DEPARTMENT OF THE ARMY
TECHNICAL MANUAL

TM 9-803-6

(FORMERLY TM 9-1813F)

DEPARTMENT OF THE AIR
FORCE TECHNICAL ORDER

TO 19-75AA-159

ORDNANCE MAINTENANCE

BODY AND AUXILIARY EQUIPMENT FOR 2½-TON 6 x 6 TELEPHONE CONSTRUCTION AND MAINTENANCE TRUCK V-17A/MTQ 2½-TON 6 x 6 EARTH-BORING MACHINE AND POLE-SETTER TRUCK V-18A/MTQ

DEPARTMENTS OF THE ARMY AND THE AIR FORCE

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DEPARTMENTS OF THE ARMY AND
THE AIR FORCE
WASHINGTON 25, D. C., *3 November 1954*

ORDNANCE MAINTENANCE:
BODY AND AUXILIARY EQUIPMENT FOR 2½-TON 6 x 6 TELEPHONE CONSTRUCTION AND MAINTENANCE TRUCK V-17A/MTQ
2½-TON 6 x 6 EARTH-BORING MACHINE AND POLE-SETTER TRUCK V-18A/MTQ

CHAPTER 1
INTRODUCTION

Section I. GENERAL

1. Scope

a. These instructions are published for the information and guidance of personnel responsible for field and depot maintenance of this materiel. These instructions contain information on maintenance which is beyond the scope of the tools, equipment, or supplies normally available to using organizations. This manual does not contain information which is intended primarily for the using organization, since such information is available to ordnance maintenance personnel in the pertinent operators technical manual or field manuals.

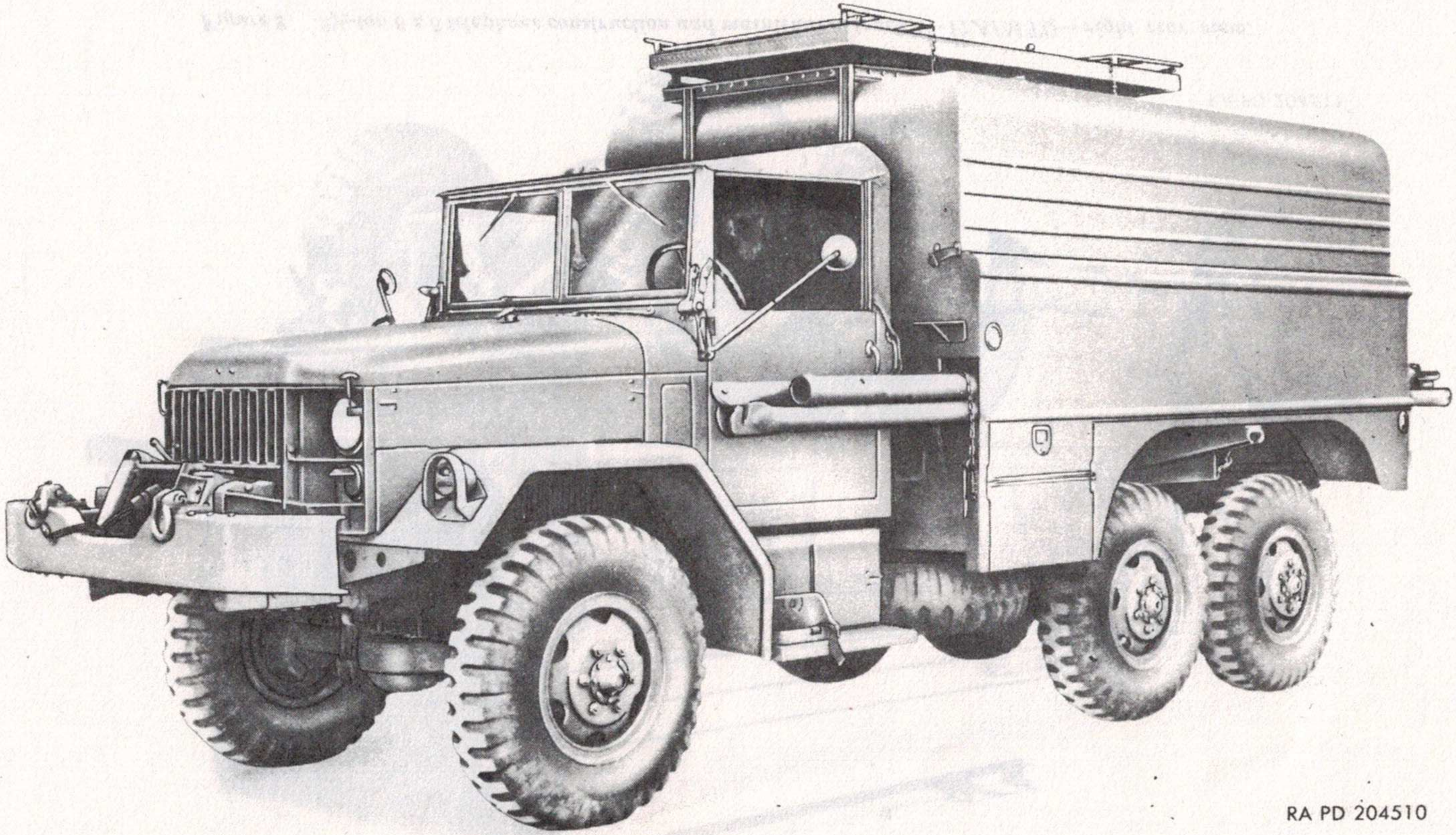
b. This manual contains a description of and procedures for removal, disassembly, inspection, repair, rebuild, and assembly of the auxiliary components peculiar to the telephone construction and maintenance V–17A/MTQ (figs. 1, 2, and 3) and earth boring machine and pole setter V–18A/MTQ (figs. 4, 5, and 6) 2½-ton 6 x 6 trucks. The appendix contains a list of current references, including supply manuals, technical manuals, and other available publications applicable to the materiel.

c. TM 9–819 (to be renumbered TM 9–8022) contains operating and lubricating instructions for the materiel and contains all maintenance operations allocated to using organizations in performing maintenance work within their scope.

d. TM 9–1819A contains a description and procedure for disassembly, cleaning, inspection, repair, rebuild, and assembly of the engine and clutch.

e. TM 9–1819B contains the same essential information of the power-train, frame, paulin-top cab, front winch, drive shafts, and M34 body.

f. This first-edition manual is published in advance of complete technical review. Any errors or omissions will be brought to the attention of the Chief of Ordnance, Department of the Army, Washington 25, D. C., ATTN: ORDFM-Pub.



RA PD 204510

Figure 1. 2½-ton 6 x 6 telephone construction and maintenance truck V–17A/MTO—left front view.

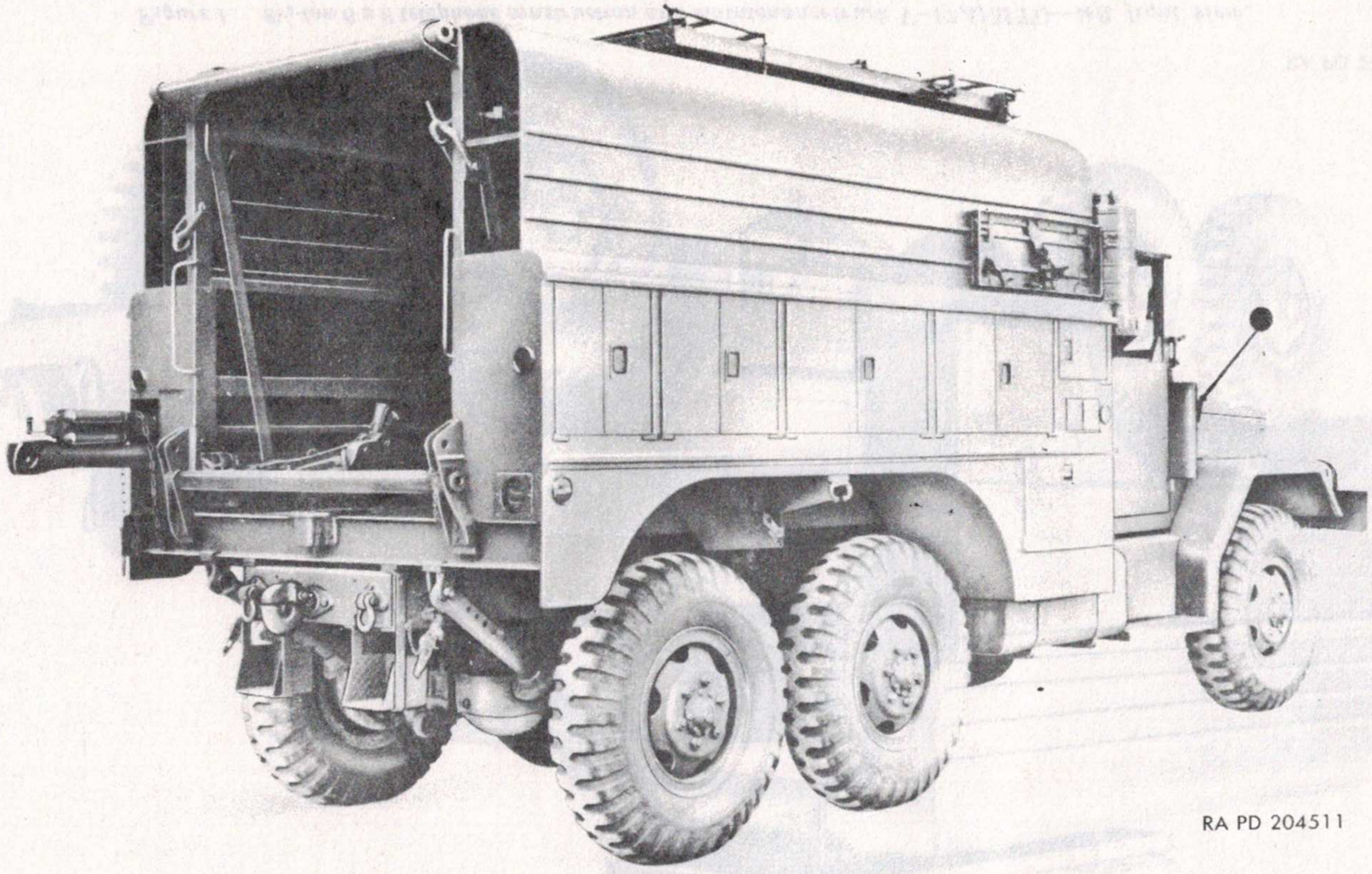


Figure 2. 2½-ton 6 x 6 telephone construction and maintenance truck V–17A/MTQ—right rear view.

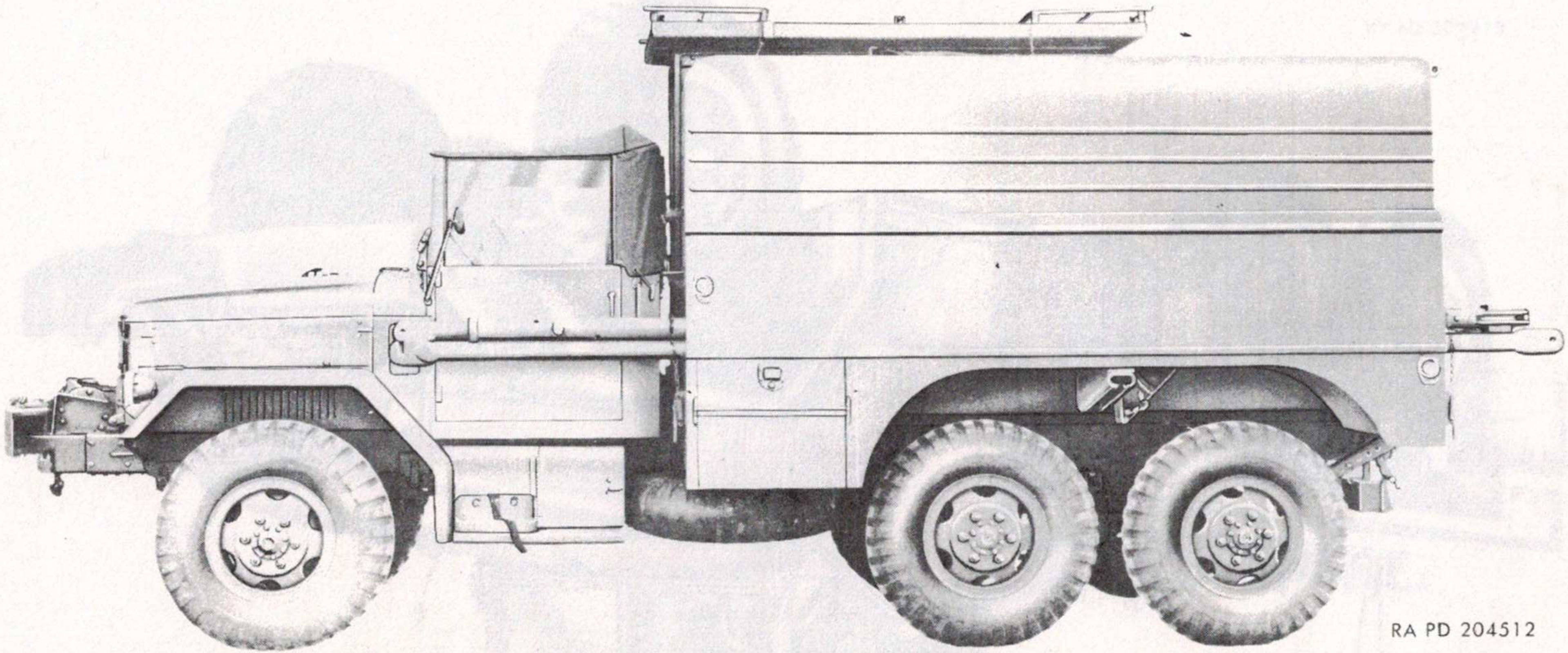


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Figure 3. 2½-ton 6 x 6 telephone construction and maintenance truck V–17A/MTQ—left side view.

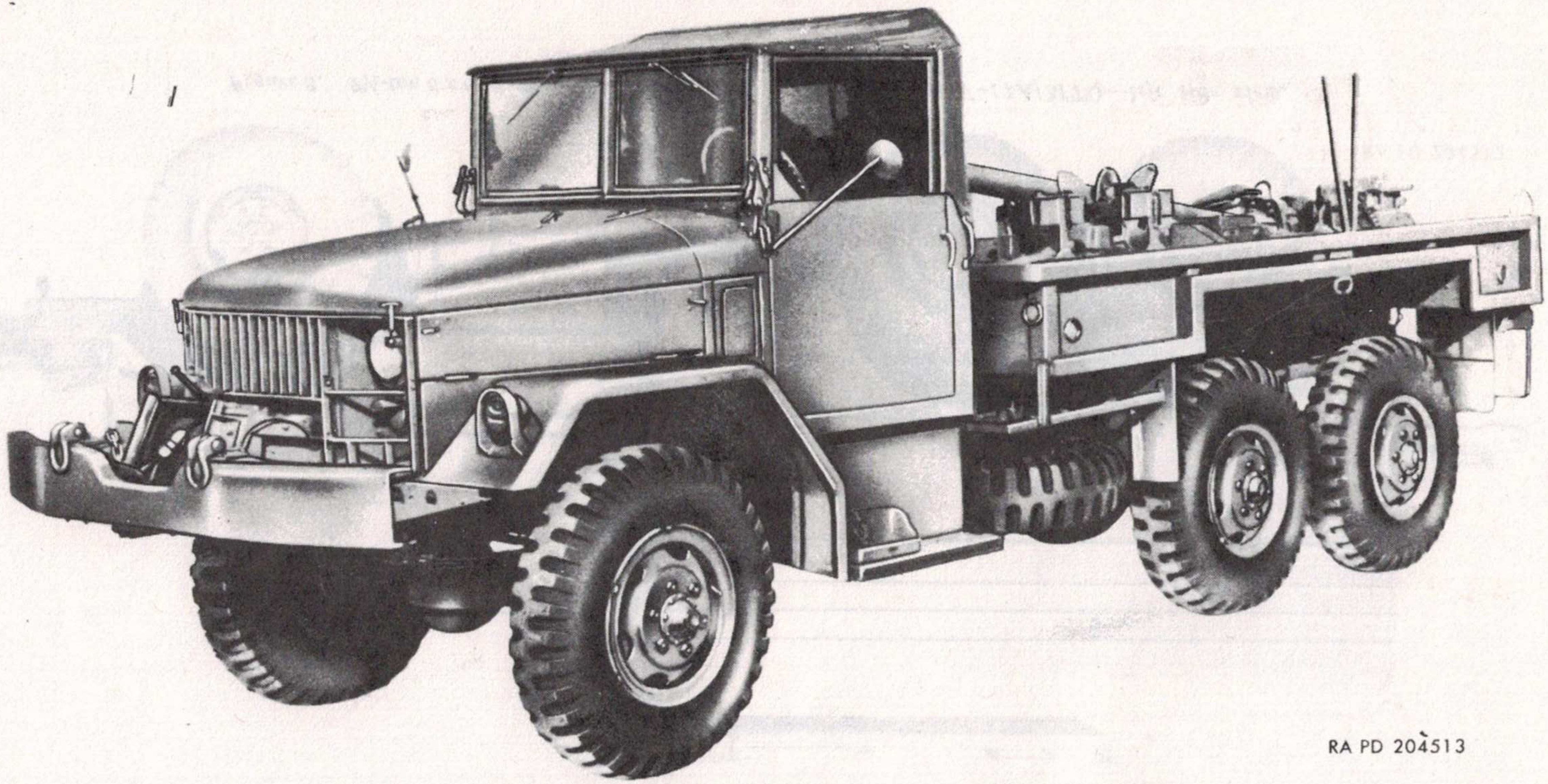

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Figure 4. 2½-ton 6 x 6 earth boring machine and pole setter truck V–18A/MTQ—left front view.

