

**Servicemen's
Reference
Book**

Caterpillar
REG. U.S. PAT. OFF.

**D4
Tractor**

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS, U.S.A.

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Foreword

IT is the purpose of Caterpillar Tractor Co., to build into its products the capability of a long life of useful work. The records of tens of thousands of users testify to success in the achievement of that purpose. It is natural, however, that length of life and cost of operation and maintenance will vary — top records are the reward of the owners and operators who are diligent and conscientious in the care, operation and maintenance of their machines.

The Operator's Instruction Book, a copy of which is supplied with each machine, tells what to do, and how and when to do it, with regard to the day-to-day lubrication, operation and maintenance of the machine. It is urged that these instructions be studied carefully and reread frequently until the operator is thoroughly familiar with them. By following the instructions, the operator is best assured of obtaining maximum life and performance from his machine and of minimizing the frequency, number and cost of repairs.

Even the best of care will not eliminate the necessity, in course of time, of making minor repairs or complete reconditioning.

Your "Caterpillar" dealer has exceptionally complete facilities for such work. He carries a stock of genuine replacement parts and has in his employ competent factory trained servicemen. For work that cannot be done in the field, dealers have well-equipped shops. Both the shop and the field servicemen have many special tools, designed and developed by "Caterpillar", that make easier and quicker the disassembly and assembly operations.

Though most "Caterpillar" owners prefer to make use of the excellent service and shop facilities of their dealers, some are themselves skilled mechanics or have such mechanics in their employ for reconditioning their equipment. To those owners this book, issued as a guide for "Caterpillar" dealer servicemen, will be of equal value.

The special tools pictured in various operations throughout are among the many which can be purchased from dealers. These tools are illustrated and listed in the Catalog for Service Tools, a copy of which is available on request.

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SPECIFICATIONS

POWER TRANSMISSION UNITS

Flywheel Clutch

Clearance between shaft and sliding collar026 - .030 -in.
Maximum permissible clearance050 -in.

Transmission

Reverse idler gear bearing backlash006 - .008 -in.
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Bevel Gear

Bevel gear and pinion backlash (as marked on bevel gear) or008 - .010 -in.
Bevel gear bearing pre-load	Adj. Nut

Steering Clutch

Clearance between shaft and pressure plate bushing . . . . .	.002 - .004 -in.
Maximum permissible clearance . . . . .	.015 -in.

Clutch Springs

Outer	
Pounds pressure	161-178
When compressed to	3 ¹ / ₈ -in.
Inner	
Pounds pressure	123-136
When compressed to	2 13/16-in.
Steering clutch, minimum overall width plates and discs	3 ¹ / ₈ -in.
Steering clutch inner drum-to-shaft press fit, tons	20
Steering clutch lever adjustment, free play	3-in.

Brakes

Adjustment	
Distance pedal depressed	3 to 4-in.
Turns to back screw off underneath transmission case	1 ¹ / ₂

Final Drive

Flange-to-final-drive pinion press fit, tons	15
Sprocket shaft-to-case press fit, tons	20
Sprocket-to-hub press fit, tons	25

TRACK ROLLER FRAME GROUP

Track Roller Frame

Outer bearing clearance.....	.006 - .009 -in.
Maximum permissible clearance outer bearing	.025 -in.
Inner bearing clearance.....	.008 - .010 -in.
Maximum permissible clearance inner bearing	.040 -in.
Minimum thickness of wear strip for front idler	1/4-in.

Track Rollers

Shaft clearance .....	.005 - .009 -in.
Maximum permissible shaft clearance .....	.050 -in.
End clearance .....	.010 - .028 -in.
Maximum permissible end clearance .....	.050 -in.

Track Carrier Rollers

Shaft clearance .....	.003 - .005 -in.
Maximum permissible shaft clearance .....	.025 -in.
End clearance .....	.015 - .033 -in.
Maximum permissible end clearance.....	.050 -in.
End of shaft to face of bracket.....	6 7/16-in.

Front Idlers

Shaft clearance .....	.005 - .009 -in.
Maximum permissible shaft clearance.....	.040 -in.
End clearance .....	.010 - .028 -in.
Recoil spring, assembled length.....	18 1/4-in.
Track adjustment, slack.....	1 1/2-2-in.
Limit of adjusting track, specified distance.....	4-in.

General Instructions

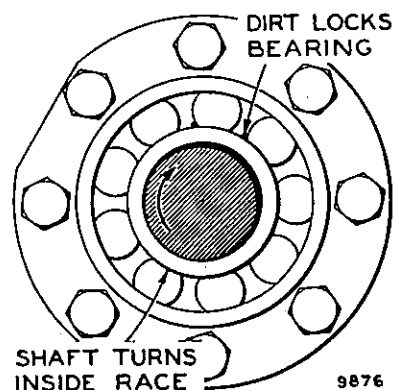
These general instructions will be extremely helpful in following the detailed instructions in the main sections of the book. They should be read and then kept in mind while assembling or disassembling the machine.

KEEP DIRT OUT

The most important single item in preserving the long life of the machine is to keep dirt out of vital working parts. Caterpillar Tractor Co. has taken precautions to safeguard against dirt entering working parts. Enclosed compartments, seals and filters have been provided to keep the supply of air, fuel, and lubricants clean. It is highly important that the effectiveness of these safeguards be maintained. Filters should be replaced or cleaned regularly. Worn seals or broken gaskets should be replaced immediately.

Anti-friction bearings, properly lubricated with clean lubricant, will last indefinitely. Abrasives in the lubricant will cause rapid wear on the extremely hard races and balls or rollers. Dirt in an anti-friction bearing can cause the bearing to lock, with the result that the shaft will turn in the inner race or the outer race will turn within the cage. Dirt and abrasives in lubricants will embed in bushing-type bearings and act like fine sandpaper against the shaft, causing extremely rapid wear.

EFFECT OF DIRT IN BEARING



Lubricant must be changed at recommended intervals. Use clean containers. Before removing a filler cap, brush away the dirt with the brush provided in the tool kit.

Utmost care must also be exercised in keeping the hydraulic equipment and lubricant passages clean during reconditioning. Foreign material carelessly introduced into these parts can cause serious trouble.

MAINTAIN ADJUSTMENTS

Operating adjustments have been kept to a minimum on "Caterpillar"-built machines but they are important and should be carefully maintained.

Keep the flywheel clutch and steering clutches in adjustment to avoid slippage and the resulting loss of power and shortened life of the clutch plates. Correctly adjusted steering clutches and brakes are essential to good performance. Keep the fan belts adjusted to the proper tension to obtain maximum belt life and proper cooling.

The tracks must also be kept adjusted to the tension best suited to the particular terrain or type of material on which the machine is operating.

If the tracks are too tight, the front idlers and final drive parts will be overstressed. If the tracks are too loose, more rapid wear will result between the track pins and bushings and the tracks are more likely to be thrown off. However, when operating in loose material which may pick up and clog the tracks, a fairly loose adjustment may be desirable. Experience will show when it is necessary to change the adjustment from normal.

INSPECT FREQUENTLY AND CORRECT MINOR TROUBLES

A bearing changed in time will save a shaft. An oil leak corrected prevents loss of lubricant and an overheated bearing. A nut tightened in time will prevent the loss or breakage of an associated part.

RECONDITIONING PROCEDURE

This book has been arranged for the disassembly and reconditioning of individual parts of the machine. If the machine is to be disassembled for complete inspection and rebuilding, the following procedure is recommended:

1. Remove sheet metal guards, including hood, radiator guard and floor plates, and clean the machine thoroughly.
2. Separate both tracks.
3. Raise the machine and block it securely, front and rear.
4. Remove both track roller frame assemblies.
5. Remove radiator, and fan assembly.
6. Remove starting engine air cleaner, carburetor and manifold assembly.

7. Remove Diesel engine air cleaner, dash and manifolds.
8. Lift out the engine.
9. Remove seat and fuel tank.
10. Remove flywheel clutch and transmission.
11. Remove steering clutches and bevel gear.
12. Disassemble and remove final drive parts.

Instructions for removing and disassembling these parts are contained in this Reference Book, although not necessarily in the above order.

SAFETY AND WORKMANSHIP SUGGESTIONS

There are certain practices which should be followed in the interest of safety and good workmanship when working around machinery.

Always show proper respect for weight. Do not attempt to lift heavy parts where a hoist should be used. Never leave heavy parts in an unstable position. When raising a machine, make sure that it is blocked securely. Then block it up so that the weight will be supported by the blocks rather than the lifting equipment.

Tools

All service tools should be kept in first class condition. Use the proper tool for the job at hand. Special service tools are available for specific jobs and they should be used when recommended. The use of these tools will save time and prevent damage to parts.

In the following pages puller arrangements are illustrated for separating tightly fitted parts. However, if the machine is being reconditioned in a shop, it may in many cases be easier and faster to use a press. When pulling a bearing or gear from a shaft, always use a centering spacer between the forcing screw and the end of the shaft.

Disassembly

If a part offers unexpected resistance to removal, check carefully to see that all nuts and capscrews have been removed before using force. Possibly some other part is interfering and should be removed first. Parts which are fitted together with tapered splines are always very tight. If they are not tight when disassembled, inspect the tapered splines and discard the part if the splines are worn.

Where shims are used, be sure to remove them all. Tie the shims together and identify them as to their location. Then keep them clean and flat until they are reinstalled.

CLEANING AND INSPECTION

Clean all parts thoroughly after they are removed and inspect them. Be sure all lubricant passages and oil holes are open. Badly worn or damaged parts should not be put back in the machine. Cover all parts to keep them clean until they are installed.

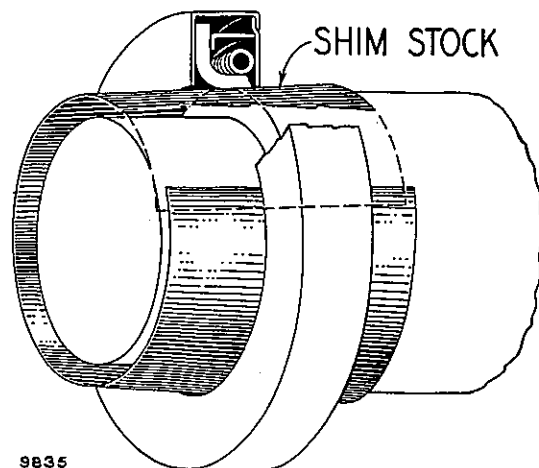
Anti-friction bearings should receive special handling. As soon as a bearing is removed, cover it to keep out dirt and abrasives. Wash bearings in non-inflammable cleaning solution and inspect the races and balls or rollers. Discard the bearings if they are pitted, scored, or burned. If the bearing is serviceable, coat it with light oil and wrap it in clean paper. Do not unwrap new bearings until ready to install them.

ASSEMBLY

Clean the rust preventive compound from all machined surfaces of new parts before installing them. Be sure to install parts in the proper location and position.

When one part is pressed into another, use white lead or a suitable prepared compound to lubricate the mating surfaces. Tapered parts, however, should be assembled dry. Before assembling parts with tapered splines, be sure the splines are clean, dry and free from burrs. Then press the parts together tightly.

When possible, soak new rawhide seals in warm oil for a half hour before installing. Install the seal with the wiping edge turned in the direction recommended. Be careful not to cut the leather seal as it is installed or when installing a shaft through the seal. Use shim stock if necessary to protect the seal from shoulders or sharp edges during installation. Packing-type seals should always be renewed if the contacting part is removed.



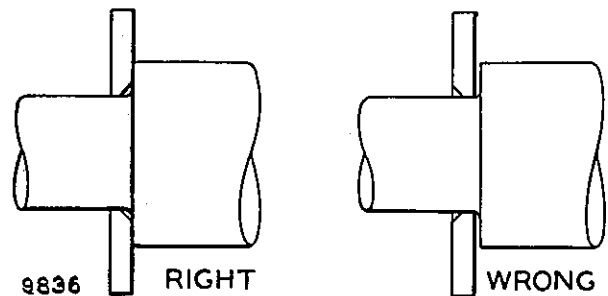
PROTECTING SEAL DURING
INSTALLATION



When installing a bearing, spacer, or washer against a shoulder on a shaft, be sure the chamfered side is toward the shoulder. If the washer is turned in the wrong direction the radius may interfere and prevent the washer from seating against the shoulder.

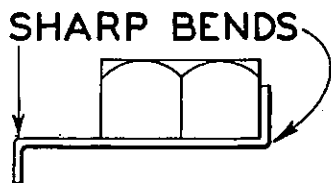
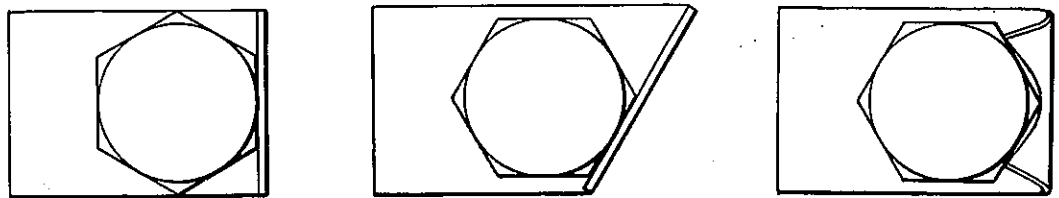
Do not install bushings by driving them in with a hammer. Use a press if possible and be sure to apply the pressure directly in line with the bore. If a bushing must be driven in, use a bushing driver or a bar with a smooth flat end. If the bushing has an oil hole, be sure it is lined up with the oil hole in the part in which it is assembled.

**HOW TO INSTALL SPACER
AGAINST SHOULDER
ON SHAFT**

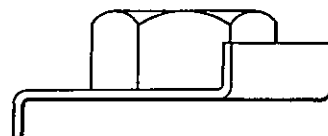


Install gaskets where required and use new ones if necessary. Never use cork or felt gaskets or seals a second time. Be sure the holes in the gaskets correspond with the lubricant passages in the mating parts. If it is necessary to make gaskets, select stock of the proper type and thickness and be sure to cut sufficient holes in the right places. Blank gaskets can cause serious damage.

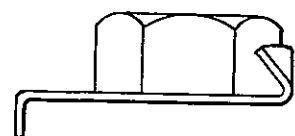
Use capscrews of the correct length. A capscrew which is too long may "bottom" before the head is tight against the part it is to hold, and in addition the threads may be damaged when the capscrew is removed.



9837 RIGHT



RIGHT

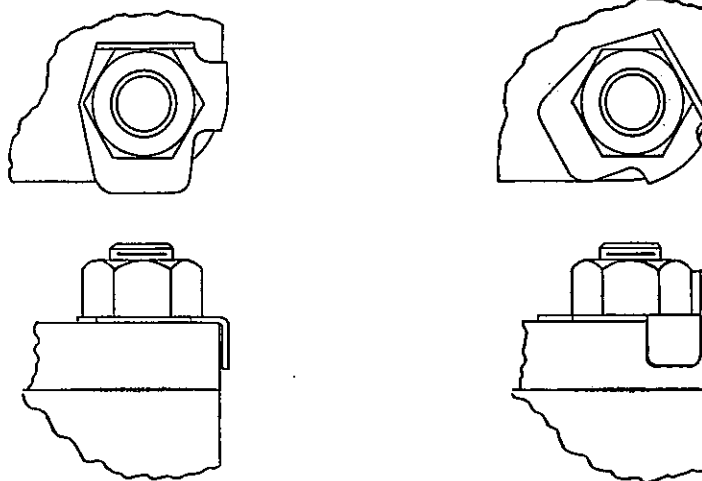


WRONG

HOW TO INSTALL FLAT METAL LOCKS

If a capscrew is too short, there will not be enough threads to hold the part securely.

Lockwashers, cotter pins, or flat metal locks should be used to lock each nut and capscrew. Flat metal locks must be installed properly to be effective. Bend one end of the lock sharply around the edge of the part. Bend the other end sharply against one flat surface of the nut or capscrew head. Do not bend the lock against more than one side of the nut.



17617 **RIGHT**

WRONG

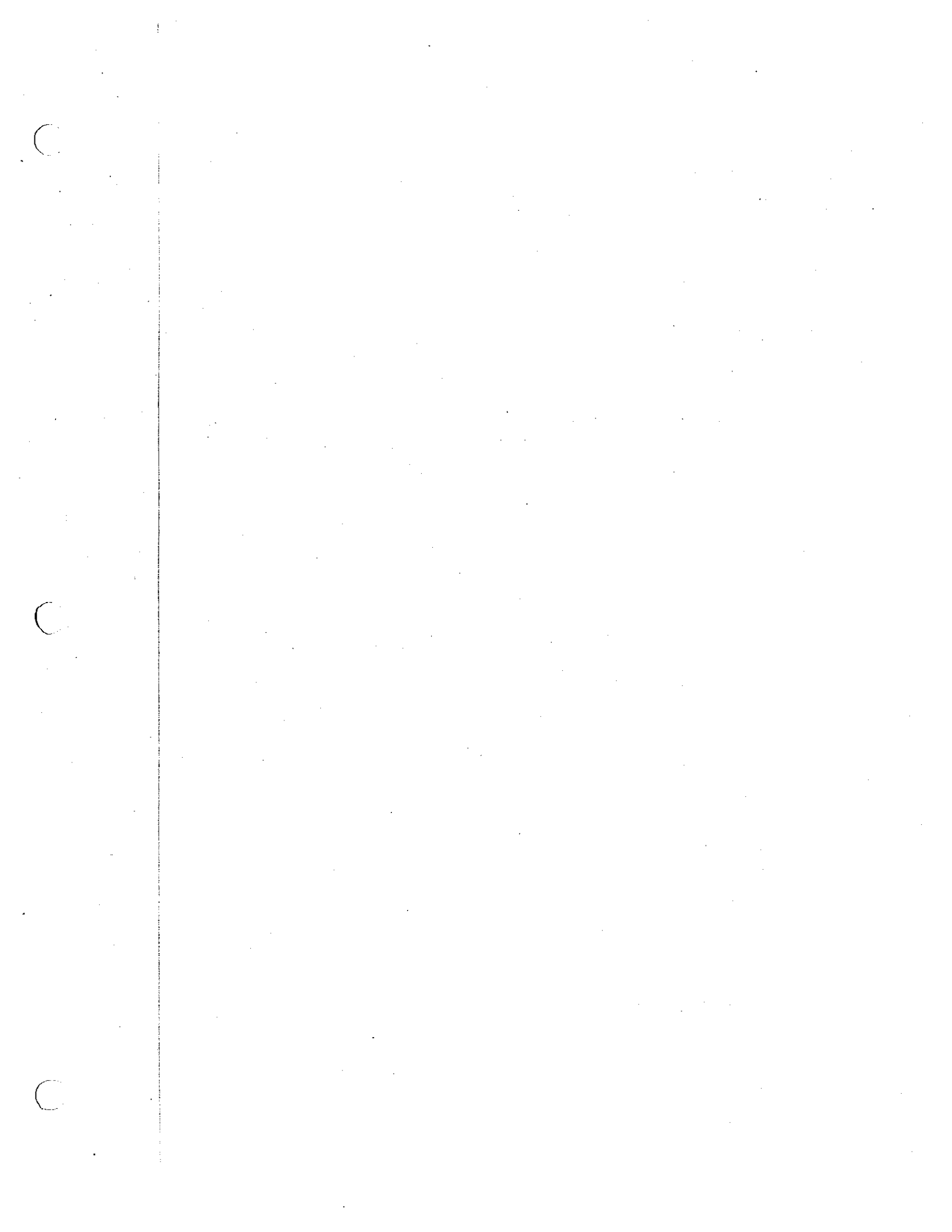
METHOD FOR LOCK POSITIONING AND BENDING

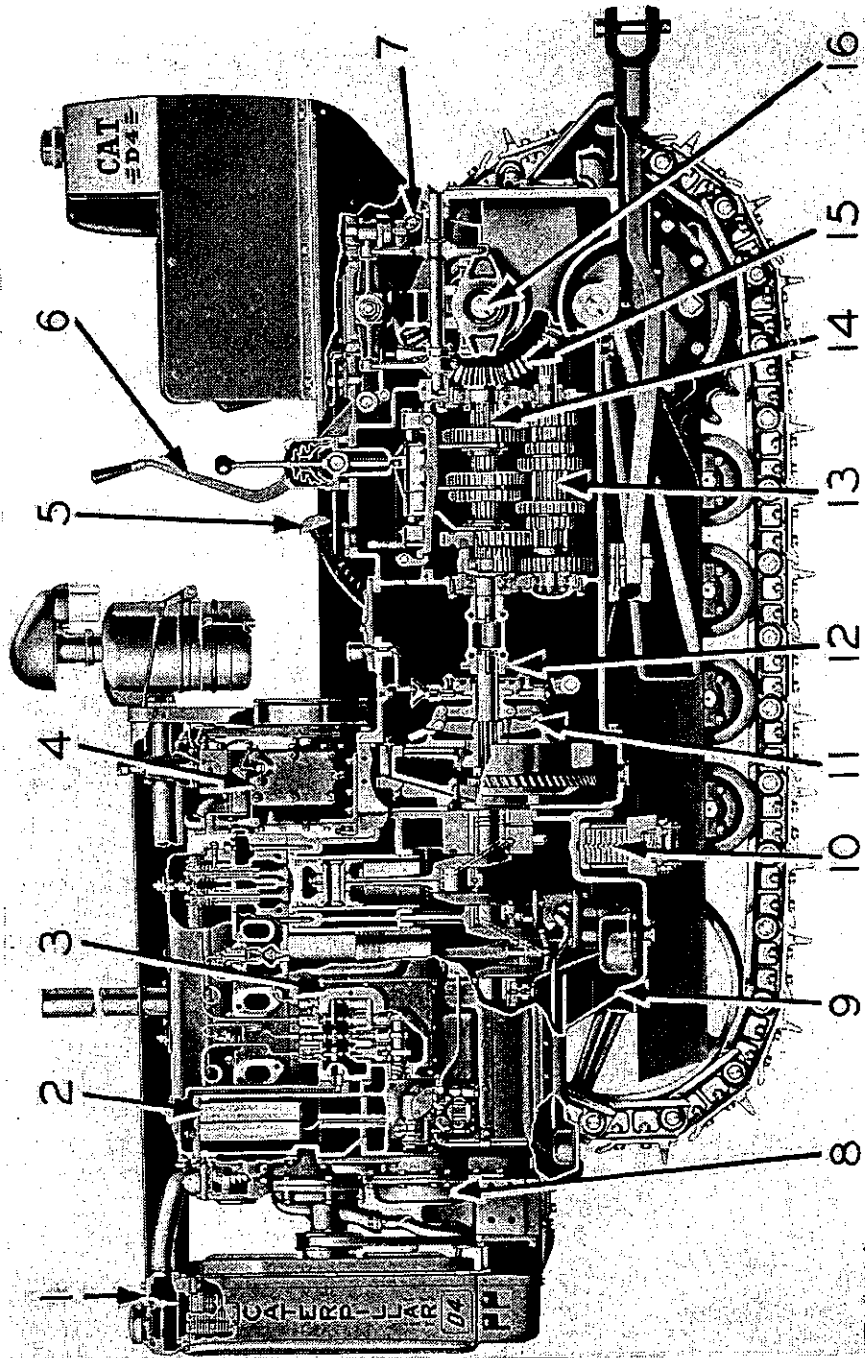
When assembling a machine complete each step in turn. Do not leave one part partially assembled and start assembling some other part. Make all adjustments as recommended. Always check the job after it is completed to see that nothing has been overlooked.

PREPARATION FOR STARTING

After assembling a machine, lubricate it thoroughly. Fill the various compartments with the type and grade of lubricant recommended in the Operator's Instruction Book.

Recheck the various adjustments by operating the machine before returning it to the job.





1. Radiator
2. Fuel Filter Element
3. Fuel Injection Pump Housing
4. Starting Engine
5. Brake Pedal
6. Steering Clutch Lever
7. Steering Clutch Booster Spring
8. Timing Gear Cover
9. Diesel Engine Oil Pan
10. Equalizer Spring
11. Flywheel Clutch Adjusting Collar
12. Flywheel Clutch Brake
13. Transmission Lower Shaft
14. Transmission Pinion Shaft
15. Bevel Gear
16. Steering Clutch and Bevel Gear Shaft

D4 TRACTOR CUTAWAY VIEW (Later Tractor)

T11718

DIESEL ENGINE

The engine which powers the D4 Tractor is a 4-cylinder, 4-stroke cycle, valve-in-head, "Caterpillar" Diesel engine. It has a 4½" bore in later or 6U and 7U series tractors and a 4¼" bore in earlier or 4G, 7J, 2T and 5T series tractors.

Reference material concerning the engines is covered in separate books. However, there are some instructions pertaining to the engine that apply only to the D4 Tractor and these differences are covered in this book.

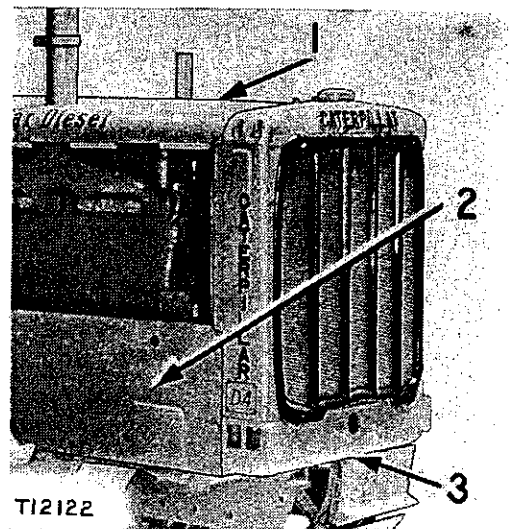
Radiator Removal

(Later Tractors)

1. Drain the cooling system.
2. Remove the hood (1). See the topic, HOOD REMOVAL.
3. Remove the side plates (2).
4. Remove the cover from the bottom of the radiator (3).

RADIATOR REMOVAL

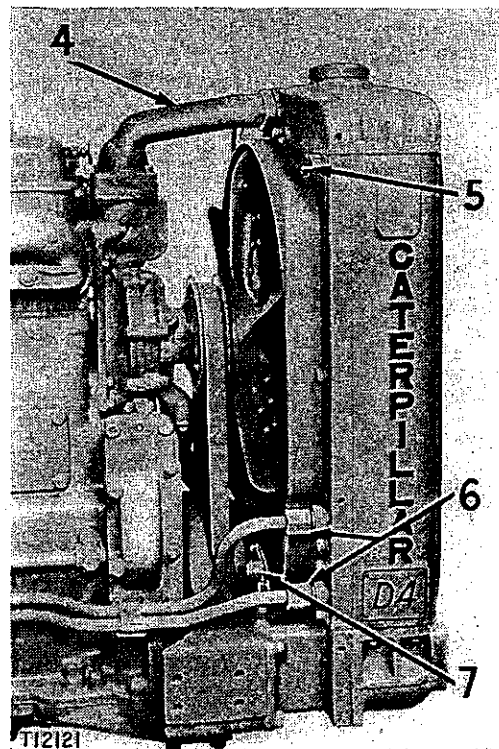
1—Hood. 2—Side plate.
3—Radiator.



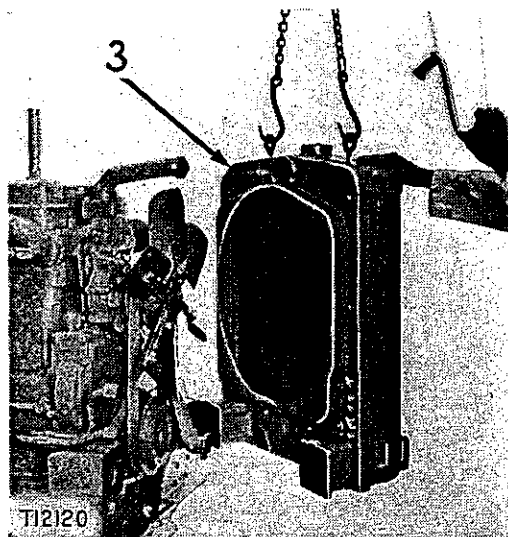
5. Drain the oil from the oil cooler by removing the drain plug from the oil filter base.
6. Open the vent (5) and disconnect the oil lines (6).
7. Remove the capscrews holding the upper water elbow (4) and the pipe (7) to the radiator.

DISCONNECTING RADIATOR

- 4—Upper water elbow. 5—Vent.
6—Oil lines. 7—Pipe.



8. Attach a suitable hoist to the radiator (3), then remove the cap-screws which secure the radiator to the front support and lift the radiator as shown.



LIFTING RADIATOR

- 3—Radiator.



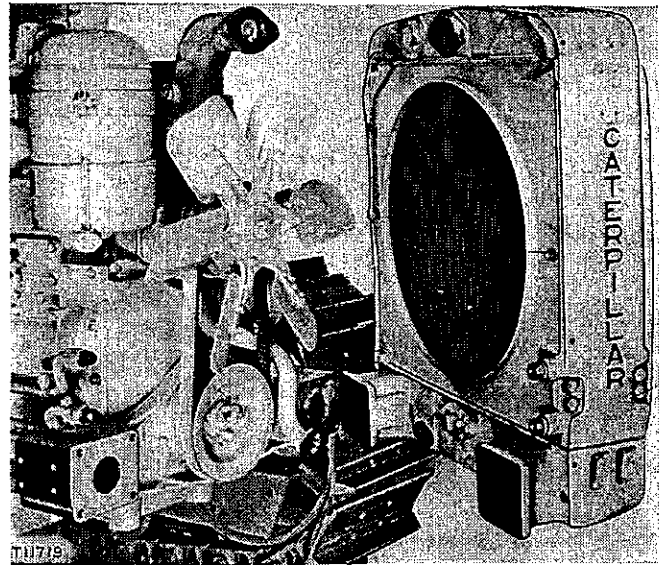
Radiator Removal (Earlier Tractors)

Remove the engine hood and side plates.

Disconnect the oil cooler tubes and the upper and lower water pipe connection to the radiator.

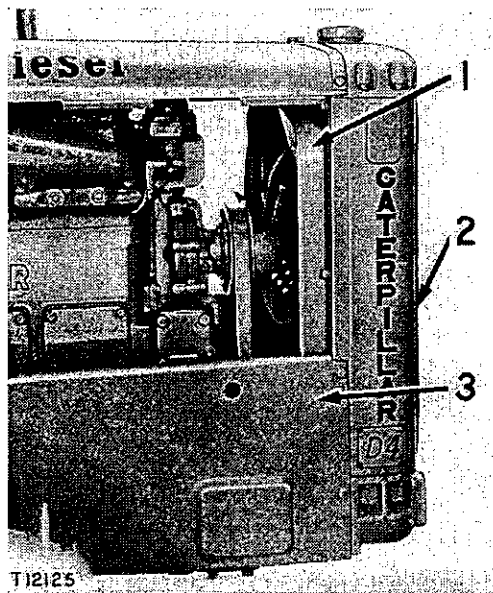
Take out the capscrews that hold the radiator assembly to the radiator support and remove the radiator and oil cooler assembly as shown.

REMOVING RADIATOR

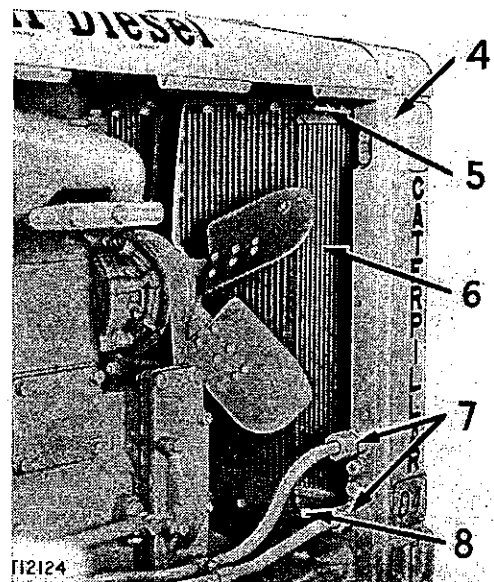


Oil Cooler Removal (Later Tractors)

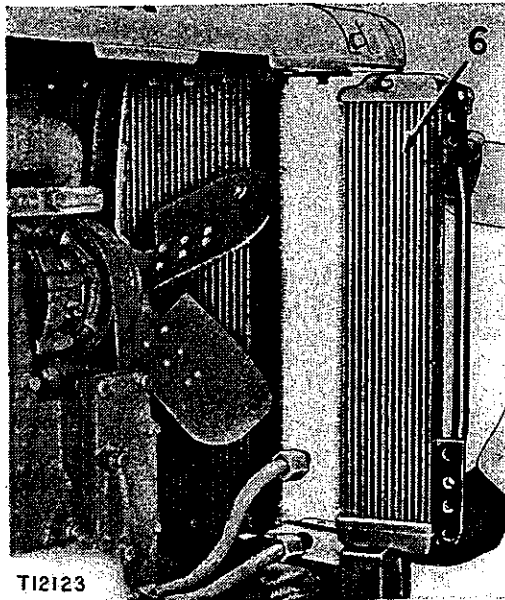
1. Remove the plate (3).
2. Remove the fan shield (1) and the radiator guard (2).
3. Drain the oil from the oil cooler (6) by removing the drain plug from the oil filter base and opening the vent (5).



OIL COOLER REMOVAL
1—Fan shield. 2—Radiator guard.
3—Plate.



OIL COOLER DISCONNECTION
4—Side plate. 5—Vent. 6—Oil cooler.
7—Oil lines. 8—Capscrew.



REMOVING OIL COOLER

6—Oil cooler.



4. Disconnect the oil lines (7).
5. Remove all the capscrews that secure the radiator side plate (4) to the radiator top and bottom tanks and to the oil cooler (6) and remove the plate.
6. Remove the capscrews (8) which secure the oil cooler to the radiator bottom tank.
7. Remove the oil cooler as illustrated.

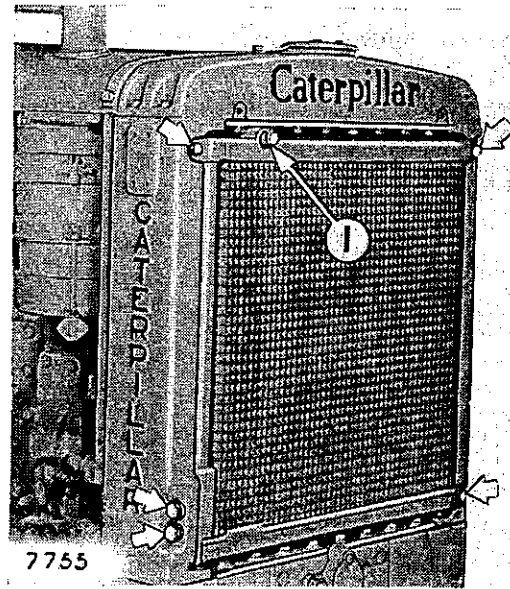
Oil Cooler Removal (Earlier Tractors)

The oil cooler is located just ahead of the water radiator and can be removed separately or as a unit with the radiator assembly.

Remove the screen guard assembly. Drain the oil from the oil cooler by loosening the vent plug (1) and removing the drain plug in the bottom of the oil filter.

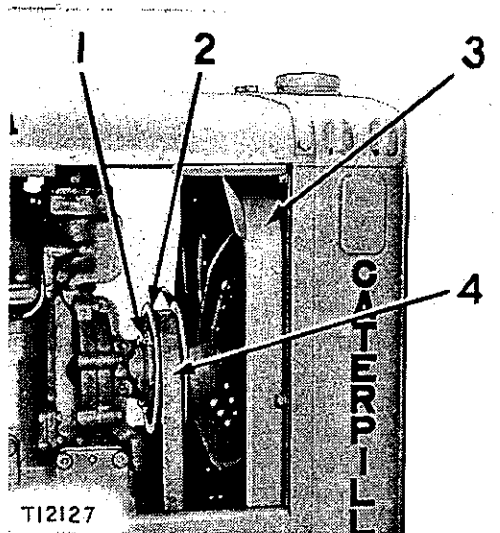
Remove the capscrews shown by the arrows and lift out the oil cooler.

OIL COOLER
1—Vent plug.

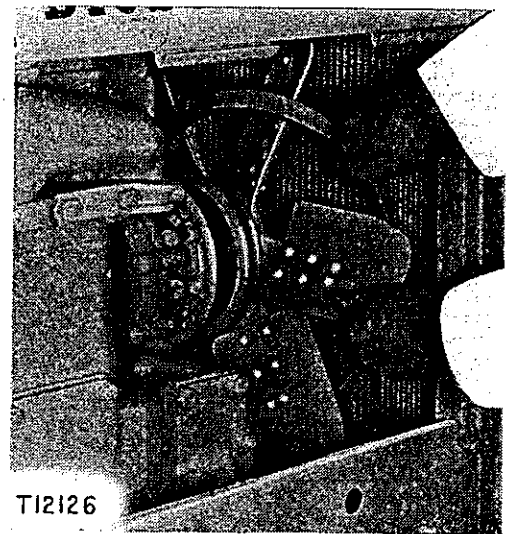


Fan Belt Replacement

1. To facilitate the removal of the fan belt (4) remove the fan shield (3).
2. Remove the capscrew and lock (1) and turn the pulley ring (2) in a counterclockwise direction completely loosening the fan belt.
3. Remove the belt from the crankshaft pulley.
4. By placing the belt between the two fan blades and the radiator and rotating the fan, the belt can be removed or installed as shown.
5. Install and tighten the belt until there is 1" slack.



PREPARING TO REMOVE FAN BELT
1—Lock. 2—Pulley ring. 3—Shield.
4—Fan belt.



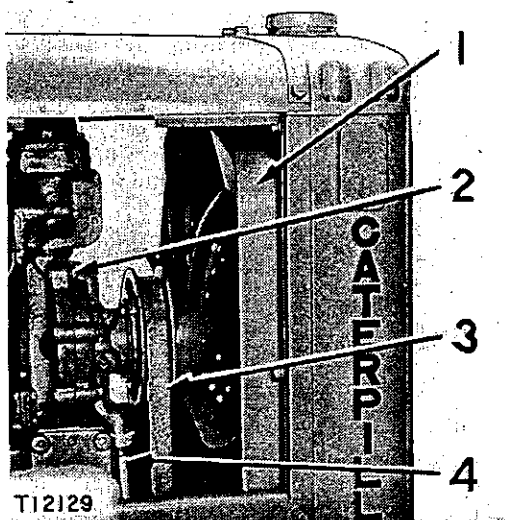
REPLACING FAN BELT

6. Install and tighten the lock in the adjusting ring (2).
7. Install the shield (3).

Fan and Water Pump Removal (Later Tractors)

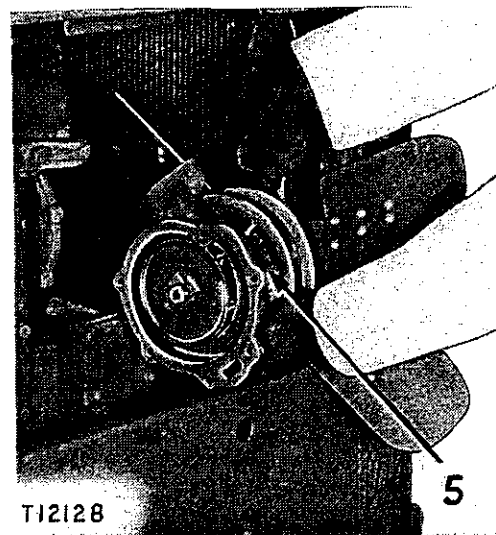
The water pump and fan assembly can be removed from the right side of the tractor.

1. Drain the cooling system.
2. Remove the shield (1).
3. Remove the fan belt (3). See the topic, FAN BELT REPLACEMENT.
4. Disconnect the inlet pipe (4) from the water pump.
5. Remove all the capscrews (2) that secure the water pump to the water temperature regulator housing.
6. Lift the water pump and fan assembly (5) out the right side as shown.



PREPARING TO REMOVE FAN AND WATER PUMP ASSEMBLY

1—Shield. 2—Capscrew. 3—Fan belt.
4—Inlet pipe.

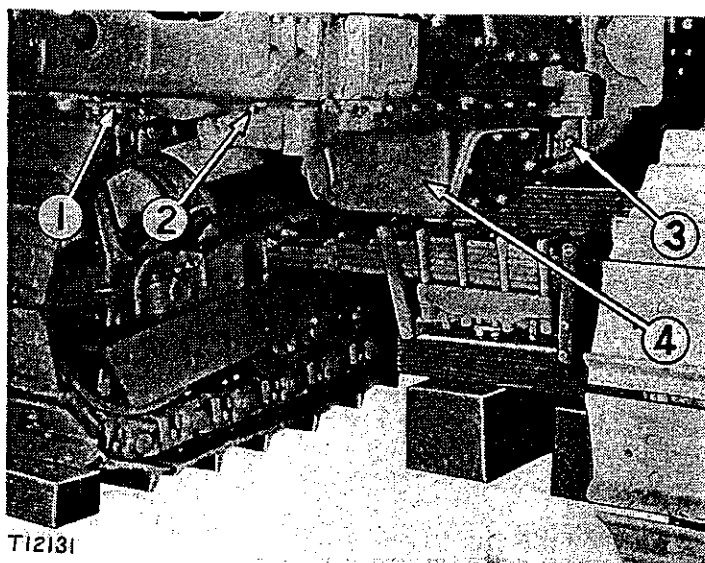


REMOVING FAN AND WATER PUMP ASSEMBLY

5—Fan and water pump assembly.

Oil Pan Removal

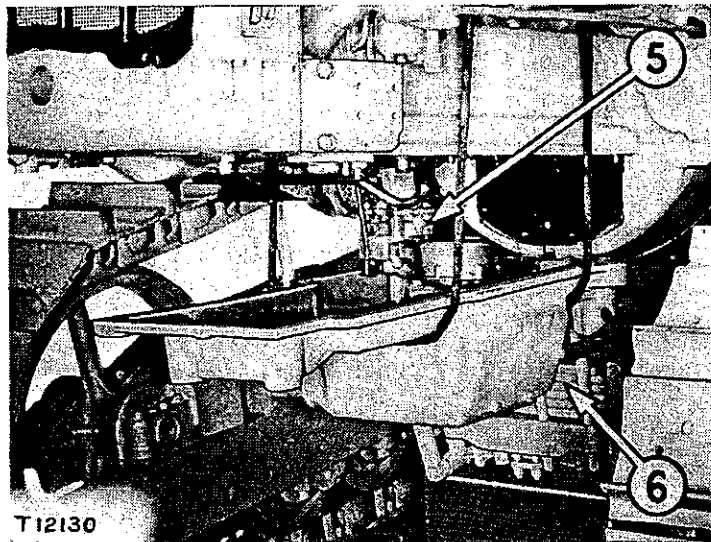
1. The oil pan (4) can be lowered or removed from the Diesel engine cylinder block without removing the engine.
2. Block the rear of the tractor upon 8" blocks and block ahead of the track to prevent the tractor from rolling forward.
3. Remove the side plates.
4. Drain the crankcase.
5. Remove the nuts which secure the auxiliary spring bracket to the engine.
6. Raise the front of the engine so that there is sufficient clearance for the removal of the oil pan between the oil pump and the equalizer spring.
7. Securely block under the flywheel housing as illustrated.
8. Remove the plate (1) securing the right front corner of the oil pan.
9. Remove the capscrews (3) holding the oil pan to the flywheel housing.
10. Remove all but two of the capscrews (2), one on each side of the engine, holding the pan to the engine.
11. Place a suitable sling under the oil pan, remove the two remaining capscrews and lower the oil pan from the dowels as shown.



T12131

OIL PAN REMOVAL

1—Plate. 2—Capscrew. 3—Capscrew. 4—Oil pan.



LOWERING OIL PAN
5—Oil pump. 6—Equalizer spring.

12. Lower the front of the pan and pull the pan forward between the equalizer spring (6) and the oil pump (5).

Two 7/16"-14 (NC) studs installed in the cylinder block for guides will aid in installing the pan.

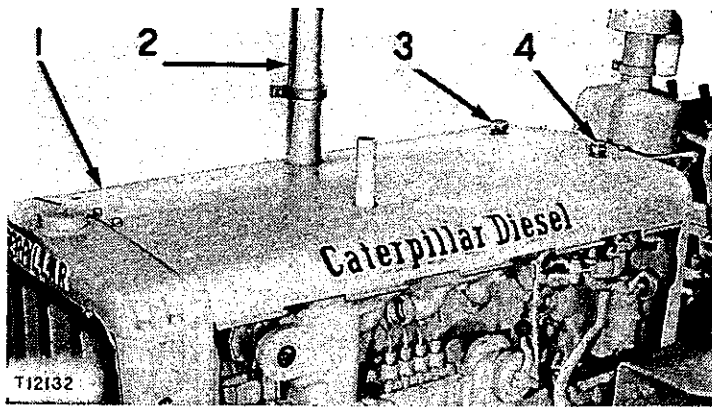
When installing a new gasket on the pan, a coating of heavy grease or gasket cement on the oil pan will hold the gasket in position during installation.

Gasket cement should not be used on the upper side of the gasket as this will not permit removal of the timing gear cover without damage to the oil pan gasket.

Hood Removal

(Later Tractors)

1. The hood (1) can be removed easily to make the engine more accessible for service work.
2. Remove the Diesel engine exhaust pipe extension (2).
3. Remove the starting engine fuel tank cap (3) and oil filler cap (4).
4. Remove the capscrews securing the hood to the radiator and the dash.
5. Lift off the hood.



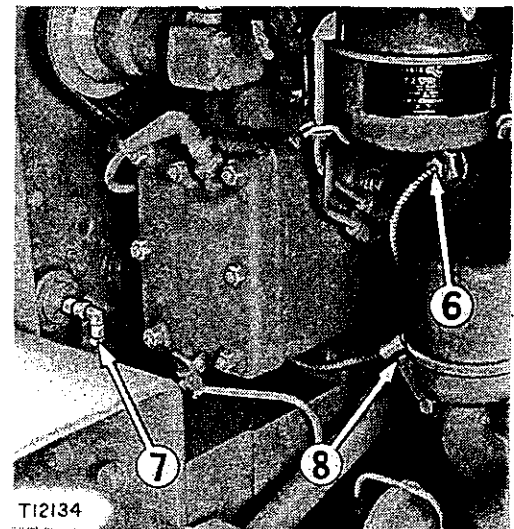
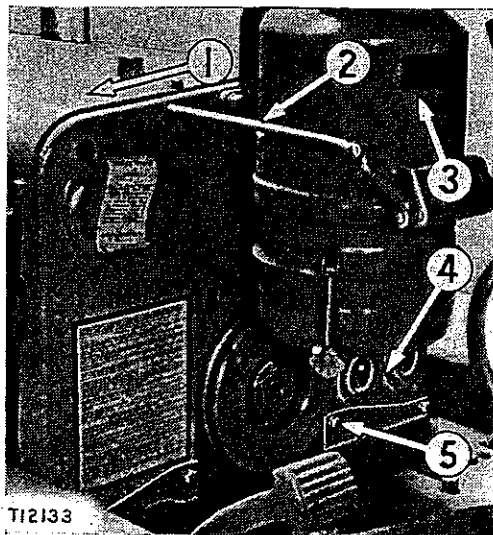
PREPARING FOR HOOD REMOVAL

1—Hood. 2—Exhaust pipe extension. 3—Fuel tank cap. 4—Oil filler cap.

Dash Removal

(Later Tractors)

1. Drain the coolant level below the connection in the head for the heat indicator line (6).
2. Remove the hood (1). See the topic, HOOD REMOVAL.
3. Remove the rod (2).
4. Remove the air cleaner (3).
5. Remove the capscrews (5) and the bolts which secure the dash (4) to the fenders and floor plates.
6. Disconnect the heat indicator line (6).



PREPARING TO REMOVE DASH

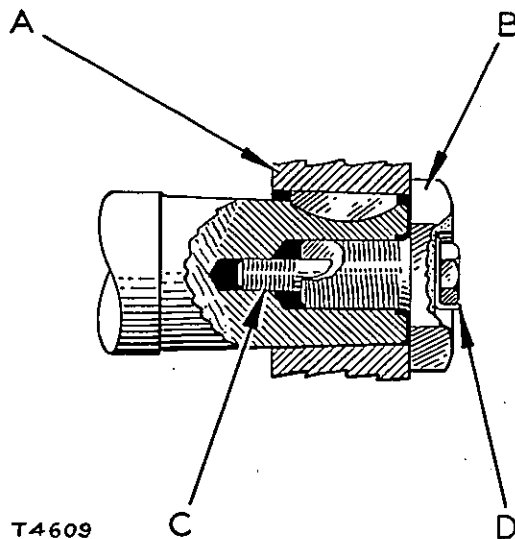
1—Hood. 2—Rod. 3—Air cleaner. 4—Dash. 5—Capscrew. 6—Line. 7—Tube. 8—Clamp.

7. Remove the clamp (8).
8. Disconnect the oil pressure gauge tube (7) and lift the dash off.

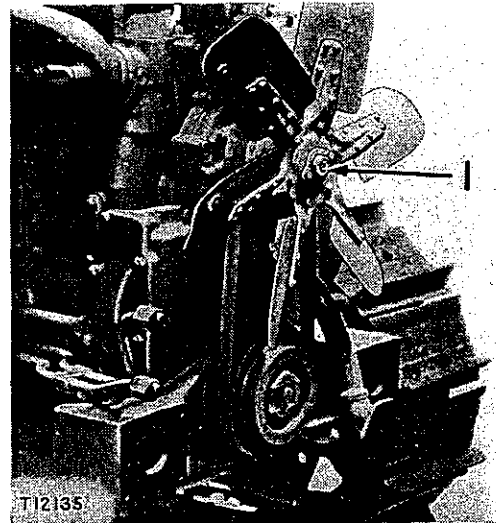
Timing Gear Cover Removal and Installation

The timing gears can be reached without removing the engine from the tractor and without removing the oil pan.

