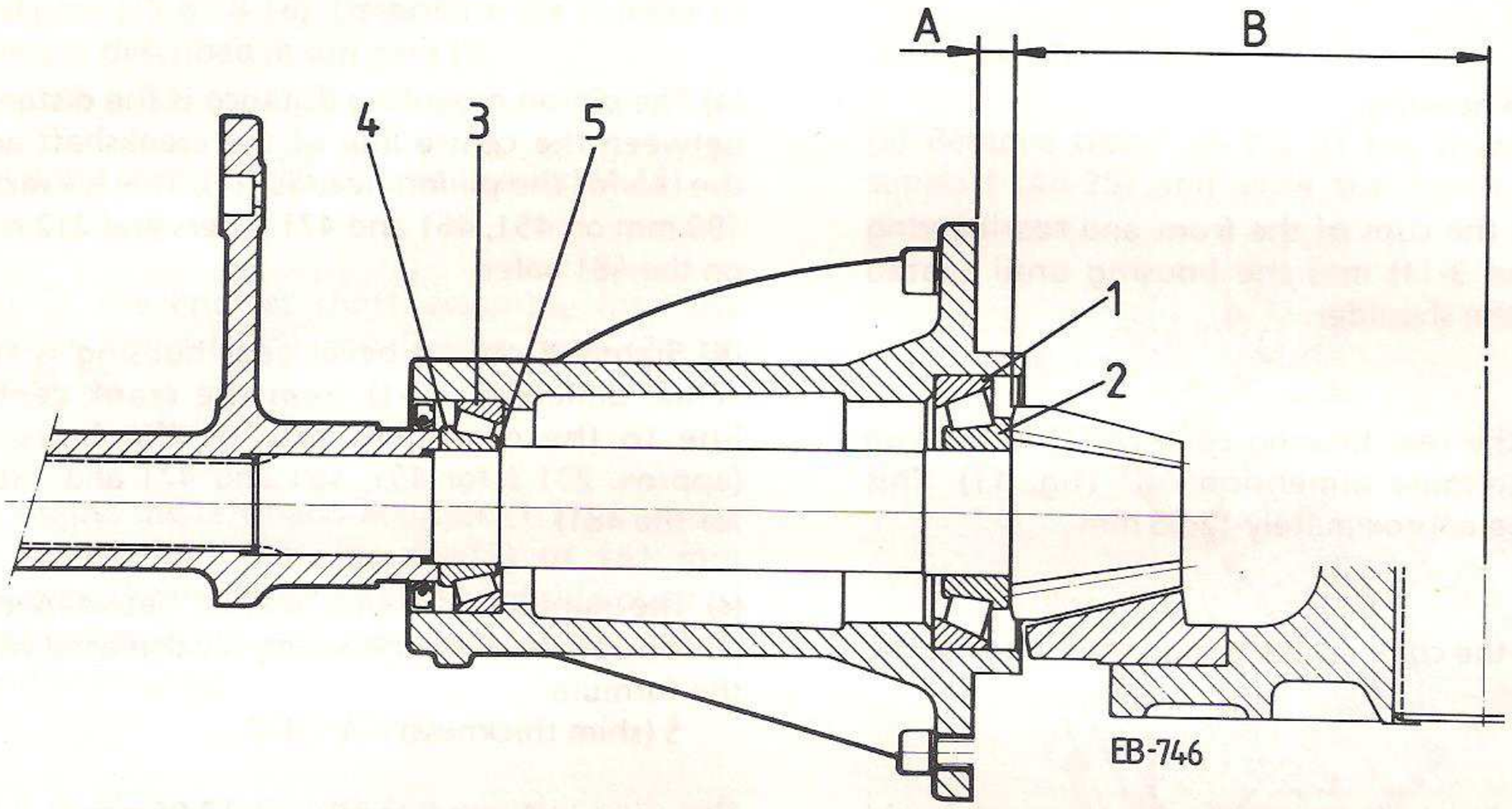


Fig. 11

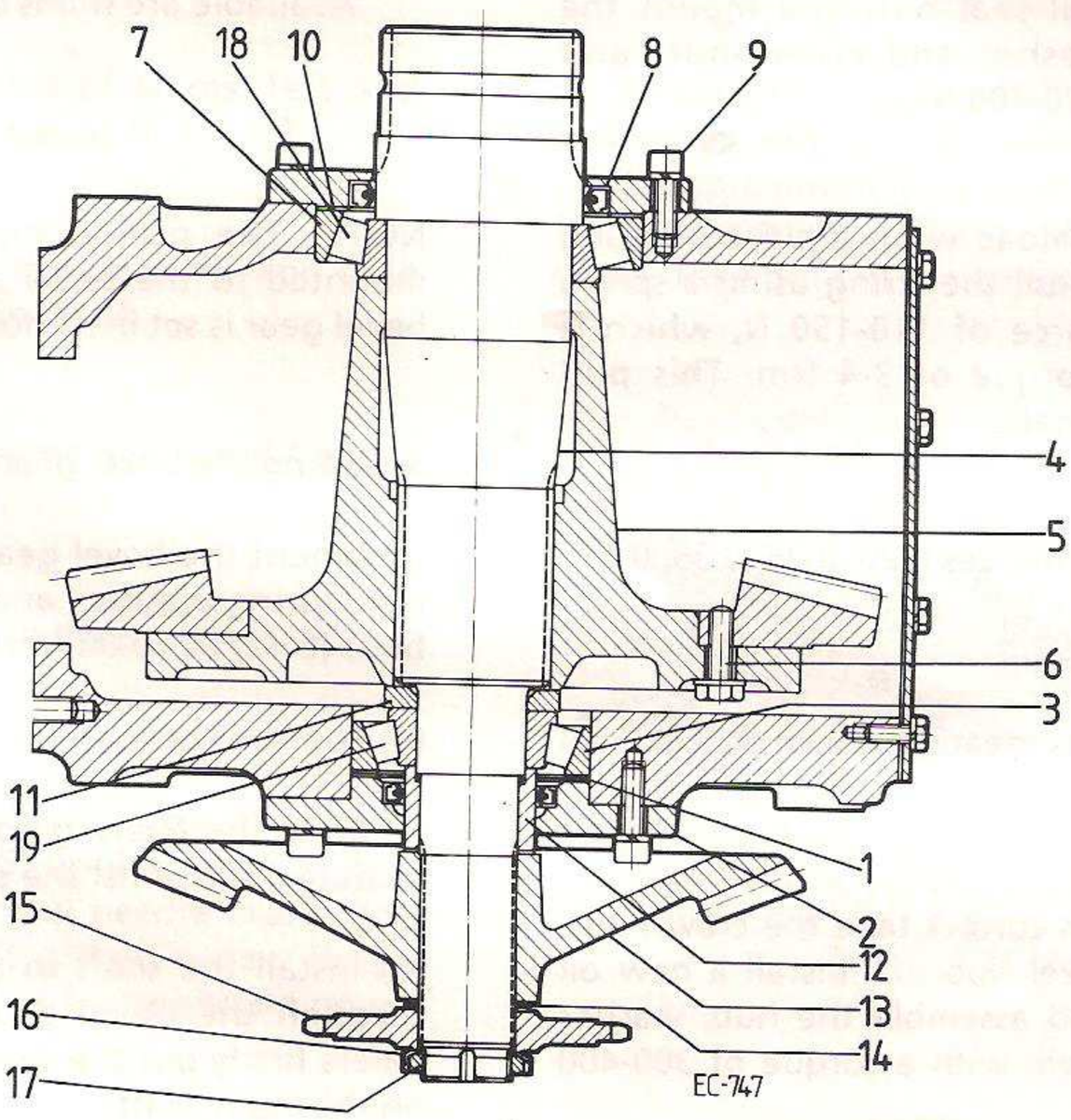


Fig. 12

(e) Press the cup of the right hand bearing (7-12) into the housing, add shims to a thickness of 1 mm for 451, 461 and 471 balers and 0.5 mm for the 481. Put the right hand retainer, without oil seal, in place and torque the bolts to 40-45 Nm.

(f) Slide the spacer (11-12) on the left hand side of the main shaft.

(g) Press the left hand bearing (3-12) on the shaft and into the housing.

(h) Add shims (1-12) to a thickness of 0.75 mm for 451, 461 and 471 balers and 0.5 mm for the 481.

(i) Fix the left hand retainer (2-12), without oil seal, and torque the bolts to 40-45 Nm.

(j) To check the preload, wrap a piece of string around the longer side (L .H.) of the main shaft. Use a spring balance to measure the rolling resistance. This should read 65-87 N, which is equivalent to 3 to 4 Nm.

(k) If necessary add or remove shims (1-12) at the left hand side of the shaft.

4. Bevel gear backlash.

a) With the correct preload on the crankshaft bearings and the pinion adjusted as detailed in sub. para.1 assemble the pinion housing to the bevel gear housing applying a thin coat of liquid gasket with the shim pack established as in sub.para.2. Torque bolts to 70-75 Nm.

(b) Position a dial indicator with the stylus on the bevel gear tooth at the pitch line and near the heel of the tooth.

(c) Hold the pinion shaft and rock the bevel gear back and forth several times to record the reading. Take a reading with the gear in several positions and select the lowest.

(d) Adjust the backlash by transferring shims (1 and 10-12) from one bearing retainer to the other.

NOTE! Shims removed from one bearing retainer must be installed under the other bearing retainer in order to maintain the bearing preload.

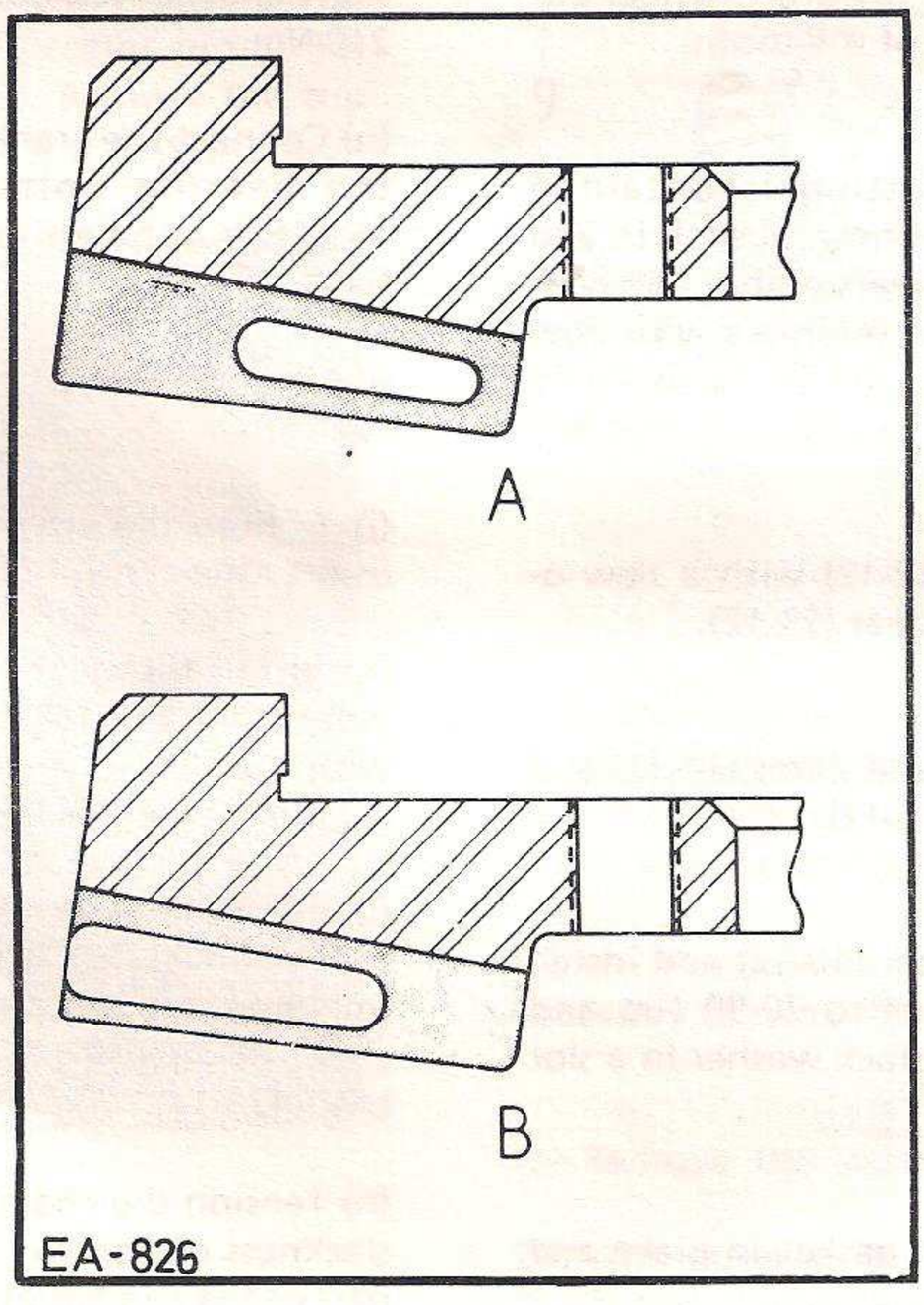


Fig. 13

5. Tooth Contact Pattern

This should be the final operation on completion of an overhaul or rebuild to check all settings are correct.

The bevel gear and pinion set fitted will have been cut using the Gleason system of gear cutting.

(a) Paint some of the bevel gear teeth with a thin smear of "Engineering Blue" or "Yellow Ochre" then move the painted teeth into mesh with the pinion until a good impression of the tooth contact is obtained.

(b) The correct tooth marking, at no load (A-13), for the Gleason system is at the "toe-end" of the gear covering approximately 1/3 to 1/2 the length of the tooth. Under load the tooth marking (B-13) will extend toward the heel but should not run off the heel of the tooth.

(c) When the correct setting is obtained dismantle the retainers, put new oil seals in and smear the faces of the retainers with a thin coat of liquid gasket. Install the retainers with new spring washers and torque the bolts to 40-45 Nm.

(d) Assemble the spacer (12-12) with a new o-ring and the outside bevel gear (13-12).

(e) Slide on 3 mm thickness of shims (14-12) and install the chain sprocket (15-12).

(f) Put on a new lock washer (16-12) and install the ring nut (17-12). Torque to 70-90 Nm and bend one of the lips of the lock washer in a slot of the nut.

(g) Put the rear cover with gasket in place and torque the bolts to 20 Nm.

2e. INSTALLATION

(a) Hoist the gearbox, refer to fig, 8, into the bale chamber.

(b) Secure it with the lower and upper bolts.

(c) Put in the front bolts and self locking nuts, and tighten lightly

(d) Take out the lower and upper bolts one by one and apply loctite and a new spring washer, re-install and tighten lightly.

(e) When all bolts are re-installed evenly, tighten the bolts with the following torques:

M16 bolts to 170-180 Nm
M20 bolts to 340-360 Nm
M24 (481) to 590-610 Nm

(f) Tighten the front bolts evenly to 80-90 Nm. Fill the gearbox with SAE 90 EP oil up to the level plug i.e. 5.7 litre for 451/461/471 and 6.3 litre for the 481. Fit the level and filler (breather) plug.

(g) Mount the crank arm (1-14) on the spline shaft and tighten bolt (2-14) to a torque of 200-210 Nm.

(h) Connect the crank to the pitman and torque the bearing bolts to 65-75 Nm for the 451/461/471 balers and 160-170 Nm for the 481 baler.

(i) Mount the flywheel, friction clutch and over run clutch.

(j) Tighten the crown nut to 300-400 Nm and insert a new cotter pin, bend the legs over.

(k) Install the bearing support (70-14) and the wear plate (67-14) which should be shimmed, with shim (66-14) to obtain a clearance of 0.6 - 1.3 mm of the rear of the gear wheel (73-14).

(l) Install the packer and knotter drive shaft.

(m) Install the pickup drive chain (74-14) and the chain cover (76-14) together with the guide block (75-14).

(n) Tension the chain with guide (77-14) until a slackness of approx. 19 mm in the free running part of the chain is obtained.

GROUP 3

GEARBOX

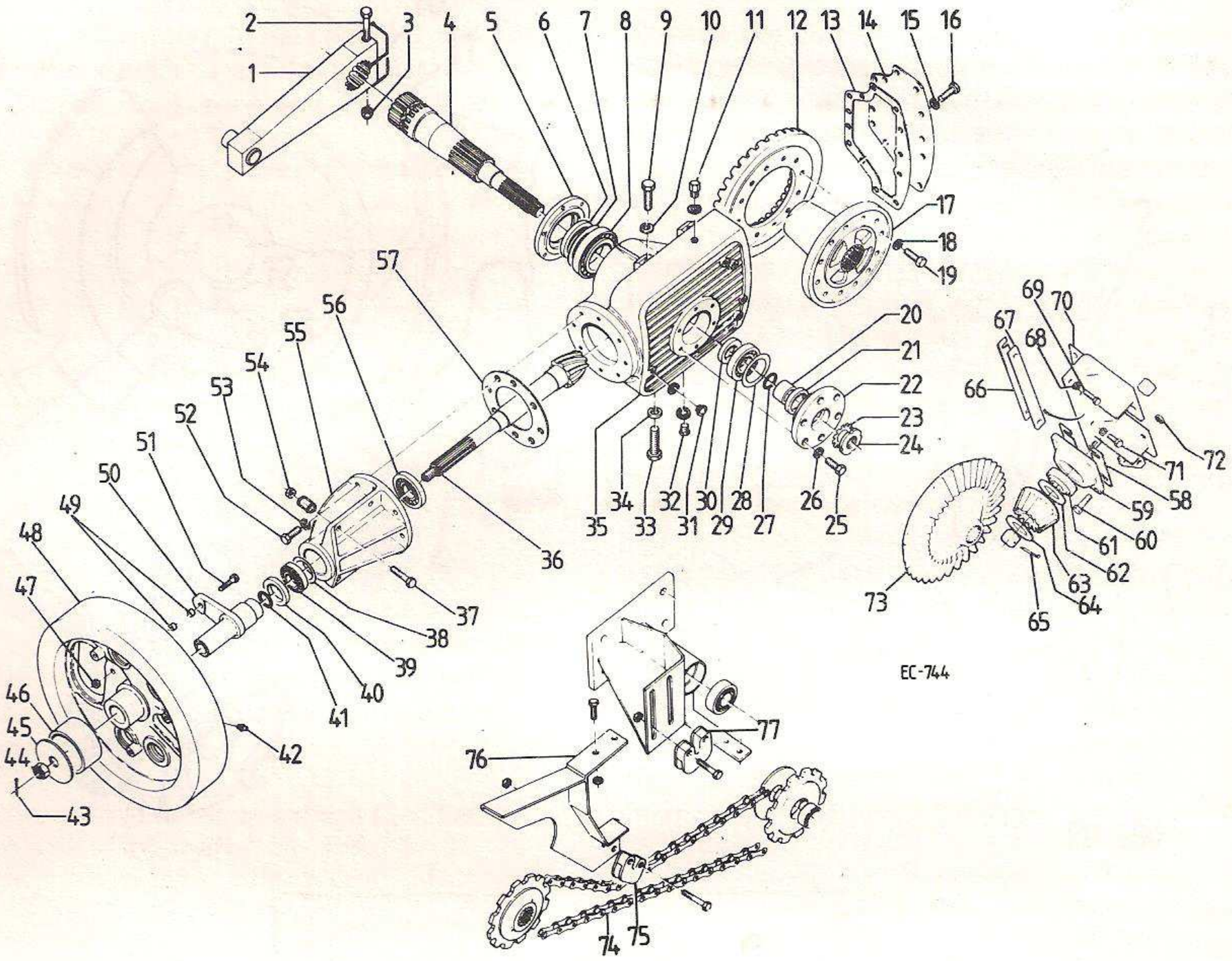


Fig. 14

GROUP 4

PACKER FINGERS AND CRANK

1. DESCRIPTION

The drive for the packer crankshaft is through a shaft driven from the main drive shaft. The front of the packer drive shaft is supported by a bearing located in the packer bearing support and the rear of the packer crank is also located in a packer bearing support.

The packer fingers are mounted on the packer crank and are protected against overload by a shear bolt (22-1). When the bolt shears a spring pulls up the fingers so that the crank can continue rotating without the fingers entering the bale chamber.

The drive for the auger is transmitted via a bevel gear carried on the rear of the crankshaft.

1. Cotter pin
2. Washer
3. Gear wheel
4. Bolt
5. Washer
6. Shim
7. Bearing assy
8. Nut
9. Key
10. Crankshaft
11. Nut
12. Fingers
13. Cotter pin
14. Nut
15. Rod
16. Spring
17. Clip
18. Rod
19. Pin
20. Clevis
21. Bush, shear bolt
22. Shear bolt
23. Pin
24. Spring
25. Washer
26. Cotter pin
27. Nut
28. Clevis
29. Cotter pin
30. Rod
31. Cotter pin
32. Washer
33. Gear wheel
34. Coach bolt
35. Shim
36. Ring
37. Bearing
38. Bearing flange
39. Nut
40. Bearing assy
41. Grease nipple
42. Bolt
43. Bolt
44. Support
45. Nut
46. Bolt

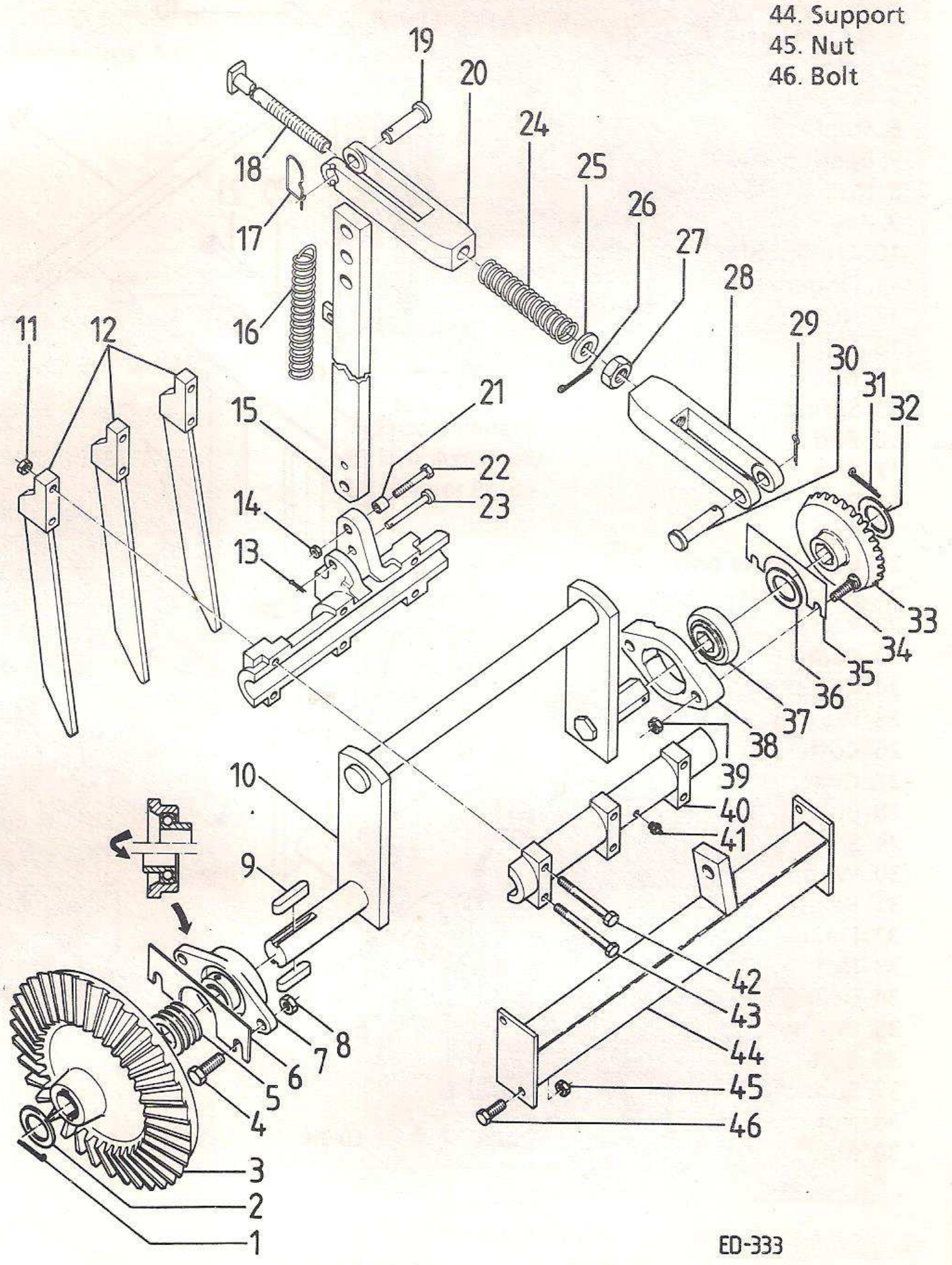


Fig. 1
461/471/481

GROUP 4

PACKER FINGERS AND CRANK

461/471/481

The packer fingers are mounted onto a cast bearing, carried on the packer crank. The fingers are secured to the right side of the bearing although if excess material is being packed the fingers can be installed on the left side.

451

The 451 has the fingers on a welded assembly and is secured to the crank by 2 split bearings. It is not possible to change one of the fingers without replacing the whole assembly.

1. Cotter pin
2. Washer
3. Gear wheel
4. Bolt
5. Washer
6. Shim
7. Bearing assy
8. Nut
9. Key
10. Crankshaft
11. Finger assy
12. Nut
13. Nut
14. Nut
15. Spring
16. Rod
17. Clip
18. Pin
19. Rod
20. Bush, shear bolt
21. Shear bolt
22. Bolt
23. Bearing
24. Cotter pin
25. Washer
26. Cotter pin
27. Gear
28. Bolt
29. Shim
30. Washer
31. Bearing
32. Flange
33. Nut
34. Bearing
35. Washer
36. Bolt
37. Support
38. Nut
39. Bolt

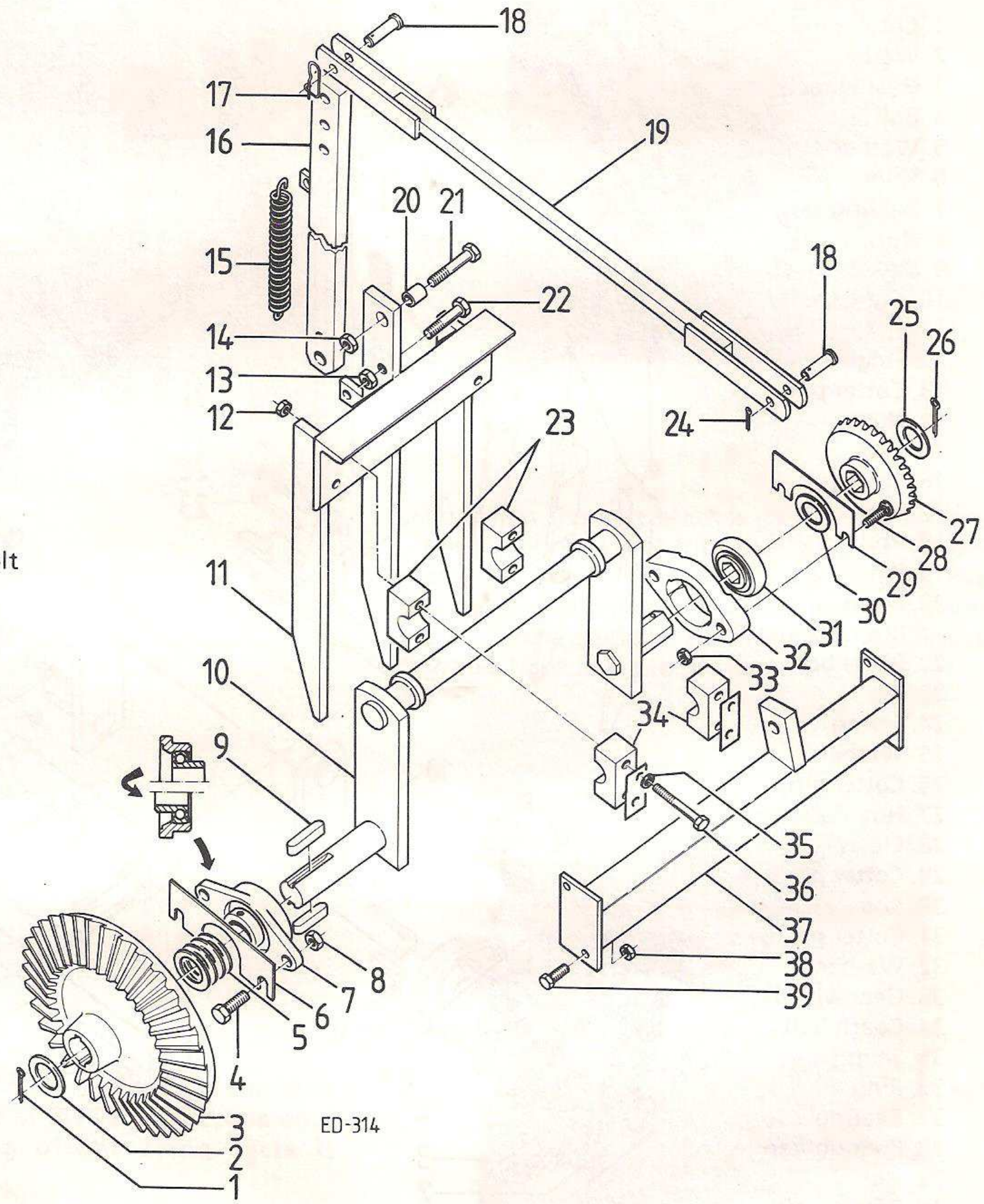


Fig. 2
451

GROUP 4

PACKER FINGERS AND CRANK

2. PACKER DRIVE SHAFT

2a. REMOVAL

(a) Turn the flywheel in the normal direction of rotation until the plunger face is central in the front packer finger slot, then block under the front packer finger. Remove the shield (1-3) and packer bearing shield (2-3).

(b) Remove the bolts (4-4) and the bolts (5-4) to remove the packer fingers drive shaft assy. (6-4).

(c) Remove the shaft assy. (6-4) and leave the bearing assemblies loose on the shaft

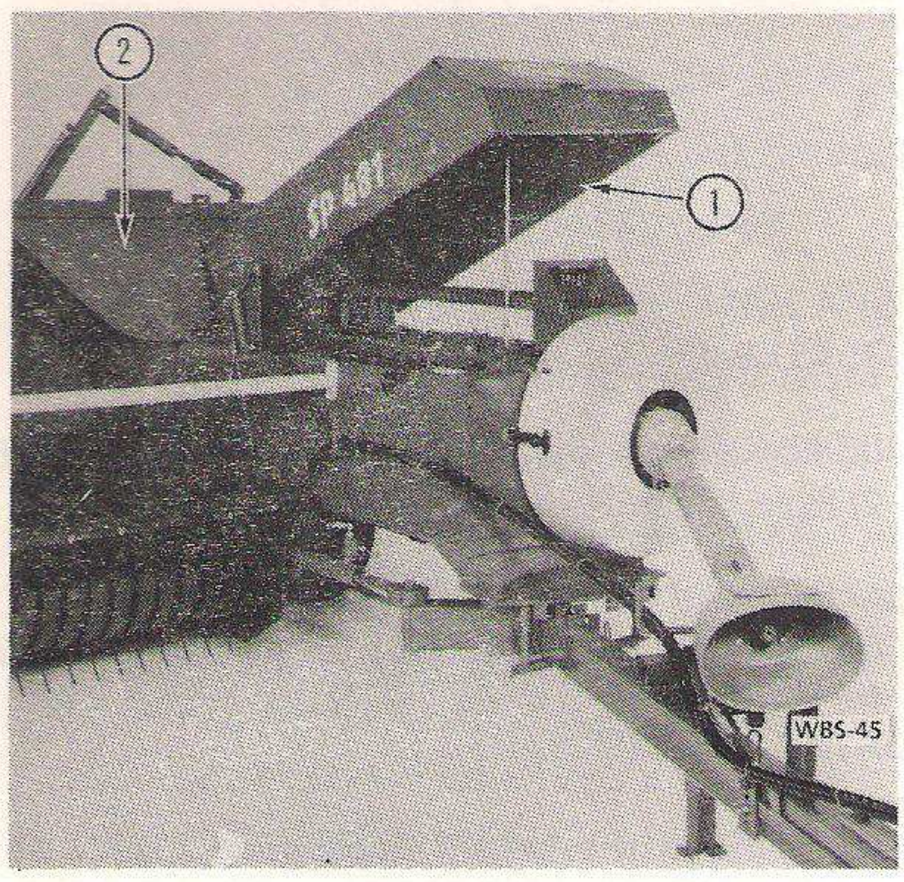


Fig. 3

(d) Remove the cotter-pin (1-1) and the washer (2-1).

(e) Remove the gear wheel (3-1) from the shaft, observing the keys (9-1) on the shaft.

(f) Remove the washers (5-1) from the shaft.

2b. INSTALLATION

(a) Install the washers (5-1) on the shaft of the packer crank and put the keys in place.

(b) Install the gear (3-1) washers (2-1) and cotter pin (1-1).

(c) Put the plunger face central under the first packer finger slot, while the plunger is on its working (rearward) stroke. (The plunger crank stands above the main shaft of the gearbox). (fig. 4a)

(d) Put a 50 mm high block on the bale chamber and let the front packer finger rest on it.

(e) Put the drive shaft assembly in place.

(f) Put a piece of light cardboard between the upper and intermediate gears (1-4, 2-4 and 3-4) and clamp them lightly with a c-clamp in such a way that the toe to toe alignment is correct.

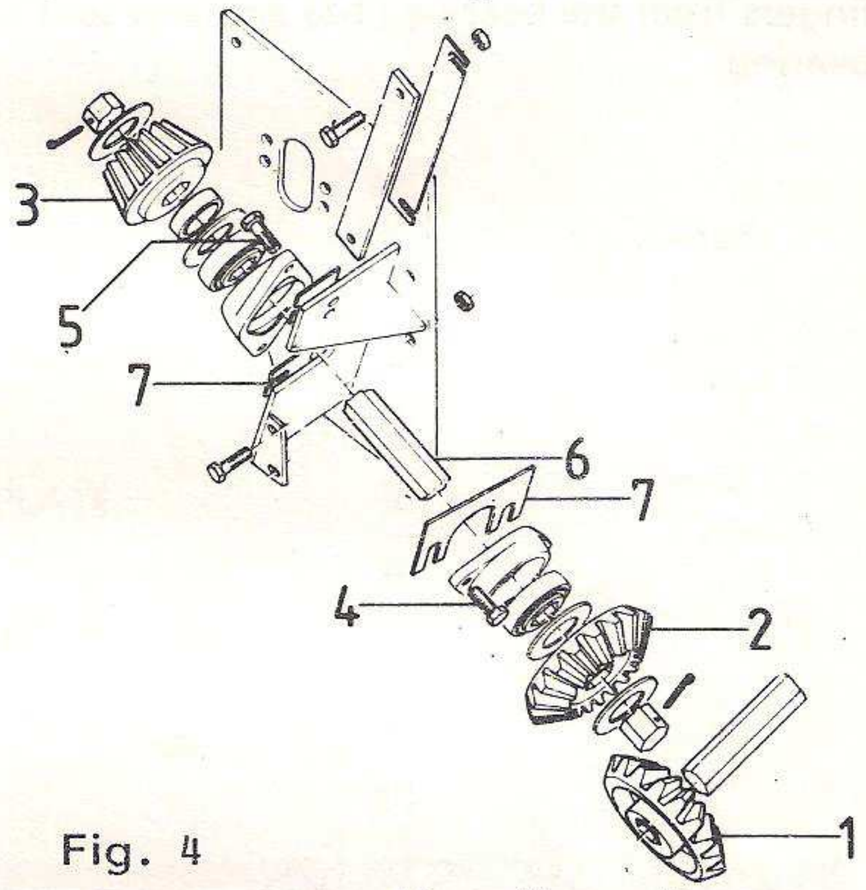


Fig. 4

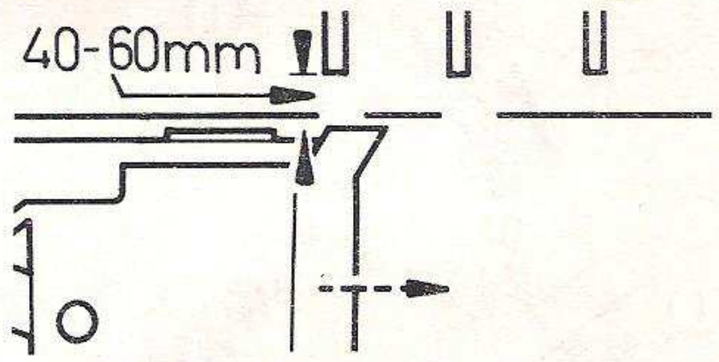


Fig. 4a

(g) Add behind the bearings, shims (7-4) to fill the gap completely.

(h) Tighten the bolts to a torque of 80-90 Nm.

(i) Remove the cardboard and check the toe to toe alignment in 3 different places.

(j) Check the backlash between the pinions and packer drive gear (3-1) in three places. The backlash must be 0.6-1.3 mm.

(k) Install the packer bearing shield front cover.

GROUP 4

PACKER FINGERS AND CRANK

3.PACKER FINGERS AND BEARING

3a. REMOVAL

1. 461-471-481 Balers

(a) Remove the clip (1-5) and headed pin from the packer finger arm.

(b) Remove the nuts (2-5) and bolts to free the fingers from the bearing (3-5) and also split the bearing.

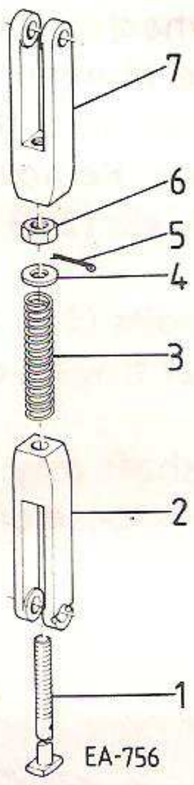


Fig. 6

2. 451 Baler

(a) Remove the cotter-pin (24-2) and the pin (18-2) from the bottom of the rod (19-2)

(b) Remove the clip (17-2) and the pin (18-2) from the top of the rod (19-2).

(c) Remove the nuts (12-2), bolts (36-2) and washers (35-2), split the bearings and remove the packer fingers.

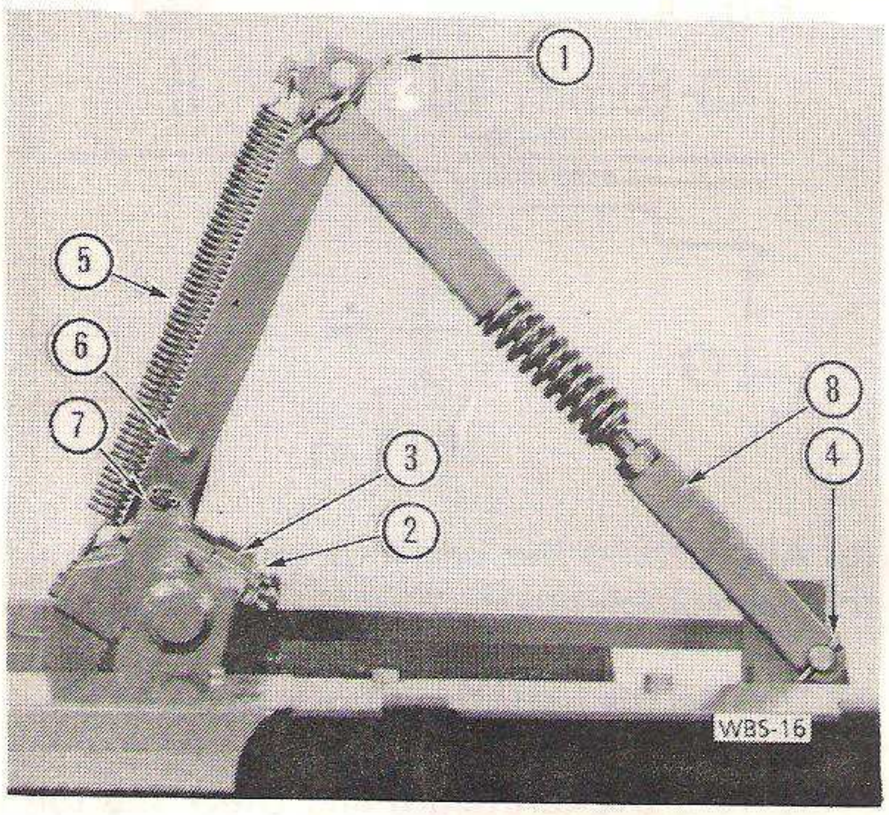


Fig. 5

(c) Remove the cotter pin (4-5) and headed pin to remove the relief guide rod.

3b. DISMANTLING. 461-471-481

(a) Remove the spring (5-5), shear bolt (6-5) and pin (7-5) to remove the packer arm from the bearing.

(b) Slacken the nut (6-6) then screw off the clevis (7-6) and nut (6-6).

(c) Compress the spring (3-6), remove the cotter (5-6), washer (4-6) and spring (3-6) then withdraw the rod (1-6) from the lower clevis (2-6).

GROUP 4

PACKER FINGERS AND CRANK

3c.INSPECTION

(a) Check the packer fingers for bends and examine the feed opening channels for any signs that the fingers have been fouling. DO NOT attempt to straighten fingers.

(b) Ensure that the shear bolt bush is tight and sharp and that the two shearing surfaces are fitting flush. The bush is a press fit and must be installed from the front side and must be flush to 0.3 mm (0.012 in) below the mating surface of the arm.

3d. ASSEMBLY

461-471-481

(a) Install the rod (1-6) through the lower clevis then thread on the spring and washer.

(b) Compress the spring and install the cotter pin.

(c) Screw on the nut (6-6) and clevis (7-6) until the distance between the clevis pin hole centres is 546 mm (21.5in.) 461/471 and 604 mm (23.7in.) 481 then tighten the nut to the clevis.

(d) Position the packer arm on the packer finger bearing and secure with the clevis pin and cotter pin.

(e) Install and tighten the shear bolt (6-5) to 21.5 to 24.5 Nm (16 to 18 lbft) then install the spring (5-5).

3e.INSTALLATION

1.461-471-481

(a) Position the two halves of the bearing (3-5) and hold in position with the centre bolts (2-5).

(b) Install the front and rear finger.

(c) Remove the centre bolts then install the remaining packer finger to the bearing.

(d) Secure the relief guide rod to the packer relief support with the headed pin and the clip pin ensuring that the head of the rod is facing the support.

(e) Connect the relief guide rod to the packer finger arm with the headed pin in the centre hole and secure with the clip pin (1-5).

2. 451 Baler

(a) Position the half bearings on the crank and secure the packer fingers to the right side with the bolts (36-2) nuts, (12-2) and washers (35-2).

(b) Secure the relief guide rod to the packer relief support with the headed pin and the clip pin ensuring that the head of the rod is facing the support.

4. PACKER CRANK

4a. REMOVAL

(a) Open the twine chest door and rear panel for access.

(b) Remove the packer bearing shield (2-3) and front shield (1-3).

(c) Remove the packer fingers and bearing referring to para.3.

(d) Remove the packer drive shaft referring to para.2.

(e) Remove cotter-pin (1-7) and washer (3-7).

(f) Move the packer crank as far as possible forward. The rear shaft can be pulled out of the gear wheel (4-7), which can then be removed

(g) Remove the nuts (8, 39-1) and bolts (4, 34-1) to loosen the bearings of the packer crank (10-1).

(h) Remove the packer crank-shaft (10-1) by driving it forward and lift the rear out of the crankcase.

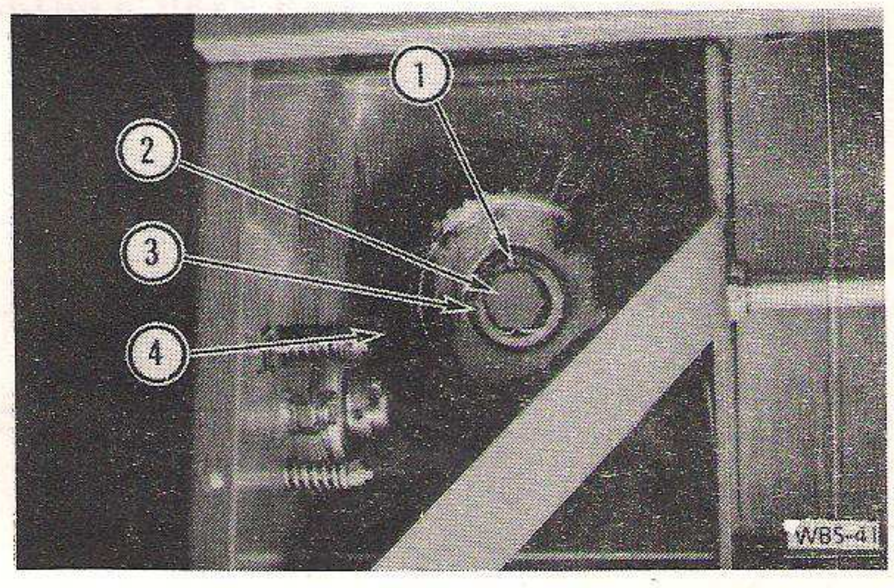


Fig. 7

4b. ASSEMBLY

(a) Position the crank (10-1) on the baler, with the bearing assy's (37-1) on the crankshaft.

(b) Secure the packer crank bearing (37-1) to the knotter frame with the nuts (39-1) and bolts (34-1). Note that the longer part of the front bearing inner cage must point to the front. If necessary turn the bearing over in the housing.

(c) Put the front journal of the packer crank through its hole in the support plate, and lower the rear side, to get the crank in place.

(d) Install the auger drive gear wheel (33-1) on the packer finger crankshaft (10-1) and install the washer (32-1) and the cotter-pin (31-1).

(e) Install the packer drive shaft referring to para.2.

(f) Install the packer fingers and bearing referring to para.3.

(g) Check, and if necessary adjust, the packer finger to plunger timing, referring to para.5.

(h) Check the backlash between the bevel gear and pinion and adjust with the washers (5-1) to 0.6 to 1.3 mm (0.024 to 0.050 in).

(i) Install the packer bearing shield (2-3) and shield (1-3).

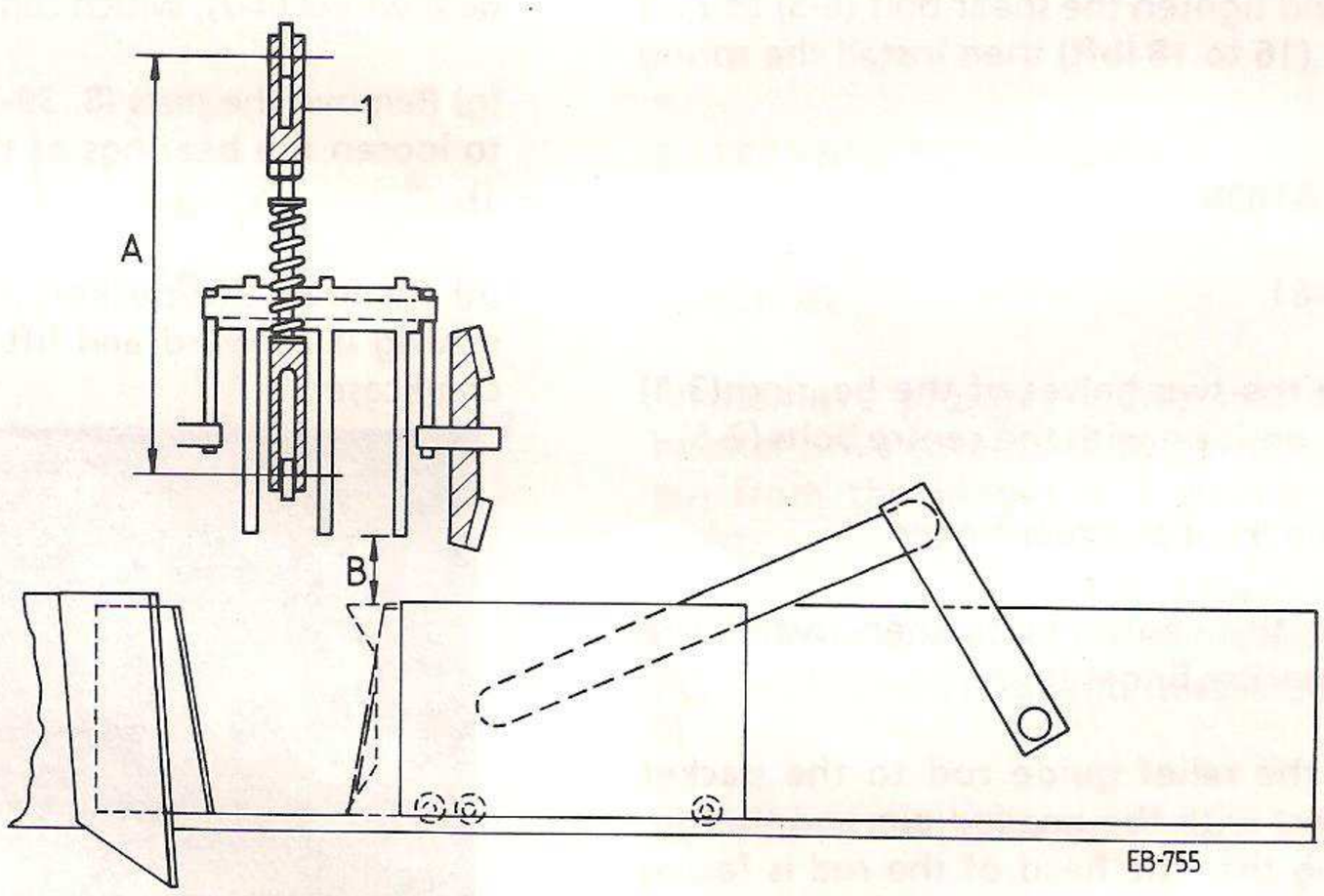


Fig. 8

5. ADJUSTMENTS

1. PACKER FINGERS TO PLUNGER TIMING

(a) Ensure the packer relief rod (1-8) is in the second hole of packer finger arm and the distance (A-8) between the clevis pin hole centres is 546 mm (21.5 in) for 461/471 balers and 604 mm (23.8) for 481 balers.

(b) See para. 2b INSTALLATION sub-para. c.

GROUP 4

PACKER FINGERS AND CRANK

2.NEEDLE PENETRATION

(a) If any work has been carried out on the needles or needle drive pitman, the needle penetration must be checked before checking the needle timing.

(b) To check the needle penetration, trip the knotter and turn the flywheel until the needle tie pipe reaches its maximum forward position i.e. its nearest point in relation to the bale chamber.

Alternatively if the knotter drive pinion is disconnected, trip the knotter, hold the anti-drift lockout latch from the notch in the trip dog carrier and push the needle tie pipe to its maximum forward position.

(c) At this point the upper needle mounting plate must clear the underside of the bale chamber by at least 12 mm (0.5 in) and not more than 16 mm (0.65 in). Refer to Fig. 9.

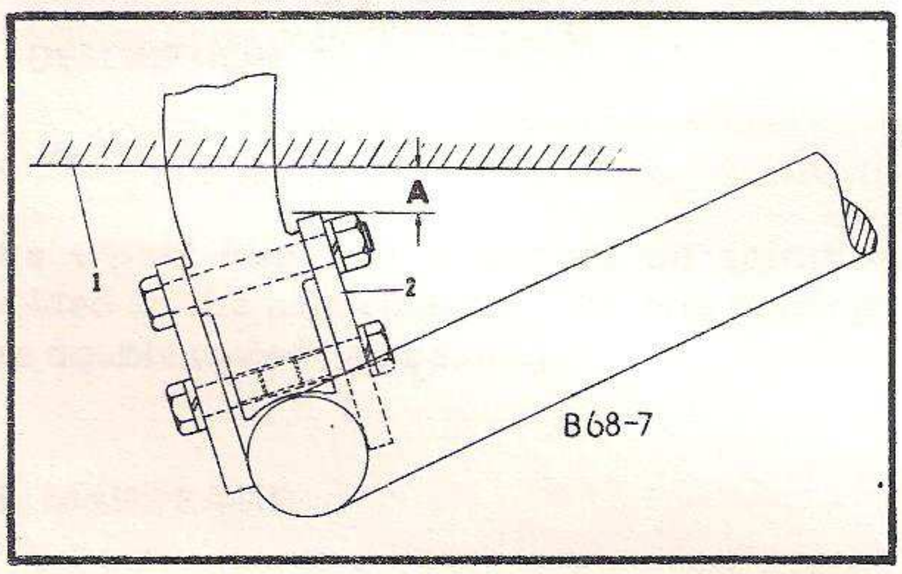


Fig. 9

A = 12 to 16 mm (0.5 to 0.65 in)

1. Bale Chamber Base Plate
2. Needle Mounting Plate

(d) Adjust the clearance as necessary by varying the length of the needle pitman shank. Disconnect the pitman and turn the loose bearing to the required length.