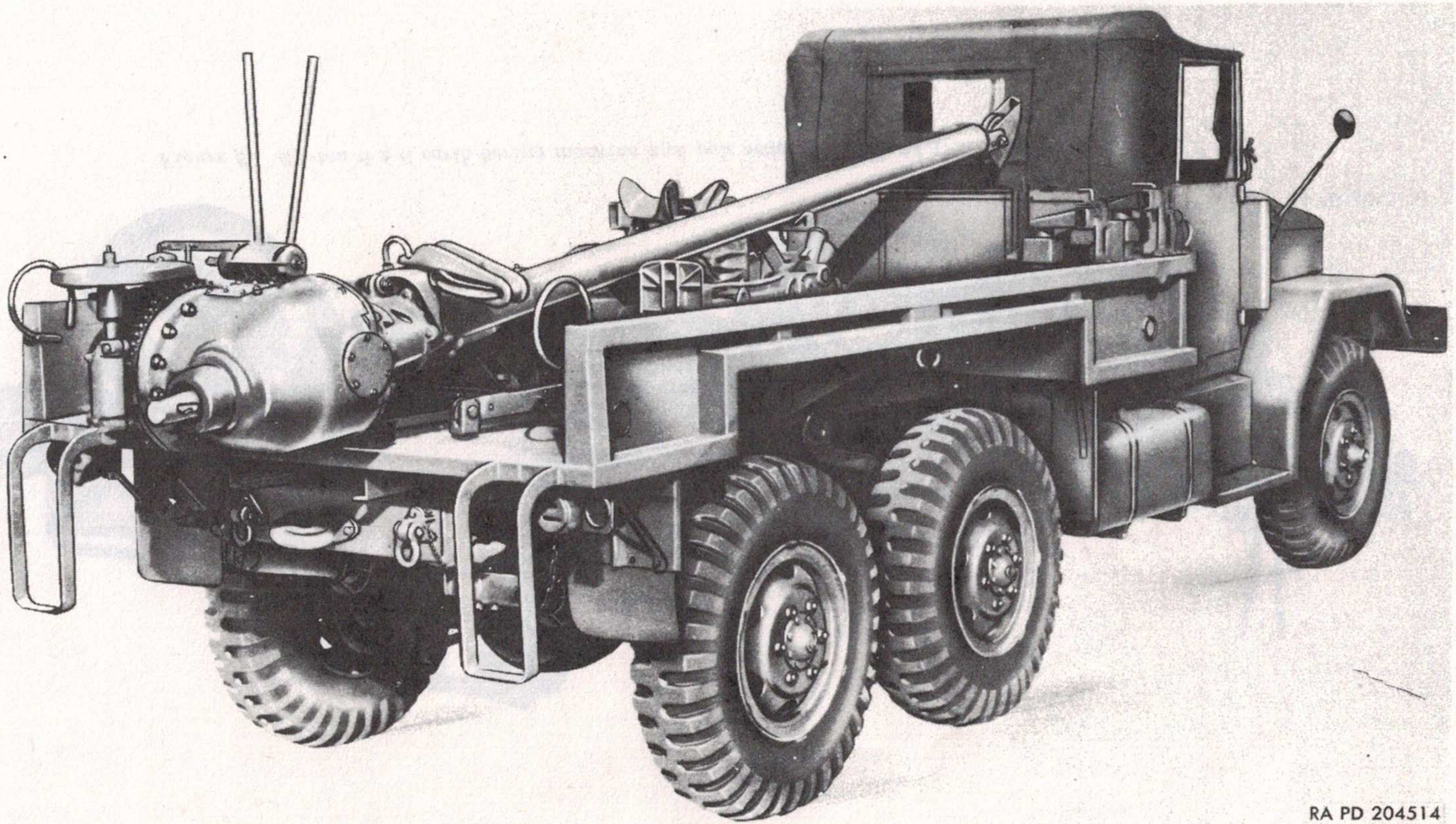

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Figure 5. 2½-ton 6 x 6 earth boring machine and pole setter truck V–18A/MTQ—right rear view.

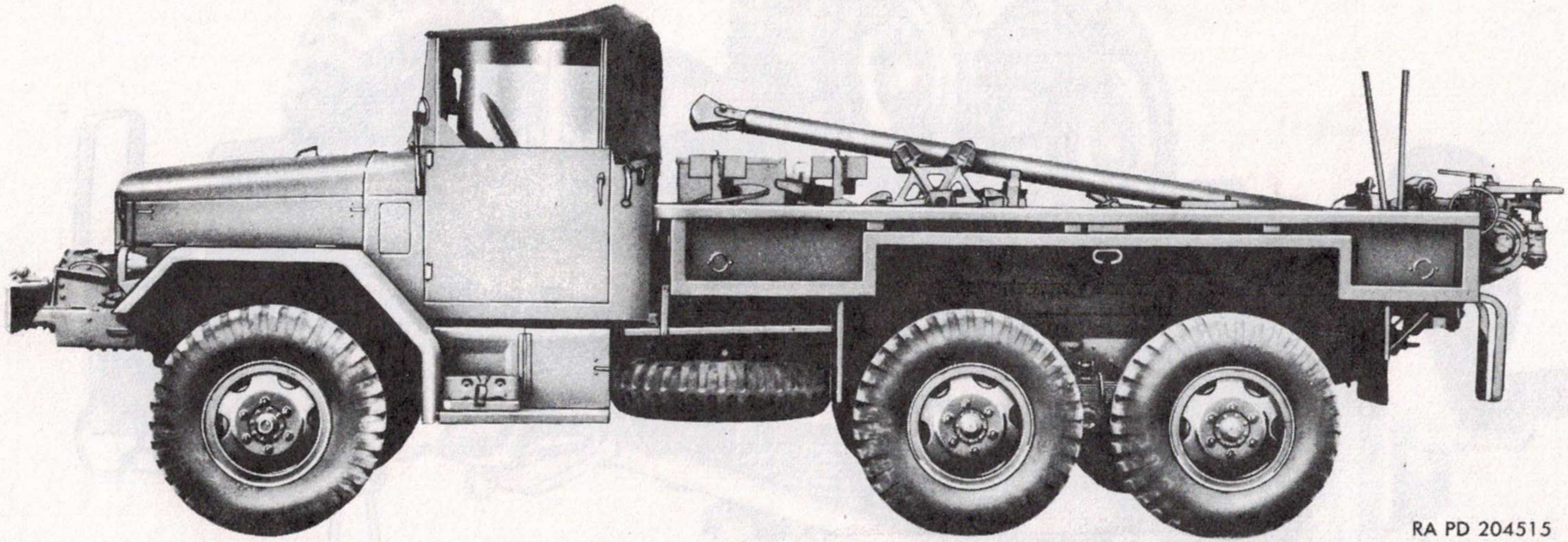

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Figure 6. 2½-ton 6 x 6 earth boring machine and pole setter truck V–18A/MTQ—left side view.

2. Field and Depot Maintenance Allocation

The publication of instructions for complete disassembly and rebuild is not to be construed as authority for the performance by field maintenance units of those functions which are restricted to depot shops and arsenals. In general, the prescribed maintenance responsibilities will be reflected in the allocation of maintenance parts listed in the appropriate columns of the current ORD 8 supply manual pertaining to those vehicles incorporating these items. Instructions for depot maintenance are to be used by maintenance companies in the field only when the tactical situation makes the repair functions imperative. Supply of parts listed in the depot guide column of ORD 8 supply manuals will be made to field maintenance only when the emergency nature of the maintenance to be performed has been certified by a responsible officer of the requisitioning organization and upon express authorization by the chief of the service concerned. Those operations which can be performed as "emergency field maintenance" are specifically covered as such in this manual.

3. Forms, Records, and Reports

a. General. Responsibility for the proper execution of forms, records, and reports rests upon the officers of all units maintaining this equipment. However, the value of accurate records must be fully appreciated by all persons responsible for their compilation, maintenance, and use. Records, reports, and authorized forms are normally utilized to indicate the type, quantity, and condition of materiel to be inspected, to be repaired, or to be used in repair. Properly executed forms convey authorization and serve as records for repair or replacement of materiel in the hands of troops and for delivery of materiel requiring further repair to ordnance shops in arsenals, depots, etc. The forms, records, and reports establish the work required, the progress of the work within the shops, and the status of the materiel upon completion of its repair.

b. Authorized Forms. The forms generally applicable to units maintaining this equipment are listed in the appendix. For current and complete listing of all forms, refer to SR 310–20–6. Additional forms applicable to the using personnel are listed in the operators manual. For instructions on use of these forms, refer to FM 9–10.

c. Field Reports of Accidents. The reports necessary to comply with the requirements of the Army safety program are prescribed in detail in the SR 385–10–40 series of special regulations. These reports are required whenever accidents involving injury to personnel or damage to materiel occur.

d. Report of Unsatisfactory Equipment or Materials. Any suggestions for improvement in design and maintenance of equipment and spare parts, safety and efficiency of operation, or pertaining to the

application of prescribed petroleum fuels, lubricants, and/or preserving materials, or technical inaccuracies noted in Department of the Army publications pertaining to Ordnance materiel, will be reported through technical channels as prescribed in SR 700–45–5 to the Chief of Ordnance, Department of the Army, Washington 25, D. C., ATTN: ORDFM, using DA Form 468, Unsatisfactory Equipment Report. Such suggestions are encouraged in order that other organizations may benefit.

Note. Do not report all failures that occur. Report only REPEATED or RECURRENT failures or malfunctions which indicate unsatisfactory design or material. However, reports will always be made in the event that exceptionally costly equipment is involved. See also SR 700–45–5 and the printed instructions on DA Form 468.

Section II. DESCRIPTION AND DATA

4. Description and Data—V–17A/MTQ Truck

(figs. 1, 2, and 3)

a. Description.

(1) *V–17A/MTQ body* (fig. 102). The V–17A/MTQ truck has a special body mounted on a M44 chassis. The V–17A/MTQ body is designed for telephone construction and maintenance work and has seven compartments built into the side panels of the body for storage of tools and equipment. The compartments are accessible through hinged doors on the outside of the panels. Other openings in the side panels provide access to the drum shaft and auxiliary shaft of the rear winch assembly for installation of a collapsible cable reel during wire handling operations.

(2) *Revolving platform assembly* (fig. 98). A manually rotated revolving platform assembly is mounted on top of the V–17A/MTQ body. The nonelevating platform is supported by a brake ring frame assembly secured to the front end of the body. A collapsible complete guard rail assembly is welded to the platform for use by operating personnel as a safety measure. The revolving platform is used for low overhead installation and the repair of telephone lines and cables.

(3) *Pole derrick assembly.* The pole derrick assembly is used in moving, erecting, and pulling of poles. This derrick has three legs, with the center leg (fig. 100) consisting of three sections. The top section of the center leg mounts a derrick sheave for use with a winch line from the rear winch assembly. When disassembled and in the travel position, the pole derrick is secured in the vehicle by two derrick leg hold-down clamp assemblies.

(4) *V–17A/MTQ rear winch assembly* (fig. 70). The V–17A/MTQ rear winch assembly is mounted in the front end of the V–17A/MTQ body. The rear winch is a single drum, brake- and clutch-type with an auxiliary shaft assembly. This winch is used in conjunction with the pole derrick assembly, the roller sheave spindle bars and roller sheaves, the universal sheave block assembly (fig. 99), and the collapsible cable reel (fig. 93) for various kinds of construction and maintenance work. Power to the rear winch is from the transfer power-take-off on the truck through the rear winch drive shaft assembly (fig. 92) to a pillow block assembly (fig. 90), and from the pillow block through a winch drive silent chain assembly to the winch. Control of the winch is through control lever linkage (fig. 78) from the truck cab.

(5) *Accessories.* The V–17A/MTQ truck also is equipped with two wheel chock with chain assemblies (fig. 102), two support legs (fig. 95) and collapsible cable reel (fig. 93).

b. Data. Data on the V–17A/MTQ truck are available in TM 9–819. Data on the above-mentioned components of this truck are tabulated in the rebuild sections of this manual pertaining to these items.

5. Description and Data—V–18A/MTQ Truck

(figs. 4, 5, and 6)

a. Description.

(1) *V–18A/MTQ body.* The V–18A/MTQ truck body is mounted on the M44 chassis. The V–18A/MTQ body is a M34 body modified to mount a center-mounted rear winch assembly and an earth boring machine. The V–18A/MTQ rear winch assembly is mounted on the body behind the cab of the vehicle. The earth boring machine is mounted on the rear end of the body platform.

(2) *Earth boring machine* (figs. 7 and 8). The earth boring machine is designed to power-dig holes in different types of soil. This machine is used in conjunction with winch for setting telephone poles and for placing guy anchors in the ground. The machine is equipped with an integral derrick assembly consisting of a derrick tube, derrick sheave assembly (fig. 35), snatch sheave assembly (fig. 8), and a strap sheave assembly (fig. 60). These are used with the V–18A/MTQ rear winch assembly (fig. 68) for erecting or removing poles. Four earth augers (fig. 58) are provided for the boring machine. With these augers and the 13-feet auger rack (A, fig. 37), the boring machine can bore holes 9, 12, 16, and 20 inches in diameter to a depth of seven feet. The machine receives its power through a boring machine drive shaft assembly (par. 155*a*(3)) from a power-divider (fig. 80)

mounted to the rear winch frame underneath the V–18A/MTQ body. The machine is operated through a control lever operating handle assembly (fig. 7) mounted on the boring machine.

(3) *Power-divider* (fig. 80). The power-divider is connected to the truck power-take-off through the power-divider drive shaft assembly (fig. 91). The divider furnishes power to the V–18A/MTQ rear winch assembly through a silent chain assembly or to the earth boring machine through the boring machine drive shaft assembly. The power-divider is operated from the cab of the truck through control lever linkage (fig. 88).

(4) *V–18A/MTQ rear winch assembly* (fig. 68). The V–18A/MTQ rear winch assembly is a single drum clutch- and brake-type and is used with the derrick assembly for pole setting. A collapsible cable reel (fig. 93) is provided for coupling to the drum shaft to string and power-wind electrical cable. Power for forward or reverse winch drive is provided from the power-divider through a winch drive silent chain assembly. A drive chain idler pulley assembly (fig. 69) is used to adjust the tension on the silent chain. The rear winch is controlled from the cab of the truck by control lever linkage (fig. 79).

(5) *Accessories.* The V–18A/MTQ truck also is equipped with two support legs (fig. 96) and two wheel chock with chain assemblies (par. 185*b*(2)) for use during earth boring, pole setting, and winch operations.

b. Data. Data on the V–18A/MTQ truck are available in TM 9–819. Data on the above-mentioned components of this truck are tabulated in the rebuild sections of this manual pertaining to these items.

CHAPTER 2

PARTS, SPECIAL TOOLS, AND EQUIPMENT FOR FIELD AND DEPOT MAINTENANCE

6. General

Tools and equipment and maintenance parts over and above those available to the using organization are supplied to ordnance field maintenance units and depot shops for maintaining, repairing, and/or rebuilding the materiel.

7. Parts

Maintenance parts are listed in Department of the Army Supply Manual ORD 8 SNL G–742, which is the authority for requisitioning replacements. Parts not listed in the ORD 8 manual but required by depot shops in rebuild operations may be requisitioned from the listing in the corresponding ORD 9 manual and will be supplied if available. Requisitions for ORD 9 parts will contain a complete justification of requirements.

8. Common Tools and Equipment

Standard and commonly used tools and equipment having general application to this materiel are authorized for issue by T/A and T/O & E.

9. Special Tools and Equipment

There are no special tools and equipment required to perform the operations described in this manual.

CHAPTER 3

TROUBLESHOOTING

Section I. GENERAL

10. Purpose

Note. Information in this chapter is for use of ordnance maintenance personnel in conjunction with and as a supplement to the troubleshooting section in the pertinent operators manual. It provides the continuation of instructions where a remedy in the operators manual refers to ordnance maintenance personnel for corrective action.