1. Remove the radiator. See the topic, RADIATOR REMOVAL (LATER TRACTORS).
2. Remove the fan and water pump assembly (1) as described in the topic, FAN AND WATER PUMP REMOVAL.
3. In later tractors the hollow screw (B) retains the crankshaft pulley (A) on the crankshaft. A small capscrew (C) having left hand threads secures this hollow screw. Remove the small lock (D) and capscrew (C). Remove the large capscrew (B).

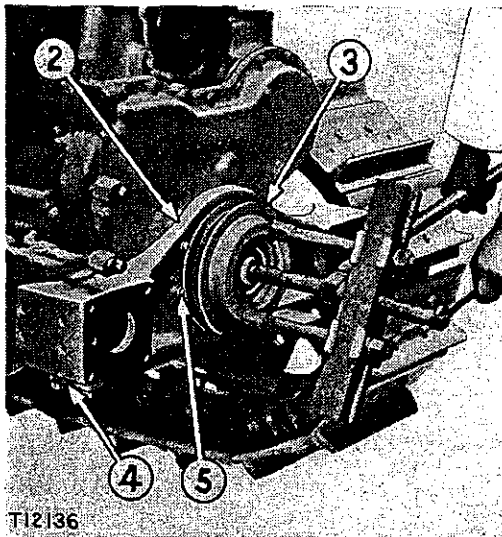


CRANKSHAFT PULLEY REMOVAL
 A—Pulley. B—Screw. C—Capscrew.
 D—Lock.

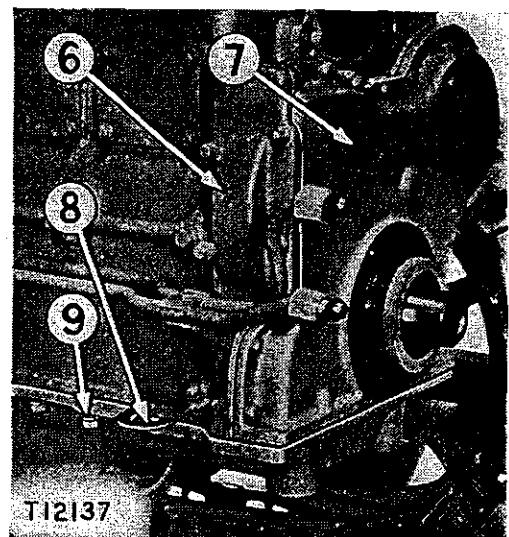


REMOVING FAN AND WATER PUMP ASSEMBLY
 1—Fan and water pump.

4. Remove the crankshaft pulley (3) using the 8B7548 Push Puller, 8B7557 Adapters and 8B7560 Step Plate.
5. Remove the capscrews (5) which secure the support (2) to the timing gear cover and remove the support.
6. Remove the plates (4) from both sides.
7. Remove the cover (6).

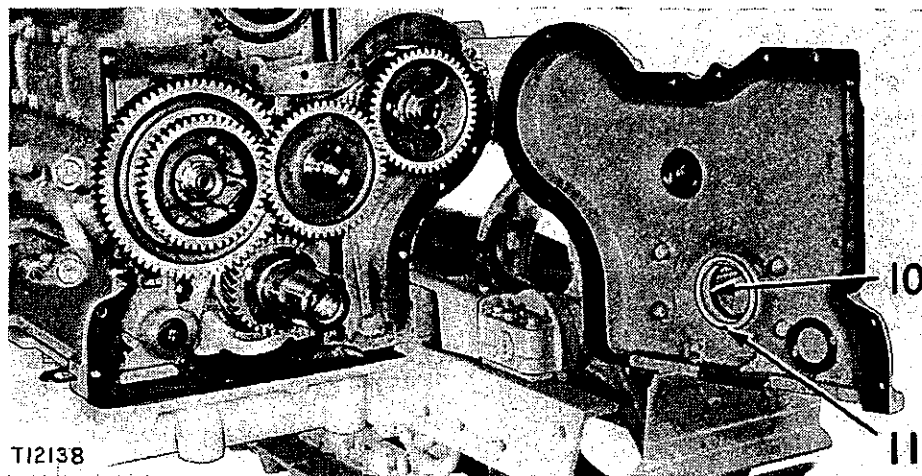


PULLING CRANKSHAFT PULLEY
 2—Support. 3—Crankshaft pulley.
 4—Plate. 5—Capscrew.



TIMING GEAR COVER REMOVAL
 6—Cover. 7—Timing gear cover.
 8—Shim. 9—Capscrew.

8. Remove the capscrews which hold the oil pan to the timing gear cover (7).
9. Loosen the capscrews (9) back to the equalizer spring on both sides. Pry the oil pan down until it is possible to install the shims (8) approximately .020" thick.
10. With a putty knife carefully separate the oil pan gasket from the crankcase, the timing gear housing and the timing gear cover to prevent the gasket from being damaged.

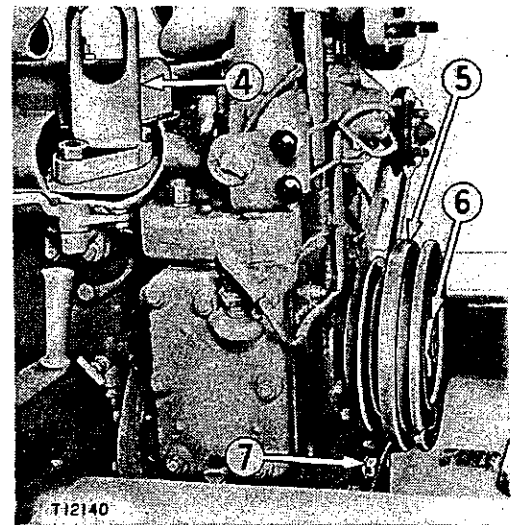
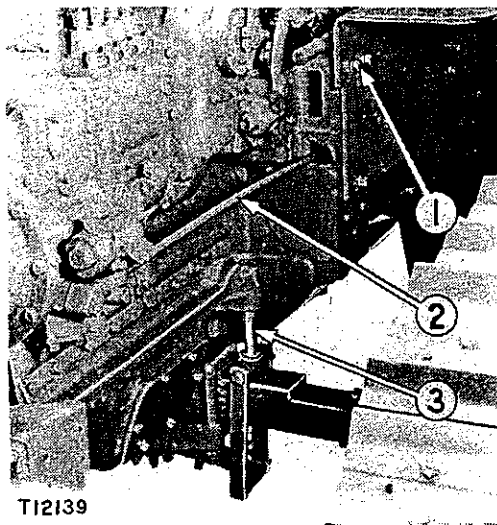


TIMING GEAR COVER REMOVED
 10—Oil seal. 11—Oil return hole.

11. Pull the timing gear cover forward until it is free of the dowels and lift it off.
12. Before installing the timing gear cover, replace the oil seal (10) if necessary with the lip out. Check the oil return hole (11) to see that it is open.

Diesel Engine Removal and Installation (Later Tractors)

1. Raise the rear of the tractor and block under the tracks until they are approximately 8 inches from the floor. This will permit the flywheel housing to clear the equalizer spring when the engine is brought up level. Block in front of track as shown.
2. Engage the clutch.
3. Remove the side plates and the dash. See the topic, DASH REMOVAL.
4. Remove the lock and nut (6) and pull the starting engine flywheel (5).
5. Disconnect the auxiliary spring clamp (3) from both sides of the cylinder block and pan.
6. Close the fuel supply line valve under the seat and disconnect the fuel supply line (2) at the fuel transfer pump.
7. Remove the capscrews (1) holding the fenders to the flywheel housing.

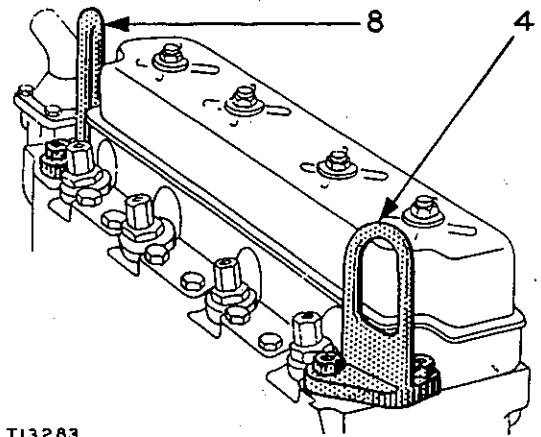


PREPARING FOR DIESEL ENGINE REMOVAL

1—Capscrew. 2—Fuel supply line. 3—Auxiliary spring clamp. 4—Lifting eye.
5—Flywheel. 6—Nut. 7—Capscrew.

LIFTING EYES

- 4—4F9659 Lifting Eye (Rear)
- 8—4F9660 Lifting Eye (Front)



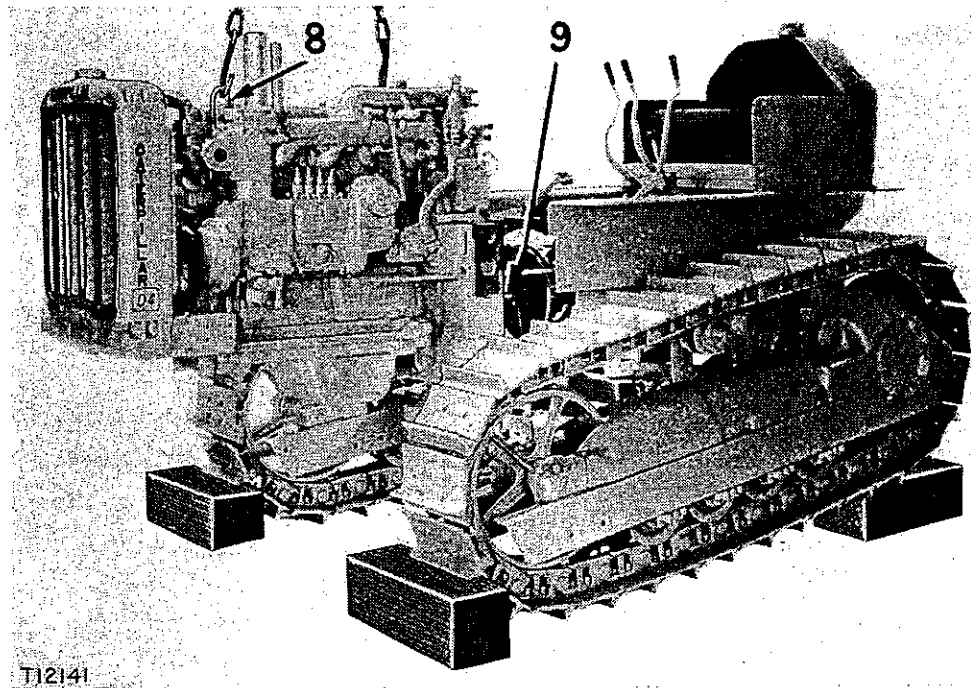
T13283

8. Install the 4F9660 Eye (8) and the 4F9659 Eye (4) to the Diesel engine.
9. With a suitable hoist lift the engine to a level position.

CAUTION

Securely block under the front and rear of the drawbar so that when the engine is removed the transmission case will not fall either way.

10. Remove all the capscrews (7) holding the Diesel engine flywheel housing to the transmission case.



T12141

REMOVING DIESEL ENGINE
8—Lifting eye. 9—Clutch shaft.

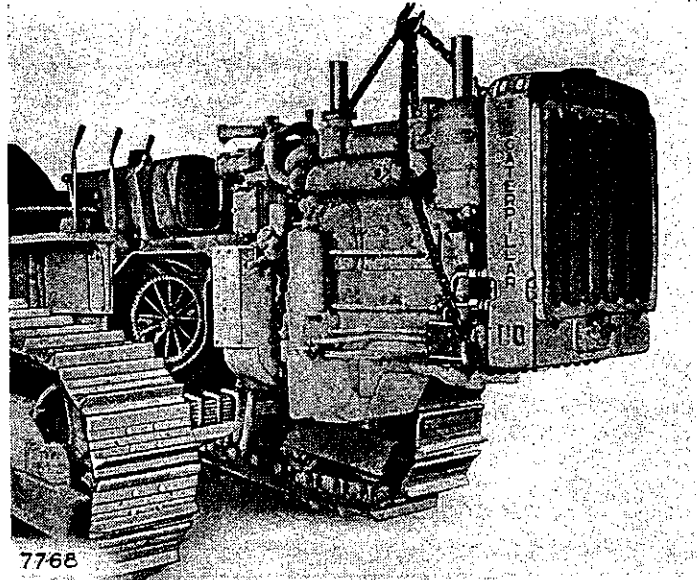
11. Move the Diesel engine forward off the dowels, the clutch shaft (9) and the fuel supply line as shown.
12. When installing the Diesel engine, guide the engine onto the fuel supply line and the clutch shaft.
13. Rotate the Diesel engine slightly by turning the fan by hand to align the teeth on the clutch plate with the teeth in the Diesel engine flywheel.
14. After the clutch plate is started into the flywheel, release the clutch and guide the Diesel engine onto the dowels.
15. Replace the capscrews which secure the flywheel housing to the transmission case.
16. As the engine is lowered, guide the auxiliary spring clamps through the holes in the oil pan and cylinder block.
17. Continue assembling in the reverse order of removal.

Diesel Engine Removal and Installation

(Earlier Tractors)

Drain the cooling system and lubricating system and shut off the fuel supply valve. Engage the flywheel clutch so that the driving disc will remain in place.

1. Remove the hood.
2. Remove the fuel line connection to transfer pump.
3. Remove the governor control rod.
4. Remove the oil line connection to the oil gauge.
5. Remove the heat indicator line at the Diesel engine connection.
6. Remove the engine side plates.
7. Remove the generator connections.
8. Remove the fuel line connection to the starting engine carburetor.
9. Remove the starting engine air cleaner and dash.
10. Remove the starting engine flywheel or starting engine.
11. Remove the capscrews fastening the front end of the fenders to the housing.
12. Remove the connections between the equalizer spring and the engine.



REMOVING DIESEL ENGINE

13. Raise the engine to clear the equalizer spring and block under the front of the transmission case.
14. Remove the capscrews fastening the engine to the transmission case.

NOTE

Use a 2-ton hoist to lift out the engine. Care should be taken that the lifting chains or cables are located so that any point of bearing will be against a solid portion of the engine.

15. Pull the engine straight forward until the flywheel clutch shaft is clear of the pilot bearing in the flywheel.
16. Securely tighten all capscrews when replacing the engine.

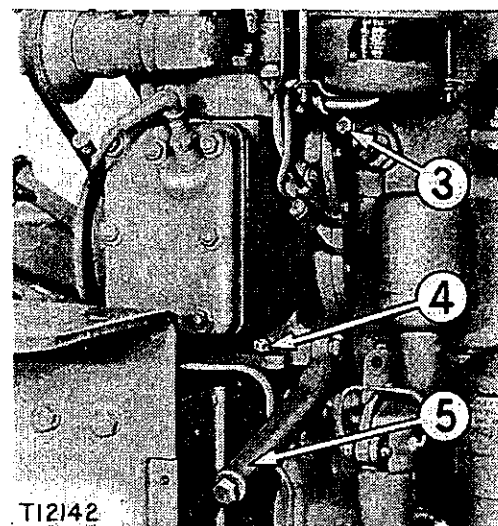
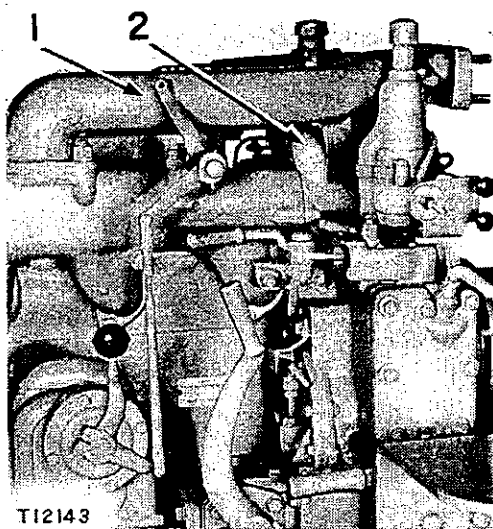
STARTING ENGINE

The starting engine, mounted on the Diesel engine flywheel housing, is used to start the Diesel engine. Most reconditioning work can be accomplished more readily by first removing the starting engine from the Diesel engine.

Starting Engine Removal and Installation

(Later Tractors)

1. Remove the hood and the dash. See those respective topics.
2. Remove the right side plate so that it will not interfere with the oil drain pipe (5).
3. Drain the oil from the starting engine crankcase.
4. Drain the Diesel engine cooling system by removing the drain plug in the left side of the block at the rear of the governor.
5. Remove the Diesel engine inlet pipe (1).
6. Disconnect the starting engine exhaust pipe (2) from the Diesel engine inlet manifold.
7. Remove the capscrews (3) securing the water outlet elbow to the Diesel engine block.



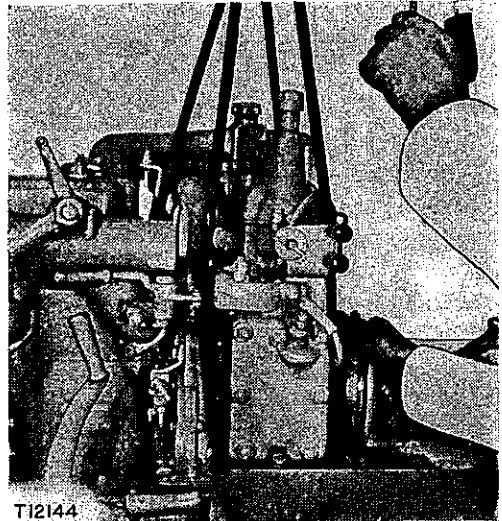
PREPARING FOR STARTING ENGINE REMOVAL (LEFT SIDE) (RIGHT SIDE)

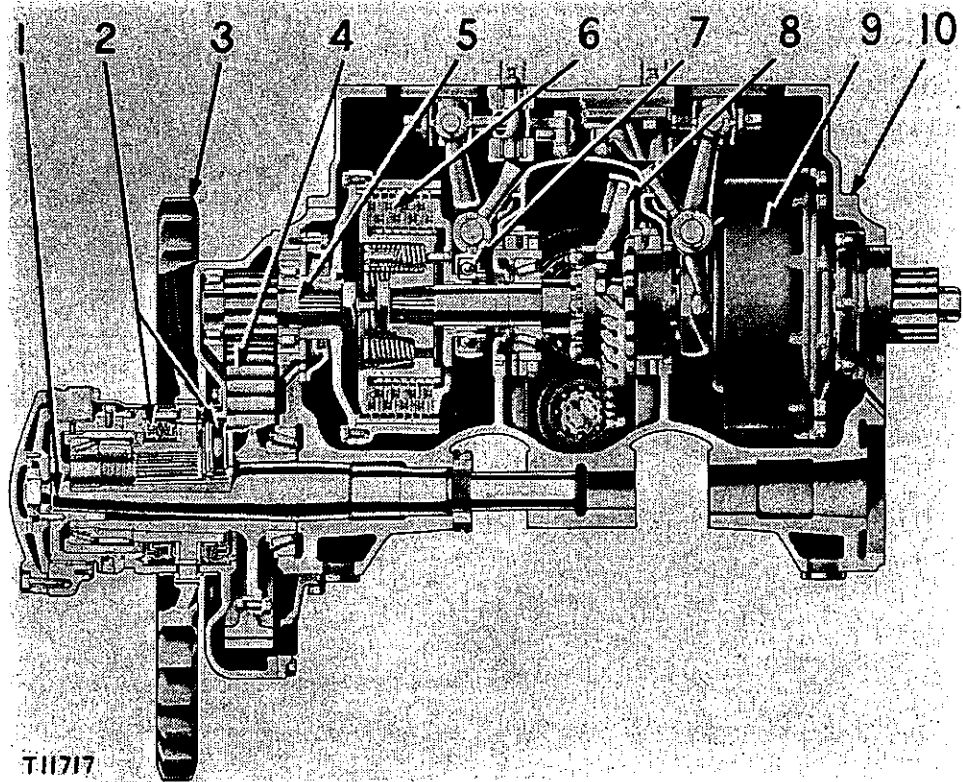
1—Diesel engine inlet pipe. 2—Starting engine exhaust pipe. 3—Capscrew.
4—Nut. 5—Oil drain pipe.

8. Remove all the capscrews and nuts (4) which secure the starting engine to the flywheel housing.
9. Install a suitable sling and lift the starting engine off the dowels.
10. Clean the gasket surface on the top of the Diesel engine flywheel housing and on the bottom of the starting engine block.
11. Cement the gasket in place on the flywheel housing and allow it to set.
12. Coat the top surface on the gasket with a heavy grease.
13. When installing the starting engine turn the flywheel slightly by hand as it is guided into position as illustrated, to assure that the starter pinion gear teeth will be in mesh.
14. Install the starting engine, exercising care to avoid damage to the gasket.
15. Tighten the capscrews and nuts at the base of the starting engine evenly and securely.
16. Complete the installation of items which were removed or disconnected.

INSTALLING STARTING ENGINE

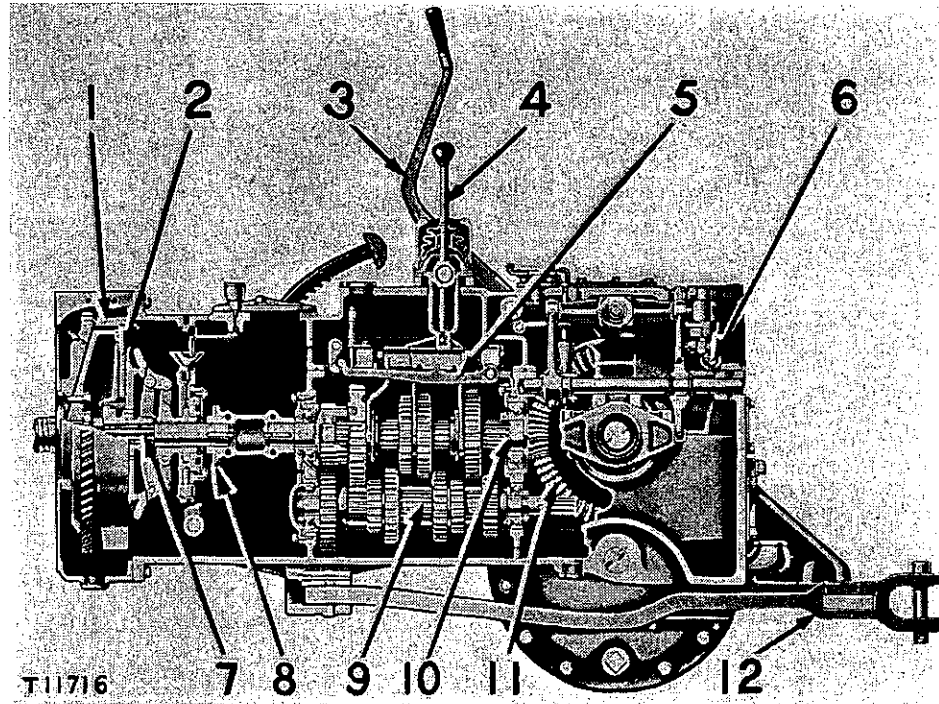
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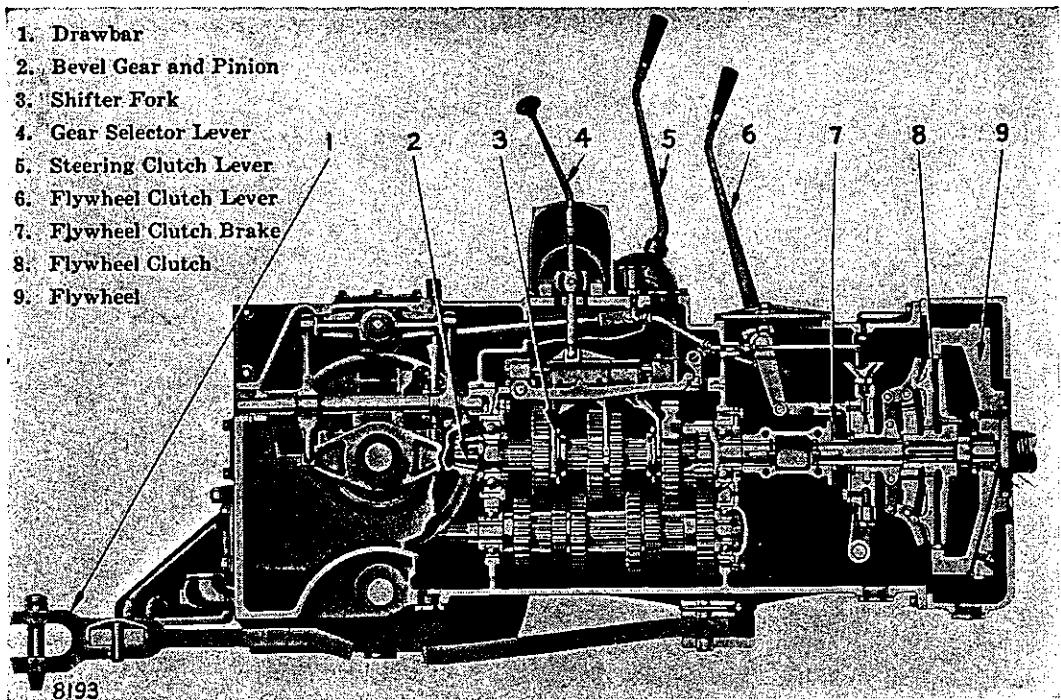
CUTAWAY VIEW OF FINAL DRIVE AND STEERING CLUTCH
(Later Tractors)

1—Sprocket shaft. 2—Final drive seals. 3—Sprocket. 4—Final drive gear. 5—Final drive pinion. 6—Steering clutch. 7—Steering clutch release bearing. 8—Bevel gear. 9—Brake drum. 10—Steering clutch case.

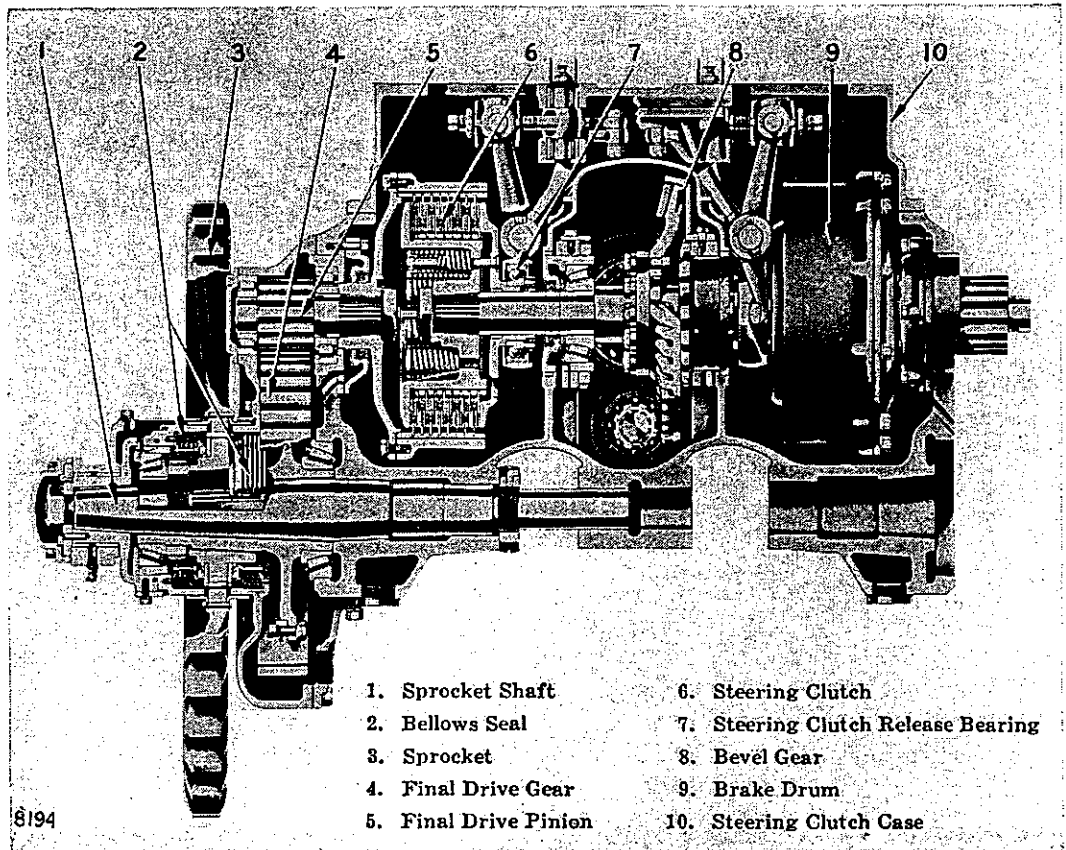


CUTAWAY VIEW OF TRANSMISSION AND FLYWHEEL CLUTCH
(Later Tractors)

- 1—Flywheel. 2—Flywheel clutch. 3—Steering clutch lever. 4—Gear selector lever.
 5—Gear shift interlock arm. 6—Steering clutch booster spring. 7—Flywheel clutch
 shaft. 8—Flywheel clutch brake. 9—Transmission lower shaft. 10—Pinion shaft.
 11—Bevel gear. 12—Drawbar.



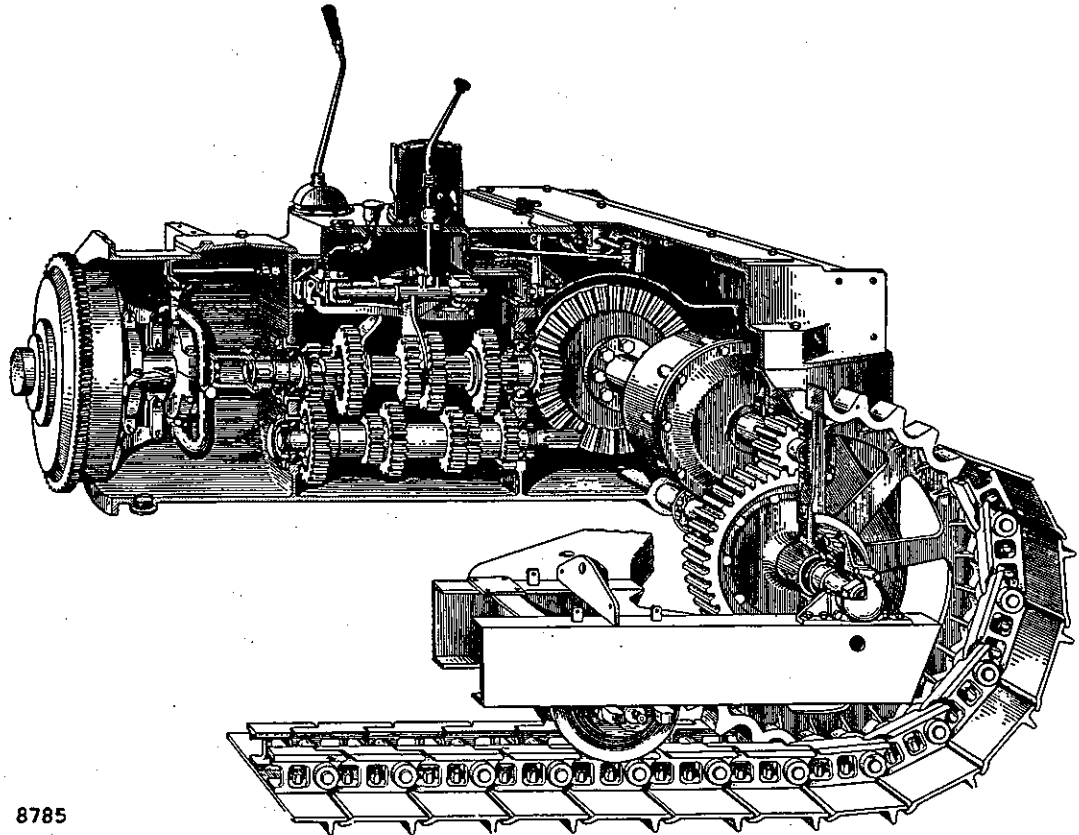
CUTAWAY VIEW OF TRANSMISSION AND FLYWHEEL CLUTCH
 (Earlier Tractors)



CUTAWAY VIEW OF FINAL DRIVE AND STEERING CLUTCH
 (Earlier Tractors)

POWER TRANSMISSION UNITS

The power transmission units consist of the flywheel clutch, transmission, bevel gear, steering clutch assemblies and final drives.



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CUTAWAY VIEW OF POWER TRANSMISSION UNITS
(Earlier Tractors)

The transmission case is divided into five compartments. The forward compartment contains the flywheel clutch. The middle compartment contains the transmission. The rear compartment is divided in two outer compartments, each containing a steering clutch, and the middle compartment containing the bevel gear and bevel gear shaft bearings. The transmission and bevel gear compartments have an opening between them which allows lubricant to flow from one to the other. The final drive gears are located outside the transmission case in the final drive cases.

Flywheel Clutch

The flywheel clutch and flywheel are enclosed in a separate compartment in the front portion of the transmission case. The clutch is accessible through the small opening, above the clutch for lubrication, adjustment and minor reconditioning.

OPERATION

The flywheel clutch driving plate (4) is connected to the flywheel (13) by means of external teeth on the drive plate and internal teeth in the flywheel. The front pressure plate (5) has the pressure plate hub integral with it and is splined to the clutch shaft (1). The clutch shaft is supported in front by the pilot bearing (6) located in the flywheel (13) while the rear end is connected to the transmission drive pinion by the coupling (7). The rear pressure plate (12) has internal teeth which mate with the external teeth on the front pressure plate hub. The adjusting collar (3) is threaded onto the front pressure plate hub. The cams (11) and links (10) connect the adjusting collar to the sliding collar (2).

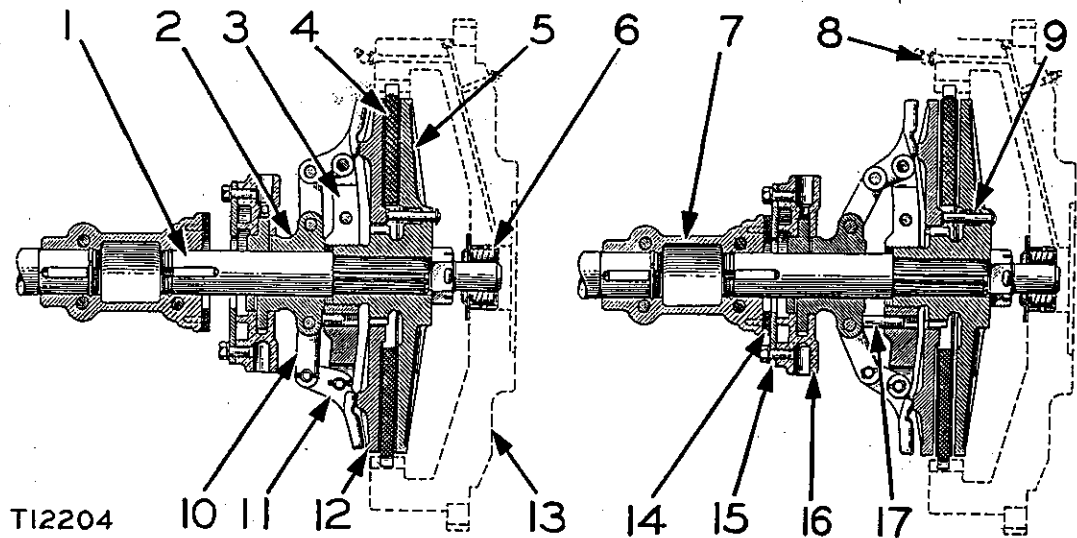
When the clutch is engaged the sliding collar (2) is moved forward, the outer ends of the links (10) are moved out, forcing the cams (11) against the rear pressure plate (12). This is commonly called an "over-center" clutch.

The rear pressure plate compresses the drive plate against the front pressure plate. When the driving plate is compressed between the two pressure plates, the turning effort of the engine is transmitted to the transmission. The clutch automatically stays engaged when the linkage "snaps over-center".

When the clutch is disengaged, the springs (9) force the two pressure plates apart and hold them in that position. A brake is provided to bring the rotating clutch shaft to a stop quickly when the clutch is disengaged. This makes it possible to shift gears without clashing them. A plate (15) is fastened to the clutch throw-out collar (16), which in turn is coupled to the sliding collar (2). As the sliding collar moves back along the clutch shaft (1), the plate (15) contacts the clutch brake facing (14) which is fastened to the coupling (7). The pin (17) acts as a guide to keep the sliding collar (2) and the adjusting collar (3) aligned with each other.

The clutch is adjusted by loosening the locking bolt and rotating the adjusting collar (3) clockwise to tighten and counterclockwise to loosen the clutch adjustment. The correct adjustment is obtained when with a reasonably hard pull on the lever, a distinct snap is felt as the linkage snaps over-center into the engaged position.

The pilot bearing (6) is lubricated through the fitting (8).



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FLYWHEEL CLUTCH

(ENGAGED)

(DISENGAGED)

- 1—Clutch shaft. 2—Sliding collar. 3—Adjusting collar. 4—Driving plate. 5—Front pressure plate. 6—Pilot bearing. 7—Coupling. 8—Fitting. 9—Spring. 10—Link. 11—Cam. 12—Rear pressure plate. 13—Flywheel. 14—Clutch brake facing. 15—Plate. 16—Clutch throw-out collar. 17—Pin.

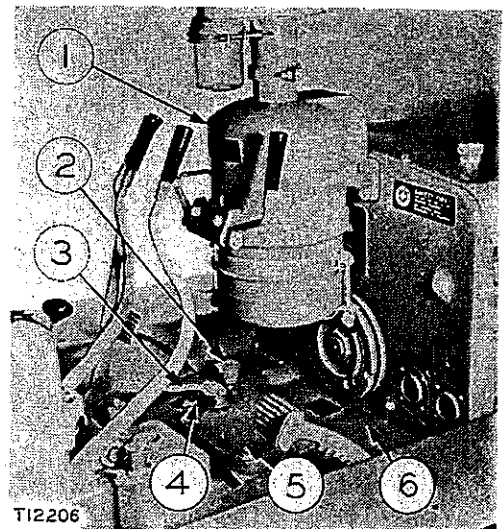
REMOVAL

(Later Tractors)

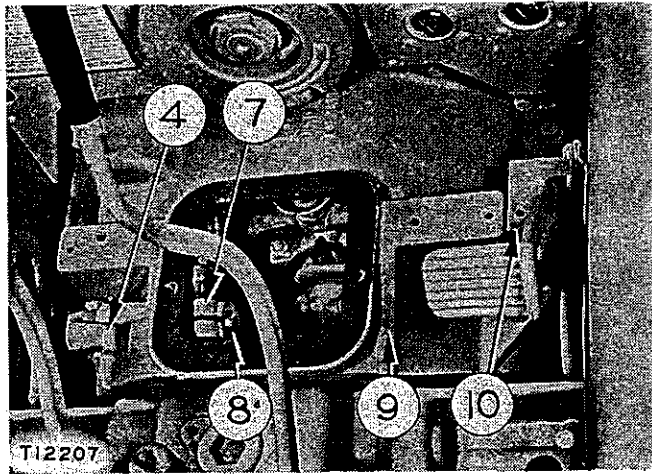
1. Engage the clutch, then disconnect the rod (3) from the lever (4).
2. Remove the air cleaner (1).
3. Remove the oil cup (2).
4. Remove all of the floor plates (6).
5. Remove the inspection cover (5).

PREPARING TO REMOVE AIR CLEANER AND FLOOR PLATES

- 1—Air cleaner. 2—Oil cup. 3—Rod.
4—Lever. 5—Cover. 6—Floor plate.



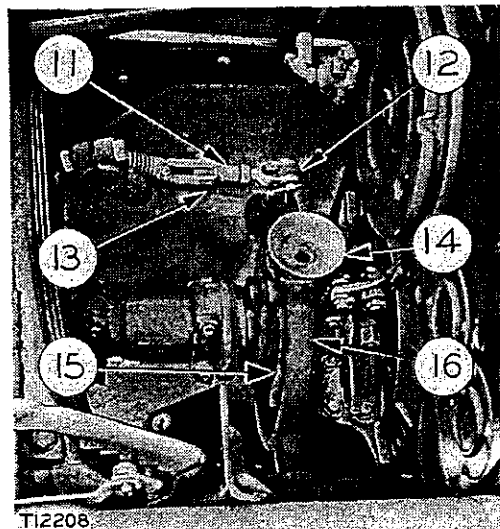
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PREPARING TO REMOVE CLUTCH COVER

4—Lever. 7—Lever. 8—Shaft. 9—Clutch cover. 10—Bracket.

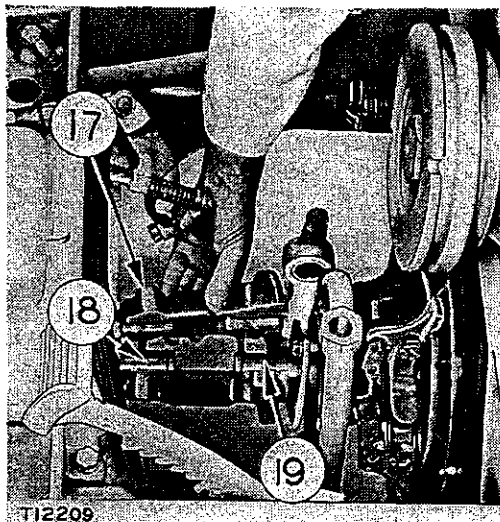
6. Remove the lever (4) and key from the shaft (8).
7. Loosen the clamp bolt in the lever (7) and slide the shaft (8) through the clutch cover and lever and remove through the inspection opening.
8. Disconnect the brake lock bracket (10) from the fender and slide the bracket up the brake pedal.
9. Remove all of the capscrews and bolts securing the clutch cover (9) to the flywheel housing and the transmission case and lift off the cover.
10. Disconnect the spring (13) and rod (11) from the clutch yoke lever (12).
11. Remove the funnel and screw assembly (14) which secures the yoke (16) to the clutch collar (15).



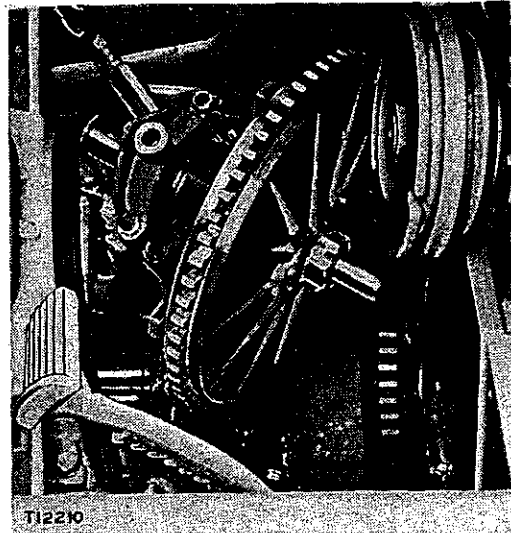
PREPARING TO REMOVE CLUTCH

11—Rod. 12—Clutch yoke lever.
 13—Spring. 14—Funnel and screw
 assembly. 15—Clutch collar.
 16—Yoke.





REMOVING COUPLING
 17—Coupling. 18—Transmission drive pinion. 19—Clutch shaft.



REMOVING CLUTCH

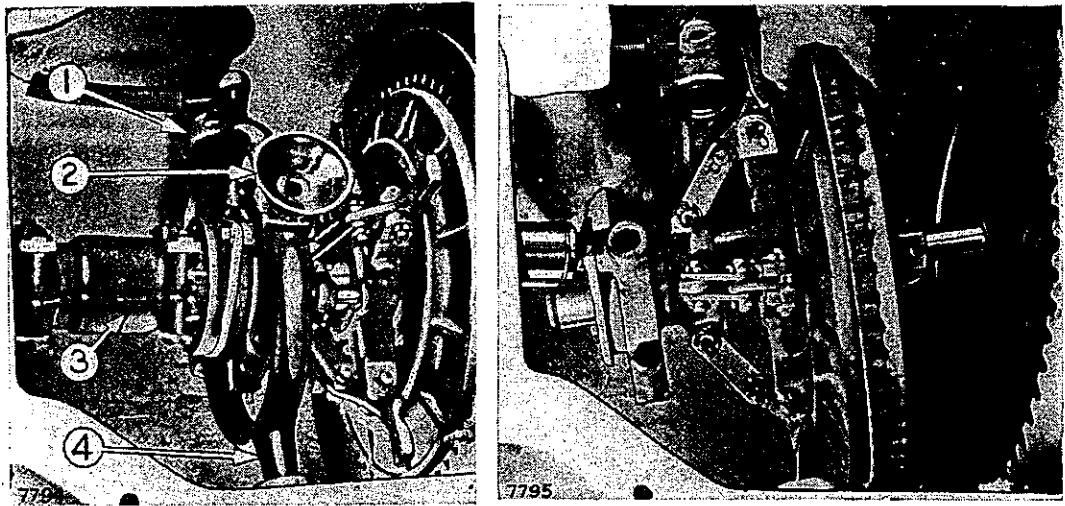
12. Remove the drain plug from the bottom of the clutch compartment and remove the screw which secures the lower part of the yoke (16) to the clutch collar (15).
13. Remove the bolts that secure the two parts of the coupling (17) together, then remove the coupling.
14. Slide the yoke (16) toward the right side of the transmission case until the left side is free of the lever (12).
15. Remove the yoke from the right side of the transmission case and lift it out between the transmission drive pinion (18) and the clutch shaft (19).
16. Support the clutch assembly by some suitable means and move it back until it clears the starting engine flywheel, then lift it out.

REMOVAL **(Earlier Tractors)**

On earlier tractors the steering clutch, transmission and clutch compartments were covered by the transmission case cover.

The flywheel clutch can be removed after taking off the transmission case cover; or if equipment is mounted on the transmission case cover, the clutch can be removed after removing the engine as outlined in the topic, DIESEL ENGINE REMOVAL (EARLIER TRACTORS).

If the clutch is to be removed by removing the cover, do so as described in the topic, TRANSMISSION CASE COVER (EARLIER TRACTORS).



REMOVING CLUTCH ASSEMBLY

1—Lever. 2—Funnel assembly. 3—Coupling assembly. 4—Yoke.

Then proceed as follows:

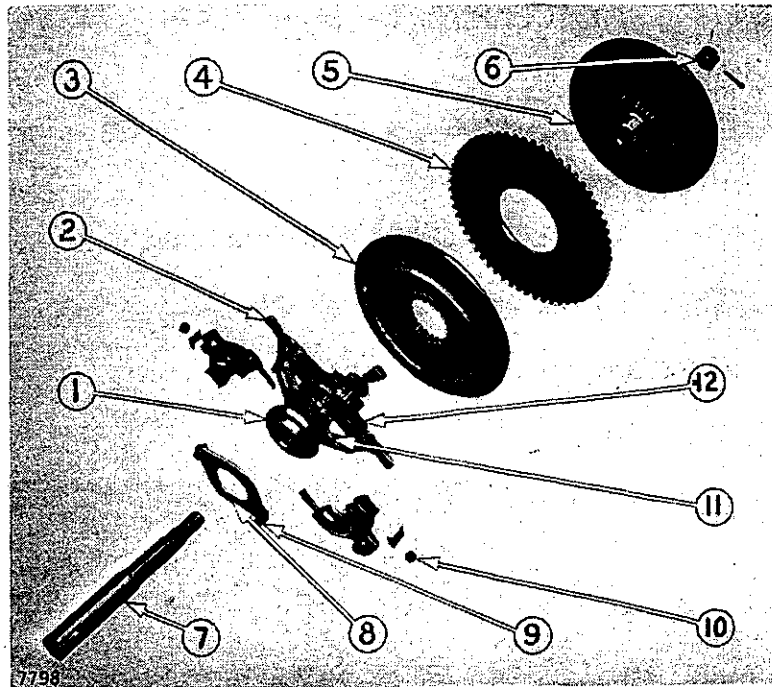
1. Remove the coupling assembly (3) and take out the screw and funnel assembly (2) and the screw at the bottom of the yoke (4).
2. Shift the yoke to the right until it is free of the lever (1).
3. Pull the yoke out of the socket in the side of the transmission case and remove from the compartment.
4. Move the clutch away from the flywheel until the front end of the clutch shaft is out of the pilot bearing in the flywheel. Then remove the flywheel clutch as shown.

DISASSEMBLY AND ASSEMBLY

1. Unscrew the adjusting collar (12) from the front pressure plate (5).
2. Remove the nut (6).
3. Slide out the clutch shaft (7).
4. Remove the front pressure plate (5), driving disc (4) and rear pressure plate (3) individually. If the contact surfaces of these parts are worn, scored or excessively cracked, they should be replaced.

NOTE

Care should be taken to prevent any lubricant or similar substance from getting on the contact surfaces of the clutch plates and driving disc as this will cause glazing of the surfaces.



CLUTCH ASSEMBLY

1—Collar. 2—Cam. 3—Rear pressure plate. 4—Driving disc. 5—Front pressure plate. 6—Nut. 7—Clutch shaft. 8—Brake plate. 9—Capscrew. 10—Nut. 11—Link. 12—Adjusting collar.

The pins and springs in the front pressure plate keep the pressure plates separated when the clutch is disengaged. If the plates do not separate when the flywheel clutch is disengaged, these springs may need to be replaced.

5. Drive the pins through the front pressure plate toward the driving disc.
6. Install new springs and pins.
7. Place the washer in position on the end of the pin and peen over the end of the pin.
8. The flywheel clutch brake plate (8) can be removed by taking out the capscrews (9).
9. The plate should be replaced if worn or scored.
10. The clutch brake facings, attached to the coupling between the flywheel clutch and transmission, should be replaced if worn flush with the countersunk machine screws.
11. To remove the bronze collar assembly, take off the nuts (10) and locks and pull each half off the collar (1).
12. Replace the worn parts of the collar assembly or collar.
13. If the cams (2), the links (11) or pins are worn, they should be replaced.