3.NEEDLE TO PLUNGER TIMING

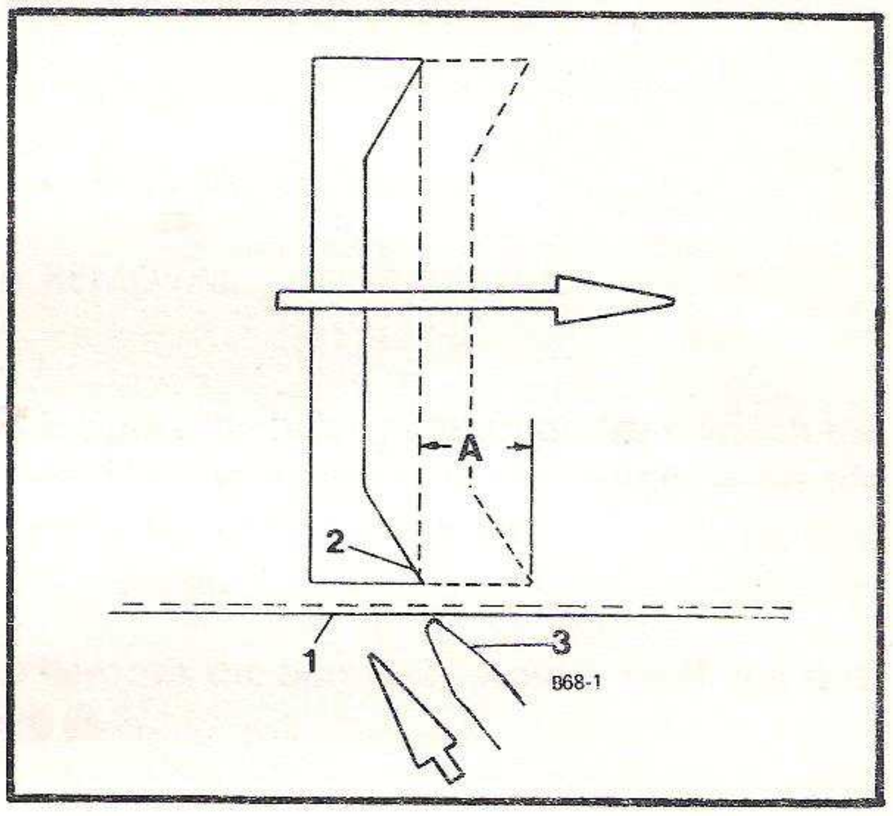
(a) The needle tips must enter the bale chamber at the same time or just after the tips of the plunger horns pass directly overhead.

Before any adjustment is carried out, the needle penetration must be checked and adjusted as detailed in para.5 sub para.2

(b) Disconnect the knotter drive assy., trip the knotter and hold the anti-drift lockout latch from the notch in the trip dog carrier.

(c) Push the needles forward until the needle tips are flush with the underside of the bale chamber.

(d) Turn the flywheel in the direction of rotation until the tip of the plunger horn is level with the needle tip when the plunger is on its rearward compression stroke. (Fig.10).



A = 0 to 50 mm (0 to 2 in)

Fig. 10

1. Bale Chamber
2. Plunger Horn
3. Needle Tip

(e) Rotate the knotter shaft of bevel gear anti-clockwise until a firm resistance is felt. That is when the bevel gear picks up the drive of the trip dog carrier, needles and knotters.

(f) Ensuring that the knotter shaft bevel gear remains in this position, install the main drive assy.

DO NOT move the plunger forward as this could result in the needles entering the bale chamber before the plunger is able to protect them.

(g) Turn the flywheel by hand to complete the tying cycle then carry out the next cycle checking that the timing is correct.

GROUP 5

PLUNGER AND BALE CHAMBER

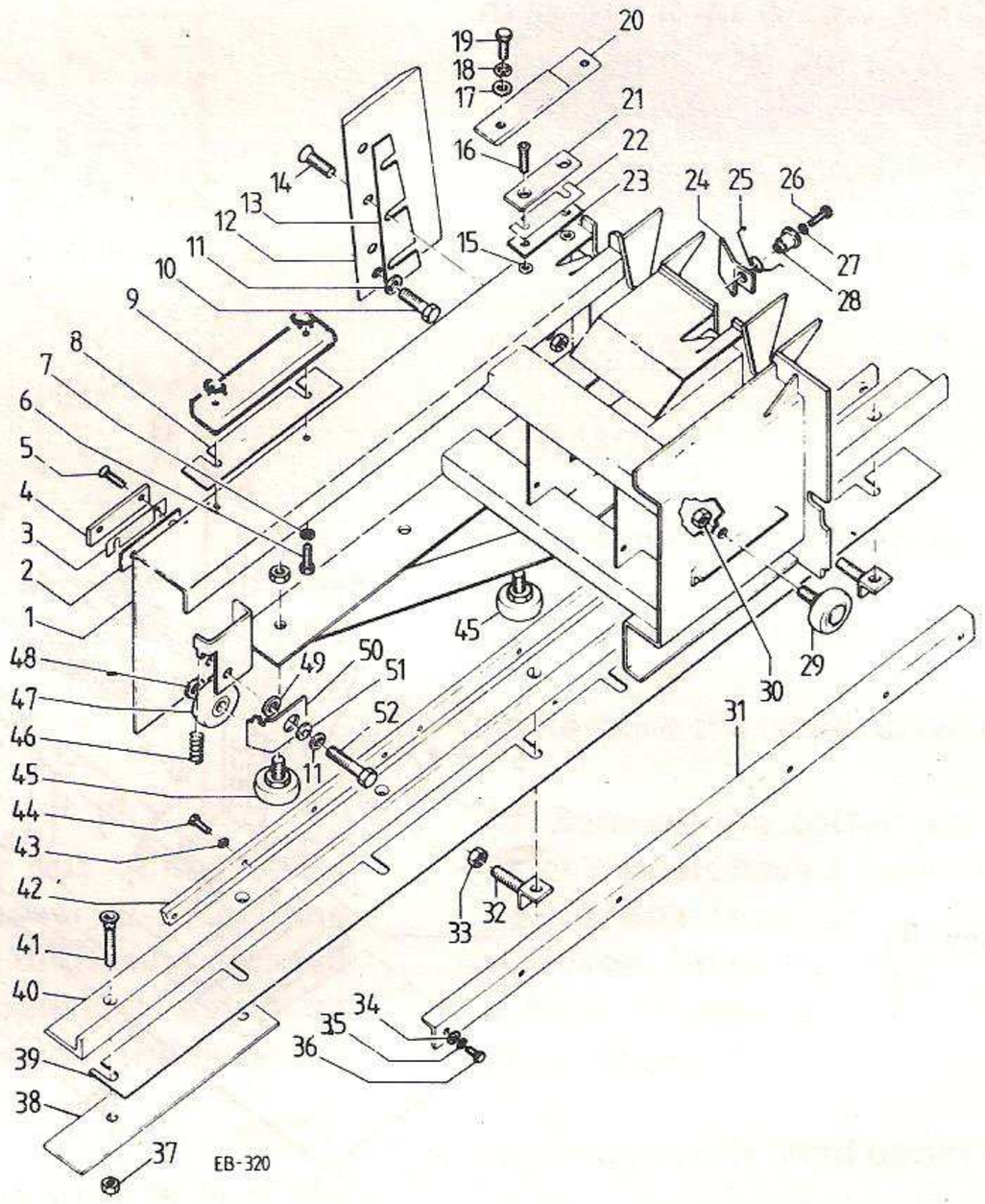
1a. GENERAL

The plunger and bale chamber are considered as a unit since they must maintain a relationship with each other for efficient service. The knife guided plunger design makes it less critical to have the plunger and bale chamber perfectly square with each other. The important consideration is to have the knives parallel with each other and held to a minimum clearance.

1b. PLUNGER

The knife guided plunger is a welded assembly supported in the bale chamber by steel rollers and steel guides with thrust runners to take the wear and side thrust imposed by the shearing of the material being baled. The slight differences between the 451/461 and 471/481 plunger assemblies can be seen in Figs.1 and 3, the main difference being that the 451/461 plunger is supported and guided on the left side by a slide assembly in place of rollers. (til 1984).

1. Plunger assy
2. Spacer
3. Spacer
4. Wearplate
5. Screw and nut
6. Bolt
7. Spring lock washer
8. Spacer
9. Block
10. Bolt
11. Spring lock washer
12. Knife
13. Shims
14. Screw
15. Nut
16. Screw
17. Washer
18. Spring lock washer
19. Bolt
20. Knife guide
21. Wear plate
22. Spacer
23. Spacer
24. Scraper
25. Spring
26. Bolt
27. Spring lock washer
28. Spacer
29. Roller and nut



30. Nut
31. Angle
32. Adjuster
33. Nut
34. Washer
35. Washer
36. Bolt
37. Nut
38. Plate
39. Spacer
40. Angle
41. Bolt
42. Strip
43. Washer
44. Bolt
45. Roller
46. Spring
47. Roller
48. Ring
49. Ring
50. Scraper
51. Ring
52. Bolt

Fig. 1
471/481 Plunger assembly
and 461/451 (after 1984)

PLUNGER AND BALE CHAMBER

1c. BALE CHAMBER

The bale chamber is a welded assembly. Included with the bale chamber are the feed opening top sheets, stationary knife, hay retainers, bale tension device, plunger guides, plunger stop and needle guards.

Attached to the bale chamber and breastplate are the bale chamber wedges, hay retainer plates, hay retainer wedges and hay retainers (hay dogs). All of these components must function to keep the material to the rear after being compressed by the plunger They must be operable and in good condition as hay being allowed to "break back" would interfere with the efficiency of both tying and feeding.

The bale chamber of the 451 baler is similar in design to that of the 461-471-481 baler but is shorter and has no loose extensions. The two designs are shown in Figs. 2 and 4.

BALE CHAMBER 461-471-481

1. Bale chamber assy
2. Screw
3. Shims
4. Shim
5. Nut
6. Stat knife
7. Nut
8. Plate, ret.
9. Coachbolt
10. Nut
11. Bolt
12. Groover assy
13. Screw
14. Nut
15. Coachbolt
16. Nut
17. Brace
18. Bale chamber ext.(R)
19. Bale chamber ext.(L)
20. Coachbolt
21. Haywedge
22. Nut
23. Coachbolt
24. Nut
25. Support, needle guard
26. Nut
27. Coachbolt
28. Brace
29. Retainer plate
30. Nut
31. Coachbolt
32. Cotter pin
33. Retainer
34. Spring
35. Shaft retainer
36. Nut
37. Adjuster assy

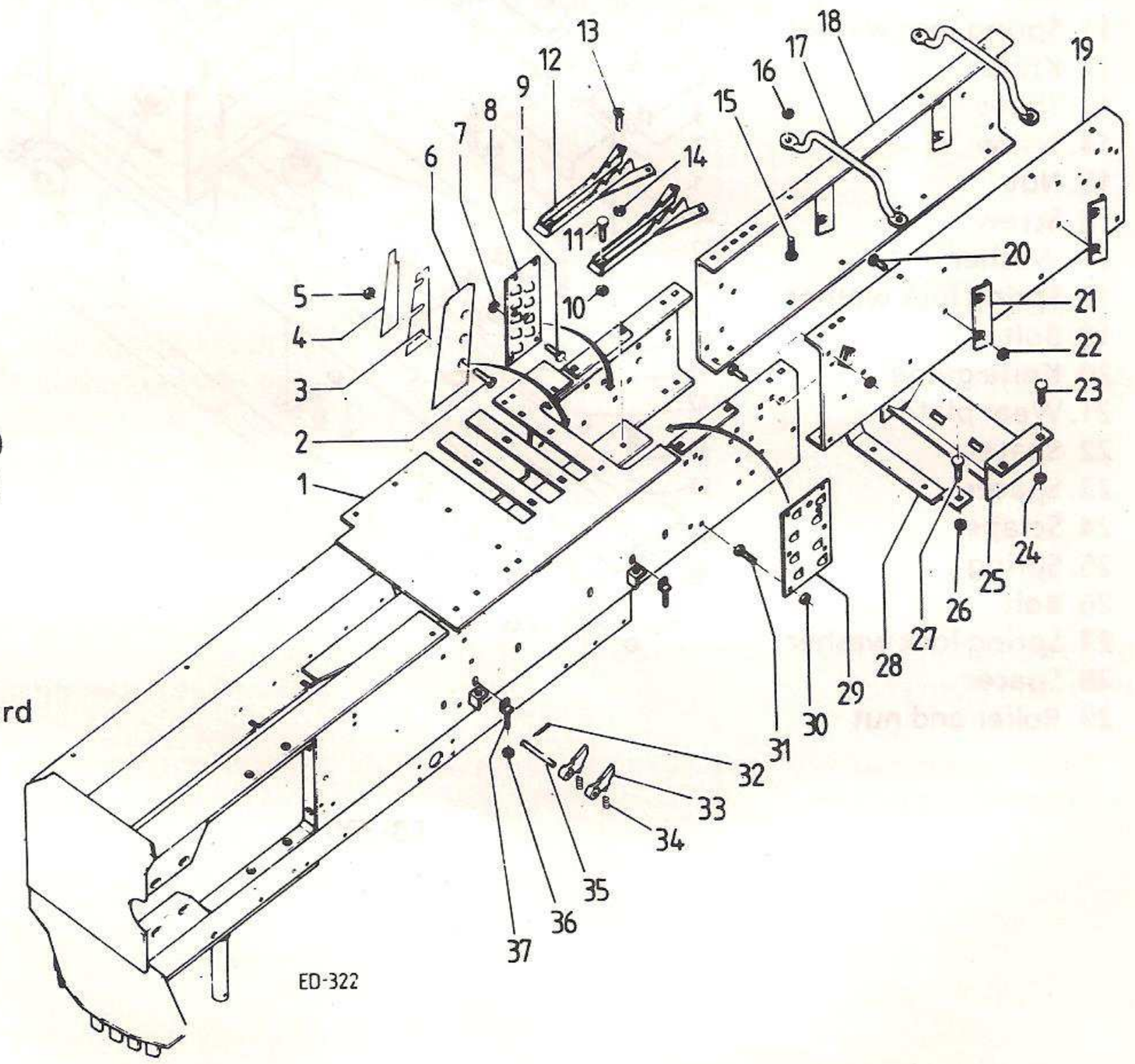


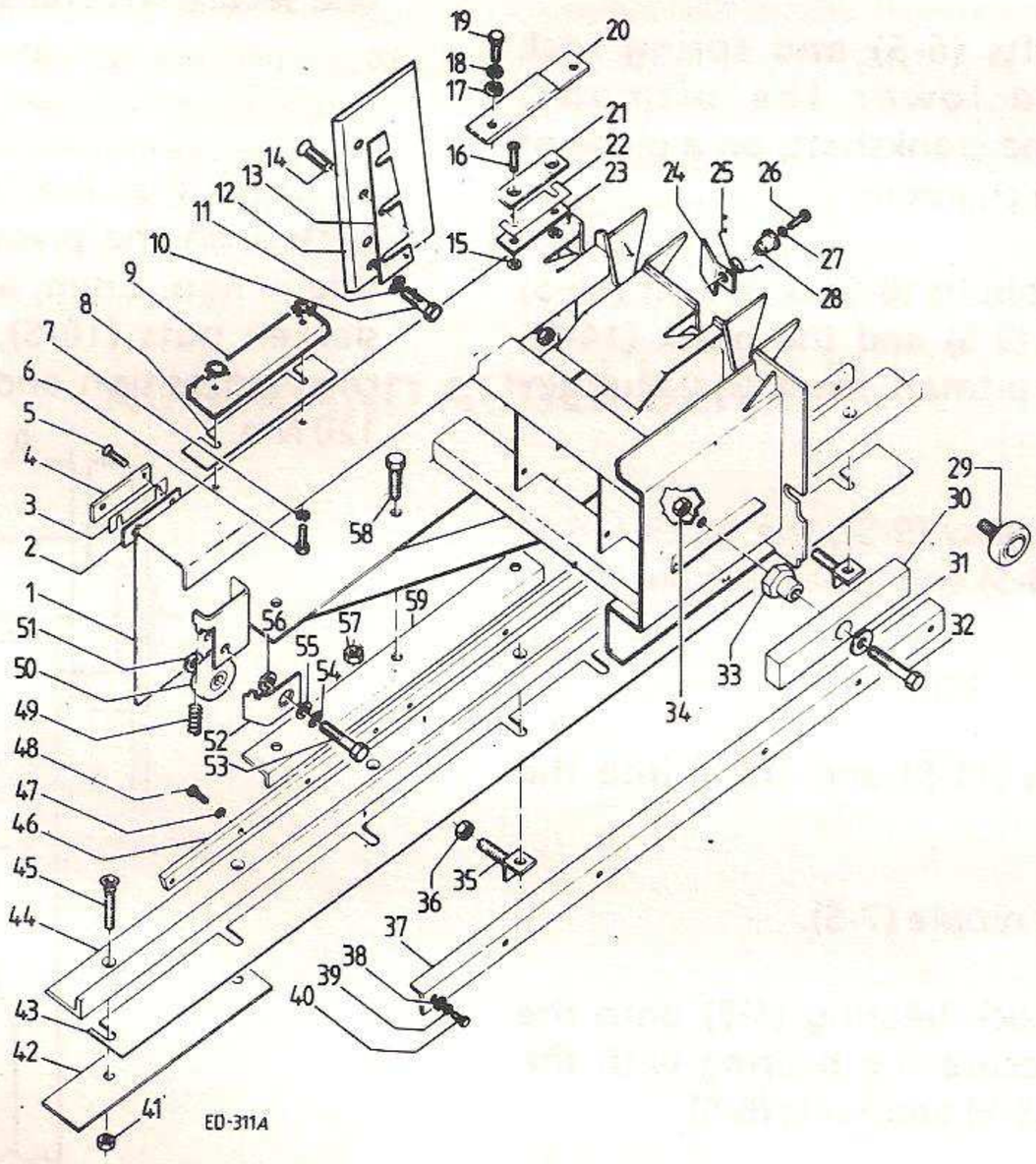
Fig. 2

GROUP 5

PLUNGER AND BALE CHAMBER

1. Plunger assy
2. Spacer
3. Spacer
4. Wear plate
5. Screw and nut
6. Bolt
7. Spring lock washer
8. Spacer
9. Block
10. Bolt
11. Spring lock washer
12. Knife
13. Shims
14. Screw
15. Nut
16. Screw
17. Washer
18. Spring lock washer
19. Bolt
20. Knife guide
21. Wear plate
22. Spacer
23. Spacer
24. Scraper
25. Spring
26. Bolt
27. Spring lock washer
28. Spacer
29. Roller and nut
30. Slide block

PLUNGER 451-461 (1984)



31. Washer
32. Bolt
33. Pivot
34. Nut
35. Adjuster
36. Nut
37. Angle
38. Washer
39. Washer
40. Bolt
41. Nut
42. Plate
43. Spacer
44. Guide angle
45. bolt
46. Guide strip
47. Washer
48. Bolt
49. Spring
50. Roller
51. Ring
52. Scraper
53. Bolt
54. Washer
55 Ring
56. Scraper ring
57. Nut
58. Bolt
59. Angle

Fig. 3

1. Bale chamber
2. Screw
3. Stat knife
4. Shims
5. Shim
6. Nut
7. Nut
8. Plate, ret.
9. Coachbolt
10. Coachbolt
11. Hay wedge
12. Nut
13. Plate ret.
14. Nut
15. Coachbolt
16. Cotter pin
17. Retainer
18. Spring
19. Shaft, ret.
20. Nut
21. Adjuster assy

BALE CHAMBER 451

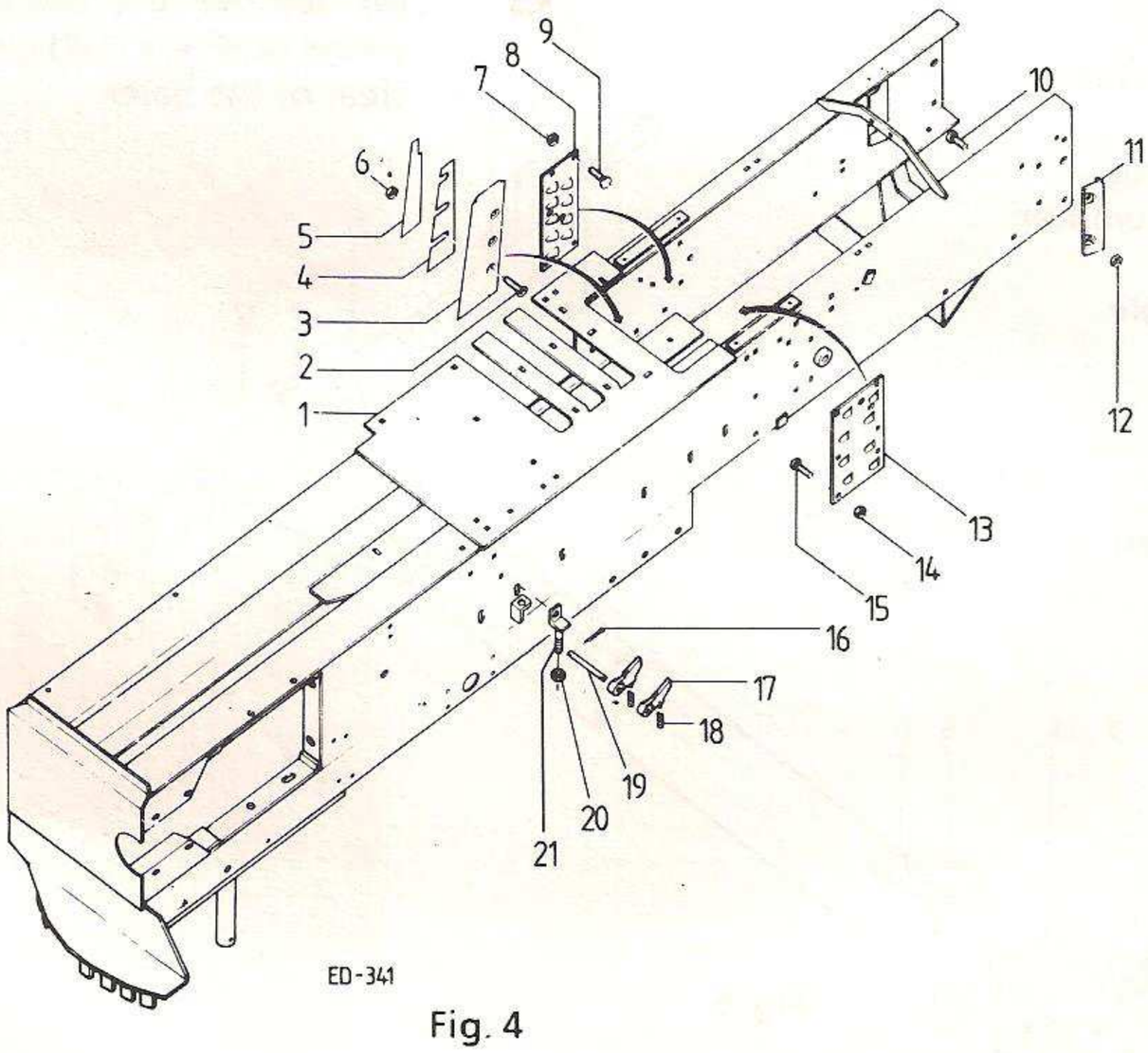


Fig. 4

PLUNGER AND BALE CHAMBER

2. PLUNGER PITMAN

2a. REMOVAL

(a) Remove the bolts (6-5) and spring lock washers (5-5) and lower the pitman , disconnected from the crankshaft, on a piece of wood across the bale chamber.

(b) Remove the coachbolts (8-5) with nuts (10-5) from the assy pivot (9-5) and the block (14-5), then withdraw the pitman from the plunger and bale chamber.

(c) Remove the pivot assy (9-5), the block (14-5) the bushes (11-5), (13-5) and grease nipple (7-5).

2b. ASSEMBLY

(a) Press new bushes (11-5) and (13-5) into the pitman (12-5).

(b) Install the grease nipple (7-5).

(c) Reconnect the block bearing (4-5) onto the pitman (12-5) and secure the bearing with the spring lock washers (5-5) and bolts (6-5).

(d) Install the assy pivot (9-5) and block (14-5) onto the pitman.

2c. INSTALLATION

(a) Lift the pitman into position on the plunger and secure with nuts (10-5) and bolts (8-5).

(b) Check that the "small end" of the pitman is central on the pivot assy. (Clearance at either side = min. 2 mm, see fig. 6 dimension A) If not slacken nuts (10-5), move the pitman to the correct position and tighten the bolts to 110-120 Nm.

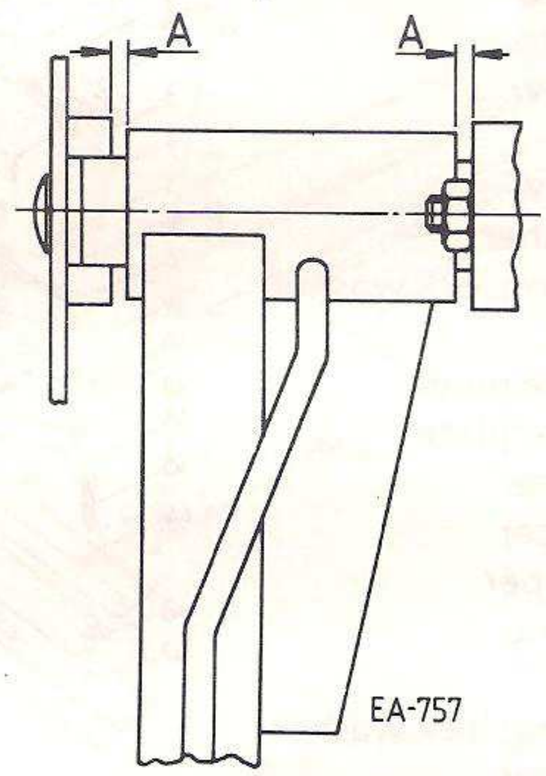


Fig. 6

3. PLUNGER

3a. REMOVAL

(a) Remove the bolts securing the metering wheel brackets (1-7) and lift the metering wheel clear of the baler.

1. Bolt
2. Spring lock washer
3. Washer
4. Block bearing
5. Spring lock washer
6. Bolt
7. Grease nipple
8. Coachbolt
9. Assy pivot
10. Nut
11. Bushing
12. Assy pitman
13. Bushing
14. Block

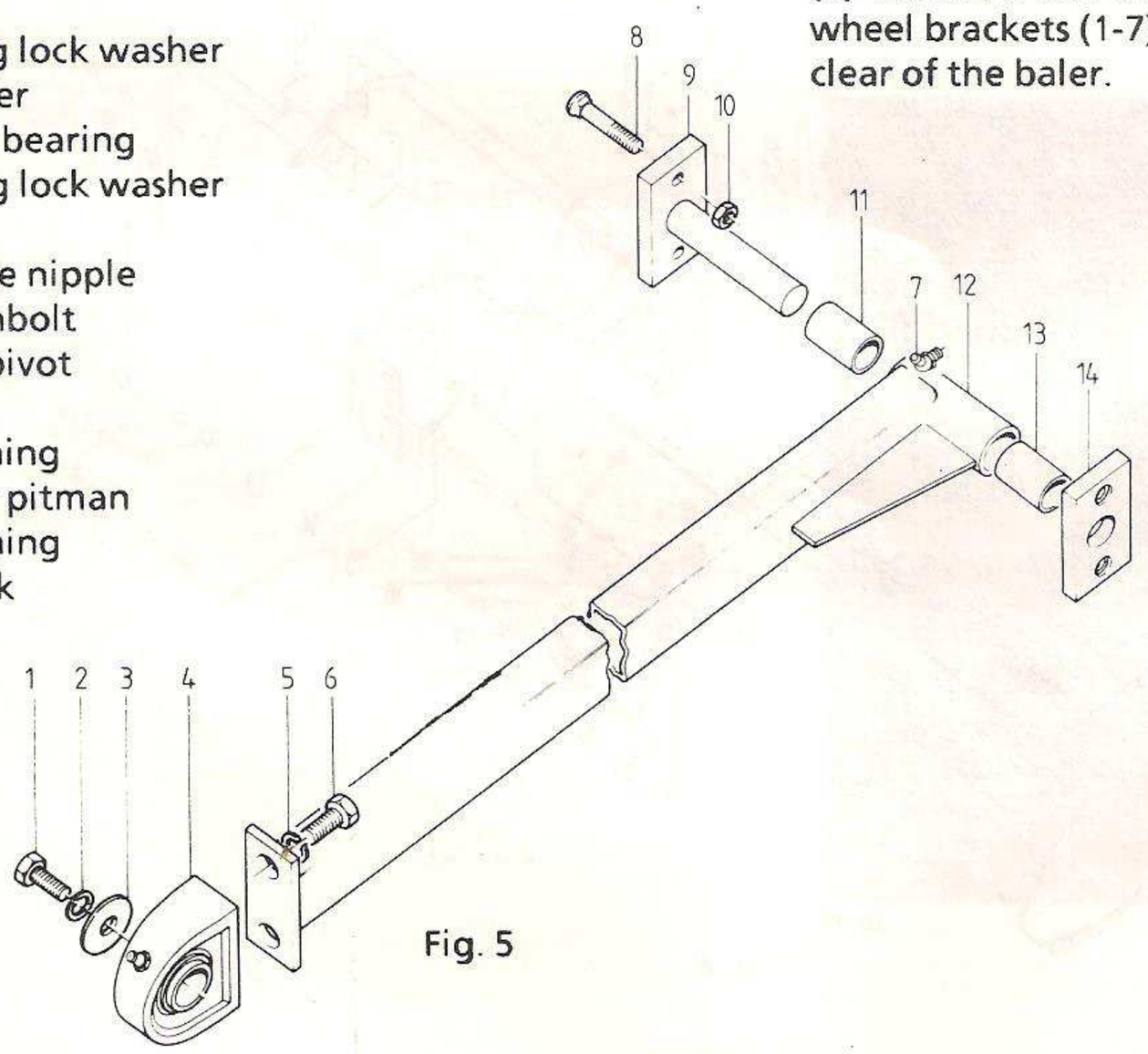


Fig. 5

(b) Unscrew the handles (2-7) until the springs (3-7) are free.

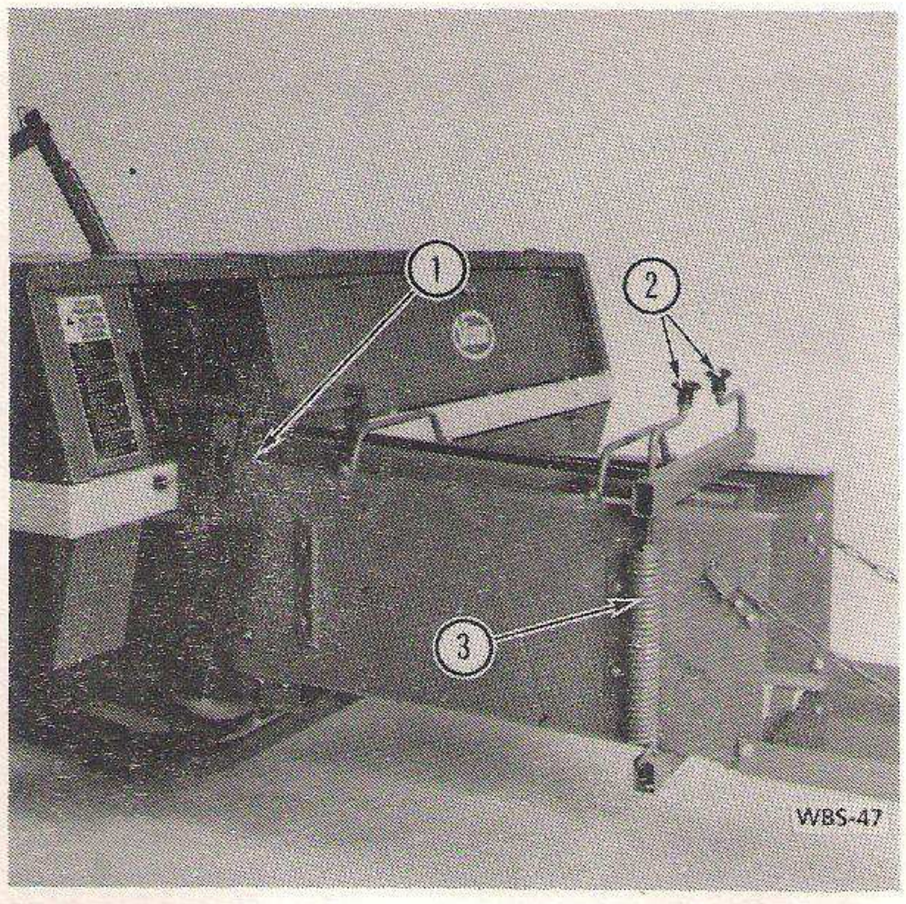


Fig. 7

(c) Remove the bale chamber wedges (21-2) and hay retainer plates (3-8).

(d) Using wedges 'wedge in' the upper hay retainers (4-8) and lower hay retainers (5-8) clear of the bale chamber.

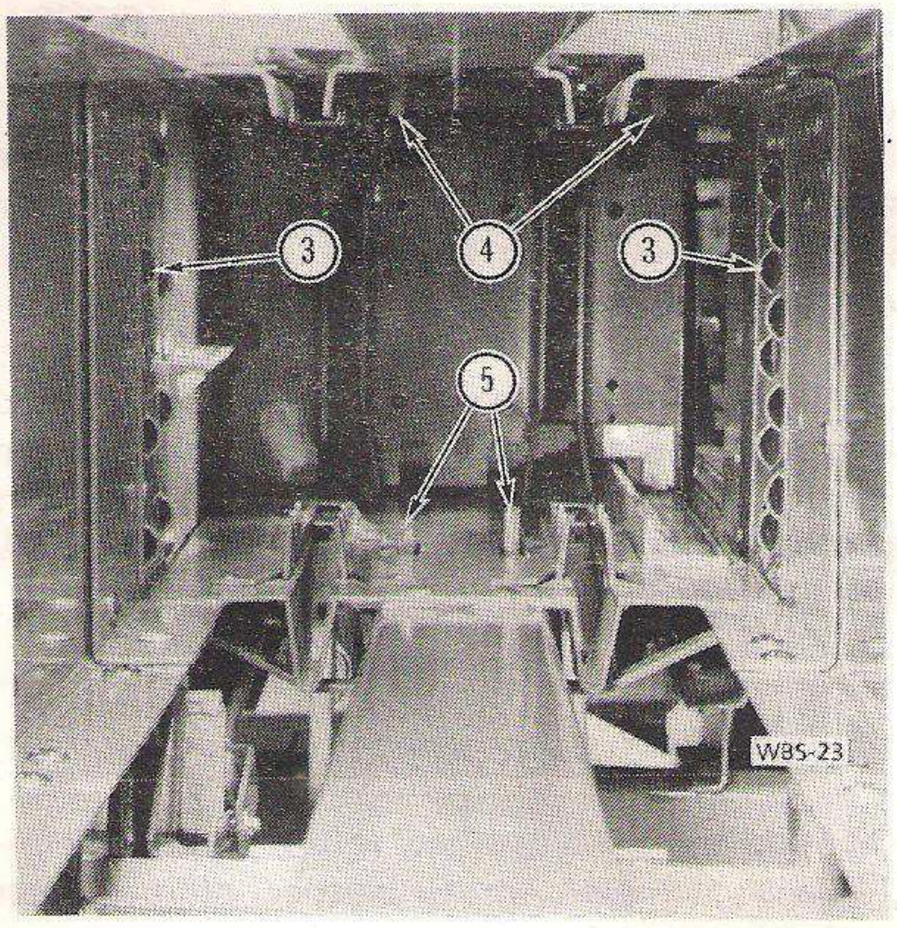


Fig. 8

(e) Remove the right upper block (9-2) and shims from the plunger then disconnect the pitman from the crank. Check that the packer fingers are well clear of the bale chamber and blocked in this position then push the plunger rearward and out of the bale chamber.

3b. DISMANTLING

(a) Remove the nut (30-1) and left side rollers (29-1) (1-9) for the 461-471-481 plunger. Remove the nut (34-3), washer (31-3), bolt (32-3) and slide block (30-3) for the 451 plunger.

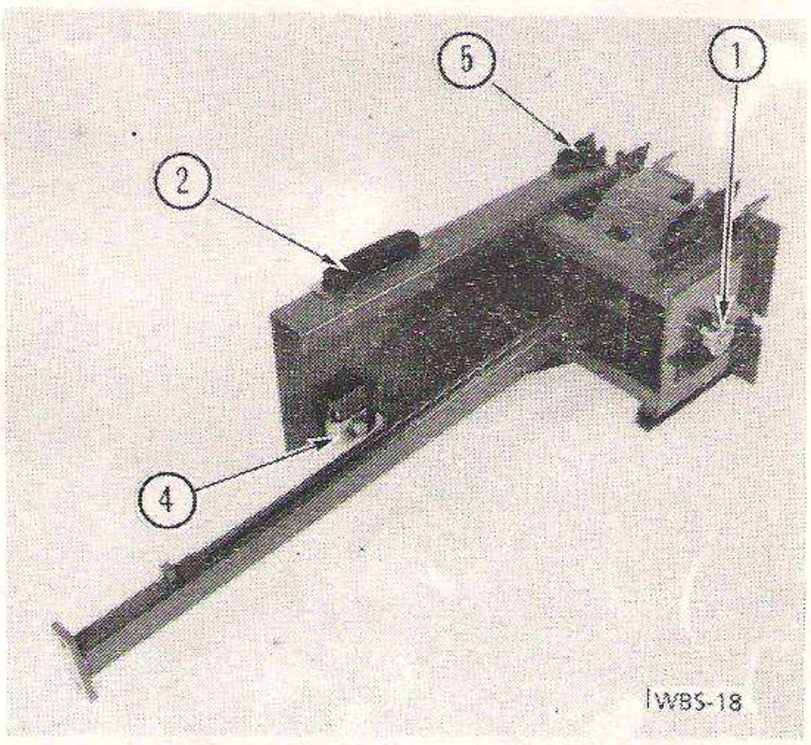


Fig. 9

(b) Remove the bolt (1-10) to remove the scraper, spacer, front roller and washer.

(c) Remove the bolts (2-10) to remove the rear roller.

(d) Remove the nuts (3-10) to remove the guide angle.

(e) Loosen the rear scraper spring, and take out the bolt and spacer (25-1, 26-1 and 28-1).

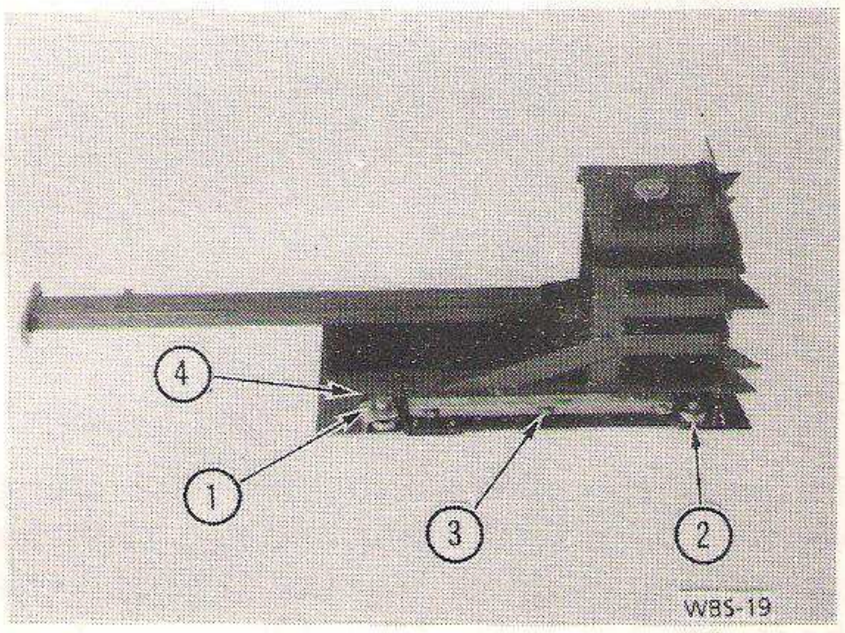


Fig. 10

(f) Remove the nuts from the bolts (1-11) to remove the plunger knife.

(g) Remove the upper wearing pad (5-9) and shims beneath.

(h) Remove the lower wearing pad (2-11) and shims beneath.

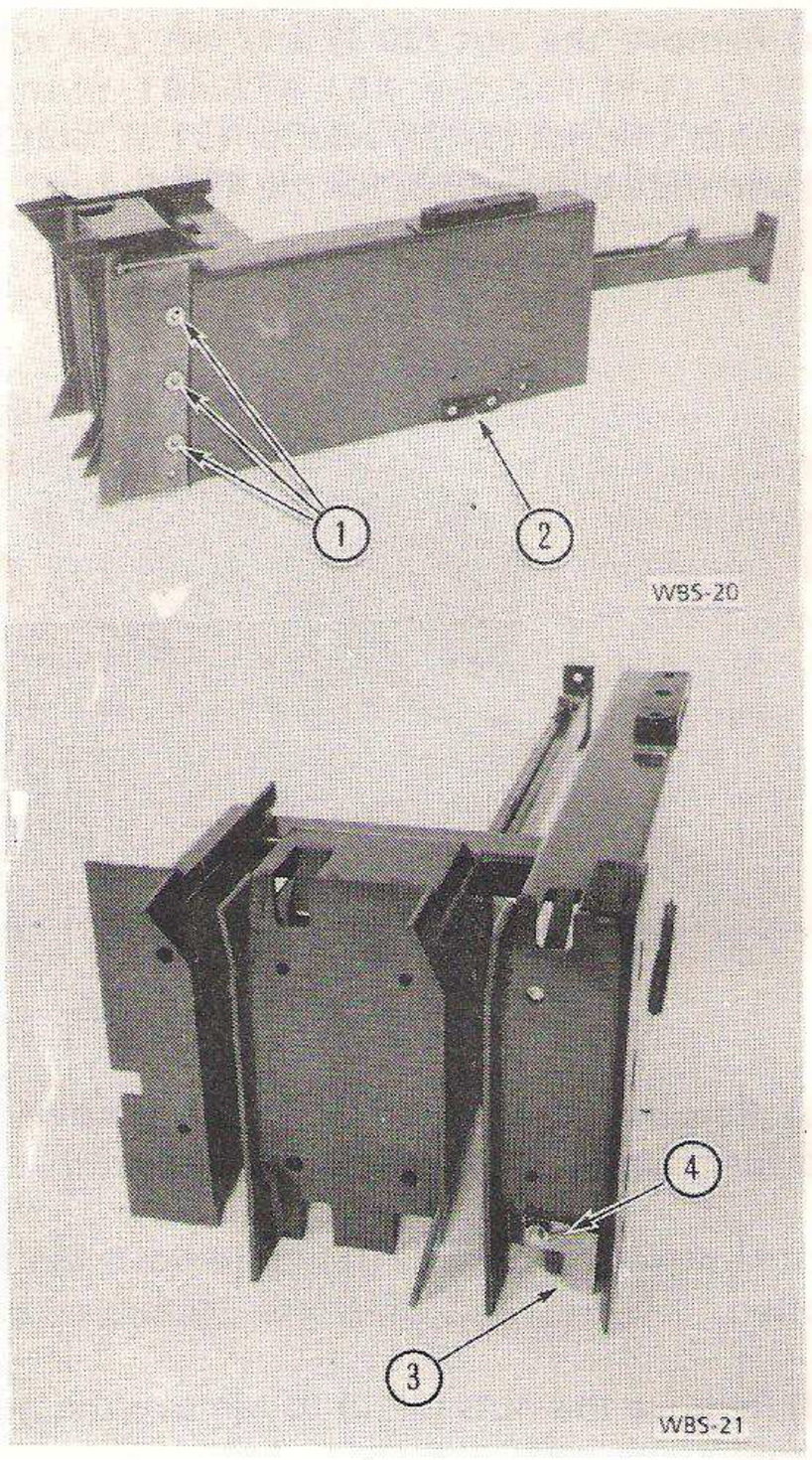


Fig. 11

(i) Remove the bolts (8-5) to free the pitman from the plunger.

(j) If inspection proves it necessary, remove the plunger guide angles (40-1) (44-3), thrust angle (2-12) feed opening knife guide (3-12), stationary knife (4-12) and plunger thrust strip (5-12).

3c. INSPECTION

(a) Check the wear surfaces of the plunger which are the side (2-11) and top (5-9) wear pads and right upper block (9-1) (2-9). Check the rollers (4-9) and (1,2 & 3- 10).

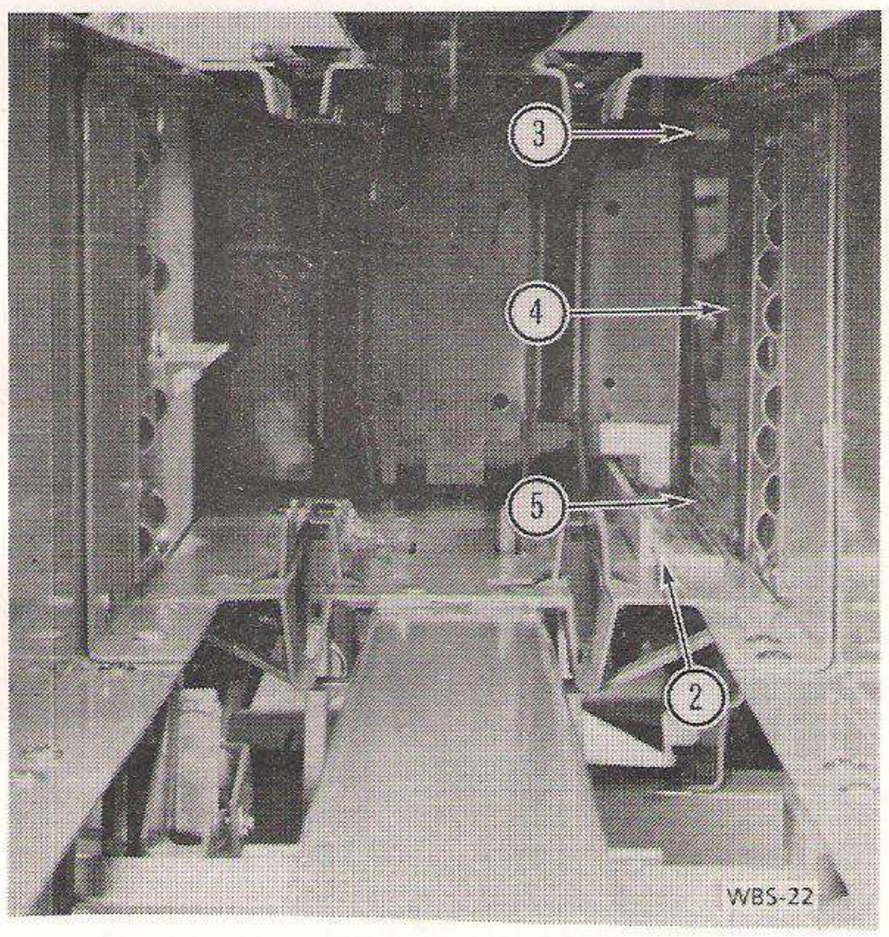


Fig. 12

(b) Check the wear surfaces of the bale chamber which are the thrust angle (2-12), thrust strip (5-12) knife guide (3-12) and guide angles (40-1) (44-3).

(c) Renew any wear surfaces if worn through half of their original thickness as it is more economical to change them while the machine is dismantled than to wait until they are completely worn.

(d) Renew any rollers which are seized, tapered or unevenly worn, and if the roller is worn down to the level of the plunger. New rollers protrude approximately 4.5 mm (3/16 in) below the plunger.

3d. ASSEMBLY

(a) Secure the front roller, referring to inset (A-13) with the bolt, spring washer, plain washer and spacer installed through the scraper, Torque the bolt 115 to 122 Nm (85 to 90 lbft) and grind off any protruding bolt end.

PLUNGER AND BALE CHAMBER

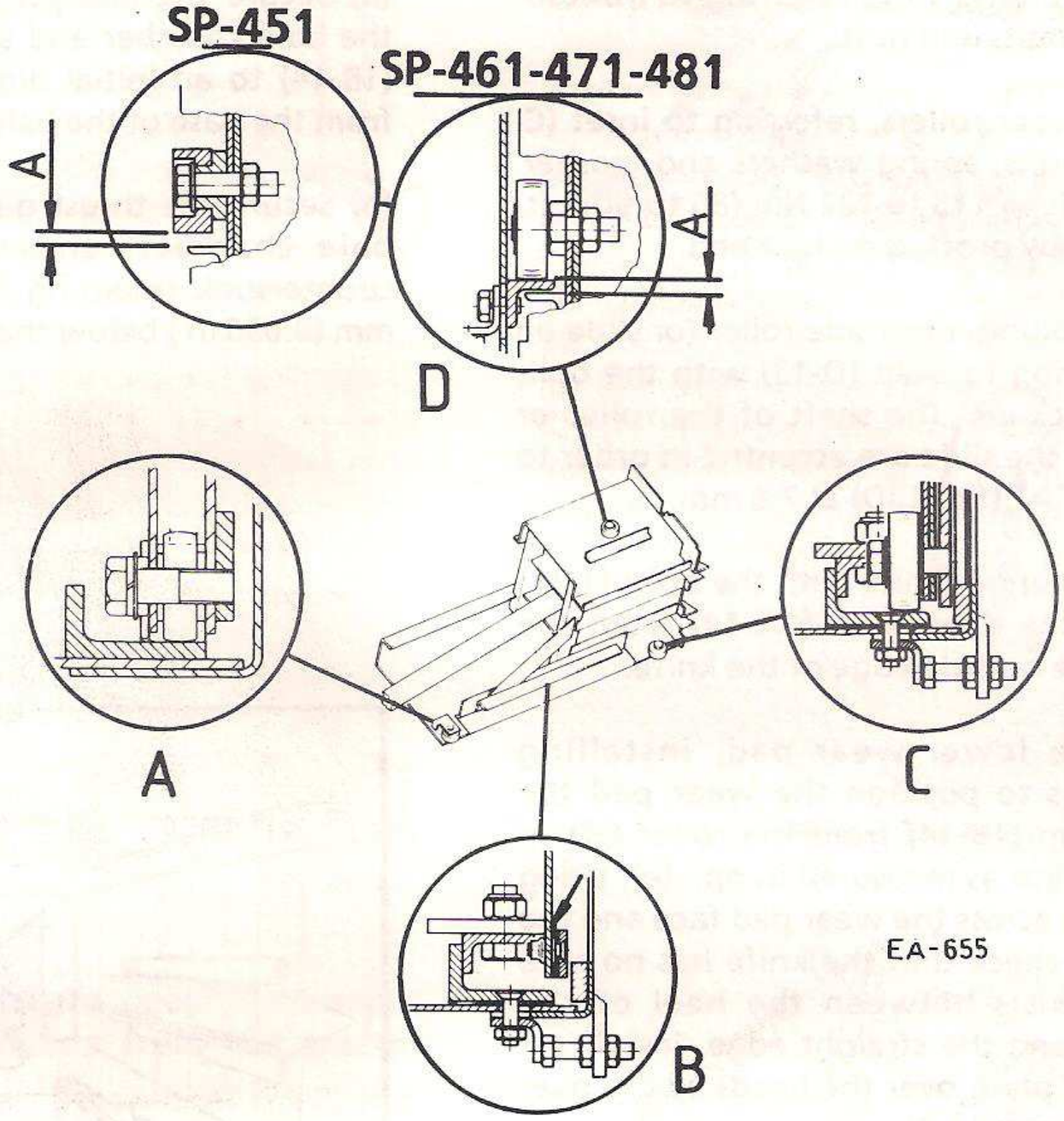


Fig. 13

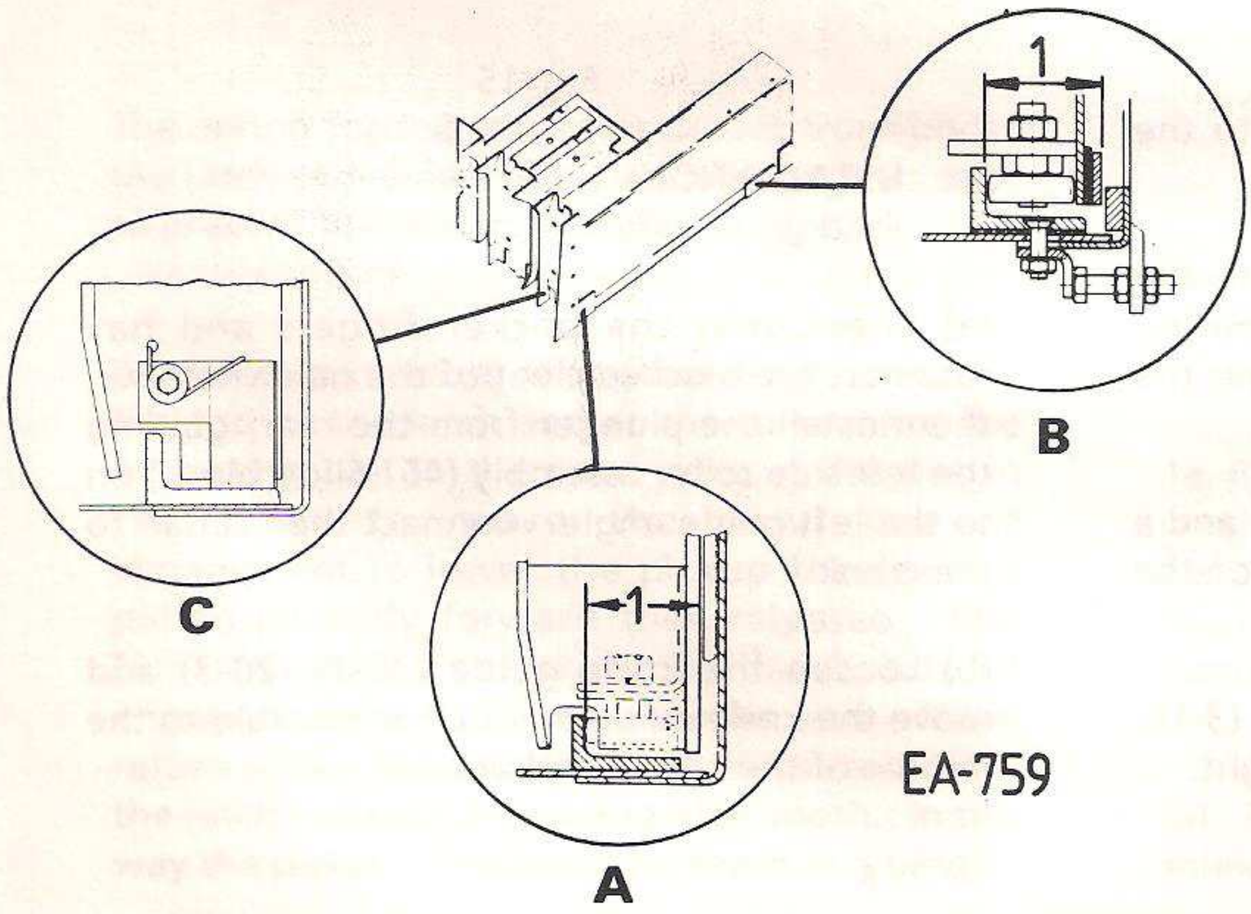


Fig. 14

(b) Secure the sliding strip, referring to inset (B-13) with the 3 bolts and nuts.