Operation of a deadlined vehicle without a preliminary examination can cause further damage to a disabled component and possible injury to personnel. By careful inspection and troubleshooting such damage and injury can be avoided and, in addition, the causes of faulty operation of a vehicle or component can often be determined without extensive disassembly.

11. General Instructions and Procedures

This chapter contains inspection and troubleshooting procedures to be performed while a disabled component is still mounted in the vehicle and after it has been removed.

a. The inspections made while the component is mounted in the vehicle are for the most part visual and are to be performed before attempting to operate the vehicle. The object of these inspections is to avoid possible damage or injury and also to determine the condition of and, when possible, what is wrong with the defective component.

b. The troubleshooting performed while the component is mounted in the vehicle is that which is beyond the normal scope of using organization. Check the troubleshooting section of TM 9–819; then proceed as outlined in this chapter. These troubleshooting operations are used to determine if the fault can be remedied without removing the component from the vehicle and also, when subsequent removal is necessary, to indicate when repair can be made without complete disassembly of the component.

c. Inspection after the component is removed from the vehicle is performed to verify the diagnosis made when the component was in

the vehicle, to uncover further defects, or to determine faults if the component alone is received by the ordnance establishment. This inspection is particularly important in the last case because it is often the only means of determining the trouble without completely disassembling the component.

d. Troubleshooting a disabled component after it has been removed from the vehicle consists of subjecting it to tests on a test stand. This chapter discusses those symptoms which can be diagnosed by by using the testing equipment and interprets the results in terms of probable causes.

Section II. EARTH BORING MACHINE

12. Troubleshooting Before Removal or Operation

a. General. Do not operate the components prior to completing the procedures given in this paragraph. Refer to paragraph 11*a* for the purpose of these inspections.

b. Detailed Procedure.

(1) *Inspect for lubricant leaks.* Visually inspect all joints, pipe plugs, hand and access holes, plates, and covers for leaking lubricant. Leakage may be caused by loose or defective cap screws, bolts, pipe plugs, gaskets, or oil seals. Tighten any loose cap screws, bolts, and plugs. Replace any defective cap screws, bolts, plugs, oil seals, or gaskets. Install new oil seals or gaskets, when possible, without removing the boring machine from the vehicle.

(2) *Inspect derrick tube.* Inspect the derrick tube for flat or bent spots. A flat or bent spot may hinder auger action or endanger personnel and equipment during operation of the earth boring machine. Replace a damaged tube (pars. 66 and 69).

c. Further Procedure. If these inspections do not disclose the fault, and the component is operable, proceed as described in paragraph 13.

13. Troubleshooting Before Removal and During Operation

a. General. If the inspections in paragraph 12 do not reveal causes of failure and the component is operative, then troubleshoot it. Refer to paragraph 11*b* for purpose and scope of these troubleshooting procedures. In order to make a thorough test of the earth boring machine while it is still mounted on the vehicle, the machine should be tested under field conditions. This is essential particularly when the machine appears to function properly during test, yet fails during field use. Before applying power to the boring machine, be sure the clutch and brake case, intermediate case, and boring case contain sufficient lubricant according to LO 9–819.

b. Detailed Procedure.

(1) *Earth boring machine functions without operator.*

Warning: If the earth boring machine functions without pressure on either of the control lever operating handles, shut off the power to the boring machine. Damage to the derrick tube, auger rack, or rack feed pinion will occur if the auger rack is at either extreme in the boring case or the derrick tube. Remove the intermediate case gear assembly (par. 63) before proceeding with the troubleshooting procedure.

Action of the boring machine functioning without an operator applying pressure to either of the control lever operating handles may be caused by wear or damage to the clutch and brake internal- and external-teeth plates in the clutch and brake case. Disassemble the clutch and brake case assembly (pars. 64 and 80) and replace any worn or damaged plates (pars. 83 and 94).

(2) *Earth boring machine fails to operate.* Failure of the earth boring machine to operate is caused by wear or damage to the input shaft gear, input shaft gear key, idler gear, or the main-drive-gear-and-clutch shell with integral gear in the clutch and brake case. Disassemble the clutch and brake case assembly (pars. 64 and 80) and replace any worn or damaged parts (pars. 83 and 94).

(3) *Auger rack fails to rotate.* Failure of the auger rack to rotate may be caused by wear or damage in the boring case, intermediate case, or the clutch and brake case.

(*a*) *Boring case.* Failure in the boring case may be caused by a worn or damaged rack drive gear. Disassemble the boring case gear assembly (par. 70*d*) and replace worn or damaged rack drive gear (par. 73*d*).

(*b*) *Intermediate case.* Failure in the intermediate case may be caused by wear or damage to the second reduction drive pinion with integral shaft, or the first reduction drive gear in the intermediate case gear assembly, or to the first reduction drive pinion or the drive clutch shaft first reduction pinion key on the end of the drive clutch shaft protruding into the intermediate case. Remove the intermediate case gear assembly (par. 63) and replace a worn or damaged second reduction drive pinion or first reduction drive gear (pars. 75*b* and 78*d*), or replace a worn or damaged first reduction drive pinion or drive clutch shaft first reduction pinion key (pars. 64 and 94).

(*c*) *Clutch and brake case.* Failure in the clutch and brake case may be caused by wear or damage to the shifter fork and throw shoe assembly, drive clutch and brake internal- and

external-teeth plates, drive clutch shaft sleeve, drive clutch shaft sleeve key, drive clutch hub, and the drive clutch and brake hub key. Disassemble the clutch and brake case assembly (pars. 64 and 80) and replace any worn or damaged parts (pars. 83 and 94).

(4) *Auger rack fails to raise.* Failure of the auger rack to raise may be caused by wear or damage in the boring case, intermediate case, or the clutch and brake case.

(*a*) *Boring case.* Failure in the boring case may be caused by a jammed or damaged rack lock, or by a worn or damaged rack thrust plate, rack feed pinion, rack feed driven pinion, or rack feed idler gear. Disassemble the boring case assembly (par. 70*e*) and replace any worn or damaged parts (par. 73*c*).

(*b*) *Intermediate case.* Failure in the intermediate case may be caused by a worn or damaged second reduction feed pinion with integral shaft or first reduction feed gear in the intermediate case assembly, or by a worn or damaged first reduction feed pinion and feed clutch shaft first reduction pinion keys on the intermediate case end of the feed clutch shaft. Disassemble the intermediate case gears (par. 75) and replace worn or damaged parts (par. 78). Remove and replace a worn or damaged first reduction feed pinion and feed clutch shaft first reduction pinion keys (pars. 64 and 94).

(*c*) *Clutch and brake case.* Failure in the clutch and brake case may be caused by a worn or damaged feed clutch pressure plate, shifter fork and throw shoe assembly, feed clutch and brake internal and external teeth plates, feed clutch hub, or the feed clutch and brake hub key. Disassemble the clutch and brake case assembly (pars. 64 and 80) and replace any worn or damaged parts (pars. 83 and 94).

(5) *Auger rack fails to lower to ground.* Failure of the auger rack to lower to ground in preparation for boring may be caused by wear or damage in either the drive power-train or the feed power-train.

(*a*) Operate earth boring machine to raise the earth auger. If earth auger fails to raise, refer to (4) above for trouble-shooting procedure.

(*b*) Operate the earth boring machine to rotate the earth auger. If earth auger fails to rotate, refer to (3) above for troubleshooting procedure.

(6) *Auger rack fails to feed during boring.* Failure of the auger rack to feed during boring may be caused by wear or damage in the boring case, intermediate case, or the clutch and

brake case. Refer to (4) above for troubleshooting procedure.

(7) *Vertical power leveler fails to operate.* Failure of the vertical power leveler to operate may be caused by a worn or damaged clutch sliding jaw or drive pinion. Disassemble the power leveler (par. 70*f*) and replace worn or damaged parts (par. 73*c*).

c. Further Procedure. If these troubleshooting procedures do not disclose the fault, proceed as specified in paragraph 14.

14. Troubleshooting After Removal and Before Operation

a. General. After the earth boring machine has been removed from the vehicle or if it has been received already removed, further inspection is necessary. Refer to paragraph 11*c* for purpose and scope of these procedures.

b. Detailed Procedure. Inspect the earth boring machine for lubricant leaks and the derrick tube for bends, bowing, flattening, or other damage (par. 12).

15. Troubleshooting After Removal and During Operation

a. General. This paragraph discusses those symptoms which can be diagnosed by operating the earth boring machine on a suitable test stand or vehicle.

b. Detailed Procedure.

(1) *Installation of earth boring machine.* Install the earth boring machine on a suitable test stand or available vehicle. Fasten the boring machine securely to the test stand or vehicle so that vibration or the weight of the machine will not cause the machine to loosen during operation. Level the machine in both directions.

(2) *Check lubricant levels.* Check the level of the lubricant in the clutch and brake case, intermediate case, and boring case according to LO 9–819. Make sure that the boring machine is properly lubricated before applying power to the machine.

(3) *Unusual gear noises.* Apply low speed power to the input shaft of the earth boring machine and listen for unusual gear noises. If such noises are heard, remove power to the boring machine and disassemble the clutch and brake case assembly (pars. 64 and 80). Replace any worn or damaged parts (pars. 83 and 94).

(4) *Operational tests.* Apply low speed power to the earth boring machine and perform the various operational tests of the boring machine as detailed in paragraph 97. If unusual gear or auger rack noises are heard, remove power to the boring

machine. Disassemble a noisy assembly and replace any worn or damaged parts (ch. 5).

(5) *Lubricant leakage.* During and after testing, inspect the earth boring machine for lubricant leaks (par. 12).

Section III. REAR WINCH ASSEMBLY

16. Troubleshooting Before Removal or Operation

a. General. Do not operate the rear winch assembly prior to completing the procedures given in this paragraph. Refer to paragraph 11*a* for the purpose of these inspections.

b. Detailed Procedure. Visually inspect the rear winch assembly for lubricant leakage around all joints, gaskets, covers, and plugs. Leakage may be caused by loose or defective cap screws, gaskets, oil seals, or pipe plugs. Tighten all loose cap screws and pipe plugs. Replace any defective cap screws, pipe plugs, oil seals, or gaskets. Install a new oil seal or gasket when possible, without removing the rear winch from the vehicle.

c. Further Procedure. If these inspections do not disclose the fault and the component is operable, proceed as described in paragraph 17.

17. Troubleshooting Before Removal and During Operation

a. General. If the inspections in paragraph 16 do not reveal causes of failure and the component is operable, then troubleshoot it. Refer to paragraph 11*b* for purpose and scope of these troubleshooting procedures. Before applying power to the rear winch assembly, check to see that the rear winch is lubricated according to LO 9–819.

b. Detailed Procedure.

(1) *Drum shaft does not rotate.* Failure of the drum shaft to rotate may be caused by wear or damage to the drum shaft drive gear. Replace a worn or damaged gear (pars. 112*b* and 115*c*).

(2) *Clutch and brake plate fails to rotate.* Failure of the clutch and brake plate to rotate may be caused by wear or damage to the clutch and brake plate. Disassemble the clutch and brake assembly (par. 112*c*) and replace a worn or damaged clutch and brake plate (par. 115*c*).

(3) *Drum clutch does not engage.* Failure of the drum clutch to engage may be caused by failure in clutch and brake plate assembly. Failure may be caused by foreign matter lodged in the assembly, a broken or worn dog-point cap screw in the detent sleeve, a worn or damaged clutch and brake plate or keys, a worn clutch detent, or a cracked or permanently set clutch and brake plate spring. Disassemble the clutch and brake plate assembly (par. 112*c*) and clean any foreign matter from the assembly (par. 71). Perform the operations

detailed in paragraph 114 for rotation of an internally worn detent sleeve and relocation or replacement of the dog-point cap screw. Replace any worn or damaged parts (par. 115).

(4) *Drum brake does not engage.* Failure of the drum brake to engage may be caused by wear or damage to the clutch and brake plate assembly or the clutch and brake plate lining. Troubleshoot the clutch and brake plate assembly according to (3) above. Disassemble the clutch and brake plate assembly (par. 112) and replace a worn lining on the plate (par. 115).

(5) *Worm automatic brake fails to operate.* Failure of the worm automatic brake to operate when there is a load on the winch line and the rear winch is turning in a reverse direction will cause the winch to drive backwards or "over-run." Failure may be caused by a worn or damaged worm automatic brake stop sleeve, worm automatic brake stop nut, stop sleeve pin, worm automatic brake linings, or worm automatic brake lining plates in the worm automatic brake assembly. Disassemble the brake assembly (par. 117*c*) and replace any worn or damaged parts (par. 120*f*).

(6) *Lubricant leakage.* Inspect for lubricant leakage during and after operation (par. 16).

c. Further Procedure. If these troubleshooting procedures do not disclose the fault, proceed as prescribed in paragraph 18.

18. Troubleshooting After Removal and Before Operation

a. General. After the rear winch assembly has been removed from the vehicle or if it has been received already removed, further inspection is necessary. Refer to paragraph 11*c* for purpose and scope of these procedures.

b. Detailed Procedure. Inspect the rear winch assembly for lubricant leakage (par. 16).

19. Troubleshooting After Removal and During Operation

a. General. This paragraph discusses those symptoms which can be diagnosed by operating the rear winch assembly on a suitable test stand.

b. Detailed Procedure.

(1) *Installation on test stand.* Install the rear winch assembly on the test stand and make sure that the winch is securely fastened to the stand and is level in two directions.

(2) *Check lubricant level.* Check the level of the lubricant in the worm housing to make sure that sufficient lubricant is present according to LO 9–819.

(3) *Unusual gear noises.* Apply power to the rear winch assembly and listen for unusual gear noises. If unusual noises are

heard, remove power to the winch assembly and disassemble the worm housing assembly (par. 117). Replace any worn or damaged parts (pars. 115 and 120).

(4) *Operational tests.* Test the rear winch assembly under the various conditions described in paragraphs 130 and 131. If the rear winch fails in any of these tests, troubleshoot the assembly according to paragraph 17.

(5) *Lubricant leakage.* During and after testing, inspect the rear winch assembly for any lubricant leakage (par. 16).

Section IV. POWER-DIVIDER

20. Troubleshooting Before Removal or Operation

a. General. Do not operate the component prior to completing the procedures given in this paragraph. Refer to paragraph 11*a* for the purpose of these inspections.

b. Detailed Procedure. Visually inspect the power-divider for lubricant leaks around all joints, gaskets, plugs, and covers. Leakage may be caused by loose or defective cap screws, pipe plugs, oil seals, or gaskets. Tighten all loose plugs and screws. Replace any defective screws, plugs, oil seals, or gaskets (pars. 139 and 142).

c. Further Procedure. If these inspections do not disclose the fault and the component is operable, proceed as described in paragraph 21.

21. Troubleshooting Before Removal and During Operation

a. General. If the inspections in paragraph 20 do not reveal causes of failure and the component is operable, then troubleshoot it. Refer to paragraph 11*b* for purpose and scope of these troubleshooting procedures. Before applying power to the power-divider, check to see that the power-divider case is filled with lubricant according to LO 9–819.

b. Detailed Procedure.

(1) *Shifter rod fails to shift.* Failure of the shifter rod to shift upon application of pressure to the control lever may be caused by damage to the shifter rod or the input shaft sliding gear. Disassemble the shifter assembly (par. 136) and replace any worn or damaged parts (par. 145).

(2) *Shifter rod fails to hold in position.* Failure of the shifter rod to hold in any position without deliberate movement of the control lever may be caused by damage or wear to the shifter shaft or shifter fork detent. Disassemble the shifter assembly (par. 136) and replace any worn or damaged parts (par. 145).

(3) *Power-divider fails to operate in all operating positions.* Failure of the power-divider to operate in all operating positions upon shifting of the control lever may be caused by wear or

damage to the shifter rod, input shaft sliding gear, or the input shaft. Disassemble the shifter assembly (par. 136) and replace any worn or damaged parts (par. 145).

(4) *Power-divider fails to operate in "rear winch-forward" position.* Failure of the power-divider to operate in the "rear winch-forward" position may be caused by wear or damage to the front output shaft forward speed gear. Remove the front output shaft assembly (par. 138) and replace worn or damaged gear (par. 142).

(5) *Power-divider fails to operate in "rear winch-reverse" position.* Failure of the power-divider to operate in "rear winch-reverse" position may be caused by damage or wear to the reverse idler gear or the front output shaft reverse speed gear. Remove the reverse idler gear assembly (par. 137) and the front output shaft assembly (par. 138) and replace any worn or damaged parts (par. 142).

(6) *Power-divider fails to operate in "earth auger" position.* Failure of the power-divider to operate in the "earth auger" position may be caused by wear or damage to the input shaft sliding gear or the rear output shaft. Remove the input shaft assembly and the rear output shaft assembly (par. 135) and replace any worn or damaged parts (par. 142).