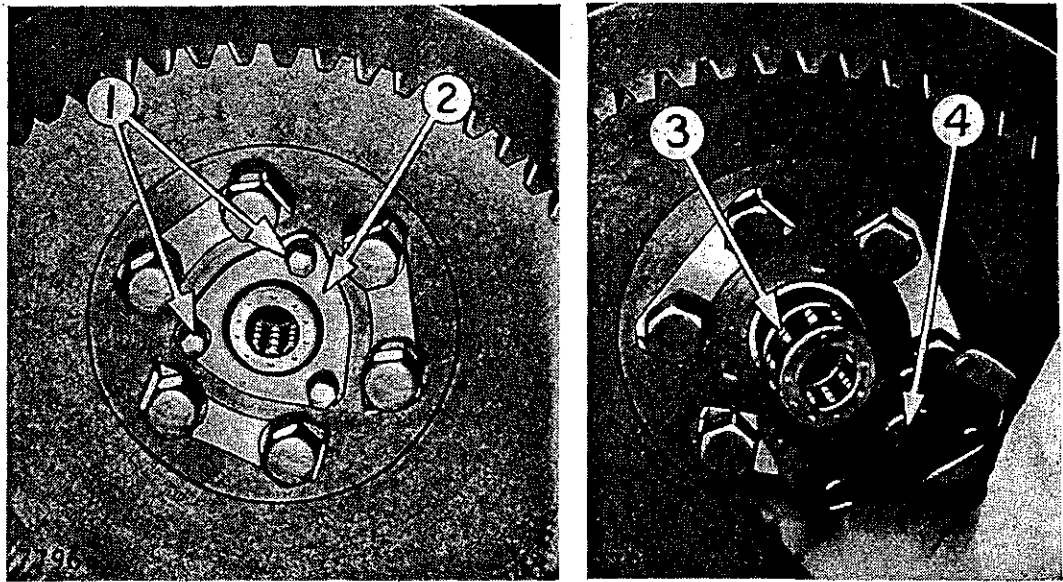
CLUTCH PILOT BEARING

To remove the pilot bearing (3) in the flywheel, take out the cap-screws (1) and remove the inner and outer retainer (2) and felt washer (4) as a unit.

The washer should be replaced if worn and leaking.

The bearing (3) will slide out of the flywheel.

The inner and outer races should be replaced if worn.



CLUTCH PILOT BEARING

1—Capscrews. 2—Retainer. 3—Bearing. 4—Felt washer.

Transmission

OPERATION

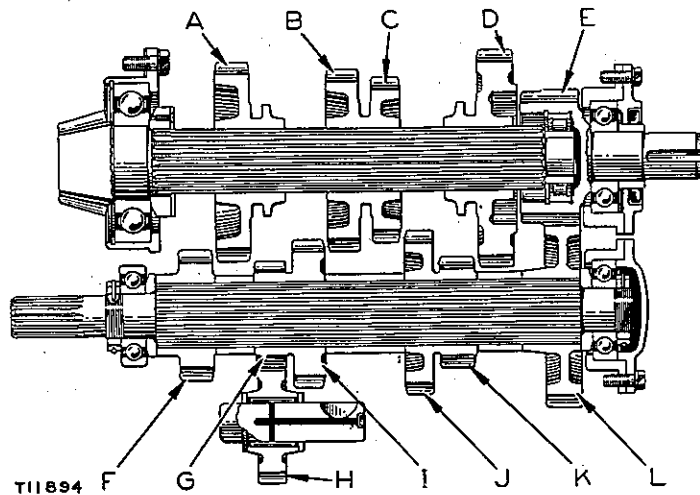
The transmission (speed change compartment) is located in the middle compartment of the transmission case. All of the gears required for obtaining the five forward and one reverse speeds are located in this compartment.

A locking device actuated by the flywheel clutch lever locks the sliding gears in position when the flywheel clutch is engaged.

The bevel gear is located in the rear compartment of the transmission case.

The various speeds are accomplished by combinations of positions of three sets of sliding gears as shown. Gears (A), (B)-(C) and (D) are sliding gears which operate on the splined pinion shaft. Gears (F), (G)-(I), (J)-(K) and (L) are splined to the lower shaft.

Gear (H) is the reverse idler gear and turns on a separate shaft. Gear (H) actually sets on the right side of the lower shaft and is always in mesh with gear (G). When the gear shift lever is placed in the reverse position, the sliding gear (A) on the pinion shaft is shifted into mesh with the idler gear (H) which reverses the rotational direction of the pinion shaft.



TRANSMISSION GEAR ARRANGEMENT

- A—Sliding gear (2nd and Reverse).
- B—Sliding gear (3rd).
- C—Sliding gear (4th).
- D—Sliding gear (1st and 5th).
- E—Pinion.
- F—2nd gear.
- G—Reverse gear.
- H—Reverse idler gear.
- I—3rd gear.
- J—4th gear.
- K—1st gear.
- L—Lower shaft driving gear.

1st	E-L	K-D	
2nd	E-L	F-A	
3rd	E-L	I-B	
4th	E-L	J-C	
5th	E-D		
Reverse	E-L	G-H	H-A

POWER FLOW

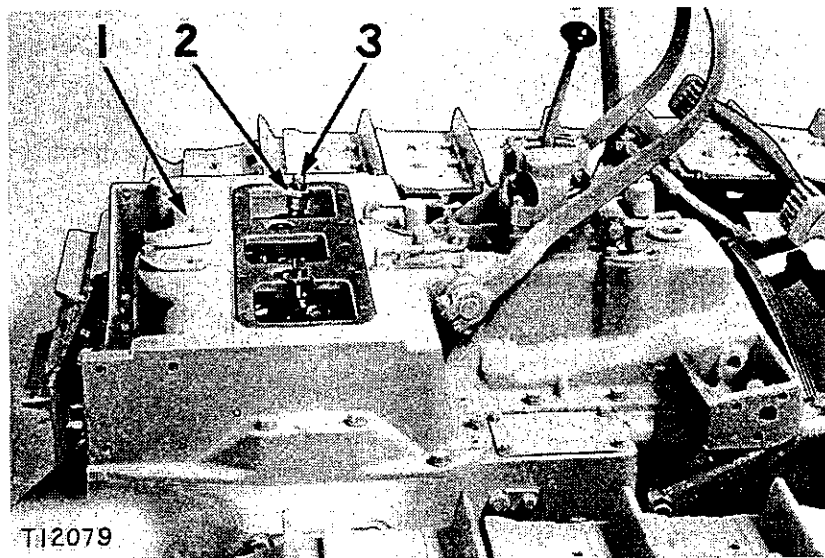
The pinion shaft does not extend the full length of the transmission compartment but is piloted at its front end in the transmission drive pinion. By shifting the sliding gear (D) forward, the internal teeth of this gear are meshed with the external teeth on the drive pinion (E) to obtain a direct drive for the fifth gear.

TRANSMISSION CASE COVER (Later Tractors)

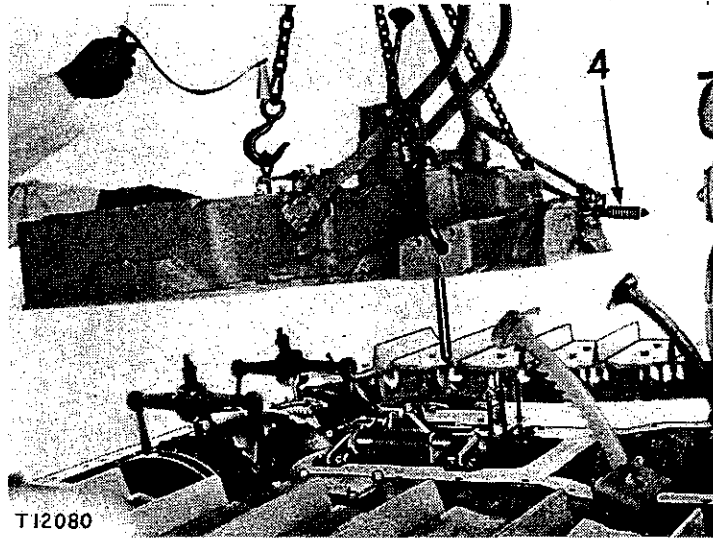
The transmission cover on later tractors, covers the transmission and the steering clutch compartments.

Removal

1. Remove the dash, see the topic, DASH.
2. Remove the seat, fuel tank and fenders, see the topic, SEAT, FUEL TANK AND FENDERS.
3. Remove the cover from over the clutch as outlined in the topic, CLUTCH.
4. After removing the plate from the transmission cover (1), loosen the lock nuts (2) from both steering clutch adjusting screws (3) and loosen the screws until they are free of the sockets in the steering clutch bell crank, then position the adjusting screws as shown.
5. Remove all of the capscrews holding the transmission cover to the steering clutch and transmission case.



STEERING CLUTCH ADJUSTING SCREWS
1—Transmission cover. 2—Lock nut. 3—Adjusting screw.



REMOVING TRANSMISSION COVER
4—Rod and spring.

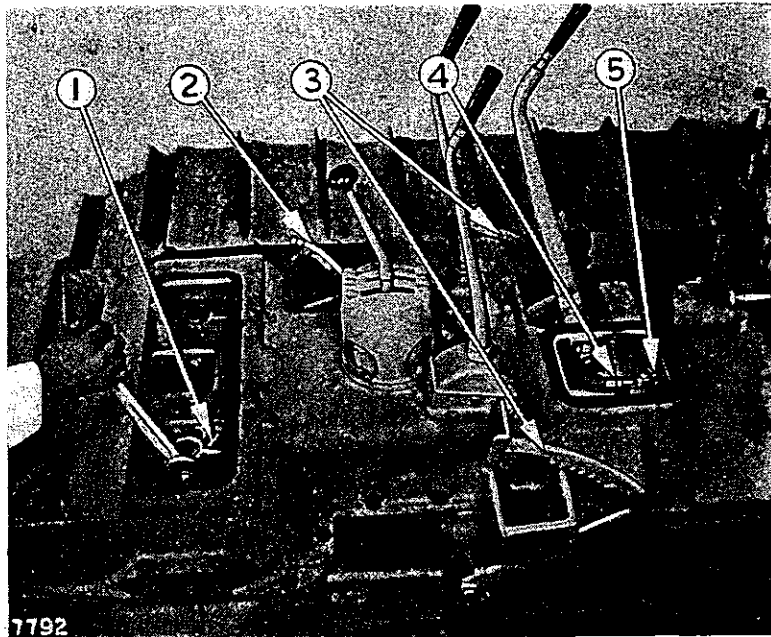
6. Disconnect the rod and spring (4) from the lever, in the clutch compartment and move it toward the rear of the cover to prevent the cams in the cover from damaging the locking arms on the interlocking mechanism when lifting the cover off.
7. With a sling arrangement similar to the one shown. Lift the cover from the case.

TRANSMISSION CASE COVER (Earlier Tractors)

The transmission cover on earlier tractors covers the flywheel clutch, transmission and the steering clutch compartments.

Removal

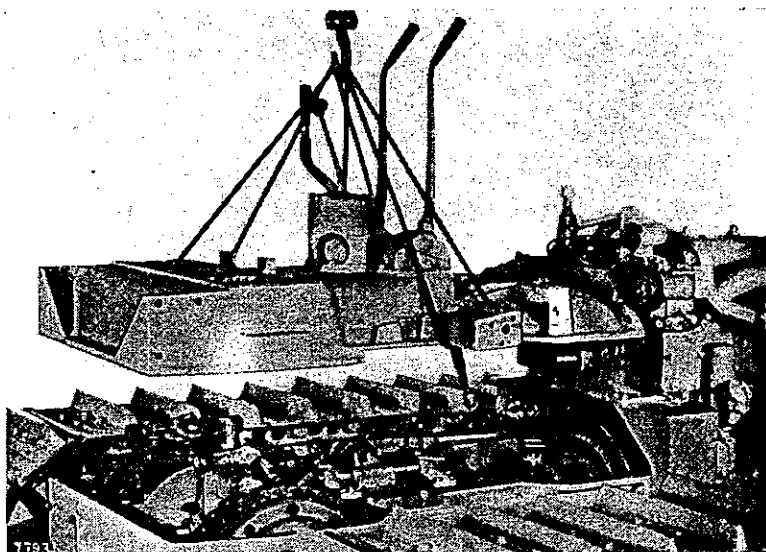
1. Disconnect the fuel line (2) at the fuel tank and remove the dash.
2. Remove all the capscrews holding the floor plates in position, but do not remove the floor plates. Then remove all the capscrews holding the fenders to the transmission case.
3. Lift off the seat, fenders and fuel tank as a unit.
4. Remove the floor plates.
5. Remove the starting engine flywheel.



PREPARING TO REMOVE TRANSMISSION CASE COVER

1—Steering crank. 2—Fuel line. 3—Brake pedals. 4—Clutch linkage. 5—Lever.

6. Disconnect the flywheel clutch linkage (4) at the top of the lever (5) inside the flywheel clutch compartment after removing the inspection cover.
7. Remove the inspection plate at the rear of the transmission case cover and loosen the steering clutch adjustment as shown until the adjusting screw is free of the socket in the steering crank (1).
8. Remove the brake pedals (3) or loosen the brake adjustment and swing the pedals forward.



REMOVING TRANSMISSION CASE COVER

9. With the flywheel clutch lever forward, lift off the transmission case cover as shown.
10. When installing the transmission case cover, place the flywheel clutch lever in the forward or disengaged position to prevent the cams on the shaft in the transmission case cover from damaging the gear shift interlock assemblies.

GEAR SHIFT AND INTERLOCK MECHANISM

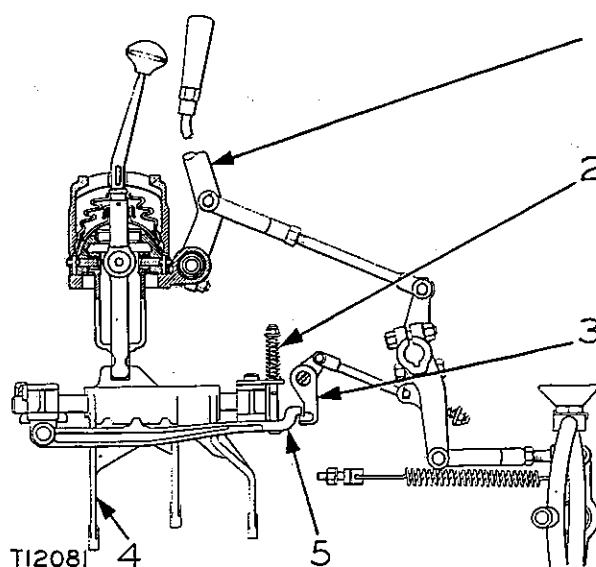
The gear shift and interlock mechanism is mounted directly on top of the middle compartment of the transmission case.

The gear shift interlock mechanism is operated by the flywheel clutch lever (1) and locks the engaged transmission gears in position. The gears cannot be shifted unless the flywheel clutch is in the disengaged position. A locking arm (5) is provided for each shifter fork (4).

A tang on the locking arm (5) fits into the notches of the shifter forks to lock the fork in the desired position.

Three cams (3) fastened to a shaft in the transmission cover are connected by linkage to the flywheel clutch lever. When the clutch is engaged the cam (3) is rotated so the hooked end of the cam is beneath the end of the locking arm (5) preventing the arm and shifter fork (4) from moving while trying to shift gears with the clutch in the engaged position.

When the clutch lever is in the disengaged position the cam is rotated away from the locking arms and the arms are free to be moved by the wedging action of the notch in the shifter fork against the tang on the locking arm. The tension of the spring (2) on the locking arm is only sufficient to properly position the shifter fork.



GEAR SHIFT AND INTERLOCK MECHANISM

1—Flywheel clutch lever. 2—Spring. 3—Cam. 4—Shifter fork. 5—Locking arm.

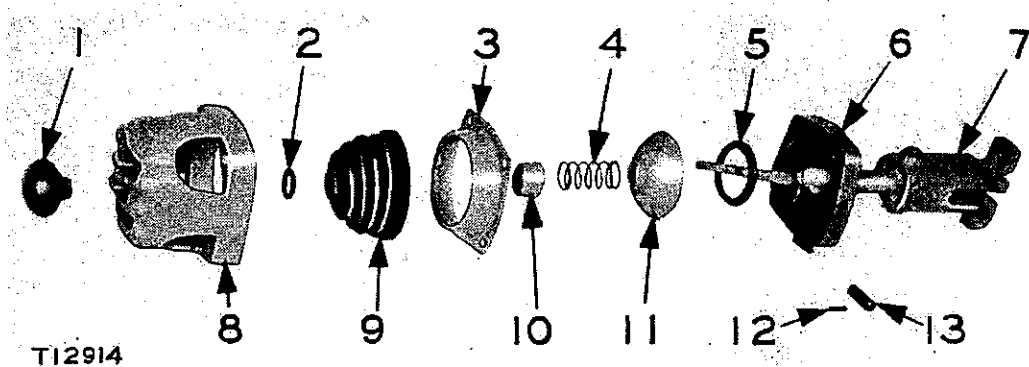
Gear Shift Lever (Later Tractors)

A swinging "gate" lock assembly (7) which follows the lateral movement of the speed selector lever prevents any but the desired fork from shifting when the gears are shifted rapidly.

1. Remove the nuts holding the plate (8) to the transmission top cover and remove the gear shift lever and gate assembly (7).
2. Remove the handle (1).
3. Remove the plate (8) from the gate assembly (7).
4. Remove the ring (2) and lift the boot (9) and ring (3) from the gate assembly.
5. Remove the cover (10), spring (4), cover (11) and seal (5).
6. Remove the pin (12) securing the shaft (13) in the adapter (6).
7. Remove the shaft (13) securing the gate assembly (7) to the adapter (6).

NOTE

The seal (5) should be replaced if damaged. The gate assembly (7) should rotate freely on the pins that secure it to the gear shift lever and also on the shaft (13).



GEAR SHIFT LEVER EXPLODED VIEW

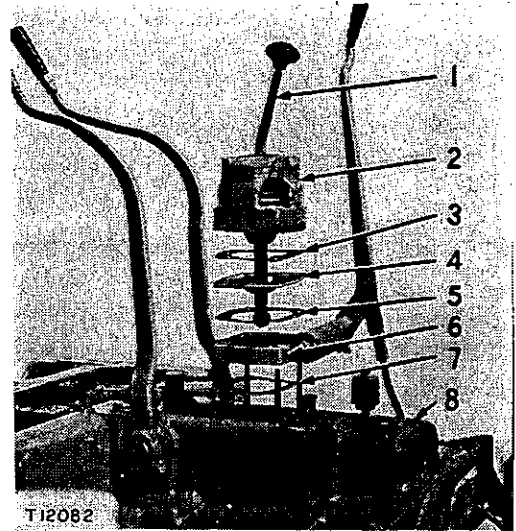
1—Handle. 2—Ring. 3—Ring. 4—Spring. 5—Seal. 6—Adapter. 7—Gate assembly.
8—Plate. 9—Boot. 10—Cover. 11—Cover. 12—Pin. 13—Shaft.

Gear Shift Lever (Earlier Tractors)

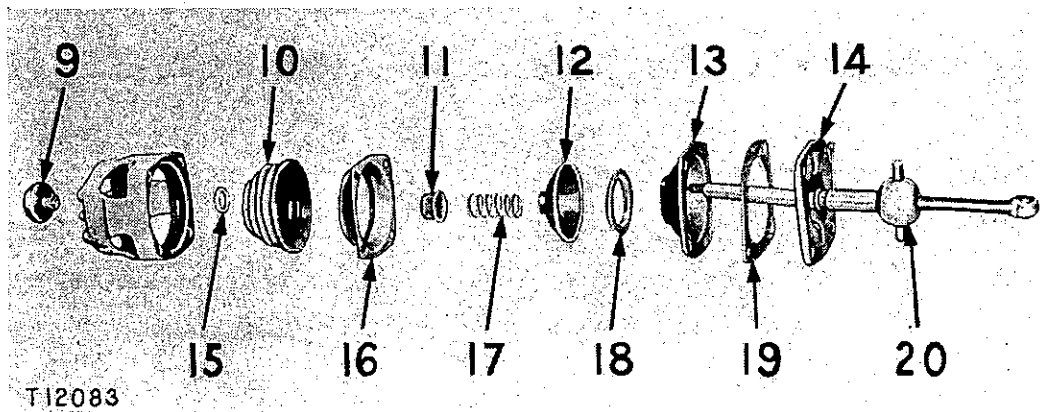
1. Remove the nuts securing the plate (2) to the transmission cover (8) and lift the gear shift lever (1), plate (2) and the parts within the plate, from the transmission cover.

REMOVING GEAR SHIFT LEVER

- 1—Gear shift lever. 2—Plate. 3—Gasket. 4—Socket plate. 5—Gasket. 6—Spacer. 7—Gasket. 8—Transmission cover.



2. The gasket (3), socket plate (4), gasket (5), spacer (6) and gasket (7) can now be removed from the cover.
3. Remove the handle (9) from the lever (1).
4. Lift the plate (2) off the lever (1).
5. Remove the ring (15) securing the boot (10) to the lever and then lift the boot and plate (16) from the lever.
6. Remove the cotter pin holding the spring retainer (11) on the gear shift lever, then remove the retainer, spring (17), cover (12), seal (18), cover (13), gasket (19) and socket plate (14) from the gear shift lever.
7. The gaskets (3), (5), (7) and (19) are alike and should be replaced if damaged.



GEAR SHIFT LEVER EXPLODED VIEW

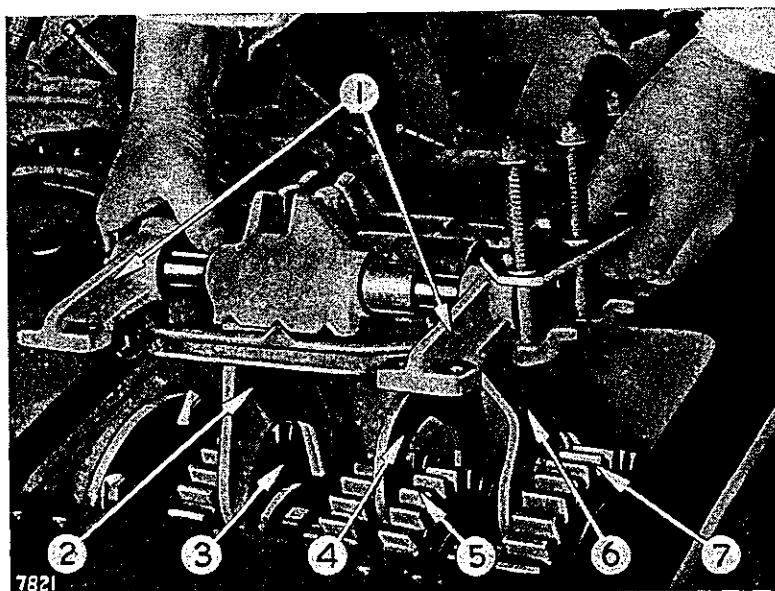
- 9—Handle. 10—Boot. 11—Spring retainer. 12—Cover. 13—Cover. 14—Socket plate. 15—Ring. 16—Plate. 17—Spring. 18—Seal. 19—Gasket. 20—Spherical portion of gear shift lever.

8. If the socket plates (4) and (14) and the spherical portion (20) of the gear shift lever are rough they should be smoothed up with emery cloth.
9. If the boot (10) is torn or damaged it should be replaced.

Gear Shift and Interlock Mechanism Removal

To remove the gear shift and interlock mechanism, first remove the transmission case cover as described in the topic, TRANSMISSION CASE COVER.

Remove the capscrews holding the brackets (1) to the transmission case and lift off the entire mechanism as shown.



REMOVING GEAR SHIFT AND INTERLOCK MECHANISM

1—Brackets. 2—Rear shifter fork. 3—Sliding gear. 4—Center shifter fork. 5—Sliding gear. 6—Front shifter fork. 7—Sliding gear.

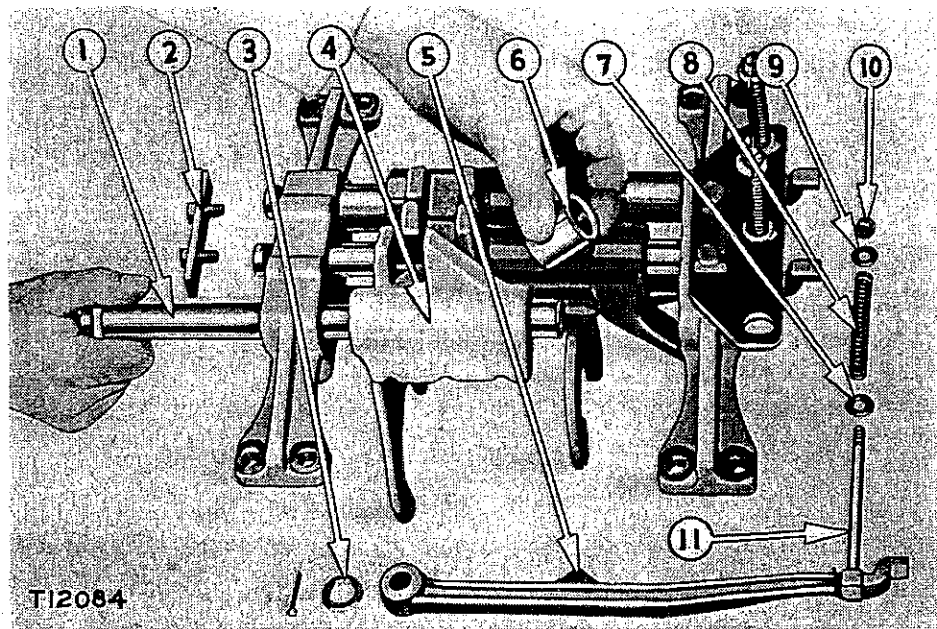
The forward fork (6) shifts the gear (7) forward for fifth gear and to the rear for first gear.

The center fork (4) shifts the gear (5) forward for fourth and to the rear for third gear.

The rear fork (2) shifts the gear (3) forward to engage the reverse idler gear for reverse and to the rear for second gear.

Gear Shift and Interlock Mechanism Disassembly

To remove the gear shifter forks remove the nut (10), washer (9), spring (8) and washer (7) at the front end of each of the three lock assemblies (5).



GEAR SHIFT AND INTERLOCK MECHANISM DISASSEMBLY

1—Shaft. 2—Plate lock. 3—Washer. 4—Fork. 5—Lock assembly. 6—Spacer.
7—Washer. 8—Spring. 9—Washer. 10—Nut. 11—Stud.

On earlier tractors the stud (11) was welded to the lock assembly (5) while on later tractors the stud is changed to a bolt and has a cotter pin in it.

Remove the washer (3) and drive out the pin at the rear end of the three lock assemblies (5) and remove the lock assemblies.

Remove the capscrews securing the shaft plate lock (2) and remove the lock.

Slide out the gear shifter shaft (1), removing first the spacer (6) and then the fork (4).

The outside shifter fork shafts have a spacer in front of the fork; a spacer is not used on the center shifter fork shaft.

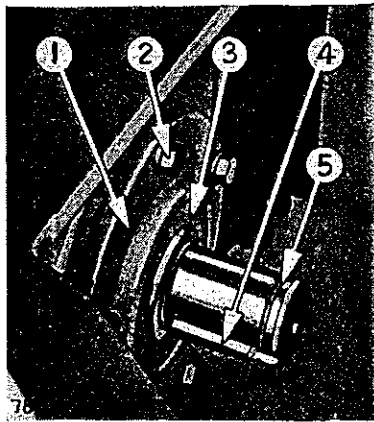
TRANSMISSION DRIVE PINION

The transmission drive pinion transmits the power from the clutch to the transmission shafts.

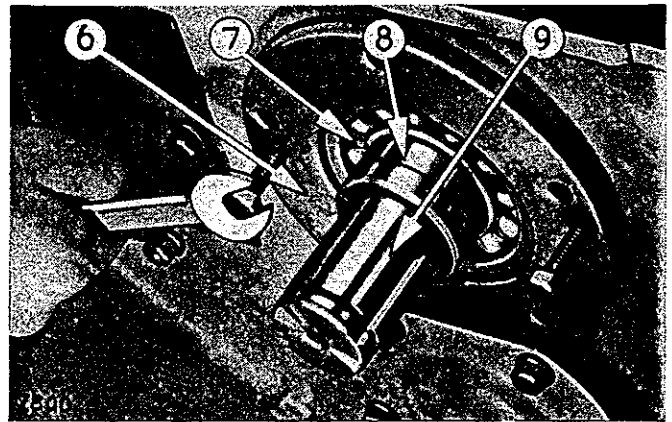
To remove the transmission shafts the seat, transmission case cover, gear shift and interlock mechanism, flywheel clutch cover on later tractors and the flywheel clutch must be removed as outlined under the covering topics.

Removal and Disassembly

1. Remove the snap ring (5) and key (4).
2. Remove the capscrews (2) around the cover (1) and remove the cover.
3. The seal (3) in the cover should be replaced if it has been leaking lubricant into the clutch compartment. Install a new seal with the lip toward the transmission compartment.
4. Using the capscrews from the cover, pull the bearing cage (6), bearing (7) and pinion (9) as a unit.



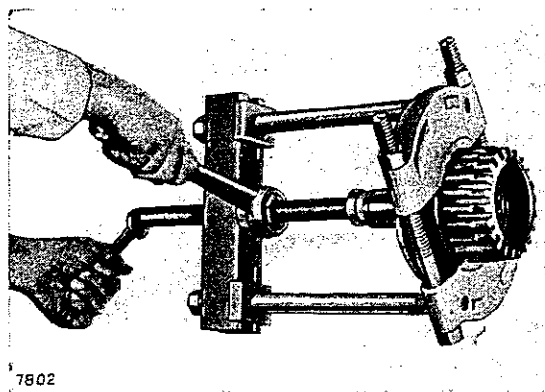
TRANSMISSION PINION COVER



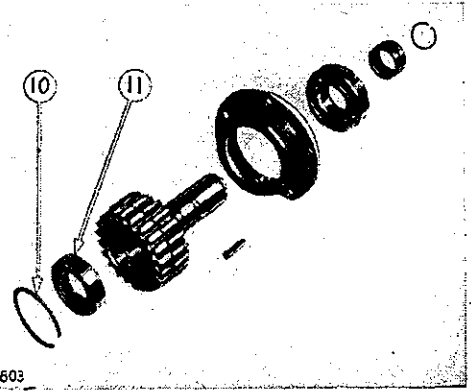
PULLING TRANSMISSION PINION BEARING CAGE

1—Cover. 2—Capscrew. 3—Seal. 4—Key. 5—Snap ring. 6—Bearing cage.
7—Bearing. 8—Spacer. 9—Pinion.

5. Pull the cage and bearing from the transmission drive pinion as shown, using the 8B7551 Bearing Pulling Attachment and 8B7548 Push Puller. The spacer (8) will come off with the bearing and cage.



PULLING PINION BEARING



DRIVE PINION ASSEMBLY
10—Snap ring. 11—Pilot bearing.

6. Press the bearing (7) out of the cage.
7. The pilot bearing (11) in the drive pinion will slip out after the snap ring (10) is removed.

PINION SHAFT

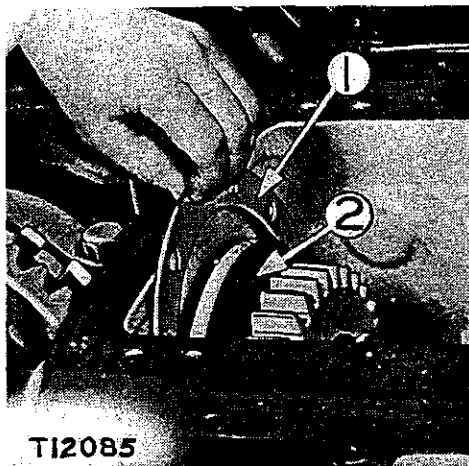
The pinion shaft does not extend the length of the transmission compartment, but is piloted at the front end in the drive pinion which is located in the front of the transmission case.

Removal

Remove the capscrews and locks around the bearing cage (2) at the rear end of the pinion shaft.

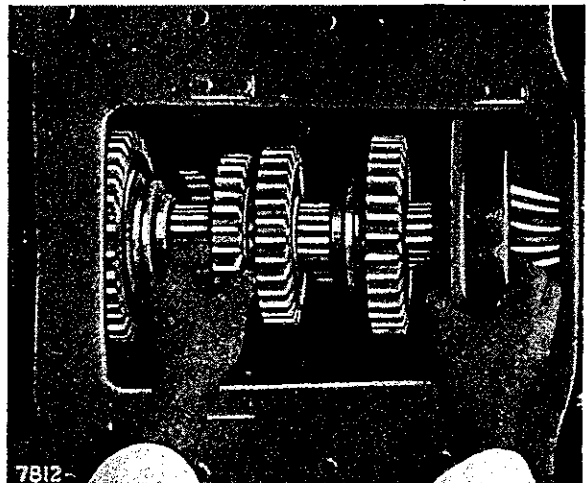
Using two $\frac{3}{8}$ "-16 (NC) capscrews, pull the bearing cage out of the rear wall of the transmission compartment.

Remove the shims (1) and wire them together so none will be lost or damaged as this is the proper amount of shims to be used for the pinion adjustment if the same pinion shaft is used again.



PINION SHAFT BEARING CAGE
AND SHIMS

1—Shims. 2—Bearing cage.

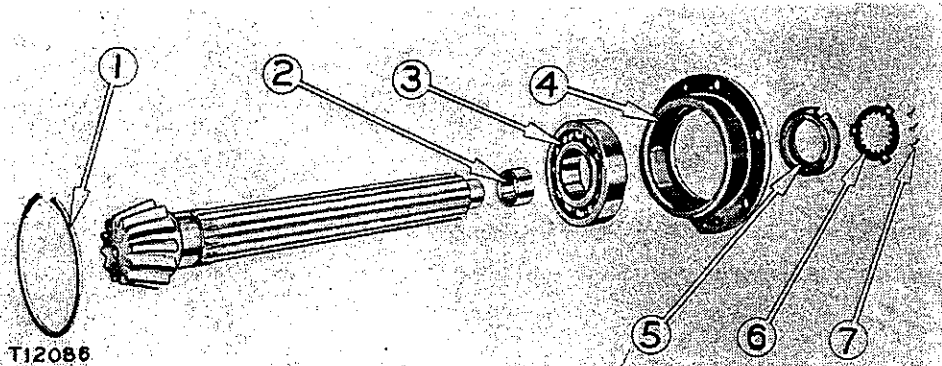


PINION SHAFT REMOVAL

Lift out the pinion shaft and gears after moving them forward for the rear end of the pinion shaft to clear the rear of the transmission compartment. The gears are splined and will slide off the shaft.

Disassembly and Assembly

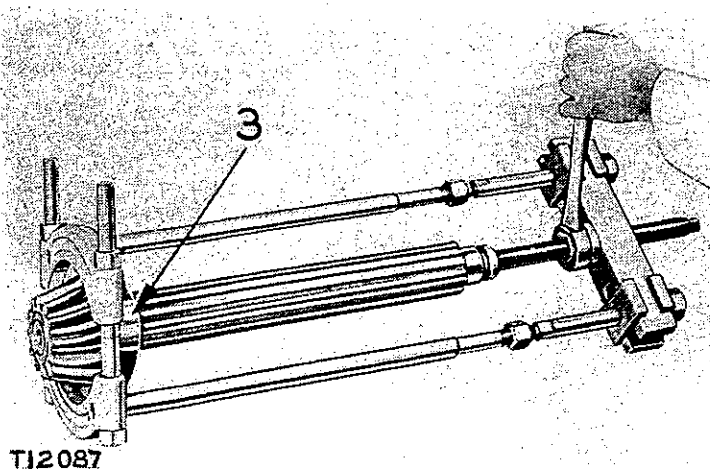
1. Remove the screws (7) and lock (6) from the nut (5).
2. Remove the nut (5) with a 3B5964 Wrench.
3. Remove the lock ring (1), which secures the bearing (3) in the bearing cage (4), then slide the cage from the bearing.



PINION SHAFT DISASSEMBLY

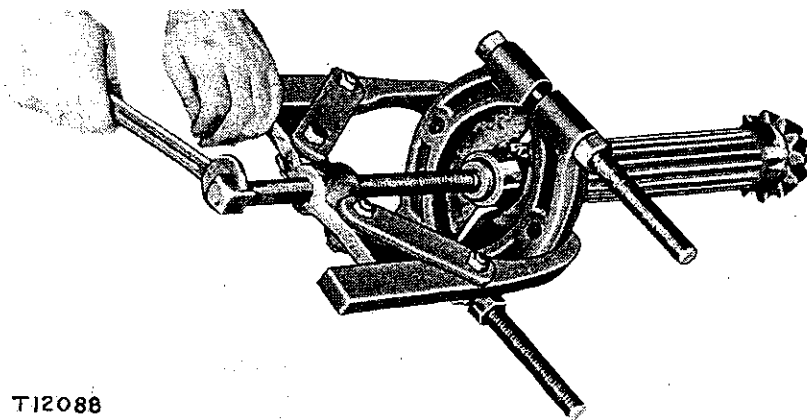
1—Lock ring. 2—Race. 3—Bearing. 4—Bearing cage. 5—Nut. 6—Lock. 7—Screws.

4. The bearing (3) can be removed from the pinion shaft by using a 8B7551 Bearing Pulling Attachment, 8B7549 Legs, 8B7555 Adapters and the 8B7548 Push Puller.
5. The pilot bearing inner race (4) on the front end of the shaft can be pulled with an 8B7551 Bearing Pulling Attachment and 8B7545 Puller.



REMOVING BEARING

3—Bearing.



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REMOVING BEARING RACE

6. When replacing the lock (6), stake the screws (7) securely in position with a center punch.

Installation

If the pinion shaft is reinstalled in the same transmission case, use the same shims back of the bearing cage flange at the rear end of the pinion shaft that were removed when the transmission was disassembled. The shims are semi-circular, making it unnecessary to remove the cage to add or remove shims.

The pinion shaft can be located by observing the tooth contact pattern made by the pinion teeth on the bevel gear teeth. For this method of setting, see the topic, BEVEL GEAR AND PINION SETTINGS.

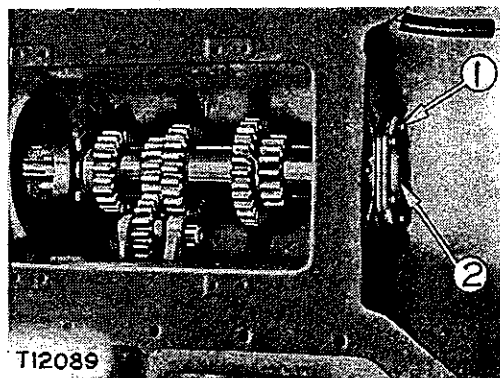
LOWER SHAFT

Removal and Disassembly

1. Remove the capscrews (1) and cover (2).

PREPARING TO REMOVE LOWER SHAFT

1—Capscrew. 2—Cover.

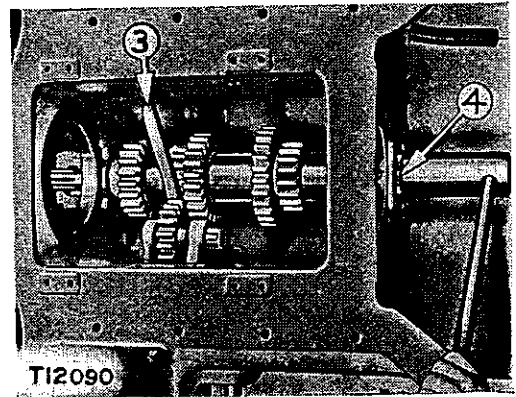


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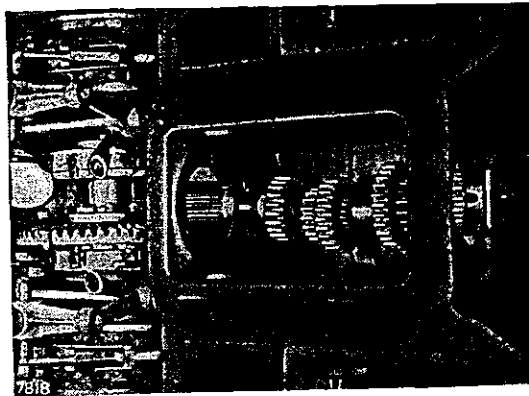
2. Remove the lock ring from the nut (4) and remove the nut with a 3B6780 Wrench while holding the shaft from turning by inserting a wedge (3) between the lower shaft gear and the reverse idler gear.
3. Pull the bearing and cage off the shaft by using two $\frac{3}{8}$ "-16 (NC) puller screws.

PREPARING TO REMOVE LOWER SHAFT

3—Wedge. 4—Nut.



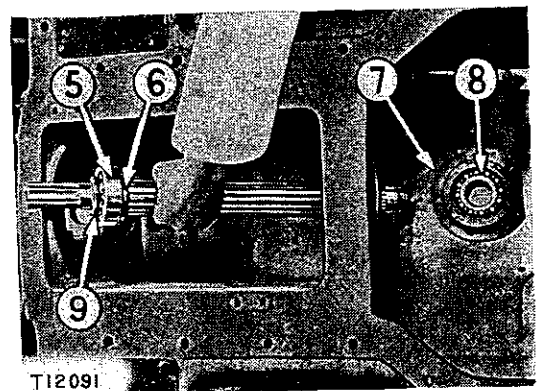
4. The bearing (8) can be pressed out of the cage (7) for inspection or replacement.



REMOVING LOWER SHAFT

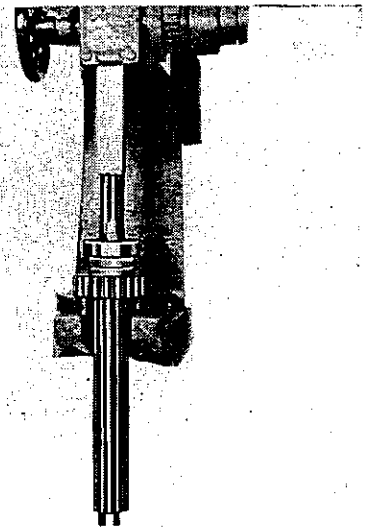
REMOVING LOWER SHAFT

5—Bearing. 6—Spacer. 7—Bearing cage.
8—Bearing. 9—Nut.



5. Move the lower shaft into the rear compartment of the transmission case, at the same time removing the gears and spacers from the forward end of the shaft.
6. After the gears and spacers have been removed, move the shaft forward until it can be removed as shown.
7. Remove the lock ring from the nut (9).
8. Remove the nut (9) with a 3B6780 Wrench.
9. The bearing (5) and spacer (6) can be pressed off in a press by installing a gear in front of the spacer and pressing down on the shaft.

REMOVING BEARING FROM SHAFT



T12092

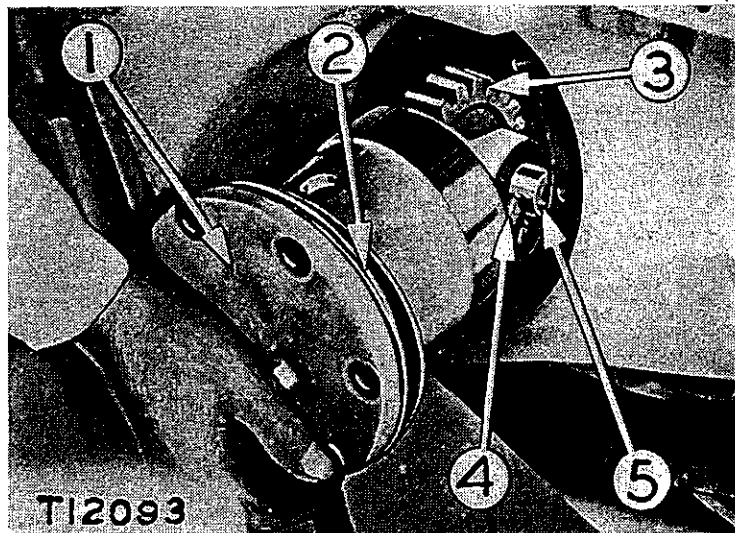
REVERSE IDLER GEAR

The reverse idler gear (3) is carried on a bracket (1) which is mounted through the right side of the transmission case and can be removed as a unit.

The shims (2) between the bracket and transmission case control the backlash between the idler gear and the pinion shaft and lower shaft gears.

To remove the idler gear (3) and bearing (11) for inspection, remove the lock (4) and press out the shaft (5).

The hardened thrust washers (7) and (10) are positioned between the gear and inside faces of the bracket by dowels (6) in the bracket. These washers should be replaced if badly worn or scored.



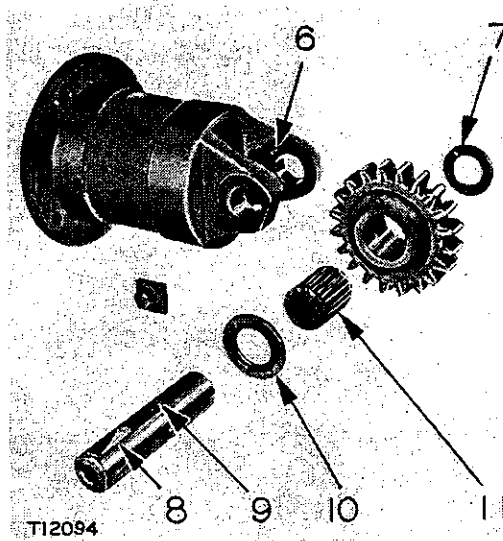
REVERSE IDLER GEAR ASSEMBLY

1—Bracket. 2—Shims. 3—Reverse idler gear. 4—Lock. 5—Shaft.

Oil collected in the hole (8) flows through a drilled passage to the oil hole (9) in the shaft to lubricate the bearing (11).

When installing the gear (3) into the bracket, place the gear so the chamfered edge of the teeth is toward the rear of the tractor as this is the side that meshes with the sliding gear on the pinion shaft.

When installing the idler gear and bracket place a sufficient amount of shims (2) between the bracket and transmission case to give a clearance of .006"-.008" at the point of least backlash with the gear on the lower shaft.



**REVERSE IDLER GEAR ASSEMBLY
EXPLODED**

6—Dowel. 7—Thrust washer. 8—Oil collecting hole. 9—Oil hole. 10—Thrust washer. 11—Bearing.

Bevel Gear

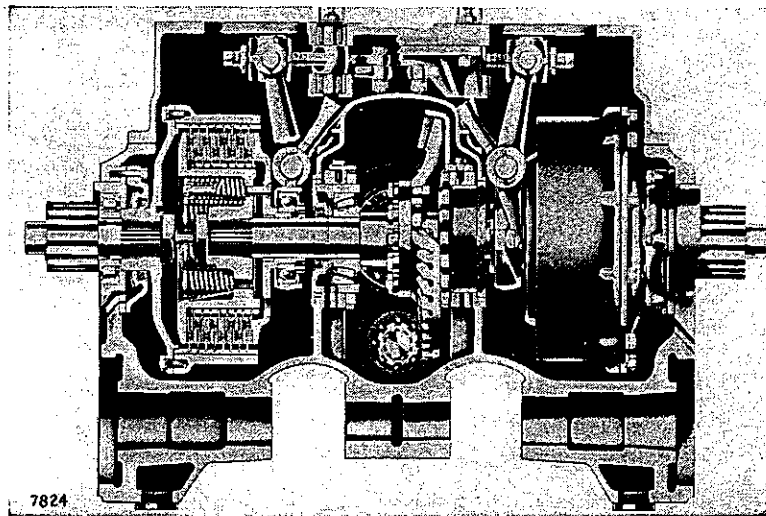
The power is transmitted from the transmission pinion shaft to a bevel gear which is secured to a shaft upon which the steering clutches are mounted.

Both steering clutches, bevel gear and shaft must be removed from the tractor as a unit if service work is to be done on either of these parts.

Removal

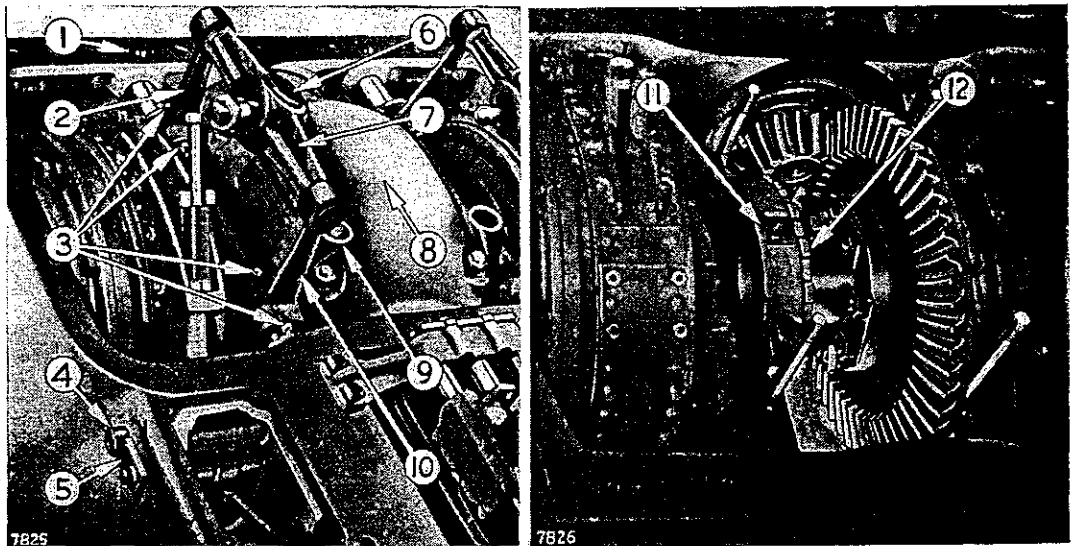
1. In preparing to remove the bevel gear, remove the following:

Seat, fuel tank and fenders, transmission case cover, flywheel clutch cover on later tractors, gear shift and interlock mechanism and steering clutches as outlined under the covering topics.