(c) Secure the rear rollers, referring to inset (C-13) with the bolts, spring washers and washer. Torque the bolt to 115 to 122 Nm (85 to 90 lbft) and grind off any protruding bolt end.

(d) Secure the plunger left side roller (or slide on the 451) referring to inset (D-13) with the bolt, washer and locknut. The shaft of the roller or the bushing of the slide are eccentric in order to set dimension "A" (fig. 13D) at 7-8 mm.

(e) Install the plunger knife with the bolts (1-11) and measure the dimension (1A-14) from the roller OD to the outside edge of the knife.

(f) Secure the lower wear pad, installing sufficient shims to position the wear pad the same dimension (1B-14) from the roller OD to the wear pad face as measured in op. (e). Using a straight edge across the wear pad face and the plunger knife, check that the knife has no rake and no.gap exists between the heel of the plunger knife and the straight edge. Install a 1 mm thick filler plate over the heads of the rivet nuts (figs. B-13 and 23-3).

(g) Secure the plunger scraper (3-11) with the bolt and spacer then install the tension spring. Refer to inset (C-14).

(h) Install the upper wear pad (5-9) without shims and with the bolts finger tight.

(i) Locate the pitman bearing blocks (14-5) in the plunger and secure leaving the bolts loose.

(j) Secure the plunger thrust strip (5-15) to the bale chamber if this was removed.

(k) Assemble the stationary knife (4-15) to the bale chamber with sufficient shims to position the knife flush to 0.3 mm (0.010 in) below the plunger thrust strip.

(l) Check that the knife has a positive rake and a gap of not more than 1 mm at the heel of the knife.

(m) Secure the feed opening knife guide (3-15) to the breast plate with the bolts finger tight.

(n) Secure the plunger guide angles (1-15) to the bale chamber and set the L.H. guide angle (1B-14) to an initial dimension of 146 mm up from the base of the bale chamber.

(o) Secure the thrust guide angle (2-15) to the bale chamber, ensure the heads of the countersunk retaining bolts are flush to 0.80 mm (0.030 in) below the guide angle.

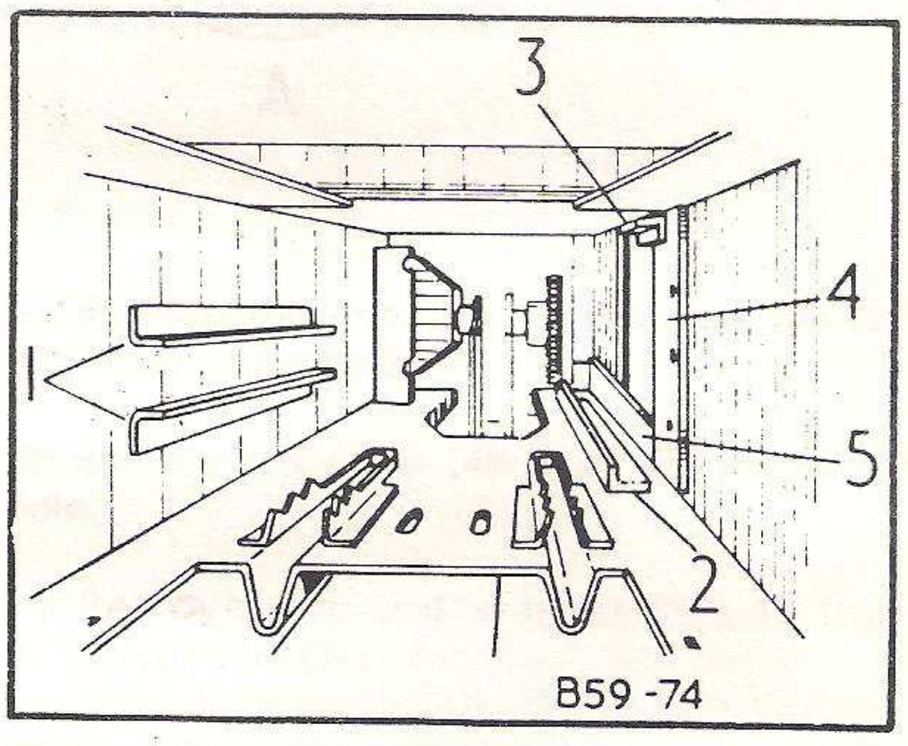


Fig 15

3e. INSTALLATION

(a) Check that the packer fingers and hay retainers are blocked clear of the bale chamber, then install the plunger from the rear, guiding the left side roller assembly (451 Slide block) on to the left guide angle. Connect the pitman to the crank.

(b) Loosen the knife guide (20-1) (20-3) and move the knife guide as much as possible to the middle of the bale chamber.

(c) Move the plunger to the front, check the position of the stationary knife for the correct clearance of the guide strip. (B-16). The stationary knife position should be 0 to 0.3 mm below the guide strip, and is adjusted by shims (0.5-0.25 mm) (13-1). The stationary knife should have a positive rake of between 0 and 1mm, if not, slacken the bolts and slide in or out shims (3-2) or (4-4) to alter the space below the guide strip and shim (5-4) to alter the rake angle.

(d) Move the plunger to the back and as near to the middle of the bale chamber (against the guide) as possible. Check the clearance between the knife and the guide strip, it should be between 0.2 and 0.5 mm (II-16), if necessary adjust (adj. A-16).

(e) Move the plunger forward until the knife is in front of the feed opening. Check the clearance between the knife and guide strip. The clearance should be between 0 and 0.5 mm. Adjust the front adjuster to obtain this.

(f) Re-check the settings achieved in steps (d) and (e) and if correct torque the guide angle bolts to 30-40 Nm.

(g) Move the plunger towards the rear, with the front wear pad (4-1) in the feed opening. The clearance between the guide strip and the wear pad here should be 0.2-0.5 mm (D-16). If necessary slacken the allen screws and slide in or out shims (3-3) to obtain this. Torque bolts to 10 Nm. + locktite.

(h) Move the plunger so that the bottom of the knives are parallel to each other. Check the clearance between the knives, it should be between 0 to 0.8 mm. (B-16). Move the plunger slightly rearward so that the top of the knives are parallel to each other, check that the clearance is between 0 to 0.8 mm, but not more than 0.5 mm more than the clearance obtained at the bottom of the knives, if necessary adjust. (adj. C-16).

(i) Adjust the front adjuster (adj. C-16) so that the L.H. guide angle is parallel to the bottom of the bale chamber to within ± 2 mm over the full length.

(j) Re-check settings (h) and (i) and torque the guide bolts to 20-25 Nm.

(k) Set both the inner and outer knife guide so that they clear the knife 0.3-0.8 mm (dim E and F-16)

(l) Check the clearance between the upper wear pad and the inner knife guide (dim G-16). This should be 0.5 to 1.5 mm. If this clearance is not achieved move the plunger slightly to the front and slacken the allen screws through the slots in the feed opening, slide in or remove shims until the correct setting is obtained. torque bolts to 10 Nm. + Locktite.

(m) Shim the wooden block (9-1) with the spacer (8-1) to obtain a clearance of 0 5 to 1.5 mm from the upper side of the bale chamber at the moment of cutting. (H-16)

(n) Check the "small end" (plunger end) of the pitman for a mimimum clearance of 2mm from the end blocks. If this is not achieved, loosen bolts, adjust and then re-torque bolts to 80 to 90 Nm.

(o) Turn the flywheel in the normal direction of rotation through a number of full cycles to check if any binding is taking place and adjust as necessary.

It is advisable to check all settings again. (see Fig. 16).

A -	Knife guidestrip clearance	=	0.2-0.5 mm
B -	Knife to knife clearance	=	0-0.8 mm
C -	Knife parallel within	=	0.5 mm
D -	Lower wear pad to guidestrip	=	0.2-0.6 mm
E -	Knife guide to knife	=	0.3-0.8 mm
F -	Knife guide to knife	=	0.3-0.8 mm
G -	Upper wear pad to knife guide	=	0.5-1.5 mm
H -	Wooden block to bale chamber top		
	shearing point	=	0.5-1.5 mm
	full length max	=	3 mm
	Pitman "small end" to pivot block min.	=	2 mm

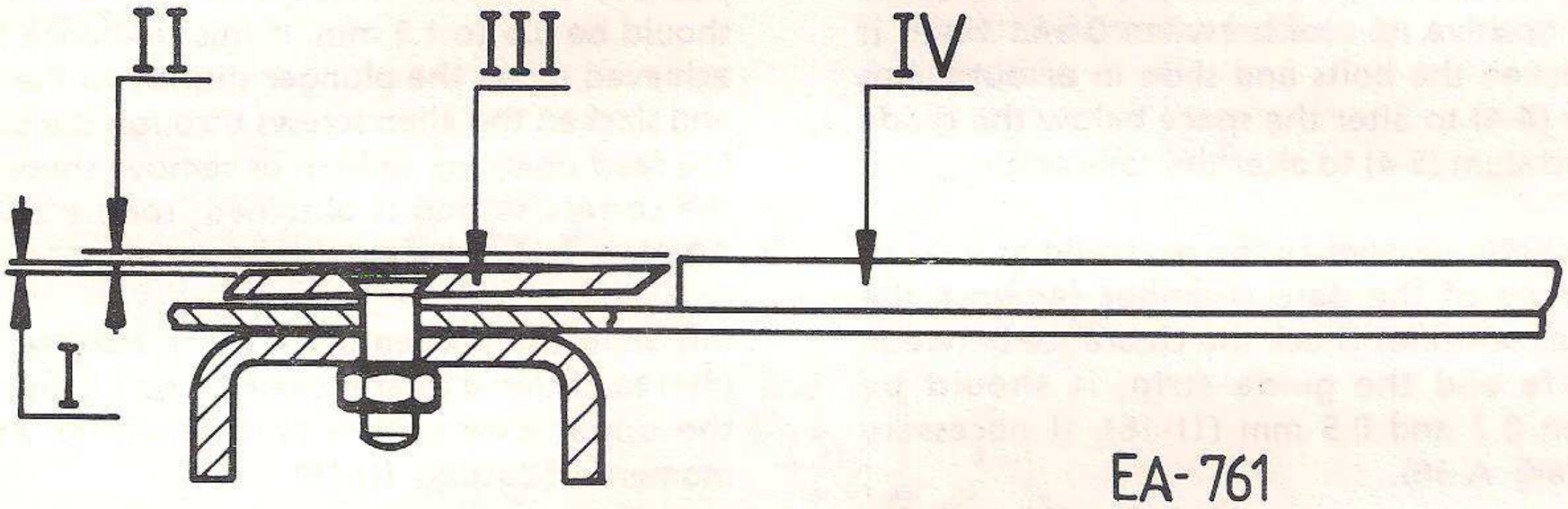
(p) Free the wedges from the upper hay retainers (4-8) and lower hay retainers (5- 8).

(q) Install the hay retainer plates (3-8) and bale chamber wedges (21-2).

GROUP 5

PLUNGER AND BALE CHAMBER

I = RAKE II = CLEARANCE III = STATIONARY KNIFE IV = GUIDE STRIP



EA-761

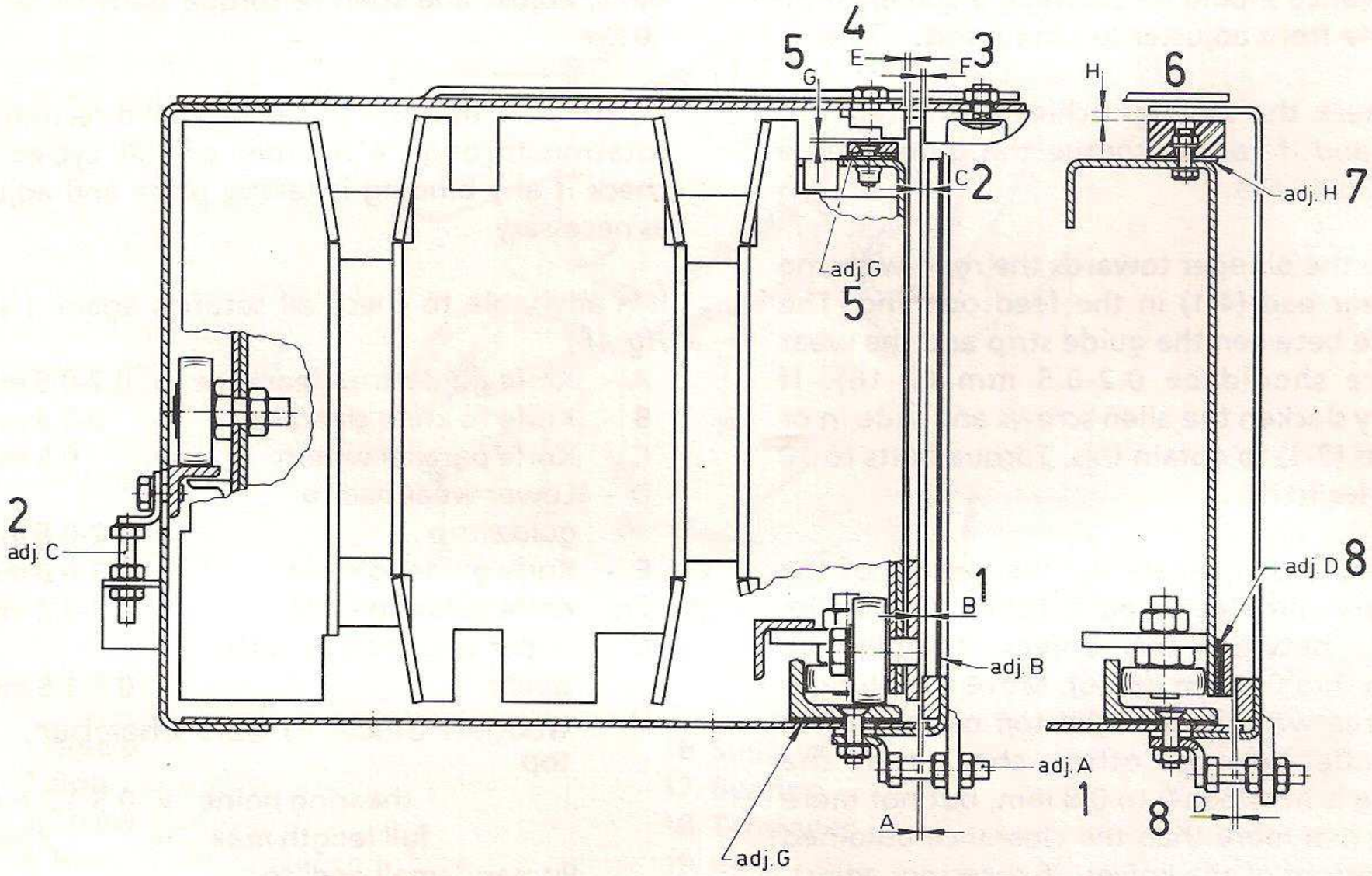


Fig. 16

GROUP 5

PLUNGER AND BALE CHAMBER

4. BALE CHAMBER

4a. REMOVAL

(a) Block under the front and rear of the bale chamber then remove the hitch, gear box, plunger, packer fingers and drive, knotter frame and breastplate and needle mechanism, referring to the relevant GROUPS.

(b) Remove the feed opening top sheets and channels.

(c) Support under the pickup and twine chest then disconnect the feed opening sheet, cross conveyor support channel, twine chest support, bale chamber support bar and diagonal brace from the right side of the bale chamber.

(d) Support the disconnected parts then securely sling the bale chamber, disconnect the mainframe on the underside and lift the bale chamber clear.

4b. DISMANTLING

Remove the hitch support plate, the serial number plate, hay knife, plunger thrust spacer, filler and shim, the twine guides, hay retainers and plunger stop.

4c. ASSEMBLY

(a) Put the bale chamber upside down on the work bench

(b) Install the hay retainers (33-17) with pin and springs.

(c) Not 451. Install bottom groovers (12-17)

(d) Not 451. Install bale chamber extensions (18-17 and 19-17).

(e) Not 451 Put on needle guard support (25-17) and cross braces.

(f) Install plunger stop dog (2-18) and connect the grease line (21, 22, 23 and 24-18).

(g) Install the plunger stop support (17-18).

(h) Install the rest of the plunger stop referring to fig. 2 and group 9 chapter 3d.

(i) Put in twine guide eyes.

(j) Put the needles (4-19) on the needle tie pipe (11-19), using the long bolts (12-19) with jam nuts in the front holes and the short bolts with spring washers on the rear holes, top and bottom. Tighten bolts hand tight.

(k) Put the inner nylon bushes (After 1984 bronze: (9.19) in the tie pipe bearings and slide the tie pipe bearings over the bale chamber.

(l) Slide in the outer nylon bushes (After 1984 bronze: (9.19) and the pivot pin assemblies (7-19 and 16-19). Tighten nuts and bolts (5-19).

(m) Determine how many shims (8-19 and 10-19), L.H. and R.H of both bearings, are required to ensure that when the needles are fully up, the needles are in the centre of the slots in the bale chamber.

(n) If necessary dismantle the pivot assemblies, put in the required shims and assemble again, tightening bolts (5-19) and nuts (6-19).

(o) Turn the bale chamber right side up and put the needles in the bale chamber to prevent damage.

(p) Install all plunger guides, that is: L.H. guide (31-20) with its adjusters (37-17), guide strip (42-20), bottom guide (40-20) with its filling plate (38-20) and 1 mm shim (39-20) and 2 adjusters (32-20). Do not tighten the guide bolts until the adjustments of the plunger are completed.

(q) Install the inner and outer knife guide. Do not tighten bolts.

(r) Install stationary knife (adjust according to chapter 3e). Torque bolts to 170-180 Nm.

(s) Install cross braces (17-17).

(t) Position the bale chamber and connect the diagonal brace, twine chest support, feed opening sheet, cross conveyor support channel and bale chamber support

(u) Install the feed opening top sheets and channels.

Install the hitch, gearbox, plunger, packer fingers and drive, breastplate, knotter frame and needle mechanism, referring to relevant groups.

GROUP 5

PLUNGER AND BALE CHAMBER

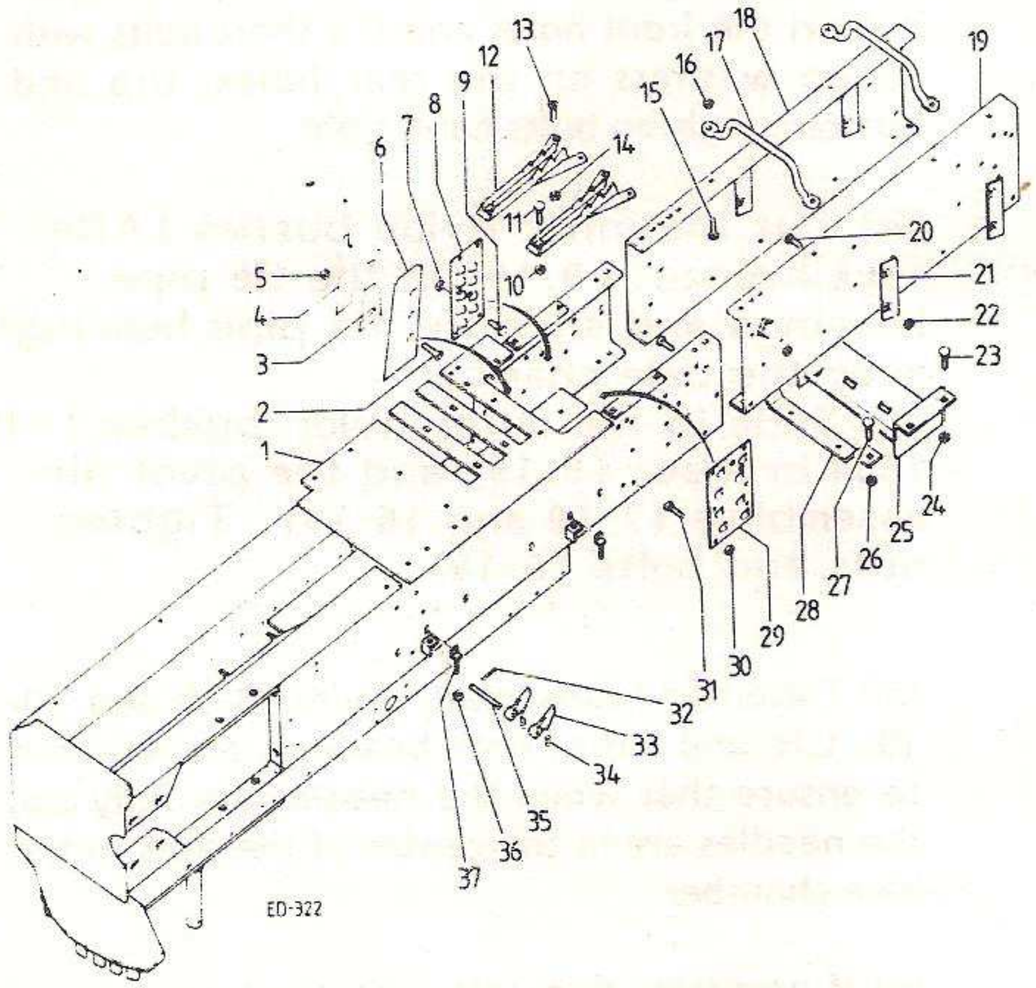


Fig. 17

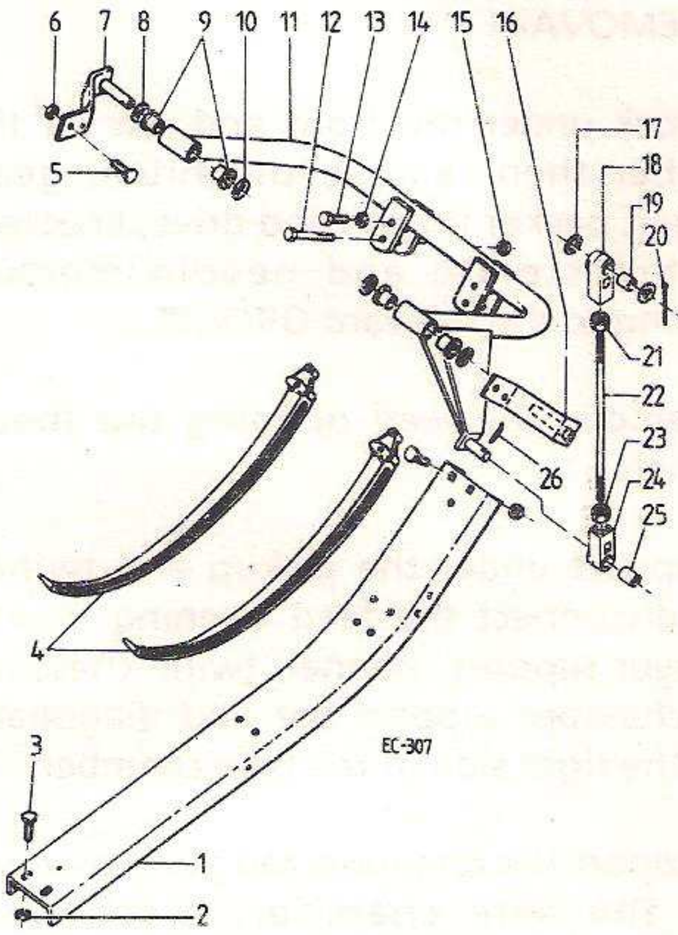


Fig. 19

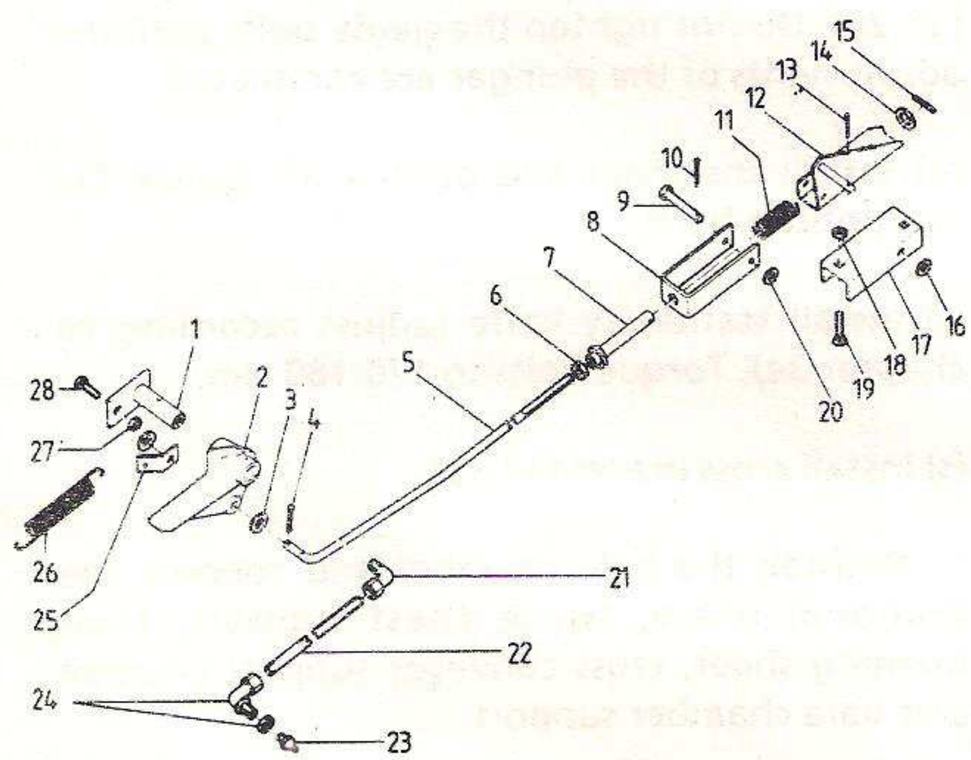


Fig. 18

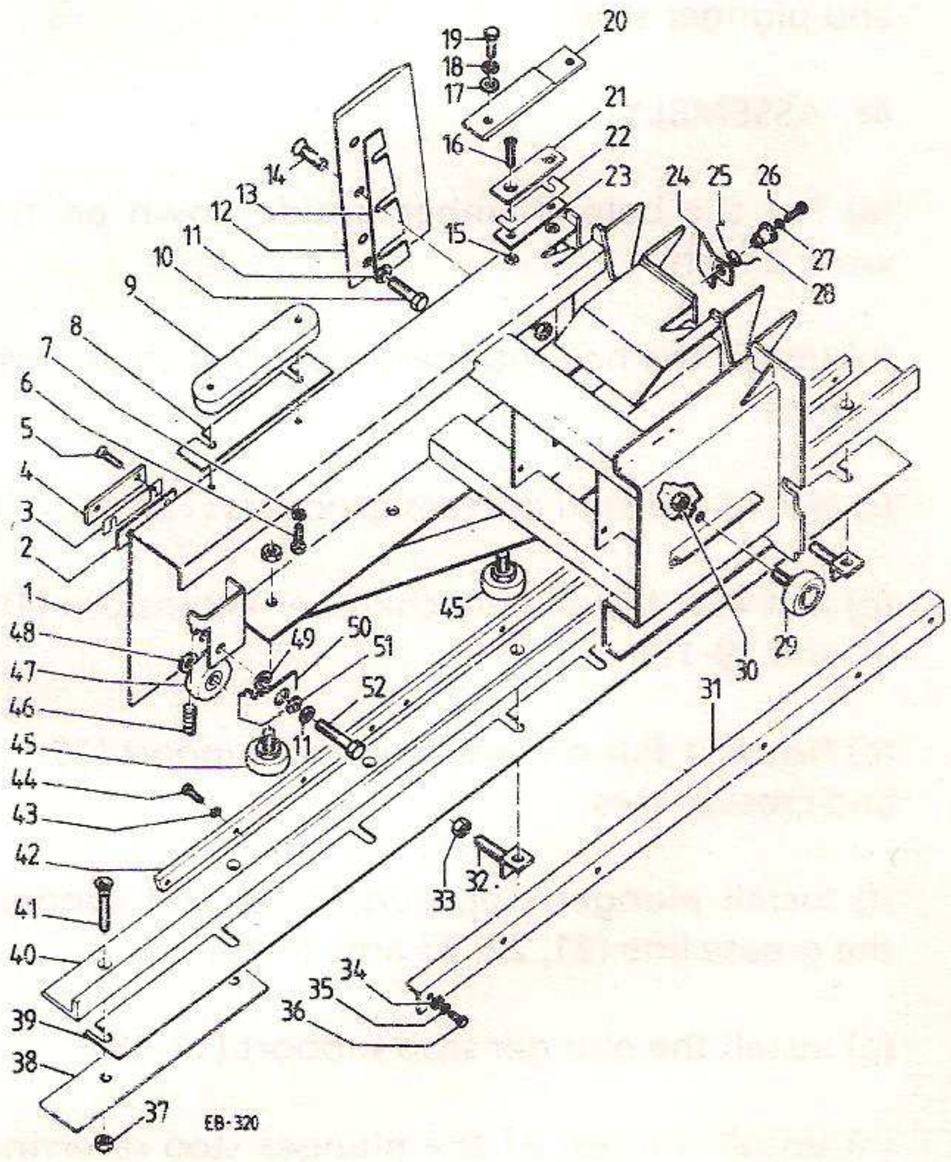


Fig. 20

GROUP 6

PICKUP

DESCRIPTION

The pickup assembly consists of the frame (29-1), the drive shaft (3-1), the tine bars (11-1), the control arm (2-1), the stripper loops (27-1) and the side plates (1 and 26-1)

The pickup is chain driven from a sprocket on the gearbox (fig. 2). A slip clutch protects the drive train and the pickup itself.

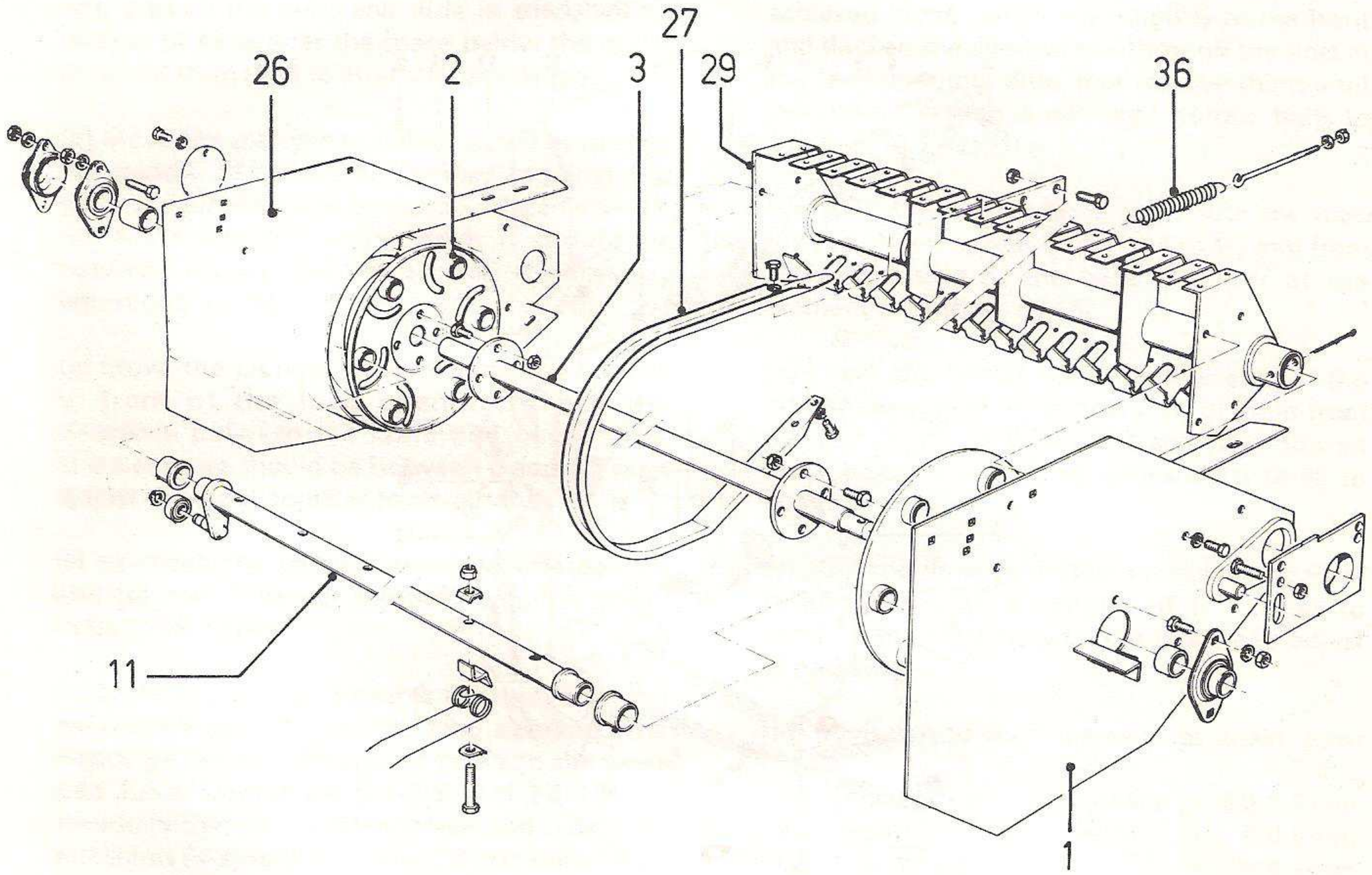


Fig. 1

GROUP 6

PICKUP

The drive also consists of a shaft (5-2) with a universal joint at each end, to allow the pickup to move up and down.

The effective weight of the pickup is controlled and adjusted by the tension on the balance spring (36-1).

The pickup is free to float to follow the contour of the ground but for very uneven surfaces a pickup wheel is available as an attachment.

On the 451 the height of the pickup is adjusted by physically lifting it up and positioning the chain (8-3) on the hook (2-3). A clip (1-3) secures the chain.

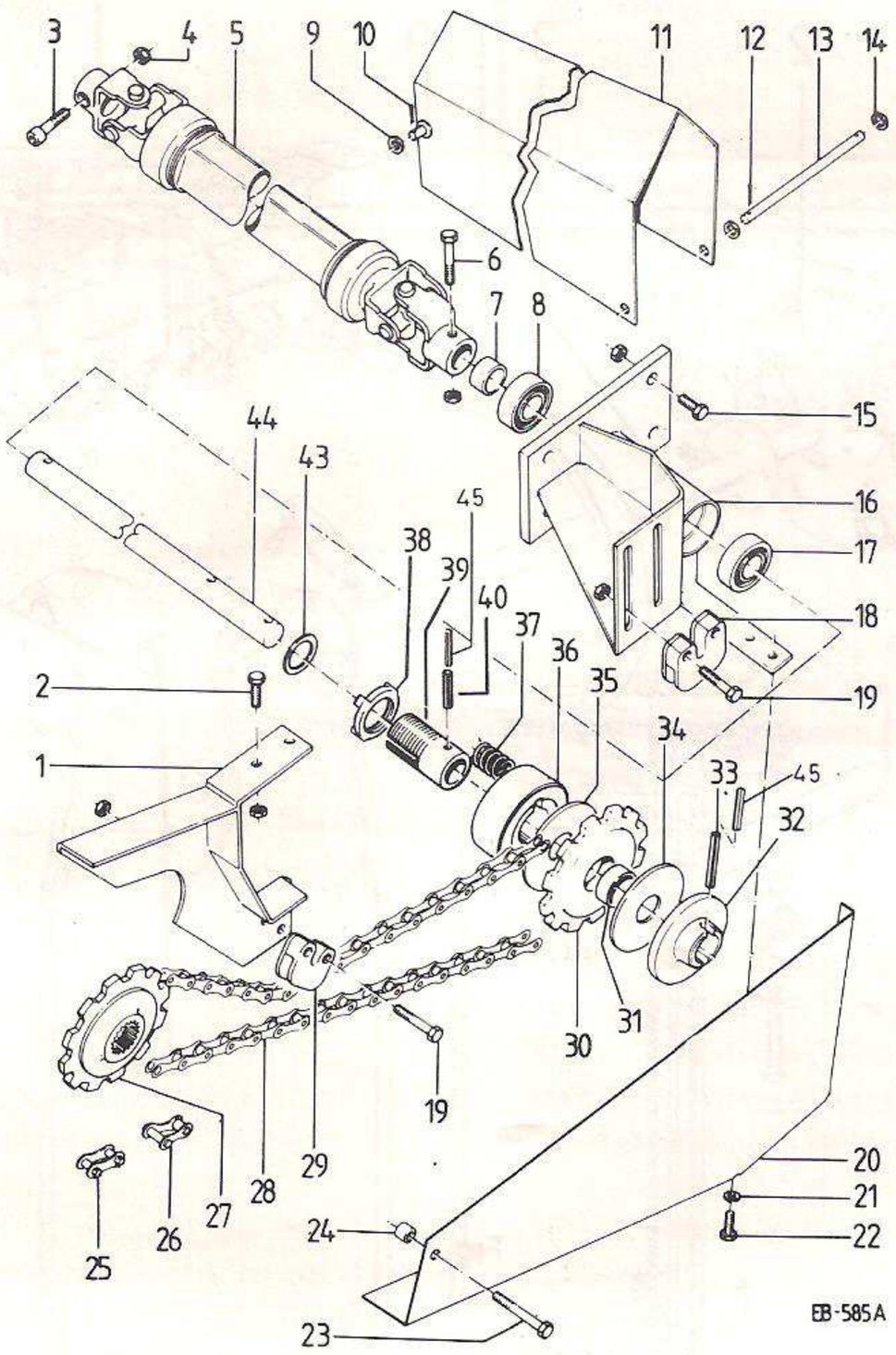


Fig. 2

1. Shield
2. Bolt
3. Screw
4. Nut
5. Shaft
6. Bolt
7. Spacer
8. Bearing
9. Washer
10. Cotter pin
11. Cover
12. Cotter pin
13. Pin
14. Washer
15. Bolt
16. Support
17. Bearing
18. Tensioner
19. Bolt
20. Shield
21. Washer
22. Bolt
23. Bolt
24. Bushing
25. Link
26. Link
27. Sprocket
28. Chain
29 Guide
30. Sprocket
31. Bushing
32. Hub
33. Pin
34. Facing
35. Facing
36. Hub
37. Spring
38. Washer
39 Hub
40 Pin
43. Shim
45. Pin

GROUP 6

PICKUP

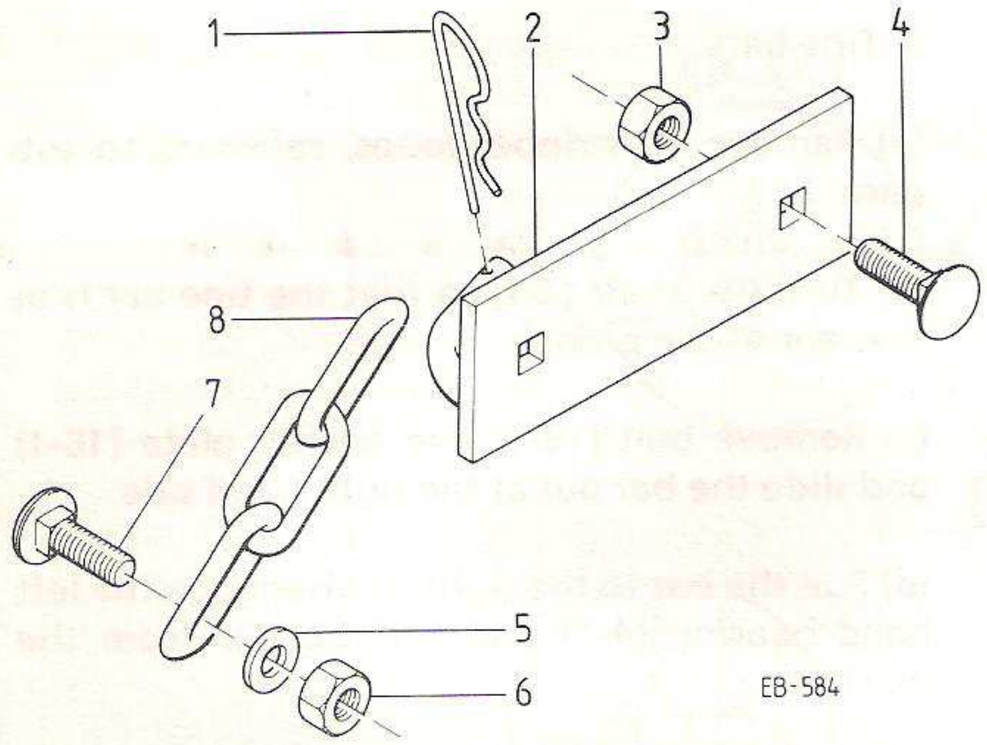


Fig. 3
pickup lift 451

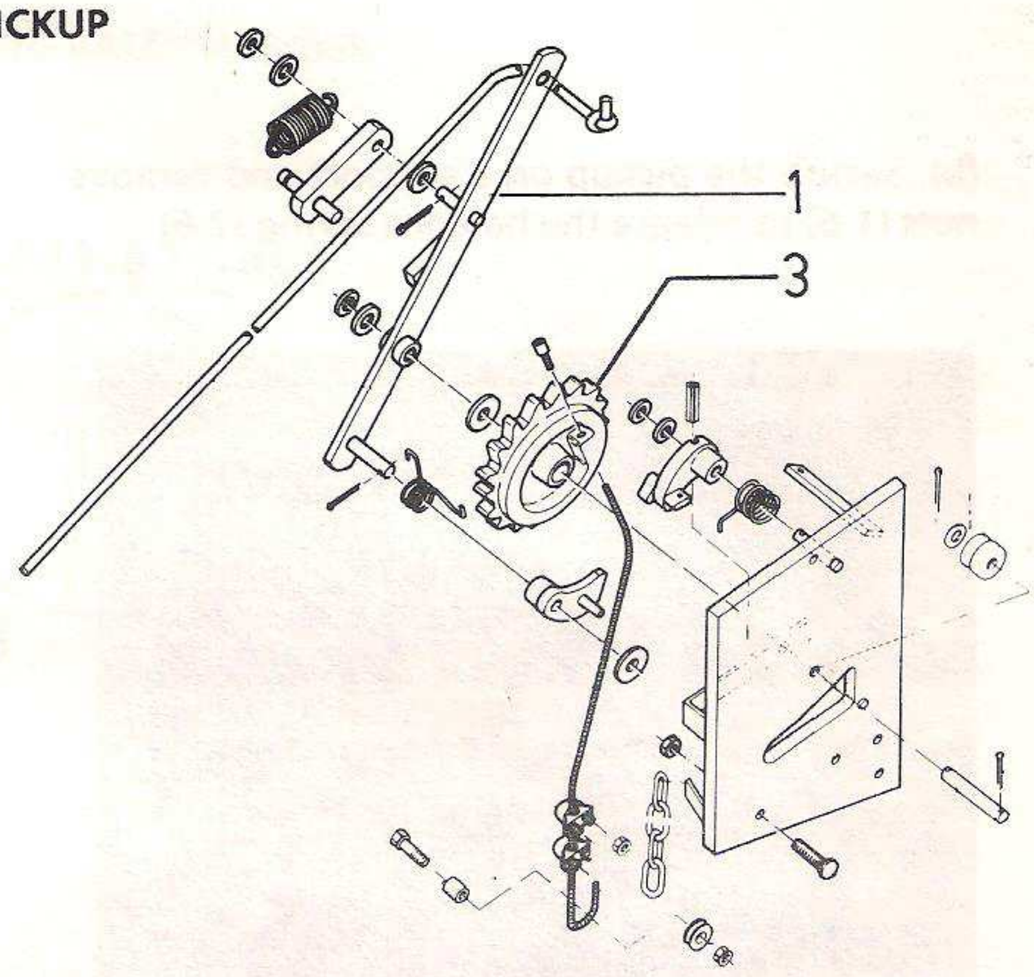


Fig. 4
Pickup lift 461-471

1b REMOTE CONTROL PICKUP LIFT ATTACHMENT

This attachment enables the operator to adjust the height of the pickup from the tractor driving seat.

To raise the pickup, the lever (1-4) which pivots about the centre of the ratchet wheel (3-4) is pulled fully forward by the rope. As the lever moves, the spring loaded trip lever will lift the latch out of engagement. At the same time the pawl engages a ratchet tooth so that continued movement of the lever turns the ratchet wheel to wind up the cable and so lift the pickup.

The spring loaded trip lever passes from under the latch and allows the latch to engage a tooth to prevent the ratchet wheel running back.

As the lever is returned the trip lever rides over the top of the latch and at the same time the projecting pin on the pawl rides in the slot in the plate to move the pawl out of engagement.To lower the pickup the lever is pulled partially forward then released. The forward movement trips the latch out of engagement as the pawl engages and on the return stroke the pawl provides a restraint until the latch engages the next ratchet tooth. In this way the pickup is lowered one tooth at a time.

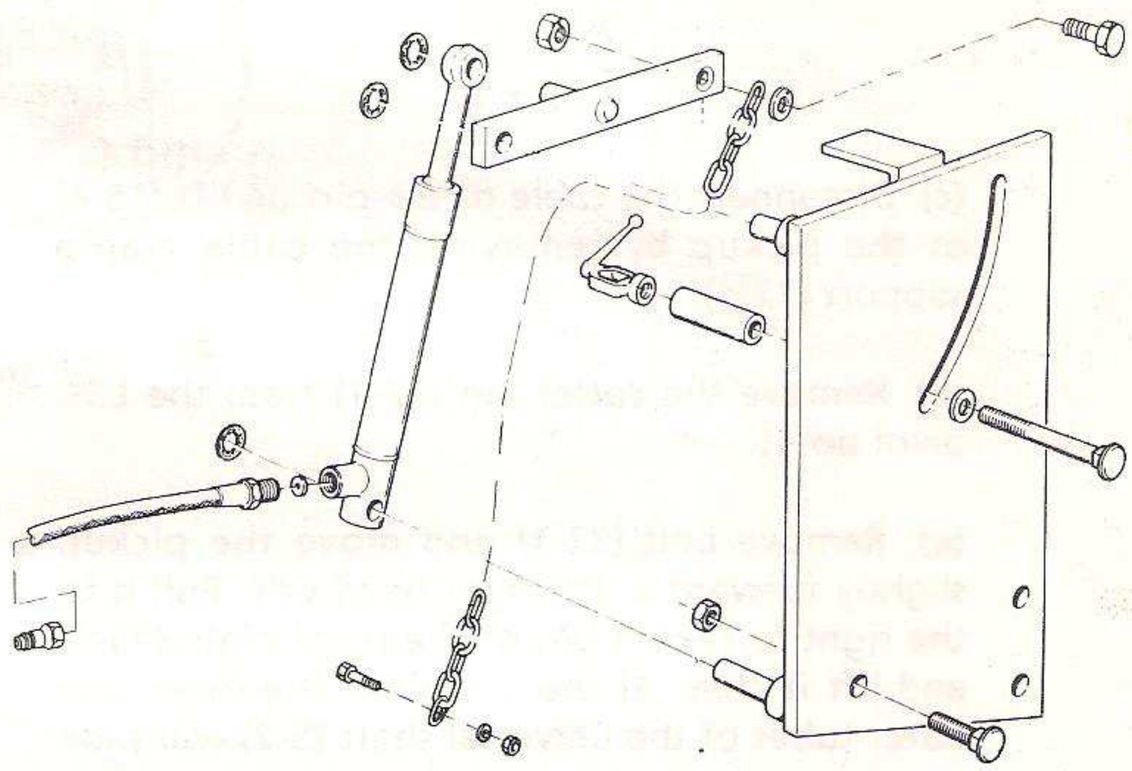


Fig. 5
Hydraulic Pick up lift.481

The remote control pickup lift is available as an attachment for the 451.

1a. REMOVAL

For replacing stripper loops, tines, tine bars, bearings and rollers it is not necessary to remove the entire pickup

(a) Remove cotter pin (10-2) and release the shield (11-2)

(b). Secure the pickup on a support and remove nuts (1-6) to release the balance spring (2-6).

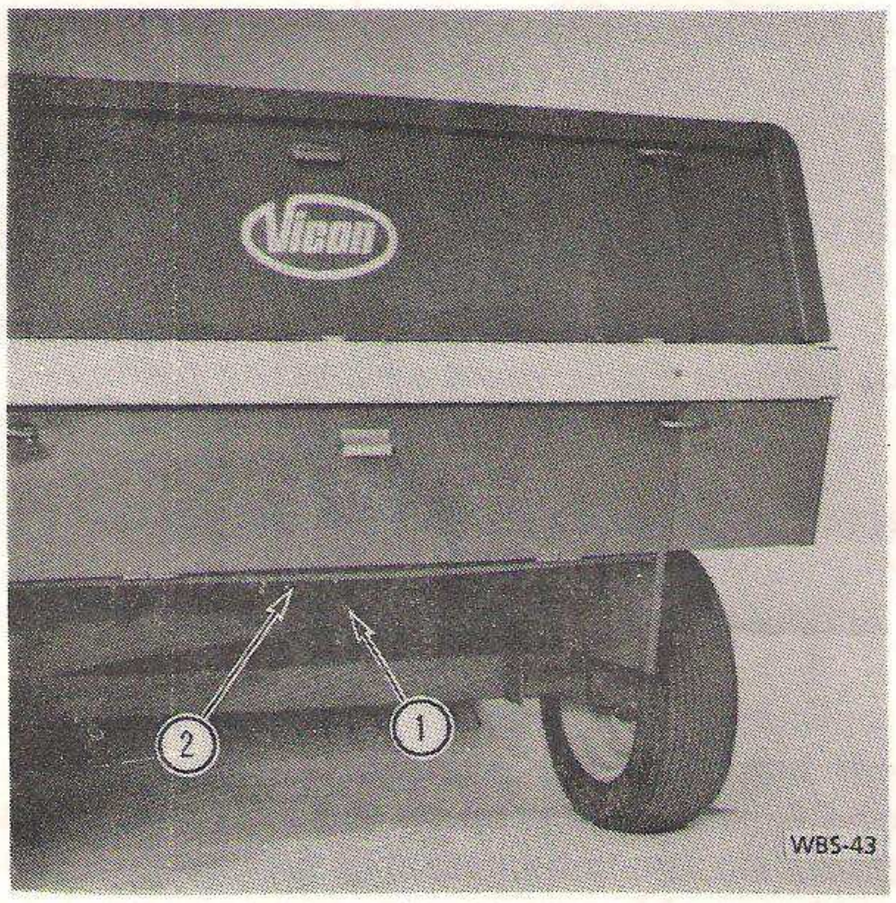


Fig. 6

(c). Disconnect the cable of the pickup lift (15-4) at the pickup by removing the cable clamp support (12-4).

(d). Remove the cotter pin (42-1) from the L.H. pivot point.

(e). Remove bolt (32-1) and move the pickup slightly forward at the right hand side. Pull it to the right to take it out of the pivot plate (43-1) and lift it clear of the machine. The inner and outer tubes of the universal shaft (5-2) will slide apart.

1b. DISMANTLING

1. Stripper loops

(a) Remove the two bolts (28-1) on each end of the stripper loops.

(b) Slide the stripper loops from the cylinder.

2. Tines

(a) Remove the appropriate stripper loop, referring to sub para. 1.

(b) Remove the nut and bolt (15-1) to release the tines (13-1).

3. Tine bars

(a) Remove all stripper loops, referring to sub para. 1.

(b) Turn the shaft (3-1) so that the tine bar is at the rear of the pickup.

(c) Remove bolt (19-1) and anchor plate (18-1) and slide the bar out at the right hand side.

(d) Pull the bar to the right to disengage the left hand bearing (4-1) and lift the bar from the machine.

(e) Remove, inspect and replace where necessary roller (7-1), bearings (4-1 and 21-1) and tines (13-1 and (20-1).

4. Rollers

(a) Remove the end stripper loop at the left hand (bale chamber) side.

(b) Remove the cover (48-1) of the inspection hole.

(c) Remove nut and washer (5,6-1) from defective roller (7-1).

(d) Turn the roller opposite the inspection hole in the pickup side plate, and push it out.

(e) Remove spacer (8-1) and roller from the bolt (10-1).

5. Main bearings

(Right hand side)

(a) Remove cotter pin (25-1) and spacers (23-1).

(b) Slide the bearing off the main shaft.

(Left hand side)

(a) Remove shield (11-2).

(b) Remove the bolt (3-2) from the shaft.

(c) Remove the yoke of the main shaft.

(d) Slide out bearing (51-1).

GROUP 6

PICKUP

6. Main shaft, Main frame and control cam.

(a) Remove the pickup as described in chapter 1.

(b) Remove the tine bars, referring to chapter 1b sub para. 3.

(c) Remove the drive shaft (5-2) from the left hand side.

(d) Remove the pickup cover (fig. 7).