(7) *Shifter rod fails to return to "neutral" position.* Refer to (3) above for troubleshooting procedure for this failure.

(8) *Power-divider leaks lubricant during operation.* Leakage of lubricant during operation of the power-divider may be caused by loose or defective cap screws, pipe plugs, oil seals, or gasket. Tighten all loose cap screws and pipe plugs. Replace any defective parts.

c. Further Procedure. If these troubleshooting procedures do not disclose the fault, proceed as prescribed in paragraph 22.

22. Troubleshooting After Removal and Before Operation

a. General. After the power-divider has been removed from the vehicle or if it has been received already removed, further inspection is necessary. Refer to paragraph 11*c* for purpose and scope of these procedures.

b. Detailed Procedure. Visually inspect the power-divider for lubricant leaks (par. 20*b*).

23. Troubleshooting After Removal and During Operation

a. General. This paragraph discusses those symptoms which can be diagnosed by operating the power-divider on a suitable test stand.

b. Detailed Procedure.

(1) *Installation on test stand.* Install the power-divider securely on the test stand.

(2) *Check lubricant level.* Check the power-divider to make sure that there is sufficient lubricant in the power-divider case according to instructions in LO 9–819.

(3) *Check for gear noises.* Apply low speed power to the power-divider and listen for unusual gear noises. Move the shifter rod through its entire range of positions and check for unusual noises. If unusual noises are heard, remove power to the divider and disassemble the power-divider (par. 139). Replace any worn or damaged parts (par. 142).

(4) *Operational tests.* Apply low speed power to the power-divider. Engage the shifter rod in all positions to test the power-divider in all operating conditions as detailed in paragraph 148. The divider should function in any of the three operating positions and have no output in the neutral position. Failure of the divider in any position may be caused by the troubles discussed in paragraph 21.

(5) *Lubricant leakage.* During and after the testing inspect the power-divider for lubricant leakage (par. 20*b*).

CHAPTER 4

REMOVAL AND INSTALLATION OF MAJOR COMPONENTS

Section I. REMOVAL OF MAJOR COMPONENTS

24. General

a. This section contains information for the guidance of personnel performing major rebuild work on the telephone construction and maintenance V–17A/MTQ; earth boring machine and pole setter, V–18A/MTQ, 2½-ton, 6 x 6, trucks. It provides an assembly line procedure for the disassembly of the vehicle into its major components. It designates what constitutes a major component, illustrates the points of connection between major components, and states briefly what must be done.

b. It is mandatory that the rear winch drive shaft assembly be removed from the V–17A/MTQ truck before the pillow block assembly is removed from the vehicle. It is mandatory that the pillow block assembly be removed from the V–17A/MTQ truck before the V–17A/MTQ rear winch assembly is removed from the vehicle. It is mandatory that the V–17A/MTQ rear winch control lever linkage be removed from the V–17A/MTQ truck at the same time that the rear winch assembly is removed from the vehicle. It is mandatory that the V–17A/MTQ rear winch assembly be removed from the V–17A/MTQ truck before the V–17A/MTQ body is removed from the truck. The order of removal of the remaining major components on the V–17A/MTQ truck is optional.

c. It is mandatory that the boring machine drive shaft assembly connecting the earth boring machine to the power-divider on the V–18A/MTQ truck be removed before removal of the earth boring machine and the power-divider. It also is mandatory that the power-divider drive shaft assembly and the power-divider control lever linkage be removed before removal of the power-divider from the V–18A/MTQ truck. It is mandatory that the V–18A/MTQ rear winch control lever linkage be removed from the V–18A/MTQ truck before removal of the V–18A/MTQ rear winch assembly from the vehicle. It is mandatory that the earth boring machine and the

V–18A/MTQ rear winch assembly be removed from the V–18A/MTQ truck before the V–18A/MTQ body is removed from the chassis. The order of removal of the remaining major components on the V–18A/MTQ truck is optional.

25. Rear Winch Drive Shaft Assembly Removal

The rear winch drive shaft assembly is removed from the V–17A/MTQ truck according to procedure in TM 9–819.

26. Pillow Block Assembly Removal

The pillow block assembly is removed from the V–17A/MTQ truck according to procedure in TM 9–819.

27. V–17A/MTQ Rear Winch Assembly and Control Lever Linkage Removal

The V–17A/MTQ rear winch assembly and control lever linkage are removed from the V–17A/MTQ truck according to procedure in TM 9–819.

28. V–17A/MTQ Body Removal

The V–17A/MTQ body is removed from the V–17A/MTQ truck according to procedure given in TM 9–8023–3 for removal of the M34 body with the addition of removal of two safety nuts and cap screws at rear of body and two added compression spring mountings at front of body.

29. Revolving Platform Assembly Removal

The revolving platform assembly is removed from the V–17A/MTQ truck according to procedure in TM 9–819.

30. Pole Derrick and Derrick Leg Hold-Down Clamp Assemblies Removal

The pole derrick and derrick leg hold-down clamp assemblies are removed from the V–17A/MTQ truck according to procedure in TM 9–819.

31. Roller Sheave Spindle Bars and Roller Sheaves and Universal Sheave Block Assembly Removal

The roller sheave spindle bars and roller sheaves and the universal sheave block assembly are removed from the V–17A/MTQ truck according to procedure in TM 9–819.

32. Collapsible Cable Reels, Support Legs, and Wheel Chock with Chain Assemblies Removal

The collapsible cable reels, support legs, and the wheel chock with chain assemblies are removed from the trucks according to procedure in TM 9–819.

33. Boring Machine Drive Shaft Assembly Removal

The boring machine drive shaft assembly is removed from the V–18A/MTQ truck according to procedure in TM 9–819.

34. Earth Boring Machine Removal

The earth boring machine is removed from the V–18A/MTQ truck according to procedure in TM 9–819.

35. Power-Divider Drive Shaft Assembly Removal

The power-divider drive shaft assembly is removed from the V–18A/MTQ truck according to procedure in TM 9–819.

36. Power-Divider Control Lever Linkage Removal

The power-divider control lever linkage is removed from the V–18A/MTQ truck according to procedure in TM 9–819.

37. Power-Divider Removal

The power-divider is removed from the V–18A/MTQ truck according to procedure in TM 9–819.

38. Earth Augers and Strap Sheave Assembly Removal

The earth augers and the strap sheave assembly are removed from the V–18A/MTQ truck according to procedure in TM 9–819.

39. V–18A/MTQ Rear Winch Assembly and Control Lever Linkage Removal

The V–18A/MTQ rear winch assembly and control lever linkage are removed from the V–18A/MTQ truck according to procedure in TM 9–819.

40. V–18A/MTQ Body Removal

The V–18A/MTQ body is removed from the V–18A/MTQ truck according to procedure given in TM 9–8023–3 for removal of the M34 body.

Section II. INSTALLATION OF MAJOR COMPONENTS

41. General

a. This section provides an assembly line procedure for assembling the vehicle from its major components.

b. It is mandatory that the body be installed on the V–17A/MTQ truck before the V–17A/MTQ rear winch assembly is installed on the vehicle. It is mandatory that the V–17A/MTQ rear winch control lever linkage be installed on the V–17A/MTQ truck at the same time as the V–17A/MTQ rear winch assembly. It is mandatory that the

V–17A/MTQ rear winch assembly be installed on the V–17A/MTQ truck before the pillow block assembly is installed on the vehicle. It is mandatory that the pillow block assembly be installed on the V–17A/MTQ truck before the rear winch drive shaft assembly is installed on the vehicle. The order of installation of the remaining major components on the V–17A/MTQ truck is optional.

c. It is mandatory that the body be installed on the V–18A/MTQ truck before the earth boring machine and the V–18A/MTQ rear winch assembly is installed on the vehicle. It is mandatory that the V–18A/MTQ rear winch control lever linkage be installed in the V–18A/MTQ truck at the same time as the V–18A/MTQ rear winch assembly. It is mandatory that the earth boring machine and the power-divider be installed on the V–18A/MTQ truck before the boring machine drive shaft assembly connecting the earth boring machine to the power-divider is installed on the vehicle. It also is mandatory that the power-divider be installed on the V–18A/MTQ truck before the power-divider drive shaft assembly and the power-divider control lever linkage are installed on the vehicle.

42. Installation of V–17A/MTQ Body

The V–17A/MTQ body is installed on the V–17A/MTQ truck according to procedure given in TM 9–8023–3 for installation of the M34 body with the addition of installation of two ⅝–18NF x 2 hex-head cap screws and ⅝–18NF safety nuts at rear of body and two added compression spring mountings at front of body.

43. Installation of V–17A/MTQ Rear Winch Assembly and Control Lever Linkage

The V–17A/MTQ rear winch assembly and control lever linkage are installed on the V–17A/MTQ truck according to procedure in TM 9–819.

44. Installation of Pillow Block Assembly

The pillow block assembly is installed on the V–17A/MTQ truck according to procedure in TM 9–819.

45. Installation of Rear Winch Drive Shaft Assembly

The rear winch drive shaft assembly is installed on the V–17A/MTQ truck according to procedure in TM 9–819.

46. Installation of Revolving Platform Assembly

The revolving platform assembly is installed on the V–17A/MTQ truck according to procedure in TM 9–819.

47. Installation of Pole Derrick and Derrick Leg Hold-Down Clamp Assemblies

The pole derrick and the derrick leg hold-down clamp assemblies are installed on the V–17A/MTQ truck according to procedure in TM 9–819.

48. Installation of Roller Sheave Spindle Bars and Roller Sheaves and Universal Sheave Block Assembly

The roller sheave spindle bars and roller sheaves and the universal sheave block assembly are installed on the V–17A/MTQ truck according to procedure in TM 9–819.

49. Installation of Collapsible Cable Reels, Support Legs, and Wheel Chock with Chain Assemblies

The collapsible cable reels, support legs, and wheel chock with chain assemblies are installed according to procedure in TM 9–819.

50. Installation of V–18A/MTQ Body

The V–18A/MTQ body is installed on the V–18A/MTQ truck according to procedure given in TM 9–8023–3 for installation of the M34 body.

51. Installation of V–18A/MTQ Rear Winch Assembly and Control Lever Linkage

The V–18A/MTQ rear winch assembly and control lever linkage are installed on the V–18A/MTQ truck according to procedure in TM 9–819.

52. Installation of Power-Divider

The power-divider is installed on the V–18A/MTQ truck according to procedure in TM 9–819.

53. Installation of Power-Divider Drive Shaft Assembly

The power-divider drive shaft assembly is installed on the V–18A/MTQ truck according to procedure in TM 9–819.

54. Installation of Power-Divider Control Lever Linkage

The power-divider control lever linkage is installed on the V–18A/MTQ truck according to procedure in TM 9–819.

55. Installation of Earth Boring Machine

The earth boring machine is installed on the V–18A/MTQ truck according to procedure in TM 9–819.

56. Installation of Boring Machine Drive Shaft Assembly

The boring machine drive shaft assembly is installed in the V 18A/MTQ truck according to procedure in TM 9 819.

57. Installation of Earth Augers and Strap Sheave Assembly

The earth augers and the strap sheave assembly are installed on the V 18A/MTQ truck according to procedure in TM 9 819.

58. Inspection

Perform a technical inspection as prescribed in AR 700 105, using DA Form 461 5, Limited Techincal Inspection, and as outlined in TM 9-819 for the "6,000-mile" or 6 months organizational maintenance service.

CHAPTER 5
EARTH BORING MACHINE

Section I. DESCRIPTION AND DATA

59. Description and Operation

a. Description.

(1) The earth boring machine (figs. 7 and 8), mounted on the rear of the V–18A/MTQ truck, is designed to bore holes in most kinds of soil. Four earth augers (fig. 58) furnished with the boring machine permit power boring of holes 9, 12, 16, and 20 inches in diameter to a maximum depth of 7 feet. Power for the boring machine is transmitted from the V–18A/MTQ truck transfer case power-take-off to a power-divider (fig. 80), then through the earth boring machine drive shaft assembly (par. 155) to the boring machine.

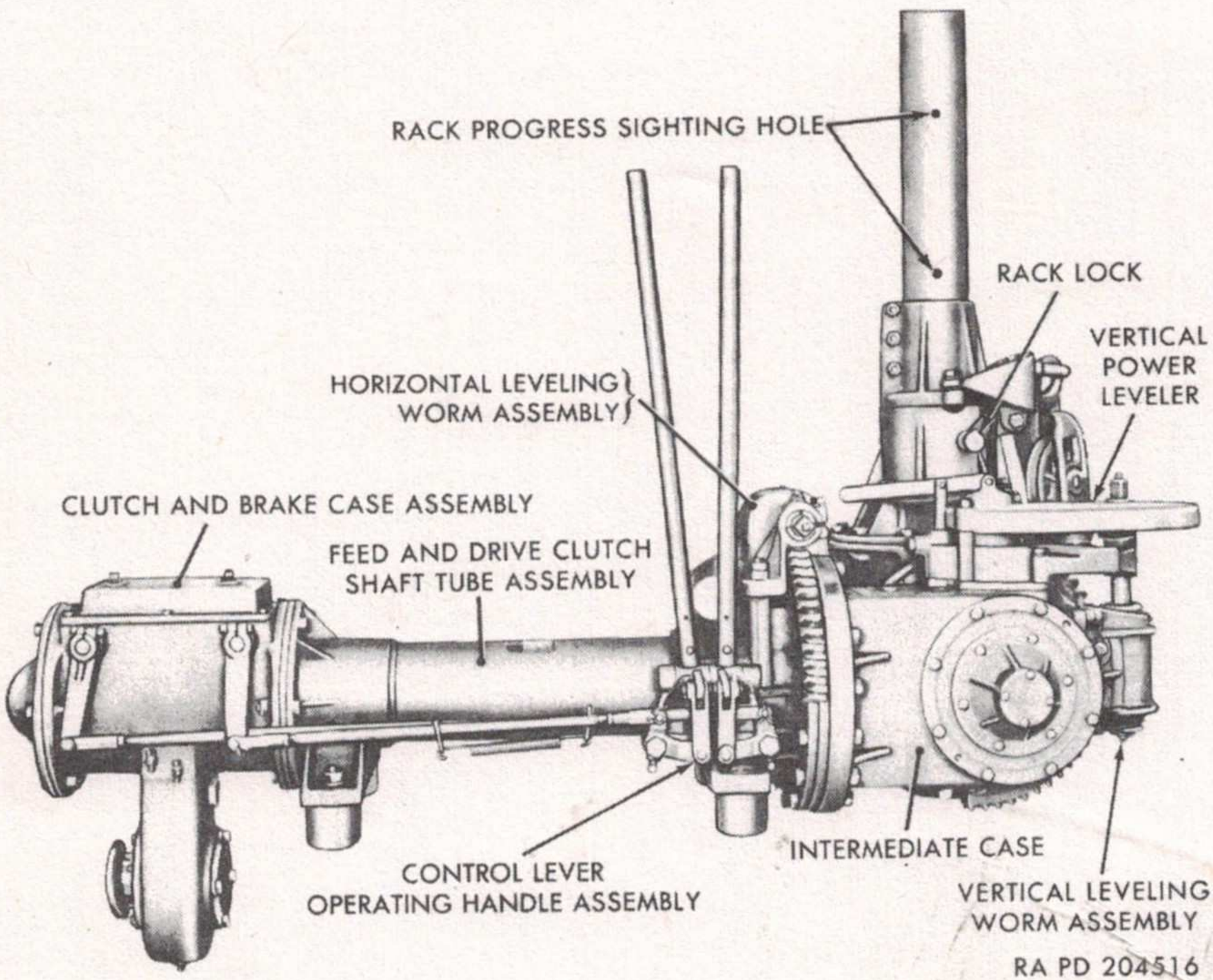


Figure 7. Earth boring machine, model "HD"—left side view..

(2) Fastened to the boring machine base, the feed and drive clutch shaft tube assembly supports the major components of the earth boring machine. The clutch and brake case assembly, connected on the front of the clutch shaft tube assembly, contains the input shaft assembly and the feed and drive clutch and brake assemblies. The feed and drive clutch shaft tube, containing the feed and drive clutch shafts also serves as a mount for the control lever operating handle assembly and the horizontal leveling worm assembly. The right-hand operating handle is the drive control lever operating handle while the left-hand handle is the feed control lever operating handle. Connected to the rear of the clutch shaft tube is the intermediate case containing the reduction feed and drive gears and pinions. The intermediate case mounts the vertical power leveler and the vertical leveling worm assembly. This case also supports the boring case. The boring case contains the boring gear assembly through which the auger rack passes. The integral derrick assembly is supported by the boring case. The derrick assembly includes the derrick tube, derrick tube base, rack lock, derrick sheave assembly, and a snatch sheave assembly.