LOCATION OF BEVEL GEAR AND STEERING CLUTCHES
CUTAWAY VIEW FROM THE REAR

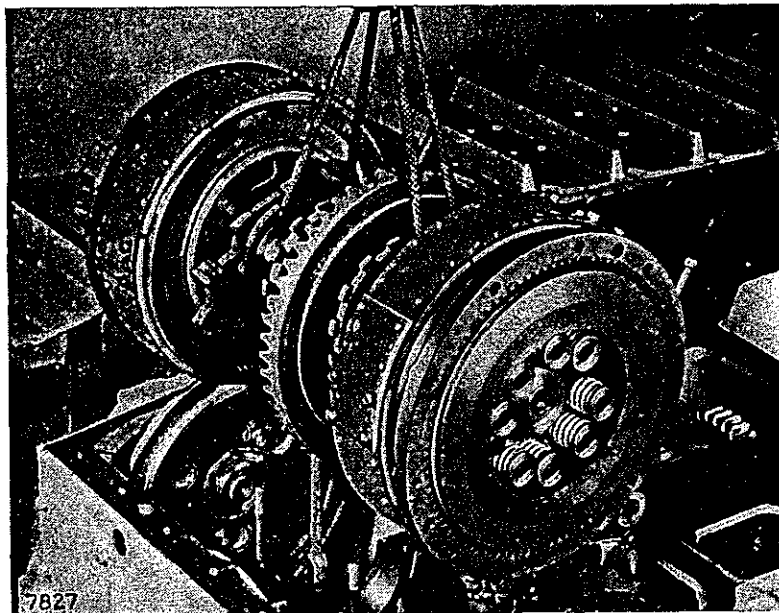
2. Remove the brake lever shaft (4) from the outside of the transmission case after removing the capscrew and flat lock (5) by inserting the capscrew in the tapped hole in the end of the shaft and pulling the shaft.
3. Disconnect the brake linkage.
4. Remove the cotter pins (3) and slide the arm (2) to the rear and remove the trunnion (7).
5. Remove the rivet (1) from the shaft and slide the shaft out the rear of the transmission case, removing at the same time the arms (2) and (10) and tube assembly (9).
6. The bearings in the arms (2) and (10) should be replaced if worn.



PREPARING TO REMOVE BEVEL GEAR AND STEERING CLUTCHES

- 1—Rivet. 2—Arm. 3—Cotter pins. 4—Shaft. 5—Lock. 6—Pin. 7—Trunnion.
 8—Bevel gear guard. 9—Tube assembly. 10—Arm.
 11—Bearing cage cap. 12—Adjusting nut.

7. Remove the bevel gear guard (8).
8. Remove the bearing cage caps (11) and loosen the bevel gear shaft adjusting nut (12). Mark the caps to insure replacement on proper side when reinstalling.
9. Remove the capscrews from the outer drums of the clutches and slide the drums toward the center of the machine so that they clear the ridge on each steering clutch flange. Lift out the steering clutches, brake bands and bevel gear as shown.



REMOVING BEVEL GEAR AND STEERING CLUTCH ASSEMBLY

10. When installing the trunnion, be sure that the flat top of the pin (6) is up and the adjustment screws are in position toward the bevel gear guard (8) as shown.

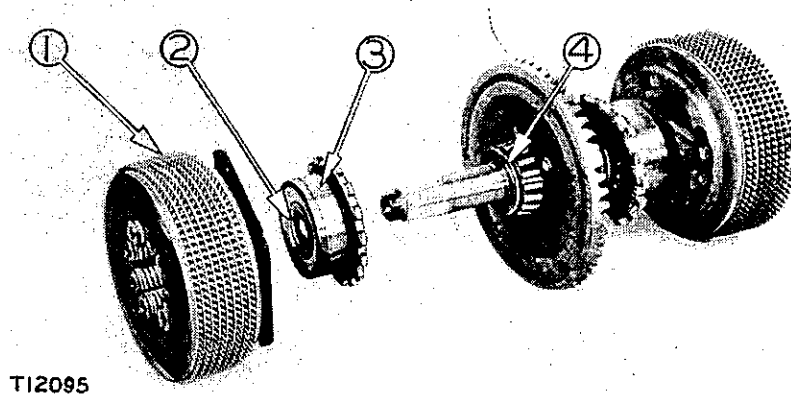
Disassembly and Assembly

1. Remove the steering clutches (1) from the shaft as outlined in the topic, STEERING CLUTCH REMOVAL.
2. After pulling the steering clutches from the shaft, the cage (3) containing the bevel gear bearing race and seal will slide off the shaft.

NOTE

Oil leakage from the bevel gear and transmission compartment into the steering clutch compartments would be evidenced by loss of oil from the transmission and bevel gear compartments and the appearance of oil in the steering clutch compartments. Such leakage can be corrected by replacing the seals in the bevel gear bearing cages.

3. Remove the seal (2) and replace it with a new one which has been soaked in warm lubricating oil. Install the seal with the wiping edge toward the bevel gear.



T12095

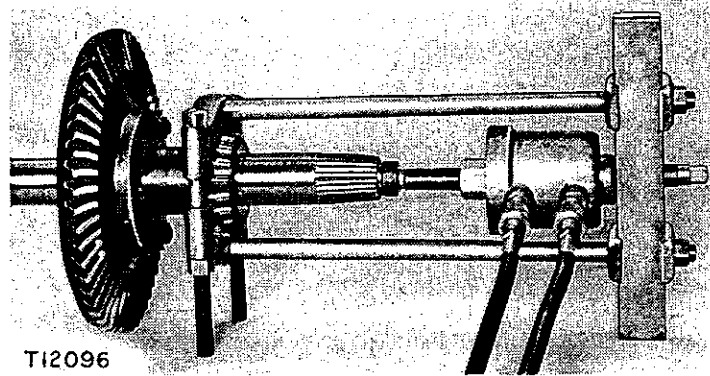
BEVEL GEAR SHAFT ASSEMBLY

1—Steering clutch. 2—Seal. 3—Cage. 4—Thrower.

NOTE

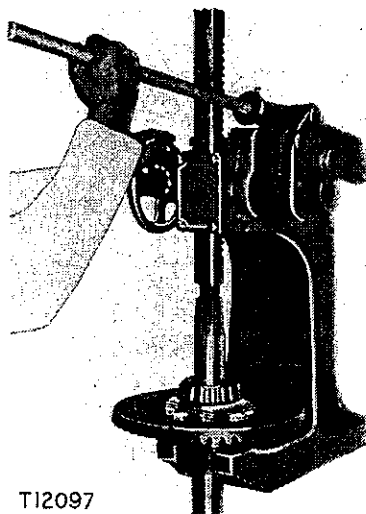
When replacing the cage and seal, care should be taken not to turn the lip of the seal inside out when slipping the seal and cage into position. Be sure that the cage is installed with the oil return hole at the bottom.

4. Remove the thrower (4) from the shaft.



REMOVING BEARING

5. The bearing on the left side of the bevel gear can be removed by using the 8B7548 Push Puller, 8B7549 Legs, 8B7551 Pulling Attachment and the 7F9540 Hydraulic Puller.
6. Remove the nuts that secure the bevel gear to the shaft.
7. The bearing next to the bevel gear can be removed with a small press and pieces of strap iron $3/16'' \times 1'' \times 4''$ long. These pieces of strap iron can be added as required to push off the bearing.
8. After the bearing (6) has been removed, the bevel gear can be lifted from the shaft.
9. Inspect the gear teeth at the heel and at the toe as well as at the contact faces. If the bevel gear teeth are cracked or chipped, or if the faces are pitted and showing wear through the hard outer surfaces, a new gear should be installed.
10. Be sure the flange on the bevel gear shaft and the mating surface on the bevel gear are perfectly clean and free from nicks or burrs when assembling these two parts.



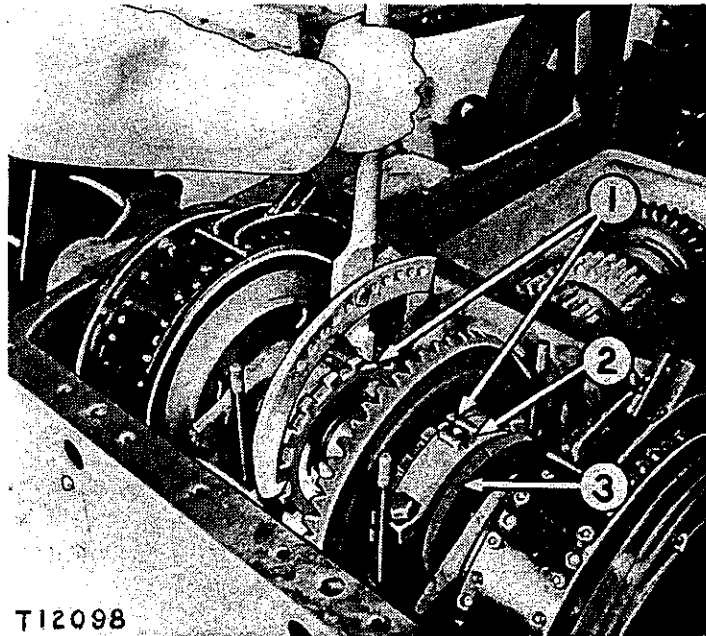
REMOVING BEARING



Installation

When installing the bevel gear and steering clutches, be sure to install new cork seals (3) in the supporting web for the bevel gear bearing cages and new seals for the bevel gear guard. Bevel the edges of the cork seals (3) after installation of the bevel gear and steering clutch assembly to insure an oil tight seal around the bearing cage.

With the bevel gear and steering clutch assembly in place, install the bearing caps (2) and tighten the capscrews enough to seat the bearing caps on the bearing cages but not enough to cause the bearing cage to bind. Using the 5F9693 Wrench as shown, tighten the adjusting nuts (1) on each bearing cage until tight. This will place a preload on the bearings and prevent the bevel gear and shaft from shifting when the tractor is placed in operation.



T12098

ADJUSTING BEVEL GEAR BEARINGS

1—Adjusting nuts. 2—Bearing cap. 3—Cork seal.

Adjust the backlash as described in the topic, BEVEL GEAR AND PINION SETTINGS.

BEVEL GEAR AND PINION SETTINGS

The bevel gear and pinion must be adjusted to the proper location to obtain the correct tooth contact. Shims are provided between the pinion bearing cage flange and the transmission case so the pinion cage can be moved toward or away from the center line of the bevel gear shaft. Adjusting nuts are located on the bevel gear bearing cages to permit moving the bevel gear toward or away from the center line of the bevel

pinion shaft, thereby changing the backlash. Moving either the bevel gear or pinion affects the backlash and tooth contact so the two must be adjusted at the same time.

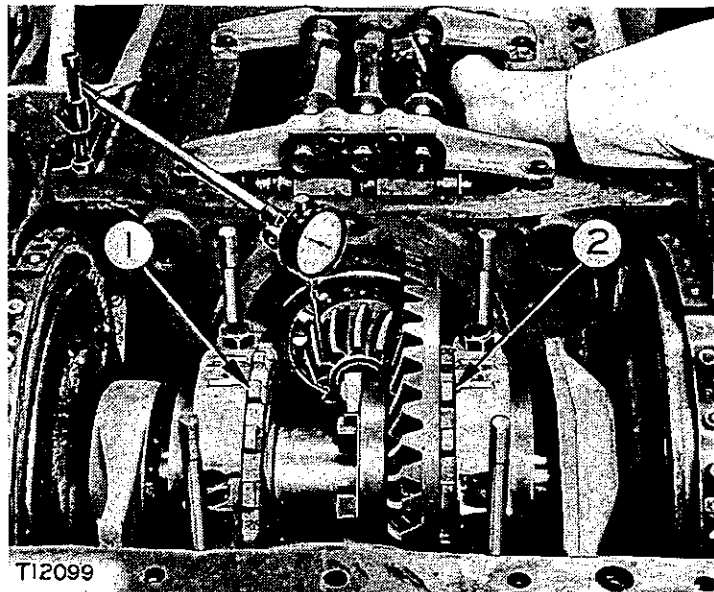
Because of manufacturing tolerances, the relative positions of bevel gears and pinion shafts will vary with different sets. The correct amount of backlash for each bevel gear is sometimes marked on the outside diameter of that gear. The end of each pinion shaft is usually marked with a dimension to be used with a special gauge for locating the pinion in the transmission case.

If the gauge is not available, the pinion can be located by observing the tooth contact as described later. However, this method requires more time and accurate results are more difficult to obtain.

Backlash Adjustment

The proper amount of backlash is sometimes marked on the outside diameter of the bevel gear. When not marked, adjust the backlash to .007"-.009".

To check the backlash mount a dial indicator with the finger on one of the pinion gear teeth as shown. Block the bevel gear so it cannot rotate and rock the pinion shaft back and forth. The backlash will be equal to the difference in the readings on the dial indicator. Check the



CHECKING BACKLASH
1—Adjusting nut. 2—Adjusting nut.

backlash at four points around the bevel gear to determine the position of least backlash.

If the backlash is too great at the point of least backlash, loosen the adjusting nut (1) and tighten the adjusting nut (2) an equal amount. To increase the backlash, loosen the adjusting nut (2) and tighten the adjusting nut (1). By tightening one nut the same amount the other is loosened, the preload on the bearings will not be changed.

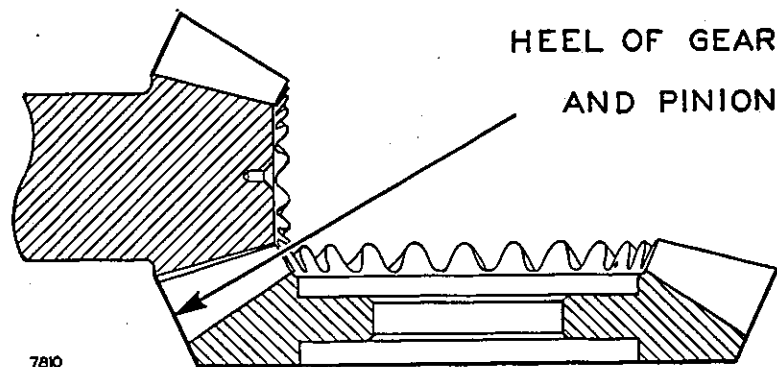
After adjusting the bevel gear, securely tighten the capscrews holding the bearing caps in place and lock them. If the notches on the adjusting nuts and bearing cage caps are not lined up, turn the nuts to the nearest notch and install the locks. Tighten and lock the capscrews that secure the bevel gear bearing cage to the transmission case.

Bevel Pinion Location

If the bevel pinion is re-installed in the same transmission case, use the same shims back of the bearing cage flange at the rear end of the pinion shaft that were removed when the transmission was disassembled. The shims are semi-circular, making it unnecessary to remove the cage to add or remove shims. The pinion can be located by observing the tooth contact pattern made by the pinion teeth on the gear teeth.

Determine the tooth contact pattern in the following manner:

1. Install the transmission and use sufficient shims between the pinion bearing cage and the transmission case to align the heel ends of the bevel gear and pinion. This will place the pinion in nearly the correct relationship with the bevel gear. Adding shims will move the pinion away from the center line of the bevel gear shaft. Removing shims will move the pinion closer to the center line of the bevel gear shaft.



ALIGNING BEVEL GEAR AND PINION

2. Adjust the bevel gear backlash as described in the topic, BACKLASH ADJUSTMENT.
3. Brush red lead or Prussian blue sparingly on the bevel gear teeth. When the pinion is rotated, the red lead is squeezed away by the contact of the teeth, leaving bare areas the exact size, shape and location of the contacts. Sharper impressions may be obtained by applying a small amount of resistance to the bevel gear while rotating the pinion. When making adjustments, check the drive side of the bevel gear teeth. The reverse or coast side contact should be automatically correct when the drive side is correct.

With adjustments properly made, the correct tooth contact shown in Figure 1 will be secured. The area of contact starts near the toe of the gear and extends about 80 per cent of the tooth length. This adjustment results in a quiet running bevel gear and pinion set, which because the load is distributed over the teeth within the proper area, will give maximum service life.

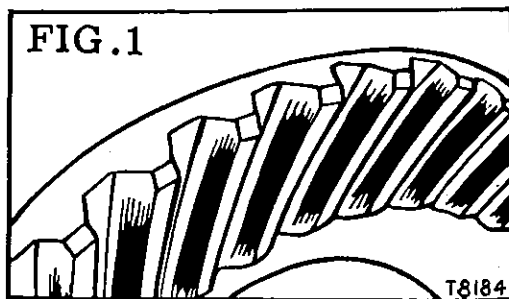
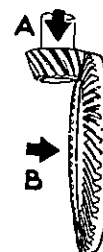
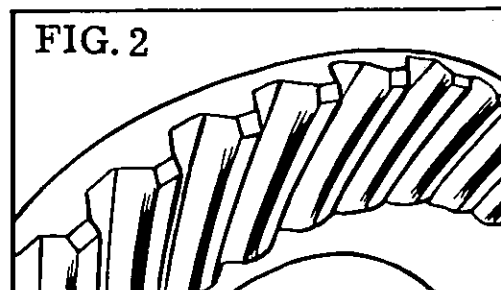


FIG. 1
PROPER TOOTH CONTACT PATTERN

A high, narrow tooth contact as shown in Figure 2 is not desirable. If gears are allowed to operate with an adjustment of this kind, noise, galling and rolling over of the top edges of the teeth will result. To obtain correct contact, move the pinion toward the bevel gear to lower the contact area to the proper location. This adjustment will decrease the backlash between the pinion and bevel gear teeth, which can be corrected by moving the bevel gear away from the pinion. The correct backlash is given in the topic, BACKLASH ADJUSTMENT.



A
CONTACT
ADJUSTMENT
B
BACKLASH
CORRECTION

T8185

FIG. 2 HIGH NARROW CONTACT

A low narrow contact as shown in Figure 3 will result in galling, noise and grooving of the teeth. To correct this, move the pinion away from the bevel gear to raise the contact area and the bevel gear toward the pinion to correct the backlash.



FIG. 3 LOW NARROW CONTACT

A short toe contact as shown in Figure 4 will result in chipping at the tooth edges and excessive wear due to the small tooth contact area. To obtain the correct contact, move the bevel gear away from the pinion. This will increase the lengthwise contact and move the contact toward the heel of the tooth. Then move the pinion toward the bevel gear to obtain the correct backlash.

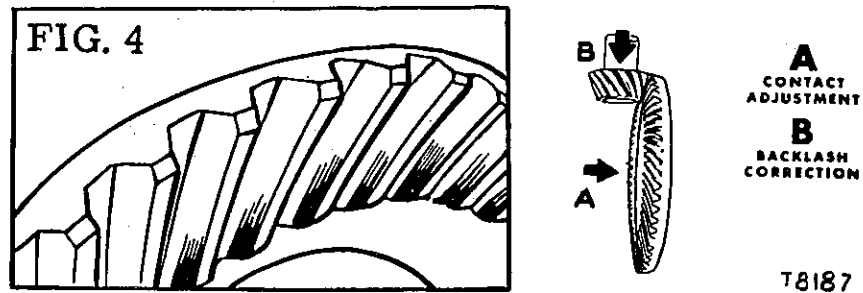


FIG. 4 SHORT TOE CONTACT

A short heel contact as in Figure 5 may cause chipping of the teeth, excessive wear and noise. To correct this, move the bevel gear toward the pinion to increase the lengthwise contact and also move the contact area toward the toe. Move the pinion away from the bevel gear to correct the backlash.

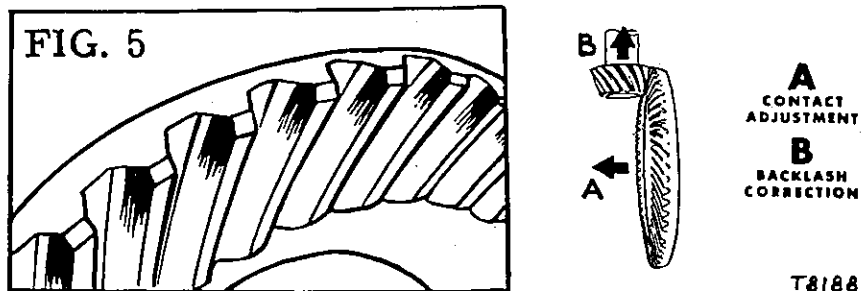


FIG. 5 SHORT HEEL CONTACT

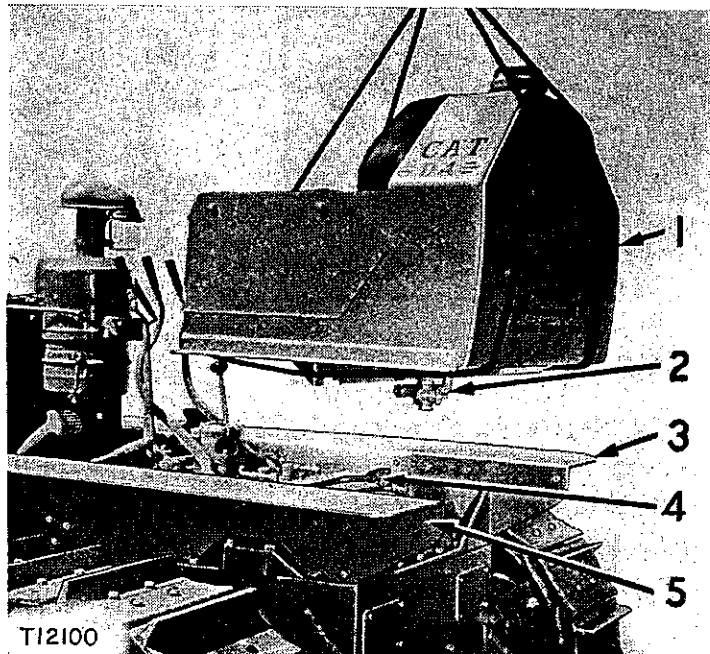
Several adjustments of both the pinion and bevel gear may be necessary before correct tooth contact and backlash are secured.

Always remember that the backlash will also affect the tooth contact pattern. Therefore, be sure the backlash is properly adjusted before checking the adjustment of the pinion.

Seat, Fuel Tank and Fenders

The fuel tank on later tractors is shaped to support the seat cushions while on earlier tractors the seat and fuel tank were separate with the fuel tank mounted on the left fender. In either case the removal is similar.

1. Remove the floor plates as they are secured to lugs which are part of the fenders.
2. Shut off the fuel at the valve (2) and disconnect the fuel line (4).
3. Remove the capscrews along both sides which hold the seat (1) to the fenders (3) and (5).
4. The seat and fuel tank can be lifted off as shown.



**REMOVING SEAT AND FUEL TANK
(Later Tractors)**

1—Seat and fuel tank. 2—Shut-off valve. 3—Right fender. 4—Fuel line. 5—Left fender.

5. Remove the capscrews holding the brake lock to the inside of the right fender (3) and remove all the capscrews that secure the fender to the transmission cover, flywheel housing and dash, then lift the fender off.

- The left fender (5) can be removed in a similar manner as the right fender (3) except that on earlier tractors the fuel tank is mounted on the fender. On these earlier tractors the fuel tank and fender can be removed as a unit or separately as desired.

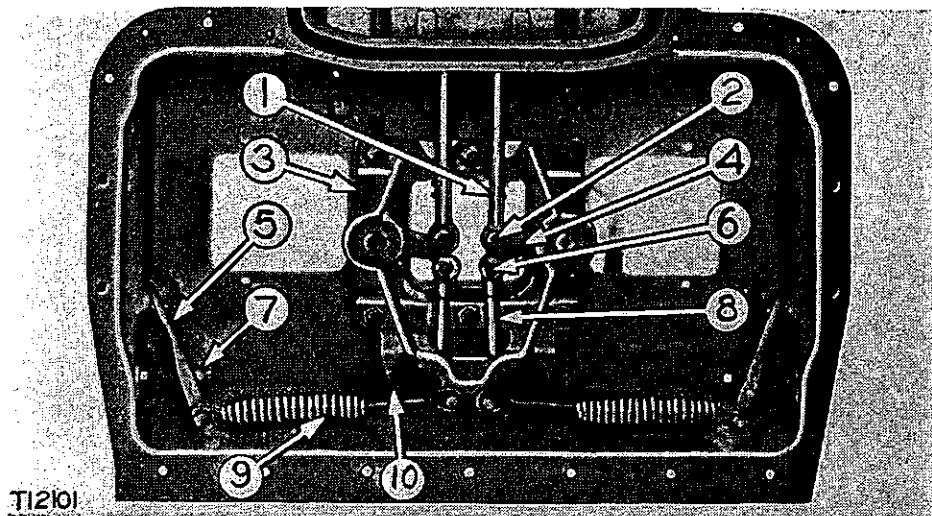
Steering Clutch Controls

On later tractors a steering clutch booster mechanism has been incorporated to reduce the effort required to actuate the steering clutches. The assembly, consisting of springs and levers, is located inside the transmission cover.

For removal of the steering clutch mechanism, the transmission cover must be removed. See the topic, TRANSMISSION COVER.

REMOVAL

- With the steering clutch control levers in the engaged position, loosen the lock nut and back off the adjusting nut (7) until the tension on the booster spring (9) is relieved, then remove the booster spring and anchor (5).
- Loosen the clamp bolt in the lever (10) and remove the lever and key.
- Remove the bolts (2) and pins (6) securing the rods (1) and (8) to the crank (4).
- Remove the capscrews holding the bracket (3) to the transmission cover and lift the bracket and levers out.

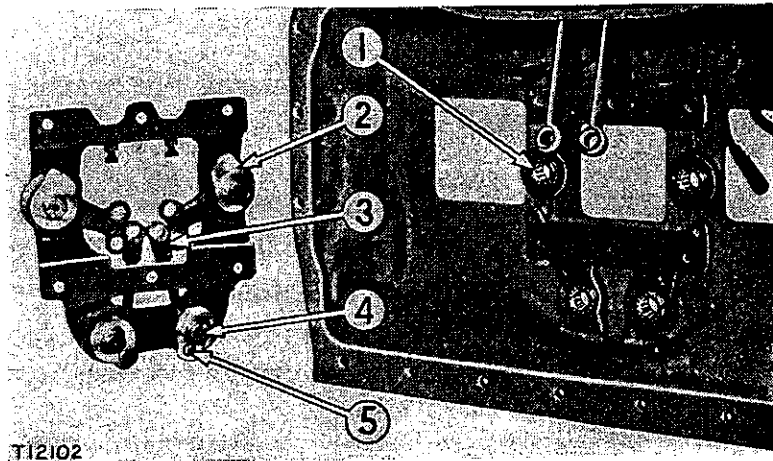


PREPARING TO REMOVE BOOSTER SPRING AND BRACKET

- 1—Rod. 2—Bolt. 3—Bracket. 4—Crank. 5—Anchor. 6—Pin. 7—Adjusting nut.
8—Rod. 9—Booster spring. 10—Lever.

DISASSEMBLY

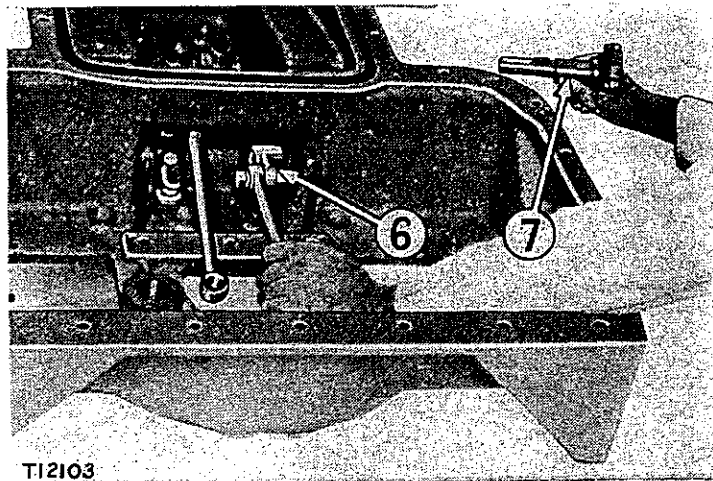
1. Remove the pins (5), then slide the rods (3) out of the shafts (4) and remove the shafts from the bracket.
2. The cranks (2) can be removed from the bracket.
3. Remove the bearings (1) from the transmission cover and corresponding bearings from the bracket. If the bearings, bearing races or the ends of the shafts (4) or cranks (2) are worn, replace those parts.



REMOVING SHAFTS AND CRANKS

1—Bearing. 2—Crank. 3—Rod. 4—Shaft. 5—Pin.

4. The steering clutch lever and shaft (7) can be removed by loosening the clamp bolt in the lever (6) and prying the shaft (7) out of the lever.



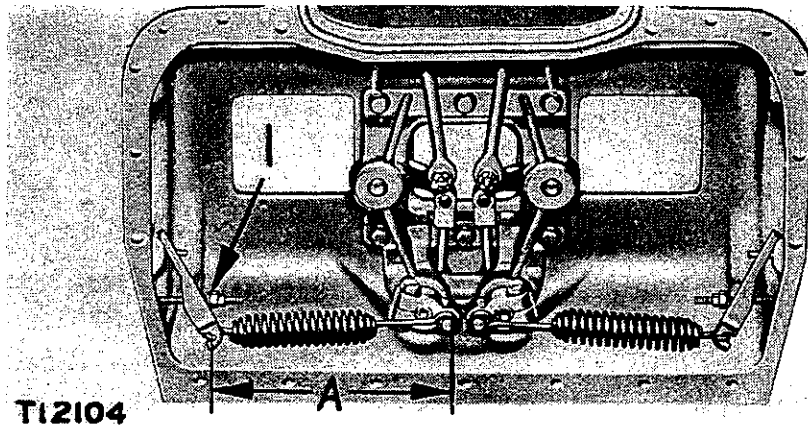
REMOVING STEERING CLUTCH LEVER SHAFT

6—Lever. 7—Shaft.

ASSEMBLY

When installing the bearing in the bracket and in the transmission cover, pack them with ball and roller bearing lubricant.

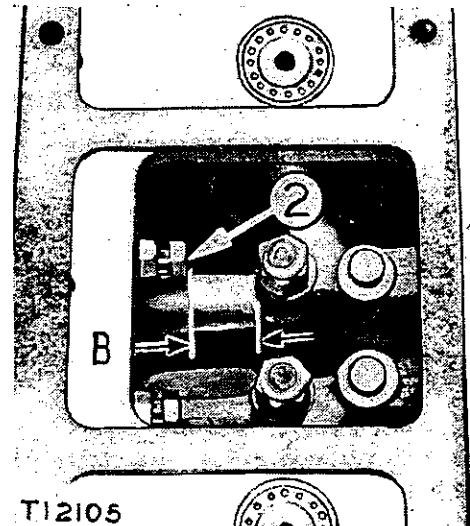
Tighten the adjusting nut (1) until the booster spring length (A) is $10\frac{1}{4}$ ".



T12104

BOOSTER SPRING ADJUSTMENT
1—Adjusting nut. A— $10\frac{1}{4}$ " dimension.

After the transmission cover is installed and all linkage connected, adjust the stop (2) so it is $15/16$ " from the front edge of the crank, when the steering clutches are in the engaged position. This adjustment can be made through the inspection cover on top of the transmission cover.



T12105

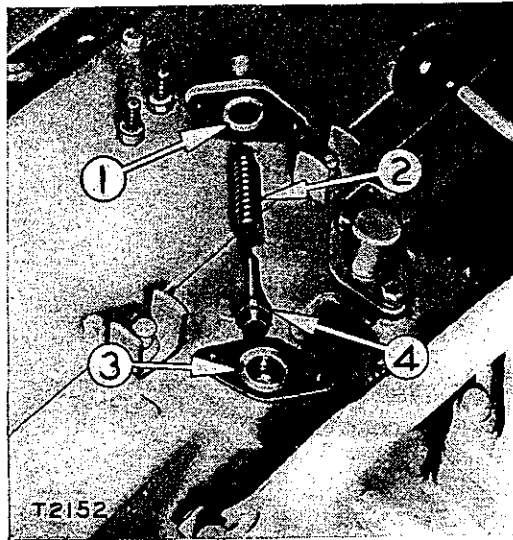
STOP ADJUSTMENT
2—Stop. B— $15/16$ " dimension.

STEERING CLUTCH LEVER BUMPER STOPS

A spring loaded stop (4) absorbs the shock when a steering clutch control lever is released suddenly.

The stops which are located on top of the transmission cover can be removed by taking off the housing (1) and lifting the spring (2) and stop (4) from the guide (3).

There is no adjustment other than seeing the stop works freely in the guide.



STEERING CLUTCH LEVER BUMPER STOP

1—Housing. 2—Spring. 3—Guide.
4—Stop.



Steering Clutches

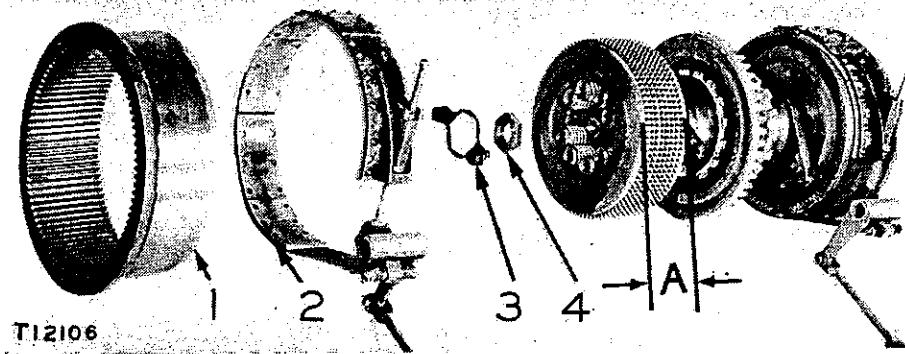
The rear end of the transmission and steering clutch case is divided into three compartments. The outer two compartments are dry and contain the steering clutches and brakes while the center compartment contains the bevel gear.

The steering clutches are splined to the bevel gear shaft, therefore the steering clutches, brakes, bevel gear and shaft must be removed from the tractor as a unit.

For the removal of the steering clutches from the tractor, see the topic, BEVEL GEAR.

REMOVING STEERING CLUTCHES FROM SHAFT

Remove the outer clutch drums (1) and brake bands (2). If the splines of the outer clutch drums are worn excessively, the final drive pinion bearings should be inspected for wear. See the topic, FINAL DRIVE.



T12106

REMOVING DRUM AND BRAKE BAND

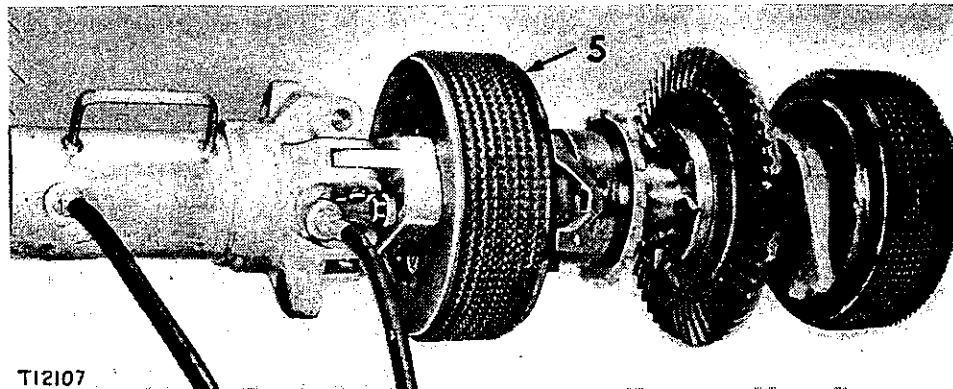
1—Outer clutch drum. 2—Brake band. 3—Lock. 4—Nut. A— $3\frac{1}{8}$ " dimension.

If the distance (A) between the face of the pressure plate and the face of the inner drum is less than $3\frac{1}{8}$ ", the steering clutch discs should be re-lined.

Remove the lock (3).

Remove the nut (4) with a 3B6352 Wrench.

The steering clutch assembly (5) can be removed from the bevel gear shaft by using the 6F25 Service Press, 6F6703 Adapter, two $\frac{5}{8}$ "-11 (NC) capscrews $3\frac{1}{2}$ " long and two suitable washers.



T12107

REMOVING STEERING CLUTCH ASSEMBLY FROM SHAFT

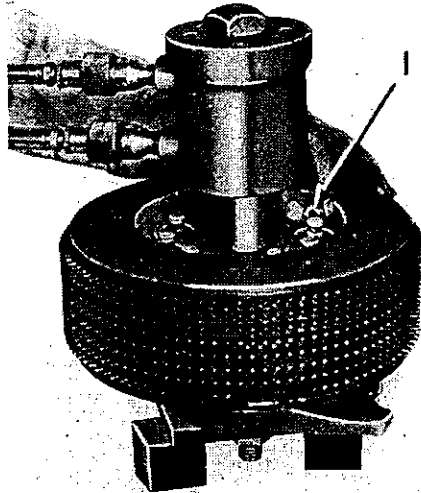
5—Steering clutch assembly.

STEERING CLUTCH DISCS

Each steering clutch consists of an inner and an outer drum, a pressure plate and a series of alternate steel and lined discs. The steel discs have internal teeth which mesh with the teeth on the inner drum. The alternate lined discs have external teeth which mesh with the internal teeth of the outer drum.

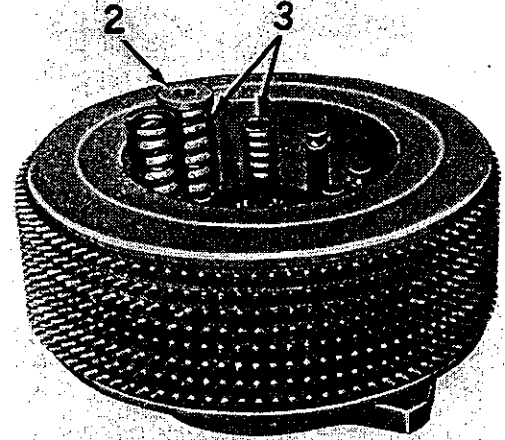
Removal and Installation

1. The steering clutch springs (3) can be compressed and the locks (1) removed by using a 7F9540 Hydraulic Puller, 1B9065 Bolt, 3456A Plate, 1B4332 Nut and a 5F5038 Plate.



T12108

REMOVING STEERING CLUTCH
LOCKS
1—Locks.



T12109

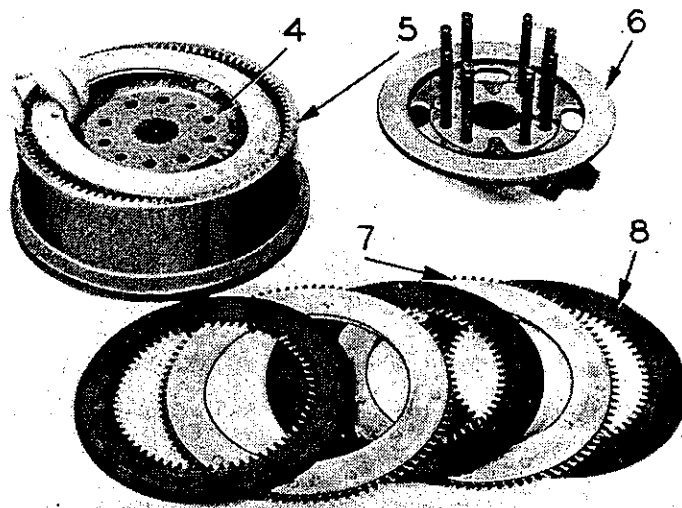
STEERING CLUTCH SPRINGS
2—Retainer. 3—Springs.

2. Remove the retainers (2) and springs (3).
3. Turn the clutch assembly over and lift off the pressure plate (6).
4. Remove the discs (7) and (8).

NOTE

If the overall thickness of discs (7) and (8) of one steering clutch is less than $3\frac{1}{8}$ " , the lined discs (5) should be replaced. See the topic, REMOVING STEERING CLUTCHES FROM SHAFT.

5. The rivets can be punched out of the lined discs (7) and the linings replaced.
6. When assembling the discs, place the outer drum (5) over the inner drum (4). This will assure alignment of the lined discs (7).
7. Beginning with a lined disc (7) against the flange of the inner drum (4), alternate with unlined disc (8) and lined disc, this will leave an unlined disc (8) against the pressure plate (6).
8. Place the pressure plate (6) on top of the discs and drop the studs in the plate into place.



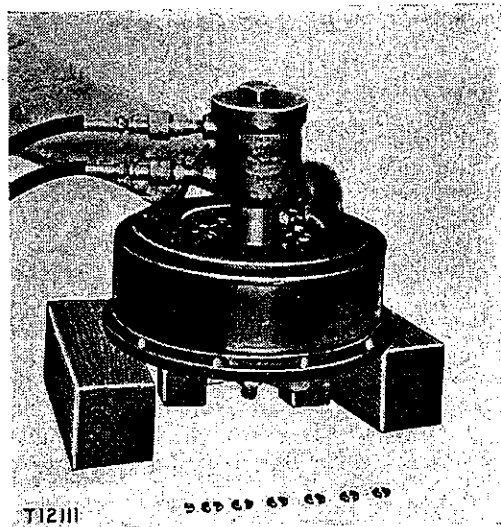
T12110

STEERING CLUTCH DISC INSTALLATION

4—Inner drum. 5—Outer drum. 6—Pressure plate. 7—Lined disc. 8—Unlined disc.

9. Without removing the outer drum (5), turn the entire clutch assembly upside down and support it so the inner and outer drums are as near concentric as possible.
10. Install the steering clutch springs, retainers and locks with the same tools used for removing them.

INSTALLING STEERING CLUTCH SPRINGS

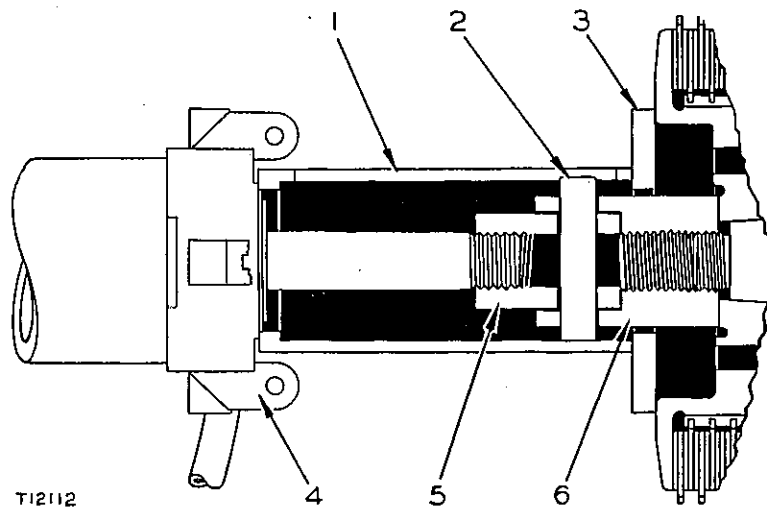


T12111

INSTALLING STEERING CLUTCHES TO SHAFT

1. When replacing the steering clutch assembly on the bevel gear shaft, see that the splines are clean, dry and free from burrs. Set the steering clutch on the shaft with the splines in the steering clutch inner drum meshing with the splines on the shaft and push the steering clutch on as far as possible by hand.

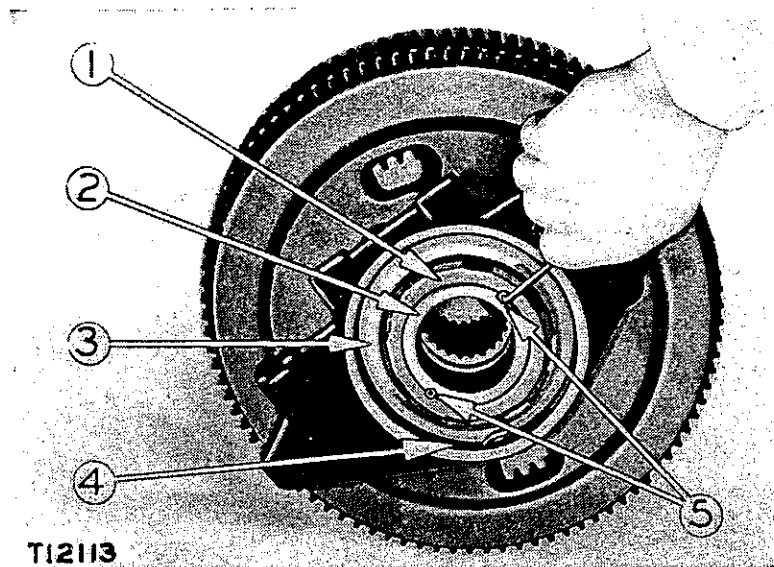
2. The inner drum of the steering clutch assembly should be pressed onto the bevel gear shaft with 15 to 20 tons pressure.
3. Install the 5F9881 Adapter (6) on the bevel gear shaft and place the 7F6065 Washer (3) over the adapter.
4. Install the 5F9888 Adapter (5) on the ram of the 6F25 Service Press (4).
5. Place the 7F6068 Sleeve (1) over the ram of the service press (4) and the adapter (6), then extend the ram of the service press until the adapter (5) and (6) can be coupled together with the 5F9892 Pin (2).
6. Place the control valve on the service press in the pulling position and press the steering clutch drum onto the shaft with a 20 ton pressure.
7. Remove the adapter and install the nut and lock.



PRESSING STEERING CLUTCH ON SHAFT
 1—7F6068 Sleeve. 2—5F9892 Pin. 3—7F6065 Washer. 4—6F25 Service Press.
 5—5F9888 Adapter. 6—5F9884 Adapter.

STEERING CLUTCH RELEASE BEARING

Remove the hollow head setscrews (5) with 4B9820 Wrench as shown and then the nut (1). The thrust bearing and cage will slide off the pressure plate hub (2). After the snap ring (4) and washer (3) are removed, press or drive the bearing out of the cage using a punch in the two holes in the back of the bearing cage and applying pressure first through one hole and then the other. If the bearing is damaged, install a new one. If the bearing is marked THRUST HERE on the side of the inner race, the marked part should face the bevel gear. If THRUST HERE is marked on the outer race, the marked side should face the steering clutch assembly.



T12113

STEERING CLUTCH RELEASE BEARING

1—Nut. 2—Pressure plate hub. 3—Washer. 4—Snap ring. 5—Setscrews.

After the bearing cage has been installed on the pressure plate hub (2) and the nut (1) tightened, drill two $7/32''$ holes $3/8''$ deep, tap $1/4''$ -20 (NC) $1/4''$ deep on the parting line of the pressure plate hub and nut and install the hollow head setscrews. Prick punch the hub and nut to lock the screws in place.

Brakes

Separate foot brakes are used to supplement the action of the steering clutches or to stop the tractor. Each pedal operates a brake band on the steering clutch outer drum.

The right brake has a hand-operated lock to set the brake.

REMOVAL

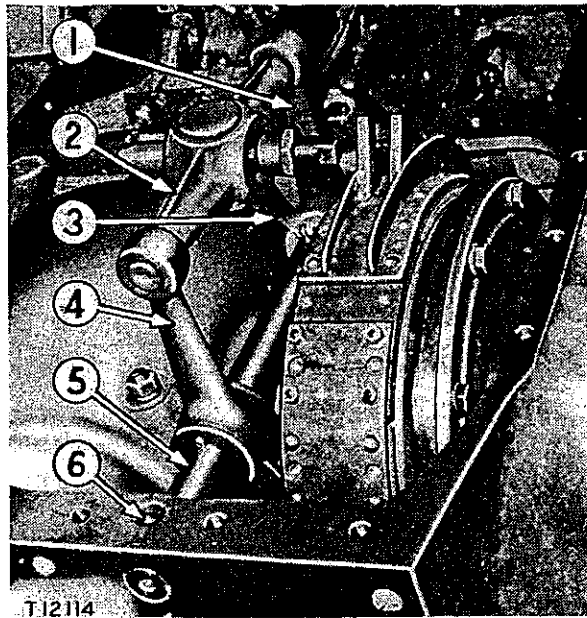
(Later Tractors)

The brake bands can be removed from the brake drum as a complete unit after the steering clutches and bevel gear is removed from the tractor. See the topic, BEVEL GEAR.

The brake bands can be separated into three sections and removed after removing the transmission cover; or by removing four bolts from the lower brake band section, the bands can be removed and replaced without removing the seat or transmission cover.

Brake Band Removal and Installation with Transmission Cover Removed

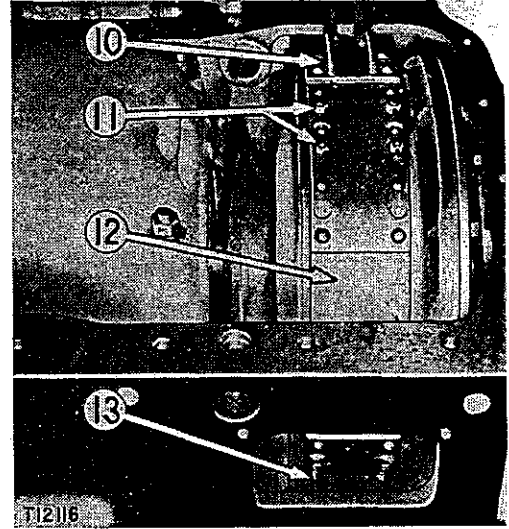
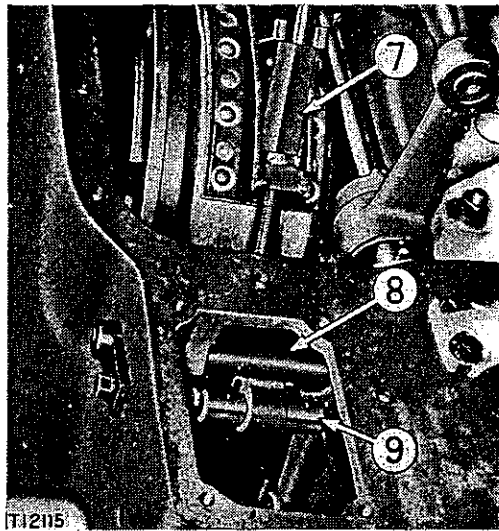
1. Remove the seat, fuel tank, fenders and the transmission cover as outlined under the covering topics.
2. Remove the cotter pins securing the arms (1) and (4) in place on the shaft (5) and slide the arm (4) toward the rear of the tractor, then remove the trunnion (2).
3. Remove the rivet (6) and slide the shaft from the arms (1) and (4) and the oil tube (3).