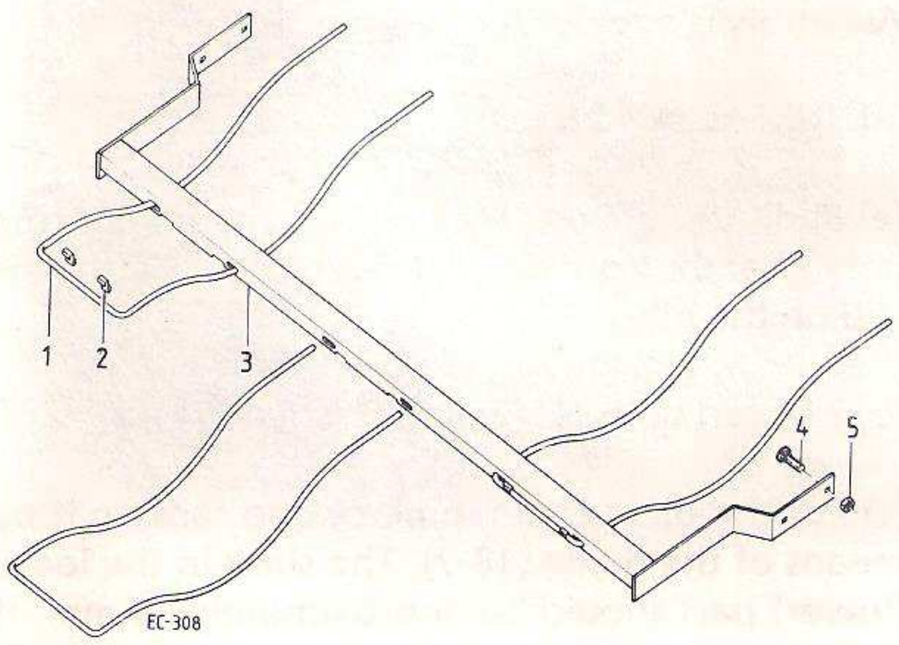


Fig. 7

(e) Remove the right hand bearing, referring to 1b sub para. 5.

(f) Remove the bolts from the right hand side plate (4 on the side, 2 at the top and two at the bottom).

(g) Slide off the right hand end plate.

(h) Pull out the main shaft.

(i) If necessary remove the left hand end plate and cam.

(j) Inspect and replace if necessary any worn or failing parts.

7. Slip clutch

For most maintenance work, i.e. replacing faces, bushes and springs, it is not necessary to take the slip clutch assembly off the machine. For items 7b (e) onwards, however it is easier to remove the slip clutch assembly.

7a. Removal.

(a) Remove safety shield (20-2) and remove the drive chain (28-2).

(b) Remove safety shield (11-2) and unscrew bolts (15-2).

(c) Pull the assembly, together with the half drive shaft clear of the machine.

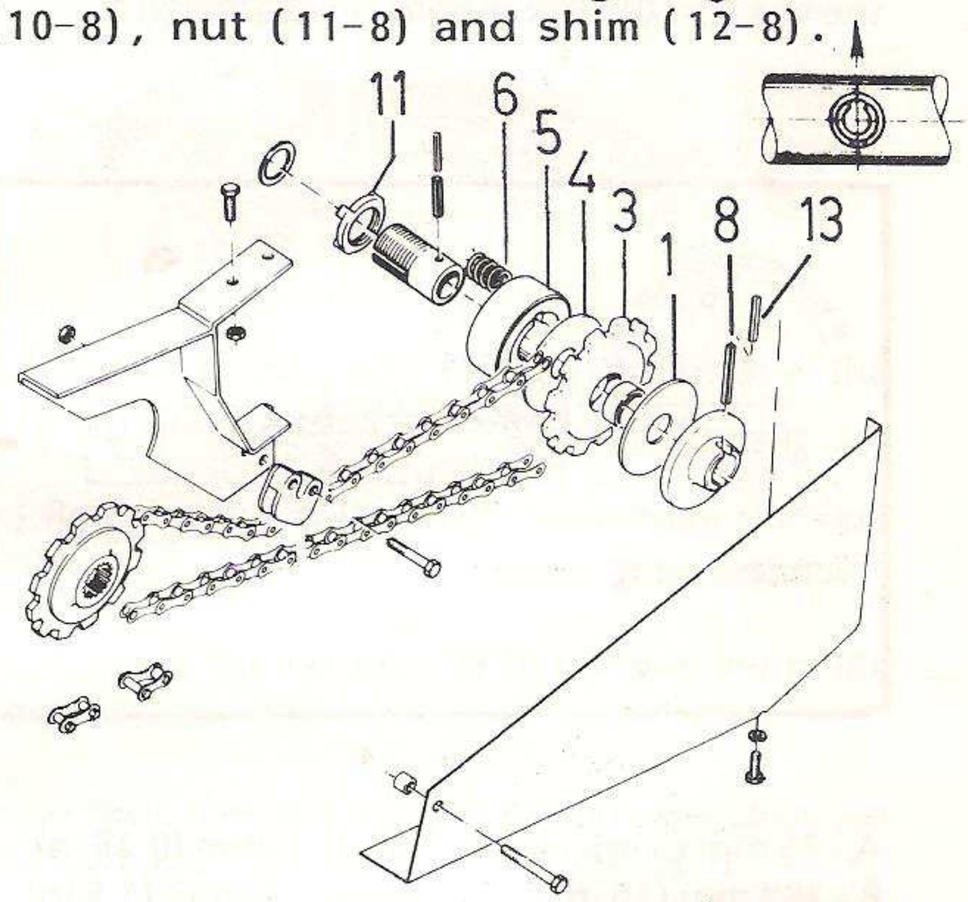
7b. Dismantling

(a) Loosen the ring nut (11-8) to release the springs (6-8).

(b) Remove the roll pin (2-9) and hub (3-9). Remove the facing (1-8) and slide off the sprocket (3-8).

(c) Remove the facing (4-8) and hub (5-8) with springs (6-8) and washer (7-8).

(d) Remove the roll pins (8+13-8) and hub (8-9) with locking ring (10-8), nut (11-8) and shim (12-8).



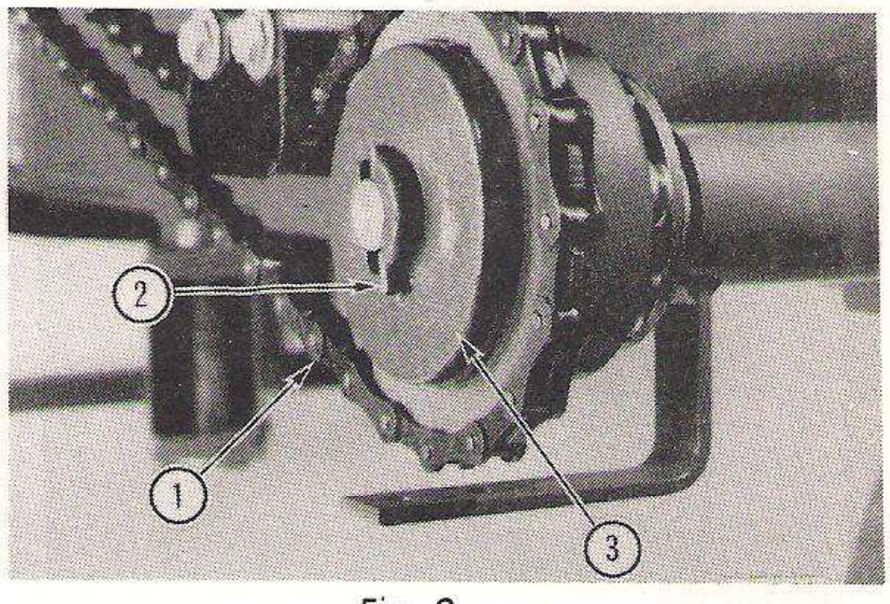


Fig. 9

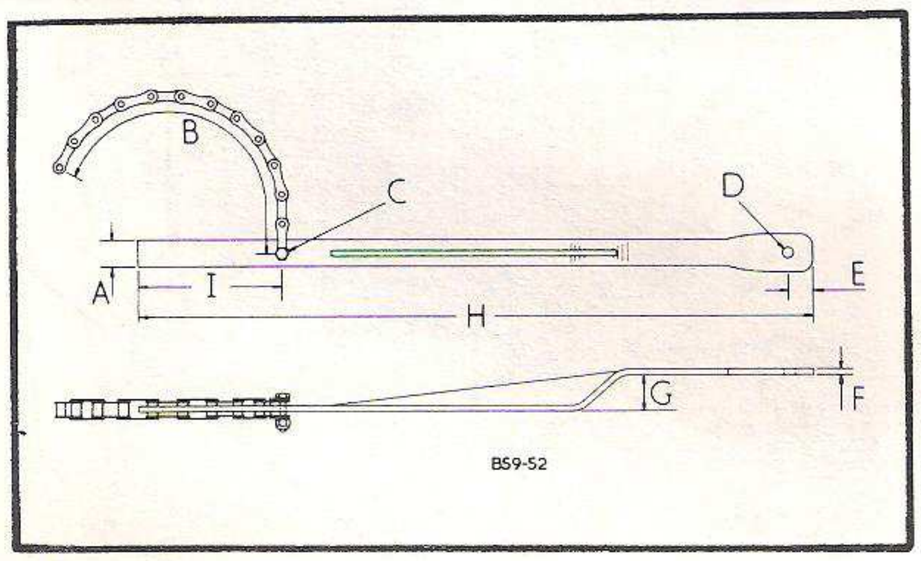
(e) Remove bolt (6-2) and slide the yoke off the drive shaft (44-2).

(f) Remove spacer (7-2) and take the shaft (44-2) out of the housing.

(g) Tap out the bearings (8, 17-2).

(h) Before re-assembling ensure that the clutch facings are free of grease and oil. Replace any defective parts.

Set the clutch at 140-160 Nm. This is approximately obtained when the space between the washer (7-8) and the rim of the hub (5-8) is 8-9 mm (A-11). A tool for "physically" checking the torque is given in fig. 9. Block the drive shaft by putting a piece if bar in the yoke. Put the chain (B-10) in the sprocket and measure with a spring balance the force at the eye (D-10). This should read 200-230 N.



A - 25 mm (1 in)
B - 380 mm (15 in)
C - 6 mm (0.25 in)
D - 12 mm (0.5 in)
E - 20 mm (0.75 in)
F - 6 mm (0.25 in)
G - 38 mm (1.5 in)
H - 710 mm (28 in)
I - 160 mm (6.3 in)

Fig. 10

8. Chain

The pickup drive chain is 1-1/4 in. extended pitch agricultural roller chain equipped with a connecting link.

9. Drive shaft assembly

Remove the drive shaft assembly referring to sub para 6.

10. Tightener block

Remove the nut, lock washer and tightener block (18-2).

1c. ASSEMBLY

Assembly is a reversal of dismantling.

1d. INSTALLATION

(a) Slide the drive shaft through the hole in the bale chamber gusset and over the half that is still on the pickup.

(b) Tighten bolts (15-2) and fit shield (11-2).

(c) Put the drive chain in place and tension it by means of the guide (18-2). The slack in the loose (lower) part should be approximately 19 mm. If the right tension cannot be obtained, add or remove the reducer link (26-2).

Note: Do not over grease the chain, as this also greases the slip clutch.

(d) Fit the safety shield (20-2).

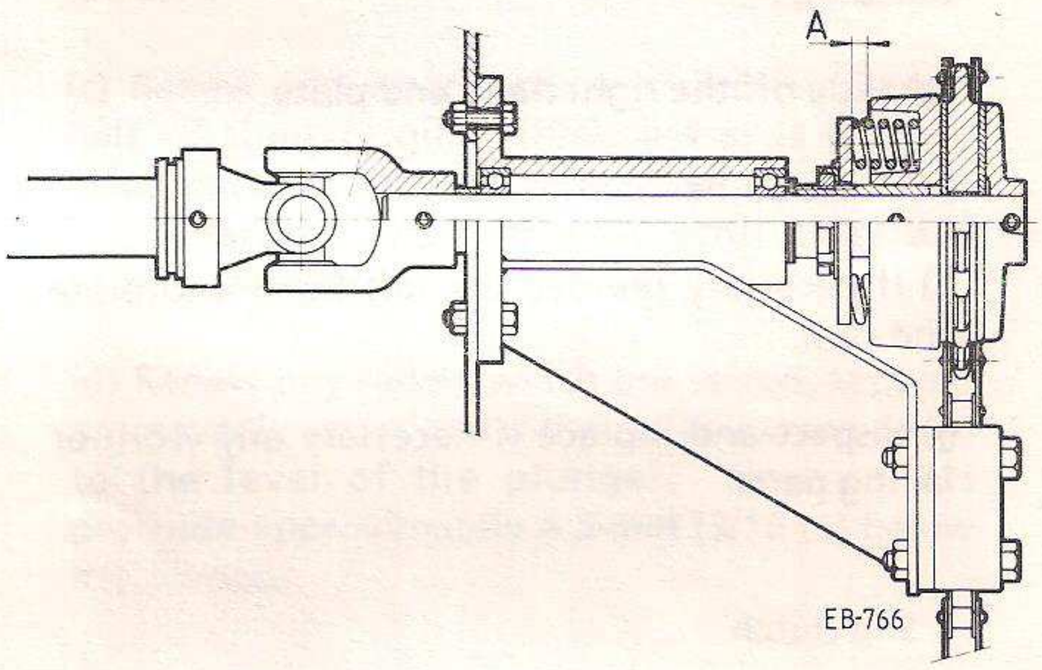


Fig. 11

GROUP 7

AUGER and AUGER DRIVE

AUGER

The spiral flights of the auger move the material from the pickup to the area in front of the feed opening. The auger is free to float up and down as the volume of material varies.

The auger is supported by the auger relief and turns on two bushings in the auger core pipe.

The auger is driven from the packer finger crank via a pinion and bevel gear, then through a V-belt and pulleys.

The belt tension can be altered by adjusting the idler pulley.

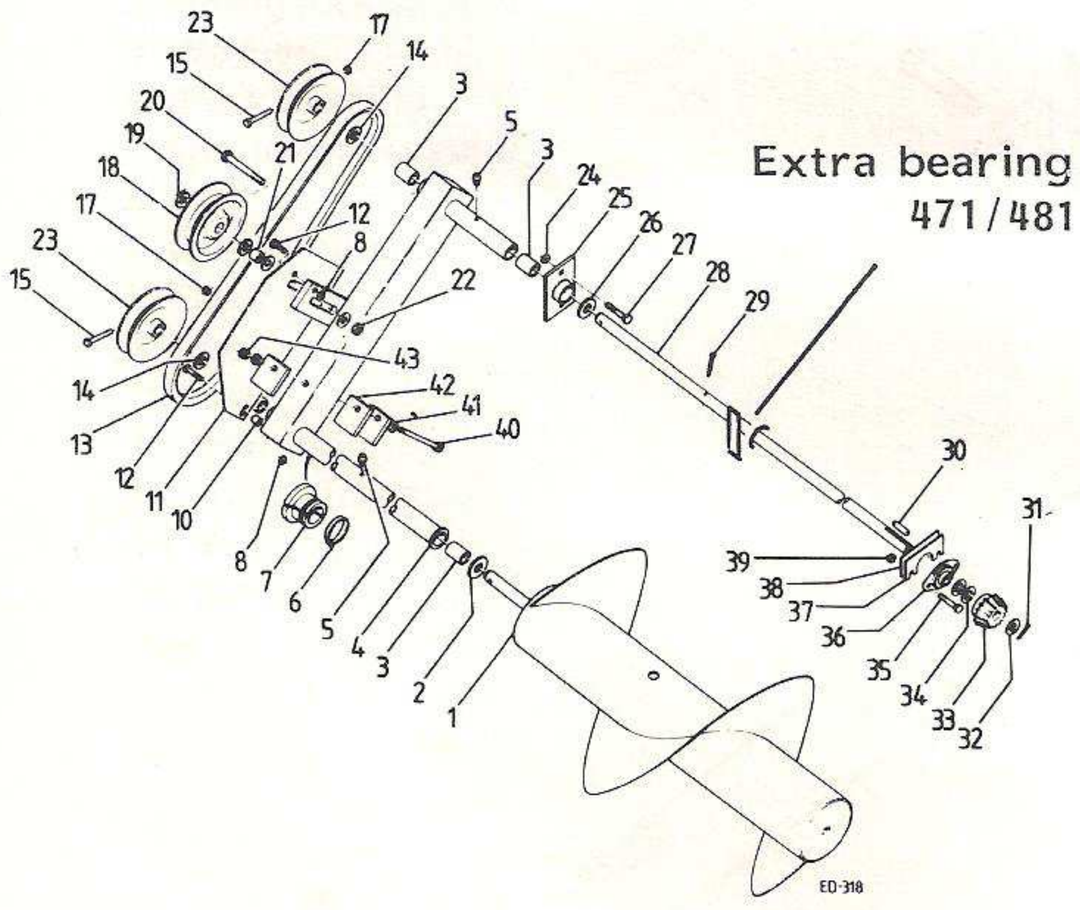


Fig. 1

1. REMOVAL

(a) Remove cover (1-2) by taking out the cotter pins (2-2) and sliding out the hinges (3-2).

(b) Remove the pickup protection bar (10-2) and right hand side plates (12-2) and (4-2).

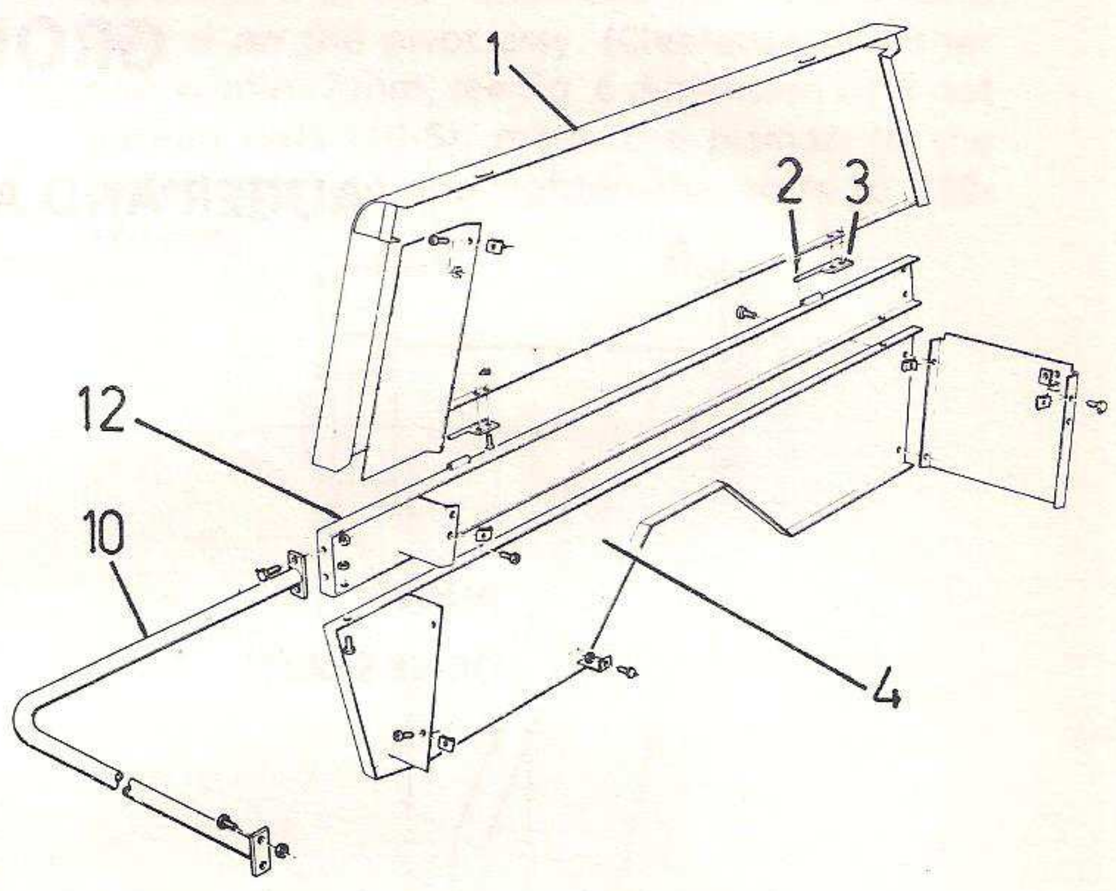


Fig. 2

(c) Slacken nut (1-3) and move the idler pulley (2-3) to slacken the belt, then remove the belt from the pulleys.

(d) Remove bolts (3-3) and draw off the pulleys (4 & 5-3).

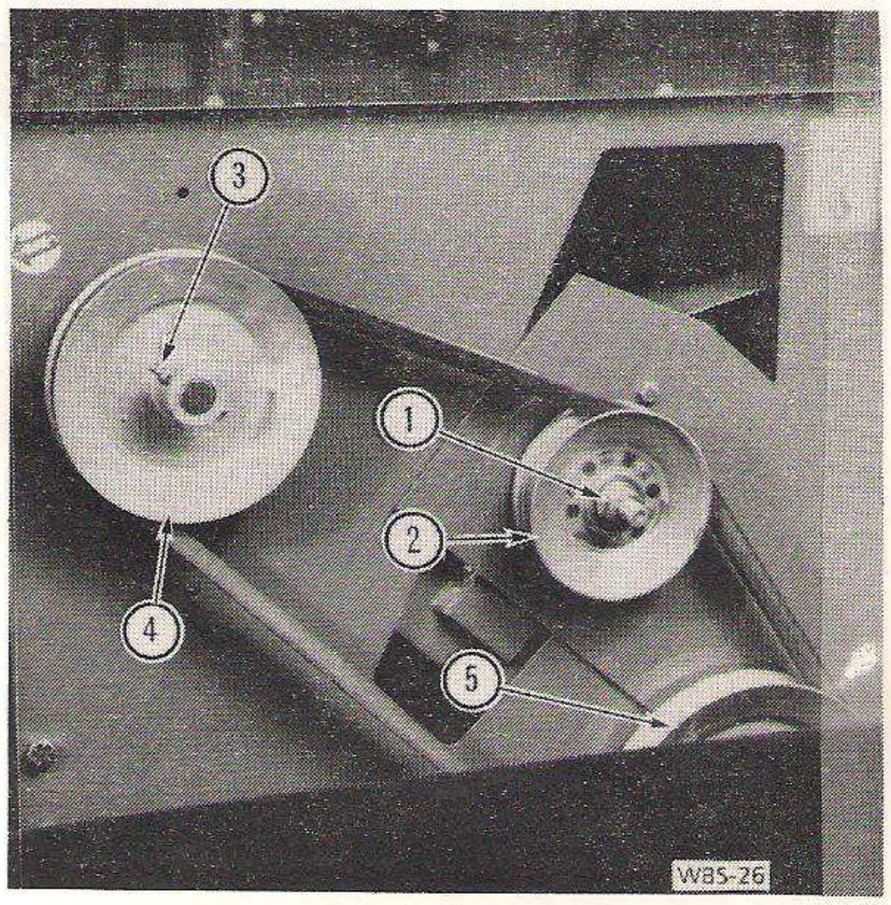


Fig. 3

(e) Remove washers (14-1) and safety shield (11-1).
(Only 471/481:
(f) Remove the side plate (16-4) by unscrewing the screws in the top plate (1-4), the twine chest support (43-6) and the cross conveyor deck (11-4).

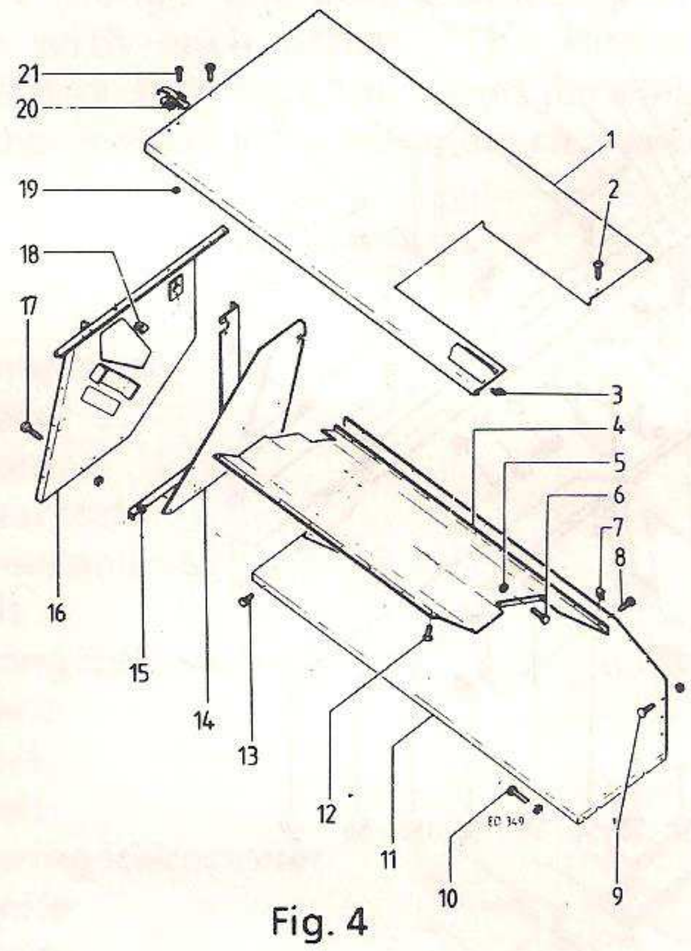


Fig. 4

(g) Pull the auger relief arm, together with the auger out of the bearing (25-1) and from the drive shaft (28-1).)

2. DISMANTLING

(a) Slide the auger assembly out of the relief arm, leaving the thrust washer (2-1) on the auger shaft. There is a cutout in the end plate of the auger core, the grease nipple (5-1) should be aligned with this cutout to enable the auger to be withdrawn.

(b) If necessary cut the binding strap (6-1) of the anti-rattle bush (7-1).

(c) Remove the nut and bolt (40-1) to remove the stop pads (42-1).

(d) If inspection proves it necessary , press out and replace the 4 bushes of the relief arm.(3-1).

3. ASSEMBLY

Assembly is a reversal of dismantling.

4. INSTALLATION

Installation is a reversal of removal.

5. ADJUSTMENTS

The maximum lateral play on the auger and drive shaft pulley is 1 mm.

The auger pulley belt tension is correct when a 14mm deflection is achieved when a force of 90 N is applied. See fig. 5.

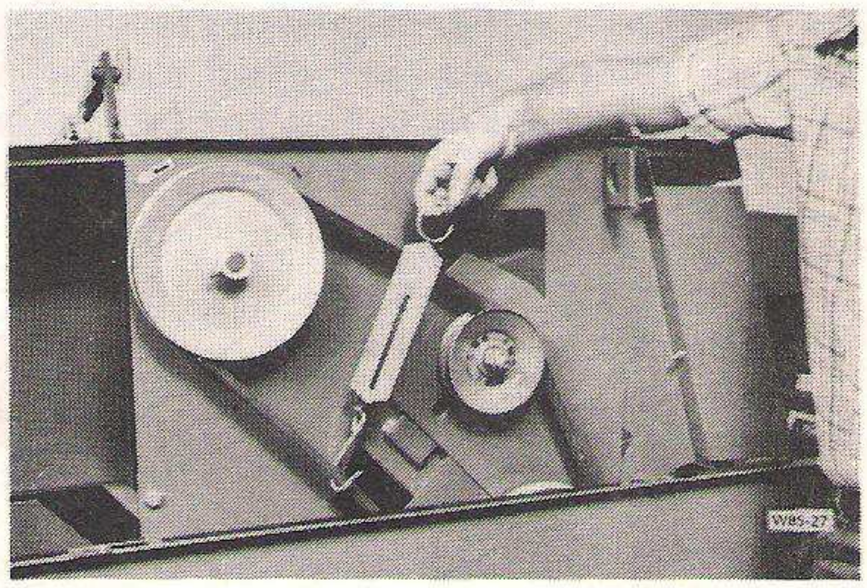


Fig. 5

DRIVE SHAFT

1. REMOVAL

(a) Remove the auger drive cover (1-2).

(b) Slacken the V-belt.

(c) Remove the upper drive shaft pulley (23-1).

(d) Remove the cotter pin (or roll pin) (29-1). Later models have a hole in the rear wall of the twine box through which the pin can be removed. On earlier models it is advisable to cut a hole of approximately 30mm diameter to allow access to the pin.

(e) Remove left hand upper shield (13-6).

(f) Remove cotter pin (31-1).

(g) Pull out the drive shaft, observing the key, (30-1), washers (34-1) and gear (33-1).

(h) If necessary remove bearing (36-1).

2. ASSEMBLY

Assembly is a reversal of removal.

3. ADJUSTMENTS

Set the drive gear backlash at 0.3-0.8 mm and make sure the toe to toe alignment is correct.

GROUP 7

AUGER

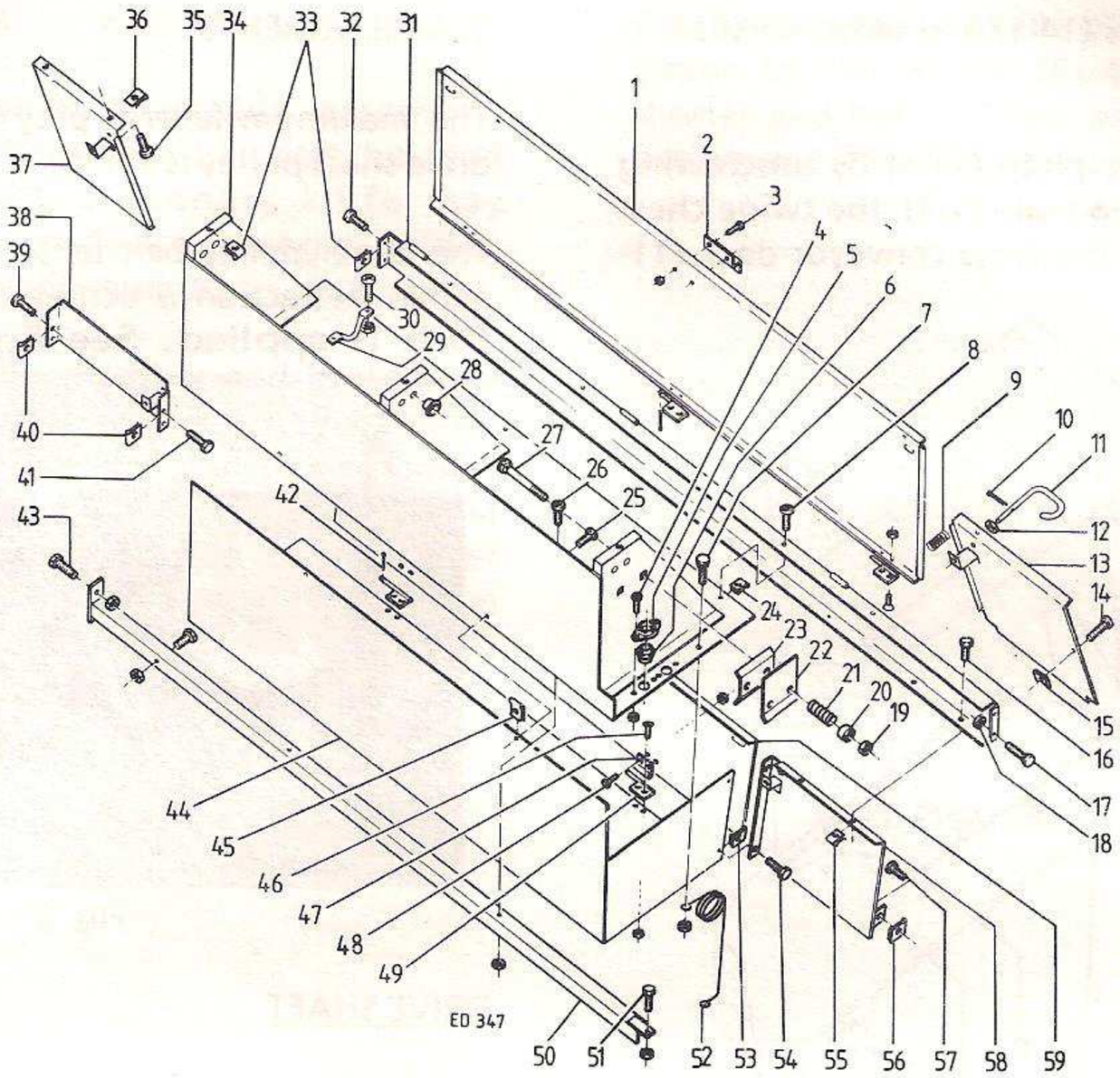
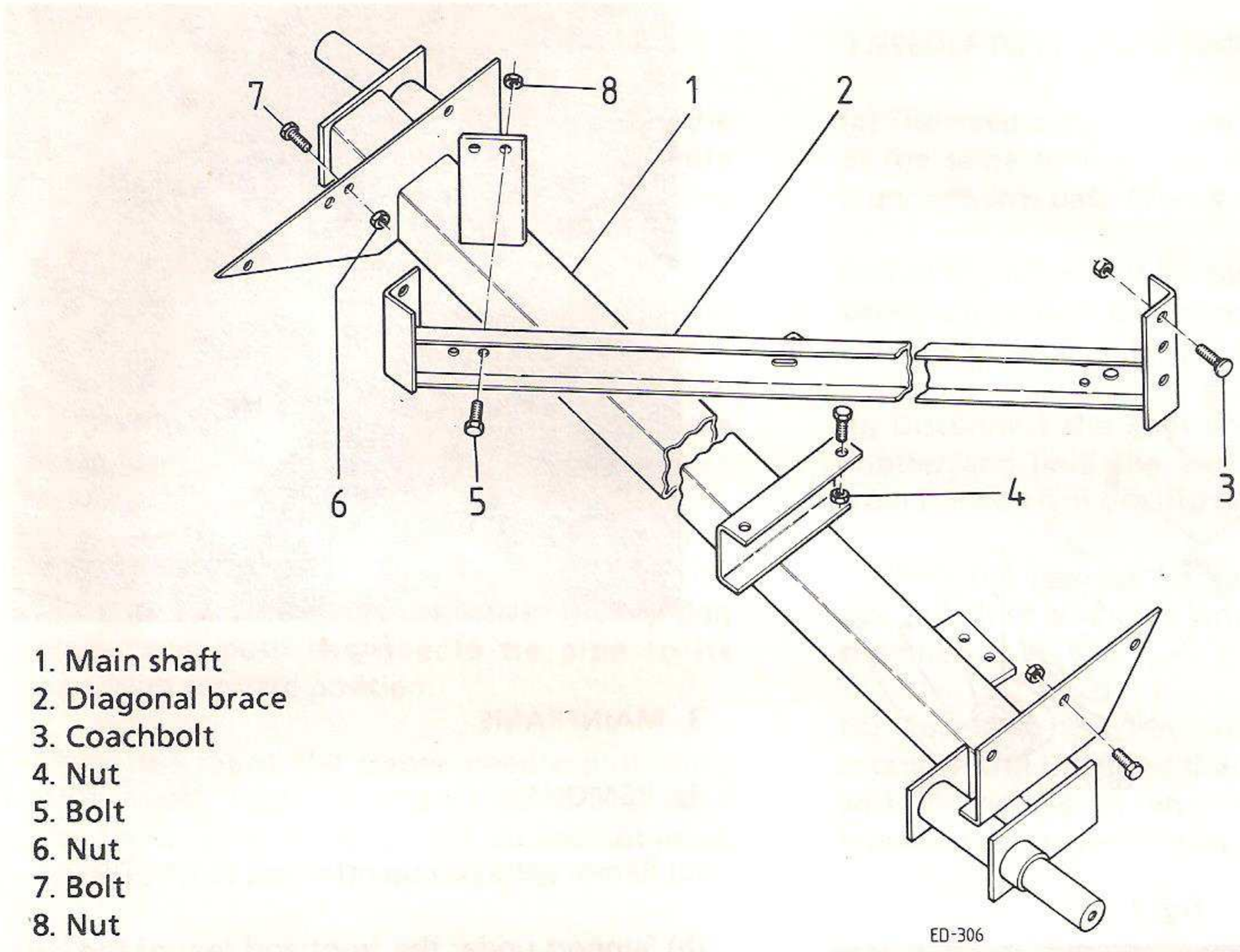


Fig. 6

GROUP 8

MAINFRAME, WHEELS AND SHEET METAL



1. Main shaft
2. Diagonal brace
3. Coachbolt
4. Nut
5. Bolt
6. Nut
7. Bolt
8. Nut

Fig. 1

1. DESCRIPTION

1a. WHEELS

The wheel hubs are mounted on spindles welded to the axle channel. The hub bearings are double sealed ball bearings.

1b. MAINFRAME

The axle and diagonal brace form the mainframe of the baler to which the other components are mounted. Figure 1 shows an exploded view of the mainframe.

1c. CROSS CONVEYOR

The cross conveyor sheets form a compartment into which material is delivered by the pickup prior to being moved into the bale chamber by the auger and packer fingers.

2. WHEELS AND HUBS

2a. REMOVAL

(a) Support the baler on the side from which the wheel is to be removed so the weight is off the wheel then remove the wheel

(b) Remove the bolt (1-2), washer (2-2) and dust ring (3-2).

(c) Remove the hub (5-2) and the ring (8-2) from the spindle together with the bearings.

2b. DISMANTLING

(a) Drive the inner and outer bearing (7-2 & 4-2) out of the hub (5-2).

GROUP 8

MAINFRAME, WHEELS AND SHEET METAL

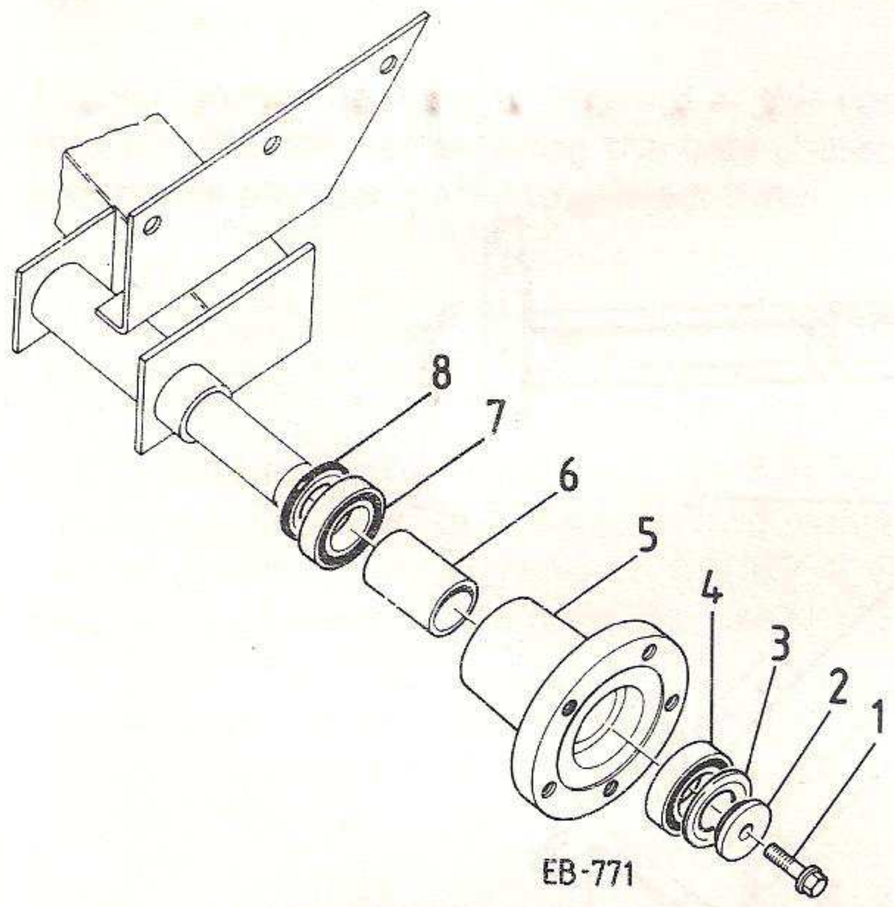


Fig. 2

Fig. 3

2c. ASSEMBLY

(a) Drive the inner bearing (7-2) into the hub.

(b) Slide the dust ring (8-2) onto the shaft.

(c) Slide the hub assembly onto the shaft.

(d) Position the spacer (6-2).

(e) Drive the outer bearing (4-2) into the hub.

(f) Install dust ring (3-2), washer (2-2) and tighten self locking bolt (1-2).

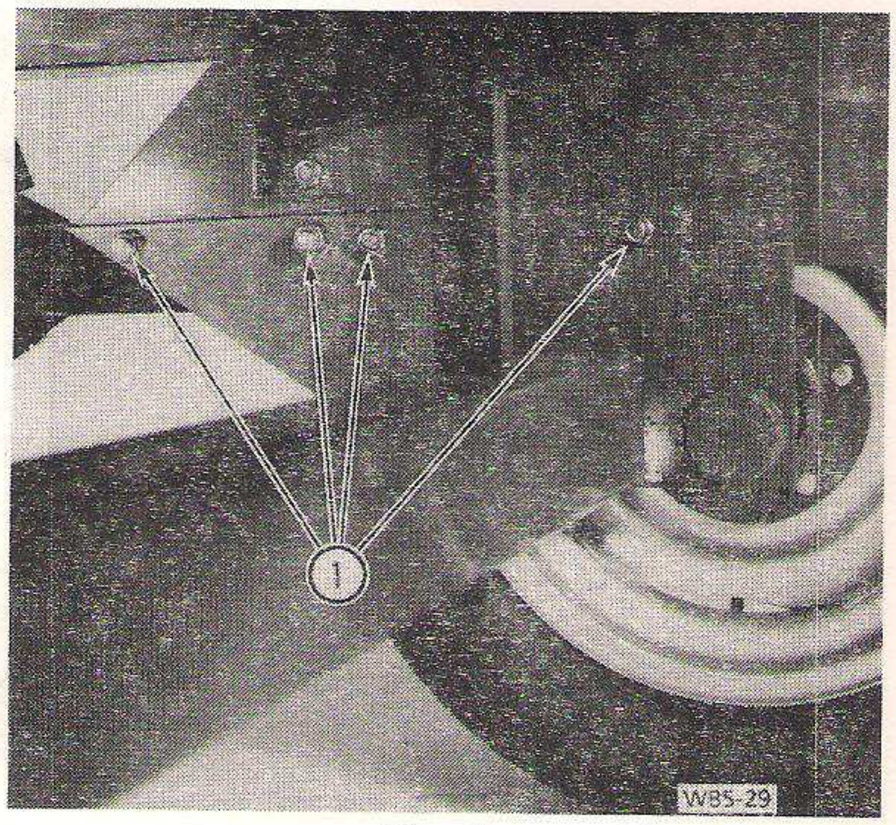


Fig. 4

3. MAINFRAME

3a. REMOVAL

(a) Remove the pickup referring to GROUP 6.

(b) Support under the front and rear of the bale chamber so that the weight is off the left wheel.

(c) Support under the cross conveyor platform so that weight is off the right wheel.

(d) Remove the needle guard (1-3).

(e) Remove the diagonal brace (2-1).

(f) Remove the nuts and bolts (2-3) and disconnect the left side of the main shaft

(g) Remove the nuts and bolts (1-4) and disconnect the right side of the main shaft.

3b. INSTALLATION

(a) Secure the left side of the main shaft to the bale chamber with the bolts and nuts (2-3).

(b) Secure the right side of the main shaft with the bolts and nuts (1-4).

(c) Install the diagonal brace (2-1).

(d) Install the needle guard (1-3).

(e) Remove the supports and lower the baler to the ground

(f) Install the pickup referring to GROUP 6.

GROUP 8

MAINFRAME, WHEELS AND SHEET METAL

SHIELDING

1. CROSS CONVEYOR DECK (11-5)

1a Removal.

(a) Remove pickup as described in GROUP 6.

(b) Remove all cross recess screws on top, front and rear edge, and in packer finger opening of the top plate (1-5). Remove top plate.

(c) Remove the auger as described in GROUP 7.

(d) Remove (if fitted) the left hand bolt (57-6) of the lower twine chest shield.

(e) Remove bolt (14-6).

(f) Remove bolts (51 & 43-6) of the twine chest support and (if fitted) the bolts holding the right hand side of the lower twine chest.

(g) Remove the bolts holding the rear support (17 & 32-6) and lift out the twine chest assembly.

(h) Remove guide plate (4-5).

(i) Remove bolt (13-5), the carriage bolts (9-5) in the knife support and the bolts (10-5) in the guide strip.

(j) Lift the cross conveyor deck clear of the machine.

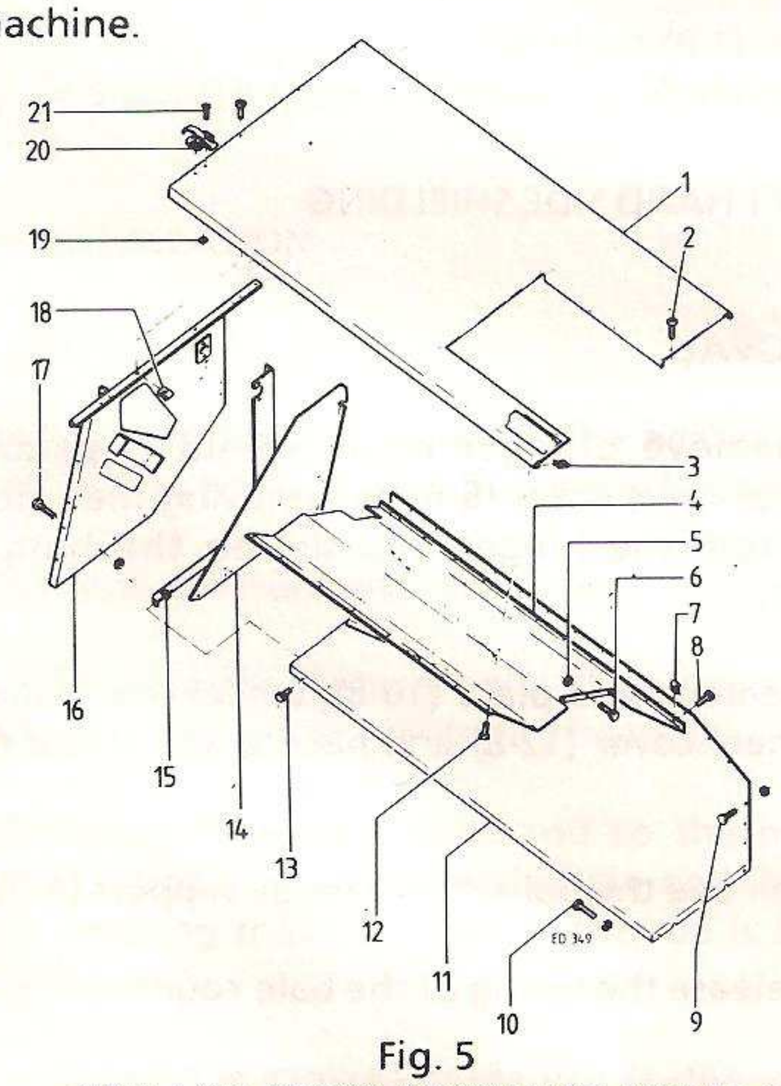


Fig. 5
TOP AND CROSS CONVEYOR SHIELDS

1b. ASSEMBLY

Assembly is a reversal of removal.

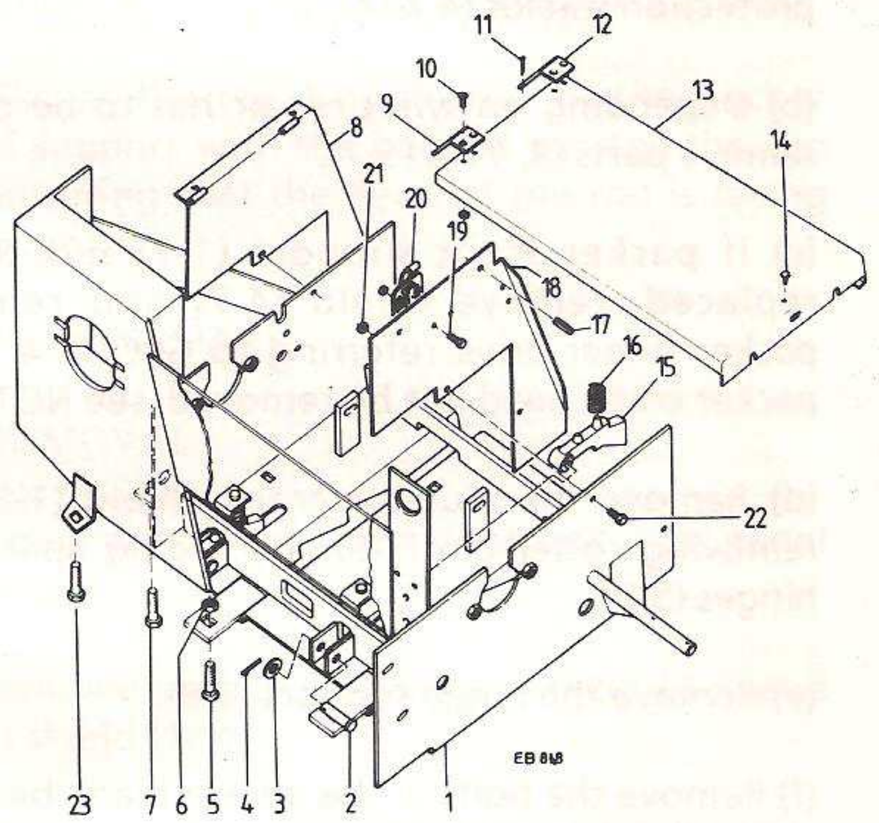


Fig.6
TWINE CHESTS

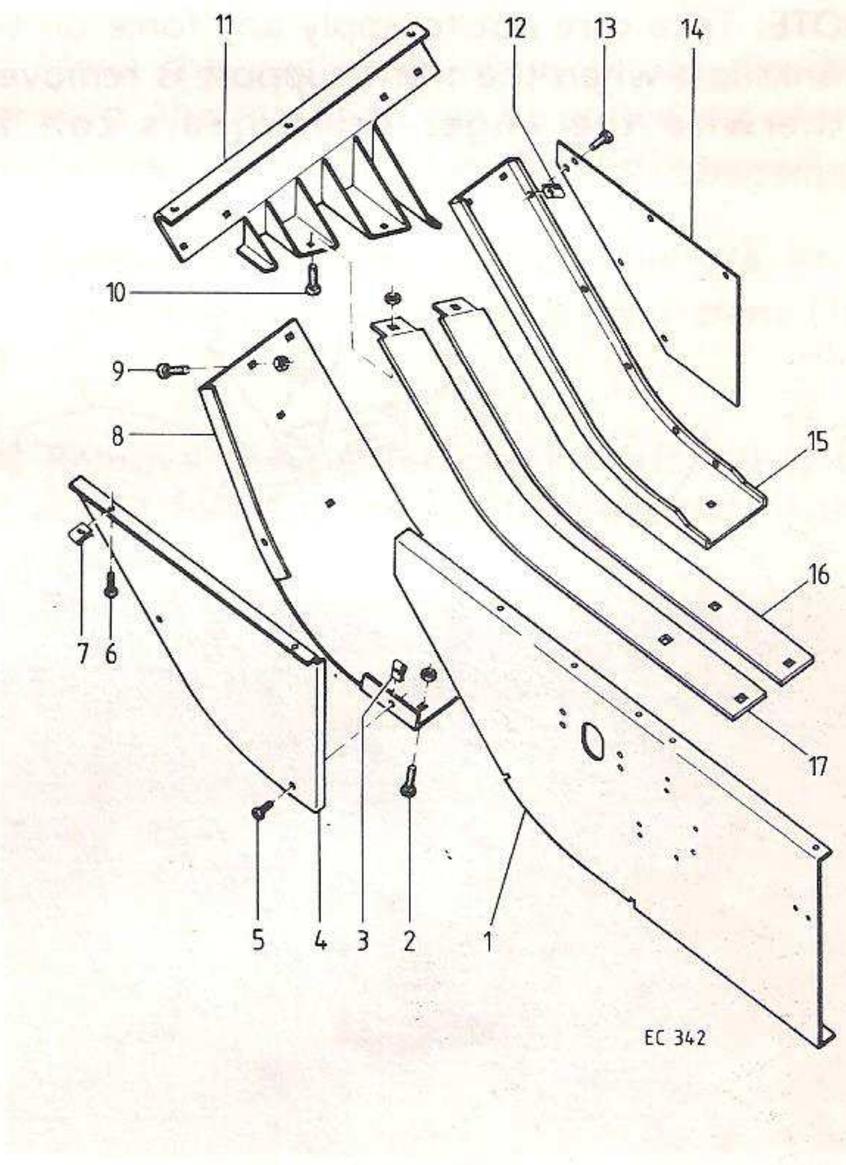


Fig. 7
PACKER FINGER SHIELDS

2. PACKER FINGER SHIELDS AND CHANNELS

2(a) REMOVAL

(a) Remove top sheet (1-5). (Not necessary for replacing packer finger channels (16 & 17-7) or protection shields (4 &14-7).

(b) Depending on what repair has to be done, remove parts (8, 11 &15-7).

(c) If packer front support (1-7) has to be replaced, remove shield (4-7) and remove packer finger drive referring to GROUP 4. (The packer crank need not be removed, see NOTE).

(d) Remove the plunger crank shield (1-8) by removing cotter pin (3-8) and sliding apart the hinges (5-8).

(e) Remove the hinge support (2-8).

(f) Remove the bolts in the packer crank bearing (front) and the bolts (4 & 7-9) of the relief arm support.

(g) Remove the bolts from the top front shield and bale chamber (9-7) and remove the shield (1-7).

NOTE: Take care not to apply any force on the crankshaft when the front support is removed. otherwise the auger drive gears can be damaged.