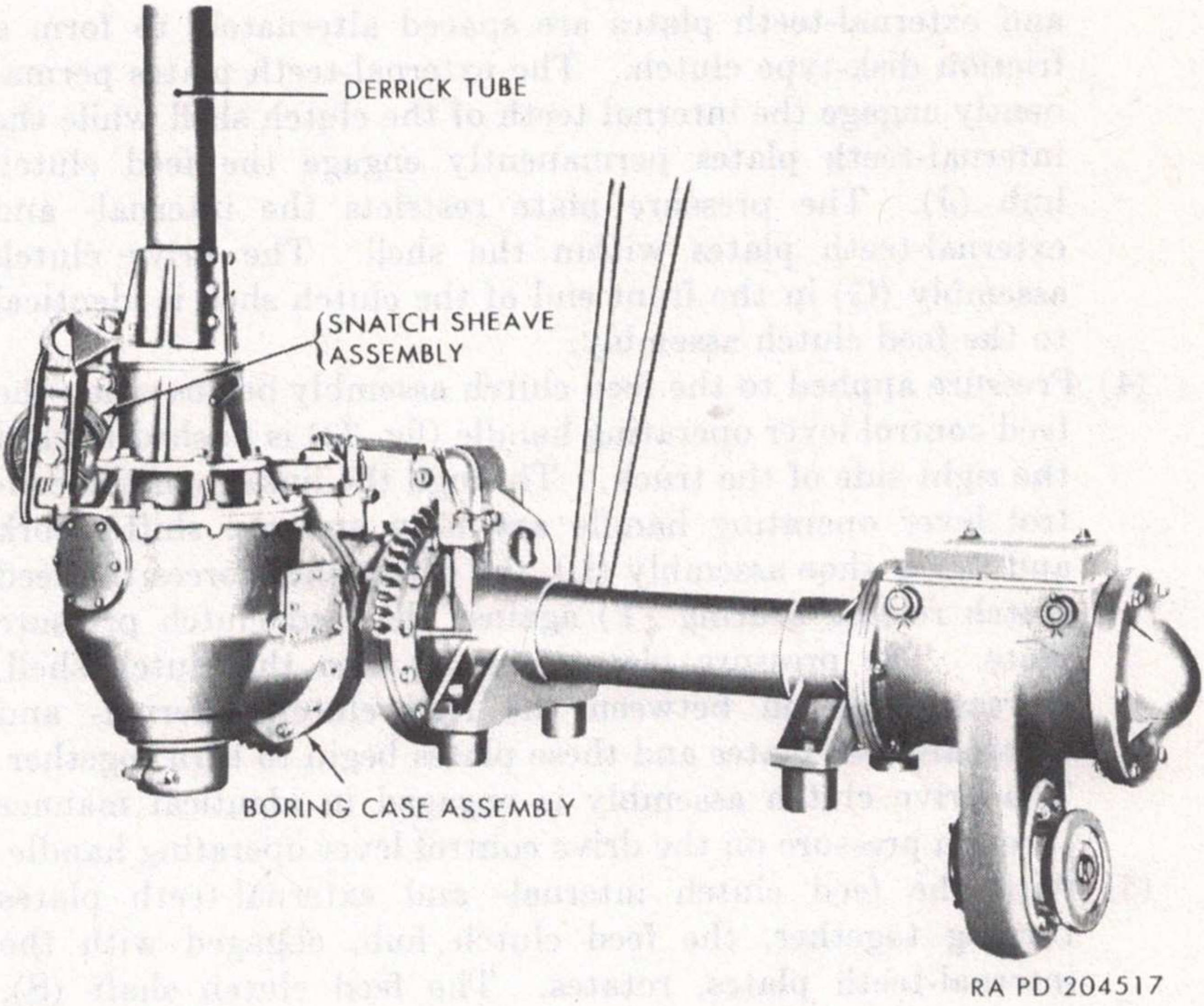


Figure 8. Earth boring machine, model "HD"—right side view.

(3) A strap sheave assembly is mounted on the rear, right-hand side of the V–18A/MTQ body adjacent to the earth boring machine. The four earth augers are mounted at the front of the body, two on each side of the rear winch assembly.

b. Operation.

Note. The key letters noted in parentheses are in figure 9, except where otherwise indicated.

(1) The earth boring machine is of the feed- and drive-type with the auger rack being raised, lowered, and rotated by gears and pinions in the boring case. During normal boring operations, the boring machine is run at a speed selected through the forward gears of the transmission of the V–18A/MTQ truck. There is no reversal of power to the boring machine during boring.

(2) Power to the input shaft (W) in the clutch and brake case is transferred through the input shaft gear (X) and the idler gear (V) to the main-drive-and-clutch shell with integral gear (H). The clutch shell rotates continuously as long as power is applied to the boring machine.

(3) Assembled within the rear end of the main-drive-and-clutch shell are the feed clutch internal- and external-teeth plates (U) and the feed clutch pressure plate (K). The internal and external-teeth plates are spaced alternately to form a friction disk-type clutch. The external-teeth plates permanently engage the internal teeth of the clutch shell while the internal-teeth plates permanently engage the feed clutch hub (J). The pressure plate restricts the internal- and external-teeth plates within the shell. The drive clutch assembly (G) in the front end of the clutch shell is identical to the feed clutch assembly.

(4) Pressure applied to the feed clutch assembly begins when the feed control lever operating handle (fig. 33) is pushed toward the right side of the truck. Through the linkage of the control lever operating handle assembly and the shifter fork and throw shoe assembly (L), the throw shoe forces the feed clutch release bearing (T) against the feed clutch pressure plate. The pressure plate, pressing into the clutch shell, increases friction between the feed clutch internal- and external-teeth plates and these plates begin to turn together. The drive clutch assembly is engaged in identical manner through pressure on the drive control lever operating handle.

(5) With the feed clutch internal- and external-teeth plates turning together, the feed clutch hub, engaged with the internal-teeth plates, rotates. The feed clutch shaft (S), keyed to the hub, rotates with the hub. Releasing the feed

control lever operating handle removes shifter fork throw shoe pressure on the feed clutch assembly. The friction between the internal- and external-teeth plates decreases and the feed clutch shaft stops rotating. The drive clutch assembly causes rotation of the drive clutch shaft (A) through the drive clutch hub (F) that is keyed to the drive clutch shaft sleeve (B) which is keyed to the shaft.

(6) The feed brake assembly is comprised of alternately assembled feed brake internal- and external-teeth plates (R) held within the feed brake housing with integral gear (N) by the feed brake pressure plate (M). The external-teeth plates are permanently engaged in the internal teeth of the brake housing. The internal-teeth plates permanently engage the feed brake hub (Q). The brake hub is keyed to the feed clutch shaft. The feed brake housing is secured between the clutch and brake case and the feed and drive clutch shaft tube front support (P). The construction of the drive brake assembly (E) is similar to the feed brake assembly. The drive brake housing with integral gear (D) is secured to the clutch and brake case. The drive brake hub (C) is keyed to the drive clutch shaft sleeve (B) which, in turn, is keyed to the drive clutch shaft (A).

(7) Pulling back on the feed control lever operating handle causes the shifter fork and throw shoe assembly to apply pressure against the feed brake pressure plate. The pressure plate forces the feed brake internal- and external-teeth plates into closer frictional contact. This prevents rotation of the feed clutch shaft. The drive clutch shaft is held from rotation by identical action of the drive brake assembly.

(8) The feed clutch shaft extends from the clutch and brake case through the feed and drive clutch shaft tube assembly (fig. 10) into the intermediate case. The first reduction feed pinion, keyed to the shaft, meshes with the first reduction feed gear (B, fig. 11). The first reduction drive pinion (fig. 10), keyed on the end of the drive clutch shaft extending into the intermediate case (C, fig. 11) mates with the first reduction drive gear (D, fig. 11).

(9) The first reduction drive gear is keyed to the second reduction drive pinion with integral shaft (E, fig. 11). The second reduction drive pinion, extending into the boring case (H, fig. 11), meshes with the rack drive gear (G, fig. 11). The rack carrier (M, fig. 11), bolted to the rack drive gear, rotates on a vertical axis with the drive gear. The auger rack (L, fig. 11), passing through the rack carrier, rotates with the carrier.

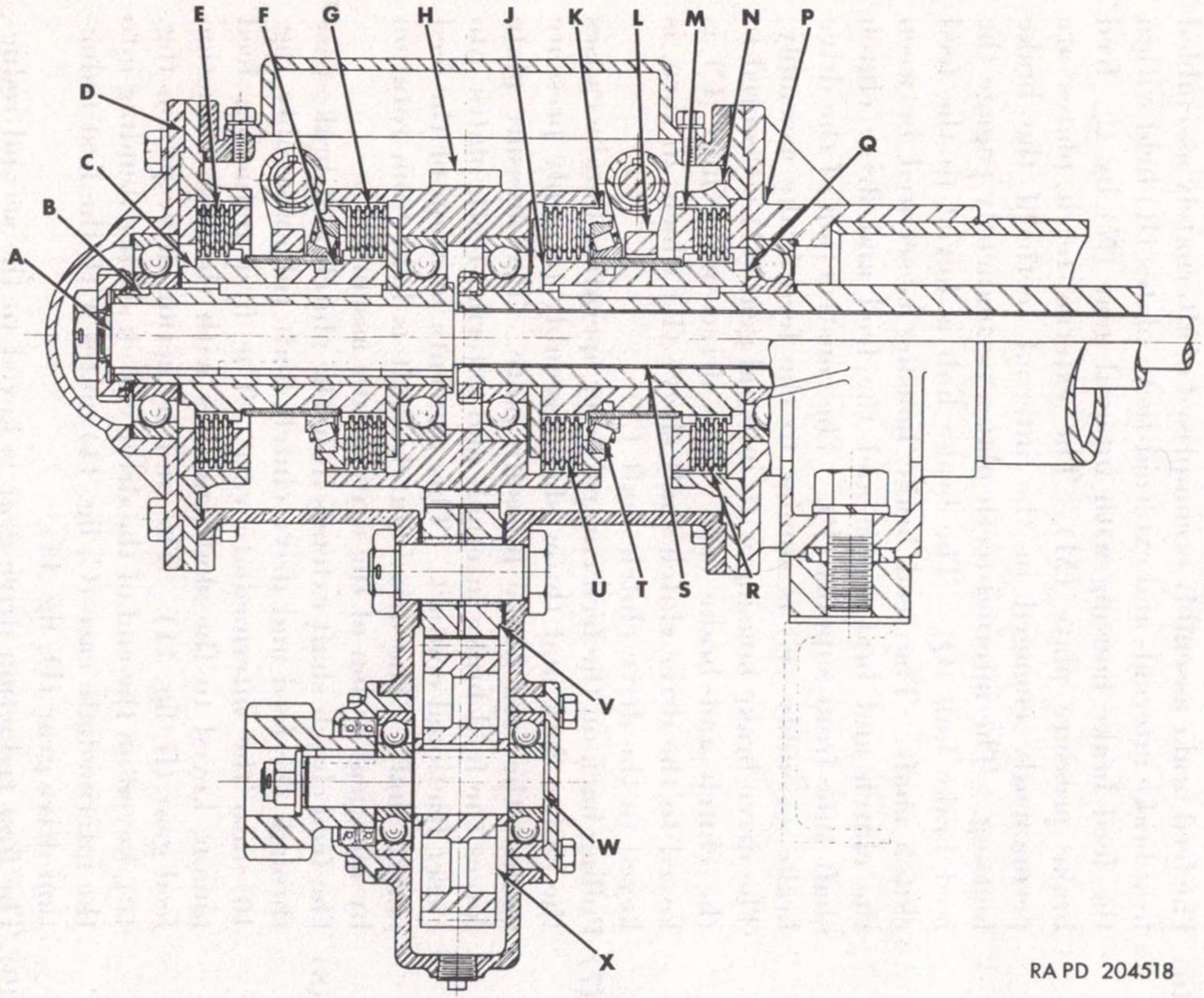


Figure 9. Clutch and brake case assembly.

A—Drive clutch shaft
B—Drive clutch shaft sleeve
C—Drive brake hub
D—Drive brake housing with integral gear
E—Drive brake assembly
F—Drive clutch hub
G—Drive clutch assembly
H—Main-drive-and-clutch shell with integral gear
J—Feed clutch hub
K—Feed clutch pressure plate
L—Shifter fork and throw shoe assembly
M—Feed brake pressure plate
N—Feed brake housing with integral gear
P—Feed and drive clutch shaft tube front support
Q—Feed brake hub
R—Feed brake internal- and external-teeth plates
S—Feed clutch shaft
T—Feed clutch release bearing
U—Feed clutch internal- and external-teeth plates
V—Idler gear
W—Input shaft
X—Input shaft gear

Figure 9—Continued

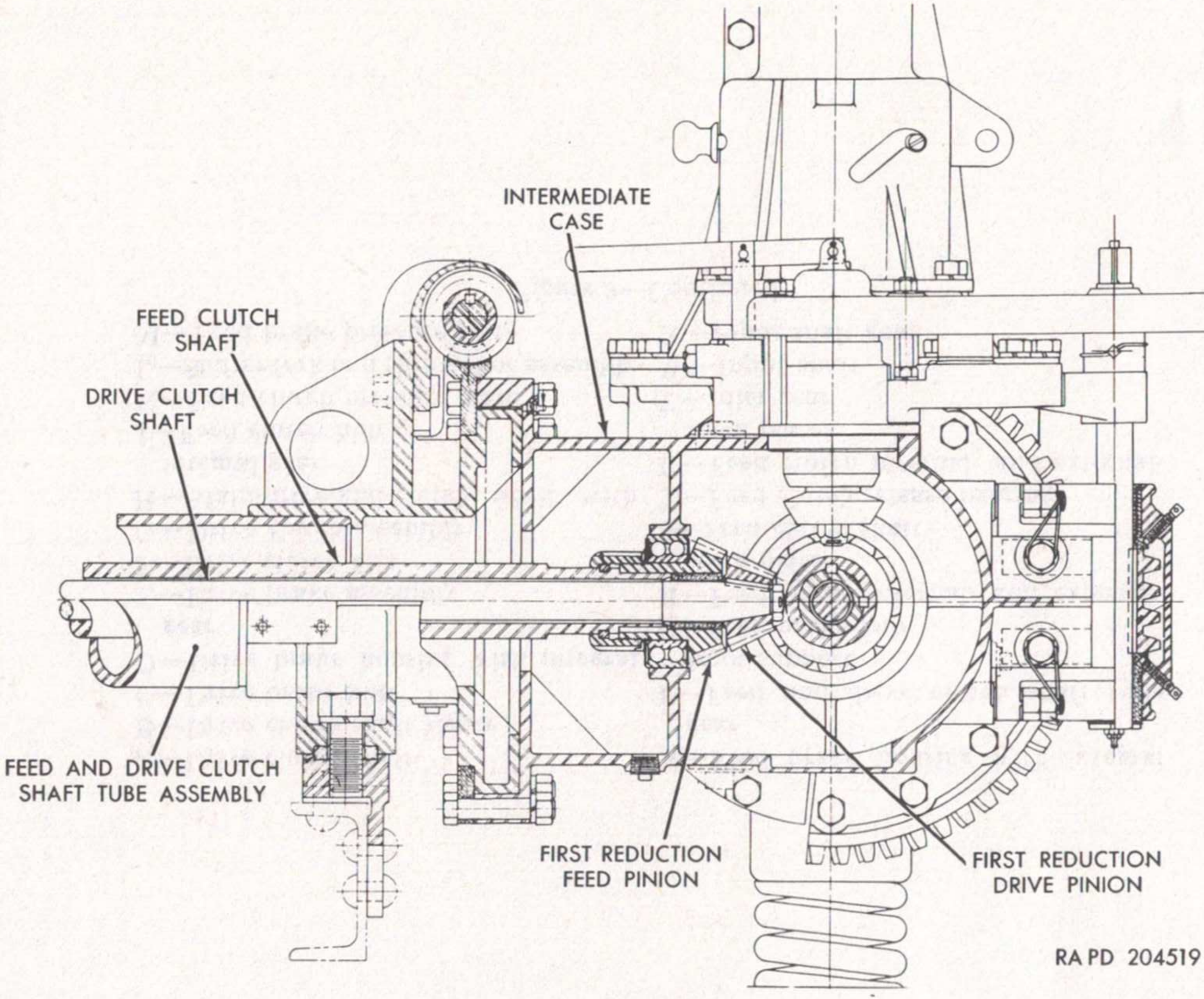
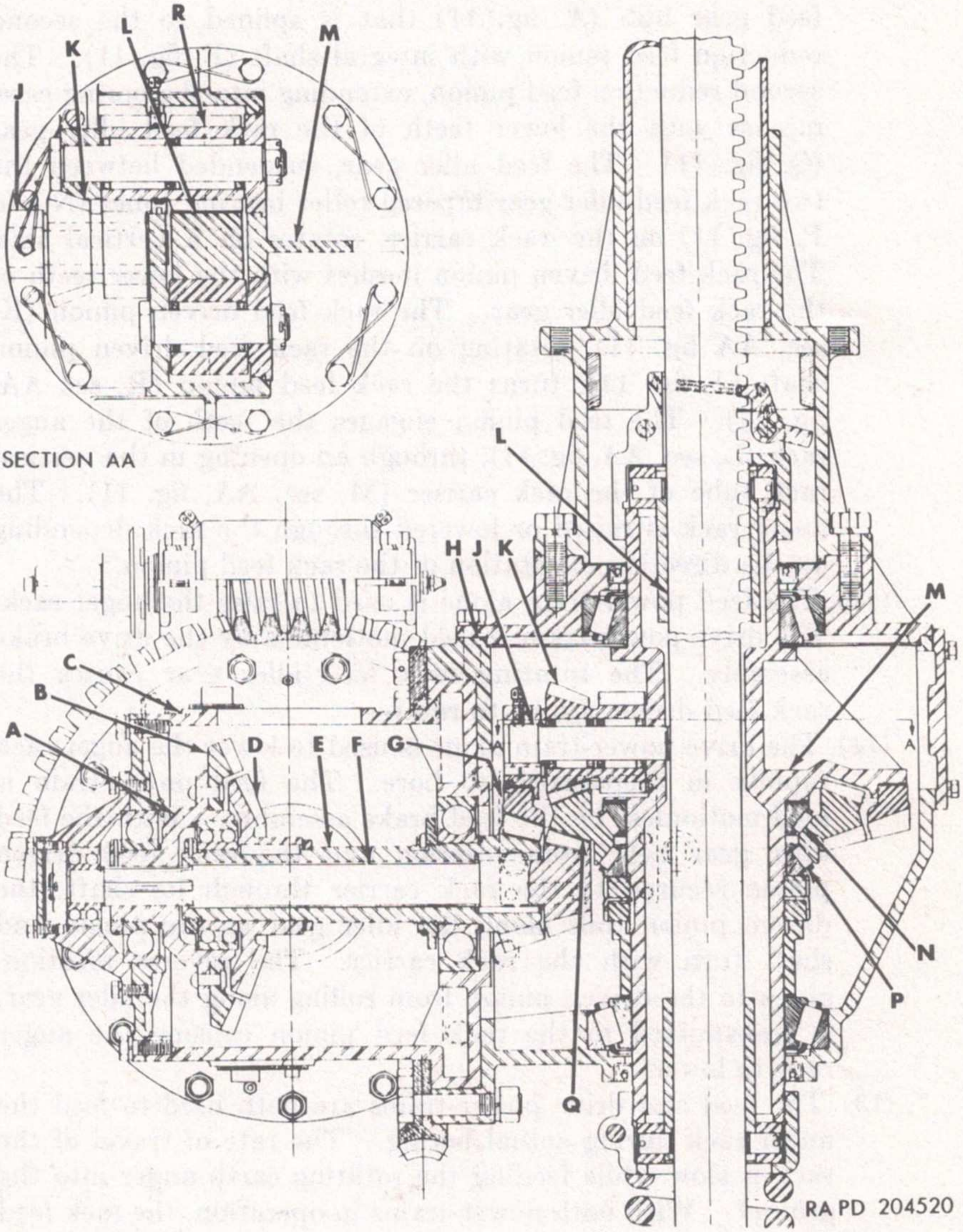