PREPARING TO REMOVE TRUNNION

- 1—Arm. 2—Trunnion. 3—Tube.
4—Arm. 5—Shaft. 6—Rivet.

4. Remove the brake adjusting nut (7).
5. Remove the pin securing the lower brake band section (9) to the lever (8).
6. Remove the brake support screw on the under side of the steering clutch case below the brake drum.
7. Rotate the top section (10) of the brake band toward the front of the tractor as far as possible.
8. Remove the nuts (11) securing the top brake band section to the center brake band section (12).
9. Reach through the inspection opening on the rear of the steering clutch case and remove the nuts (13) securing the lower brake band section (9) to the center brake band section then remove the center and top brake band sections.



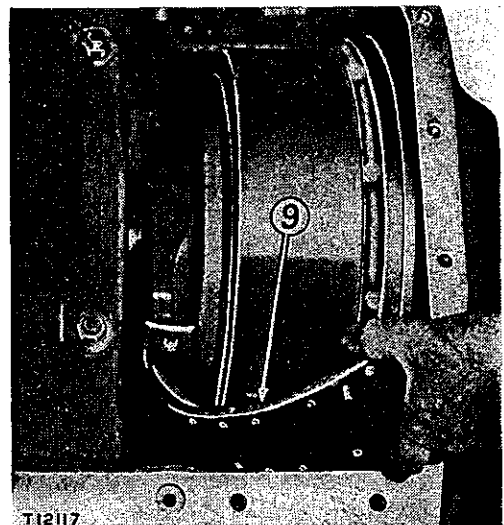
PREPARING TO REMOVE BRAKE BANDS

7—Adjusting nut. 8—Lever. 9—Lower brake band section. 10—Top brake band section. 11—Nuts. 12—Center brake band section. 13—Nut.

10. Slide the lower brake band section (9) to the rear and under the brake drum and remove it from the case as shown.
11. If the brake drums are badly worn or scored, they should be replaced to insure proper braking.
12. New brake linings should be installed if they are worn flush or nearly flush with the rivet heads. If the wear is allowed to exceed this amount, the rivets may cut the steering clutch drums and will require drum replacement.
13. With the brake bands removed from the tractor, the rivets can be punched out and the linings replaced.

REMOVING LOWER BRAKE BAND SECTION

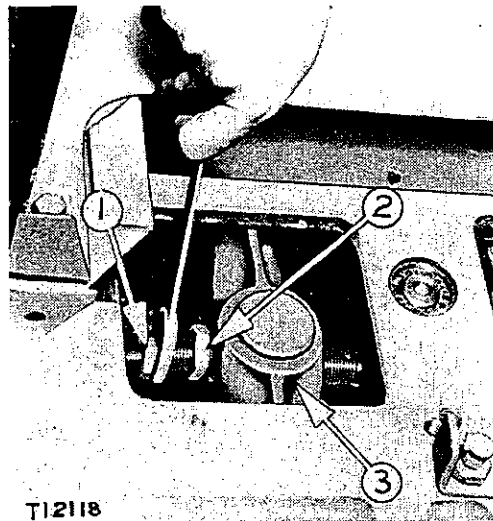
9—Lower brake band section.



14. When installing new linings on the brake bands, be sure the bolts securing the band sections together are in place, as the bolt heads are covered by the linings.
15. When reinstalling the bands, securely tighten the nuts which hold the three sections together.
16. After the brake bands are installed and all linkage connected, adjust the brakes as outlined in the topic, BRAKE ADJUSTMENT.

Brake Band Removal and Installation without Removing Seat and Transmission Cover

1. Remove the seat cushion on earlier tractors or cushion and tool box from beneath the cushion on later models.
2. Remove the inspection cover located on top of the transmission cover.
3. Loosen the lock nut (2) which holds the adjusting screw (1).
4. Turn the adjusting screw counterclockwise or away from the center of the tractor until the trunnion (3) is loose.
5. Remove the inspection cover on the rear of the steering clutch case and remove the pin and slide the steering clutch throwout arm toward the rear of the tractor. The top end of the arm supports the rear end of the trunnion (3).
6. Remove the trunnion through the inspection opening on top of the transmission cover.

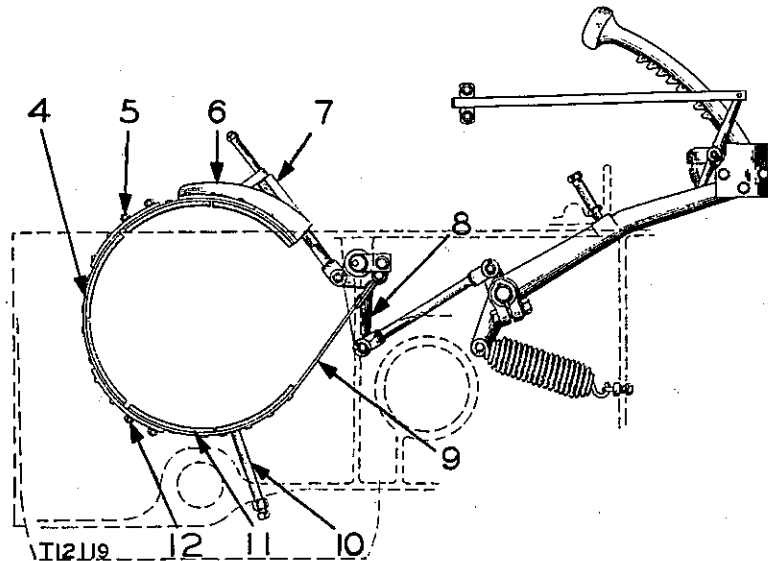


PREPARING TO REMOVE TRUNNION

- 1—Adjusting screw. 2—Lock nut.
3—Trunnion.



7. Remove the adjusting nut (7) through the top inspection opening.
8. Remove the setscrew (10).

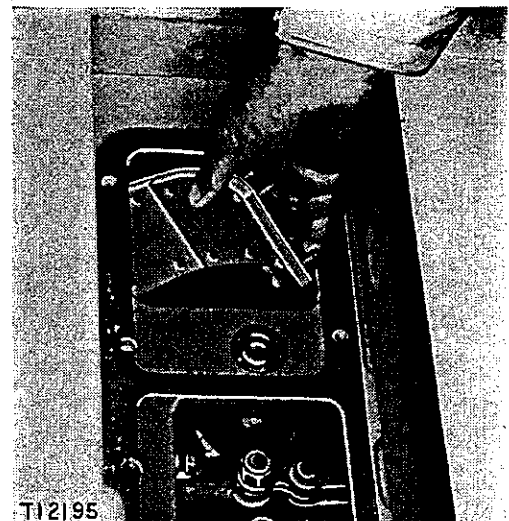


BRAKE MECHANISM

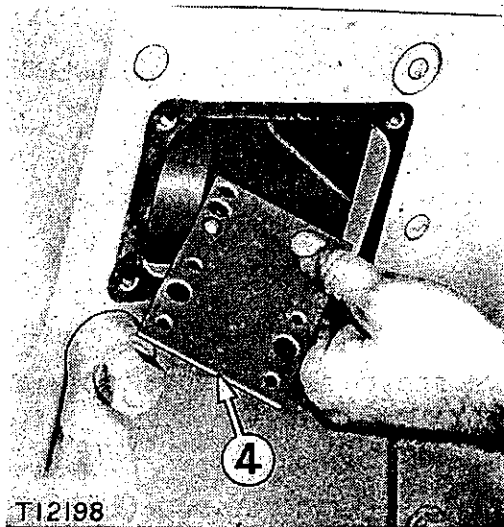
- 4—Center band section. 5—Nut. 6—Top band section. 7—Adjusting nut.
 8—Lever. 9—Lower band section. 10—Setscrew. 11—Brake lining.
 12—Bolt.

9. Remove the floor plates and inspection covers from the steering clutch case.
10. Remove the pin securing the lower brake band section (9) to the lever (8).
11. Rotate the brake band forward until the nuts (5) holding the top section (6) to the center section (4) can be removed through the inspection opening beneath the seat, then remove the top section (6) as shown.

REMOVING TOP BRAKE BAND SECTION SECTION (Later Tractors)



12. Remove the nuts from the bolts (12) holding the center section (4) and lower section (9) together by reaching through the inspection opening in the rear of the steering clutch case.
13. Lower the center section (4) until the top end is even with the inspection opening in the rear of the steering clutch case and by twisting the center portion of the band toward the bevel gear compartment and at the same time pulling the top end out through the opening, the section (4) can be removed as shown.



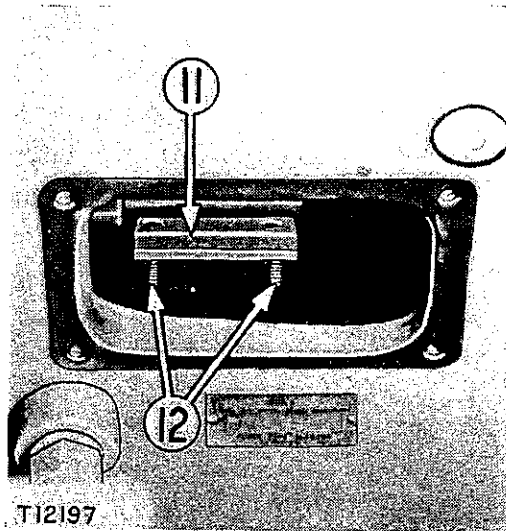
REMOVING CENTER BRAKE BAND SECTION

(Left Side Illustrated)
4—Center brake band section.

NOTE

On some tractors there may be enough clearance between the steering clutch outer brake drum and the portion of the steering clutch case through which the sprocket shaft passes, for the bolts in the lower end of the lower band section (9) to pass.

14. On tractors with insufficient clearance at this point, move the lower band section (9) back beneath the brake drum as far as possible and pry off a portion of the brake lining (11) to permit the removal of the bolts (12).
15. After the bolts have been removed slide the left lower band section forward and remove it through the inspection opening on top of the steering clutch case as shown.
16. After removing the bolts from the lower section on the right side, slide the section forward beneath the brake drum as was done on the left side.



PREPARING TO REMOVE BOLTS
11—Brake lining. 12—Bolts.

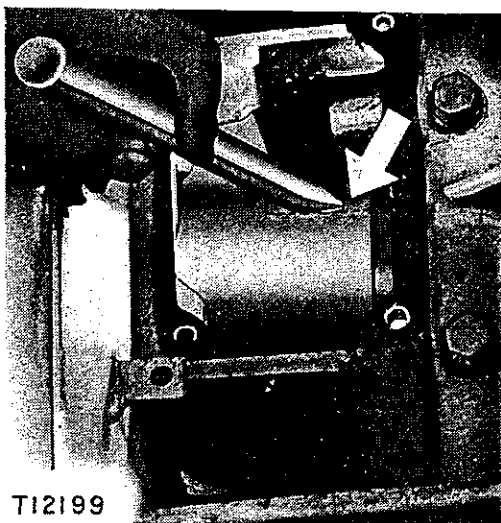


REMOVING LOWER BRAKE BAND SECTION
(Left Side)

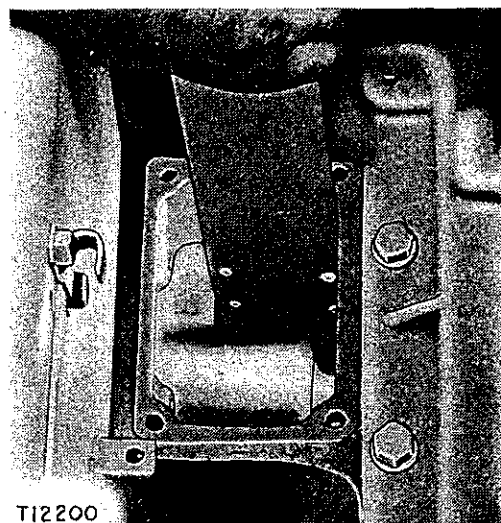
NOTE

On some tractors the lower section (9) of the brake band cannot be removed without first removing a portion of metal located adjacent to the reverse idler gear bracket bore. This projecting piece of metal can be chipped off with a chisel as shown.

17. Remove enough metal to allow sufficient clearance to remove the lower section of the brake band, then remove the band.

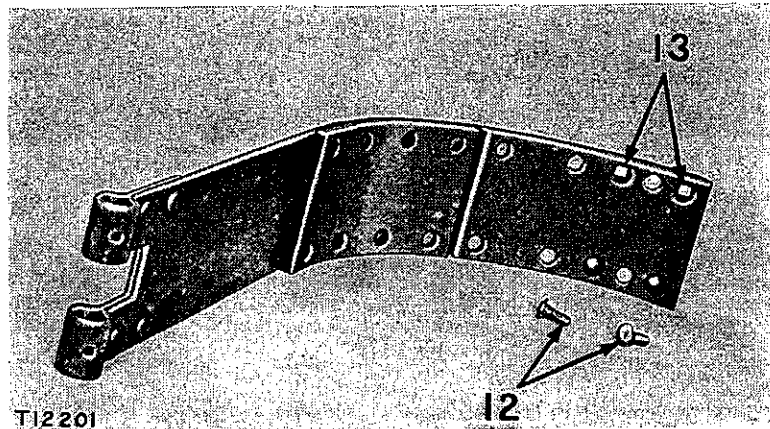


CHIPPING OFF METAL PROJECTION



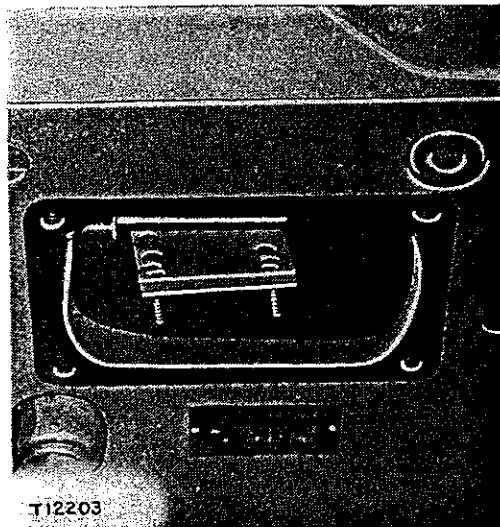
REMOVING LOWER BRAKE BAND SECTION
(Right Side)

18. With the brake bands removed from the tractor, the rivets can be punched out and the linings replaced.
19. When installing new linings on the top and center sections, be sure the bolts in the top sections are in place as the bolt heads are covered by the linings.
20. On tractors where the bolts (12) have to be removed in order to remove the lower band sections, drill four $\frac{1}{2}$ " holes (13) through the lining above the bolt heads.



HOLES DRILLED IN BRAKE LINING
 12—Bolts. 13—Holes in brake lining.

21. Rivet the linings to the brake band.
22. Leave the bolts out of the band and install the band in the reverse order of removal.
23. Slide the lower band section beneath the brake drum and toward the rear of the tractor as far as possible, then install the bolts through the drilled holes in the brake lining and into the brake band.



BOLTS INSTALLED IN BRAKE BAND

24. Install the center section of the brake band through the rear inspection opening and connect the lower and center sections.
25. Install the top section through the inspection opening in the top of the transmission cover and connect to the center section.
26. Securely tighten the nuts which hold the three sections together.
27. After the brake bands and all linkage are connected adjust the brakes as outlined in the topic, BRAKE ADJUSTMENT.

BRAKE ADJUSTMENT

Keep the brakes adjusted just tight enough so the tractor will turn correctly when the steering clutch is released and the brake pedal is depressed about 3 to 4 inches.

1. Remove the inspection plate on the transmission top cover just below the operator's seat.
2. Turn the adjusting nut in a clockwise direction to tighten the brakes.

NOTE

A spring, mounted on the tang of the brake band, engages the adjusting nut at each 1/6 turn, and keeps it from jarring out of adjustment. The adjusting nut should be turned sufficiently each time to allow the spring to seat firmly on the nut.

3. Loosen the lock nut on the support screw on the under side of the transmission case below the brake drum. Apply the brake to draw the brake band tightly around the drum.
4. Turn the support screw up tight against the band and then back off 1 1/2 turns and tighten the lock nut. This screw supports the brake band and maintains the correct clearance between the lining and the drum.

The band should be entirely free from the drum when the pedal is in the released position.

Final Drive Group

The final drive consists principally of a pinion, a gear and a sprocket which transmit the driving torque from the steering clutch to the track.

All of the parts on each side are identical and interchangeable.

The final drive assembly will differ slightly in a 44" gauge in comparison to a 60" gauge machine. The 60" gauge machine has a longer

sprocket shaft, a longer gear hub and an extension between the final drive case and the sprocket.

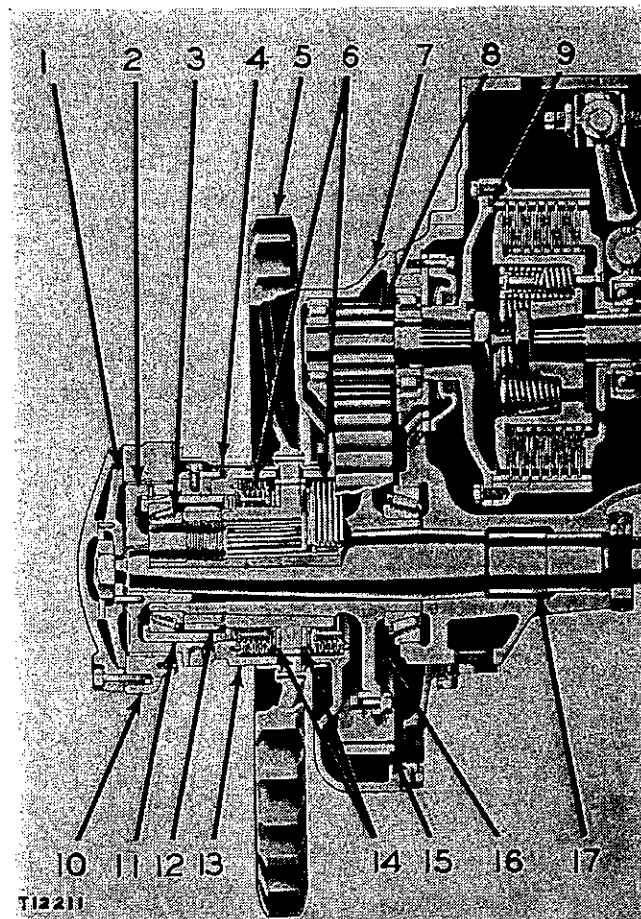
OPERATION

The steering clutch transmits the driving torque from the transmission to the pinion flange (9) turning the pinion (8). From the pinion the power is transmitted to the gear (15) which is bolted to the hub (16).

The sprocket (5) is splined to the hub (16) and held in place by the nut (12).

The two washers (14) are held to and rotate with the sprocket (5).

The final drive seals (6), one of which is mounted in the final drive case (7) on 44" gauge tractors or in the extension on 60" gauge tractors, and the other in the adjusting nut (13), keep the dust and dirt from entering the final drive and keep the lubricant in.



FINAL DRIVE CUTAWAY (44" GAUGE) (LEFT SIDE — REAR VIEW)

1—Retainer. 2—Holder. 3—Bearing. 4—Guard. 5—Sprocket. 6—Final drive seals. 7—Final drive case. 8—Pinion. 9—Pinion flange. 10—Support assembly. 11—Cage. 12—Nut. 13—Adjusting nut. 14—Washers. 15—Gear. 16—Hub. 17—Sprocket shaft.

Added protection is also provided by dirt guards (4).

The bearing cage holder (2) is keyed to the support shaft (17) and contains the bearing (3) and cage (11).

The bearing and cage supports the outer end of the hub upon which the drive sprocket (5) is mounted. The adjustment of this bearing is made by rotating the adjusting nut (13).

The support assembly (10), which is doweled and bolted to the track roller frame, supports the rear end of the tractor.

The shims between the retainer (1) and the holder (2) are to be used in aligning the track roller frame with the drive sprocket (5).

PREPARATION FOR DISASSEMBLY

Various parts and assemblies must be removed to gain access to the gears and bearings inside the final drive case. It is not necessary, however, to disassemble the various assemblies except to inspect or replace parts thereon.

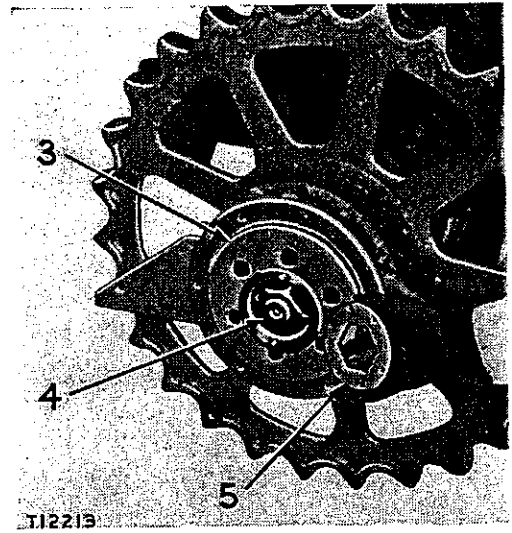
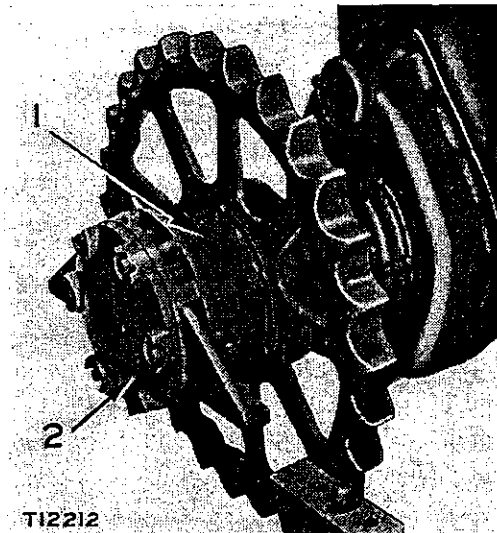
Before starting to disassemble the final drive, separate the track and lay it out flat as outlined in the topic, SEPARATING TRACK. If only one final drive is to be removed, move the tractor back on the track until the drive sprocket clears the end of the track as shown.

Disconnect the track roller frame and roll it forward on the track as outlined in the topic, TRACK ROLLER FRAME.

TRACK ROLLER FRAME OUTER BEARING AND BEARING CAGE HOLDER

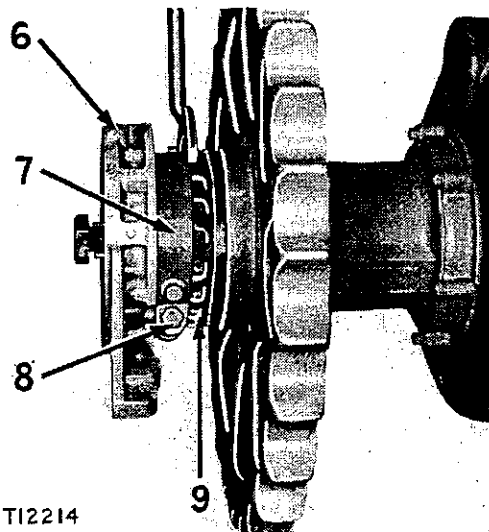
Removal and Assembly (Later Tractors)

1. Remove the cap (2) and guard (1).
2. Remove the lock (5) and the nut (4).
3. Remove the retainer (3) and the shims behind it.
4. Slide the support (6) from the bearing cage holder (7).
5. If the bushing in the support is worn to the extent that a .025" thickness gauge can be inserted between the bushing and the bearing cage holder, the bushing should be replaced.
6. Replace the nut (4) on the end of the sprocket shaft, leaving some space between it and the end of the bearing cage holder.



PREPARING TO REMOVE OUTER BEARING
 1—Guard. 2—Cap. 3—Retainer. 4—Nut. 5—Lock.

7. Remove the lock holding the adjusting nut (9) to the bearing cage holder (7).
8. Loosen the nut on the bolt (8).
9. Tighten the outer bearing adjusting nut in a counterclockwise direction with a 5F9693 Spanner Wrench thus forcing the bearing cage holder (7) from the taper on the sprocket shaft. It may be necessary to strike the holder with a soft hammer to free it.
10. The sprocket hub outer bearing race, cage adjusting nut and outer final drive seal will be pulled with the holder.



PULLING BEARING CAGE HOLDER
 6—Support. 7—Bearing cage holder.
 8—Bolt. 9—Adjusting nut.



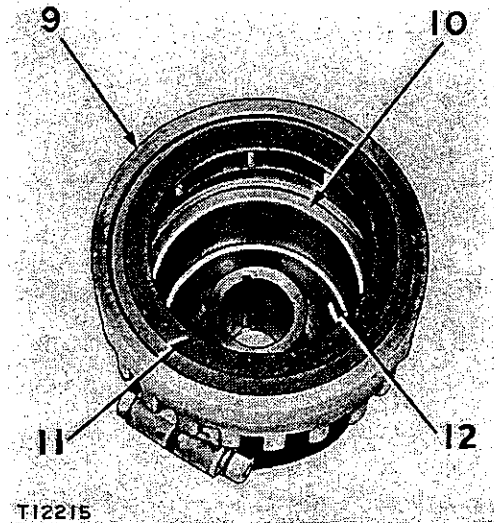
11. When installing the holder assembly, loosen the adjusting nut until the cage can be driven to the bottom of the holder. This will insure that the holder can be drawn up tight on the sprocket shaft before the final drive bearings become tight in their races.
12. Unscrew the adjusting nut (9) from the bearing cage (10).

NOTE

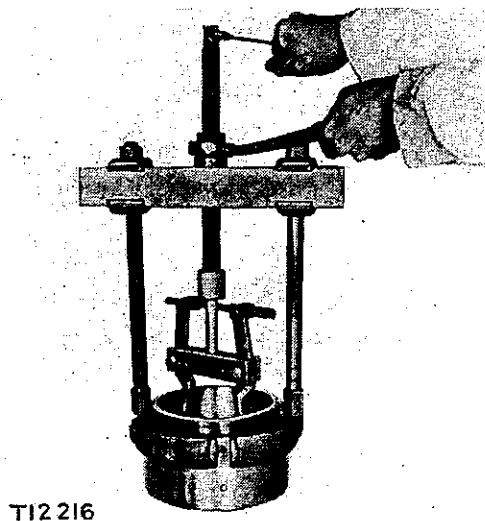
The final drive seal (11) is cemented to the adjusting nut. See the topic, SPROCKET AND FINAL DRIVE SEALS.

BEARING CAGE HOLDER ASSEMBLY

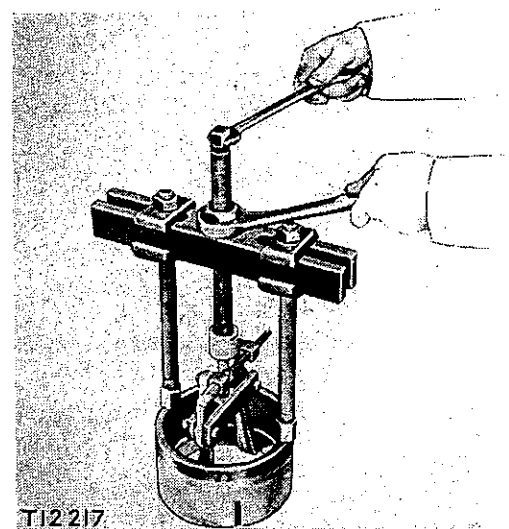
- 9—Adjusting nut. 10—Bearing cage.
11—Final drive seal. 12—Bearing race.



13. Pull the bearing cage and race from the holder using an 8B7548 Push Puller, 8B7554 Bearing Cup Pulling Attachment and an 8B7553 Adapter.

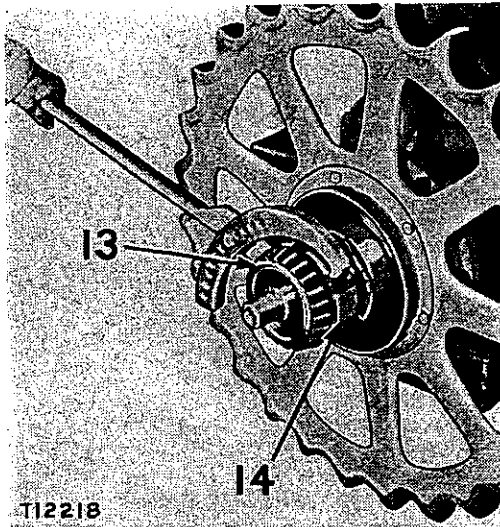


PULLING BEARING CAGE



PULLING BEARING RACE

14. The bearing race (12) can be removed from the bearing cage (10) by using the same pullers.
15. After pulling the bearing cage holder, the nut should be placed back on the sprocket shaft to protect the threads while removing the other parts of the final drive.
16. Remove the outer bearing (13) from the gear hub by unlocking the sprocket retaining nut (14) and backing it off with a 5F9693 Spanner Wrench.



REMOVING OUTER BEARING

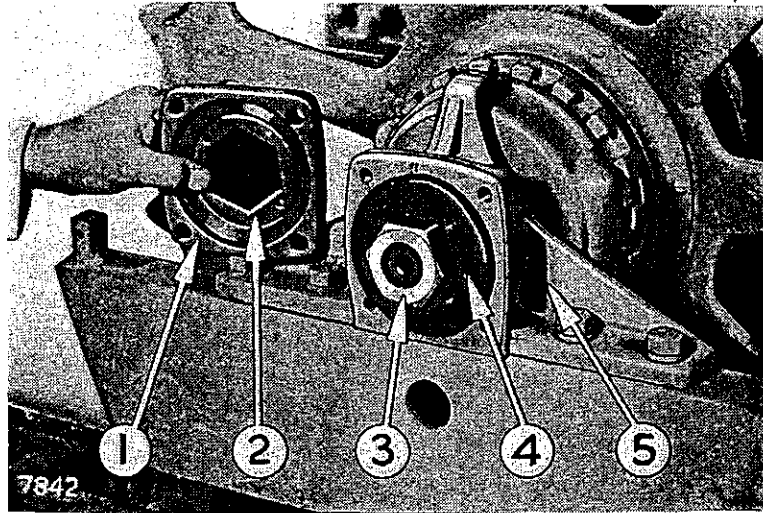
13—Bearing. 14—Nut.



17. When the bearing is backed off as far as the width of the 4B6090 Yoke, turn the nut back toward the sprocket and insert the yoke between the nut and bearing. The bearing can be removed by unscrewing the nut with the yoke in place.

Removal and Assembly (Earlier Tractors)

1. Remove the cap (1), lock (2), nut (3) and washer (4).
2. The shims behind the washer (4) are for alignment of the track rollers on the track frame with the sprocket. When properly adjusted, the track rollers will be centered with the sprocket.
3. Remove the outer frame bearing (5).
4. Replace the bronze bushing in the bearing if damaged or if worn until a .025" thickness gauge can be inserted between the bushing and bearing cage holder assembly.



BEARING CAP ASSEMBLY

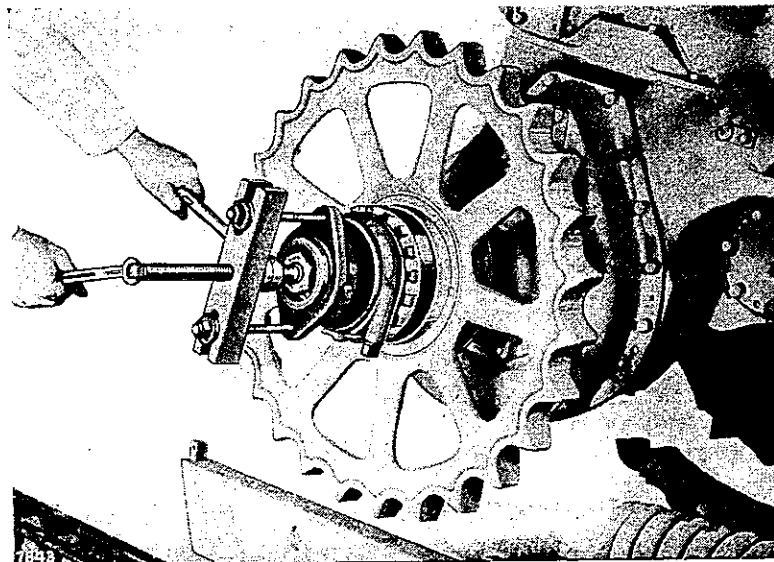
1—Cap. 2—Lock. 3—Nut. 4—Washer. 5—Outer frame bearing.

5. Replace the sprocket shaft nut (3) and use the following tools to pull the sprocket hub bearing cage holder as shown:

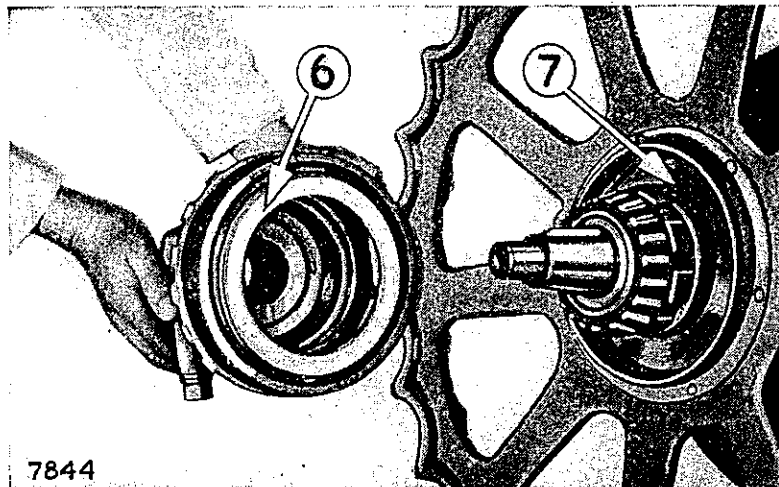
- | | |
|------------------------|---------------------|
| 1—1B4643 Yoke | 2—L1772 Stud |
| 1—1B4655 Bushing | 2—1D4720 Nut |
| 2—3B5991 Shoulder Bolt | 1—8B7561 Step Plate |

NOTE

Either the 8B7548 Puller or No. 2 Puller can be used with the above tools. The sprocket shaft nut will prevent the holder and puller arrangement from "jumping" off the end of the shaft.

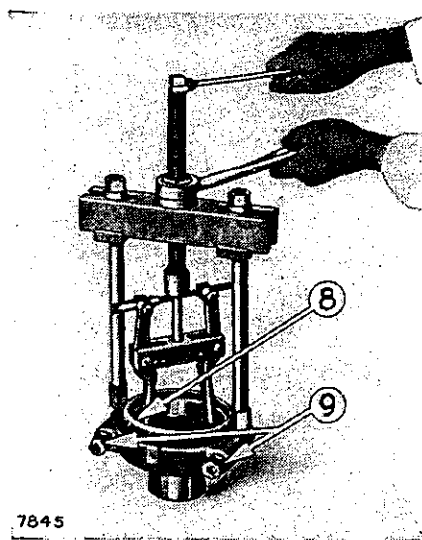


PULLING BEARING CAGE HOLDER ASSEMBLY

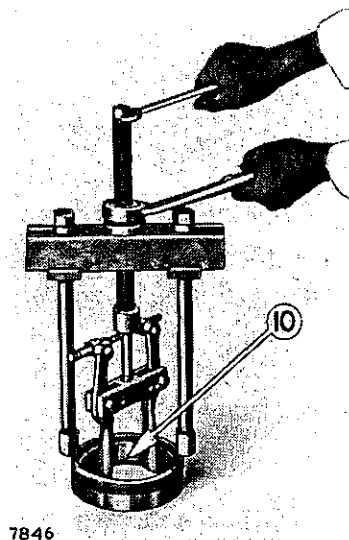


BEARING CAGE HOLDER AND SEAL ASSEMBLY
6—Bellows seal. 7—Washer.

6. Replace the bellows seal (6) in the adjusting nut if damaged or worn.
7. The washer (7) on the sprocket hub can be turned over when necessary to provide a new wearing surface. It should be replaced if both sides are worn or damaged.



PULLING CAGE
8—Cage. 9—Nuts.

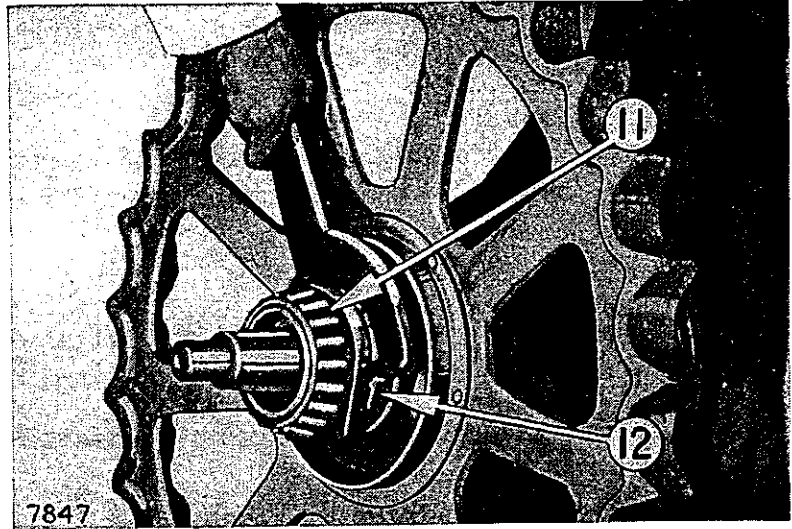


PULLING BEARING CUP
10—Bearing cup.

8. Remove the capscrew and flat lock and unscrew the final drive adjusting nut from the cage holder.
9. Loosen the nuts (9) on the bolts in the bearing cage holder.
10. Pull the cage (8) from the holder using the 8B7548 and 8B7554 Pullers as shown.
11. The same pullers will pull the bearing cup (10) from the cage.

REMOVING OUTER BEARING

11—Bearing. 12—Nut.

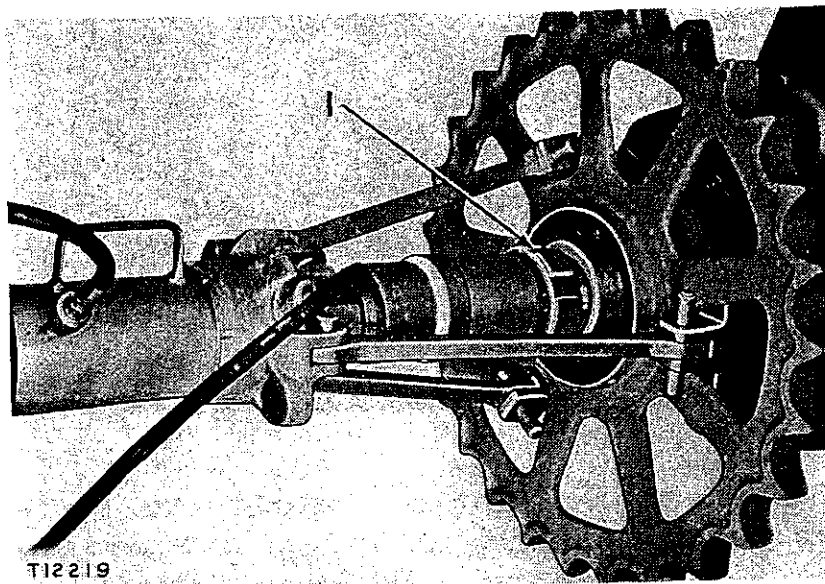


12. Force off the bearing (11), by loosening the sprocket retaining nut (12) with the 1B1563 Wrench. Due to insufficient threading on the final drive gear hub to force the bearing completely off the hub, use a 4B6090 Yoke as a spacer between the nut and bearing after the nut has forced the bearing off half-way.

SPROCKET AND FINAL DRIVE SEALS

Sprocket Removal

Place the sprocket retaining nut (1) on the final drive gear hub leaving some space between it and the sprocket. This will keep the sprocket from jumping off when it is being pulled.



PULLING SPROCKET

1—Nut.

Attach the 6F25 Service Press, 5F9040 Sprocket Puller Arm Group (3 required) and a 5F7334 Spacer as shown and pull the sprocket from the hub.

After the sprocket is pulled loose, remove the retainer nut and take off the sprocket. Inspect the splines carefully if the sprocket pulls off easily.

Final Drive Seals

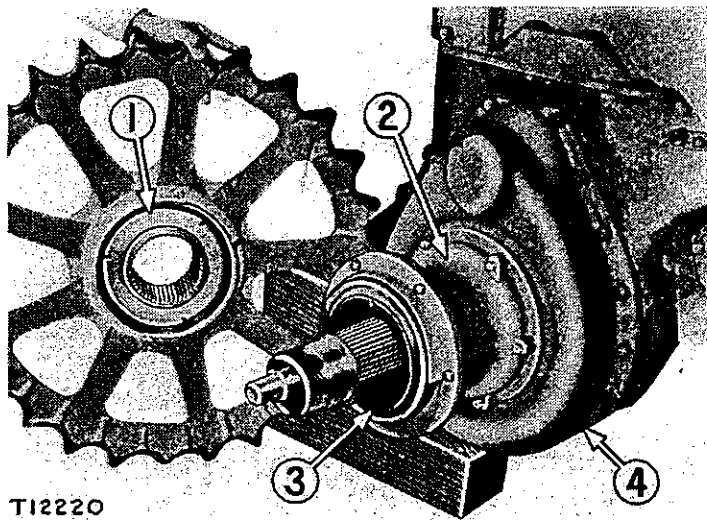
The washer (1) on either side of the sprocket can be turned over to provide a new wearing surface for the final drive seal.

The washers should be replaced if both sides are worn or damaged.

Replace the gaskets between the washers and the sprocket, cementing both sides of the gaskets with Aviation Permatex No. 3 or equivalent. Stake the washers in place so that they will not fall off during assembly but at the same time they should be loose enough to float.

The outer final drive seal is doweled and cemented to the adjusting nut which was removed from the bearing cage holder assembly.

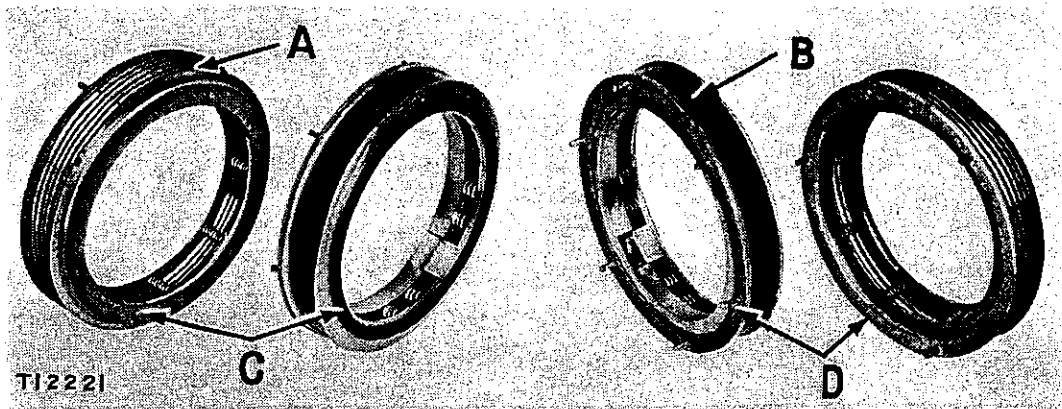
The inner final drive seal (3) is attached to the final drive case (4) on 44" gauge tractors or to the final drive extension (2) on 60" gauge tractors, in the same manner.



SPROCKET REMOVED

1—Washer. 2—Final drive extension. 3—Seal. 4—Final drive case.

On later tractors the final drive seal assembly was changed from a metal bellows type seal assembly (A) to a rubber bellows type seal assembly (B). On both the earlier seal assembly (A) and later seal assembly (B) there is a seal (C) that contacts the washer (1) on the sprocket, thus preventing dirt from entering or lubricant from escaping from the



FINAL DRIVE BELLOWS SEAL ASSEMBLIES

A—Metal bellows assembly. B—Rubber bellows assembly. C—Seals. D—Gaskets.

final drive case (4). On the later type seal assembly (B) the seal (C) is leather while on the earlier type bellows assembly (A), the seal (C) is cork.

On both bellows assemblies (A) and (B), the gasket (D) is cork or cork and rubber composition.

If the seals (C) or gaskets (D) are damaged they can be removed and new seals and gaskets cemented to the bellows.

If the bellows are damaged they should be replaced.

When installing the bellows assemblies into the adjusting nut or in the final drive case, cement the gasket (D) in place with Aviation Permatex No. 3 or equivalent.

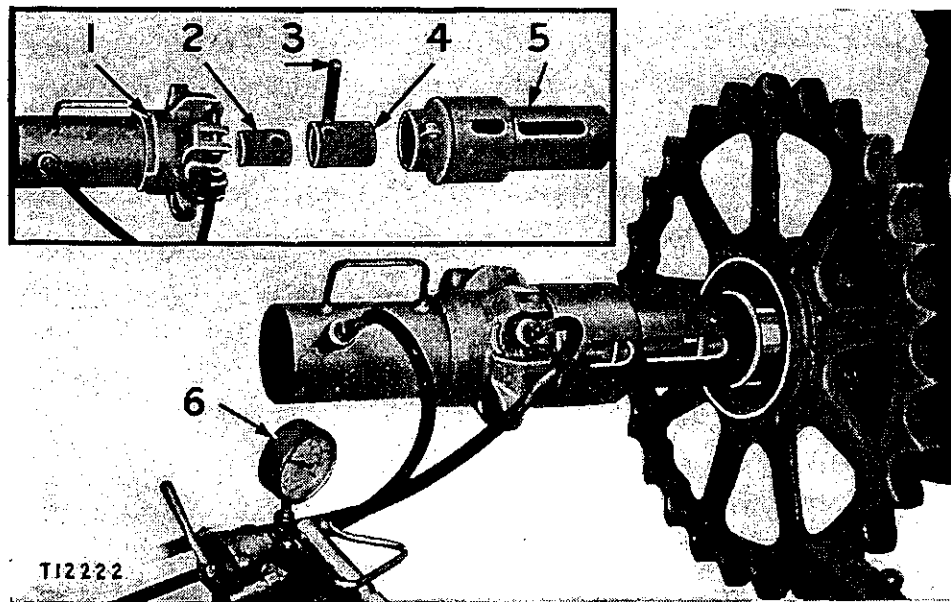
Later type rubber bellows seals used a snap on type ribbed rubber gasket (D) and this gasket requires no cement on either side.

If the seal is cork, coat the surface of the seal (C) which bears against the washer (1) with graphite or lubricant.

Sprocket Installation

1. Before installing the sprocket, make sure that the splines are clean, dry and free from burrs.
2. Set the sprocket on the hub with the splines in the sprocket meshing with the splines on the hub and push the sprocket on as far as possible by hand.
3. The sprocket can be pushed on the hub by installing a 5F9888 Adapter Coupler (2) on the end of the ram of the 6F25 Service Press (1) and extend the ram out to the limit of travel.

4. Assemble the 7F5288 Sprocket Pusher (5) to the service press (1) and screw a 5F9884 Adapter (4) to the end of the sprocket shaft.
5. Slide the sprocket pusher (5) over the end of the sprocket shaft and connect the adapter coupler (2) and the adapter (4) with the 5F9892 Coupling Pin (3).
6. Place the control valve on the service press in a pulling position and apply a slight pressure to the sprocket. Rotate the sprocket back and forth to seat the bearings and equalize the load.
7. Apply pressure to the sprocket until a reading of 25 tons is obtained on the 7F2956 Pressure Gauge (6).



INSTALLING SPROCKET

1—6F25 Service Press. 2—5F9888 Adapter Coupler. 3—5F9892 Coupling Pin.
4—5F9884 Adapter. 5—7F5288 Sprocket Pusher. 6—7F2956 Pressure Gauge.

NOTE

Inasmuch as the pressure applied against the sprocket is transmitted to the final drive bearing, it is important that the recommended pressure is not exceeded.

8. Remove the sprocket pushing tools and install the sprocket retaining lock and nut. Tighten the nut as tight as possible with a 5F9693 Spanner Wrench, then lock it by bending one of the tabs of the lock into a notch in the spanner nut.
9. Bend the lock against one of the flats on the sprocket hub.

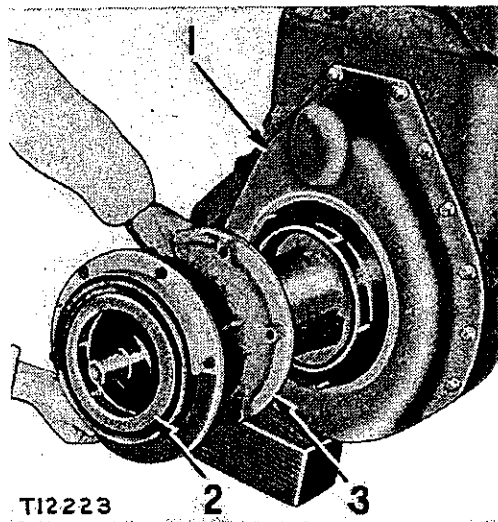
FINAL DRIVE CASE AND GEARS

Final Drive Case Removal

Remove the track roller frame outer bearings, sprocket and final drive seals as outlined in the covering topics.