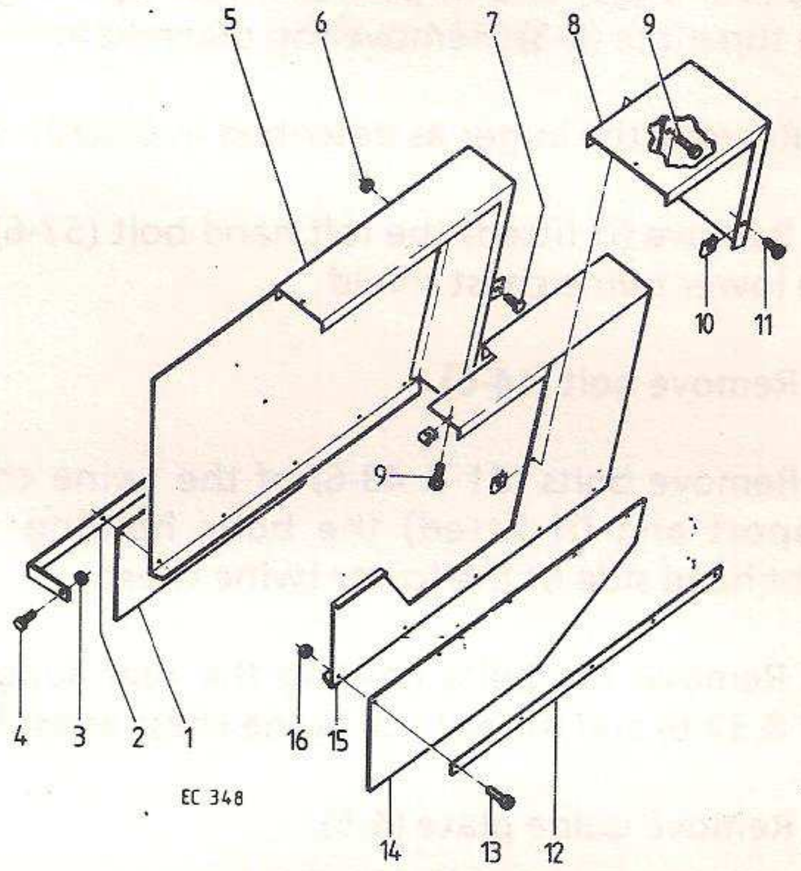


Fig. 9
NEEDLE SHIELDS

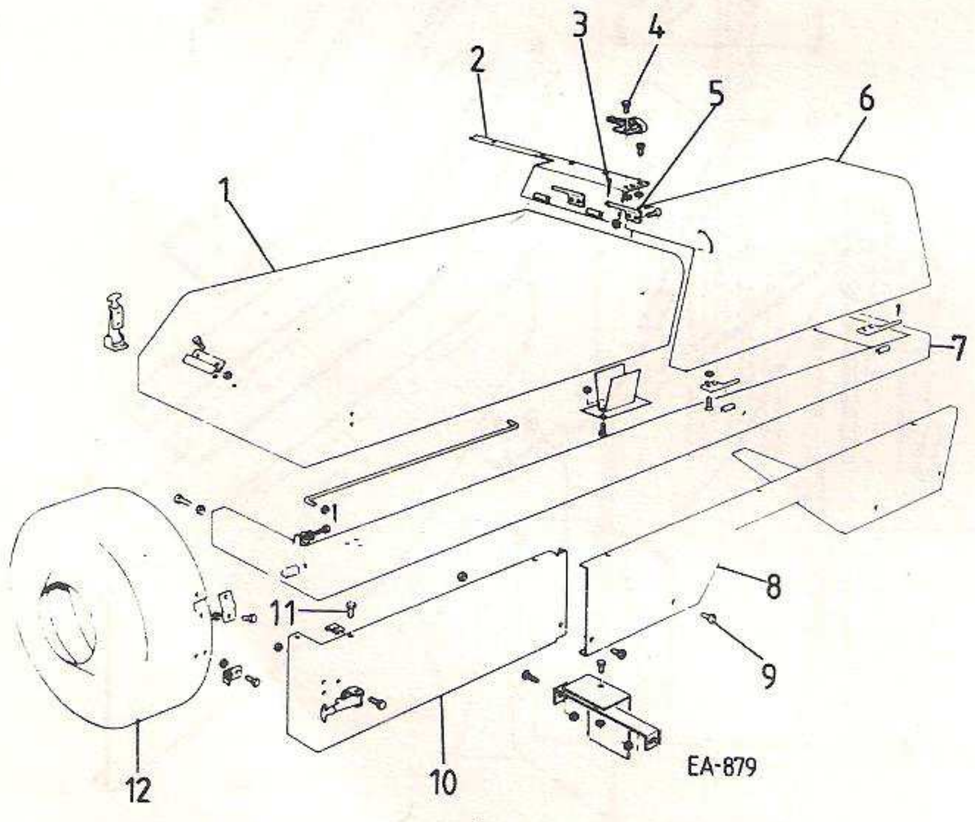


Fig. 8
LEFT HAND SHIELDS

3. LEFT HAND SIDE SHIELDING

REMOVAL

(a) Remove plunger crank shield (1-8) and knotter drive cover (6-8) by removing the cotter pin from the hinges and sliding the hinges apart.

(b) Remove side plate (10-8), wheel cover (8-8), flywheel cover (12-8) and needle arm shield (8-9).

(c) Remove the bolts of the hinge support (4-8).

(d) Release the spring of the bale counter.

(e) Remove the shield support (7-8).

GROUP 9

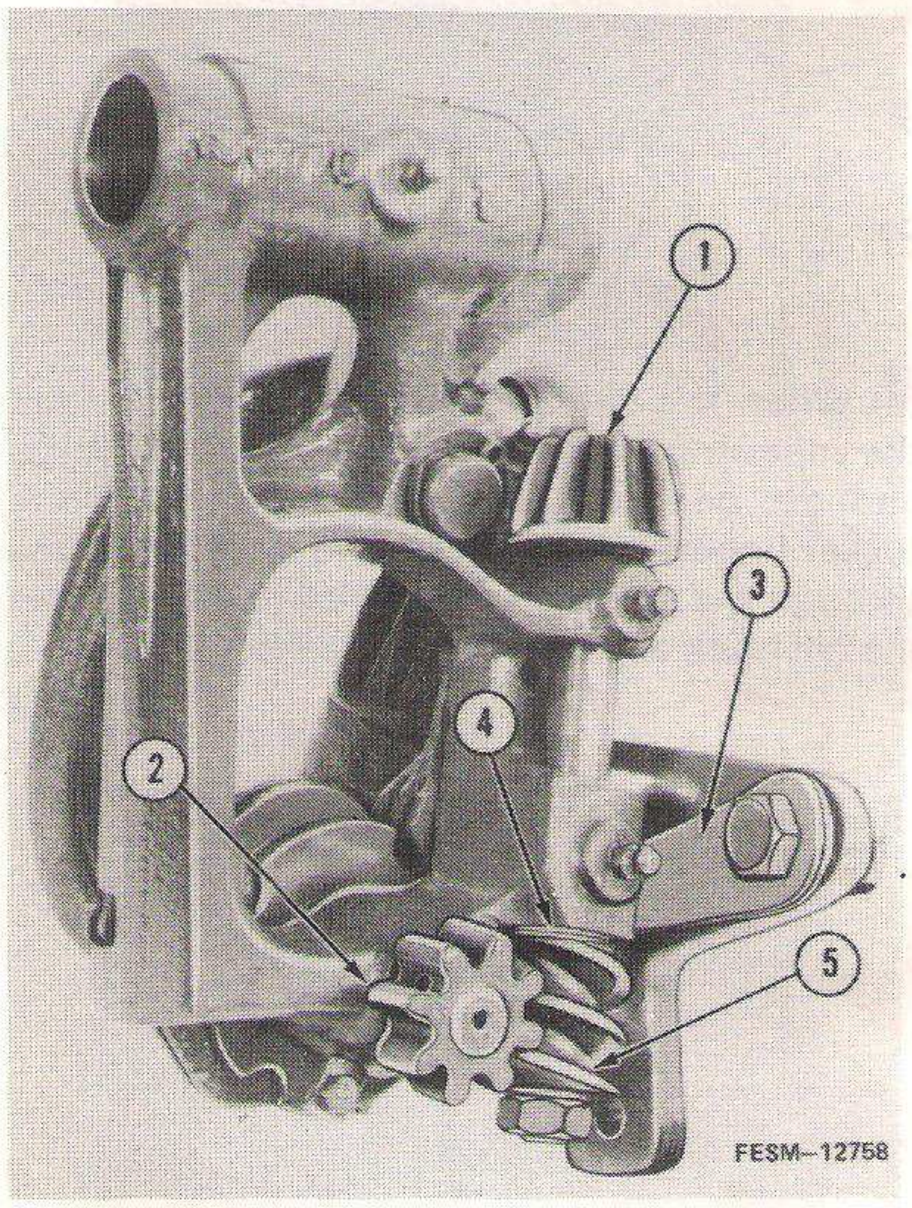
TYING MECHANISM

1. DESCRIPTION

1a. KNOTTERS

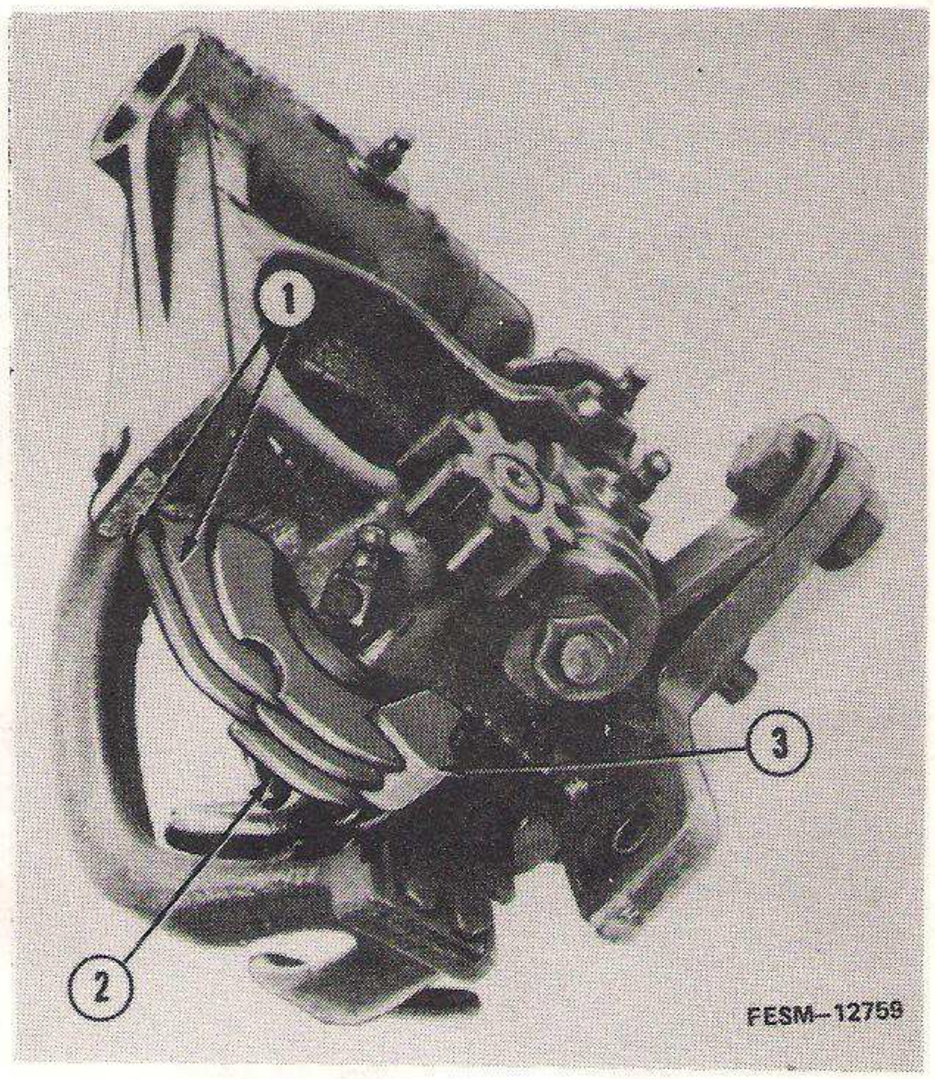
The knotter consists basically of a set of discs, a billhook and a knife arm which also serves as a twine guide. The function of the billhook is to tie the knot. The discs firmly hold the disc twine during formation of the bale and position the twines for the billhook and twine knife during the tying cycle.

The knotter parts are identified in figs. 1 to 4.



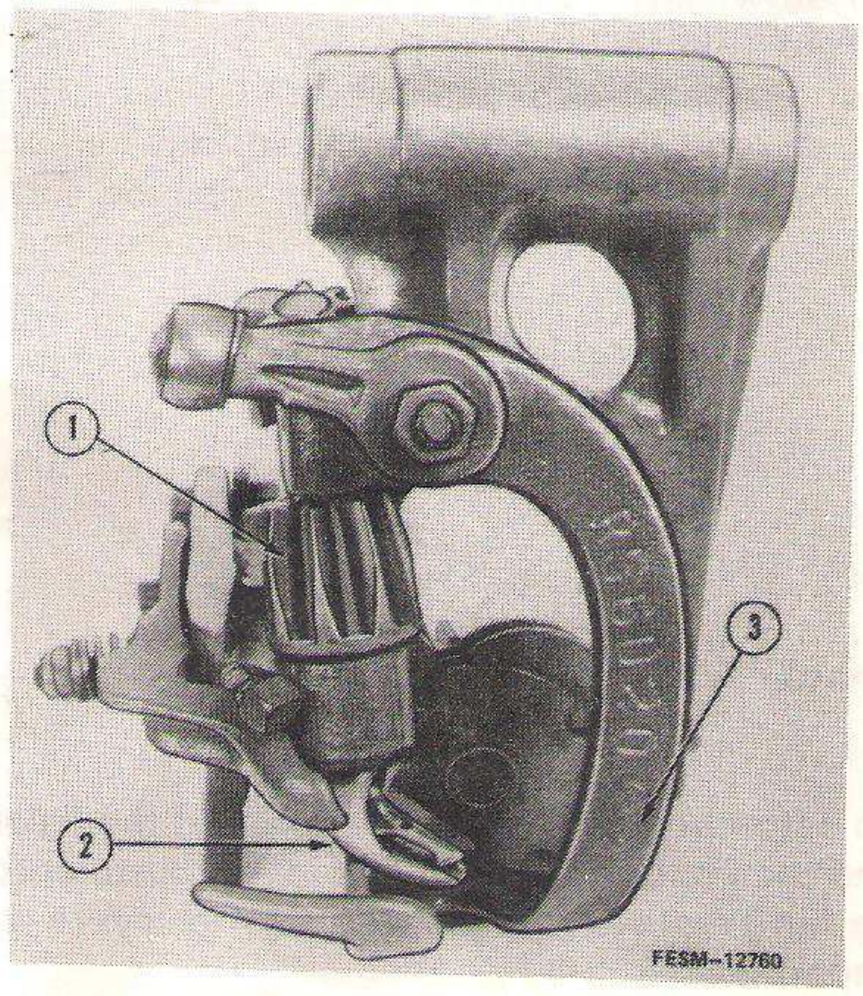
1. Twine Disc Pinion
2. Disc Helical Gear
3. Keeper Blade Leaf Spring
4. Shims
5. Worm Gear

Fig. 1



1. Disc Cleaners
2. Disc Assembly
3. Keeper Blade

Fig. 2

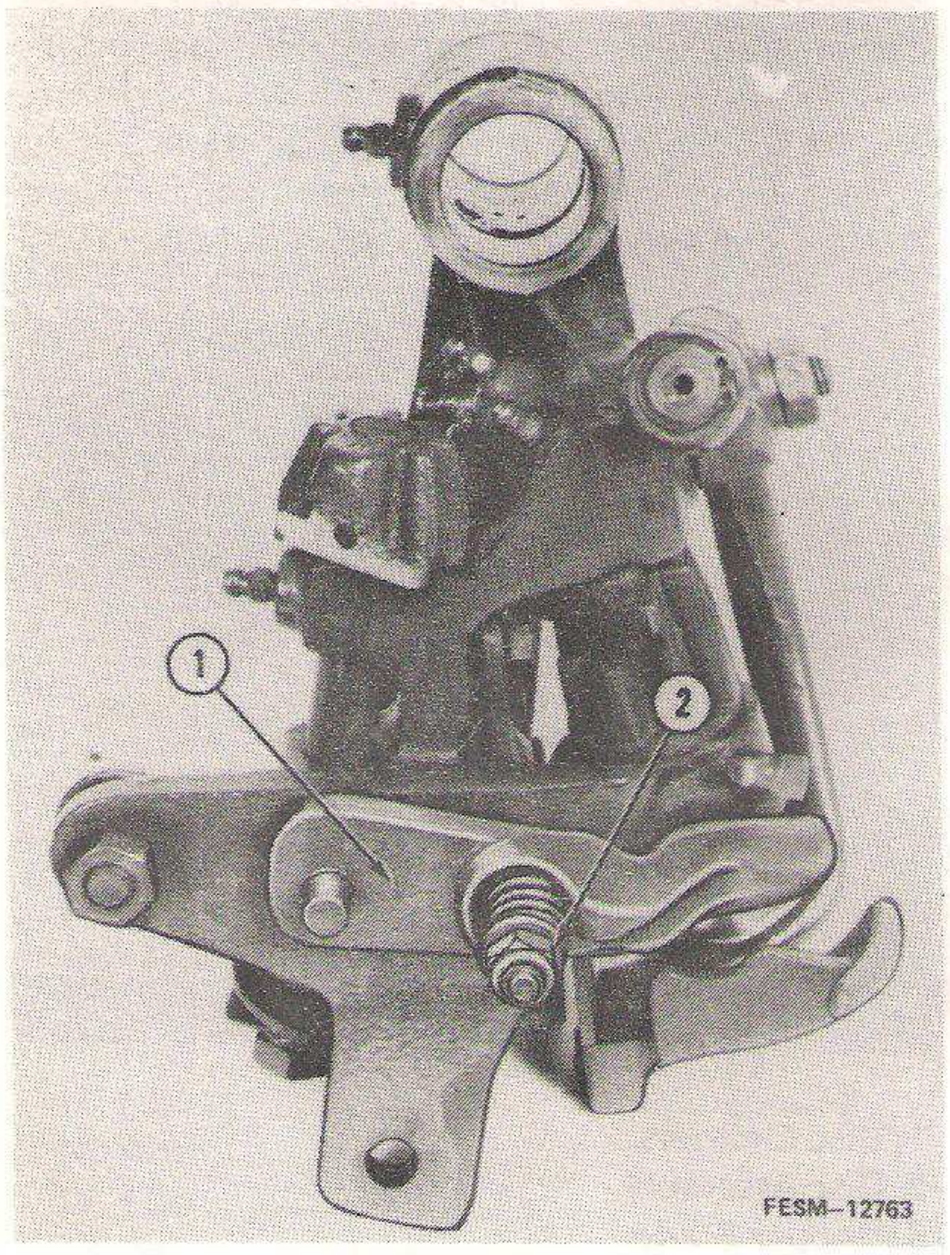


1. Knotter Hook Pinion
2. Billhook
3. Knife Arm

Fig. 3

GROUP 9

TYING MECHANISM



1. Jaw Cam
2. Adjusting Nut

Fig. 4

Knotter Tying Cycle

To better understand the operation of the baler and the importance of the various adjustments, an understanding of the tying cycle is important.

(a) After the needle has been threaded, the end of the twine is held in the twine disc (A-5) by the twine holder (B-5). As the bale is formed, twine is pulled from the twine chest.

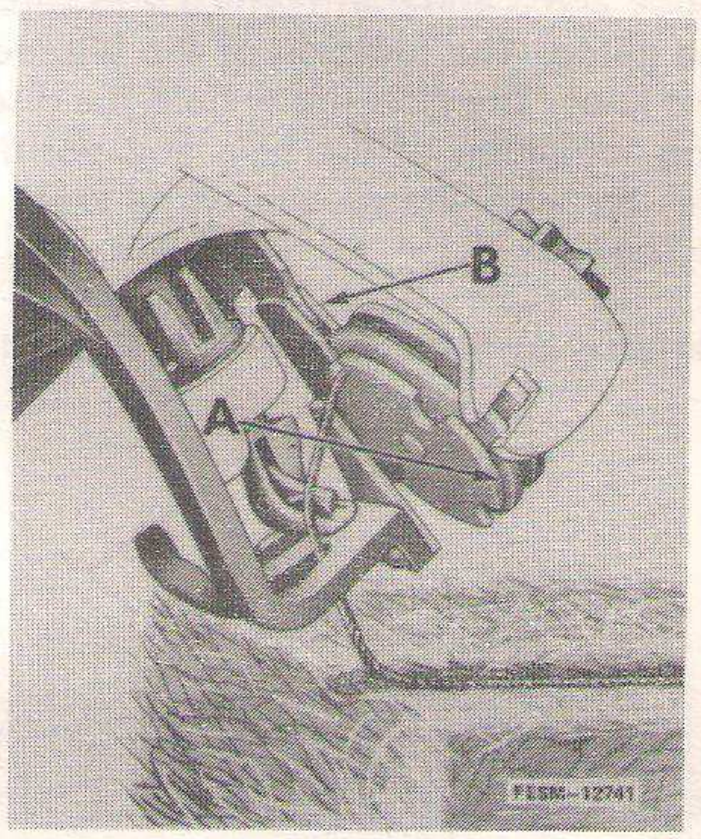


Fig. 5

(b) When the bale reaches its required length, the metering wheel trips the tying mechanism and the needle (C-6) (with the help of the tucker finger) brings the second strand of twine through the guide on the knife arm (D-6) across the bill hook and into the twine disc (A-5).

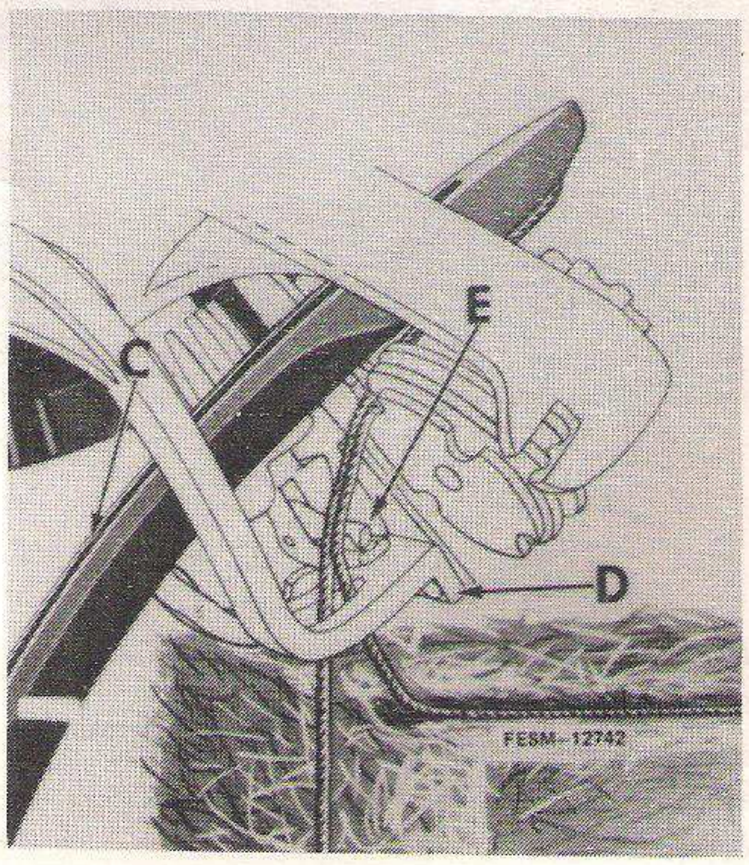


Fig. 6

(c) The bill hook (E-6) starts its revolution when the gear teeth on the intermittent knotter gear have operated the disc driving pinion and turned the disc sufficiently to permit the twine holder (B-5) to secure both strands of twine in the disc (A-5).

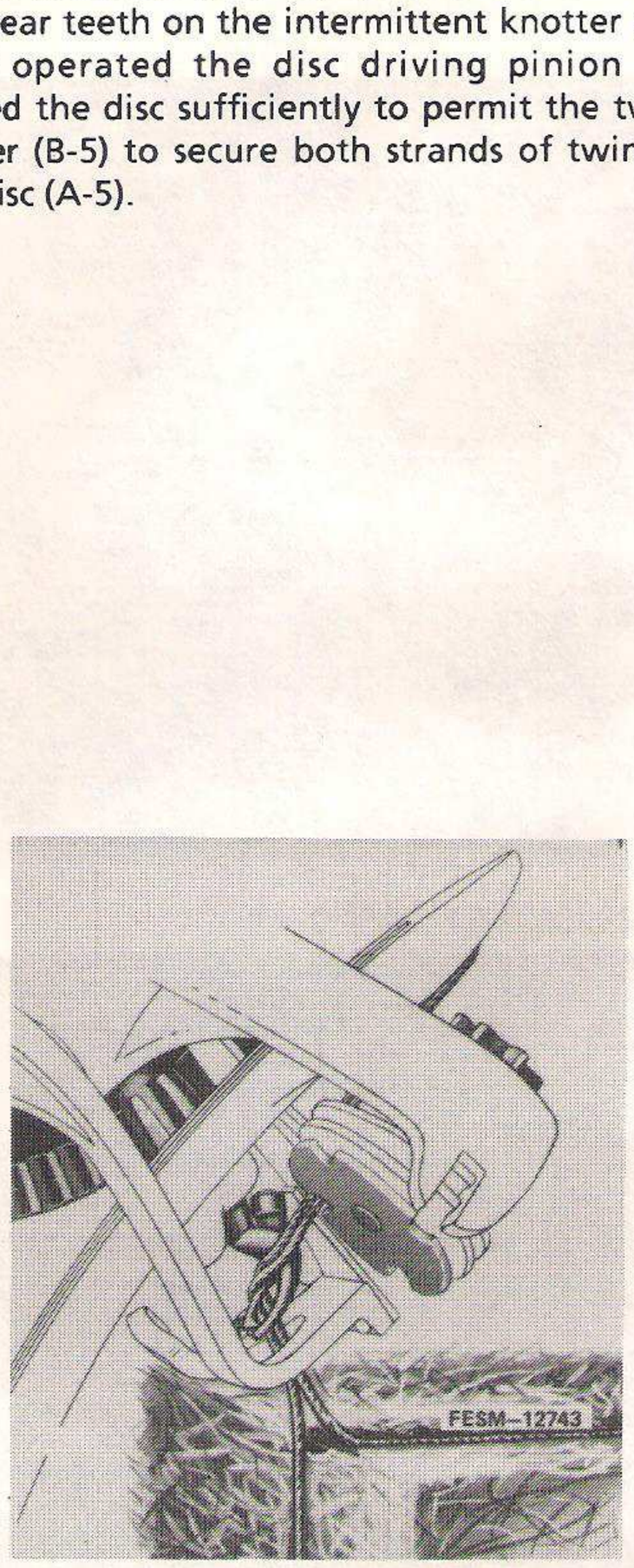


Fig. 7

(d) As the bill hook turns, it forms a loop of twine around the hook and the jaw opens to receive the twine. The knife (F) advances ready to cut the twine between the bill hook and disc.

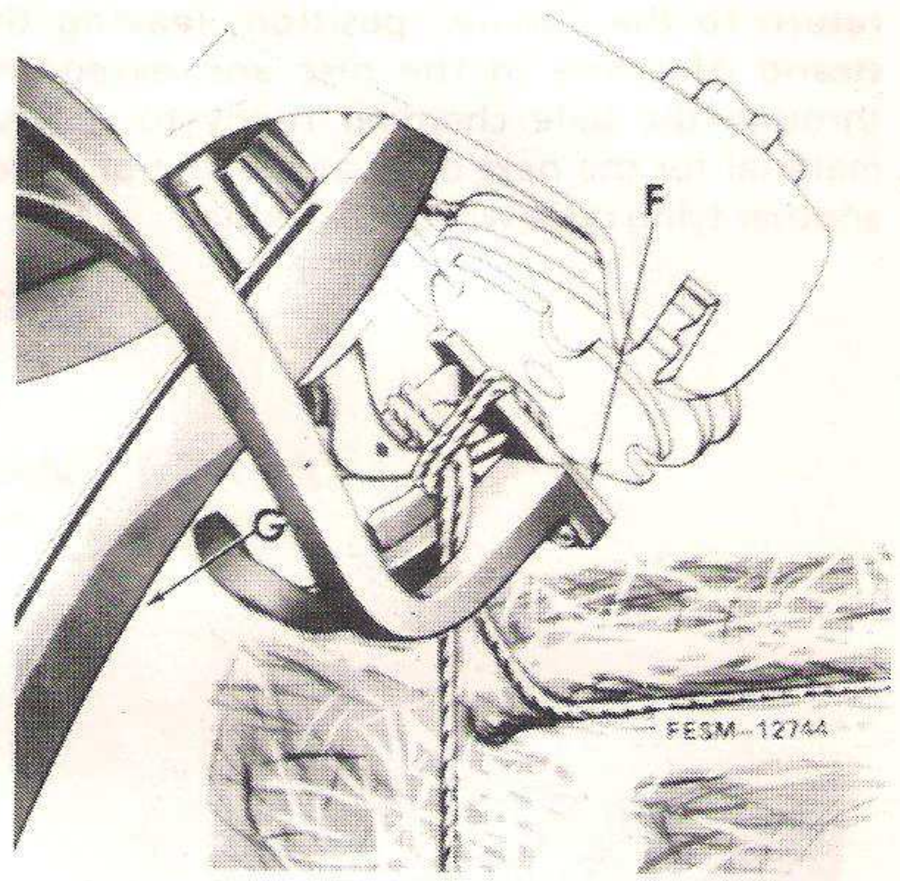


Fig. 8

NOTE: At this stage, the needle (C-6) begins to recede - leaving twine in the disc which will be held there for the next knot.

(e) The bill hook jaw has closed and now holds the ends of the twine tightly. The twine has been cut and the wiper (bold arrow) on the knife arm (D-6) advances to wipe the looped twine from the outside of the bill hook as the jaws hold the two cut ends of twine ready to complete the knot.

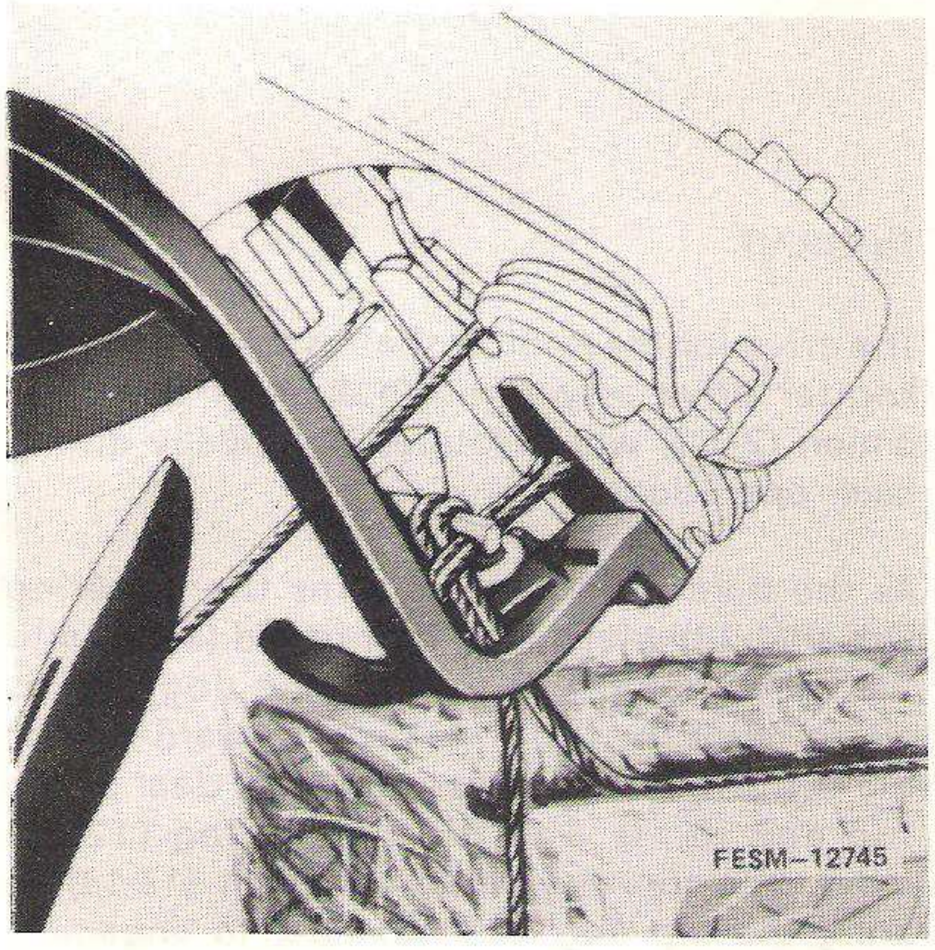


Fig. 9

(f) The knot is tied and drops from the bill hook completing the tie around the bale. The needles return to the "home" position, leaving the strand of twine in the disc and extending through the bale chamber ready to receive material for the next bale, at the end of which another tying cycle will be performed.

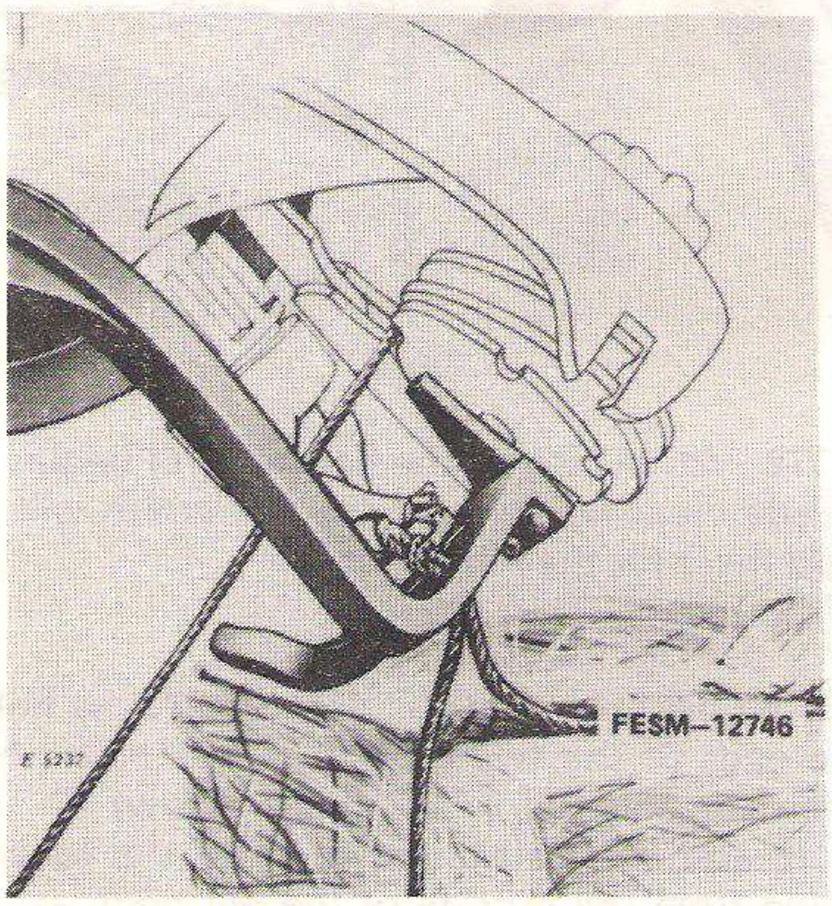


Fig. 10

1b. DRIVE

The drive for the knotter shaft is taken from the knotter drive assy through a bevel gear and pinion (2-11), which rotates continually during baler operation.

As the bale is formed, it turns the metering wheel (1-13) which lifts the trip rod (3-13) until the rack gear (2-13) reaches the dog leg, at which point the trip rod moves forward so that the trip arm (4-13) pivots and moves clear of the trip dog (5-13). The trip dog spring (12-13) moves the trip dog about the pivot (13-13) to bring the trip dog roller (8-13) in to engagement with the driving ramp (7-13) on the knotter shaft gear (6-13). The trip dog carrier (9-13) is rotated, driving the knotter shaft and the knotters via the intermittent teeth on the cam gears. As the trip dog carrier rotates, the cam (10-13) lifts the trip arm (4-13) allowing the trip rod to reset. When the trip dog contacts the trip arm the trip dog pivots and the roller is moved out of engagement with the driving ramp and the knotter shaft brake brings the knotter shaft to rest

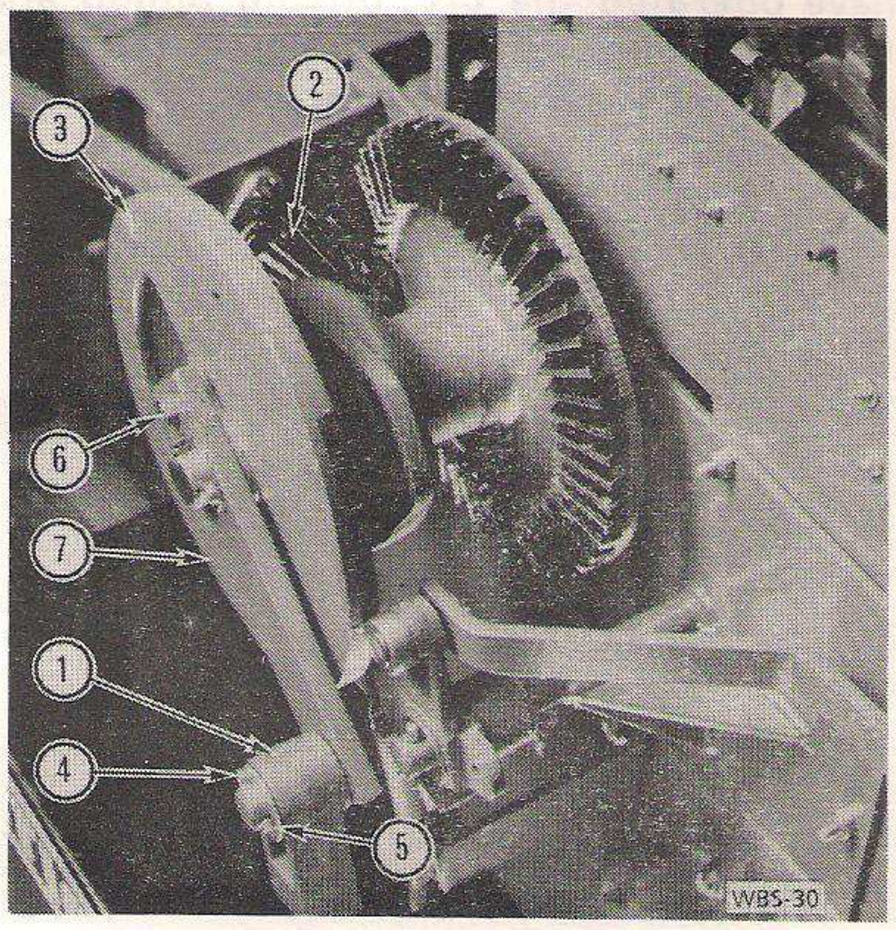


Fig. 11

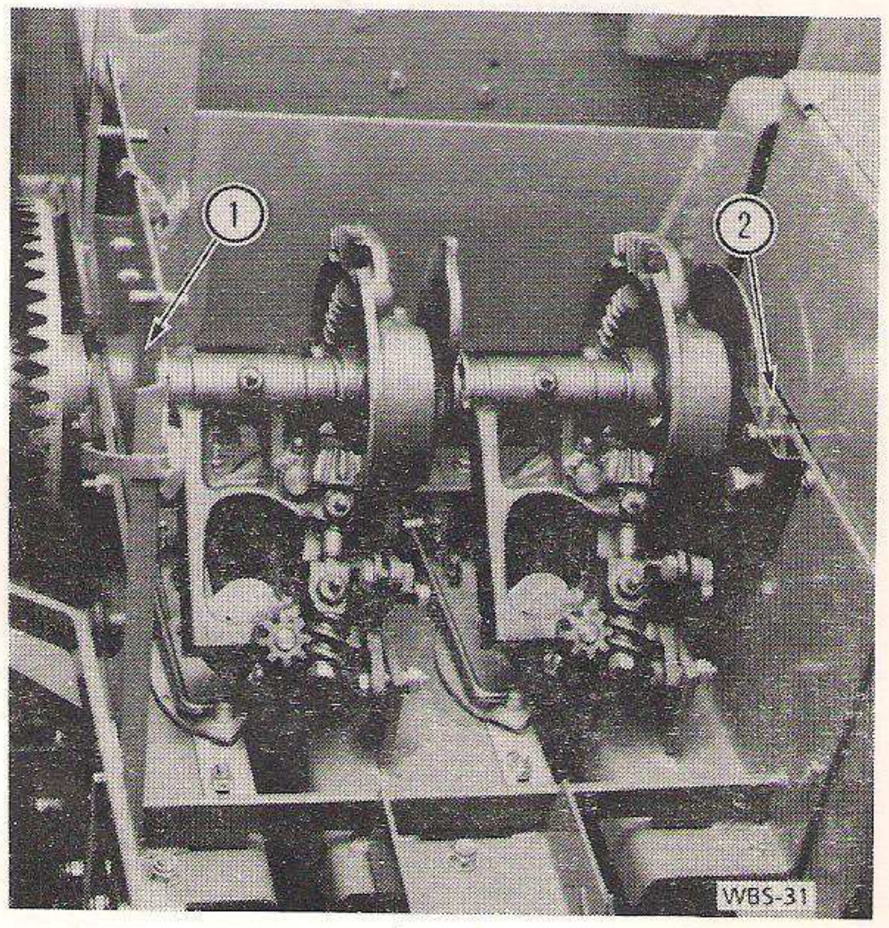
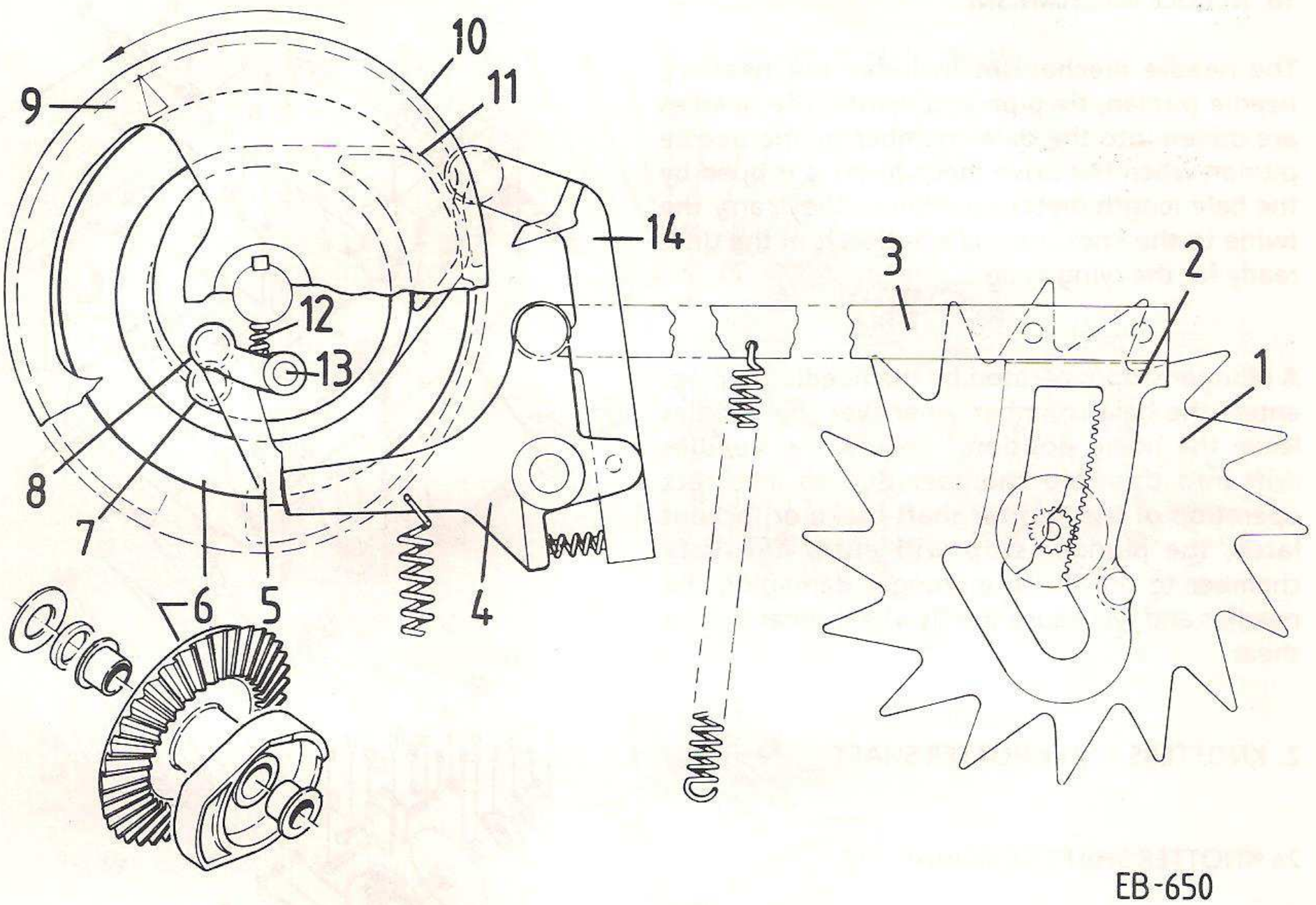


Fig. 12

GROUP 9

TYING MECHANISM



1 Metering wheel
2. Rack gear
3. Trip rod
4. Trip arm
5. Trip dog
6. Knotter shaft bevel gear
7. Driving ramp
8. Trip dog roller
9. Trip dog carrier
10. Cam
11. Cam
12. Trip dog spring
13. Pivot
14. Anti-drift lockout latch

Fig. 13

On 471 and 481 balers there is an anti-drift lockout latch (14-13) (optional on 451 and 461 balers) which operates when the metering wheel trips the trip rod. The latch engages with a cut out in the trip dog carrier preventing the needles from drifting into the bale chamber under their own weight until it is moved out of engagement by the cam on the knotter shaft bevel gear (11-13) at the same time as the trip dog roller engages with the driving ramp. If on the 451 and 461 balers the needles drift in frequently it indicates that the knotter brake could require adjusting.

1c. KNOTTER FRAME AND BREASTPLATE

The knotter frame supports the principle parts of the tying mechanism, the knotter drive shaft, knotter shaft and trip mechanism

The breastplate supports the knotter drive frame and knotter support assembly It also mounts the tucker fingers and hay retainers.

GROUP 9

TYING MECHANISM

1d. NEEDLE MECHANISM

The needle mechanism includes the needles, needle pitman, tie pipe and pivots. The needles are driven into the bale chamber by the needle pitman when the drive mechanism is tripped by the bale length metering wheel. They carry the twine to the knotters and position it in the discs ready for the tying cycle.

A plunger stop, operated by the needle tie pipe, enters the bale chamber whenever the needles leave the home position. Should the needles drift into the bale chamber due to incorrect operation of the knotter shaft brake or lockout latch, the plunger stop will enter the bale chamber to prevent the plunger damaging the needles and will cause the flywheel shear bolt to shear.

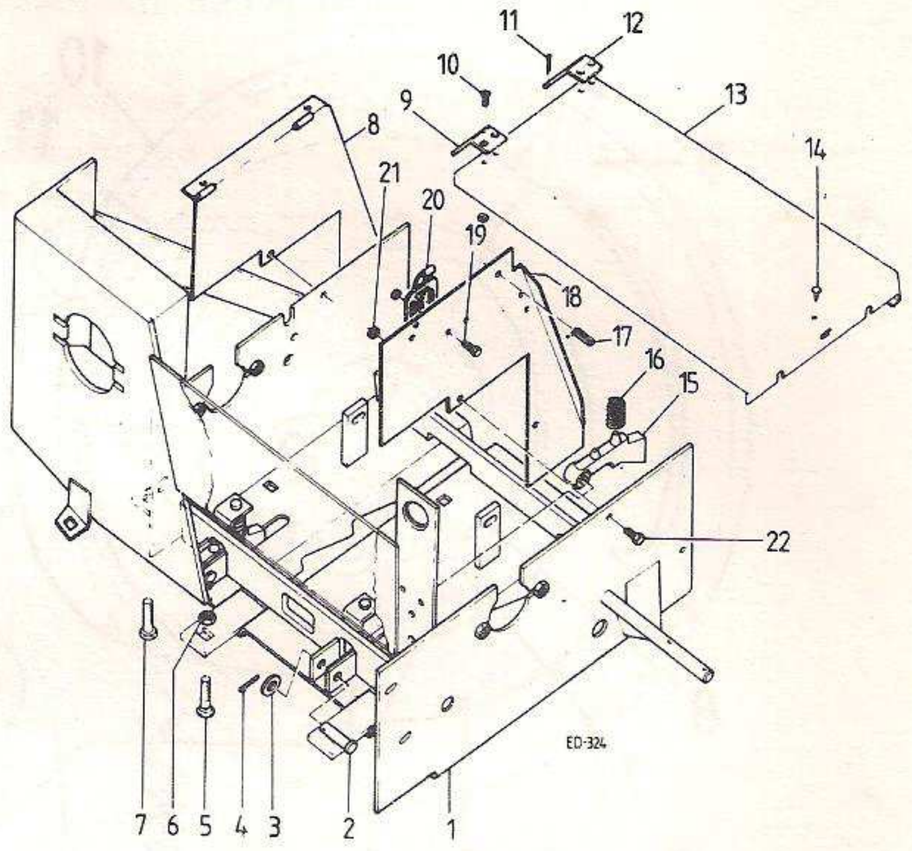


Fig. 15

2. KNOTTERS AND KNOTTER SHAFT

2a KNOTTER SHAFT REMOVAL

Note: For maintenance work on the knotter trip mechanism (fig 14) it is not necessary to remove the entire knotter shaft.

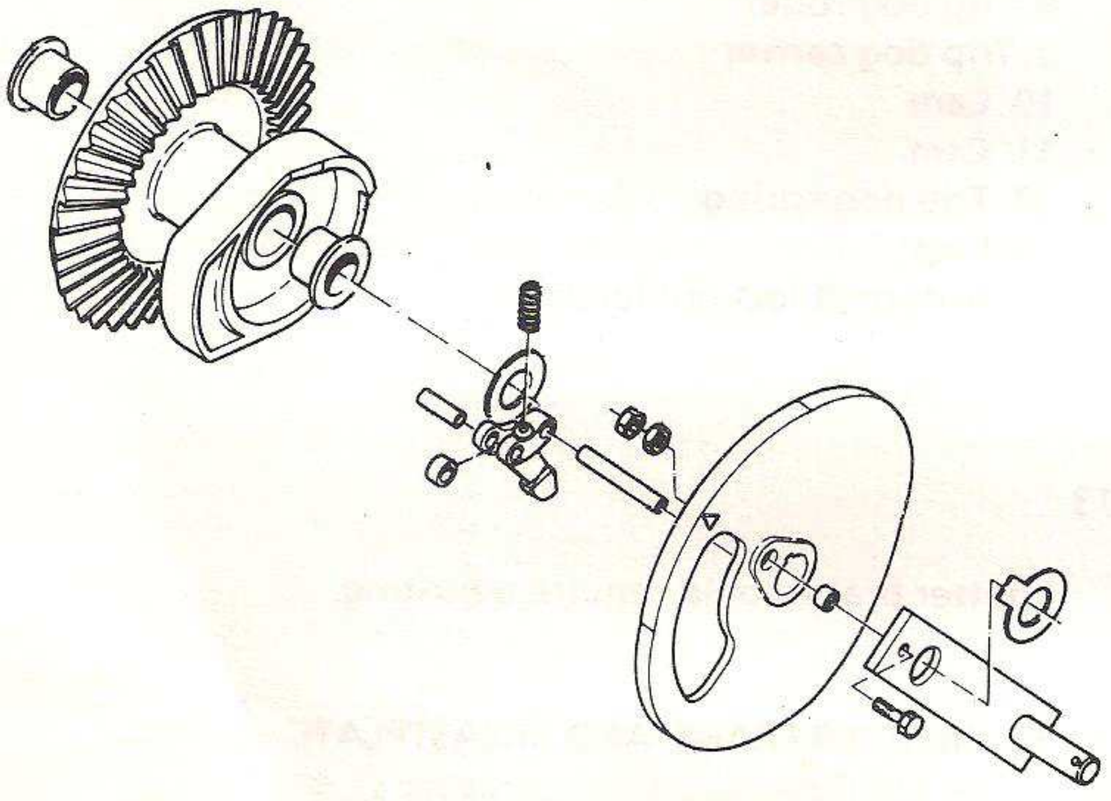


Fig. 14

(a) Remove the knotter shields (8 &18-15).

(b) Remove the knotter brake (11 & 12-16), by releasing springs (9-16) and removing bolt (13-16).

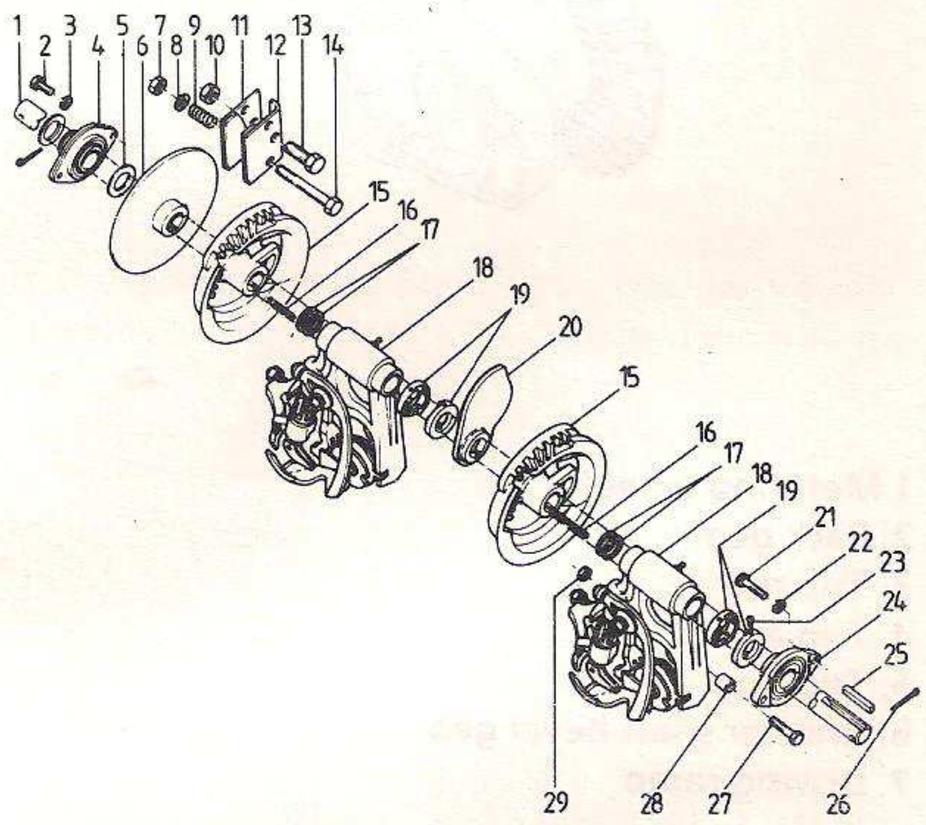


Fig. 16

(c) Chalk mark or paint adjacent teeth on the knotter drive assembly and main drive assembly on the gearbox.