Figure 10. Intermediate case.



RA PD 204520

A—First reduction feed gear hub
B—First reduction feed gear
C—Intermediate case
D—First reduction drive gear
E—Second reduction drive pinion with integral shaft
F—Second reduction feed pinion with integral shaft
G—Rack drive gear
H—Boring case
J—Rack feed driven pinion shaft
K—Rack reed driven pinion
L—Auger rack
M—Rack carrier
N—Rack feed idler gear tapered roller roller bearing cone
P—Rack feed idler gear tapered roller bearing cone
Q—Rack feed idler gear
R—Rack feed pinion

Figure 11. Intermediate case and boring case assemblies.

(10) The first reduction feed gear is riveted to the first reduction feed gear hub (A, fig. 11) that is splined to the second reduction feed pinion with integral shaft (F, fig. 11). The second reduction feed pinion, extending into the boring case, meshes with the lower teeth of the rack feed idler gear (Q, fig. 11). The feed idler gear, suspended between the two rack feed idler gear tapered roller bearing cones (N and P, fig. 11) on the rack carrier, rotates on a vertical axis. The rack feed driven pinion meshes with the lower teeth of the rack feed idler gear. The rack feed driven pinion (K, sec. AA fig. 11), rotating on the rack feed driven pinion shaft (J, fig. 11), turns the rack feed pinion (R, sec AA, fig. 11). The feed pinion engages the teeth of the auger rack (L, sec. AA, fig. 11), through an opening in the vertical rack tube of the rack carrier (M, sec. AA, fig. 11). The auger rack is raised or lowered through the rack depending on the direction of rotation of the rack feed pinion.

(11) The feed power-train alone is used to raise the auger rack. The drive power-train is held motionless by the drive brake assembly. The rotating rack feed idler gear causes the rack feed driven pinion to rotate.

(12) The drive power-train alone is used to lower the auger rack rapidly in preparation to bore. The feed power-train is held motionless by the feed brake assembly. With the feed idler gear held from rotation and the rack feed driven pinion secured to the rack carrier through its shaft, the driven pinion rolls along the idler gear as the pinion and shaft turn with the rack carrier. The reverse rotation, given to the driven pinion from rolling along the idler gear, is transmitted to the rack feed pinion causing the auger rack to lower.

(13) The feed and drive power-trains are both used to feed the auger rack during actual boring. The rate of travel of the rack is slow while feeding the rotating earth auger into the ground. With both power-trains in operation, the rack feed idler gear and the rack drive gear are rotating. The rack drive gear causes the rack feed driven pinion to roll along the idler gear, but the idler gear rotating in the same direction as the drive gear, reduces the actual rotation of the driven pinion. This combination of the feed power-train tending to raise the auger rack ((11) above) and the drive power-train tending to lower the rack rapidly ((12) above) gives a resultant slow lowering, or feeding, motion to the rotating rack.

(14) All actions of the auger rack depend on the amount of slippage in the feed and drive clutch assemblies. Controlled

motion of the control lever operating handles can change the relative speeds of the rack feed idler gear and the rack drive gear. Through these changeable relative speeds, the auger rack can be rotated at various speeds or stopped, raised or lowered at various speeds, or held motionless vertically.

(15) The vertical power leveler adjusts the vertical leveling worm assembly to establish and maintain the forward-to-rear vertical position of the auger rack through an arc of 90°. This action is accomplished by the vertical leveling worm assembly by positioning the boring case. Power for the power leveler is taken from the first reduction drive gear in the intermediate case. The manually-operated horizontal leveling worm assembly is used to position the intermediate case horizontally and, consequently, the boring case and auger rack in a right-to-left vertical direction through an arc of 90°. The combined action of the two leveling worm assemblies permits the digging of vertical holes without regard to the position of the vehicle on the terrain. This leveling combination also permits the digging of predetermined nonvertical holes for guy wire anchors and other purposes.

(16) The earth boring machine is nonautomatic. All auger rack and earth auger motion will cease upon release of the control lever operating handles. This is an important safety feature of the boring machine. Refer to TM 9–819 for full operating information and instructions.

(17) The derrick tube is used as a protective covering for the auger rack. The derrick tube, the derrick sheave assembly on the top of the tube, the snatch sheave assembly on the tube base, and the strap sheave assembly adjacent to the earth boring machine are used for pole setting operations with the V–18A/MTQ rear winch assembly (fig. 68).

60. Data

Make	Highway Trailer Company
Model	HD
Digging depth	7 ft
Auger rack length	13 ft
Earth auger sizes	9-, 12-, 16-, and 20-in diameter

Section II. DISASSEMBLY OF EARTH BORING MACHINE INTO SUBASSEMBLIES

61 Removal of Integral Derrick Assembly

a. Remove Derrick Tube (fig. 12). Raise the derrick tube until tube is clear of all obstacles.

Caution: Be sure there is sufficient space for removal of the der-

rick tube and that the boring machine is operated at low speeds during removal procedure.

Release rack lock on derrick tube base. Turn input shaft companion flange (fig. 66) clockwise, when facing flange, while moving control lever operating handles to run auger rack out of derrick tube. Run auger rack out of boring case until auger rack guide is visible in the lowest sighting hole in derrick tube. Loosen three hex nuts and cap screws securing tube in tube base and remove tube from base.

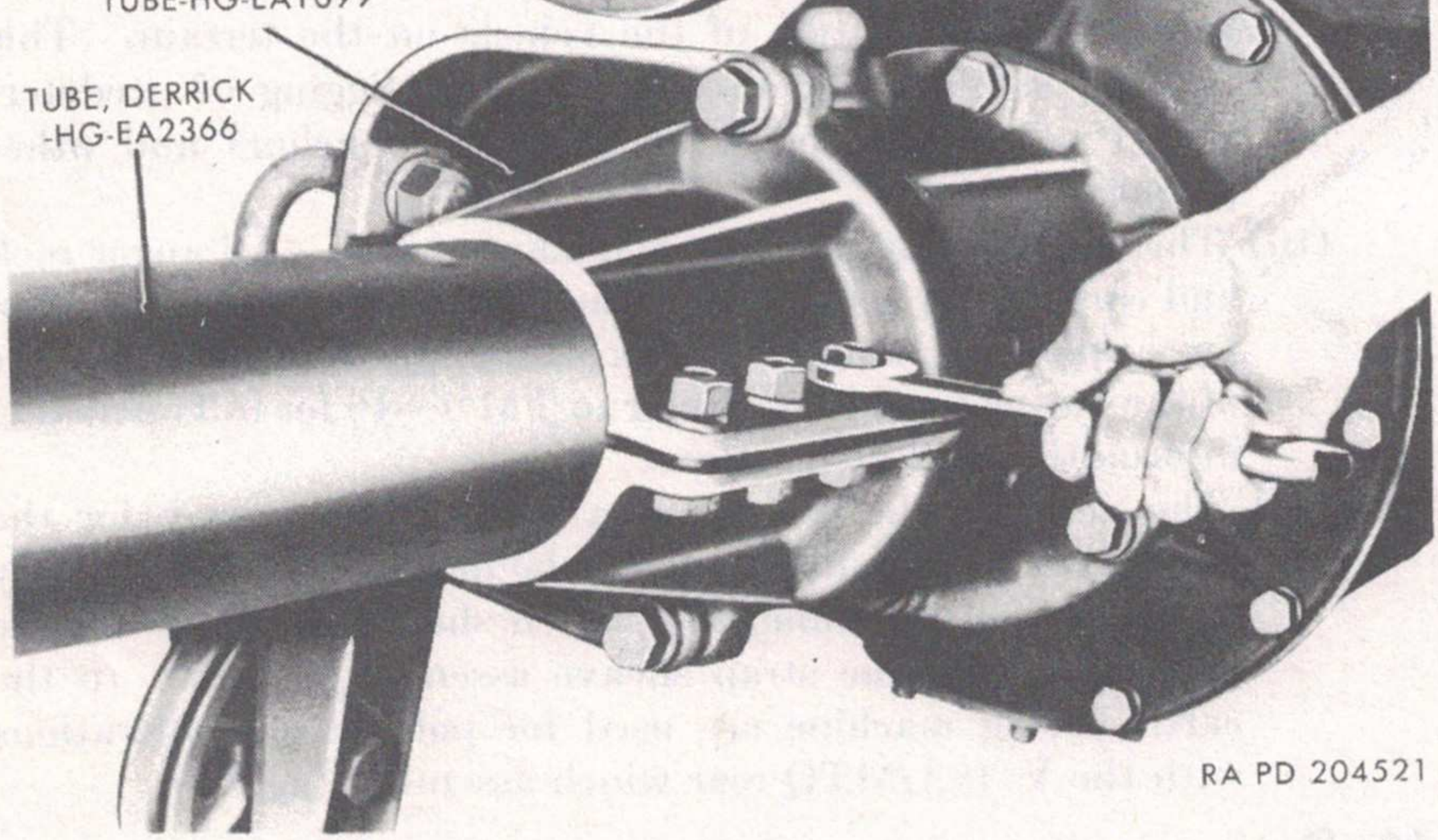


Figure 12. Removing derrick tube.

b. Remove Derrick Sheave Assembly. Loosen two hex-head cap screws and lockwashers holding derrick sheave assembly in the derrick tube sufficiently to clear the slot in derrick sheave support block. Remove derrick sheave assembly from derrick tube (fig. 13). Remove the cap screws and lockwashers completely from derrick tube and remove derrick tube cap from the derrick tube (fig. 14).

c. Remove Rack Guide and Derrick Tube Base Assembly (fig. 17).

(1) *Remove rack guide* (fig. 16). Remove the round-head screw and lockwasher holding rack guide pin in rack guide. Remove guide pin from rack guide. Remove rack guide from auger rack.

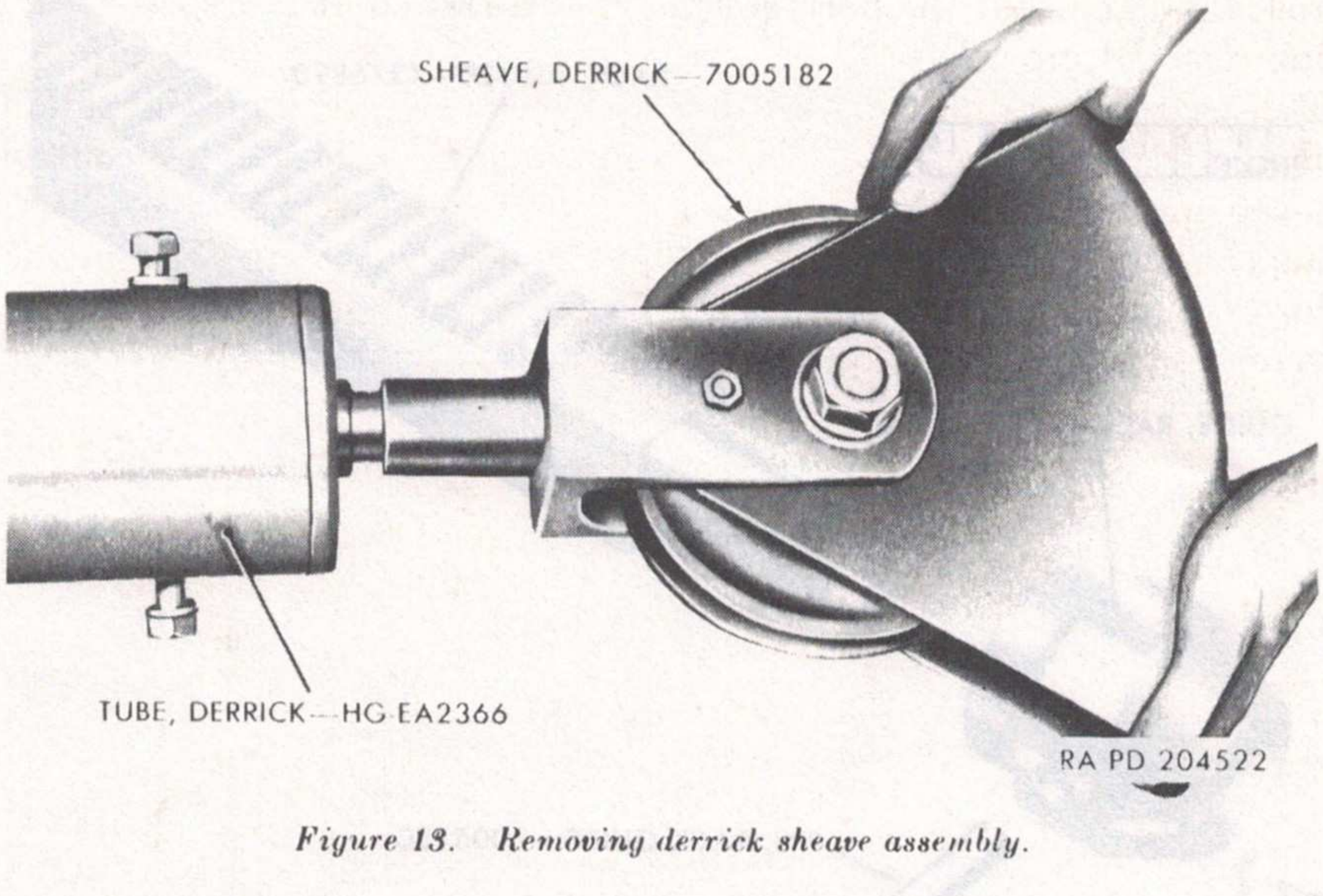


Figure 13. Removing derrick sheave assembly.