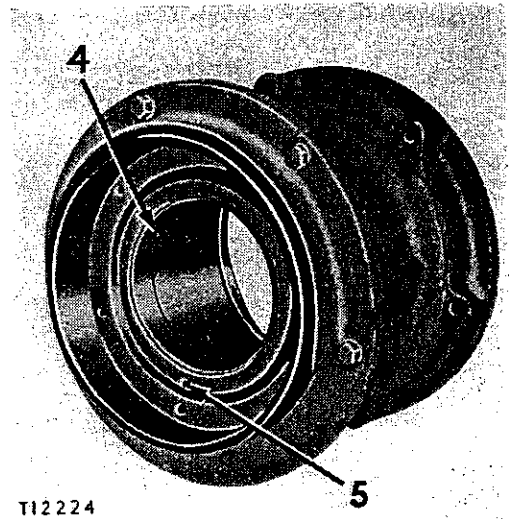
On 44" gauge tractors, the extension (3) is not used and the inner final drive seal (2) is attached directly to the final drive gear case (1).

The extension can be removed separately as shown or removed with the final drive case.



REMOVING FINAL DRIVE CASE EXTENSION

1—Final drive gear case. 2—Seal.
3—Extension.



EXTENSION REMOVED

4—Bushing. 5—Oil hole.

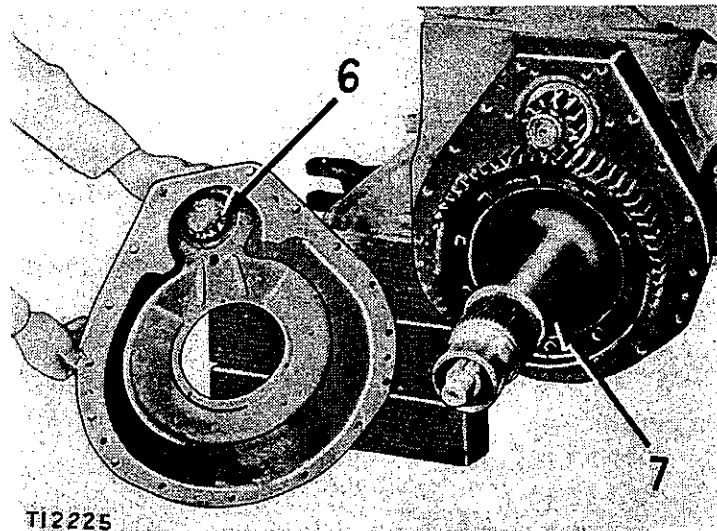
On later tractors the extension (3) has a bushing (4) which should be replaced if damaged or scored.

Assemble the extension (3) to the final drive case (1) with the oil hole (5) at the bottom.

Remove all of the capscrews from the final drive gear case and with two $\frac{3}{8}$ "-16 (NC) puller screws, force the case off the dowels and away from the steering clutch case.

Lift off the case, taking care to support it so it does not drop and damage the final drive seal or the threads and splines on the hub (7).

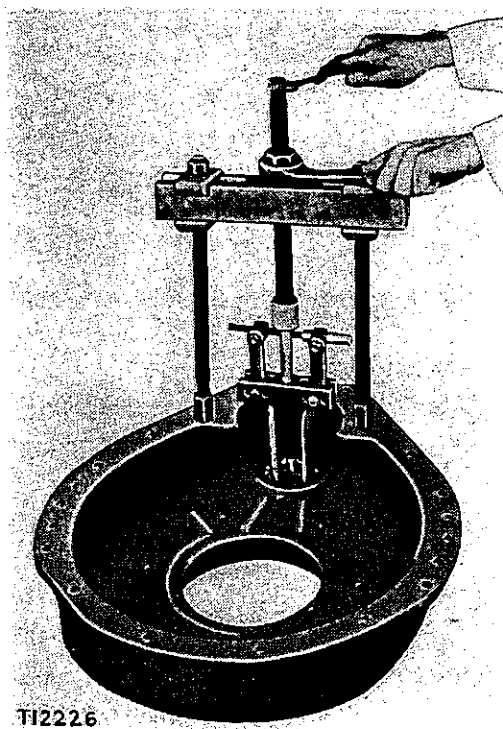
Remove the plug and pull the dowel holding the bearing (6) in the case with a No. 6-40 (NF) screw.



REMOVING FINAL DRIVE GEAR CASE
 6—Bearing. 7—Hub.

On later tractors the bearing can be removed by using a 8B7548 Push Puller, 8B7553 Adapter and a 8B7554 Bearing Cup Pulling Attachment.

On earlier tractors there is a cover over the outer side of the bearing (6). After removing the dowel and cover the bearing can be pressed out of the case.



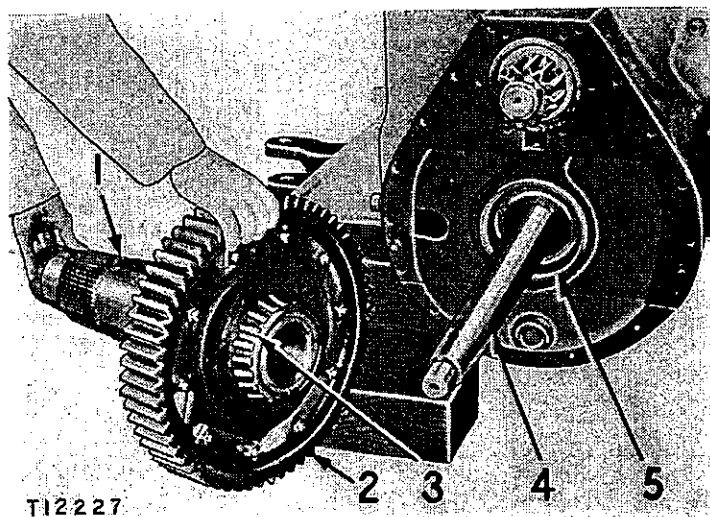
REMOVING BEARING

Final Drive Gear and Bearing Removal

The hub (1) on 60" gauge tractors is longer than the hub on 44" gauge tractors, however the removal procedure is the same for both.

After the final drive gear case has been removed, slide the hub (1) and final drive gear (2) from the sprocket shaft (4).

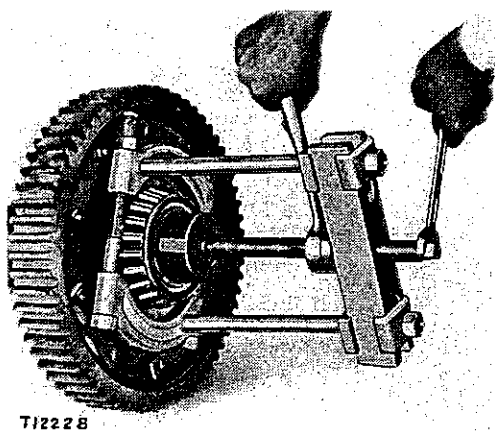
The final drive gear (2) can be replaced after removing the bolts securing it to the hub (1).



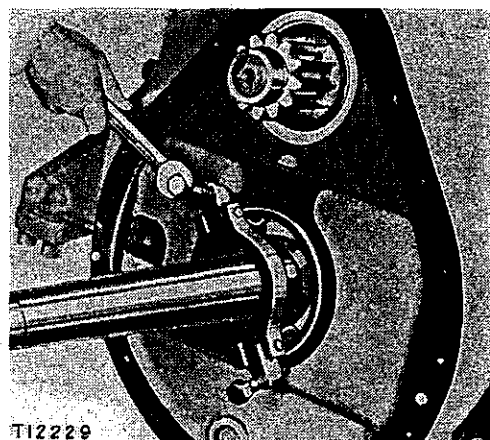
REMOVING FINAL DRIVE GEAR AND HUB
1—Hub. 2—Gear. 3—Bearing. 4—Sprocket shaft. 5—Bearing cup.

The bearing (3) on the inner end of the hub (1) can be removed by using an 8B7551 Bearing Pulling Attachment, 8B7548 Push Puller and a $3\frac{3}{4}$ " diameter spacer as shown, after four bolts, securing the gear to the hub are removed.

Pull the bearing cup (5) using a 3B7084 Puller and two 3B7080 Screws as shown.



PULLING BEARING



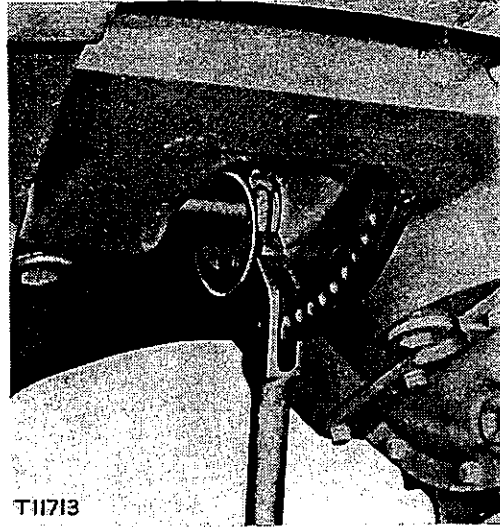
PULLING BEARING CUP

SPROCKET SHAFT

Removal

Pry off the snap ring and remove the pin from the sprocket shaft retaining nut.

Unscrew the nut using a 7F9306 Spanner Wrench.



REMOVING SPROCKET SHAFT
RETAINING NUT

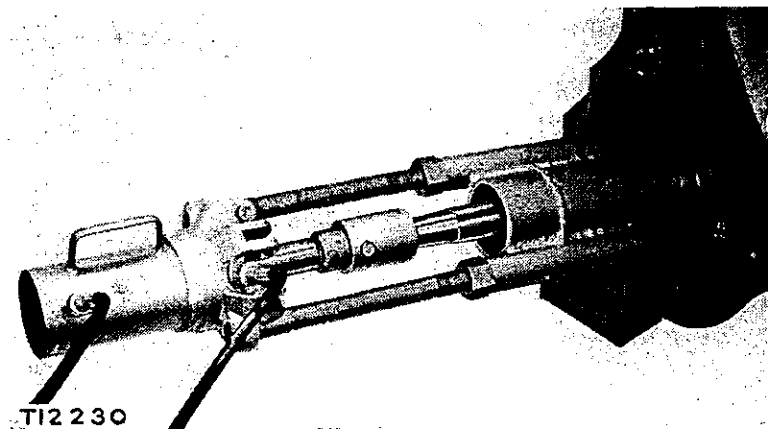


Attach the sprocket pulling arrangement as shown and pull the shaft.

The following tools are used with the 6F25 Service Press:

1—5F9896 Sleeve
2—1A1777 Nut
2—5F9893 Stud

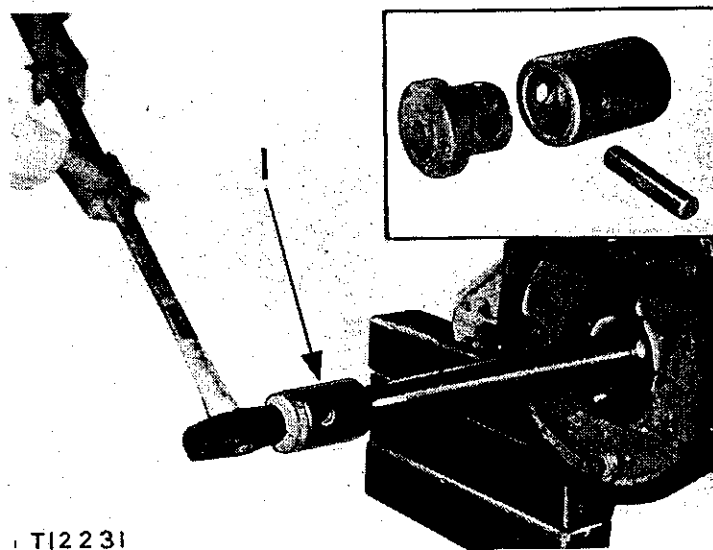
1—5F9888 Ram Coupling
1—5F9892 Pin
1—5F9884 Adapter



PULLING SPROCKET SHAFT

Installation

1. Install the sprocket shaft into the steering clutch case and through the retainer nut and snap ring, making sure the keyway in the outer end of the shaft is on top.
2. Install the 5F9884 Adapter (1), 5F9889 Plug and 5F9892 Pin on the outer end of the shaft and tighten the adapter securely against the shoulder.

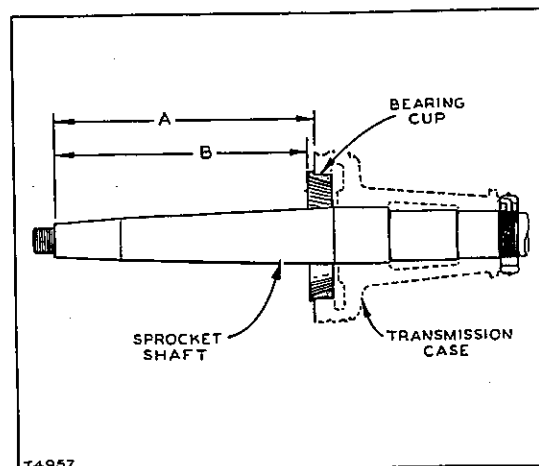


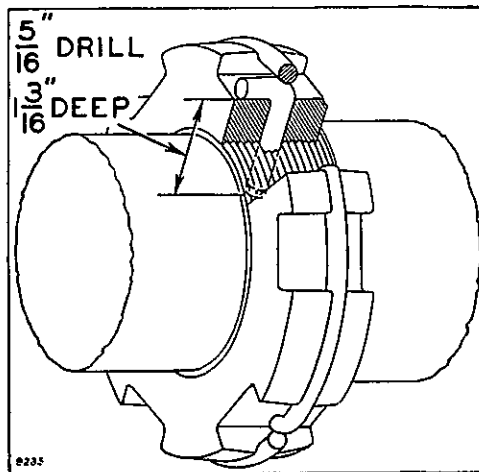
INSTALLING SPROCKET SHAFT

3. Tighten the retainer nut with the 7F9306 Spanner Wrench and at the same time drive against the end of the plug with a heavy sledge until the distances exist as illustrated.

DIMENSIONS WITH SPROCKET SHAFT PROPERLY INSTALLED

44" Gauge A—12 9/32" B—12"
60" Gauge A—20 9/32" B—20"





INSTALLING RETAINING NUT LOCK PIN

4. When the retainer nut is securely tightened, lock it in the following manner: In one of the notches in the nut, drill a 5/16" diameter hole through the nut and 1 3/16" deep through the nut and into the shaft.
5. Place the lock pin in the hole and install the snap ring to hold the pin in place.

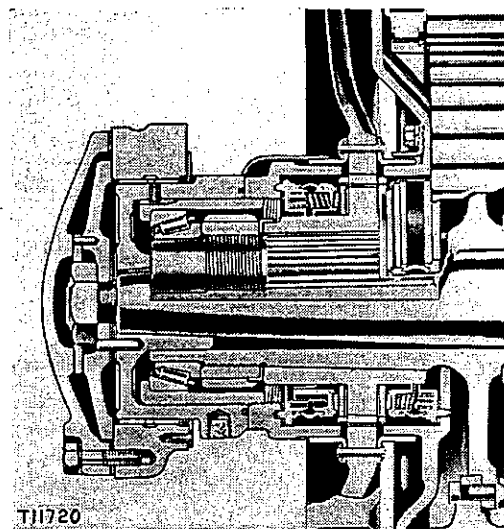
ADJUSTMENTS

Final Drive Bearings

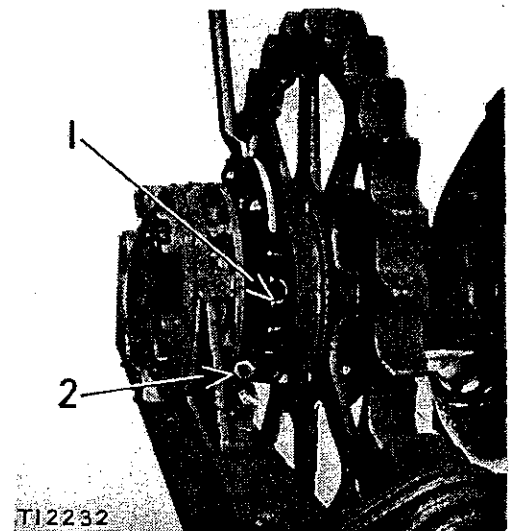
After the final drive has been assembled, adjust the bearings.

With the adjusting nut lock removed and the clamping bolt (2) loose, tighten the adjusting nut (1) in a counterclockwise direction as tight as possible with a three foot extension on the 7F9693 Spanner Wrench.

Securely tighten the clamping bolt and install the lock.



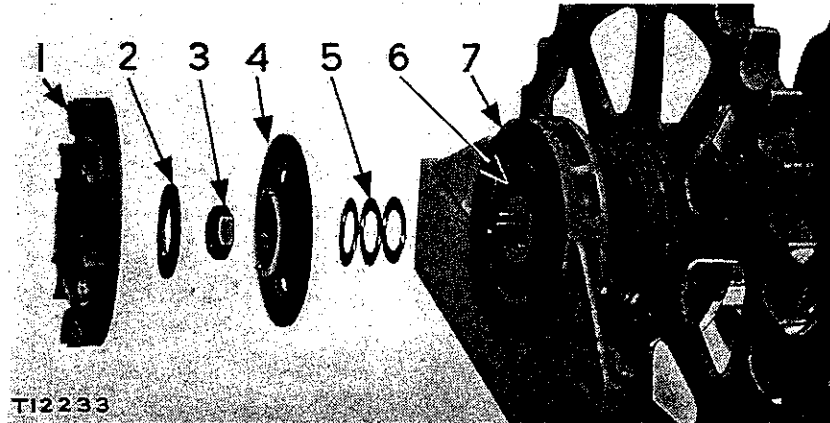
CUTAWAY VIEW OF FINAL DRIVE



ADJUSTING FINAL DRIVE BEARINGS
1—Adjusting nut. 2—Clamping bolt.

ALIGNING TRACK ROLLER FRAME WITH SPROCKET

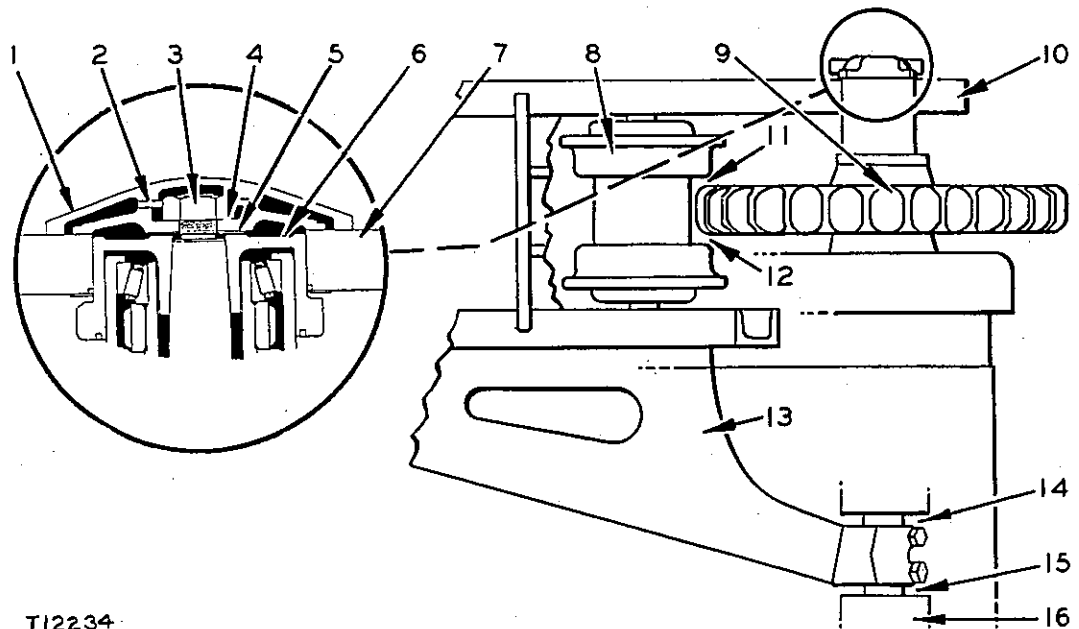
When installing the track roller frame (10), the center of the track rollers should be centered with the drive sprocket (9), so that the track will lead straight off of the rear roller (8) onto the drive sprocket and not rub against either the sides of the sprocket or the rims of the track roller.



LOCATING TRACK ROLLER FRAME

1—Cap. 2—Lock. 3—Nut. 4—Retainer. 5—Shims. 6—Holder. 7—Support.

The drive sprocket (9) should be centered in the recess of the rear track roller (8) so that the spaces (11) and (12), between the outer face of the



ALIGNING TRACK ROLLER FRAME WITH SPROCKET

1—Cap. 2—Lock. 3—Nut. 4—Retainer. 5—Shims. 6—Holder. 7—Support. 8—Rear track roller. 9—Drive sprocket. 10—Track roller frame. 11—Clearance. 12—Clearance. 13—Diagonal brace. 14—Clearance. 15—Clearance. 16—Steering clutch case.

sprocket and the inner edge of the track roller rim, are equal. When this is properly adjusted, the diagonal brace (13) should be checked to see that there is some clearance at (14) and (15) in the recess in the steering clutch case (16).

This adjustment can be made by removing the cap (1) from the support (7) and taking off the lock (2), nut (3) and retainer (4).

Add shims (5) between the retainer (4) and holder (6) to move the roller frame out, decreasing the clearance (12) at the roller and at the diagonal brace (14) and increasing the clearance at (11) and (15).

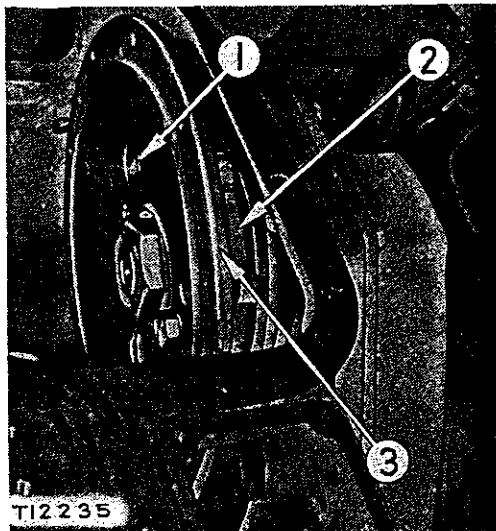
Remove shims (5) to allow the roller frame to move closer to the tractor, decreasing the clearance at (11) and (15) and increasing the clearance at (12) and (14).

FINAL DRIVE PINION

Removal

If only the final drive pinion and inner bearing is to be removed, it is not necessary to disassemble the final drive.

1. Remove the steering clutches and bevel gear shaft as outlined in the topic, BEVEL GEAR.
2. Remove the capscrew and stop from over the opening (1) in the final drive pinion flange (3).
3. Remove the capscrews securing the cover (2) and bearing cage to the steering clutch case by using a socket and an extension through the opening (1) in the flange (3).

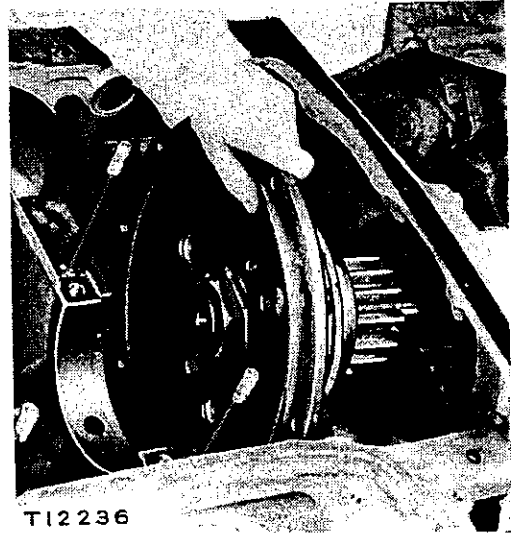


PREPARING TO REMOVE FINAL DRIVE PINION

1—Opening. 2—Cover. 3—Pinion
flange.



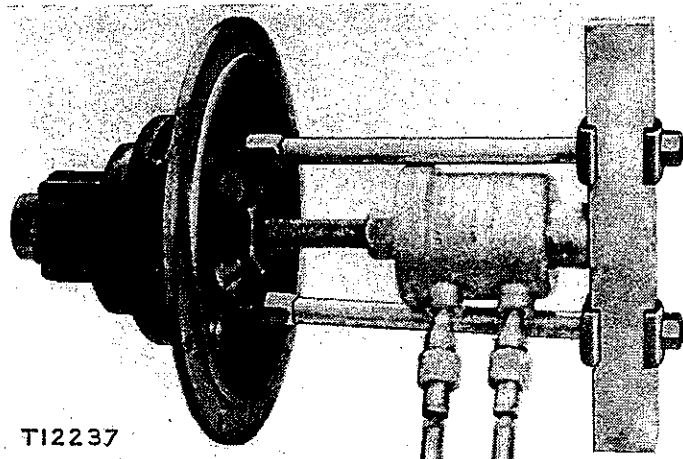
REMOVING FLANGE AND PINION



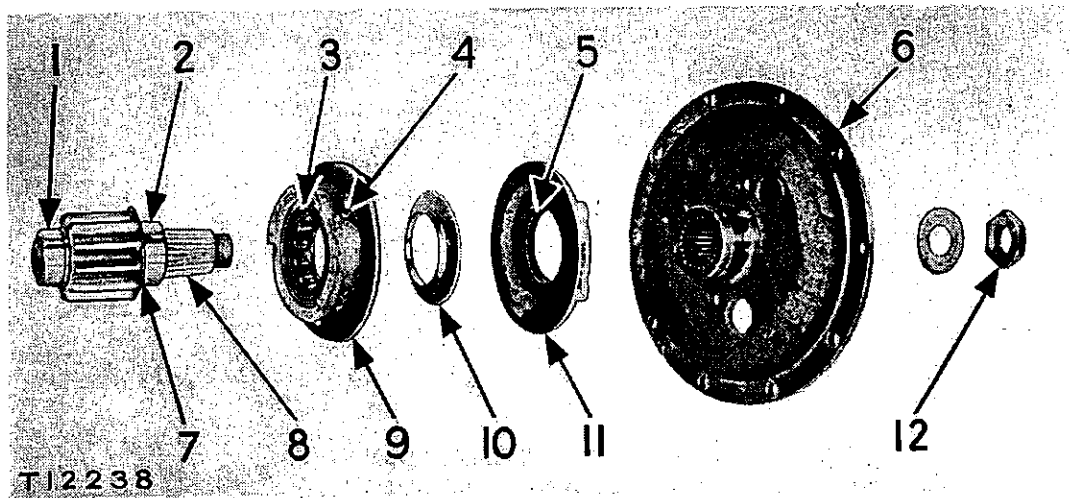
4. After the capscrews have been removed, pull the flange away from the outer wall. Considerable effort may be required at first while the bearing cage is being pulled out of the bore.
5. Lift the flange and pinion out of the case.

Disassembly

1. Loosen the nut (12) but do not remove it, then pull the flange (6) from the pinion (8) by using a 7F9540 Hydraulic Puller, 8B7548 Push Puller and 8B7556 Adapters.
2. Lift the flange (6), cover (11) and thrower (10) as an assembly from the pinion (8).
3. The thrower (10) is a press fit on the hub of the flange (6) and can be removed by prying the cover (11) away from the flange (6).



PULLING FLANGE FROM PINION



PINION AND FLANGE DISASSEMBLY

1—Bearing race. 2—Bearing race. 3—Bearing. 4—Dowel. 5—Seal. 6—Flange.
7—Deflector. 8—Pinion. 9—Cage. 10—Thrower. 11—Cover. 12—Nut.

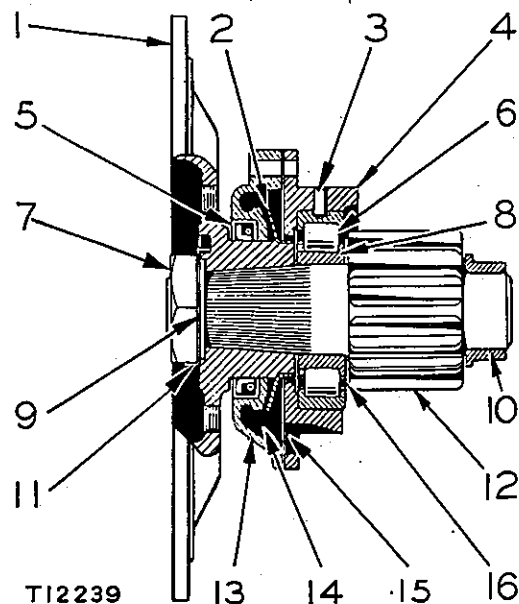
4. If the oil seal (5) in the cover (11) has been leaking lubricant it should be replaced.
5. Remove the dowel (4) then press the bearing (3) from the cage (9).
6. If the bearing races (1) and (2) are worn or pitted they should be replaced. They can be removed by applying heat from a torch evenly and rapidly to the entire outer surface of the race. This application of heat will cause the bearing race to expand so it can be removed from the pinion (8).
7. After the bearing race (2) has been removed, remove the deflector (7).

Assembly

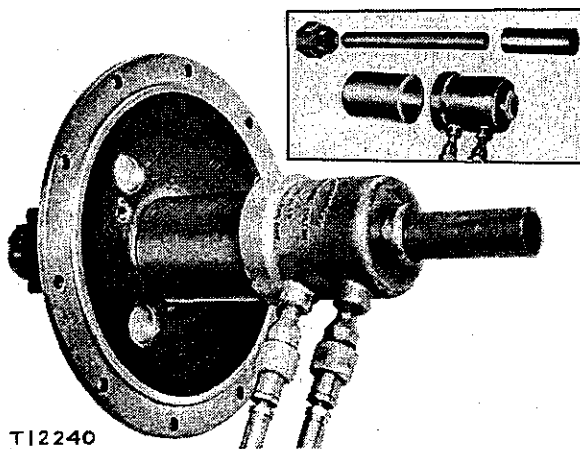
1. Press the bearing race (10) on the end of the pinion.
2. Place the deflector (16) over the splined end of the pinion (12) and press the bearing race (8) on the pinion.
3. Press the bearing (6) into the cage (4) and install the dowel (3).
4. Place the cage (4) and bearing (6) over the end of the pinion (12) onto the race (8).
5. Press the seal (5) into the cover (13) with the wiping edge toward the bearing (6).
6. Place the cover (13) and seal (5) on the hub of the flange (1) and install the thrower (2).
7. Place the flange (1) and cover (13) on the pinion after making sure the splines are clean, dry and free from burrs.

**PINION AND FLANGE
ASSEMBLY**

- 1—Flange. 2—Thrower. 3—Dowel.
4—Bearing cage. 5—Seal. 6—Bearing.
7—Nut. 8—Bearing race. 9—Gasket.
10—Bearing. 11—Lock. 12—Pinion.
13—Cover. 14—Oil drain passage in
cover. 15—Oil drain hole in cage.
16—Deflector.



8. Press the flange (1) on the pinion with a pressure of 15 tons.
9. One method of pressing the flange on the pinion is to weld a 1½"-12 (NF) nut and a 1⅛"-12 (NF) nut together and using the 7F9540 Hydraulic Puller, 8F3670 Stud, 8F3667 Sleeve and a spacer with a 3" inside diameter, press the flange on the pinion as shown.



**PRESSING FLANGE ON
PINION**

10. Place a new gasket (9) on the end of the pinion and install the lock (11) and nut (7).
11. Tighten the nut securely and lock it.
12. Lower the pinion and flange assembly into the steering clutch case and guide the pinion through the bearing cage bore.
13. Be sure the oil drain hole (15) in the bearing cage and the oil drain passage (14) in the cover (13) registers with the drain hole in the case.

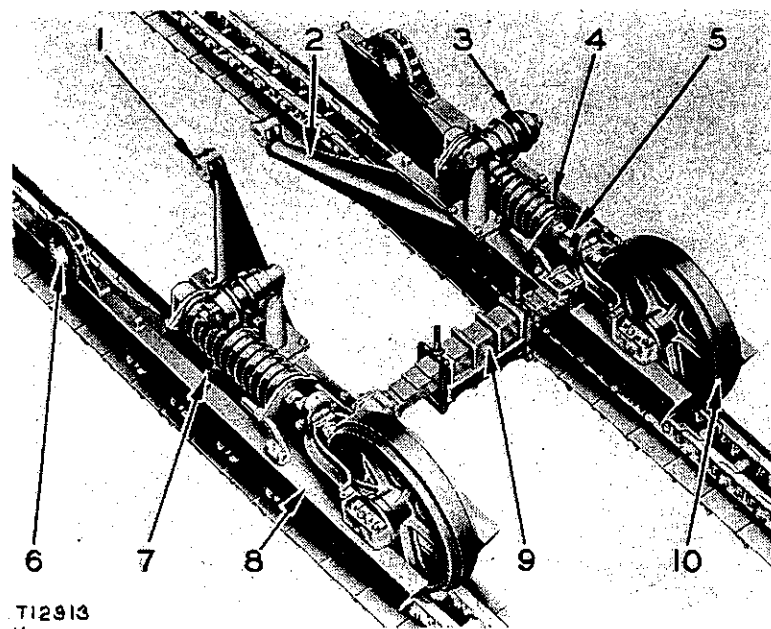
14. Pull the bearing cage into the bore by tightening the capscrews. Do not attempt to force it into the bore by pushing on the flange as this might damage the seal (5).

TRACK ROLLER FRAME GROUP

The track roller frame assembly provides a mounting for the track rollers (7), track carrier rollers (3), front idlers (10), recoil springs (4) and equalizer spring (9).

The weight of the tractor is carried through the frame (8) to the rollers.

The diagonal brace (2), welded to the inside of the frame, maintains correct track roller frame alignment.



712913

TRACK ROLLER FRAME GROUP

1—Diagonal brace bearing. 2—Diagonal brace. 3—Track carrier roller. 4—Recoil spring. 5—Track adjusting screw. 6—Outer bearing. 7—Track roller. 8—Frame. 9—Equalizer spring. 10—Front idler.

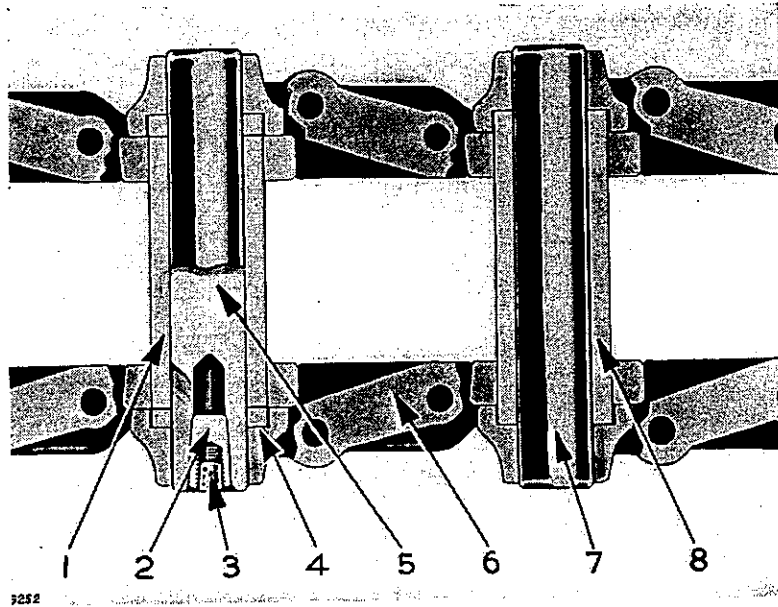
This construction allows each track frame to operate independently and to move up and down relative to one another by pivoting at the sprocket shaft through outer bearings (6) and diagonal brace bearings (1).

The track tension is adjusted by the track adjusting screw (5).

Tracks

The track link assembly consists of links, pins and bushings. As shown, each link (6) overlaps the preceding link thus forming a continuous chain. Each link is counterbored in the overlapped portion to provide a tight well sealed joint to reduce the entrance of abrasives.

The bushings (8) are all alike except the master bushing (1) which is shorter for assembly purposes. With the master bushing, collars (4) are inserted in the counterbored space. The pins (7) are alike except the



TRACK PIN AND BUSHING CUTAWAY VIEW (Earlier Tractors)
1—Master bushing. 2—Tapered plug. 3—Cork. 4—Collar. 5—Master pin (earlier tractors). 6—Link. 7—Pin. 8—Bushing.

master pin (5) which is taper reamed and split at each end. This construction permits the tapered plug (2) to be driven into the master pin to hold the pin in position in the links on earlier tractors. The cork (3) protects the threads in the plug.

SEPARATING TRACK

Remove the guard over the track adjusting nut and loosen the track adjustment as much as possible.

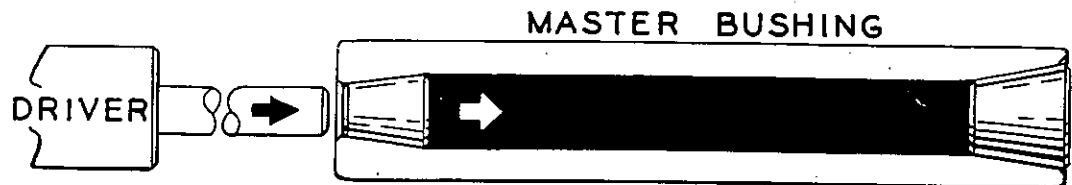
Place a block approximately 12" high in front of the track and drive the tractor forward so the track shoe below the master pin rides on the block and the slack is taken out of the bottom part of the track. The master pin will then be in a position in front of the idler and approximately even with the top of the track roller frame.

Set the brake so the slack will remain in the top part of the track.

Master Pin Removal and Installation (Later Tractors)

After the preliminary steps described in the topic, SEPARATING TRACK, have been taken, the 1H338 Driver can be used to drive the tapered plugs from the master pin and the master pin from location in one operation. The driving is done from the small tapered plug end of the master pin.

1. Remove the bushing collars.



T10706

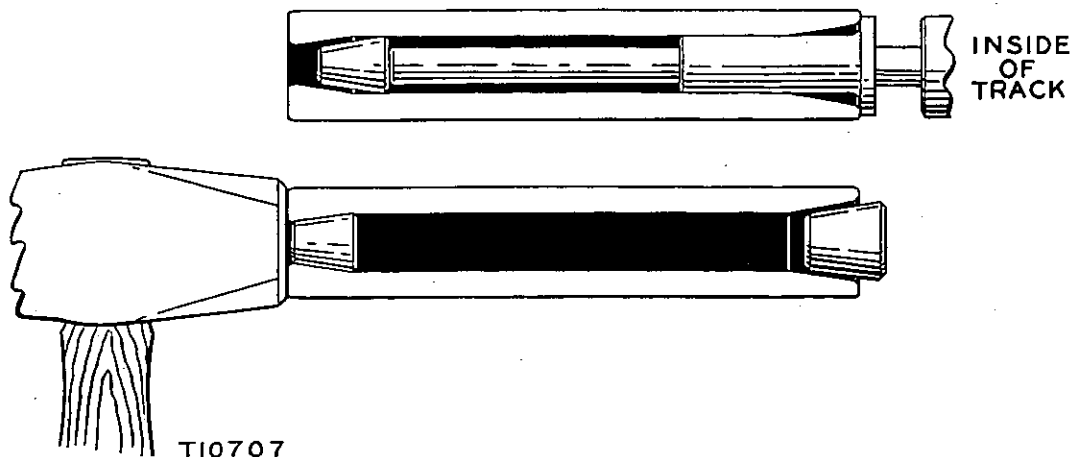
REMOVING TAPERED PLUGS AND MASTER PIN

2. To install the master pin place the bushing collars in position and drive the master pin in from the outside of the track with the small taper bore facing outward.

NOTE

The master pin may have had either tapered bore facing outward at the time of removal but this installation procedure is suggested to provide for easier future removal of the master pin.

3. Insert a small tapered plug from the inside of the track and, using the 1H339 Pilot and the 1H338 Driver, sledge the small plug in place.



T10707

DRIVING IN PLUGS
(Showing method of backing master pin with sledge.)

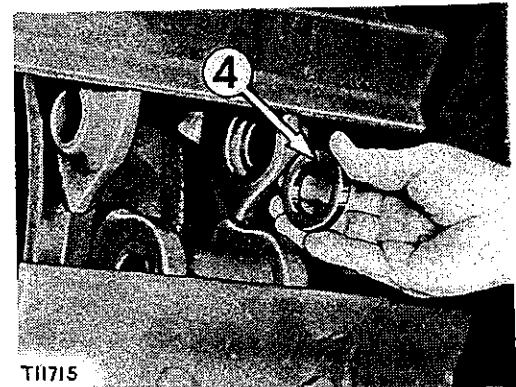
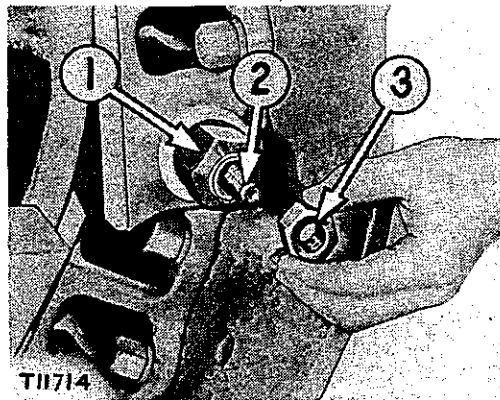
4. Remove the driver and pilot and sledge the large plug into position.

NOTE

It may be necessary to "back up" or "buck" the master pin with another sledge when driving in either, or both, taper plug. Otherwise the master pin may be driven out of location or the tapered plugs may not be properly seated.

Master Pin Removal and Installation (Earlier Tractors)

1. Remove the corks from the master pin plugs and pull the plugs from both ends of the pin, using a 2B2108 Sleeve (1), 3B1027 Screw (2) and a 3B1028 Nut (3).



REMOVING MASTER PIN PLUG AND BUSHING COLLAR

(Earlier Tractors)

1—2B2108 Sleeve. 2—3B1027 Screw. 3—3B1028 Nut. 4—Bushing collar.

2. Drive out the master pin, using a suitable driver inserted in the plug hole of the master pin. Avoid damaging the tapered bore in the master pin.
3. Remove the bushing collars (4).
4. Install the master pins in the reverse order cleaning the tapered plugs and the mating surfaces in the master pin.

REPLACING TRACK

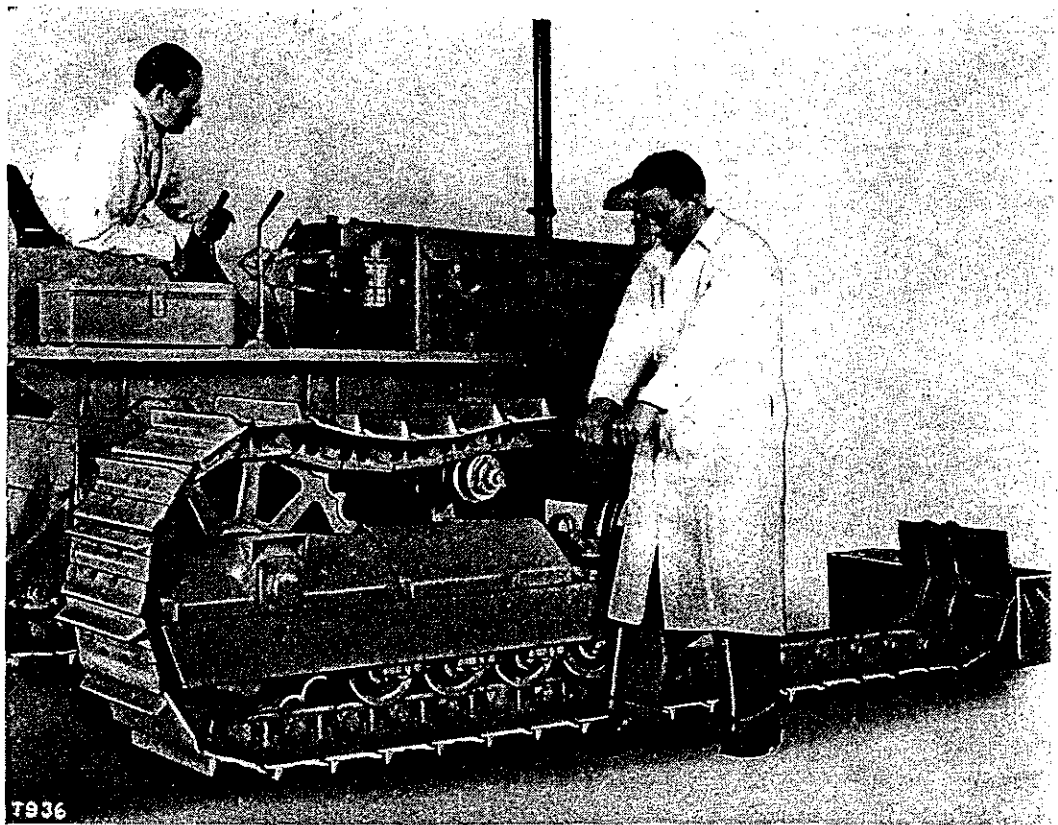
1. Back the tractor until the sprocket is just ahead of the rear end of the track.
2. Insert a bar into the last link and aid the track to climb over the sprocket and front idler, as the tractor is driven forward slowly.
3. With a block under the first shoe, bring the track almost to where it joins.

4. Insert the collars and drive ahead until the links join and the master pin holes line up.
5. Replace the master pins according to the covering topics.
6. Adjust the tracks.

WARNING

In the interest of personal safety, always hold the bar as shown.

7. Tighten the bolts that prevent the adjusting screw from turning and install the dirt guards.



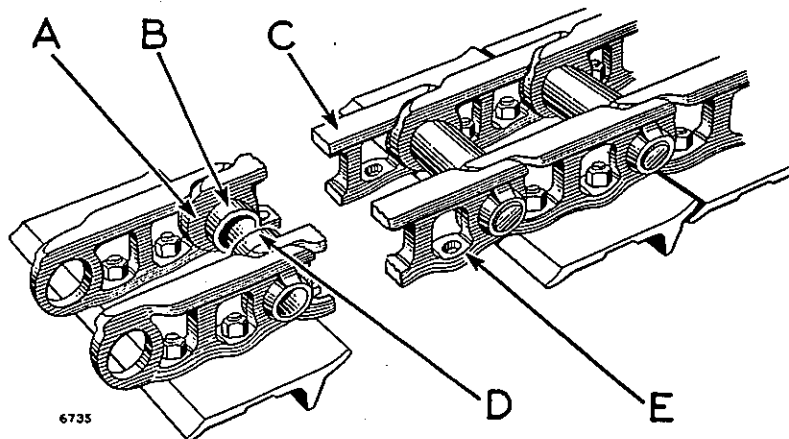
REPLACING TRACK
(Earlier Tractor Illustrated)

TRACK LINKS

A damaged track link not adjacent to the master pin can be replaced without disassembling the track.

1. Remove the shoe from the track links in question.
2. Press out the pins at both ends of the track link.

3. Cut the broken link in two, and cut a $\frac{5}{8}$ " section out of the bushing with a torch.
4. Remove the cut link (A) and bushing (B), the rest of the link (C) and then the other link (E) and the remaining part of the bushing (D).
5. Press two new links on the track, because of the possibility of uneven wear.
6. Install a standard track pin in the overlapping part of the new links.
7. Install a master bushing at the other end.
8. Insert collars in the counterbore of the mating links and press in either a master pin or a standard track pin as desired.
9. Install the master pin plugs.



REPLACING DAMAGED TRACK LINK
A—Cut link. B—Bushing. C—Cut link. D—Bushing. E—Link.

TRACK PINS AND BUSHINGS

To obtain maximum life of track pins and bushings, the wear on the outer diameter of the bushing should not exceed $\frac{1}{8}$ " before turning. To turn pins and bushings, they should be pressed out, rotated 180° and reinstalled to obtain new contact surfaces.

Disassembly

There are two types of presses for track reconditioning:

Heavy duty power press.

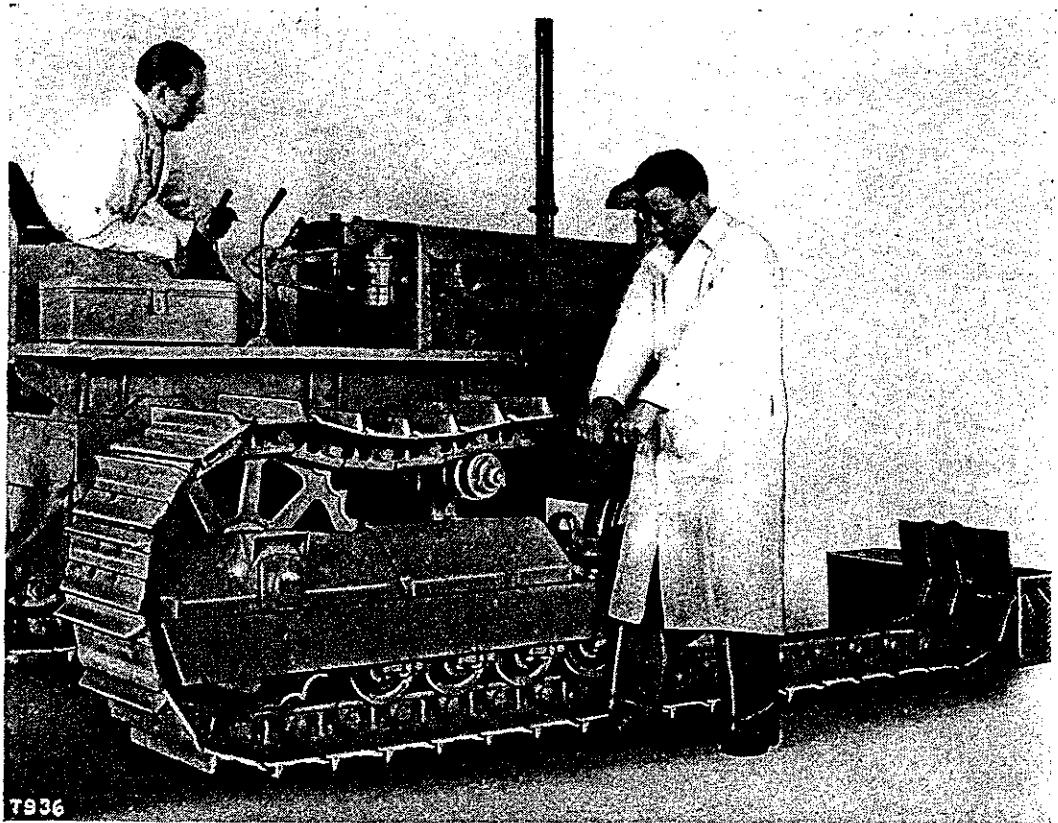
Portable hand press.