(d) Disconnect the needle drive pitman.

(e) Remove the knotter anchor bolts and bushes (6-17).

(f) Remove the bolts of the bearings (21 & 2-16) and lift the knotter shaft assembly out of the machine.

GROUP 9

TYING MECHANISM

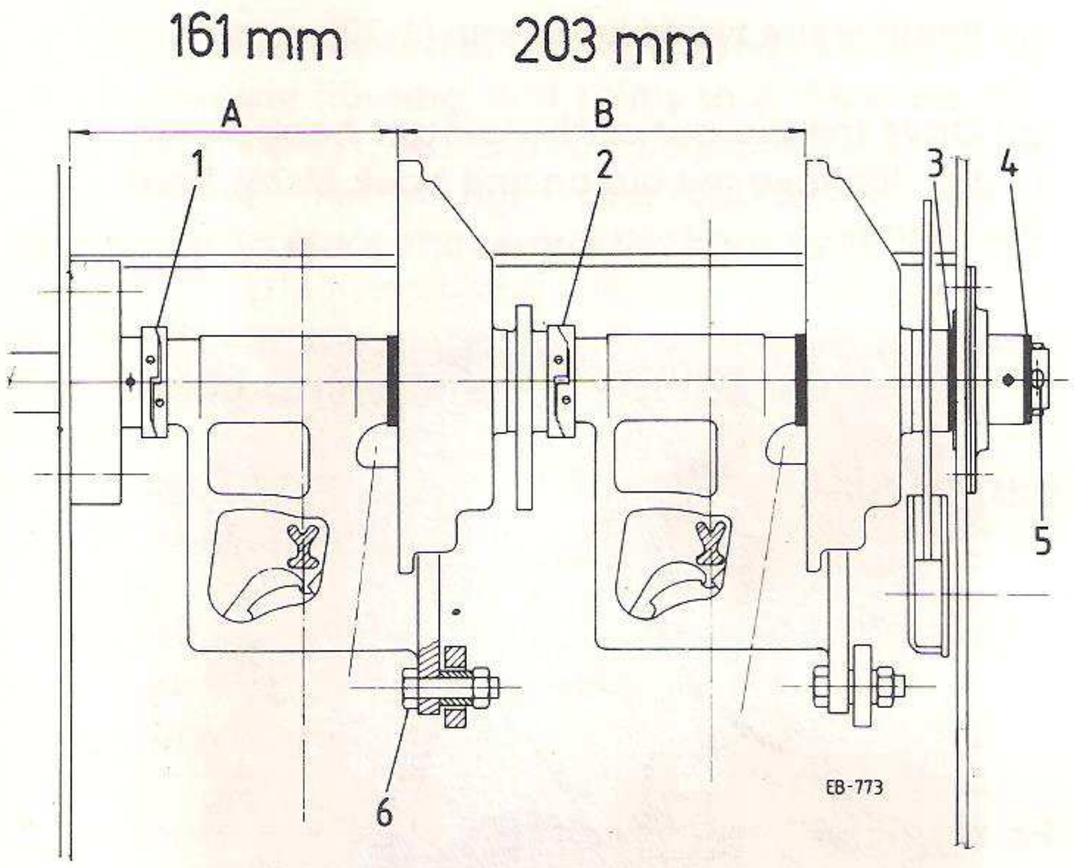


Fig. 17

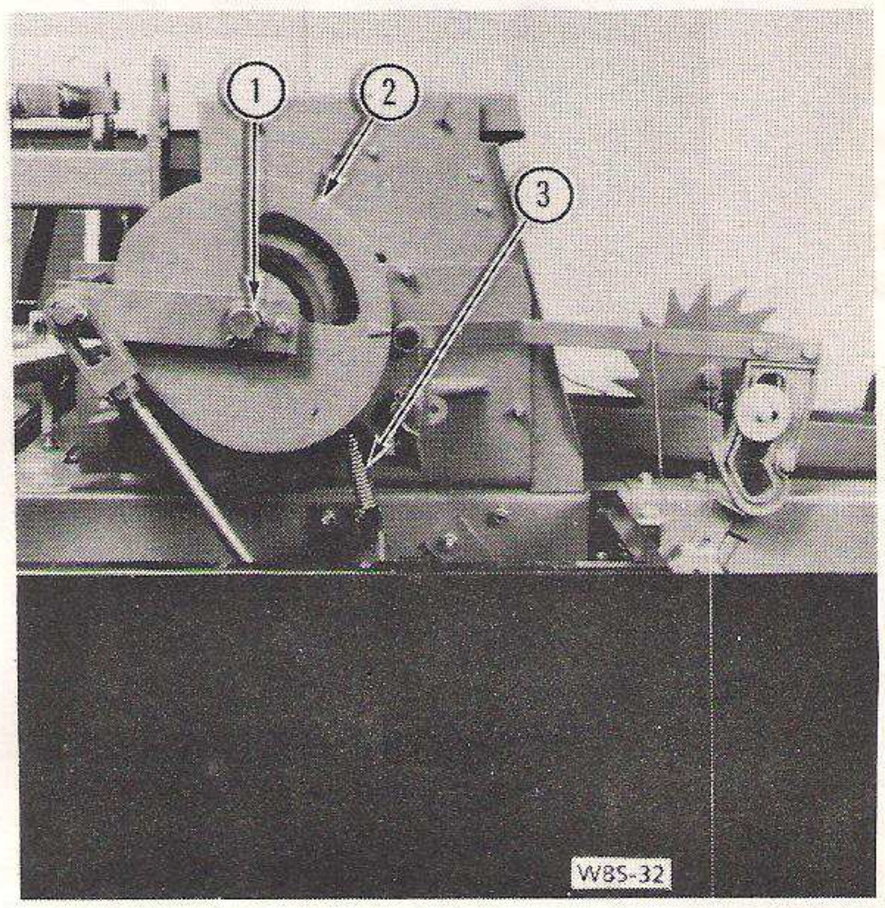


Fig. 19

2b TRIP MECHANISM DISMANTLING

(a) Remove the cotter pin (4-18) and washer (5-18) and disconnect the bearing assembly (1-18) with bush and washer from the crank (7-18). Remove the shearbolt (6-18), cotter pin (1-19) with washer and crank (7-18). Remove the trip dog carrier (3-18), noting the trip dog spring (3-19).

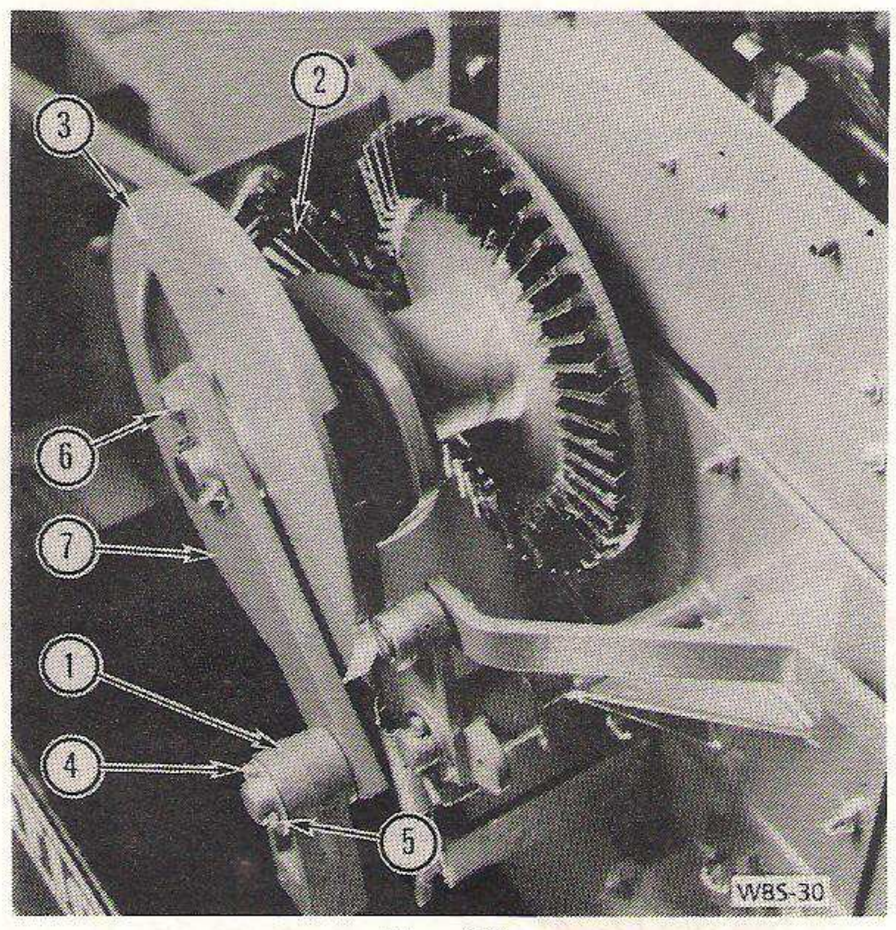


Fig. 18

(b) Remove trip arm spring (3-19) and cotter pin.

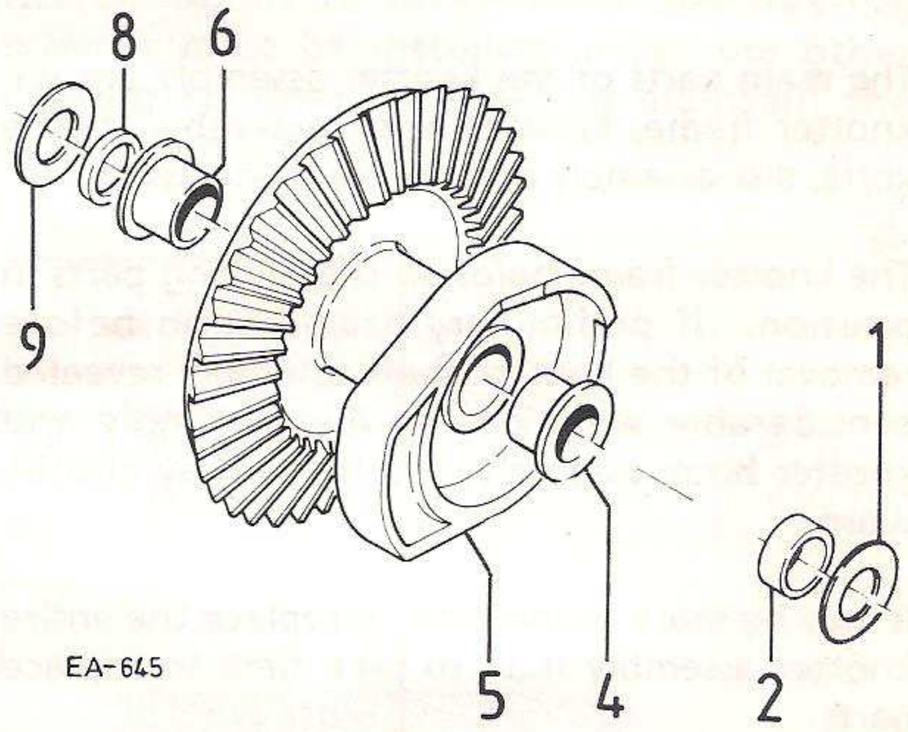


Fig. 20

(c) Disconnect the trip rod from the trip arm (2-21).

NOTE: For knotter shaft removal it is not necessary to remove the trip arm.(2-21).

(d) Remove the washer (1-20), spacer (2-20), gearwheel assembly (5-20) with bushings (6-20), spacer (8-20) and washer (9-20)

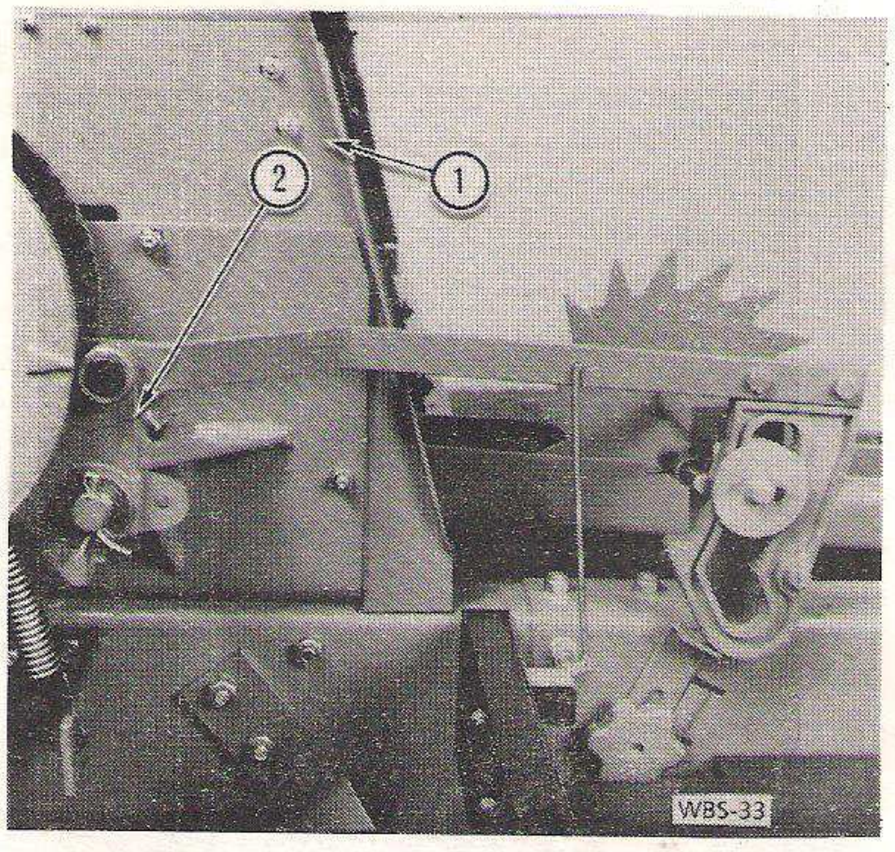


Fig. 21

(e) Remove the cam and knotter assembly from the shaft as needed for servicing.

2c. DISMANTLING

The main parts of the knotter assembly are the knotter frame, knotter hook assembly, twine knife, disc assembly and keeper blade assembly.

The knotter frame holds all the moving parts in position. If preliminary examination before removal of the knotter shaft assembly revealed considerable wear on the disc assembly and knotter hook assembly, the frame may also be worn.

It may be more economical to replace the entire knotter assembly than to take time to replace parts.

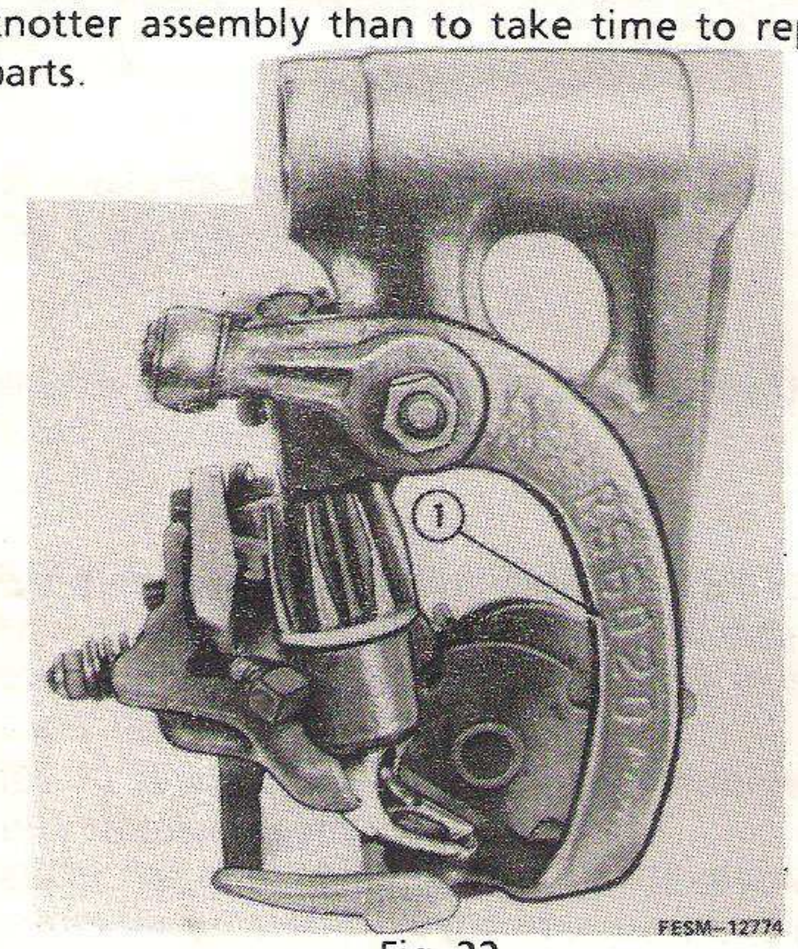


Fig. 22

(a) Remove the twine knife arm (1-22).

(b) Drive the pin out of the knotter hook pinion (1-23). Remove the pinion and hook (2-23) from the frame.

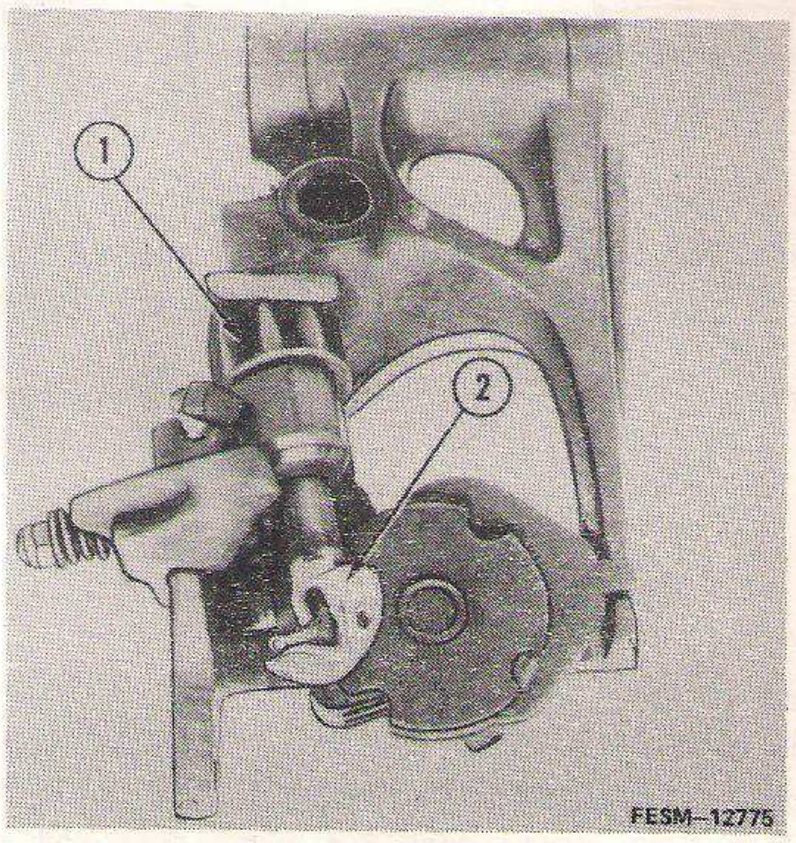


Fig. 23

(c) Drive the pin (4-24) out of the twine disc assembly helical gear (3-24) and remove the gear.

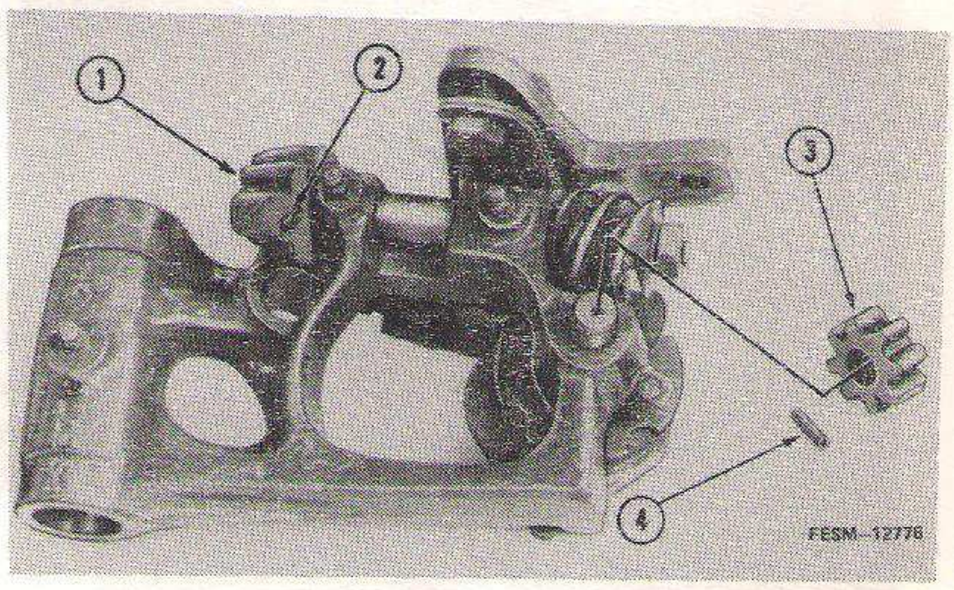


Fig. 24

Drive the pin (2-24) out of the twine disc pinion (1-24). Remove the pinion and pull the knotter worm shaft out of the frame. Note the amount of washers between the frame and the worm gear for reassembly.

(d) Remove the disc assembly and keeper blade assembly out of the frame. Remove the knotter cam jaw and spring.

(e) Inspect the delay surfaces of the knotter hook drive pinion and the knotter drive pinion.

(f) Inspect all gears for wear on the teeth.

(g) Inspect the shafts for wear, twists and partially sheared pins. Check the frame bores in which the shafts turn.

(h) Inspect the twine knife for sharpness and damage. It must be sharp enough to instantly cut a loop of twine pulled directly against the cutting edge without sliding the twine. The twine knives cutting edge and adjustment are essential to successful tying.

(i) Inspect the condition of the knotter jaw cam for distortion and wear. Check the cam spring and replace if in a doubtful condition.

2c. ASSEMBLY

(a) Position the original amount of washers on the worm shaft. Insert the shaft in the frame, install the twine disc pinion on the shaft and secure with the spring pin.

(b) Install the disc assembly and disc helical gear. Secure the gear with the spring pin.

(c) Insert the knotter hook in the frame. Install the knotter hook pinion with the delay surface facing away from the hook. Secure the pinion to the shaft with the spring pin.

(d) Install the twine knife arm and knotter jaw cam.

(e) Refer to GROUP 11 for adjustments and settings.

2d. KNOTTER SHAFT INSTALLATION

(a) Install if necesary new bearings (2-14) in knotter drive gear (1-14).

(b) Slide the trip dog carrier assembly (12-14) onto the knotter shaft, together with its key (25-16).

(c) Install crank (11-14) and fit shearbolt (9-14).

(d) Slide on one 0.5 mm shim (10-14) and fit cotter pin (26-16).

(e) Lightly tap the shaft until it leans against the cotter pin.

(f) Fit 1 mm shims (6-14), spacer (4-14), thrust washer (3-14) and gear assembly (1-14) and check if roller (15-14) is just inside the drive ramp of gearwheel (1-14). If not, add or remove shims (6-14). If correct, slide the gearwheel back and fit spring (5-14).

(g) Slide on thrust washer (17-14), spacer (18-14) and 1 mm of shim (19-14).

(h) Slide on bearing (24-16), adjuster (19-16), knotter frame (18-16) and drive gear (15-16)

(i) Take care that the drive gear lays correctly against the flat face of the twine disc pinion (1-1) and the bill hook pinion (1-3). Measure on the shaft, the gap between the hub of the drive gear and the knotter frame. Add 0.1 mm to this dimension and add this amount of shims between the gear and knotter frame. The idle (flat) part of the gear should just be free of the flat faces of both pinions.

(j) Remove the gear, fit key (16-16) and refit the gear. Fit cam (20-16), ensuring it is fitted the correct way (see illustration).

(k) Slide the adjusters (19-16) and knotter frame and gear (15 & 18-16). Determine the number of shims as described in sub para (i).

(l) Fit the brake disc (6-16) and bearing (4-16).

(m) Fit the knotter shaft assembly into the knotter frame (1-15) and fix the bolts (21-16) and (2-16).

(n) Adjust the left hand adjuster (1-17) in order to achieve a dimension (A-17) of 161 mm between the inside of the left hand side plate of the knotter frame and the idle edge of the left hand knotter gear.

(o) If A-17 is correct, lock the adjuster with soft steel wire.

(p) Set adjuster (2-17) to make dimension (B-17) 203 mm. Lock the adjuster with soft steel wire.

(q) Measure the thickness of shims, left and right, of the right hand bearing (3 & 4-17).

(r) Remove the bolts of the bearings and slide the shims on. Fit cotter pin (5-17).

(s) Put the shaft in the frame again and tighten the bearing bolts.

(t) Fit the anchor bolts with the bushes (6-17).

(u) Assemble knotter brake (11 & 12-16) ensuring that it is absolutely free of grease. Tighten the springs (9-16) until a force of 220-250 N at the journal of the needle crank just rotates the knotter shaft. When a new brake disc (16-16) is installed, this figure should go up to 280-300 N.

(v) Fit the knotter shields (8 & 18-15).

3. KNOTTER DRIVE FRAME

3a. REMOVAL

(a) Remove bolts (45-25) of the drive pinion support (46-25) and slide the knotter drive pinion down.

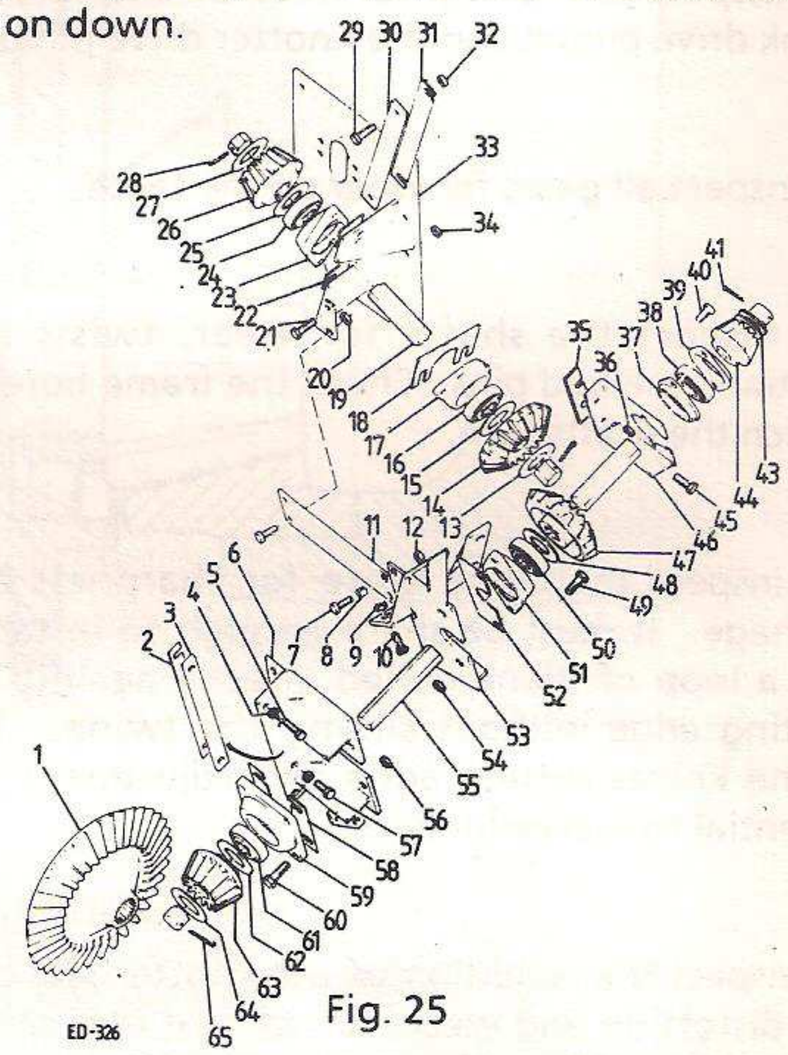


Fig. 25

(b) Remove the auger V-belt, cotter pin (29-26) and cotter pin (31-26). Slide the auger drive shaft approximately 100 mm out of the knotter frame. Save key (30-26). pinion (33-26) and shims. Take note of the amount of shims used.

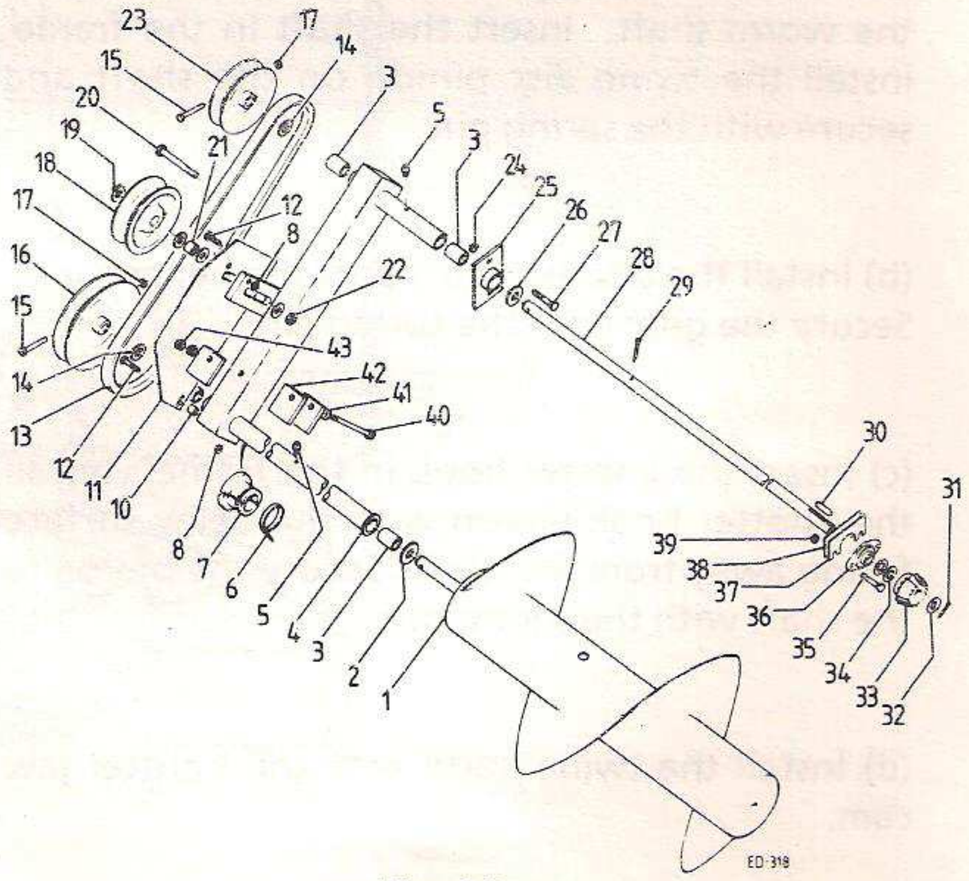


Fig. 26

(c) Remove auger drive gear (33-27), taking note of the amount of shims used.

(d) Remove bolts (46-27) at the rear of the relief arm support (44-27).

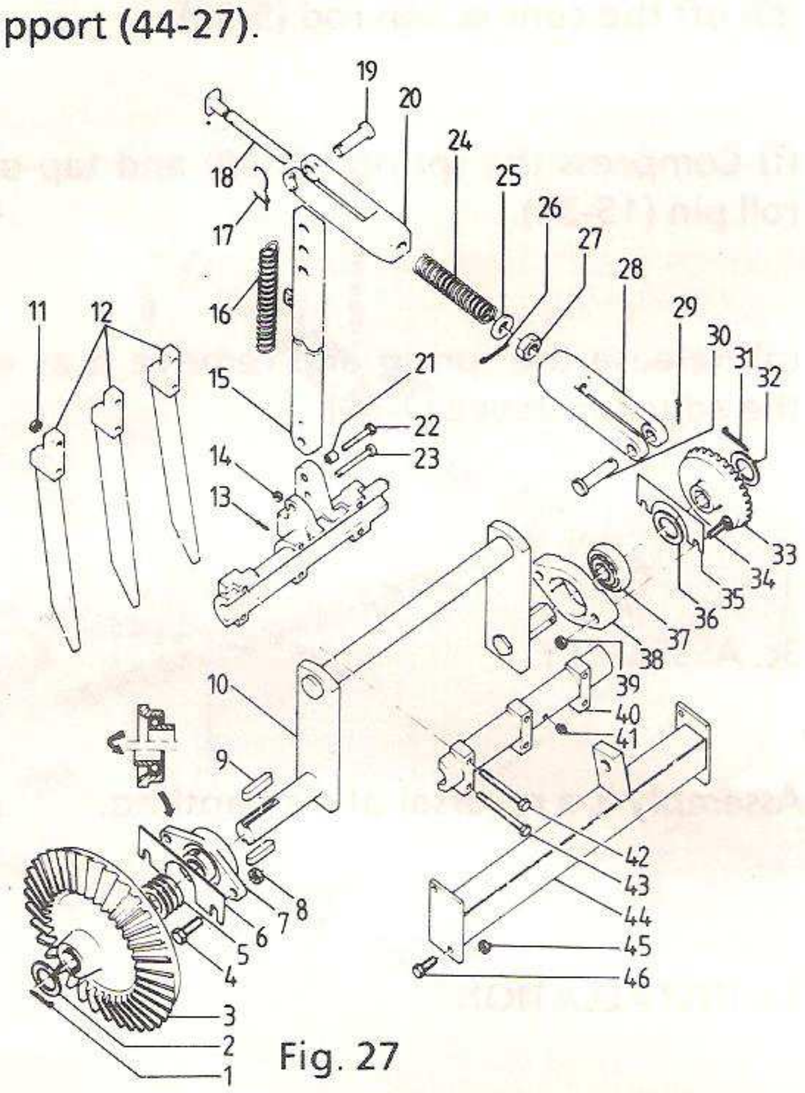


Fig. 27

(e) Remove bolts and nuts (34-27) of the packer crank rear bearing (38-27), noting the amount of shims used. See note under sub para. (k).

(f) Disconnect the bale counter spring and remove the trip arm spring (25-28). Disconnect the trip arm rod (14-28) from the trip arm (24-28).

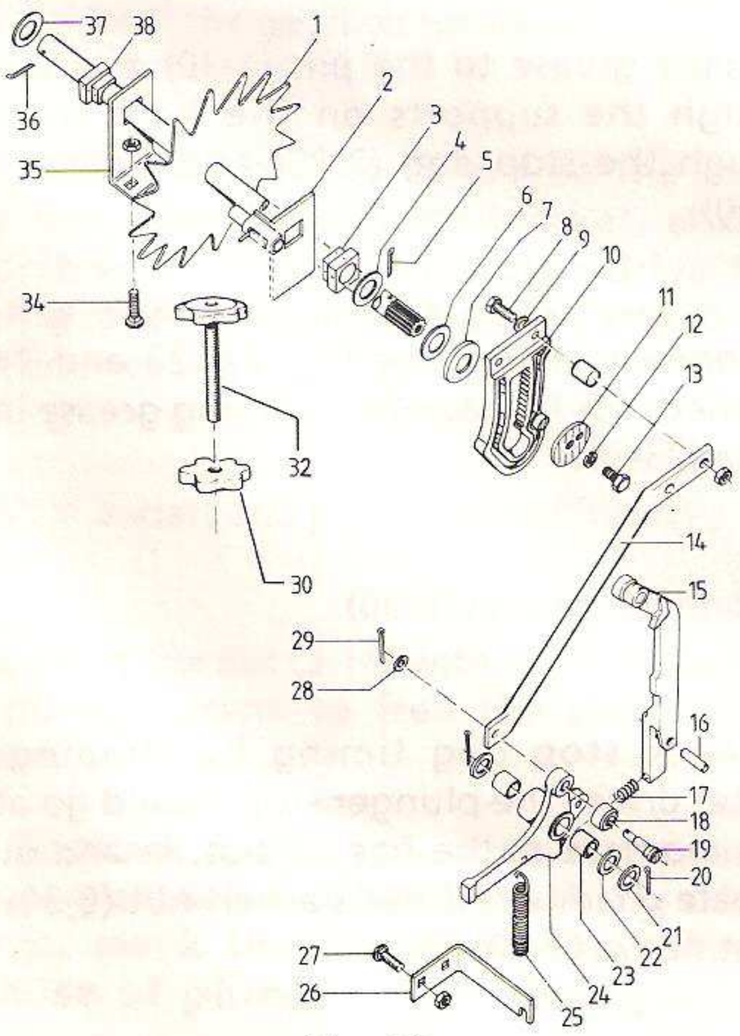


Fig. 28

(g) Remove the knotter covers (8, 18 and 13-29).

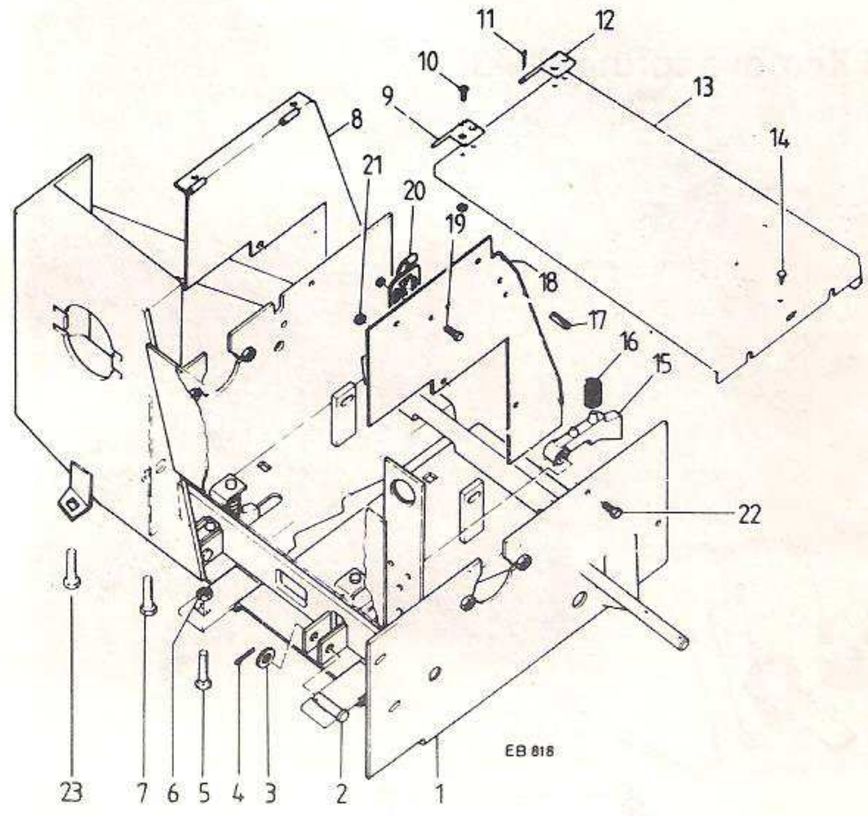


Fig. 29

(h) Remove the knotter shaft as described in para. 2.

(i) Remove the bolt of the upper bale density channel.

(j) Remove the bolts holding the knotter frame, including the one in the feed opening top shield (23-29) and in the knife support (7-29).

(k) Remove the knotter frame by sliding it rearwards of the rear shaft of the packer crank (10-27). NOTE: Do not apply any force on the packer crank when the rear support is removed To do so could result in breakage of the packer drive gears.

(l) Lift the frame clear of the machine.

3b. DISMANTLING

Remove the tucker finger assembly and actuating shaft, the retainers (15-29), the trip arm (24-28) and the bearing of the auger drive shaft (36-26)

3c. ASSEMBLY AND INSTALLATION

Replace any failing or worn parts and assemble in reverse order of removal.

4. PLUNGER STOP

4a. REMOVAL

(a) Remove spring (26-30).

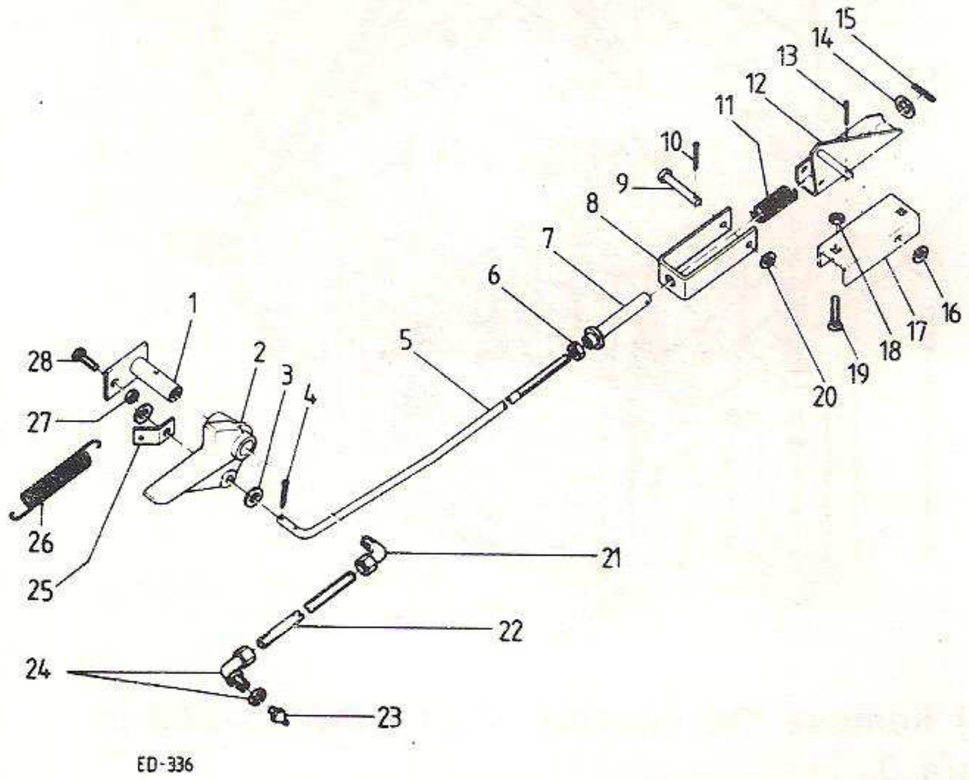


Fig. 30

(b) Remove the grease line (21, 22, 23 and 24-30).

(c) Remove bolt (28-30).

(d) Remove pivot pin (1-30). If the pin cannot be slid out by hand, it is possible to drill a hole opposite it through the side gusset of the bale chamber (Max. diameter = 20 mm 3/4"), and tap it out by means of a punch. On later models this hole is already provided.

(e) Remove cotter pin (13-30) and take the stop dog assembly out of the machine.

4b. DISMANTLING

(a) Remove cotter pin (4-30) and take off spring anchor (25-30) and washer (3-30).

(b) Remove cotter pin (10-30) and pin(9-30).

(c) Measure the distance between the centre line of the bent end of the connection rod (5-30) and the hole of the pin (9-30).

(d) Slacken nut (6-30).

(e) Turn the spring assembly (7, 8, 11, 14 and 15-30) off the connection rod (5-30).

(f) Compress the spring (11-30) and tap out the roll pin (15-30).

(g) Release the spring and remove it as well as the adjuster sleeve (7-30).

3c. ASSEMBLY

Assembly is a reversal of dismantling.

3d. INSTALLATION

(a) Apply some grease on the pivot shaft of the arm (12-30).

(b) Slide it in the support (17-30). Install the washer and cotter pin.

(c) Apply grease to the pin (1-30) and slide it through the supports on the bale chamber through the stop dog (2-30) and tighten bolt (28-30).

(d) Connect grease line (21, 22, 23 and 24-30) and check for leakage by pumping grease in the nipple (23-30).

(e) Connect spring (26-30).

(f) Check stop dog timing by tripping the knotter drive. The plunger stop should go at the same moment as the needle tips, in and out of the bale chamber If not slacken nut (6-30) and adjust sleeve (7-30).

5. BALE LENGTH CONTROL

5a. REMOVAL

1. Metering Wheel

(a) Remove the bolts of the brackets (2 & 35-32).

(b) Remove the bolts (2-31) and lift the metering wheel assembly clear.

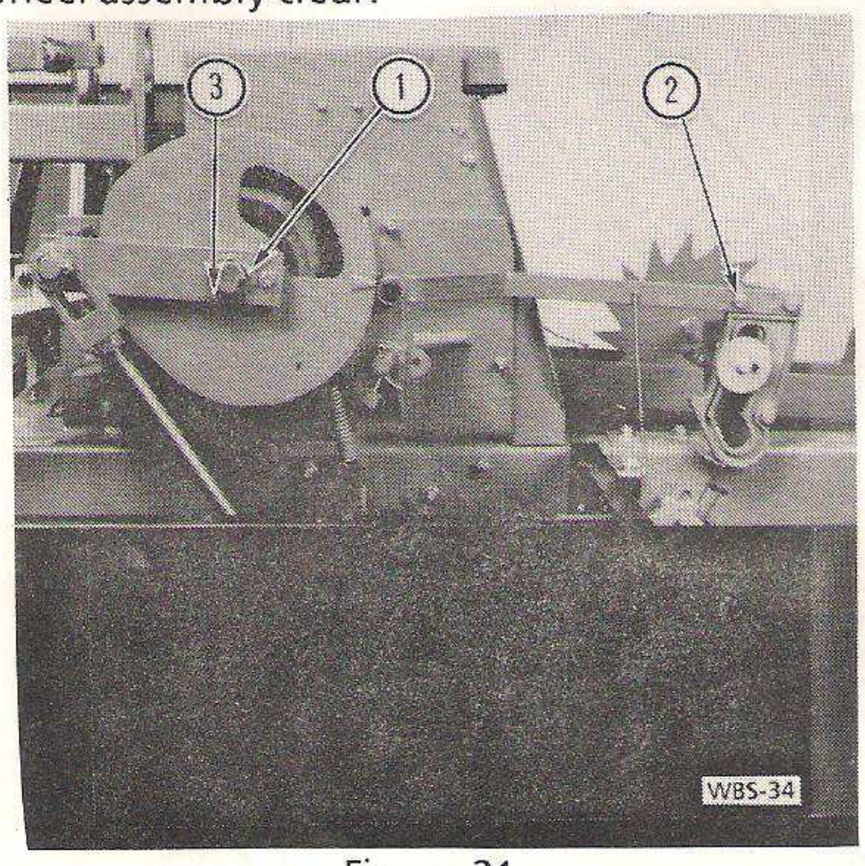


Figure 31

2. Trip Arm Assembly

(a) Drive out the spring pin (16-32) to disconnect the lockout latch (15-32) from the trip arm (24-32) taking care not to lose the spring (17-32).

(b) Disconnect the spring (25-32) from the spring anchor (26-32) and trip arm (24-32).

(c) Remove the cotter pin (29-32) to disconnect the trip rod (14-32) from the trip arm (24-32) and remove the stud (19-32) and roller (18-32).

(d) Remove the cotter pin (20-32) and the trip arm (24-32).

5b. DISMANTLING

1. Metering Wheel

(a) Remove the cotter pins (5 & 36-32) then remove the bushings (38-32) and brackets.

2. Trip arm Assembly

(a) remove the bushing (23-32) if inspection proves it necessary.

5c. ASSEMBLY

1. Metering Wheel

(a) Assemble in the reverse order of dismantling. Ensure the bracket feet face inward.

2. Trip arm Assembly

(a) Install new roller and bushings if these were removed.

5d. INSTALLATION

1. Trip arm Assembly

(a) install in the reverse order of removal, ensuring that the spring (17-32) is correctly located.

2. Metering Wheel

(a) Install in the reverse order of removal taking up any end float in the bushing with the washers (6 & 37-32)

5e. ADJUSTMENTS

1. Bale Length

(a) To make longer bales, loosen the grip (30-32) and lower the adjuster (32-32). To shorten the bale set the adjuster higher.

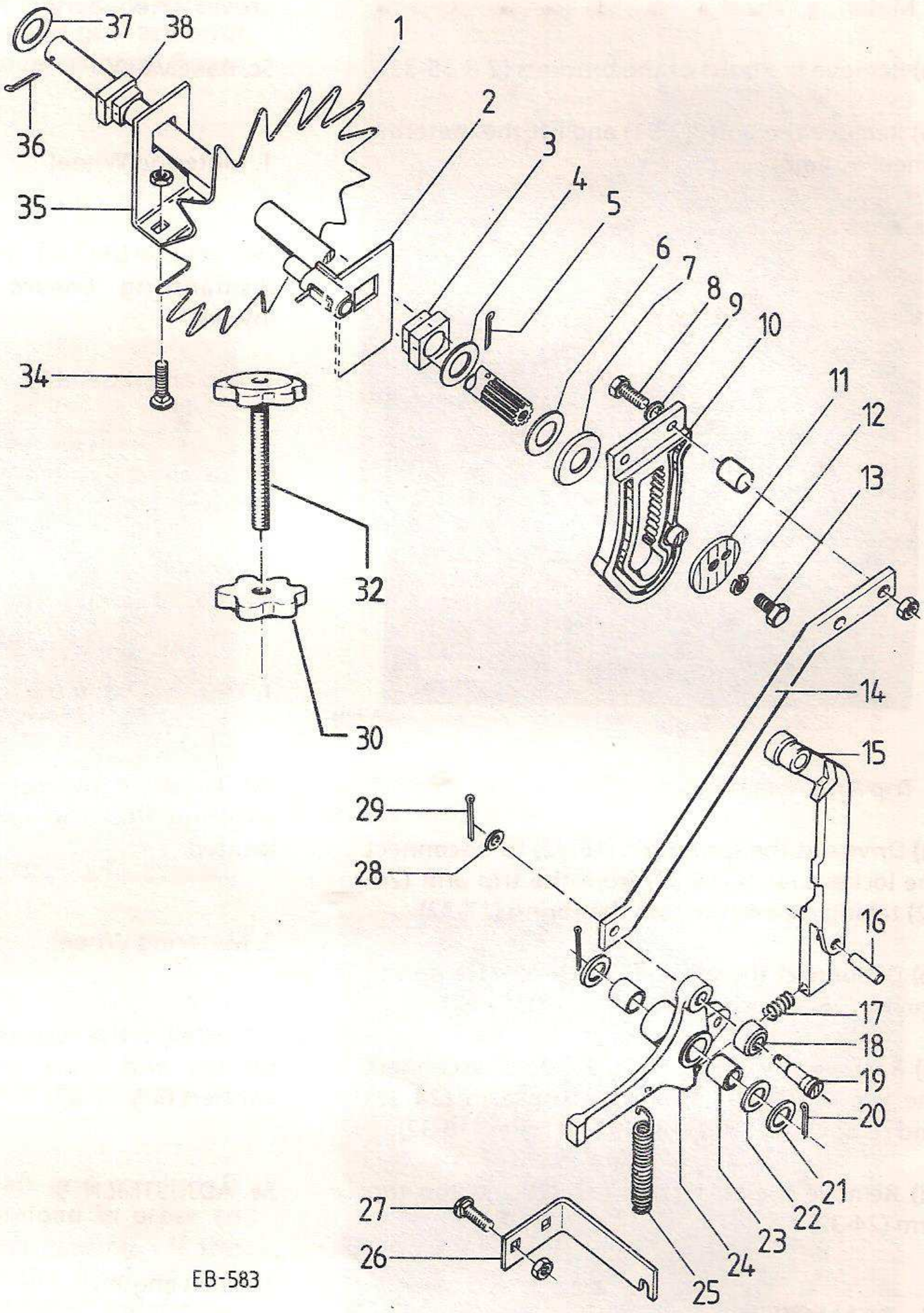
GROUP 9

TYING MECHANISM

1. Measuring wheel
2. Support assy lock
3. Bush
4. Washer
5. Cotter pin
6. Washer
7. Ring
8. Bolt
9. Washer
10. Rack
11. Ring
12. Spring lock washer
13. Bolt
14. Rod
15. Lockout latch
16. Roll pin
17. Spring
18. Roller
19. Pin
20. Cotter pin
21. Washer
22. Washer
23. Bushing
24. Triparm
25. Spring
26. Spring anchor
27. Coachbolt
28. Washer
29. Cotter pin
30. Nut

32. Adjuster bale length

34. Coachbolt
35. Support
36. Cotter pin
37. Washer
38. Bush



EB-583

Fig. 32

GROUP 9

TYING MECHANISM

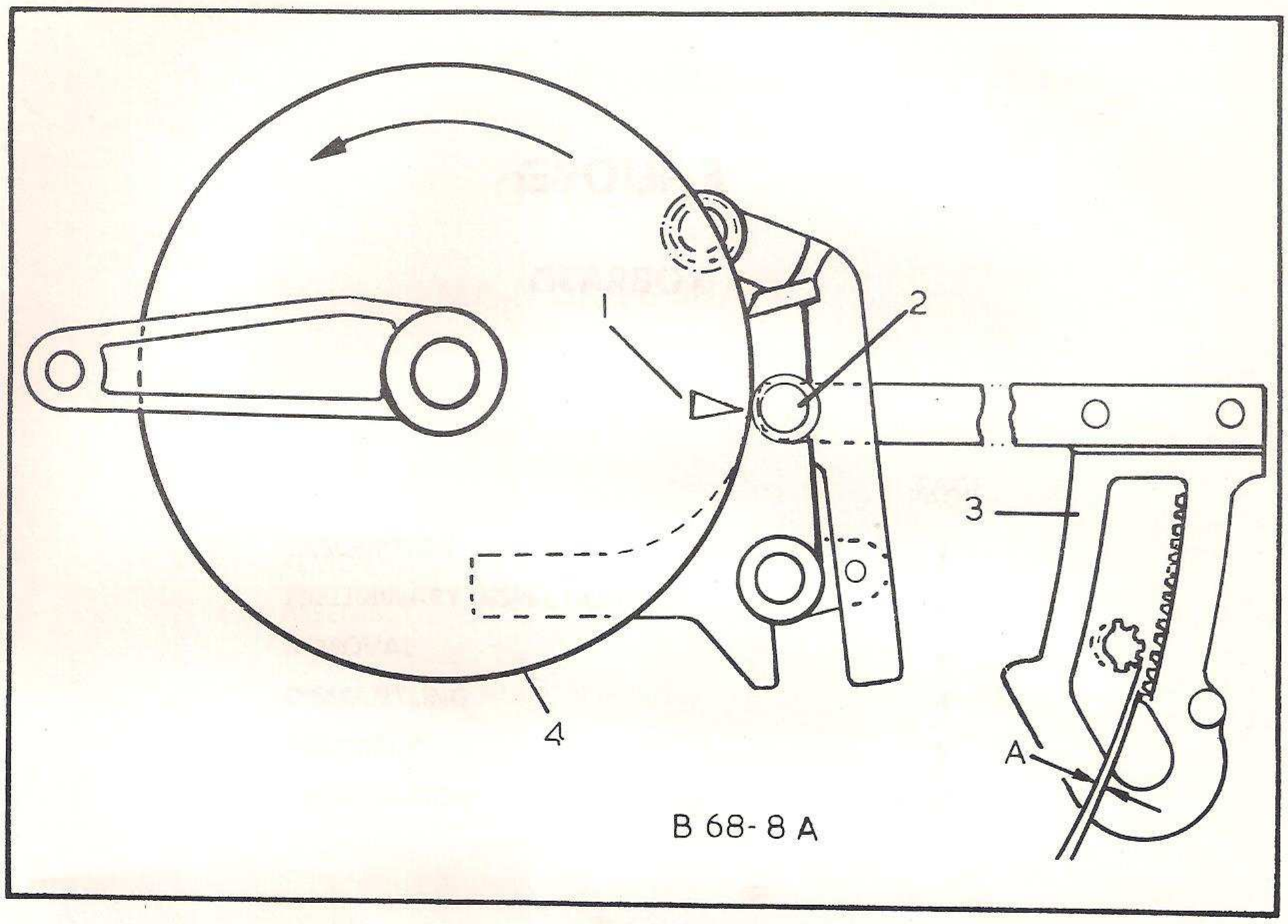


Fig. 33

2. Trip Mechanism

A clearance (A-33) of 3 to 6 mm (1/8 to 1/4 in) must be maintained when the mechanism is tripped, between the tips of the splines on the metering wheel shaft and the tips of the teeth on the rack gear.