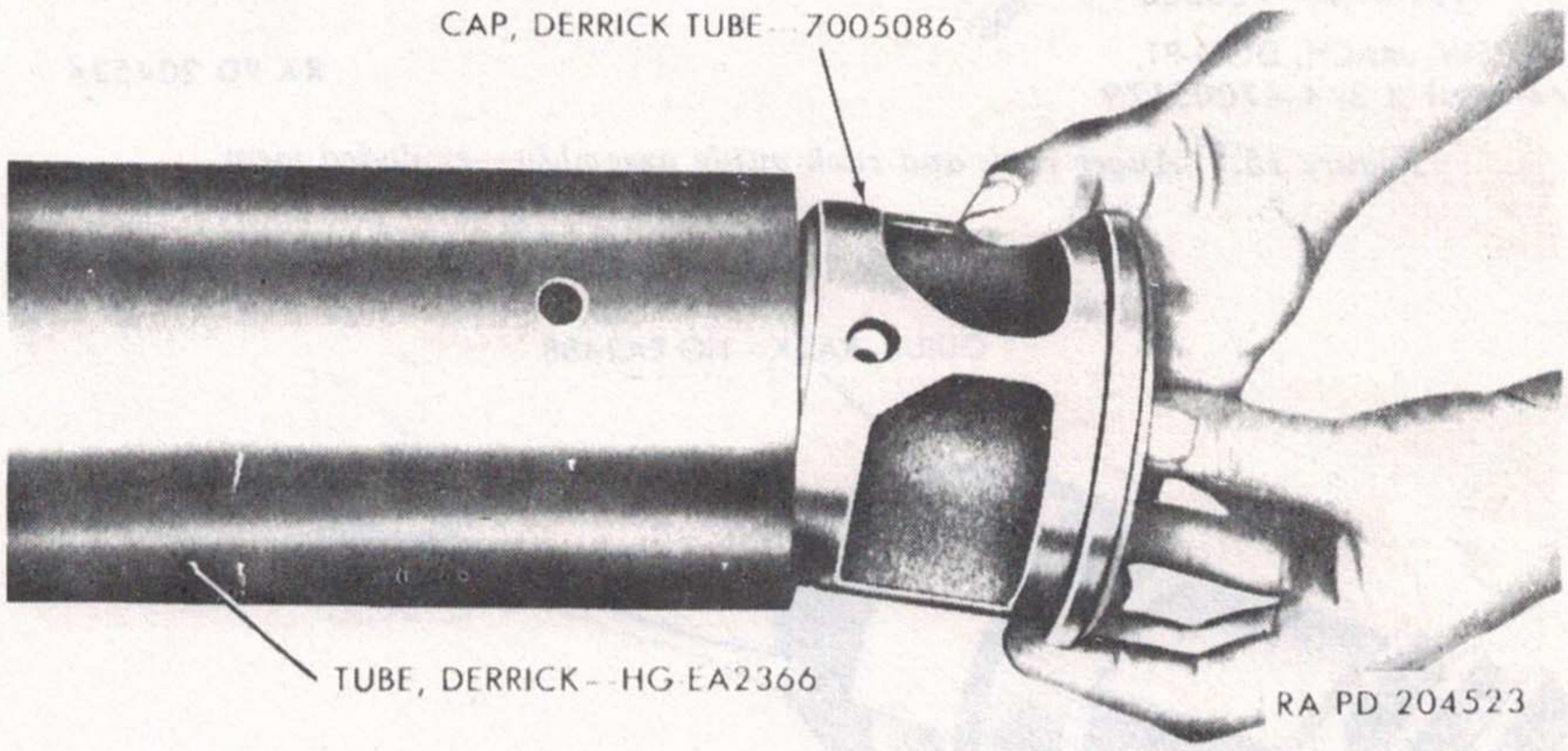


Figure 14. Removing derrick tube cap.

(2) *Remove derrick tube base assembly* (fig. 17). Remove the six hex-head cap screws and lockwashers holding derrick tube base to boring case cover. Remove tube base assembly from boring case cover.

d. Remove Snatch Sheave Assembly (fig. 8). Remove four hex-head cap screws and lockwashers from snatch sheave anchor bracket. Remove the hex nut, lockwasher, and hex-head cap screw holding anchor bracket to derrick tube base. Remove snatch sheave and anchor bracket assembly from derrick tube base.

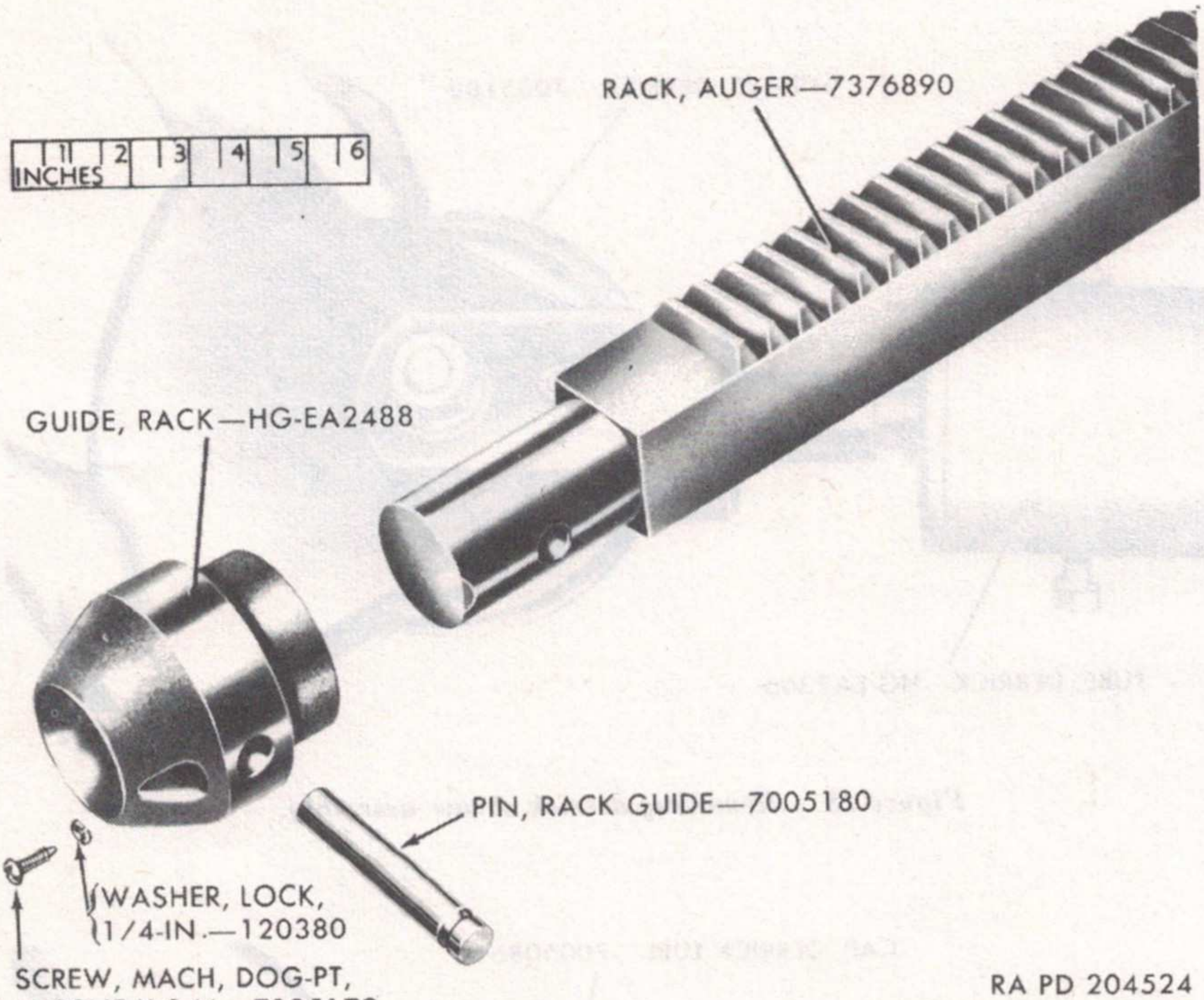


Figure 15. Auger rack and rack guide assembly—exploded view.

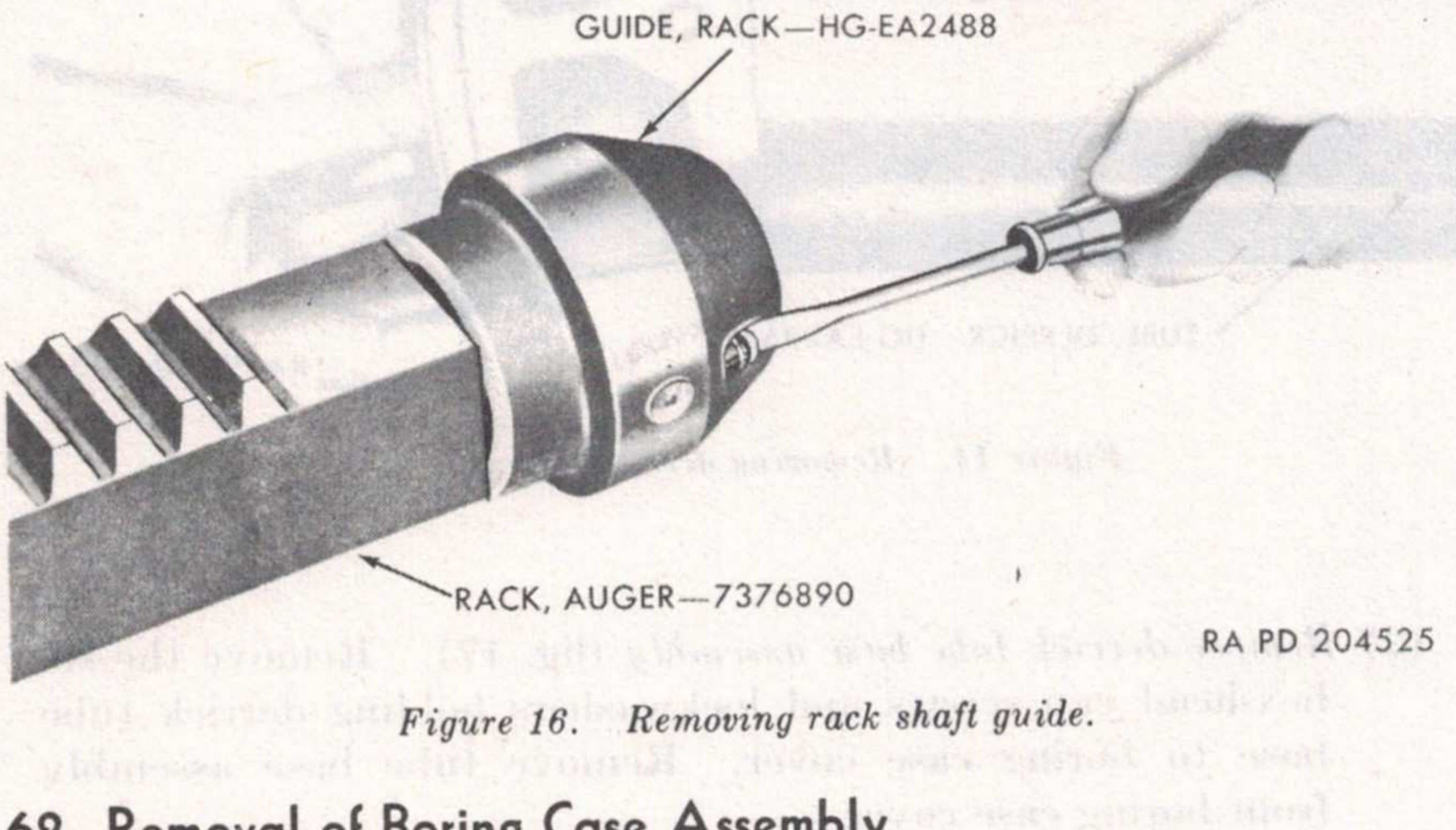


Figure 16. Removing rack shaft guide.

62. Removal of Boring Case Assembly

a. Remove Rack Thrust Plate Cage Cap Assemblies and Auger Rack.

(1) *Remove rack thrust plate cage upper cap assembly* (fig. 18). Run auger rack (par. 61*a*) out of boring case until the square of the rack clears rack thrust plate cage upper cap. Remove hex-head cap screw and lockwasher from upper cap and re-

move cap from rack carrier. Remove upper cap and rack thrust plate upper cap spacer set from the rack. Check and record the thickness of spacers removed to insure that spacers of the same thickness are used in installation (par. 95*d*(3)). Remove rack thrust plate cage assembly from rack carrier and rack. Remove thick and thin rack thrust plates from thrust plate cage.

(2) *Remove rack thrust plate cage lower cap assembly* (fig. 19). Loosen the hex nut, lockwasher, and hex-head cap screw securing rack thrust plate cage lower cap on rack carrier. Unscrew and remove lower cap from rack carrier and auger rack. Taking the weight of auger rack off rack thrust plates, remove rack thrust plate cage assembly from rack

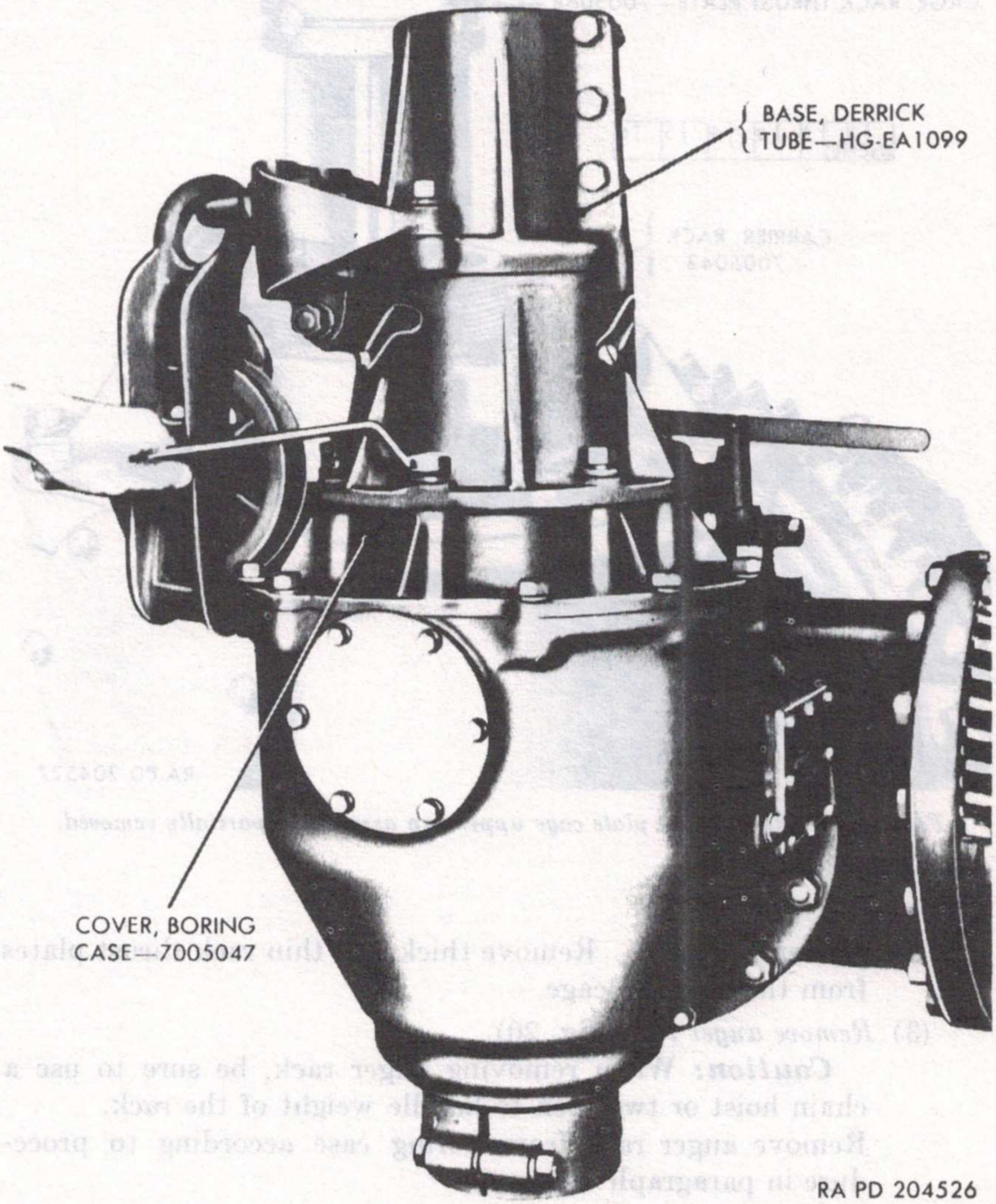


Figure 17. Removing derrick tube base assembly.