4. Insert the collars and drive ahead until the links join and the master pin holes line up.
5. Replace the master pins according to the covering topics.
6. Adjust the tracks.

WARNING

In the interest of personal safety, always hold the bar as shown.

7. Tighten the bolts that prevent the adjusting screw from turning and install the dirt guards.



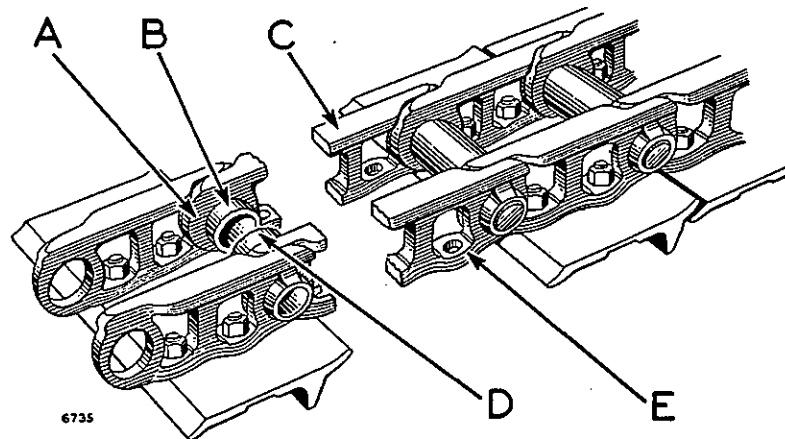
REPLACING TRACK
(Earlier Tractor Illustrated)

TRACK LINKS

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4. Remove the cut link (A) and bushing (B), the rest of the link (C) and then the other link (E) and the remaining part of the bushing (D).
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REPLACING DAMAGED TRACK LINK
A—Cut link. B—Bushing. C—Cut link. D—Bushing. E—Link.

TRACK PINS AND BUSHINGS

To obtain maximum life of track pins and bushings, the wear on the outer diameter of the bushing should not exceed $\frac{1}{8}$ " before turning. To turn pins and bushings, they should be pressed out, rotated 180° and reinstalled to obtain new contact surfaces.

Disassembly

There are two types of presses for track reconditioning:

Heavy duty power press.

Portable hand press.

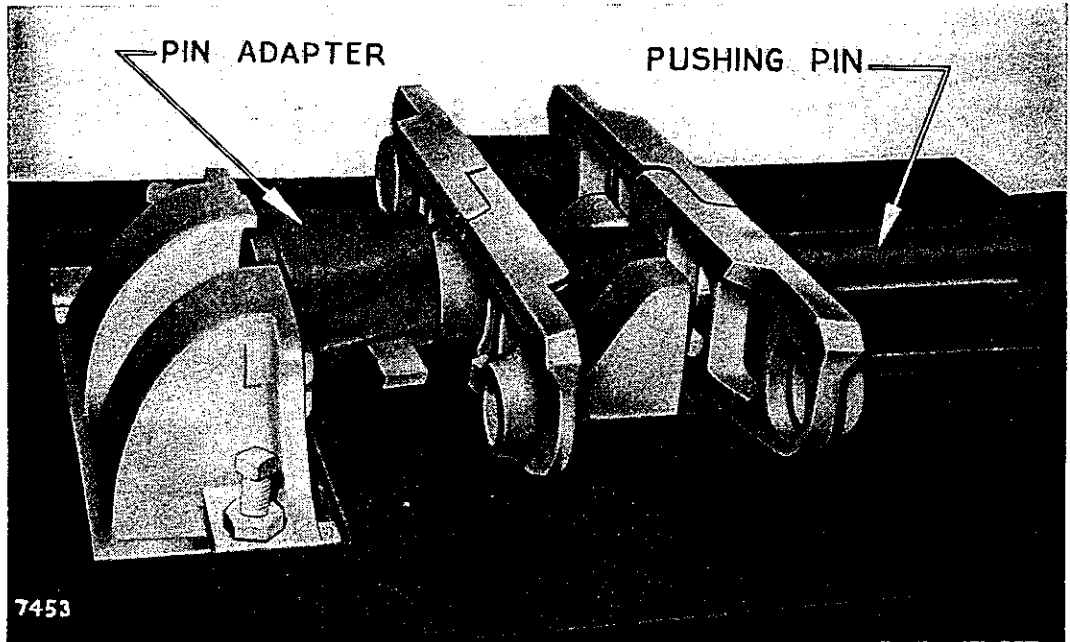


FIG. 1 REMOVING LINK

These illustrations show the use of a heavy duty power press.

1. Press out the track pins using a pin adapter and bushing pin (Fig. 1).
2. Press the bushing out of one link using the jaws and bushing pusher (Fig. 2).
3. Turn the link around and then press the bushing out of the other link.

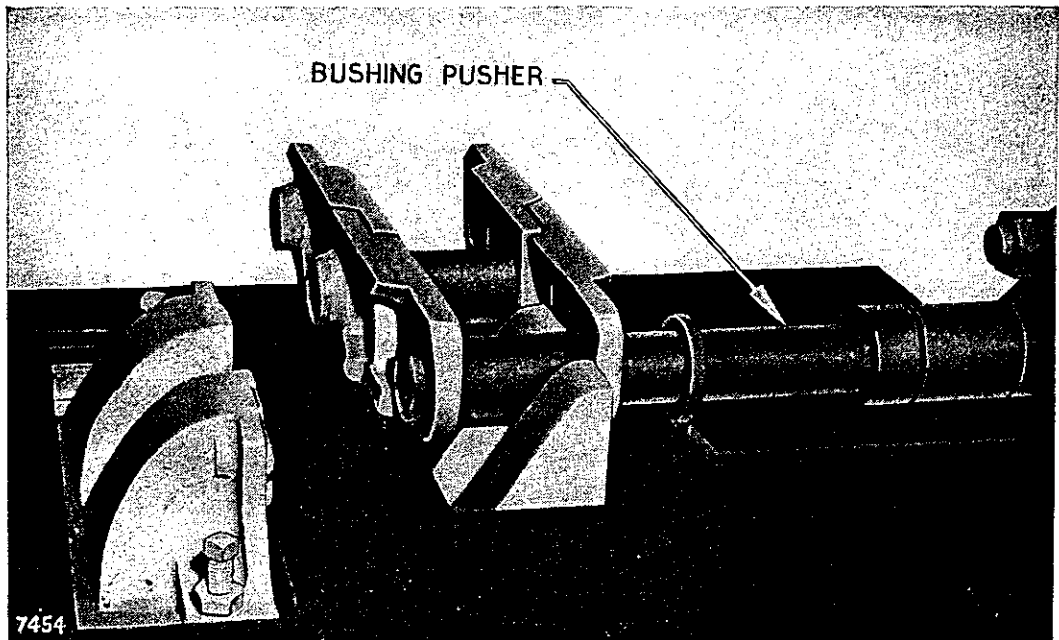


FIG. 2 REMOVING BUSHING

Assembly

1. Press the bushing in place using a bushing adapter, bushing assembly pin and bushing collar (Fig. 3).

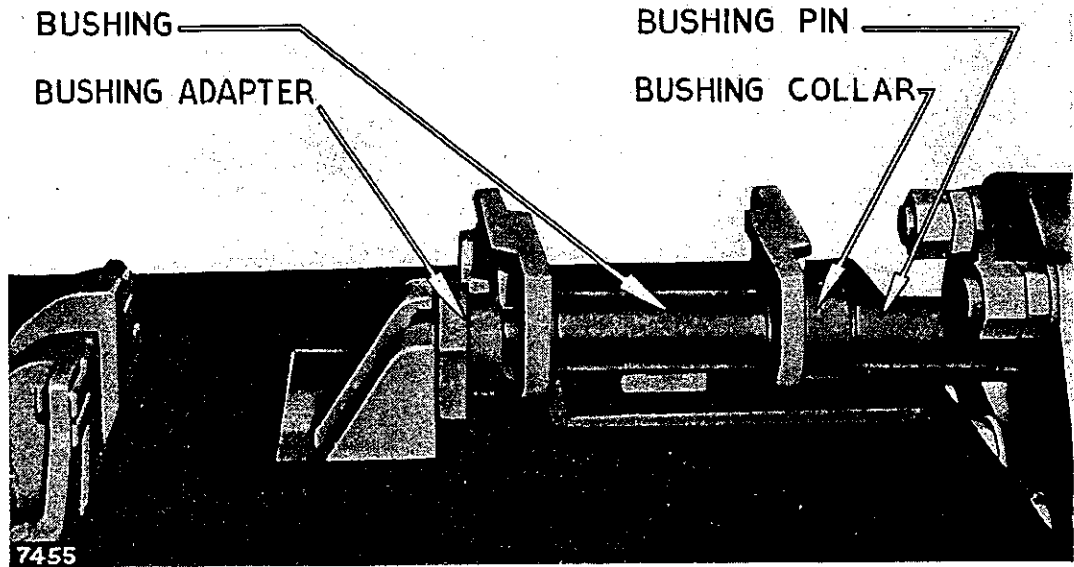


FIG. 3 PRESSING BUSHING IN PLACE

2. Place one of the next links in position with the counterbore of the links on the bushing previously installed.
3. With the pilot pin in place, press the bushing into position using the bushing adapter, bushing assembly pin and bushing collar (Fig. 4).

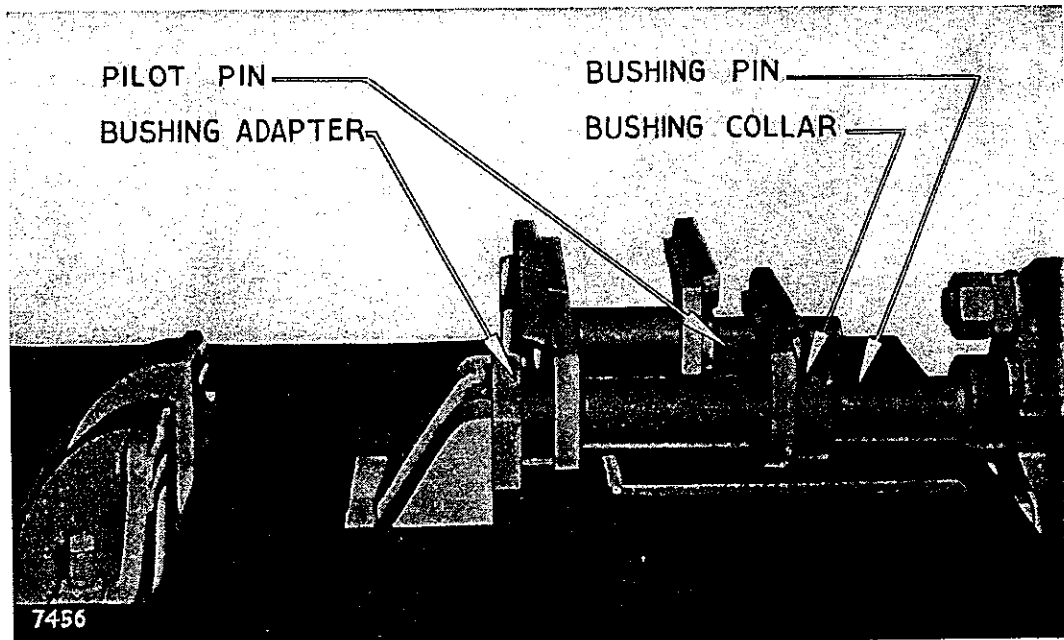


FIG. 4 ASSEMBLING TRACK

4. After the bushings are pressed into position, press in the track pins.

TRACK PIN AND BUSHING RECONDITIONING

(One Bolt Method)

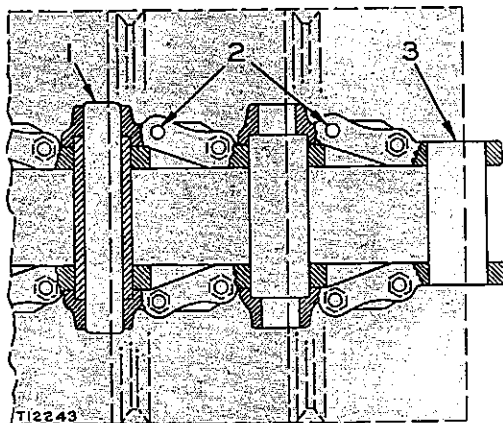
A method of rotating pins and bushings or the installation of new pins and bushings is commonly called the one-bolt method. The links are not separated from the shoes—only one bolt is removed.

Before starting to disassemble the track, uniformly mark each pin, bushing and track link by some suitable means. This identification will aid in the assembly of the track inasmuch as the location of wear of each part will not have to be determined at the time of assembly.

Remove the peened metal or rough edges from the track links.

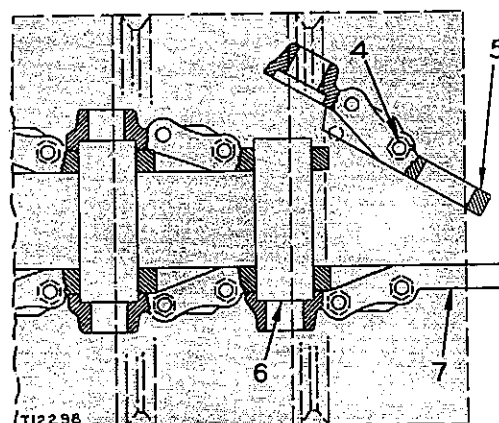
Disassembly and Assembly

1. Remove all of the track pins (1).
2. Remove the one bolt (2) nearest the pin bore end of the link from all of the shoes except the shoe on the master pin end of the track (the open end).
3. Remove the master bushing (3).



PREPARING TO REMOVE
PIN AND MASTER BUSHING

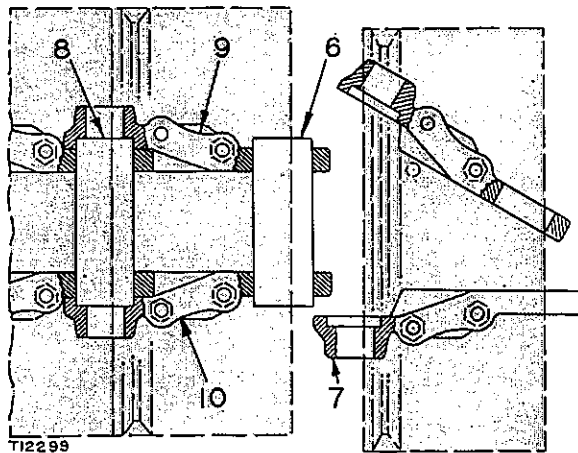
1—Track pin. 2—Bolts.
3—Master bushing.



PIVOTING TRACK LINK

4—Bolt. 5—Link.
6—Bushing. 7—Link.

4. With a firm blow of a sledge strike the end of the link (5) from which the bolt has been removed. The link will pivot around the remaining bolt (4) sufficiently to allow uncoupling the two links (5) and (7) from the extended portion of the next bushing (6).
5. Uncouple the link (7) from the bushing (6) and move the assembly away from the track as shown.



**ONE LINK ASSEMBLY
REMOVED FROM
TRACK**

6—Bushing. 7—Link.
8—Bushing. 9—Link.
10—Link.



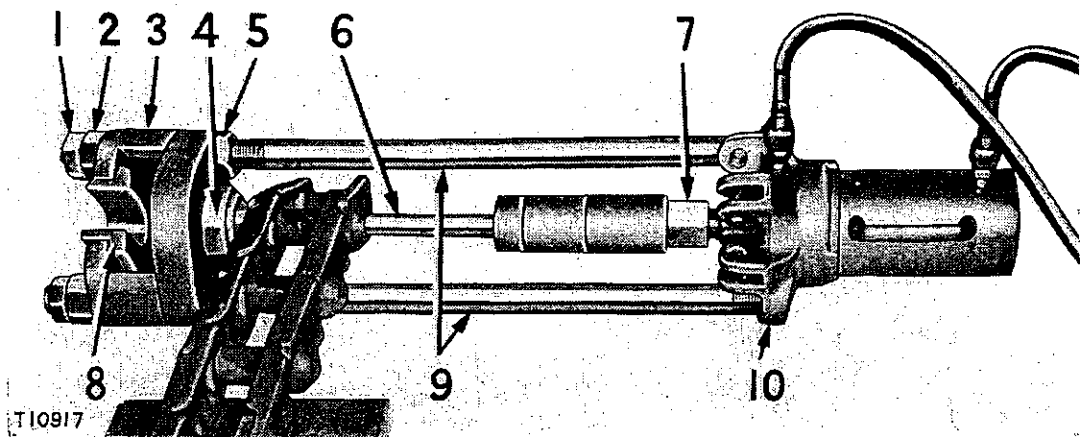
6. Continue as before, remove the bushing (6), pivot the link (9), uncouple the link (10) from the bushing (8) and move the assembly away from the remaining links until the last link of the track is reached, then remove the bushing only.
7. If bushings and pins are being turned, rotate the last bushing that was removed, 180° and press into place.
8. Slide the next link and shoe assembly into position connecting the counterbore with the bushing of the rigid link previously assembled.
9. Pivot the nonrigid link into place positioning the counterbore over the extended portion of the bushing.
10. As the link pivots, the bolt holes in the shoe and the link will line up allowing the installation of the track shoe bolt.
11. Repeat this procedure until all the bushings and bolts have been installed.
12. Install all of the track pins, rotating them 180°.
13. Install the lockwashers and nuts on the track shoe bolt and tighten.
14. Check the remaining bolts for looseness and tighten if necessary.

USING THE 6F25 SERVICE PRESS

The following illustrations show the use of the 6F25 "Caterpillar" Service Press for track work.

Pin Removal

1. Screw the two tension rods (9) evenly into the holes provided in the cylinder head (10).
2. Assemble the yoke (3) onto the tension rods after first assembling the nuts (5) on the tension rods.



PIN REMOVAL

1—5F9431 Nut. 2—5F9432 Nut. 3—5F9427 Yoke. 4—5F9445 Pin and Bushing Adapter. 5—5F9431 Nut. 6—5F9447 Pilot Pin and Pusher. 7—5F9438 Ram Cap Adapter. 8—5F9428 Yoke Adapter. 9—5F9429 Tension Rods. 10—Cylinder head.

3. Install the nuts (2) and (1).
4. Install the yoke adapter (8) and secure with two capscrews.
5. Install the ram cap adapter (7) on the ram of the service press.
6. Place the adapter (4) in the hole of the yoke (3).
7. Place the track link against the adapter with the boss of the link inserted in the recess in the adapter.
8. Place the pin pusher (6) against the track pin and with the necessary ram caps (short, long or both) between the pin pusher and the ram cap adapter, force the pin out.

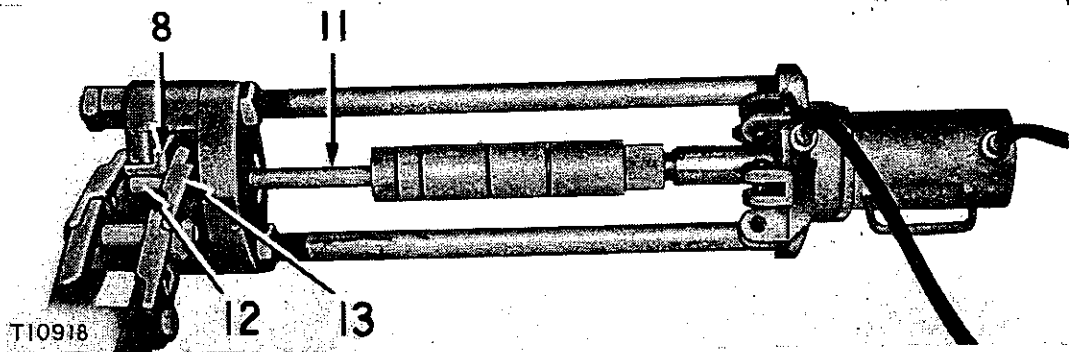
Pin Installation

The track pin is installed in the reverse order of removal with one exception, which is that the track pin and necessary ram caps are used in place of the pin pusher.

Bushing Removal

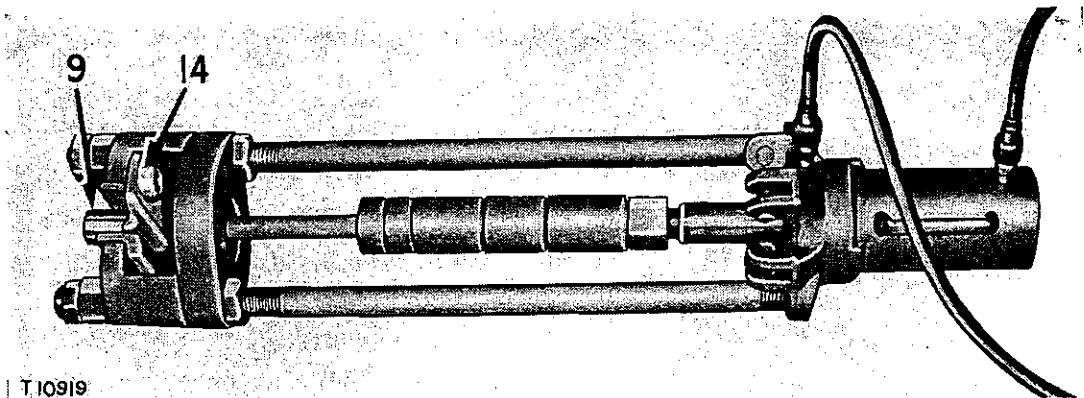
The track pins must be removed from both ends of the track link as outlined in the covering topic.

1. Place the track bushing (12) in the slot of the yoke adapter (8) as shown.
2. Insert the short end of the bushing pusher (11) through the yoke and into the bushing.



REMOVING LINK FROM BUSHING
 8—5F9428 Yoke Adapter. 11—5F9448 Bushing Pusher.
 12—Bushing. 13—Link.

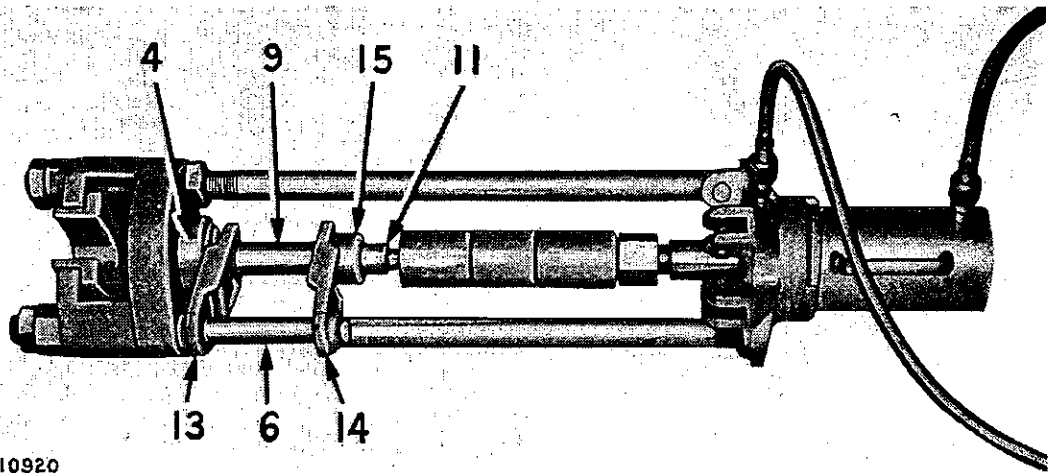
3. Fill this space between the pusher and the ram cap adapter with the necessary ram caps and force the bushing (12) out of the link (13).
4. Turn the bushing (9) end for end and remove the bushing from the other link (14) in the same manner.



REMOVING BUSHING
 9—Bushing. 14—Link.

Bushing Installation

1. Place the assembly collar (15) over the long end of the bushing pusher (11) and insert the long end of the pusher through the link (14), bushing (9) and the other link (13) and into the adapter (4).
2. Insert the pin pusher (6) in the other end of the links to align the holes.
3. Fill in the space between the ram and bushing pusher with ram caps and press both links on the bushing in one operation.

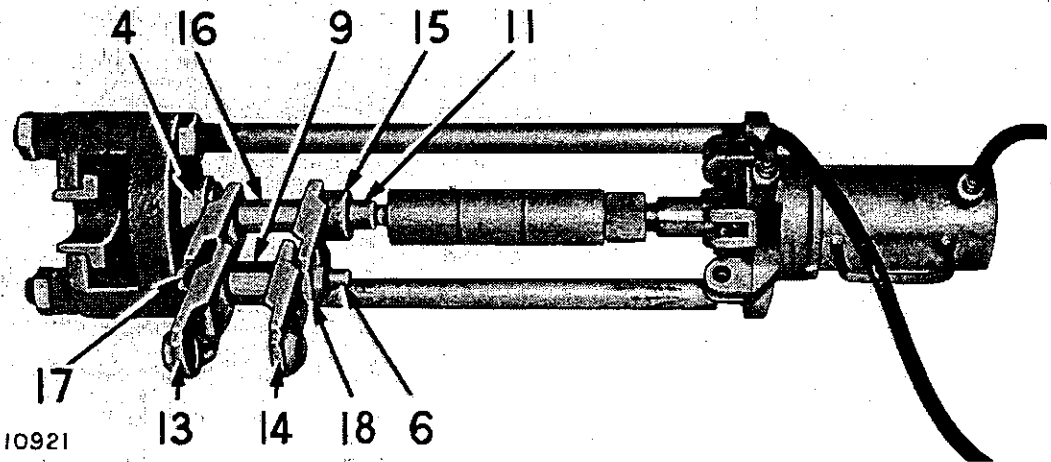


T10920

BUSHING INSTALLATION

4—5F9445 Pin and Bushing Adapter. 6—5F9447 Pilot Pin and Pusher. 9—Bushings. 11—5F9448 Bushing Pusher. 13—Link. 14—Link. 15—5F9446 Assembly Collar.

4. To continue the assembly of the track place the links (17) and (18) over the ends on the previously assembled links (13) and (14) and install the pin pusher (6) through the link (18) and bushing (9) and link (17) and continue assembling by installing track links on bushing (16).
5. After the links and bushings are assembled, install the track pins as outlined in the covering topic.



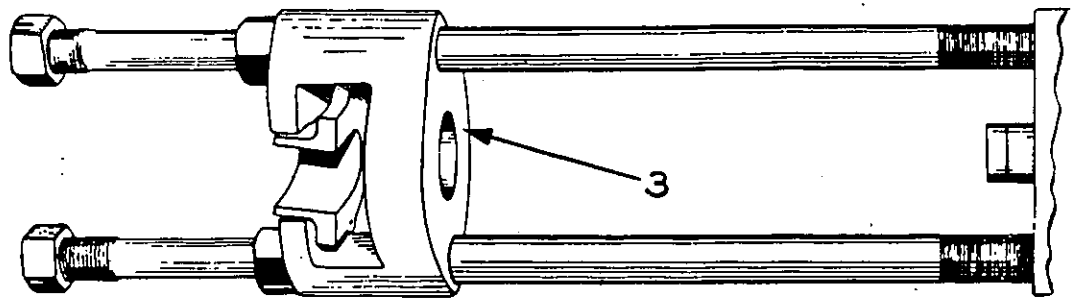
T10921

TRACK LINK AND BUSHING ASSEMBLY

4—5F9445 Pin and Bushing Adapter. 6—5F9447 Pilot Pin and Pusher. 9—Bushings. 11—5F9448 Bushing Pusher. 13—Link. 14—Link. 15—5F9446 Assembly Collar. 16—Bushings. 17—Link. 18—Link.

NOTE

The 5F9427 Yoke (3) can be used as shown (Fig. 1). This method requires fewer ram caps to work on the track.



T11732

FIG. 1

POSITIONING YOKE

3—5F9427 Yoke.

Track Carrier Rollers

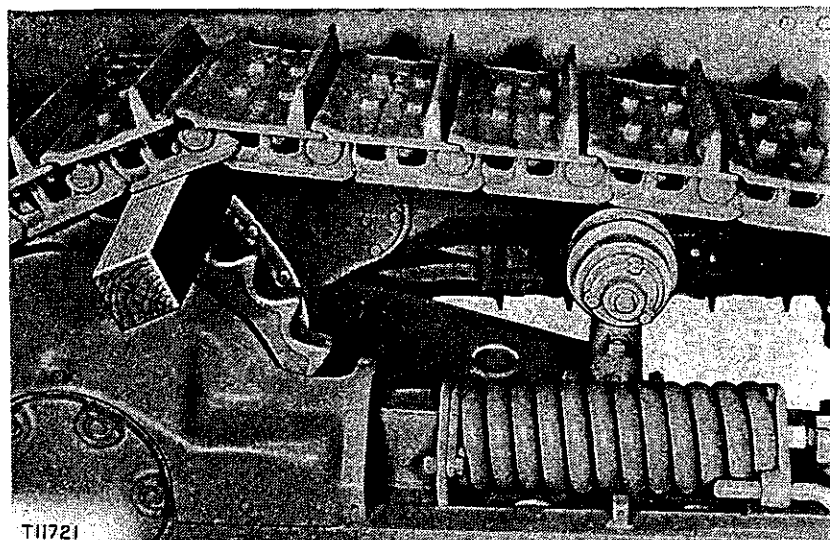
The track carrier roller supports the weight of the track between the sprocket and front idler. The carrier roller brackets are of the cantilever type and are mounted on pads on the inner channel of the track roller frame.

REMOVAL

Insert a short piece of hardwood 4" x 4" or a steel pipe between the sprocket and the top section of the track and move the tractor back until the track is lifted off the carrier roller. The roller can then be removed from the shaft, or the bracket and roller removed as a unit.

CAUTION

Remove the guard over the recoil spring and back up the tractor until the track clears the carrier roller. Stop the



T11721

RAISING TRACK FROM CARRIER ROLLER

tractor and set the brake before the recoil spring becomes solidly compressed to avoid placing excessive strain on the front idler and final drive parts.

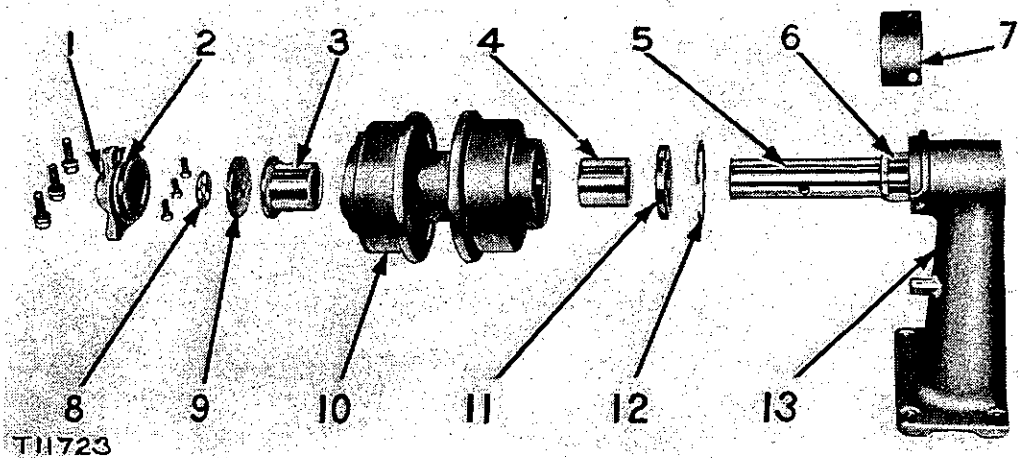
DISASSEMBLY AND ASSEMBLY

1. Remove the cap (1) and rubber ring seal (2).
2. Flatten the lock (8) and remove the capscrews, lock and washer (9).
3. Remove the roller (10) from the shaft (5).

NOTE

On earlier tractors the guard (7) was removable while on later tractors it is a part of the bracket (13).

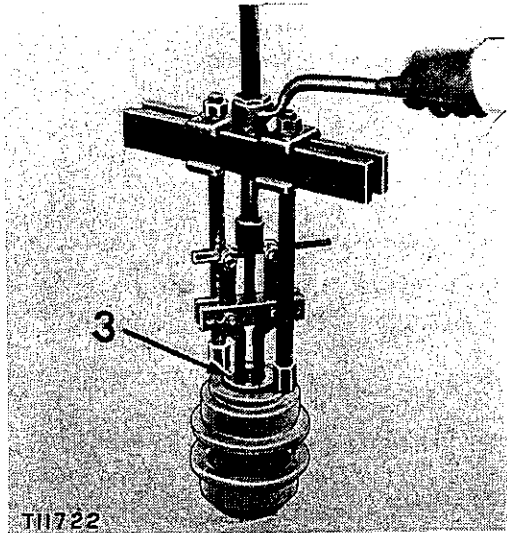
4. If the seal (11) is worn or damaged, remove the snap ring (12) and install a new seal with the wiping edge toward the roller bracket (13).
5. Replace the seal sleeve (6) if it is badly grooved from contact with the seal. Cut the old sleeve with a chisel to remove it. Heat the new sleeve and slip it on the shaft.
6. Clean out the lubricant passage in the shaft before installing the roller.
7. If the shaft (5) is damaged or badly worn, it can be pressed out of the bracket (13) after the bracket is removed from the machine.



TRACK CARRIER ROLLER GROUP

1—Cap. 2—Rubber ring seal. 3—Bushing. 4—Bushing. 5—Shaft. 6—Seal sleeve.
7—Guard. 8—Lock. 9—Lock and washer. 10—Roller. 11—Seal. 12—Snap ring.
13—Roller bracket.

8. Press in the new shaft until the end is $6\frac{7}{16}$ " from the face of the bracket.
9. On later tractors the bushings (3) and (4) can be removed by using the 8B7548 Push Puller, 8B7553 Adapter and the 8B7554 Bearing Cup Pulling Attachment.



**REMOVING TRACK CARRIER
ROLLER BUSHING**

3—Bushing.



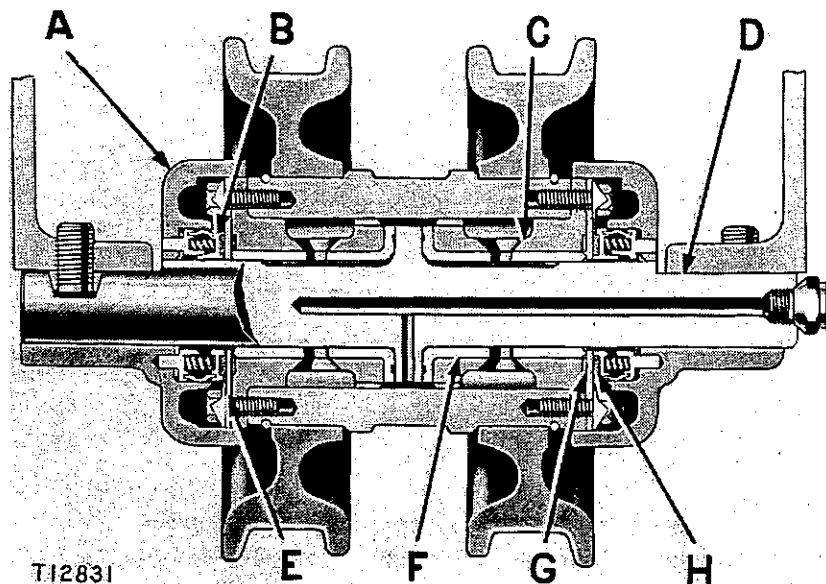
10. On earlier tractors the bushings (3) and (4) can be pressed out after removing the seal (11).
11. Support the roller on the outer end and press on a $1\frac{7}{8}$ " diameter steel plate against the end of the inner bushing.
12. Install new bushings in the roller if the clearance exceeds .025".

NOTE

Care should be taken not to damage the bushings when they are pressed in. White lead should be used on the outside of a bushing when pressing it into position. The bushing in the bracket end of the roller should be pressed in flush with the bottom of the counterbore.

Track Rollers

Track rollers are used to guide the track and to distribute the weight of the tractor along the length of the track. Track roller frames having four track rollers are arranged with a single flange roller at the front and rear positions and two double flange rollers in the middle positions. Track roller frames having five track rollers, use a double flange roller at the front followed by a single flange roller, two double flange rollers and a single flange roller.



TRACK ROLLER CUTAWAY VIEW

A—End collar. B—Seal assembly. C—Bushing assembly. D—Shaft. E—Plate.
F—Bushing. G—Cork gasket. H—Leather washer.

The track rollers are of the center thrust construction in which the flange at the center of the track roller shaft (D), bushing (F) and the bushing assembly (C) takes the side thrust of the roller and restricts the side movement of the roller assembly. The amount of side movement is controlled by the machining limits of the track roller bushings (F), bushing assemblies (C), track roller overall width and the shaft (D) flange width.

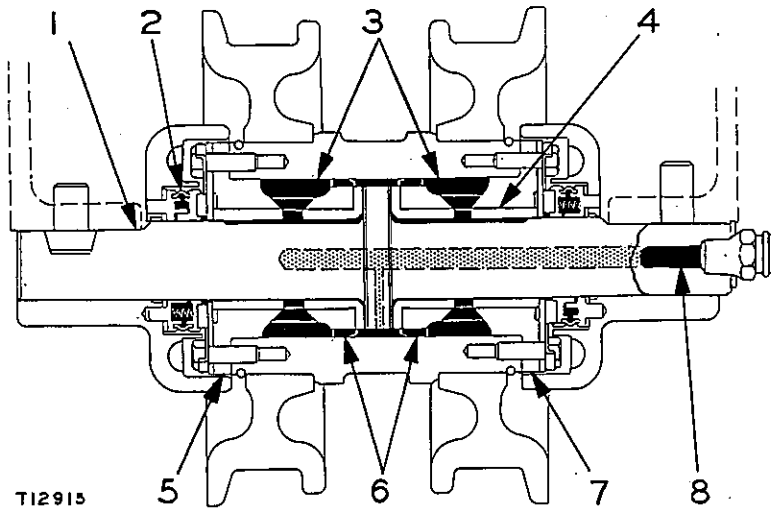
Seal assemblies (B) which are secured in the end collars (A) keep the lubricant in and dirt out of the bearings.

A leather washer (H), which is part of the seal assembly (B), a cork gasket (G) and a plate (E) form an effective seal.

TRACK ROLLER LUBRICATION

Lubricant is forced through the passage (8) in the track roller shaft (1) and center flange of the shaft into the space between the two bushing assemblies (5) and (7). There are passages (6) permitting the lubricant to enter the reservoirs (3) in the bushing assemblies.

There are two flats on the top of the shaft (1) which serve as an additional reservoir and also distribute the lubricant the length of the bushing (4). Dirt is kept out and lubricant is kept in by flexible bellow type seals (2) which are self-aligning and require no adjustment. Internal coil springs press the sealing surface of the seal uniformly against a hardened flat plate thus forming an effective seal.

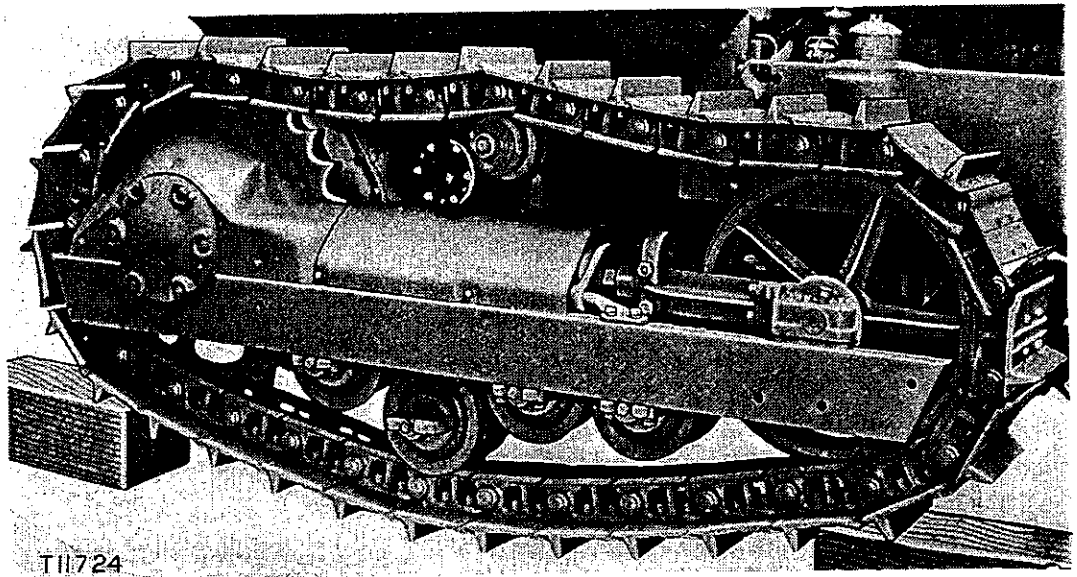


TRACK ROLLER LUBRICATION SYSTEM

- 1—Shaft. 2—Flexible bellow type seal. 3—Lubricant reservoirs. 4—Bushing.
5—Bushing assembly. 6—Passages. 7—Bushing assembly. 8—Passage.

REMOVAL

1. Remove the guard over the track adjusting screw and loosen the track adjustment as far as possible.
2. Place a block, approximately 8" high, in front of the track and run the tractor forward onto the block.
3. Place a similar block behind the track and move the tractor backward to the position shown and then set the parking brake to hold the slack in the bottom of the track. Any one or all of the track rollers can then be removed.



POSITION OF TRACTOR FOR REMOVING TRACK ROLLER

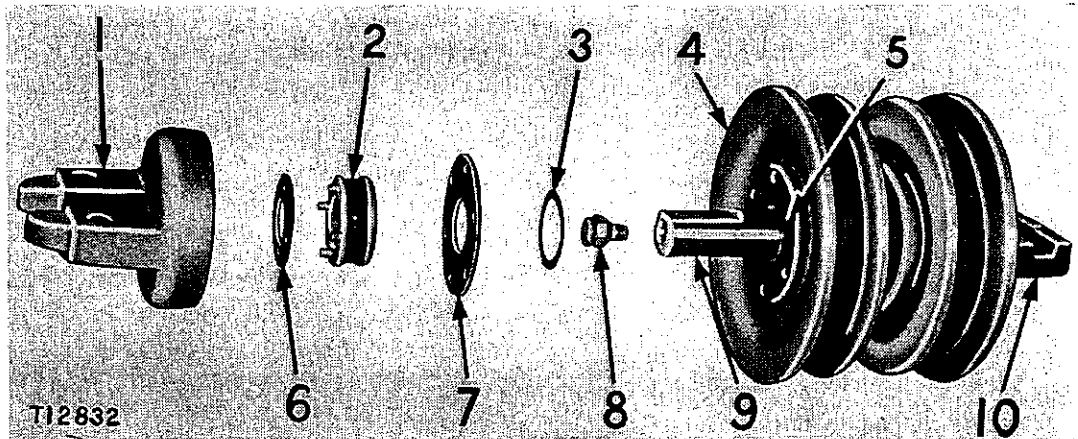
4. Remove the capscrews from the end collar at each end of the roller to be removed.

DISASSEMBLY AND ASSEMBLY

1. After removing the track roller assemblies, the end collars (1) and (10) can be removed from the shaft (9).
2. The seal assembly (2) which is held from turning by dowels can be lifted out of the end collars.
3. The rubber gasket (6) which is part of the seal assembly (2) should be installed on the dowels of the seal assembly with the lip in the inner diameter of the seal toward the end collar.

NOTE

If the leather washer only on the seal assembly (2) is worn or damaged, it can be removed and a new washer cemented to the seal assembly. Otherwise, the entire assembly should be replaced. Soak new leather washers in oil before using. When cementing a new leather washer to the seal assembly, use 3F753 Cement.



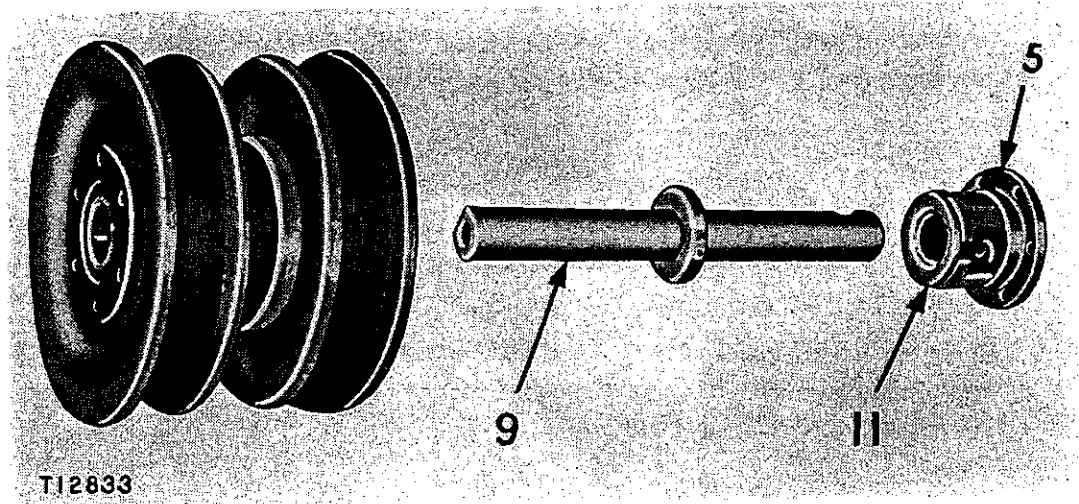
TRACK ROLLER DISASSEMBLY

- 1—Outer end collar. 2—Seal assembly. 3—Cork gasket. 4—Track roller. 5—Bushing assembly. 6—Rubber gasket. 7—Plate. 8—Lubricant fitting. 9—Shaft. 10—Inner end collar.

4. Remove the capscrews which secure the plate (7) and bushing assembly (5) in the track roller (4).
5. If the plate (7) is worn or rough, it can be turned over to provide a new wearing surface. Replace the plate if both sides are worn or rough.

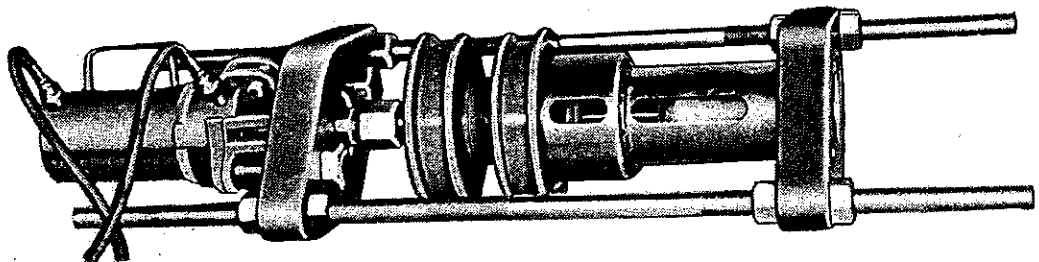
6. The cork gasket (3) should be replaced when assembling the roller.
7. Remove the lubricant fitting (8).
8. The shaft (9) and bushing assembly (5) can be pressed out of the track roller by using the following parts:

1—6F25 Service Press	2—5F9891 Bolt
2—W-427 Tie Bolt	4—1B4334 Nut
1—1B4644 Plate	1—5F9898 Plate
1—7F5288 Sleeve Assembly	



TRACK ROLLER SHAFT REMOVED
5—Bushing assembly. 9—Shaft. 11—Bushing.

9. The bushing (11) should be pressed out of the bushing assembly (5) and replaced if the clearance between the old bushing and a new shaft exceeds .050".
10. Press the new bushing into place making certain the lubricant holes are aligned.
11. The shaft (9) should be replaced if badly worn or scored, or bent more than .005".



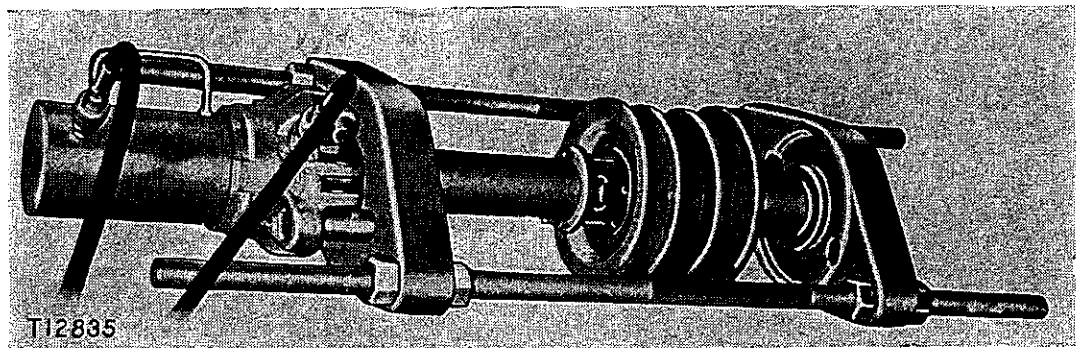
REMOVING SHAFT AND BUSHING FROM ROLLER

12. The bushing assemblies (5) and shaft (9) can be pressed into the track roller (4) by using the following tools:

1—6F25 Service Press	2—5F9891 Bolt
2—W-427 Tie Bolts	4—1B4334 Nut
1—1B4644 Plate	1—5F9898 Plate

Use two spacers not over $3\frac{1}{4}$ " outside diameter and less than 2" inside diameter, 5 inches long.

Use two $5/16$ "-18 (NC) studs or guide pins 180° apart to align the holes in the flange of the bushing assembly with the threaded holes in the roller hub.



INSTALLING SHAFT AND BUSHINGS

White lead should be used on the outside of the bushing assembly when pressing it into place.

When installing the end collars, make certain the dowels on the seal assemblies are properly located in the end collars.