Trip the mechanism and turn the flywheel by hand until the arrow (1-33) on the trip dog carrier is in line with the trip arm roller (2-33)

NOTE: Do not run the baler against normal direction of rotation when the mechanism is tripped. To do so will break the plastic rack gear.

GROUP 10

MAIN DRIVE SHAFT

1. REMOVAL

(a) Remove side shield (6-1) by removing screws (9 and 11-1).

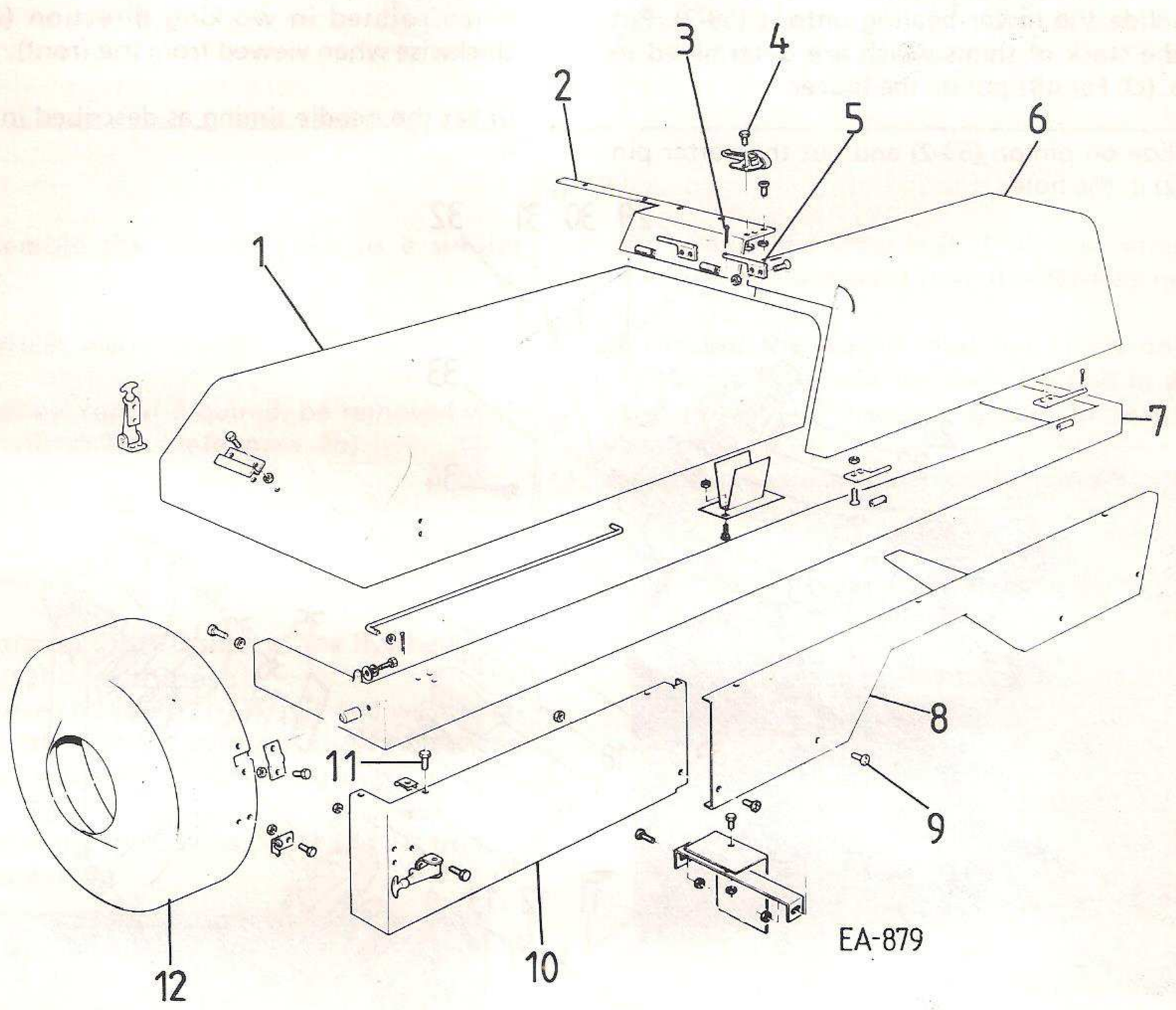


Fig. 1

(b) Block the packer finger crankshaft.

(c) Remove cotter pin (65-2) of the drive shaft (55-2).

(d) Remove the bolts of the intermediate and upper bearing (49-2 and 40-2).

(e) Remove the bolts of the lower bearing (60-2).

(f) Move the shaft (55-2) out of the intermediate and upper support and slide it out of the lower pinion, bearing and bearing support.

(g) Lift the shaft clear of the machine.

(h) Take the lower pinion (63-2) and bearing (59-2) out of the support.

(i) Replace the damaged parts on the shaft.

2. ASSEMBLY

(a) Bolt lower bearing (59-2) lightly to the support.

(b) Press the lower pinion (63-2) into its bevel gear (1-2) with the right toe to toe alignment.

(c) Measure the amount of shims which are needed between the pinion and bearing.

NOTE: the 481 has an 18 mm long spacer.

(d) Slide all the bearings and pinions over the shaft in the sequence given in Fig. 2, but leave pinion (63-2) and its bearing (59-2) off. Do not put washers between the bearings and the gears (48-2).

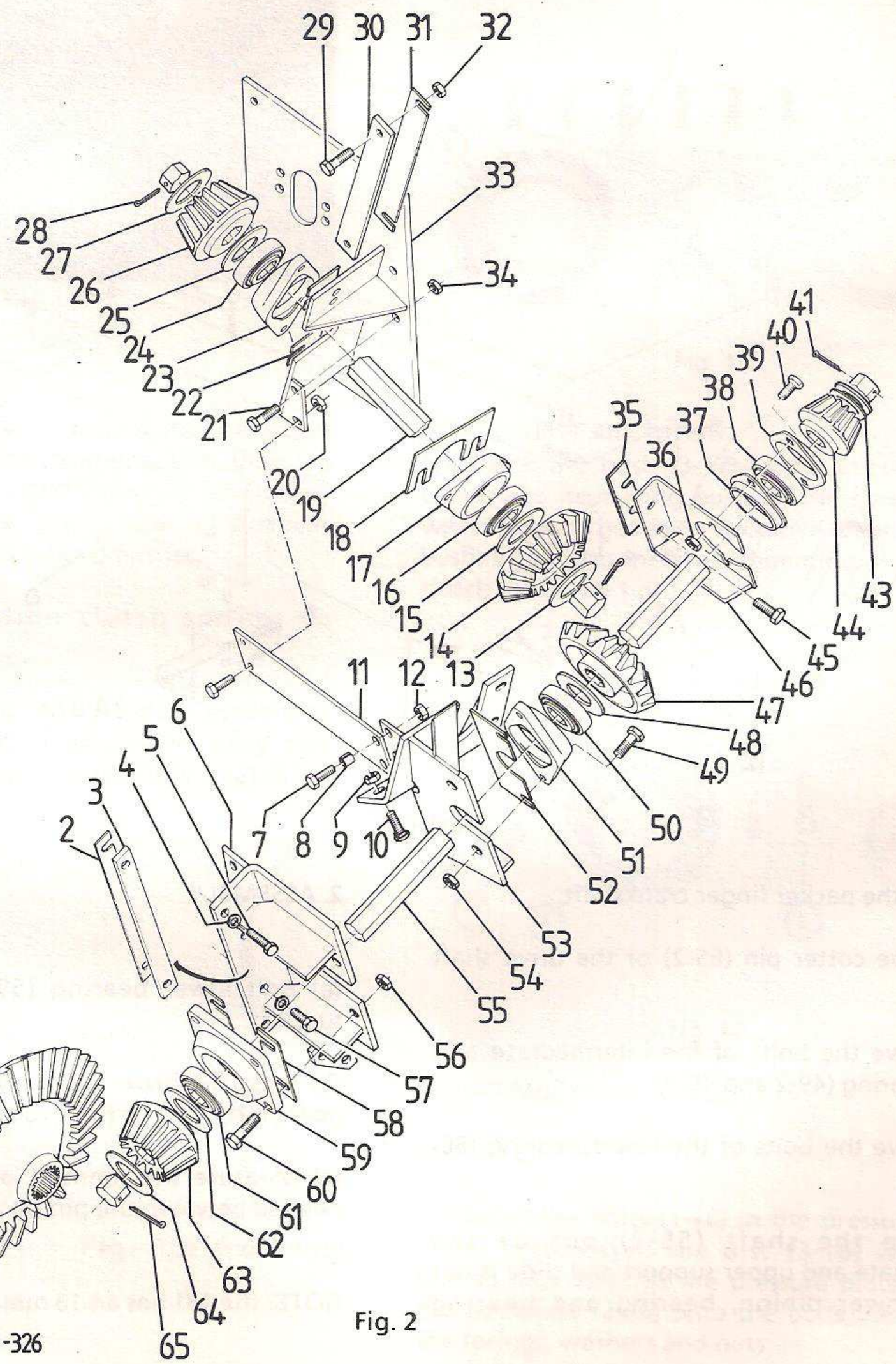
(e) Move the shaft into the lower support (6-2) and slide the lower bearing onto it (59-2). Put on the stack of shims which are determined in para. (c). For 481 put on the spacer.

(f) Slide on pinion (63-2) and put the cotter pin (65-2) in the hole.

(g) Move the shaft in the upper and intermediate bearing support (46-2 and 53-2), taking care that the bearings are at the right side of the supports.

(h) Free the packer (watch its weight) and rotate it until its stands 5-10° over its top dead centre when rotated in working direction (counter clockwise when viewed from the front).

(i) Set the needle timing as described in GROUP 4.



ED-326

Fig. 2

(j) Put a piece of light cardboard 0.6 mm thick (which is approximately twice the thickness of a standard picture postcard) between the lower pinion (63-2) and its gear and the knotter pinion (44-2) and its gear.

(k) Clamp these gears lightly with a C clamp making sure that the toe to toe alignment is correct. Check if the intermediate gears are completely free (47-2).

(l) Check if the shims (62-2) which were determined in (c) are just filling the space between the pinion (63-2) and the bearing. Adjust if necessary.

(m) If correct tighten the bolts and torque up to 70-80 Nm.

(n) Slacken the bolts of the upper support (46-2) and slide the support rearward until the bearing (38-2) rests on it.

(o) Tighten bolts (40-2). If necessary, add or remove shims (35-2) and tighten bolts (45-2).

(p) Remove the cardboard.

(q) Slacken the bolts of the packer crank drive shaft intermediate bearing (17-2).

(r) Put the cardboard between the intermediate gears and align the toe to toe contact. Clamp the gears lightly.

(s) Fill the gaps behind the bearings with shims (52-2 and 18-2) completely and tighten the bolts (49-2). Take care that the shaft is not forced into place; eventually grind out some material of the holes of the intermediate support to let the bolts pass freely. If the shaft is sprung into place it will break sooner or later

(t) Pull the shaft up as much as possible and fill the gap between the cotter pin (41-2) and knotter drive gear (44-2) completely with shims (43-2). The last shim (against the cotter pin) should be 1.5 mm thick to prevent bending.

(u) Check the gear wheel backlash (0.6-1.3 mm) on all gears in 3 places.

(v) Check the needle and packer finger timing. See group 4.

GROUP 11

ADJUSTMENTS

1. GENERAL

The efficient operation of the baler depends on the synchronised operation of several components. Worn parts, incorrect adjustment and wrong twine tension all play their part in causing malfunction of the machine. A systematic check before any adjustment is made will save time in the long term as changing worn parts will often restore the timing without the need for further adjustment.

Having satisfied himself that the baler is being correctly operated and that the packer fingers and needles are not obviously out of time, the serviceman is recommended to check the following adjustments and settings.

2. TWINE THREADING AND TENSION

(a) The twine is always drawn from the inside of the ball. When two balls are carried in each compartment of the twine chest, tie the outside end of the ball in use to the inside end of the adjacent ball with a firm square knot and trim off the loose ends.

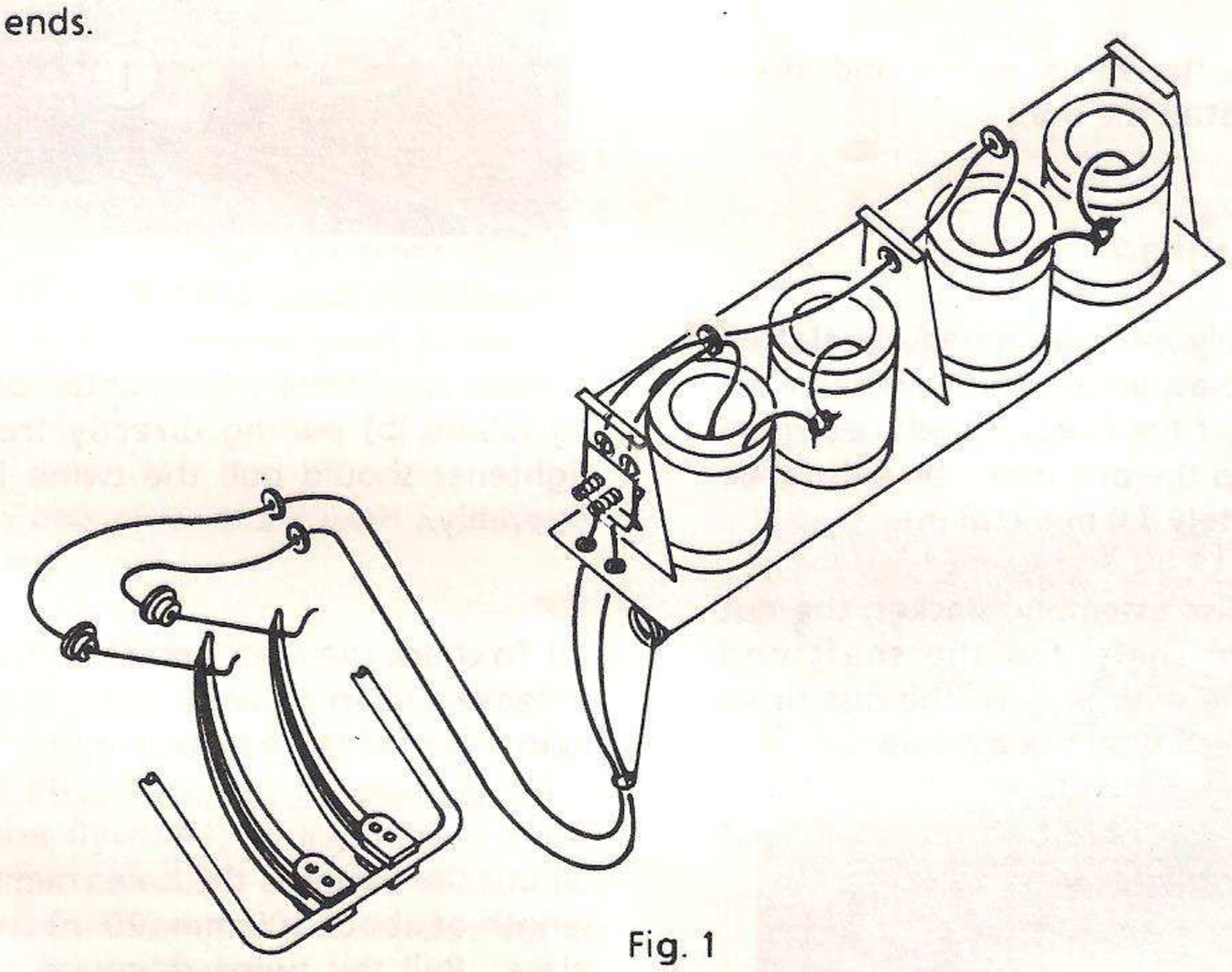


Fig. 1

(b) Thread the needles as shown in Figure 1 noting that the twine from the right compartment feeds the left needle and the twine from the left compartment feeds the right needle.

(c) Pull the ends of the twine into the balechamber and secure to some stationary member at the top rear. Lift the trip rod to trip the mechanism and turn the flywheel by hand to complete a tying cycle.

(d) Wear on the twine tensioner could prevent the correct tension being obtained. To check the twine tension, attach a spring balance to each twine directly below the twine chest lower grommets. Tension is correct when a load of 0.5 to 1 kg (1 to 2 lb) will pull twine (plastic or sisal) through the tensioner. Adjust the nuts as required to achieve the correct tension.

3. KNOTTERS

1. Knotter Cam Gear End Float

(a) Split tapered adjusting collars (1 & 2-2) are provided on the knotter shaft to permit adjustment to compensate for wear on the knotter frame and cam gear hubs (3-2). Wear will show as sideways movement of the cams.

ADJUSTMENTS

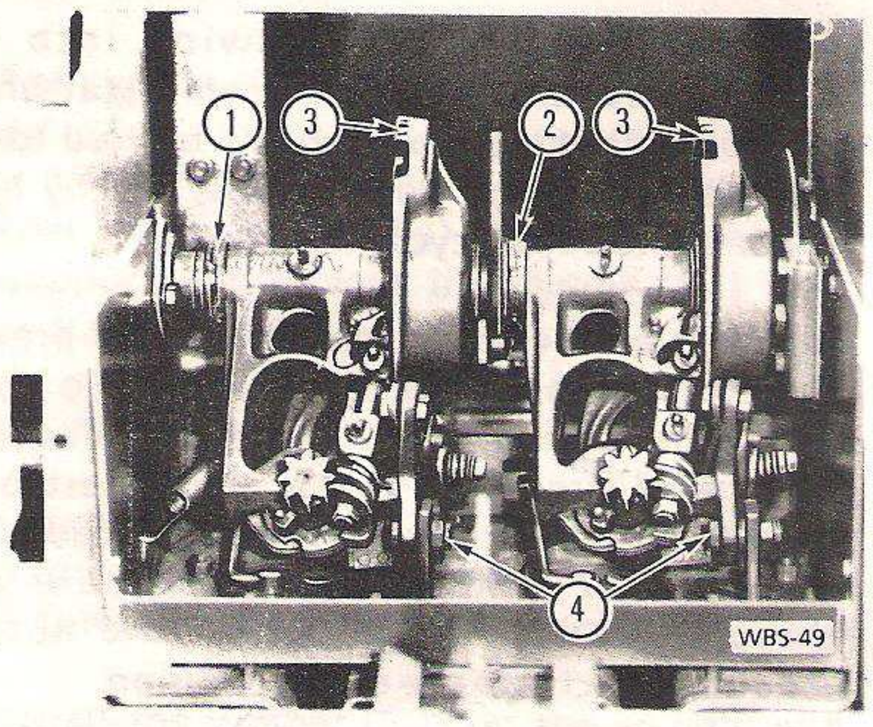


Fig. 2

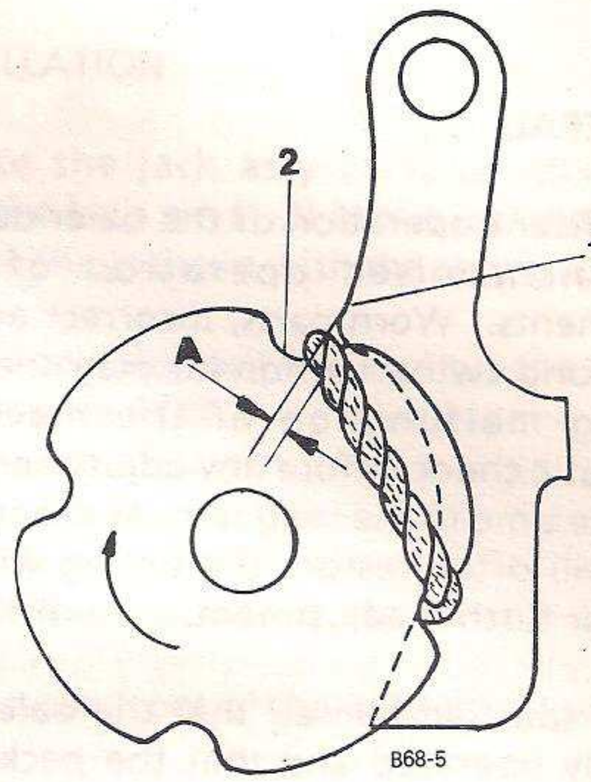


Fig. 3

(c) Remove the locking wire on the right collar (2-2) then use two punches to expand the collar until sideways movement of the cams is eliminated. Rotate the knotter assembly on the shaft to ensure that free movement exists without end float. Lock the collar by wiring around the pins in the direction the collar was expanded.

(d) Position the knotter to its anchor and insert the bushes, then install the bolt.

2. Disc Assembly Timing

(a) The disc assembly must be timed in relation to the keeper blade assembly. With twine in the disc (2-3) the nose of the keeper blade assembly (1-3) should overlap the disc notch by a distance (A-3) of approximately 3.0 mm (1/8 in).

(b) To adjust the disc assembly, slacken the nut (1-4) on the worm shaft, tap the shaft end lightly to loosen the worm. Turn the disc drive gear (2-4) as required to set the overlap.

NOTE - The worm can only be turned without twine in the keeper blade assembly.

3. Keeper Blade Setting.

(a) The keeper blade assembly retains the twine in the disc assembly both during the formation of the bale and the tying of the knot. As crop conditions, density, or twine type change it may be necessary to change the disc twine tension.

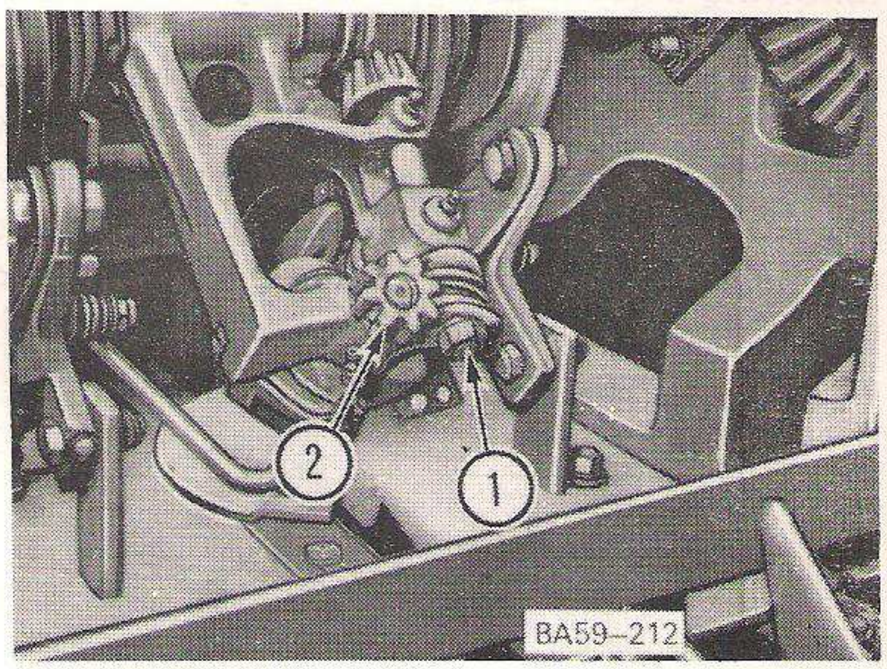


Fig. 4

In most conditions a horizontal load of 25 to 30 kg (55-66 lb) pulling directly from the twine tightener should pull the twine from the disc assembly.

(b) To check the load, complete two tying cycles to leave a scrap of twine under the keeper blade as in a normal tying cycle (Fig.5).

(c) Cut the twine in the bale chamber to leave a length of about 500 mm (20 in) from the breast plate. Pull this twine rearward out of the top notch and thread it back down between the rear disc and knotter frame (Fig.6) to enable a direct horizontal pull to be made (Fig.7).

(d) The twine should just slip from the discs with a pull of 25 to 30 kg (55-66 lb).

ADJUSTMENTS

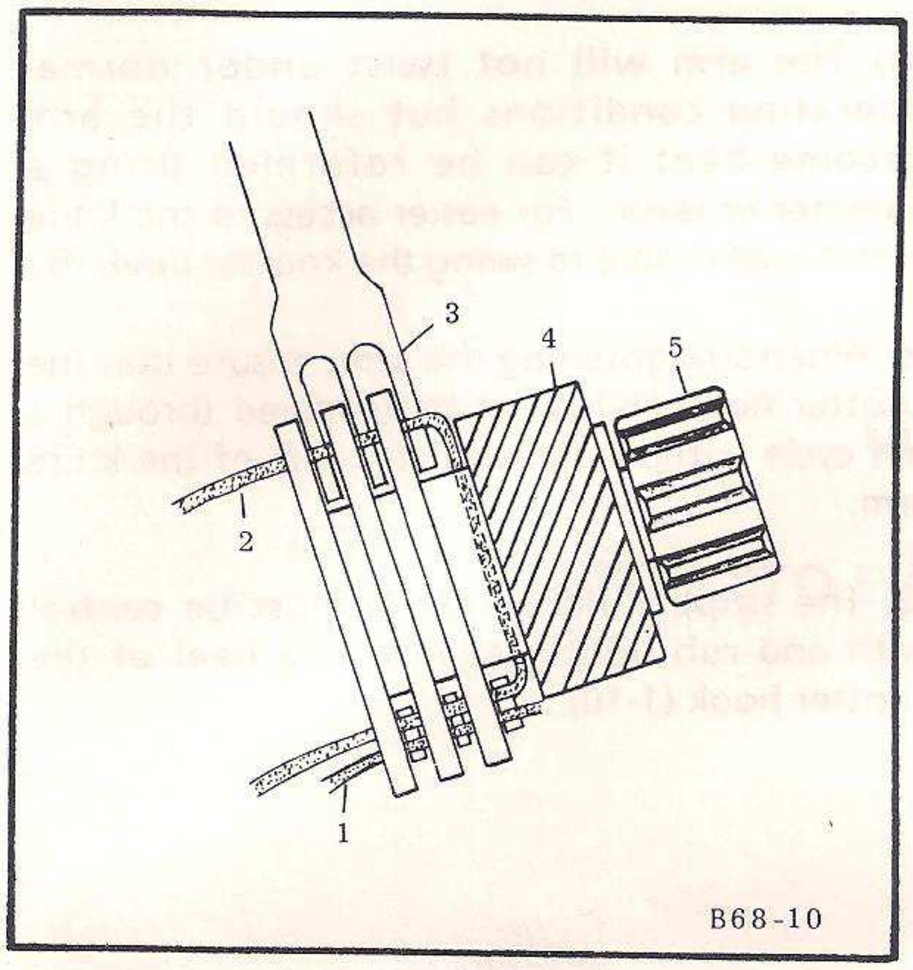


Fig. 5

1. Scrap twine
2. Disc twine
3. Keeper blade
4. Knotter frame
5. Knotter drive gear

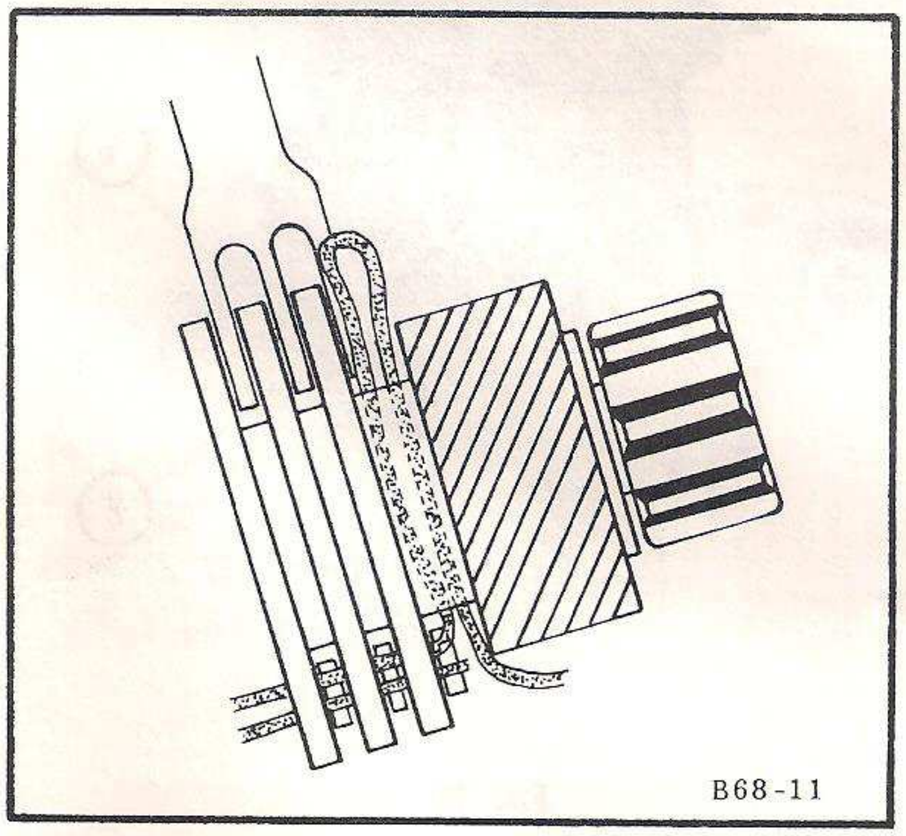


Fig. 6

(e) To adjust the load, loosen the locknut (2-8) and turn the adjusting bolt (1-8) to vary the pressure on the leaf spring (3-8) so that the correct load is obtained. Tighten the locknut and thread the knotter.

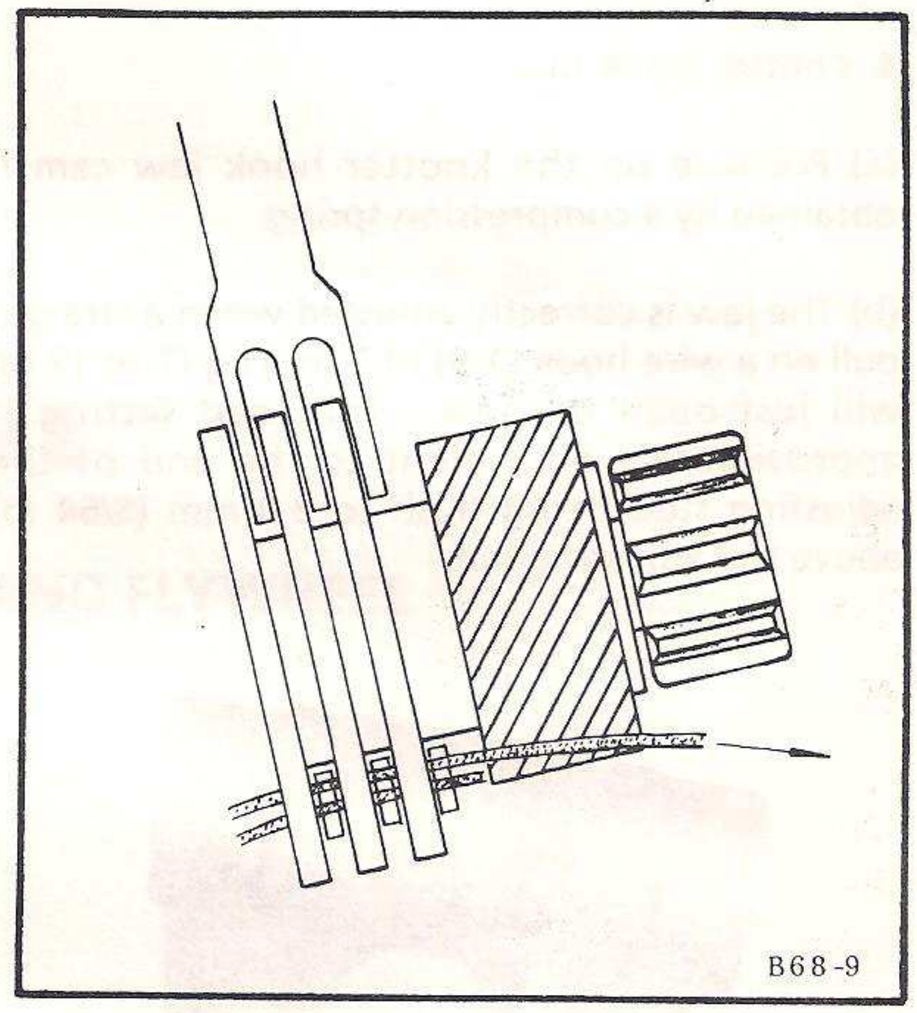


Fig. 7

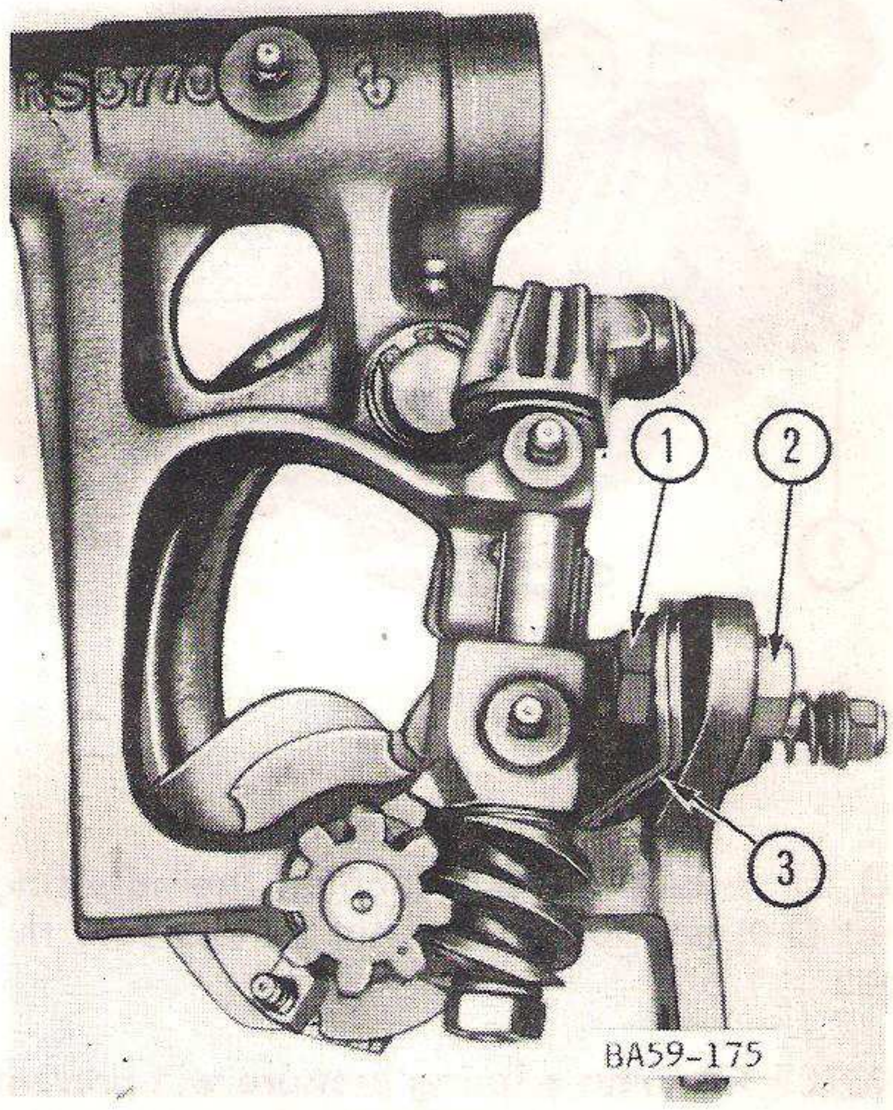


Fig. 8

Excessive pressure could result in twine breakage and wear on the knotter components. Low pressure could result in the twine being pulled from the disc causing a miss tie.

4. Knotter Hook Jaw

(a) Pressure on the knotter hook jaw cam is obtained by a compression spring.

(b) The jaw is correctly adjusted when a straight pull on a wire hook (1-9) of 3 to 5 kg (7 to 12 lb) will just open the jaw. This load setting is approximately equivalent to the end of the adjusting stud being flush to 2.0 mm (5/64 in) above the adjusting nut.

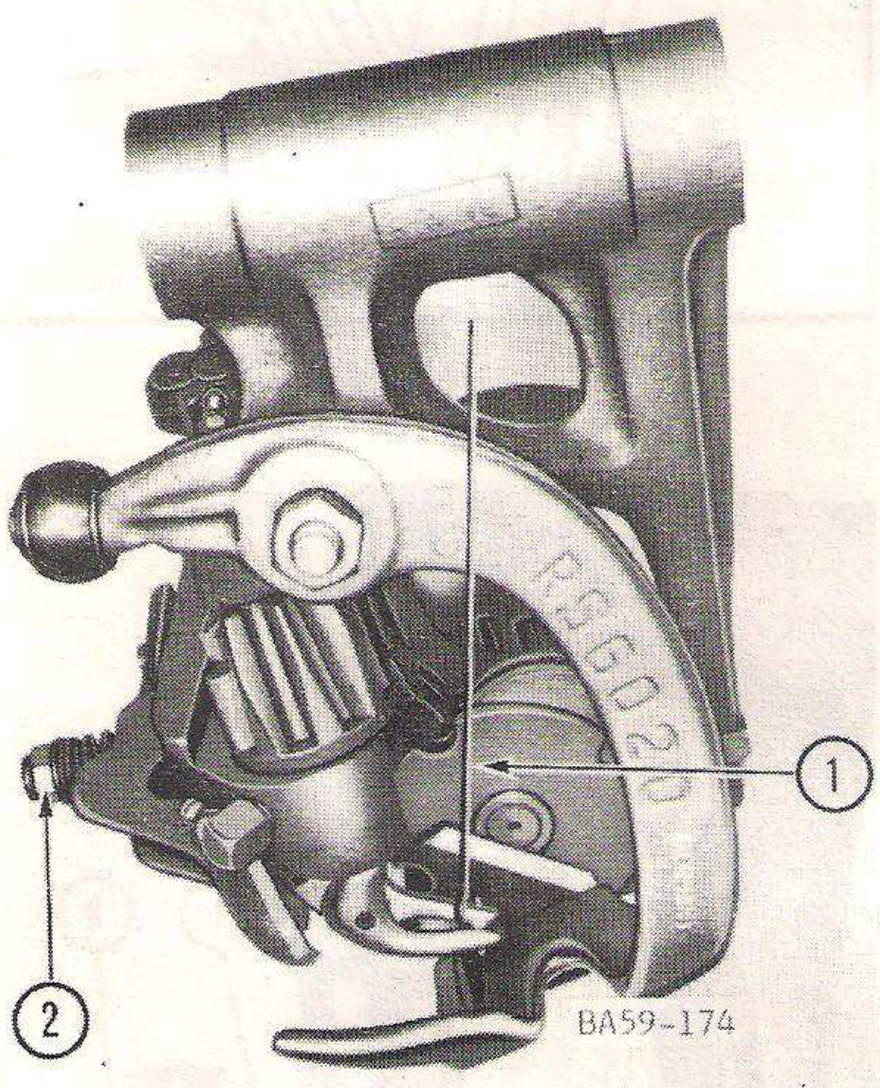


Fig. 9

(c) To increase the pull, tighten the adjusting nut (2-9) and loosen the nut to decrease the pull.

NOTE - Too high a spring pressure will prevent the knot slipping from the hook and tear the twine, while too low a pressure will result in a loose knot or no knot at all

5. Knife Arm/Stripper Arm

(a) As the knife arm acts as a twine guide, all edges must be rounded and all surfaces kept smooth, especially in the V of the arm. A new arm must be fitted if twine grooves appear in the V.

(b) The arm will not twist under normal operating conditions but should the arm become bent it can be reformed using a hammer or lever. For easier access to the knife arm it is advisable to swing the knotter upward.

(c) When straightening the arm, ensure that the knotter hook (1-10) can be revolved through a full cycle without striking any part of the knife arm.

(d) The stripper flange (2-10) must be central with and rub lightly against the heel of the knotter hook (1-10).

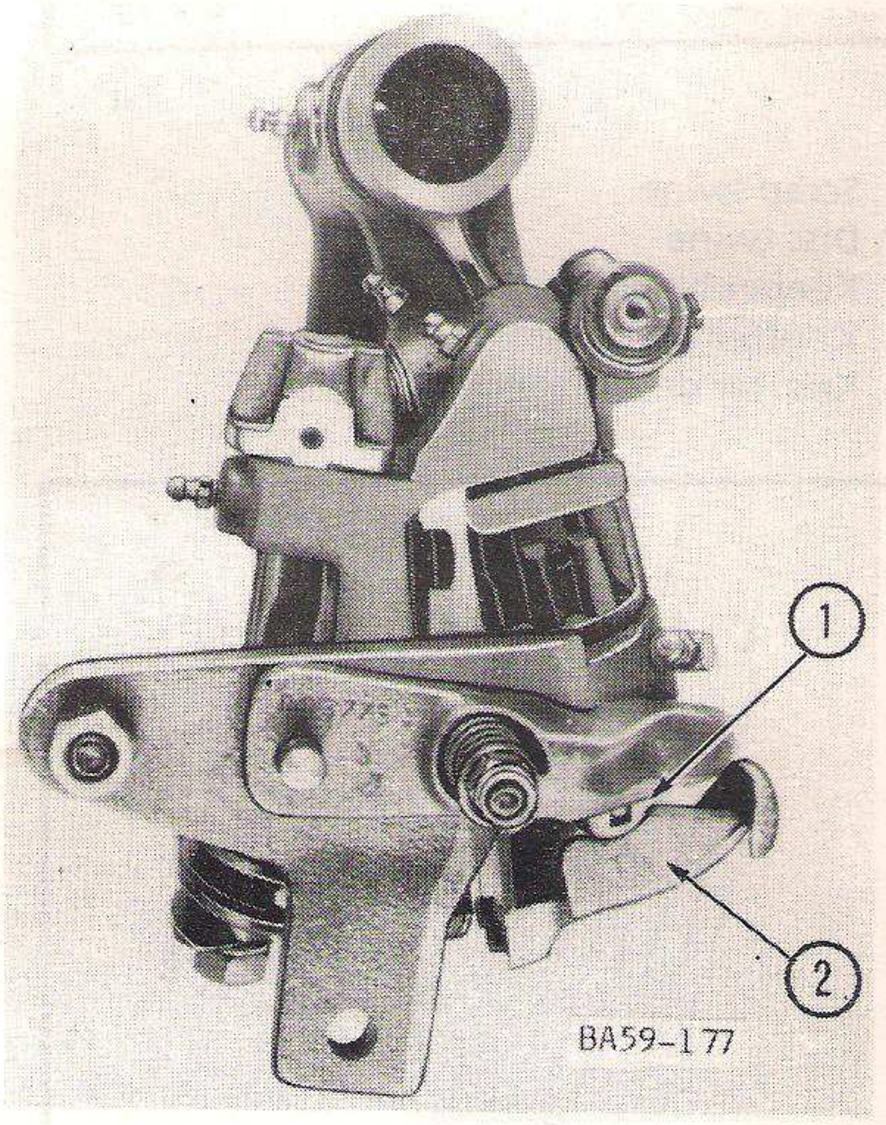


Fig. 10

(e) In its extreme position the stripper flange (2-10) should be not less than 8 mm (5/16 in) and not more than 15 mm (9/16 in) (A-11) past the tip of the knotter hook.

NOTE - Any adjustments made may easily have an adverse effect on another aspect It is essential to cycle the baler by hand to check the operation of the knife arm etc. before operating at normal speed.

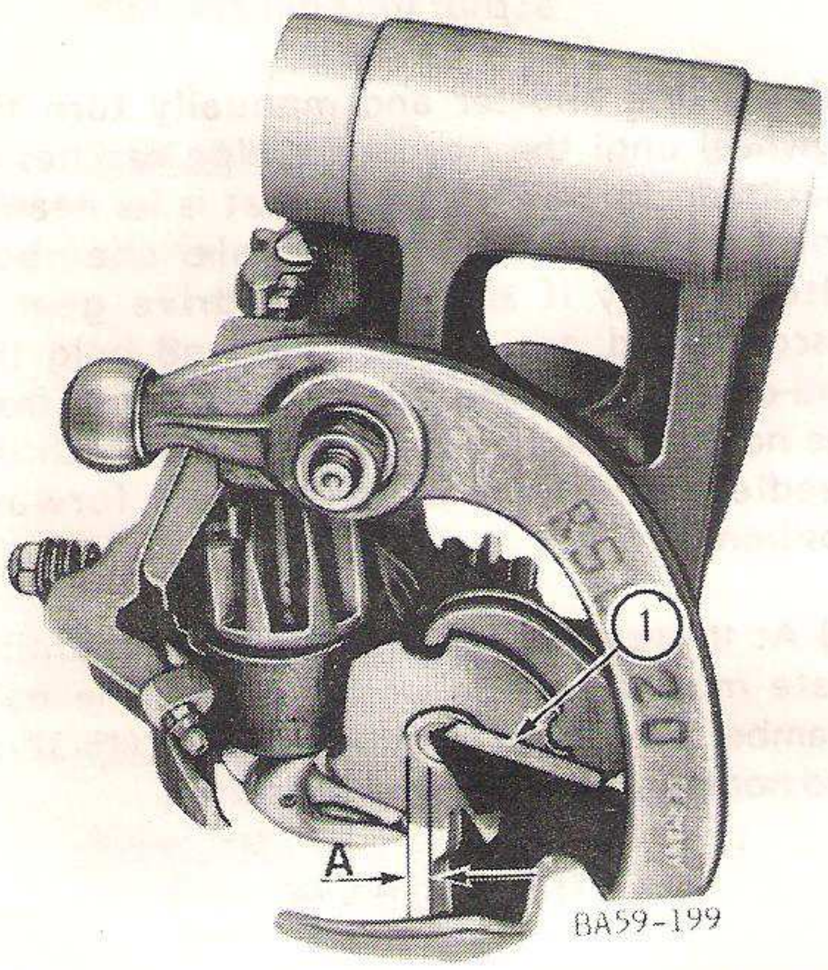


Fig. 11

6. Twine Knife

(a) The twine knife (1-11) is attached to the knife arm by two screws and is easily removed for grinding or sharpening. It cuts both the needle twine and the disc twine, the remaining scrap of disc twine being swept out by the cleaner blades in the next tying cycle leaving short pieces of twine on top of the bale.

(b) To check knife sharpness, place a loop of twine over the blade. The twine should be cut cleanly when the loop is pulled along the knife edge at an angle of 90 degrees to the back face.

Uneven or rough cutting during operation indicates the need to sharpen or change the knife.

7. Knotter Hook and Disc Pinions

The flats on these two pinions should rub lightly against the respective faces of the cam gear. A clearance of 0-0.2 mm is required.

4. NEEDLES

1. Needle Adjustment

(a) It is important that the knotter is threaded before final adjustment to the needle is carried out. This ensures that the keeper blade has retracted to give an unobstructed path to the needle as it passes over the disc assembly. If necessary, set the needle in an approximate position and thread the knotter by manually cycling the baler, taking extreme care as the needle passes through the knotter assembly.

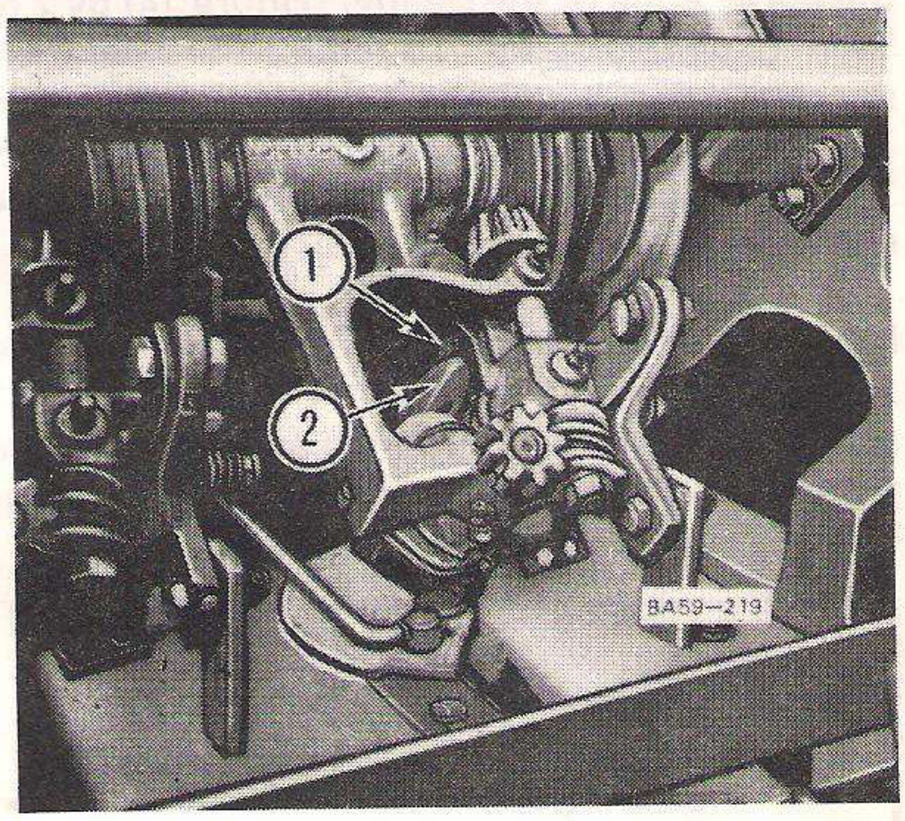


Fig. 12

(b) To set the needle, trip the knotter and turn the flywheel by hand until the needle tip is just passing over the disc worm gears. Alternatively, if the knotter drive gear is disconnected, disconnect the upper needle pitman bearing, allowing the needle tie pipe and needles to swing freely. Lift the needle to the position mentioned above.

(c) The needle should just clear or rub lightly against the side of the knotter hook pinion gear (Figure 12). To adjust the needle, slacken off nut "A" (Figure 13) and move the needle to left or right as required. (It may also be necessary to slacken screws "B" and "C").

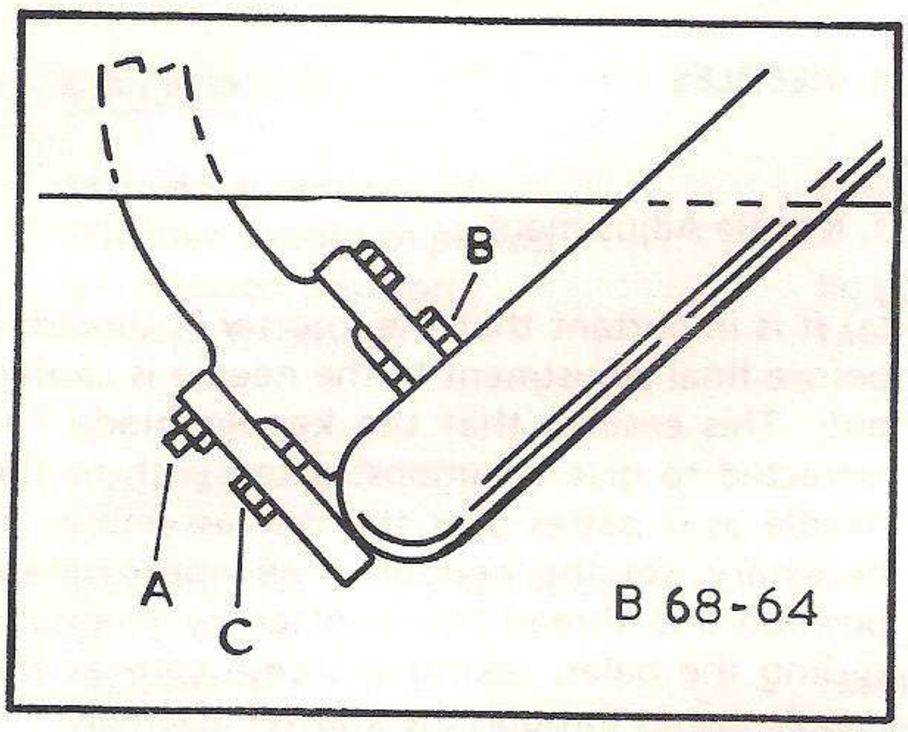
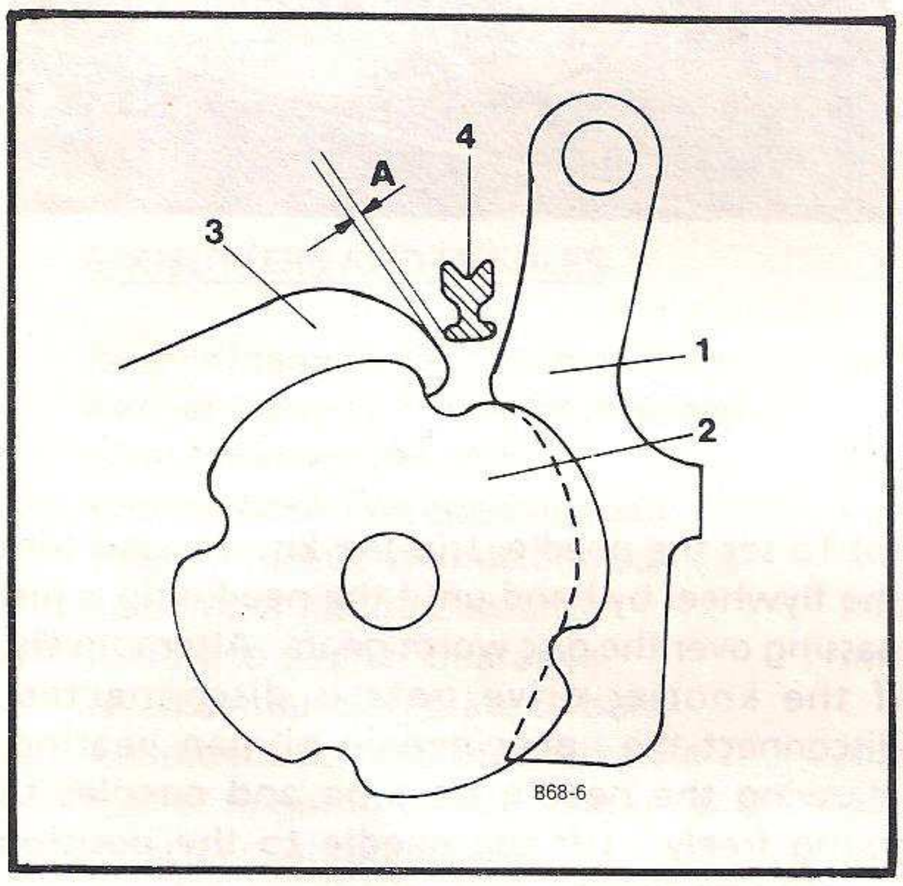


Fig. 13

(d) The inside edge of the needle should clear the upper edge of the cleaner (Figure 14) by 2 to 5 mm (5/64 to 3/32 in). To reduce the clearance, slacken screw "B",(Figure 13) and tighten screw "C". To increase the clearance , slacken screw "C" and tighten screw "B". It will also be necessary to slacken nut "A".

NOTE - After carrying out the above adjustments ensure that nut "A" and screws "B" and "C" are securely tightened and if the needle pitman has been disconnected, put in the shear bolt and tighten it.



A = 2 to 5 mm (5/64 to 3/32 in)

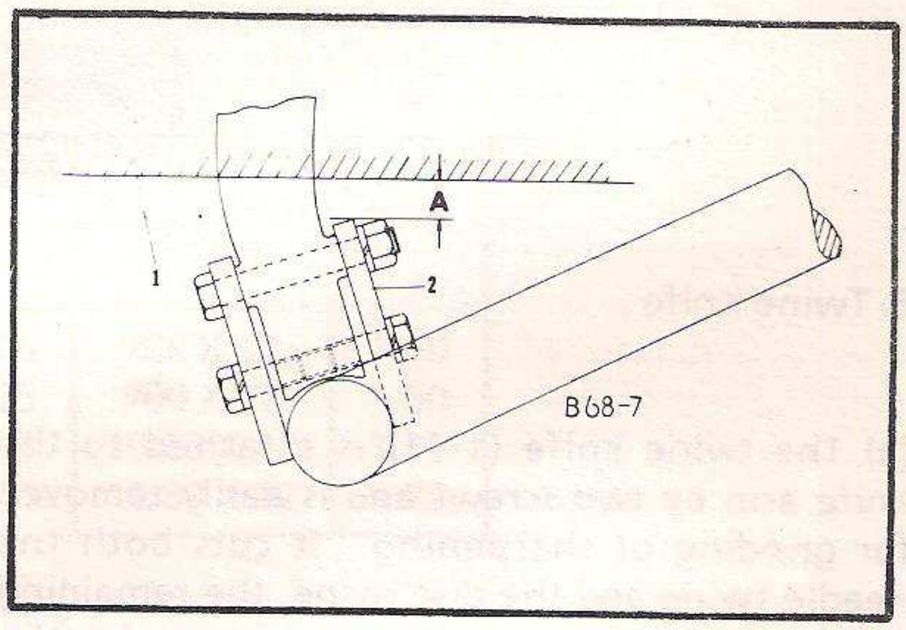
1. Keeper blade
2. Twine disc
3. Cleaner
4. Needle

Fig. 14

2. Needle Penetration

(a) Trip the knotter and manually turn the flywheel until the needle tie pipe reaches its maximum forward position, that is its nearest point in relation to the bale chamber. Alternatively if the knotter drive gear is disconnected, trip the knotter and hold the anti-drift lockout latch (471-481 balers) from the notch in the trip dog carrier then push the needle tie pipe to its maximum forward position.

(b) At this point the upper needle mounting plate must clear the underside of the bale chamber (Figure 15) by at least 12 mm (15/32 in) and not more than 16 mm (5/8 in).



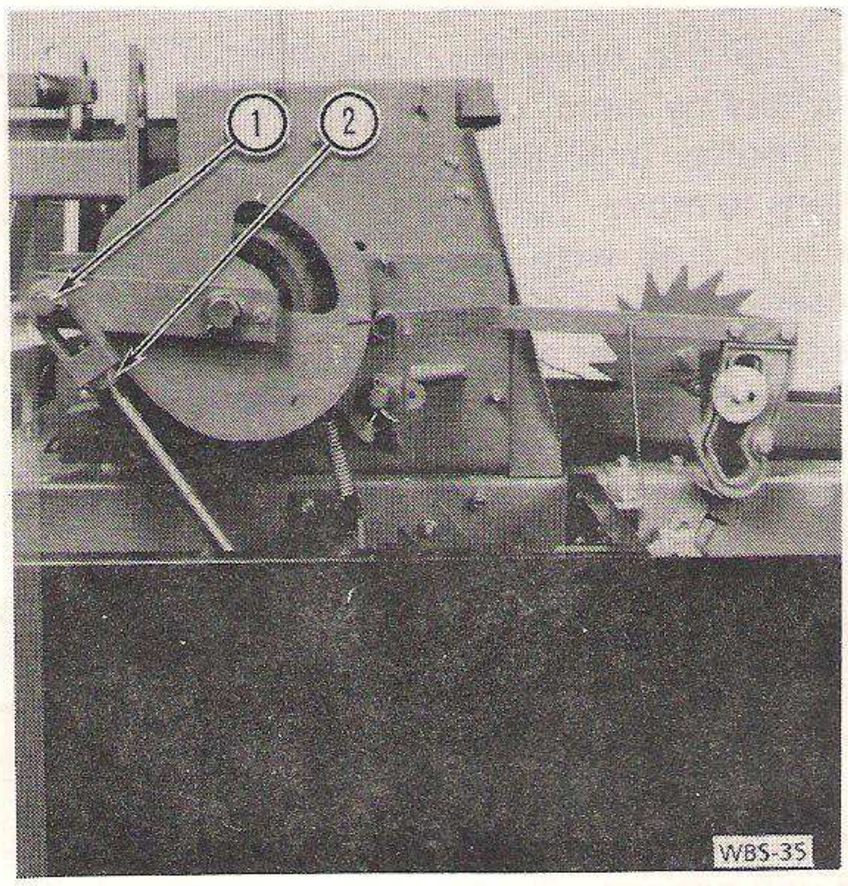
1. Bale chamber base plate
2. Needle mounting plate

A = 12 to 16 mm (15/32 to 5/8 in)

Fig. 15

(c) If necessary, adjust the clearance by varying the length of the needle pitman shank (Figure 16). Disconnect the upper pitman bearing from the trip dog carrier, release the locknut beneath the bearing and screw the bearing in the direction required Tighten the locknut and reassemble the bearing to the trip dog carrier

ADJUSTMENTS



1. Pivot cotter pin
2. Locknut

Fig. 16

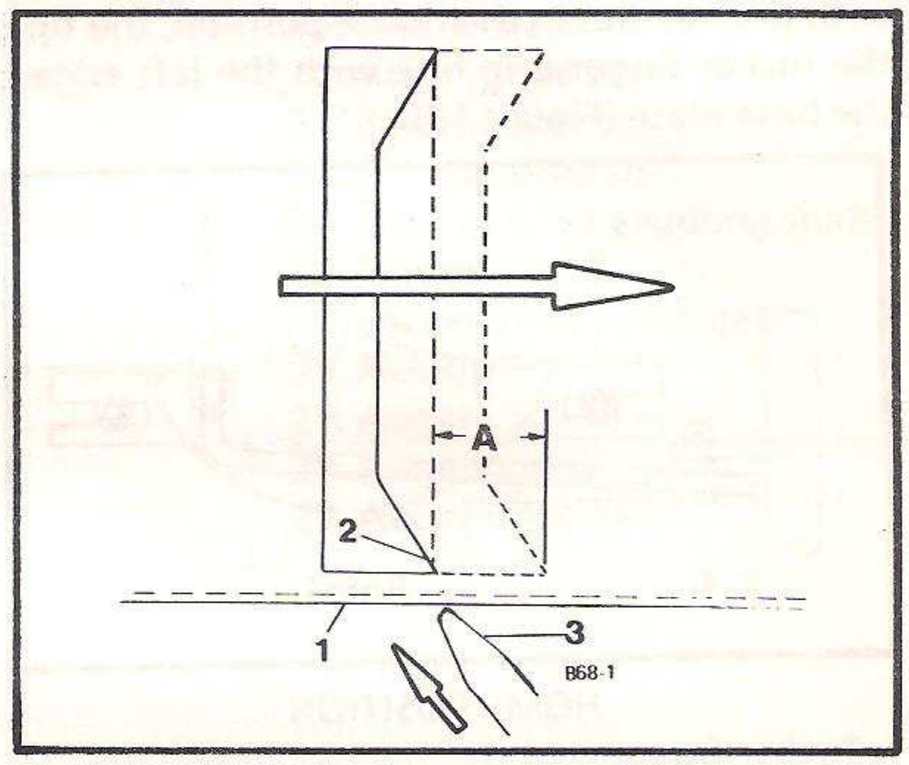


Fig. 17

3. Needle to plunger timing.

(a) The needle tips must enter the bale chamber at the same time or just after the tips of the plunger horns pass directly overhead.

(b) Disconnect the knotter drive assy., trip the knotter and hold the anti-drift lockout latch from the notch in the trip dog carrier.

(c) Push the needles forward until the needle tips are flush with the underside of the bale chamber.

(d) Turn the flywheel in the direction of rotation until the tip of the plunger horn is level with the needle tip when the plunger is on its rearward compression stroke. (Fig. 17).

A = 0 to 50 mm (0 to 2 in)
1. Bale Chamber
2. Plunger Horn
3. Needle Tip

(e) Rotate the knotter shaft of bevel gear anti-clockwise until a firm resistance is felt. That is when the bevel gear picks up the drive of the trip dog carrier, needles and knotters.

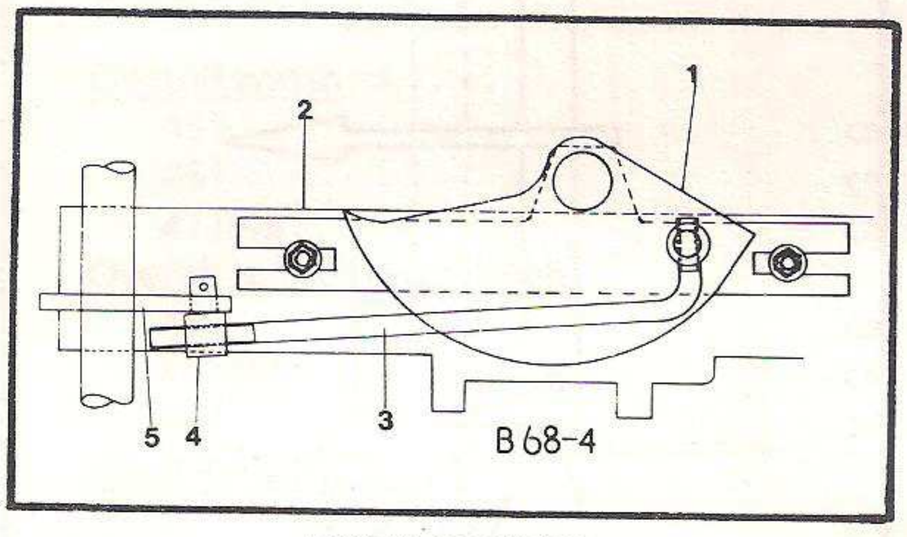
(f) Ensuring that the knotter shaft bevel gear remains in this position, install the main drive assy.

DO NOT move the plunger forward as this could result in the needles entering the bale chamber before the plunger is able to protect them.

(g) Turn the flywheel by hand to complete the tying cycle then carry out the next cycle checking that the timing is correct.

5. TUCKER FINGER TIMING AND SETTING

(a) The tucker finger timing is correct when, with the needles in the home position, the tip of the tucker finger is in line with the left edge of the base plate (Figure 18).



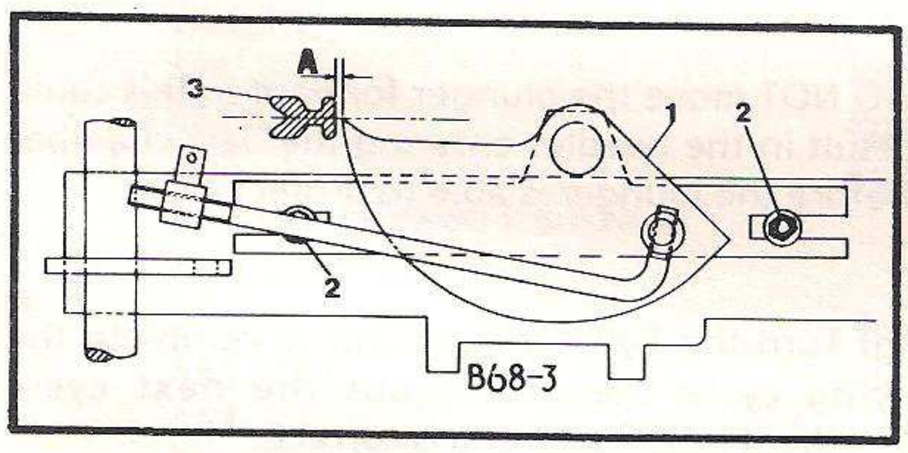
HOME POSITION

1. Tucker finger
2. Groover edge
3. Rod
4. Stud
5. Actuating arm

Fig. 18

(b) The tucker finger setting is correct when, with the tucker finger tip in line with the centre of the needle there is a gap of 2 to 5 mm (5/64 to 1/4 in) between the tucker finger tip and the inside edge of the needle (Fig. 19).

(c) Before carrying out any adjustments ensure that the needle adjustment, penetration and timing are correct. To correct the timing/setting, remove the cotter pin to disconnect the tucker finger rod stud (4-18) from the actuating arm (5-18) then move the tucker finger so that the tip is well clear of the slot in the breast plate.



WORK POSITION

A = 2 to 5 mm (5/64 to 1/4 in)

1. Tucker finger
2. Pivot bracket nuts
3. Needle

Fig. 19

(d) Trip the tying mechanism and turn the flywheel by hand, driving the needles towards the knotter until the actuating arm (5-18) just begins to move. Turn the tucker finger until the tip is in line with the centre of the needle. Loosen the pivot bracket nuts (2-19) and move the tucker finger on its mounting slots until the tip is 2 to 5 mm (5/64 to 1/4 in) from the inside edge of the needle then tighten the pivot bracket nuts.

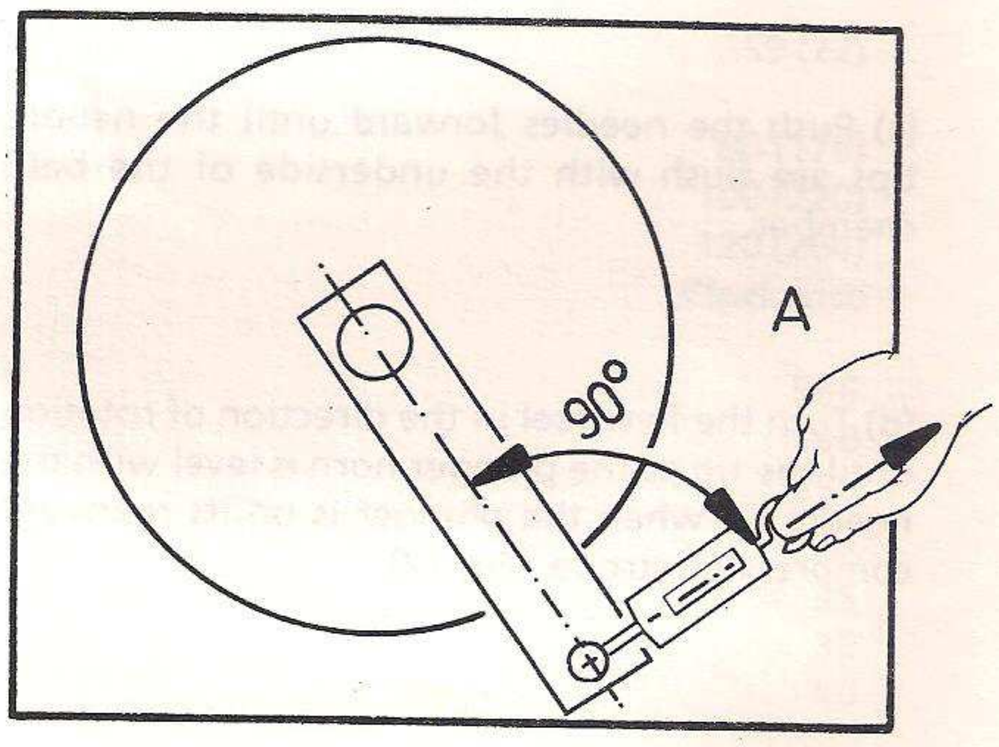
(e) Rotate the tucker finger so that the tip is well clear of the breast plate slot. Complete the tying cycle so that the needles return to the home position. Turn the tucker finger until the tip is in line with the edge of the baseplate. Screw the stud on the tucker finger rod until the peg will engage with the hole in the actuating arm. Engage the stud and install the cotter pin.

(f) Turn the flywheel by hand through a further tying cycle to check the settings before operating at normal speed.

6. KNOTTER SHAFT BRAKE

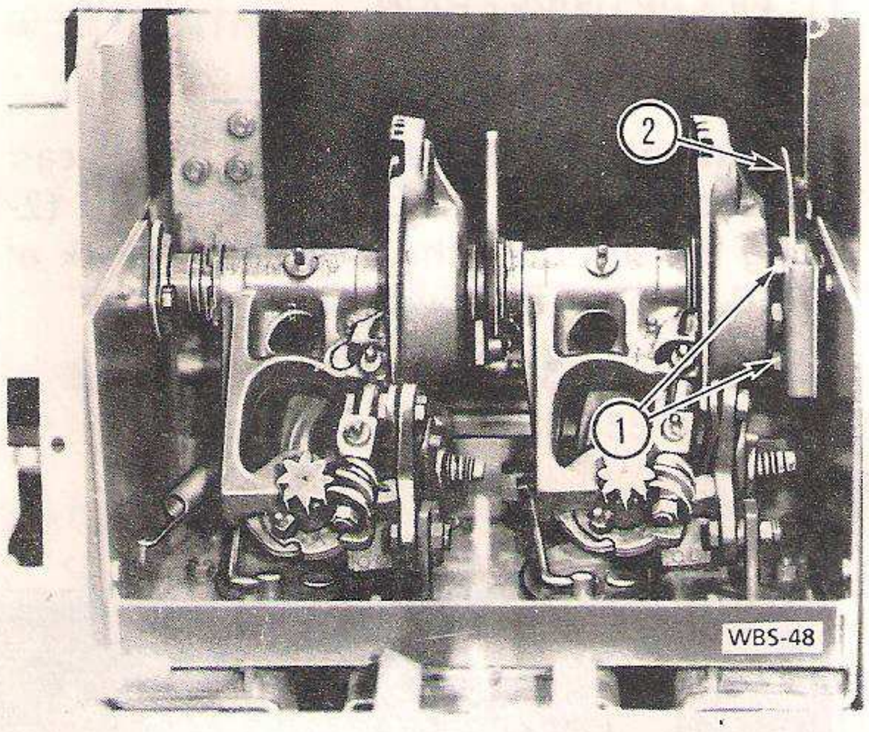
(a) Insufficient friction on the brake may allow the needles to drift into the bale chamber out of time with the plunger, resulting in failure of the flywheel shear bolt

(b) To check the setting, disconnect the needle pitman at its upper pivot then rotate the trip dog carrier clockwise until the needle crank is in the position shown in the diagram. When a new brake disc is fitted, this figure may be 280-300N because of the relative roughness of the plate.



A = 220 to 250 N

Fig. 20



1. Adjusting nut
2. Brake disc

Fig. 21

(c) Attach a spring balance to the crank. The setting is correct when the brake just slips with a force of 220-250 N applied (A-20).

(d) If adjustment is necessary, turn the two adjusters by an equal amount until the correct setting is reached.

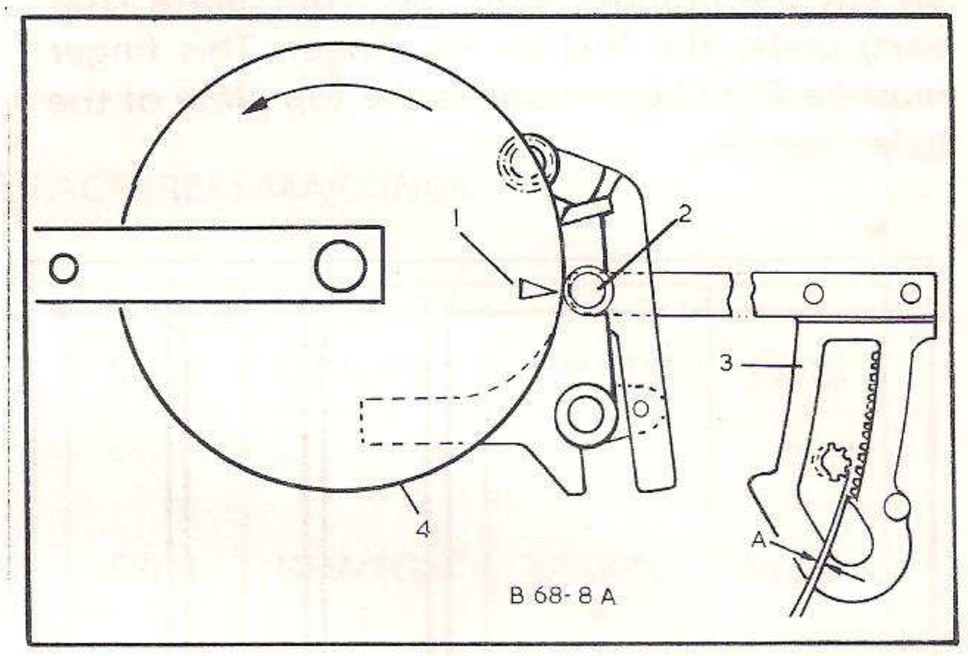
7. TRIP MECHANISM

(a) To set the trip mechanism to ensure correct drive, trip the mechanism and turn the flywheel by hand until the arrow on the trip dog carrier is in line with the trip arm roller.

NOTE - The knotters must NOT be turned against normal direction of rotation when the mechanism has been tripped. To do so will break the plastic gear arm. The trip dog carrier rotates anti-clockwise when viewed from the left.

(b) Adjust the metering wheel brackets equally as necessary to obtain the specified clearance of 3 to 6 mm (1/8 to 1/4 in) (A-22) between the splines on the metering wheel shaft and the teeth on the gear arm. Ensure that this clearance is maintained over the full length of the gear arm. Tighten the brackets and ensure that the metering wheel is correctly aligned.

Turn the flywheel to return the knotter to the home position and check that the overlap between the trip dog and the trip arm is between 9.5 to 16 mm (3/8 to 5/8 in).

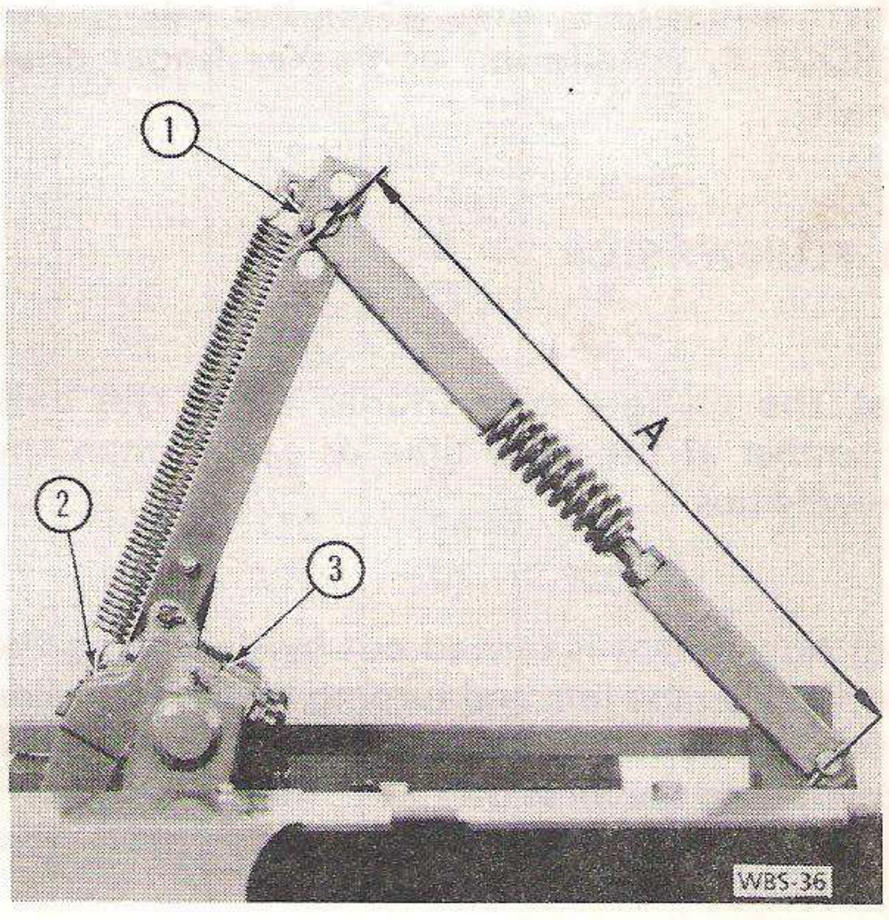


A = 3 to 6 mm (1/8 to 1/4 in)
1. Arrow
2. Trip arm roller
3. Gear arm
4. Trip dog carrier

Fig. 22

8. PACKER FINGERS

(a) Ensure that the packer relief measures 546 mm (21.5 in) on 461-471 and 604 mm on 481 between pin centres (A-23) and that the pin (1-23) is in the second hole in the packer finger arm.



A = 546 mm (21.5 in.) 461/471
A = 604 mm (23.7 in.) 481
1. Guide rod pin
2. Bearing right side
3. Bearing left side

Fig. 23

GROUP 11

ADJUSTMENTS

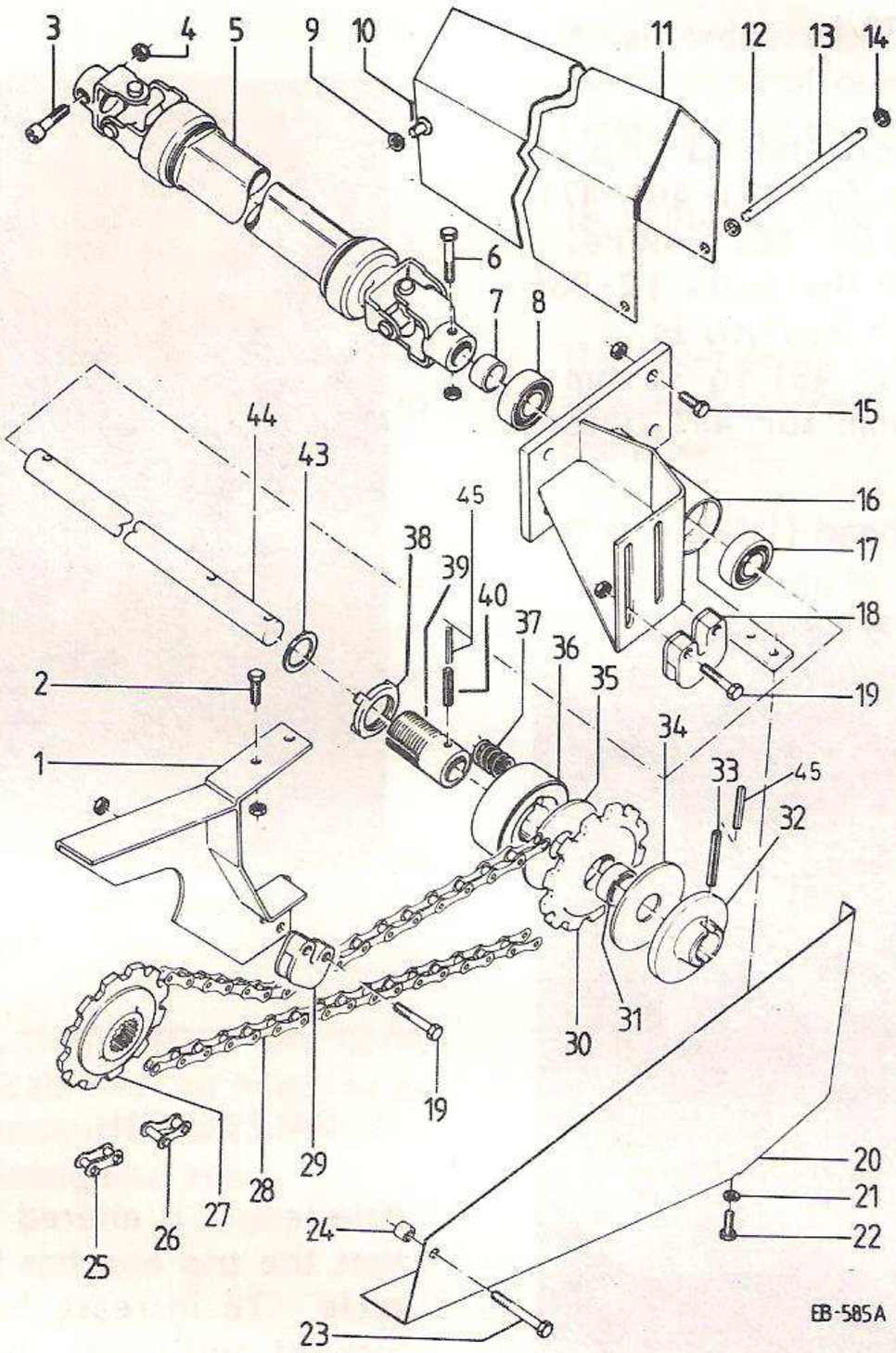


Fig. 25

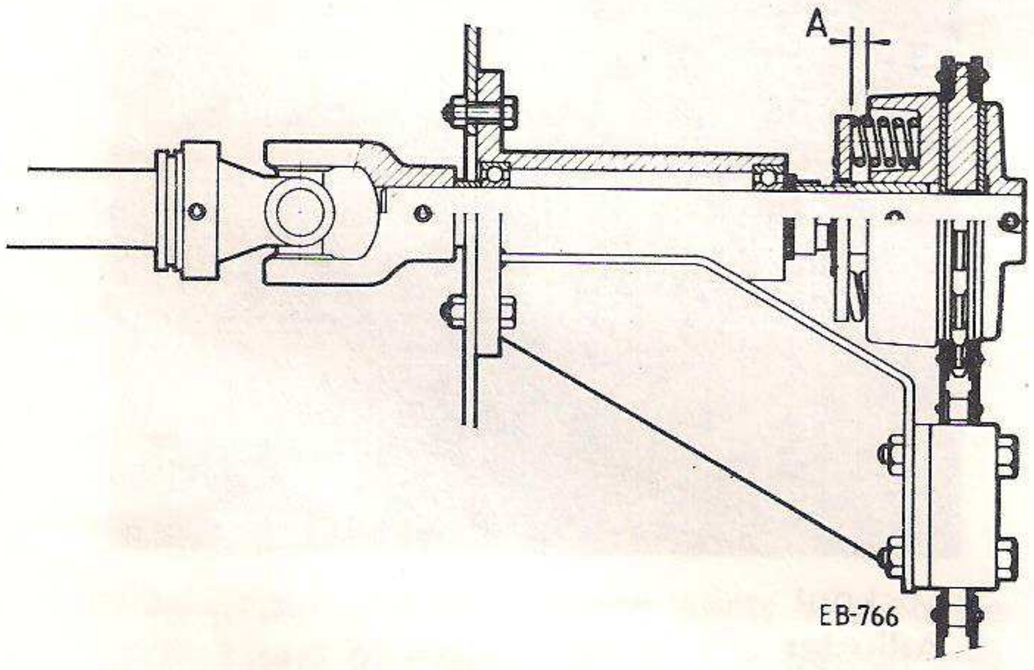


Fig. 26

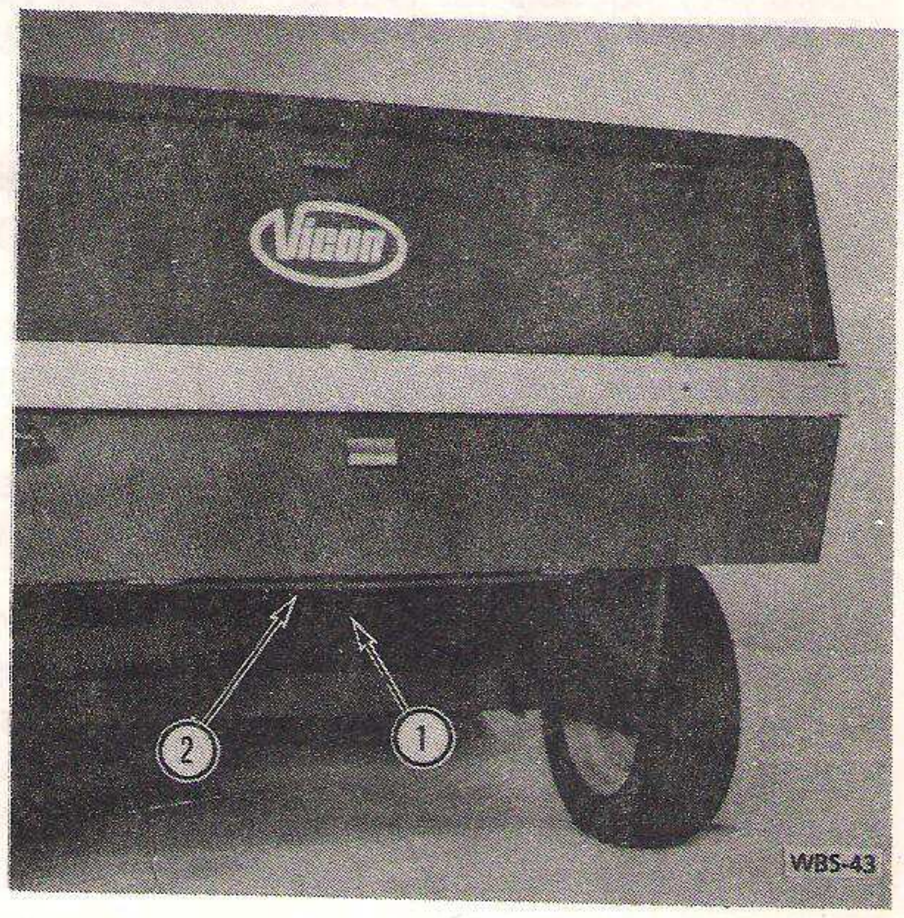


Fig. 27

14. FLYWHEEL FRICTION DRIVE

The friction drive clutch should slip at a torque of 540-560 Nm for 451-461-471 balers and 580-610 Nm for 481 balers. This will be obtained if the nuts (2-28) are tightened until each spring is compressed to 35 mm for 451 to 32 mm 461-471 balers and 40 mm for 481 balers.

Check that the shear bolt head (1-28) is to the rear.

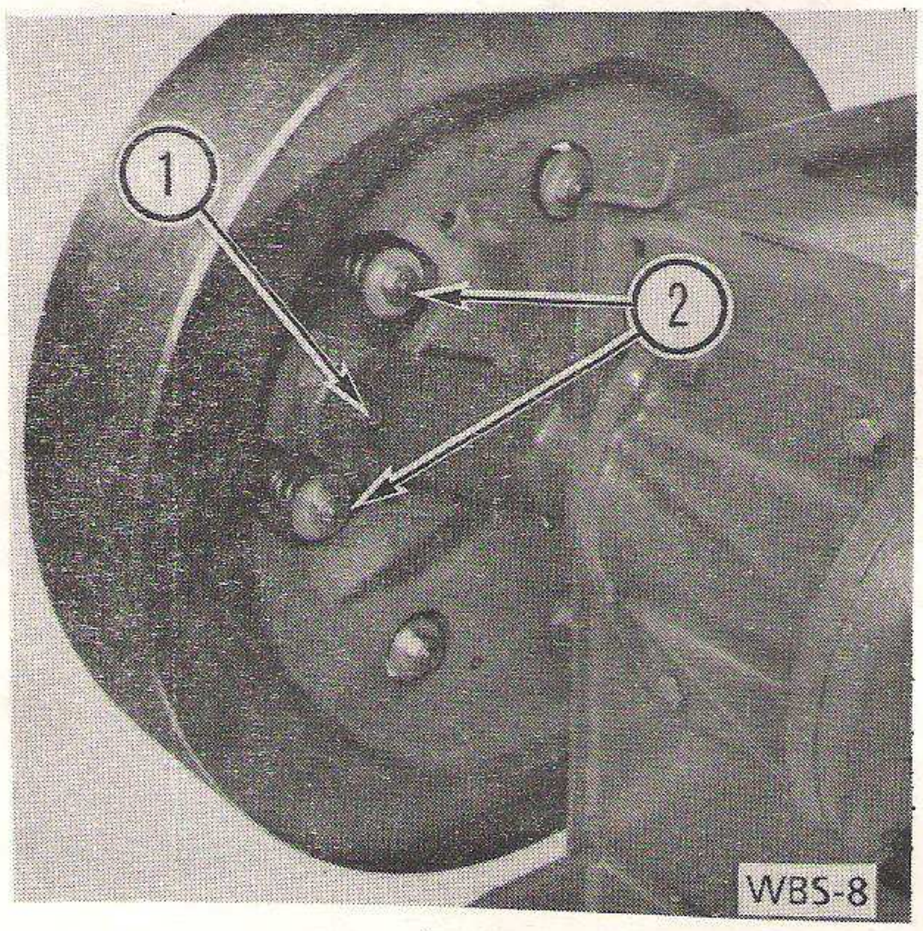


Fig. 28

15. BALE CHAMBER TENSION

(a) The bale chamber will require periodic adjustment to maintain uniform bale density. This is achieved by varying the tension on the springs by means of the screws (2-29). Adjust both screws by the same number of turns and check bale density at regular intervals. The bales should NOT be too compact.

(b) If the bales are too tight and the screws are fully open, further adjustment can be obtained by removing bale chamber wedges. These should be removed in pairs starting at the rear. A pair consists of the wedges directly across the chamber from each other.

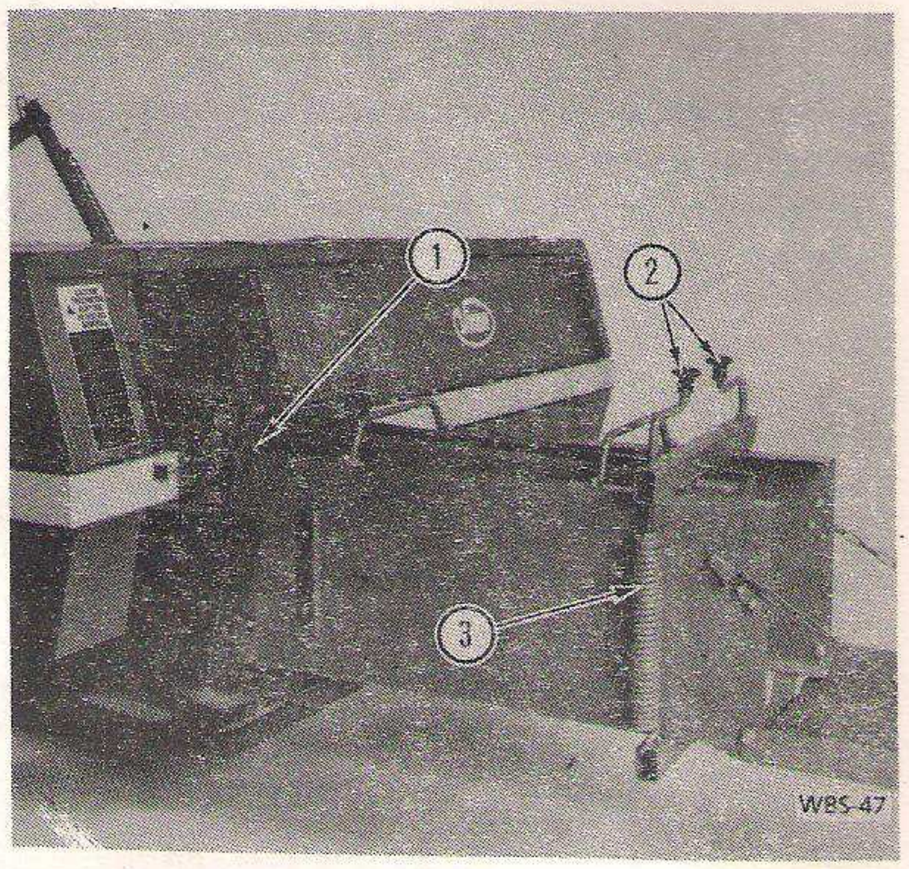
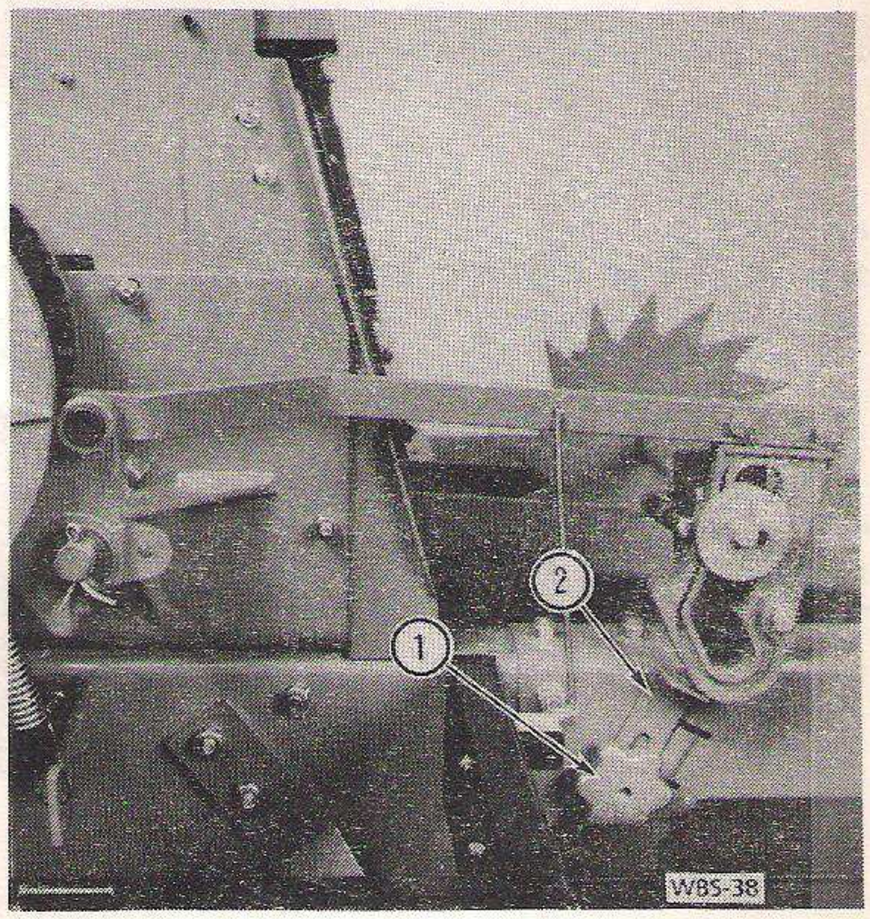


Fig. 29

16. BALE LENGTH

Bale length is altered by varying the distance that the trip arm has to lift to start the tying cycle. To increase bale length, loosen the locknut and lower the adjuster. Tighten the locknut. Set the adjuster higher to make shorter bales.



1. Locknut
2. Adjuster

Fig. 30

GROUP 11

ADJUSTMENTS

17. SHEAR DEVICES

(a) There is a shear bolt (Fig. 33) to protect the needles . If the needles are prevented from following their normal sequence of operation this bolt will shear, allowing the plunger, pickup and packer fingers to continue working.

(b) If the obstruction is such that the needles are left in the bale chamber, the plunger stop will cause the flywheel shear bolt (Fig.31) to shear so that the whole machine will stop operating.

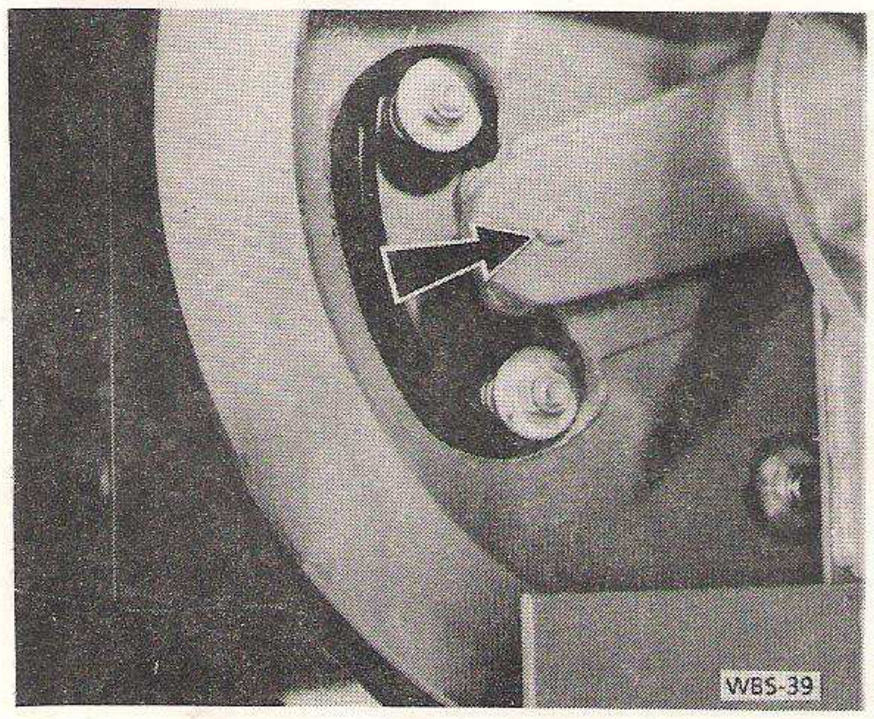


Fig. 31

(c) A shear bolt (2-32) on the balers will protect the feed mechanism against obstruction or extremely heavy charge.

(d) When the cause of shearing has been determined and the obstruction removed, knock out any remaining pieces of shear bolt and check the shear bolt bushing to see that it is tight and undamaged.

(e) Install the new shear bolt (head to rear in flywheel and packer fingers,) and tighten to 22 to 24 Nm (16 to 18 lbft).

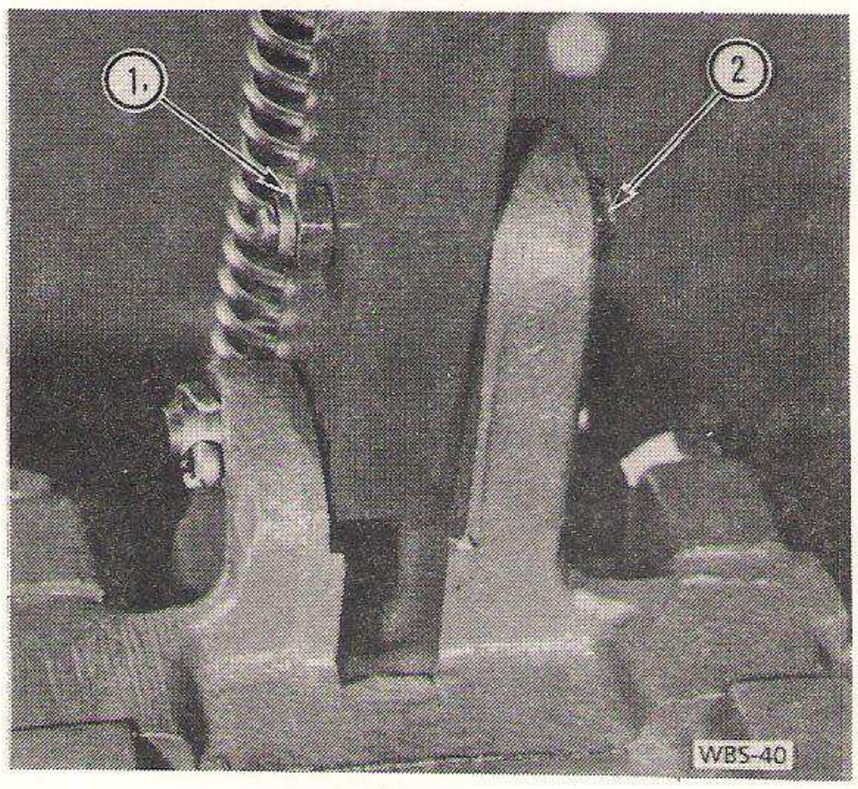


Fig. 32

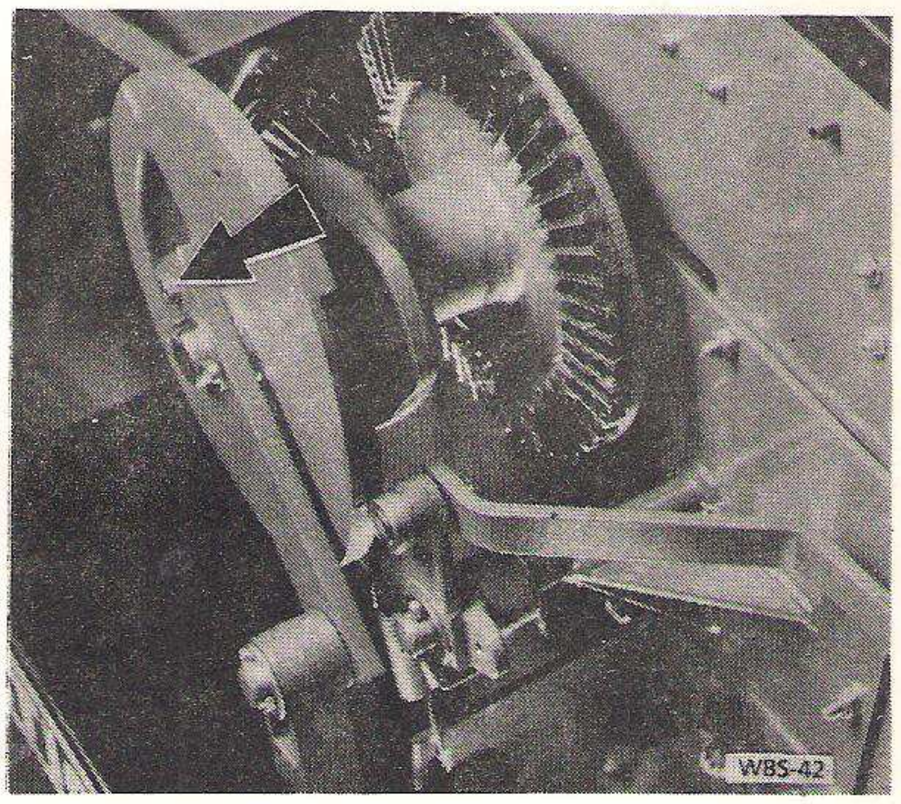


Fig. 33

18. FAULT TRACING

Reference to the Fault Tracing section of the Operators Manual will give a ready answer to the problem of bales being incorrectly tied.