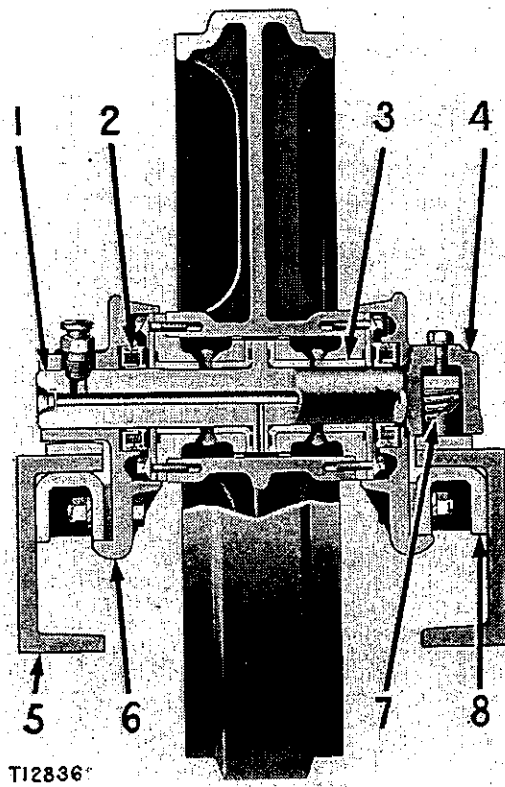
INSTALLATION

Place the rollers in their respective positions with the notched end collars on the inside.

When the track rollers are installed, particular attention should be given that the notched end of the track roller shaft is clamped tightly by the end collar against the lock strip on the bottom of the track roller frame.

Front Idler

The front idler guides the track into position in front of the track rollers. Each front idler rotates on a hardened shaft (1) and center thrust bushings (3) like the track rollers.



FRONT IDLER CUTAWAY VIEW

1—Shaft. 2—Bellows-type seal. 3—Thrust bushing. 4—Outer bearing. 5—Track roller frame. 6—Lower part of bearing (4). 7—Rubber-covered spring. 8—Guide.

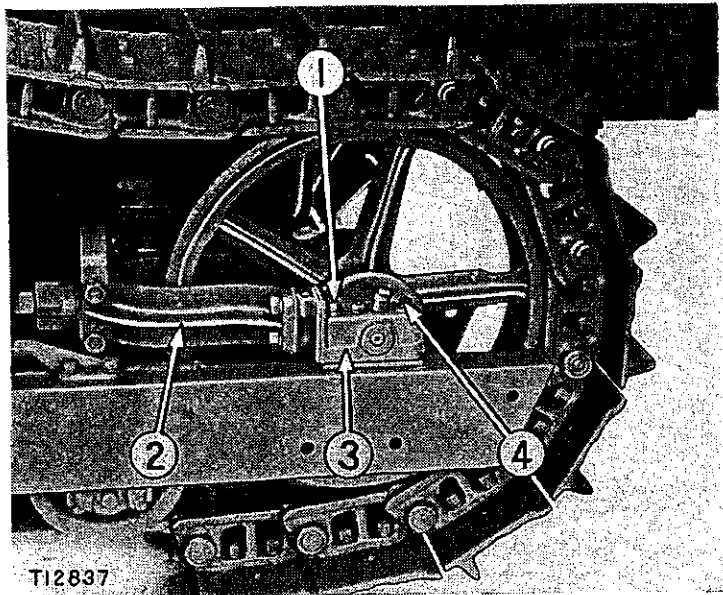
Bellows-type seals (2) keep lubricant in and dirt out.

The idler is mounted in two outer bearings (4) and end collars (6) which slide, against recoil spring pressure, back and forth on the track roller frame (5).

The guides (8), which are secured to the bearings (4), are held against the track roller frame (5) by rubber-covered springs (7).

REMOVAL

1. Separate the track and lay out. See the topic, SEPARATING TRACK.
2. Remove the capscrews securing the idler arms (2) to the end collar bearings (3).
3. Loosen the two capscrews (1) and (4) in each bearing to relieve the pressure on the springs.
4. Move the idler forward and off the track roller frame.

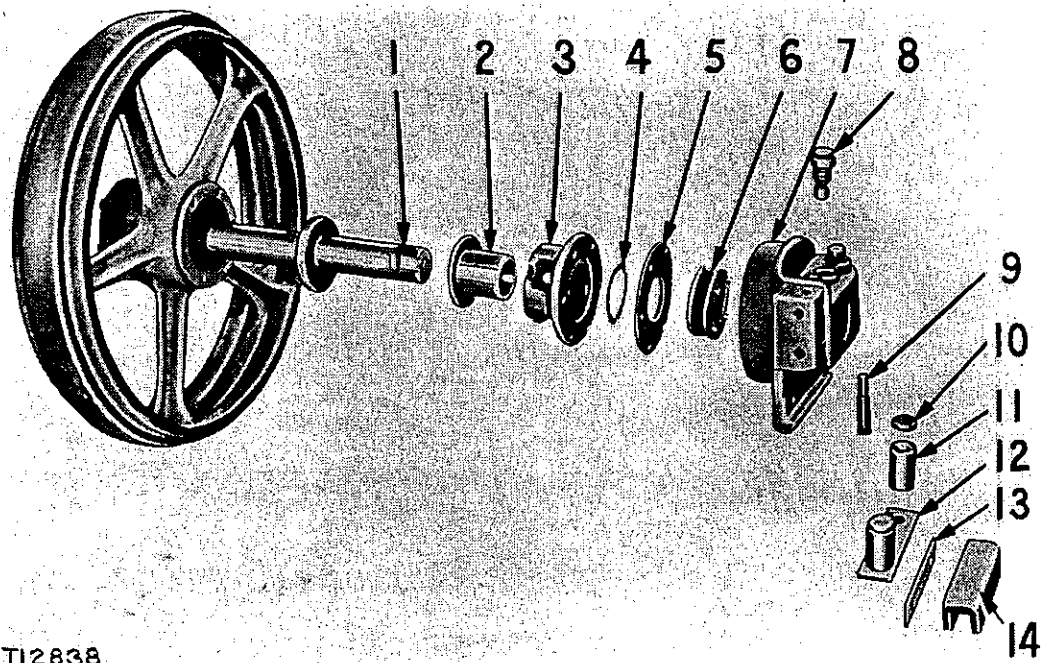


**PREPARING TO REMOVE FRONT IDLER
(Later Tractors)**

1—Capscrew. 2—Idler arm. 3—End collar bearing. 4—Capscrew.

DISASSEMBLY AND ASSEMBLY

1. Remove the fitting (8) from the shaft (1).
2. Remove the bolts securing the guide (14) to the bearing and remove the guide and shims (13).
3. Remove the wear plate (12), rubber-covered springs (11) and cap plate (10).
4. Remove the nut and drive out the tapered pin (9).
5. Remove the bearing (7) from the shaft (1).
6. Remove the bellows-type seal (6) from the bearing.
7. Remove the capscrews securing the plate (5) and bushing assembly to the front idler.
8. Remove the bearing from the back side of the front idler and press the shaft (1) and bushing assembly out of the idler.
9. Remove the gasket (4) from the bushing assembly and press out the bushing (2) if clearance between the bushing and a new shaft exceeds .050".
10. Press the new inner bushing (2) into the outer bushing (3), aligning the holes in the inner bushing with the holes in the outer bushing.
11. Install the shaft (1) in the front idler and replace the bearing collar assembly on the opposite side.



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FRONT IDLER EXPLODED VIEW

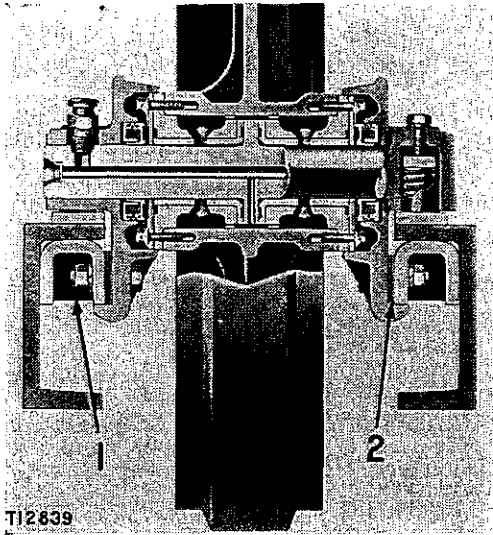
1—Shaft. 2—Inner bushing. 3—Outer bushing. 4—Gasket. 5—Plate. 6—Bellows-type seal. 7—Bearing. 8—Fitting. 9—Tapered pin. 10—Cap plate. 11—Rubber-covered spring. 12—Wear plate. 13—Shims. 14—Guide.

12. Install the bushing assembly over the shaft, replace the gasket (4) and install the plate (5). If the plate is worn or rough, it can be turned over to provide a new bearing surface. It should be replaced if both sides are worn or rough.
13. Replace the bellows seal (6) in the bearing (7) over the shaft, aligning the notch in the shaft with the tapered hole in the end collar assembly.
14. Install the tapered pin (9) and tighten.
15. Install the cap plates (10), rubber-covered springs (11) and wear plate (12).
16. Install the guide (14) and bolt in place.
17. Install the fitting (8).

ADJUSTMENT

The shims (2) are for the purpose of centering the idler in the track roller frame so that it will guide the track between the flanges of the track rollers.

Examine the flanges on the first track roller back of the idler to determine if the idler needs to be shifted. If the track has been bearing heavily against the outside flange of the roller, the idler should be moved toward the opposite track.



FRONT IDLER ADJUSTING SHIMS

1—Guide. 2—Shims.

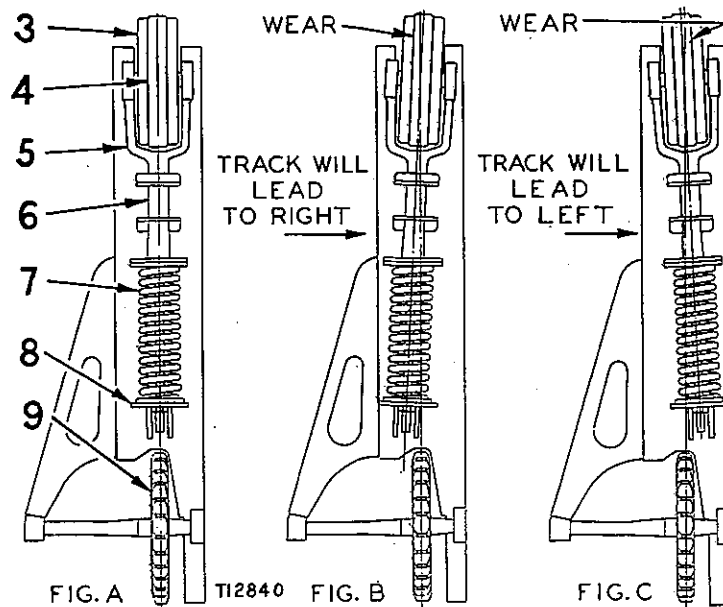


This is accomplished by moving shims (2) from the bearing at the inner end of the idler hub to the outer bearing.

As the guides (1) wear, it is advisable to add shims (equal to wear) to prevent excessive side movement of the whole idler group.

The parallel alignment of the front idler (3) with the track rollers and sprocket (9) is controlled by the position of the yoke (5), adjusting screw (6), recoil spring (7) and bracket (8) on the track roller frame.

If, after the correct adjustment is made with shims (2), the track continues to bear more heavily against one side of the center flange (4) of



PARALLEL ALIGNMENT

3—Front idler. 4—Center flange. 5—Yoke. 6—Adjusting screw. 7—Recoil spring. 8—Bracket. 9—Sprocket.

the idler than against the other side, the parallel alignment of the yoke (5), screw (6), spring (7) and bracket (8) should be checked.

Misalignment can be caused by a number of things, for example, the front idler shaft can be bent or badly worn, yoke (5), adjusting screw (6), spring (7) or the track roller frame can be sprung.

Minor corrections can sometimes be made by rotating the recoil spring 180°.

Sometimes cutting off the bracket (8), as exaggerated in Fig. B and C, and rewelding in a slightly different position will correct the difficulty.

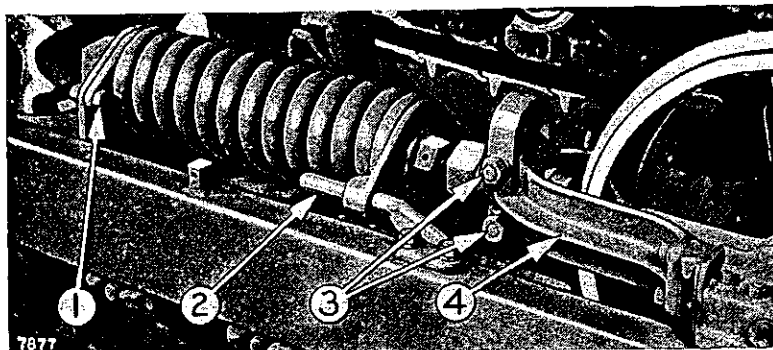
Recoil Spring

The recoil springs are compressed and held to a definite length by the recoil spring bolt. Normally, the pressure of the recoil spring is not exerted against the track. However, should rocks or other obstructions get between the tracks and rollers, idler or sprocket, the springs will recoil still farther to avoid overstressing the track.

The recoil spring can be removed without separating the track providing the bolt is not broken.

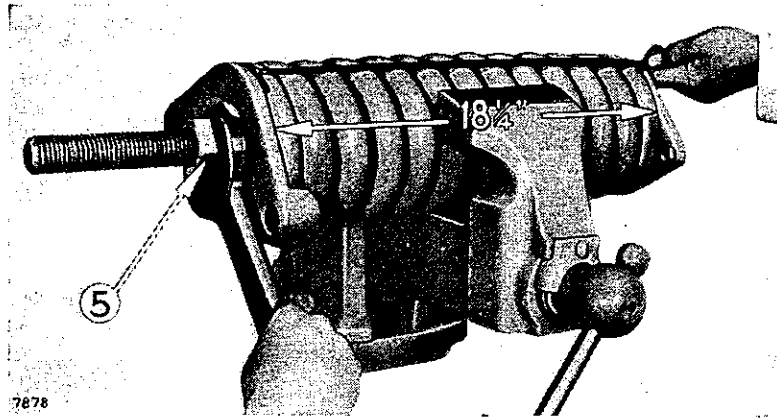
REMOVAL

1. Remove the recoil spring guards.
2. Without separating the track, block between the rear of the front idler and the web of the track frame assembly.
3. Loosen the track adjustment as much as possible.
4. Remove the nuts (3) and take off the outside arm.
5. Remove the recoil spring guides (2).



RECOIL SPRING ASSEMBLY

1—Capscrew. 2—Guide. 3—Nuts. 4—Arm.

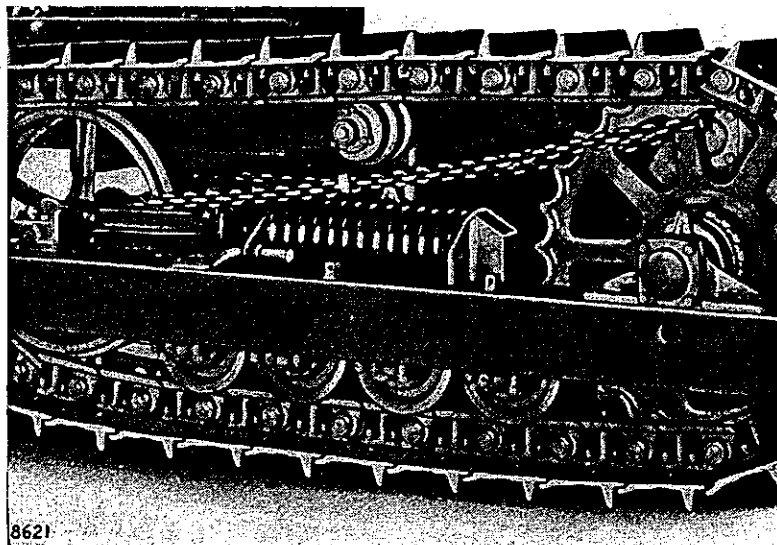


CHECKING LENGTH OF RECOIL SPRING
5—Nut.

6. Remove the capscrews (1) through the seat and bracket, and lift out the recoil spring.
7. Remove the track adjusting nut.
8. Remove the nut (5) to disassemble the spring.
9. When assembling, tighten the nut as shown until the length of the recoil spring is $18\frac{1}{4}$ " between the plate seats.

RECOIL SPRING BOLT

Should a recoil spring bolt break, all of the spring tension will be exerted against the track and it will be necessary to relieve this tension before the track can be separated.



REMOVING BROKEN RECOIL SPRING BOLT
(Earlier Tractor Illustrated)

The tension can be relieved in the following manner:

1. Move the tractor forward until the master pin is in front of the idler.
2. Remove track roller frame guards from the idler arms and the recoil spring.
3. Loosen the track adjustment as much as possible and place a heavy chain around the front idler and the drive sprocket as shown.
4. Move the tractor back to compress the recoil spring.
5. Remove the master pin and separate the track.
6. Move the tractor forward and remove the chain.

CAUTION

Do not completely compress the spring or damage can result to the final drive and idler parts.

7. Remove the recoil spring and replace the bolt. See the covering topic.
8. Compress the spring and install.

Equalizer Spring Group

The equalizer spring supports the front end of the tractor and transfers the weight to the track roller frames.

The auxiliary spring holds the equalizer spring in the spring saddle of the oil pan and permits the equalizer spring to oscillate when the track roller frames pivot at the sprocket shaft.

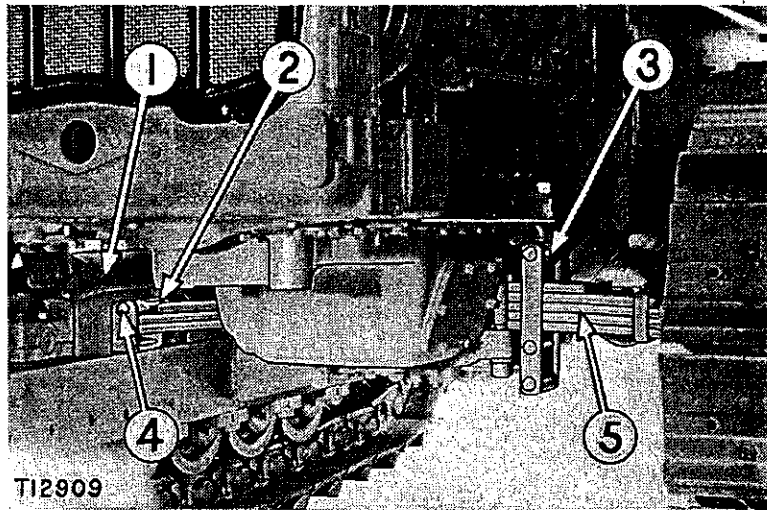
REMOVAL AND INSTALLATION

(Later Tractors)

The equalizer spring and auxiliary spring can be removed as a unit.

As a safety precaution, set the brakes to prevent the tractor from moving.

1. Remove the front idler yoke guard (1).
2. Remove the pin (4) and the clip (2) which secure the equalizer spring (5) in the bracket of the track roller frame.
3. Remove the engine side plates.
4. Remove the nuts from the shackle bolts (3).

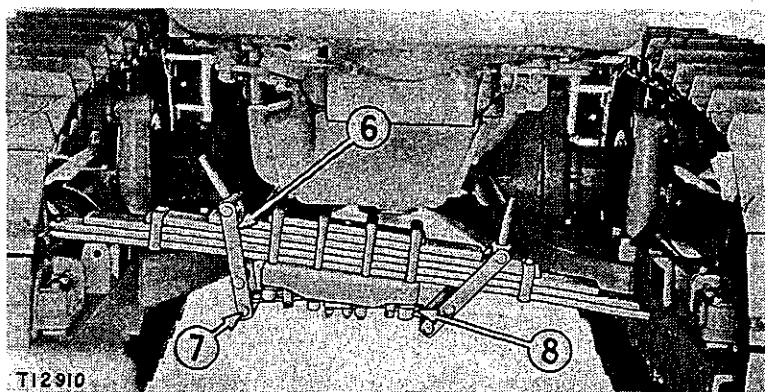


T12909

PREPARING TO REMOVE EQUALIZER SPRING

1—Guard. 2—Clip. 3—Shackle bolt. 4—Pin. 5—Equalizer spring.

5. Raise the front end of the tractor until the lower side of the oil pan is even with the top of the equalizer spring.
6. Lift one end of the equalizer spring until it clears the front idler arm, then move it out over the top of the arm until the opposite end of the spring is clear of the clip and bracket on the other track roller frame.
7. Remove the equalizer spring (5) and auxiliary spring (8) from under the tractor.
8. The auxiliary spring (8) can be removed from the equalizer spring by removing the pins (7) from the shackles (6).
9. Replacement of any leaf of the springs can be made after the nuts and clips are removed.
10. When installing the spring, see that the equalizer spring is centered in the saddle of the oil pan and that the auxiliary spring is centered in the plate of the equalizer spring.



T12910

REMOVING EQUALIZER SPRING

6—Shackle. 7—Pin. 8—Auxiliary spring.

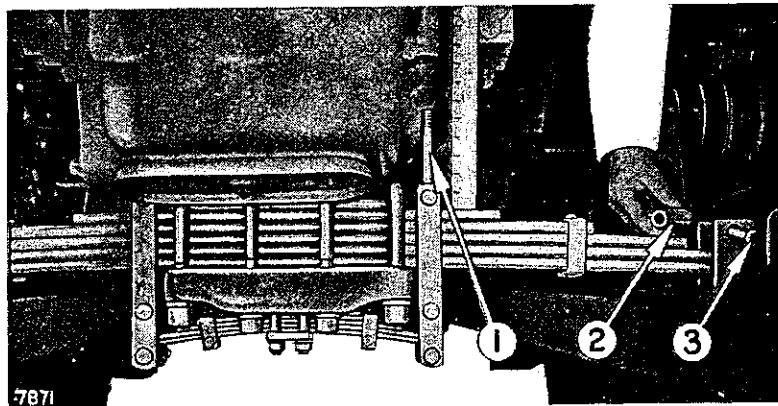
NOTE

It is important that the clip nuts on the springs be tightened periodically as a preventive against spring breakage.

REMOVAL AND INSTALLATION

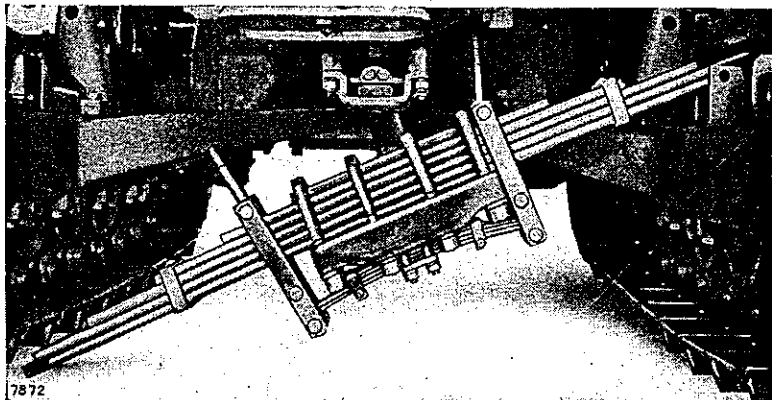
(Earlier Tractors)

The equalizer spring and auxiliary spring can be removed as a unit. As a safety precaution, set the brakes to prevent the tractor from moving.



PREPARING TO REMOVE EQUALIZER SPRING
1—Shackle bolt. 2—Sleeve. 3—Pin.

1. Remove the engine side plates and the nuts from the shackle bolts (1).
2. Remove either front idler yoke guard and remove the cotter pin, pin (3) and sleeve (2) holding the equalizer spring in the bracket of the track frame.
3. Raise the front of the tractor until there is 10" clearance between the top of the equalizer spring and the lower edge of the engine block.
4. Move the equalizer and auxiliary springs to the side until the end of the spring is clear of the bracket on the other track frame and remove it from under the tractor.
5. Replacement of any leaf of the springs can be made after the nuts and clips are removed.
6. When installing the spring see that the equalizer spring is centered in the saddle of the oil pan and that the auxiliary spring is centered in the plate of the equalizer spring.



REMOVING EQUALIZER SPRING

NOTE

It is important that the clip nuts on the springs be tightened periodically as a preventive against spring breakage.

Track Roller Frame Assembly

The track roller frame assembly can be removed as a unit for servicing any of the assemblies mounted on it.

1. Separate the track and lay it out flat as described in the topic, SEPARATING THE TRACK.
2. Remove the bearing cap from the diagonal brace (1).

NOTE

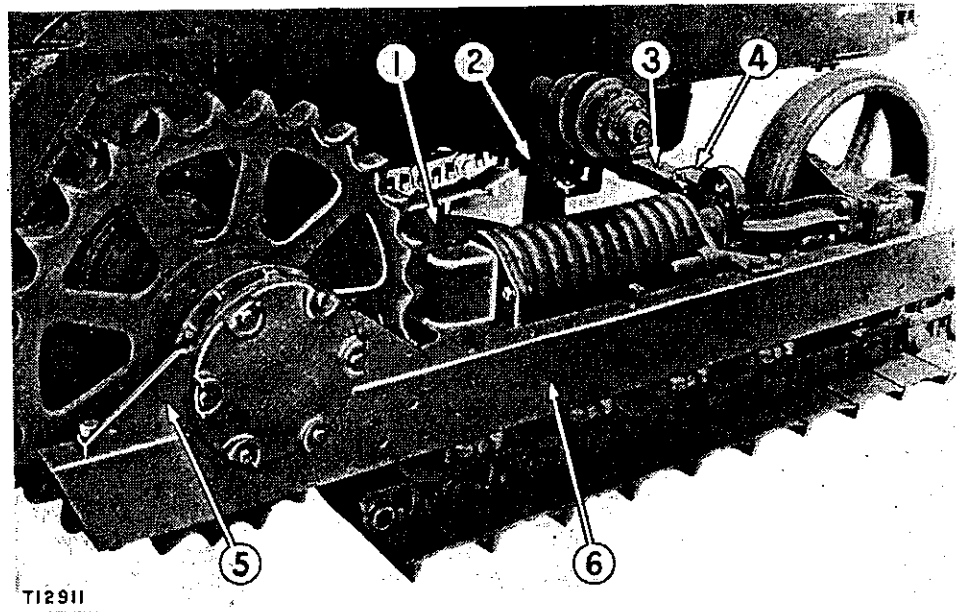
The hardened bearing shells in the cap and in the diagonal brace (6) should be replaced if the clearance exceeds .040".

3. Remove all of the guards from the track roller frame.

NOTE

On earlier tractors remove the lubricant fitting for the sprocket outer bearing, through the opening in the side of the track roller frame.

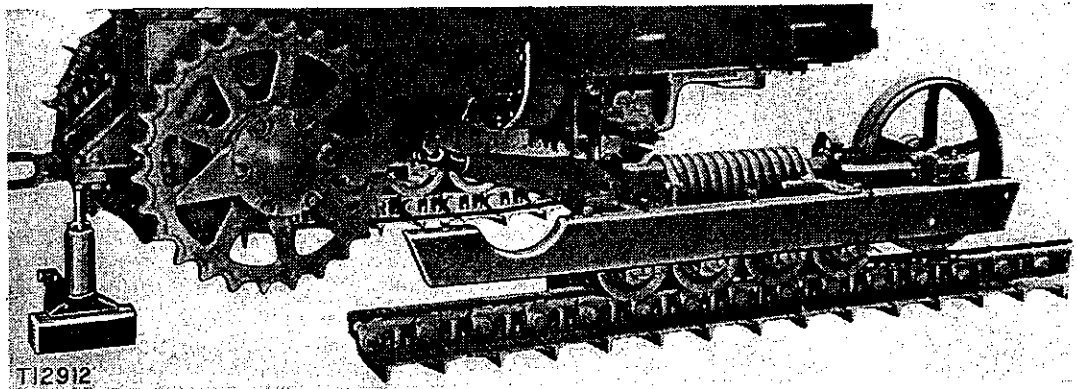
4. Remove the capscrews securing the sprocket outer bearing cage support (5) to the track roller frame (6).
5. Remove the track carrier roller and bracket (2) from the track roller frame.
6. Remove the clip (4) that secures the equalizer spring (3) in the track roller frame bracket.



T12911

PREPARING TO REMOVE TRACK ROLLER FRAME
 1—Diagonal brace. 2—Track carrier roller bracket. 3—Equalizer spring. 4—Clip.
 5—Bearing cage support. 6—Track roller frame.

7. Raise the steering clutch case and equalizer spring sufficiently to clear the diagonal brace and block securely.
8. The track roller frame can now be rolled out and turned over if desired for further work.



T12912

REMOVING TRACK ROLLER FRAME

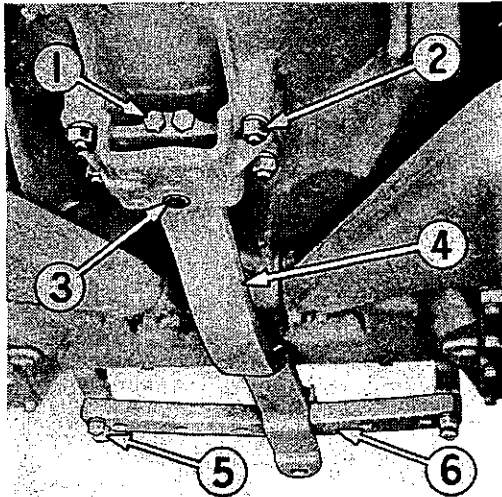
Drawbar

The forward end of the drawbar (4) is attached to the underside of the steering clutch case by means of a pivot pin (3) and bracket.

The rear end of the drawbar is supported by a plate (6) which allows the drawbar to swing freely, or to be pinned in any one of five positions.

REMOVAL

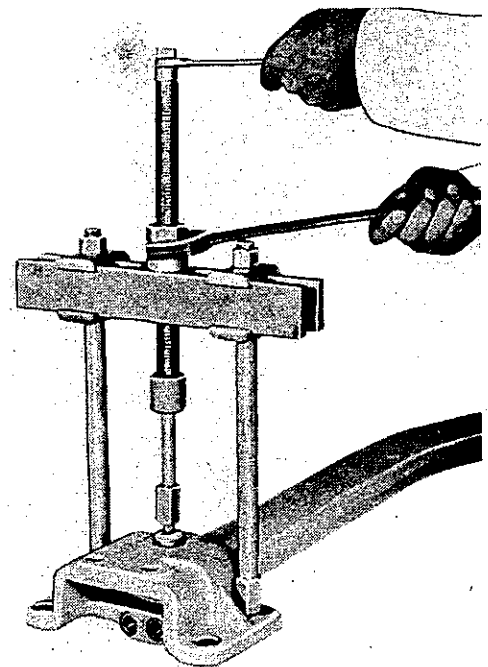
1. Support the drawbar by passing a chain or cable around it just back of the steering clutch case.
2. Remove the nuts (2) holding the bracket to the steering clutch case.
3. Remove the nuts (5) securing the plate (6) to the braces, which are fastened to the rear of the steering clutch case.
4. Lower the drawbar to the floor and slide out the plate (6).



PREPARING FOR DRAWBAR REMOVAL

- 1—Screw. 2—Nut. 3—Pin. 4—Drawbar.
5—Nut. 6—Plate.

PULLING PIN

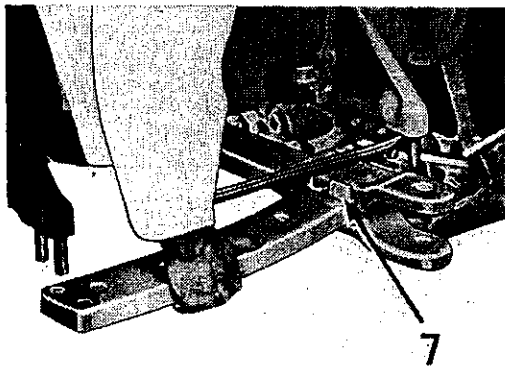


NOTE

The pin (3) can be replaced with the drawbar on or off the tractor by removing the screws (1) and pulling the pin with the 8B7548 Push Puller, with the 8B7553 and the 5F7341 Adapters as illustrated.

The shoe (7) can be replaced without removing the drawbar.

5. Remove the nuts (5) securing the plate (6) to the braces.
6. Pry the drawbar down until the plate is off the studs.
7. Pull the plate out of the hole in the drawbar.
8. Remove the shoe (7).



T12147

REMOVING SHOE

7—Shoe.

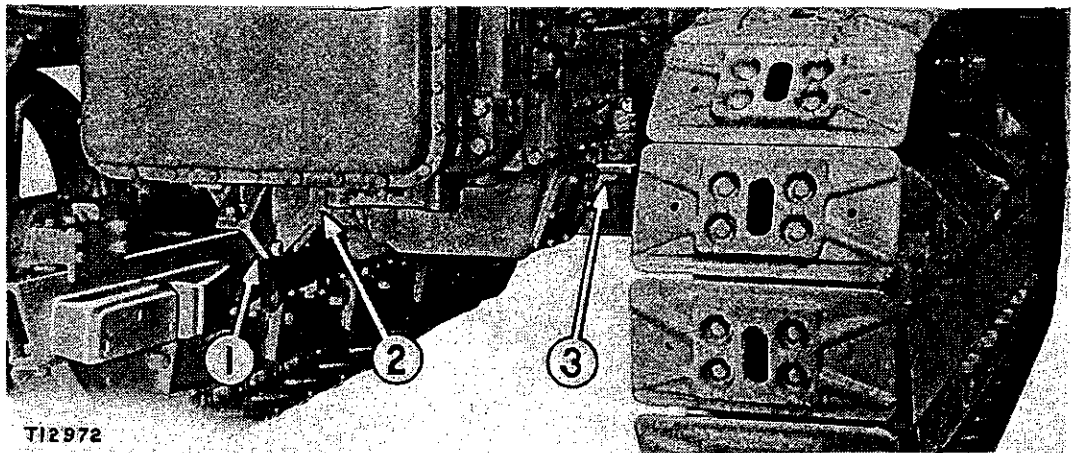


ATTACHMENTS

Nonoscillating Track Roller Frame Support

REMOVAL

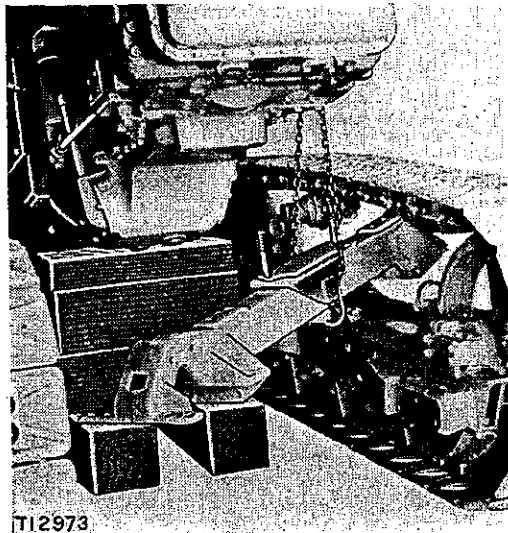
1. Remove the hood.
2. Remove the front and center track roller guards from each track roller frame.
3. Remove the engine side plates.
4. Remove the capscrews securing the support assembly (2) to the top of the track roller frames and the capscrews and shims (1) on the inside of each track roller frame. The shims under each end of the support assembly should be wired in place or tagged as to their proper location, as this is the correct amount of shims to be used when re-installing the support assembly.
5. Remove the nuts securing the saddle (3) to the Diesel engine cylinder block.



PREPARING TO REMOVE SUPPORT ASSEMBLY

1—Shims. 2—Support assembly. 3—Saddle.

6. Raise the front end of the tractor and block securely under the fly-wheel clutch compartment as shown.
7. Raise the support assembly and move one end over the front idler adjusting screw and beneath the track until the opposite end of the support assembly can be removed as shown.



REMOVING SUPPORT ASSEMBLY



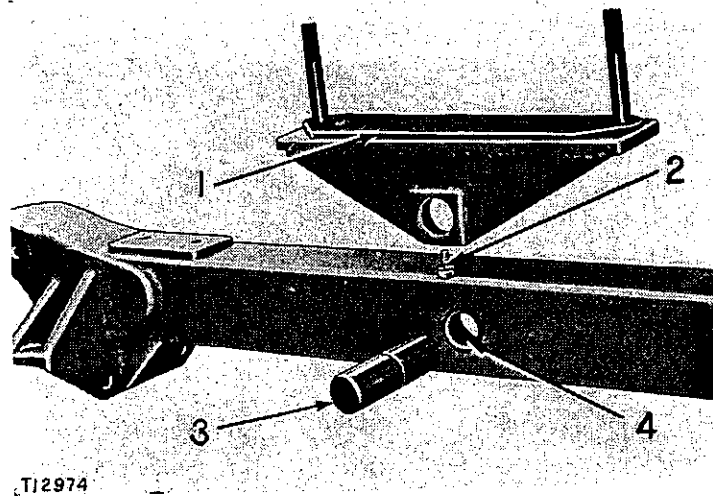
DISASSEMBLY

Remove the setscrew (2) from the saddle.

Remove the pivot pin (3).

The bushings (4) can be pressed out and replaced if damaged.

Replace the spacer (1) if torn or damaged.

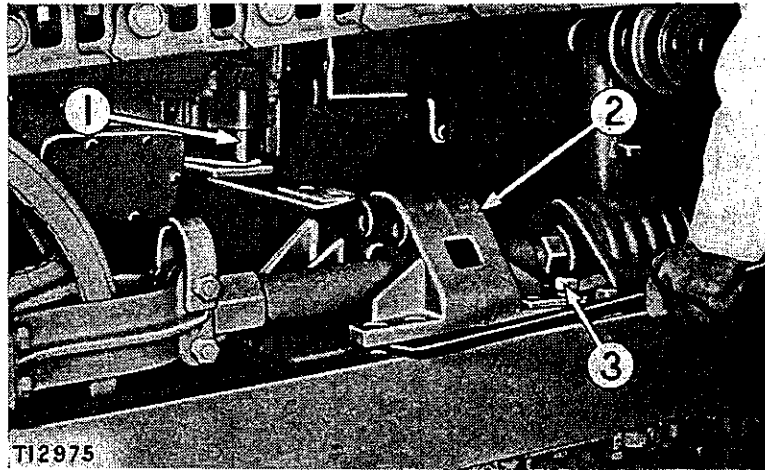


PIVOT PIN REMOVED

1—Spacer. 2—Setscrew. 3—Pivot pin. 4—Bushing.

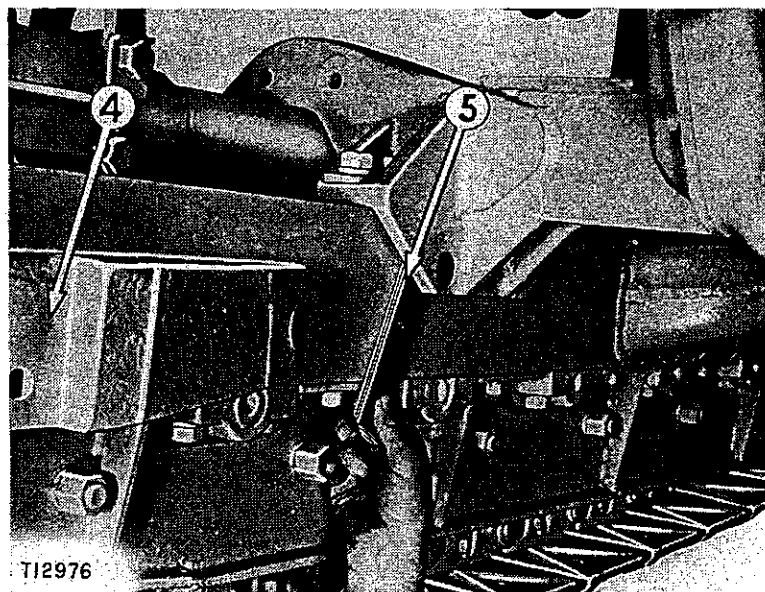
INSTALLATION

1. Place the support assembly (2) in position on the track roller frames and start the capscrew (3) at each end of the support assembly.
2. Raise the front end of the engine and remove the blocking from beneath the clutch compartment.



INSTALLING SUPPORT ASSEMBLY
 1—Stud. 2—Support assembly. 3—Capscrew.

3. Raise the front side of the support assembly as the engine is lowered so the studs (1) in the saddle will enter the holes in the cylinder block and oil pan and not damage the stud.
4. Install, tighten and lock the nuts on the studs (1).
5. Install all of the other capscrews that hold the support assembly to the top of the track roller frames but do not tighten them.
6. Install enough shims (5) between the end of support assembly and the inside of the track roller frame to give a minimum width of $22\frac{3}{4}$ " on the 44" gauge tractor, or $38\frac{3}{4}$ " on the 60" gauge tractor, between



INSTALLING SHIMS
 4—Mounting bracket. 5—Shim.

the mounting brackets (4), with the track roller frames parallel within $\frac{1}{8}$ " when measured at the front and back.

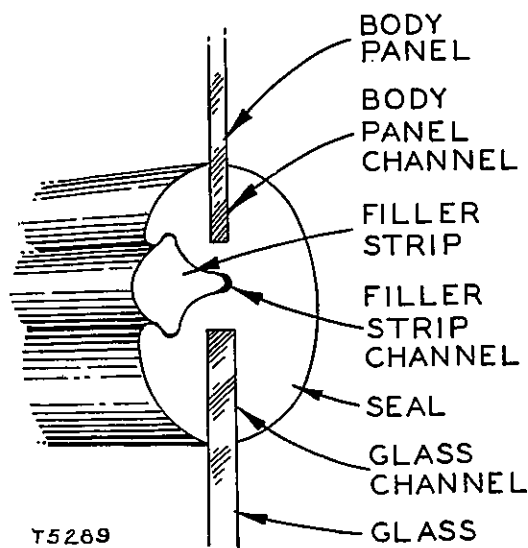
7. Install and tighten the capscrews through the shims (5) and into the side of the track roller frame before tightening those securing the support to the top of the roller frame.
8. Tighten the capscrews securing the support assembly to the top of the track roller frame.
9. Recheck parallel alignment.
10. Recheck minimum width between mounting brackets.
11. Install guards, engine side plates and hood.

Installing Glass in the Cab

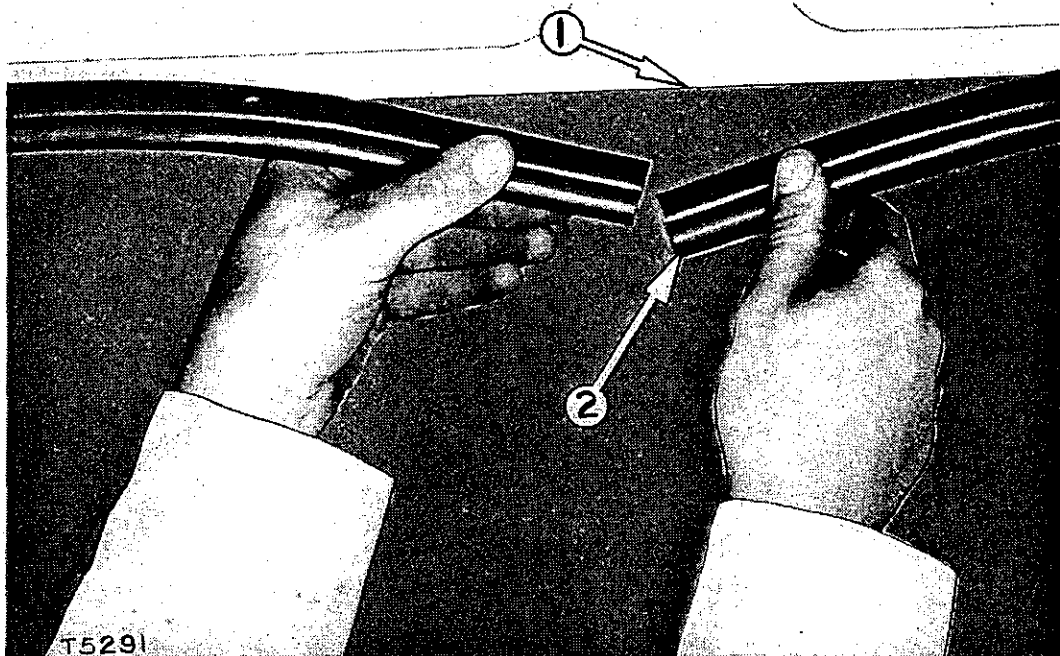
Steel cab groups shipped from the factory do not have the glass installed. These instructions will give the information for making the installation or they can be used for glass replacement. Each new cab group contains ample filler strip and seal. In addition, an 8F3336 Filler Strip Installation Tool is provided.

The installation of glass in the steel cab is easier if the correct method is used.

1. The window panel opening should be rubbed with paraffine or the seal should be lubricated with a soap and water solution.



CROSS-SECTION OF SEAL,
GLASS AND FILLER
STRIP INSTALLED



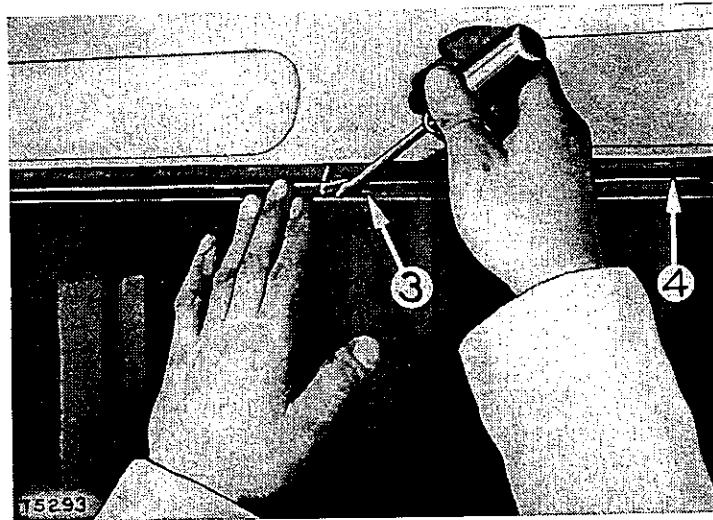
INSTALLING SEAL OVER PANEL
 1—Edge of body panel opening. 2—Seal.

2. Place the seal (2) over the edge of the body panel opening (1). The seal is cut to overlap the starting point by $\frac{1}{8}$ inch per foot of body opening. This will assure a tight fit.
3. Withdraw the seal slightly at the starting point and bring the ends together and force them over the body panel (1). This will make a tight smooth joint.



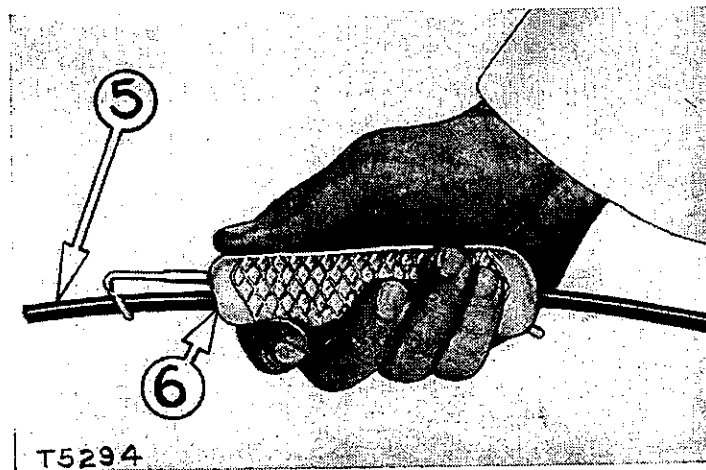
INSTALLING GLASS IN CHANNEL

4. Starting at the lower corner, place the glass in the channel as far as it will go without forcing.
5. Working in both directions from the starting point, lift the glass channel lip (3) and the glass will slip into place.
6. Apply soap and water to the filler channel (4) before installing the filler strip (5).
7. Place the filler strip (5) in the 8F3336 Filler Strip Installation Tool (6).



POSITIONING CHANNEL LIP OVER GLASS
 3—Glass channel lip. 4—Filler channel.

8. At the top of the channel, approximately two inches away from the seal joint (7), insert the filler strip and the eye of the installation tool into the filler strip channel. Hold the end of the filler strip in position with the thumb during the first motion of the tool.



PREPARING TO INSTALL FILLER STRIP
 5—Filler strip. 6—Installation tool.

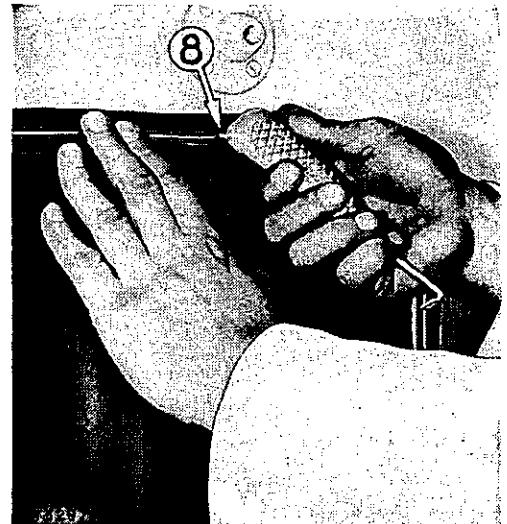
9. Move the tool along the channel and thread the filler strip into the filler strip channel. The filler strip will feed through the handle and eye as the tool is pulled along.
10. When rounding corners, jiggle the tool slightly to position the filler strip.
11. Remove the tool when the starting point is reached.

INSTALLING FILLER STRIP

7—Seal joint.



12. Cut the filler strip so that it will overlap the starting point.
13. Press the end of the filler strip into place with the spur (8) on the handle of the tool. This will cause the joint to be under pressure when both ends are forced into the filler strip channel.
14. Re-position any part of the filler strip that is not properly seated, using the spur on the handle of the installation tool.



REMOVING TOOL AND POSITIONING THE FILLER STRIP

8—Spur.

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