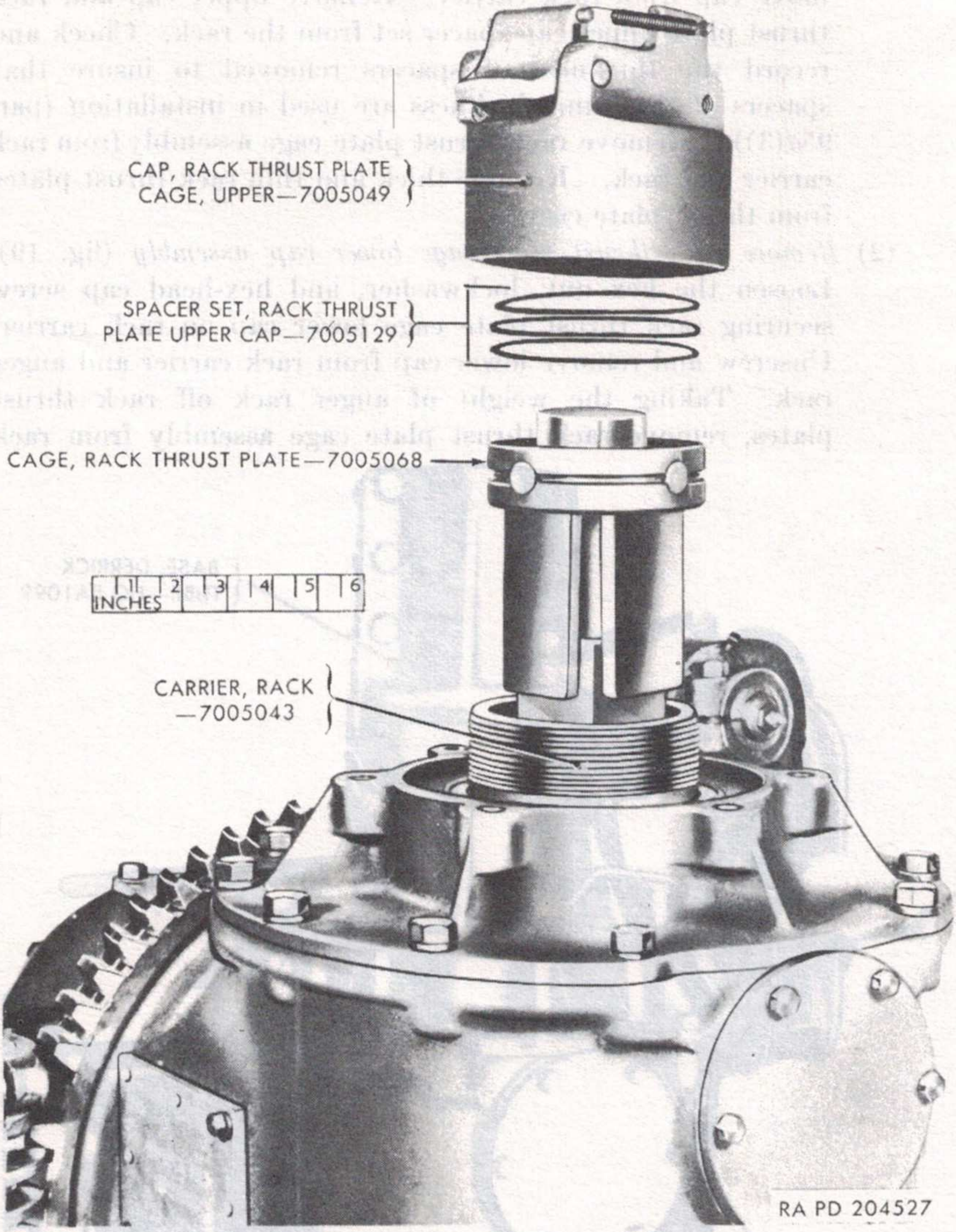


Figure 18. Rack thrust plate cage upper cap assembly—partially removed.

carrier and rack. Remove thick and thin rack thrust plates from thrust plate cage.

(3) *Remove auger rack* (fig. 20).

Caution: When removing auger rack, be sure to use a chain hoist or two men to handle weight of the rack. Remove auger rack from boring case according to procedure in paragraph 61*a*.

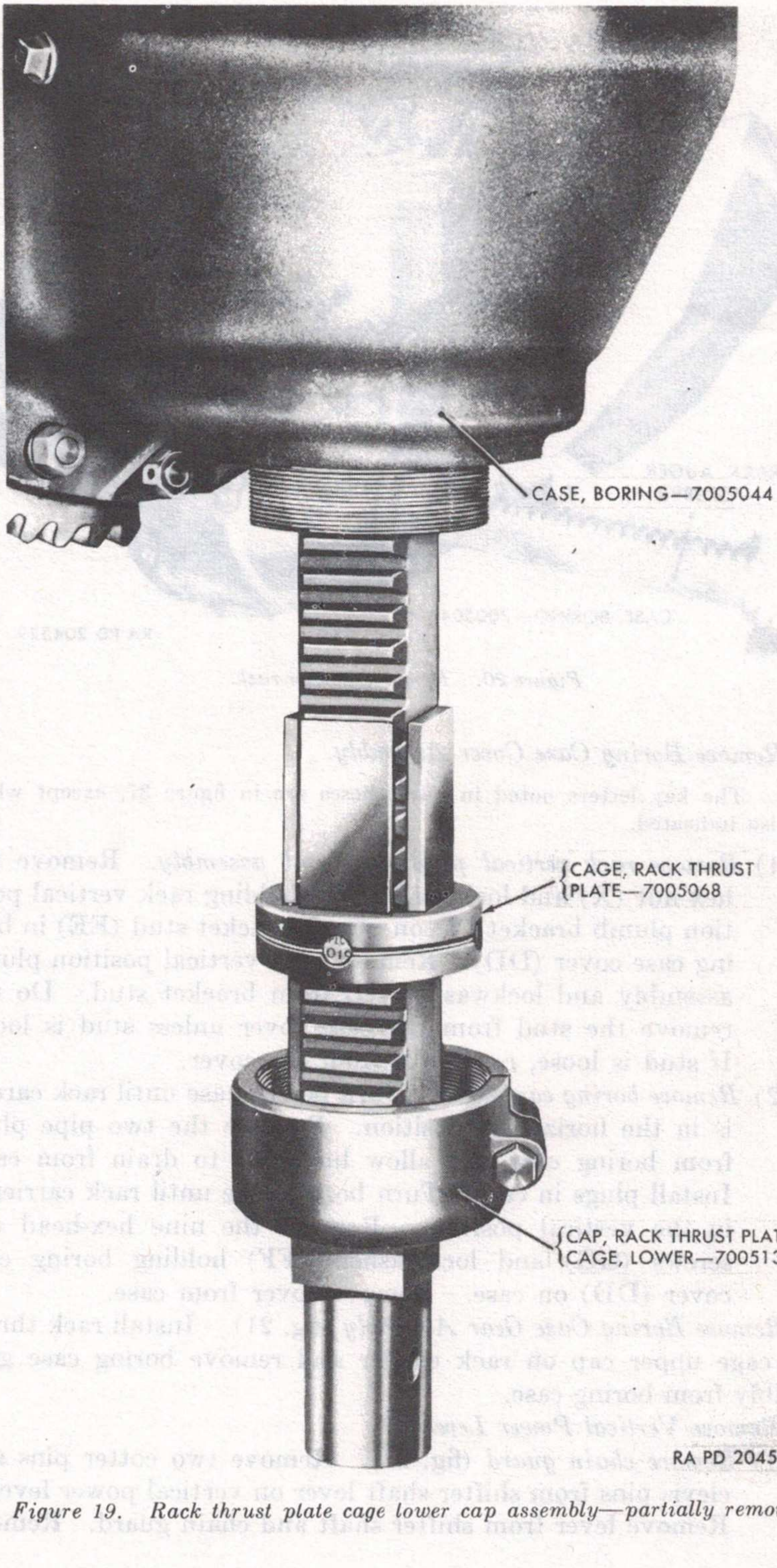


Figure 19. Rack thrust plate cage lower cap assembly—partially removed.

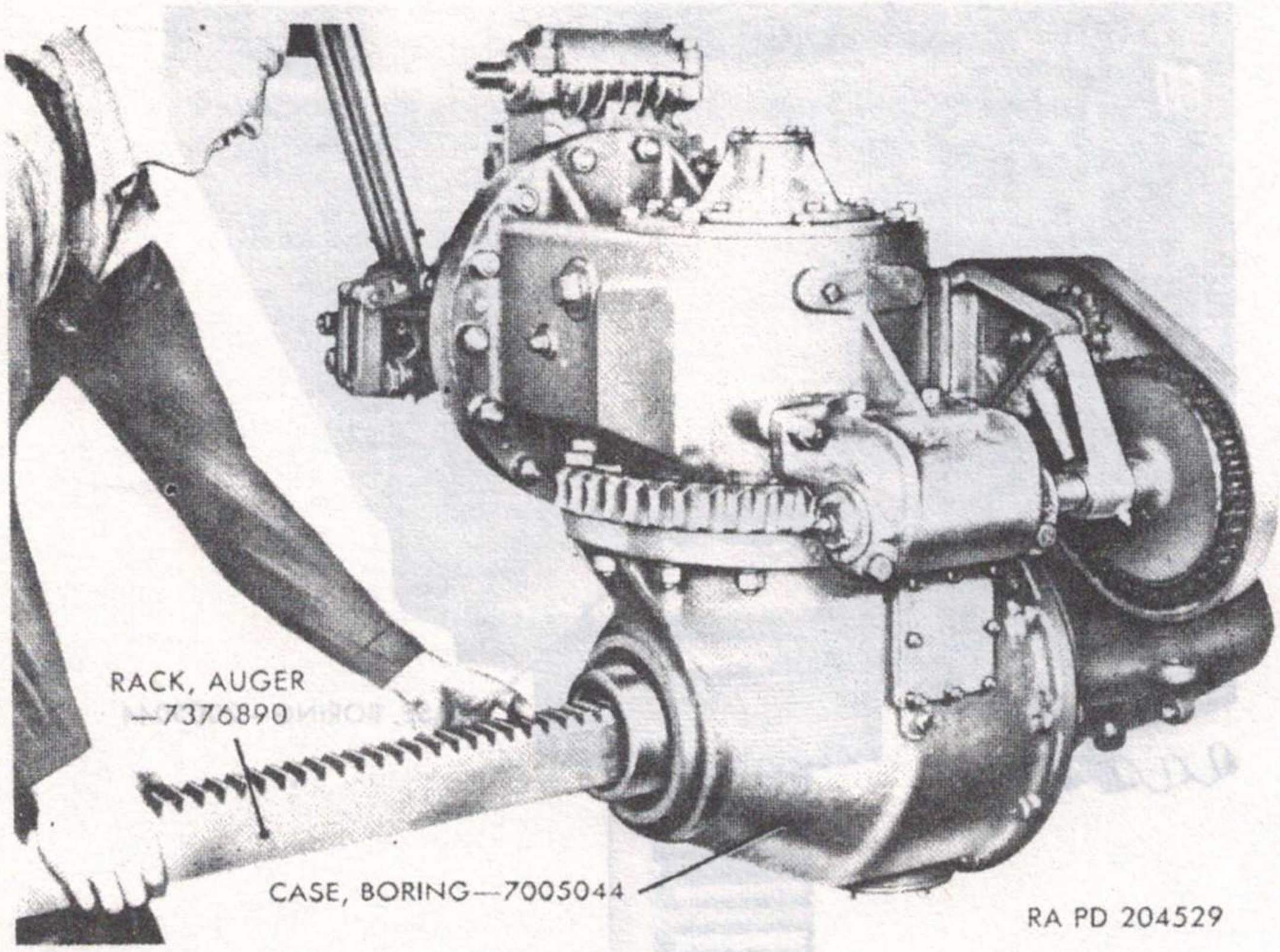


Figure 20. Removing auger rack.

b. Remove Boring Case Cover Assembly.

Note. The key letters noted in parentheses are in figure 37, except where otherwise indicated.

(1) *Remove rack vertical position plumb assembly.* Remove the hex nut (X) and lockwasher (W) holding rack vertical position plumb bracket (V) on plumb bracket stud (EE) in boring case cover (DD). Remove rack vertical position plumb assembly and lockwasher (U) from bracket stud. Do not remove the stud from the case cover unless stud is loose. If stud is loose, remove it from the cover.

(2) *Remove boring case cover.* Turn boring case until rack carrier is in the horizontal position. Remove the two pipe plugs from boring case and allow lubricant to drain from case. Install plugs in case. Turn boring case until rack carrier is in the vertical position. Remove the nine hex-head cap screws (GG) and lockwashers (FF) holding boring case cover (DD) on case. Remove cover from case.

c. Remove Boring Case Gear Assembly (fig. 21). Install rack thrust plate cage upper cap on rack carrier and remove boring case gear assembly from boring case.

d. Remove Vertical Power Leveler.

(1) *Remove chain guard* (fig. 22). Remove two cotter pins and clevis pins from shifter shaft lever on vertical power leveler. Remove lever from shifter shaft and chain guard. Remove

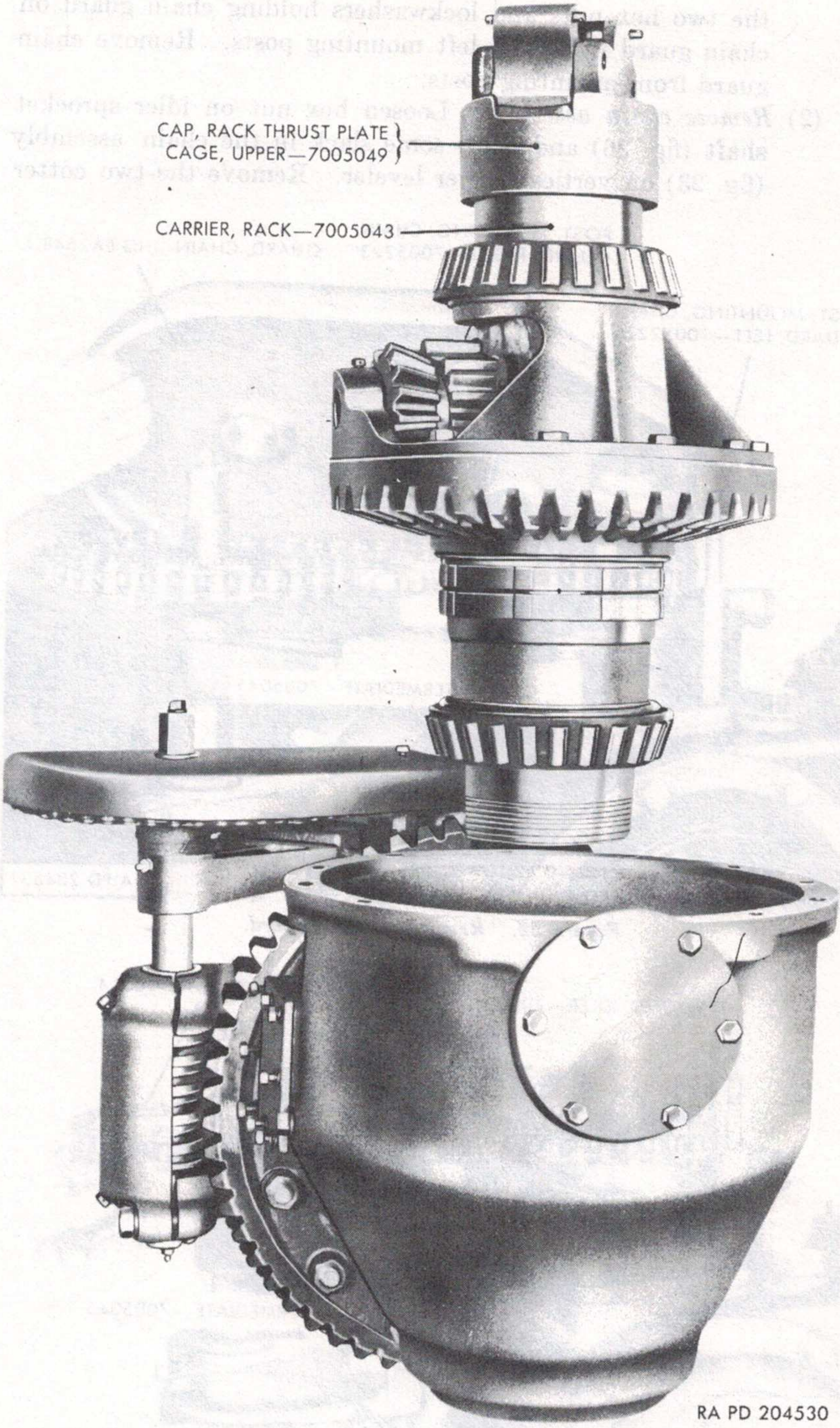


Figure 21. Boring case gear assembly—removed from boring case.

the two hex nuts and lockwashers holding chain guard on chain guard right and left mounting posts. Remove chain guard from mounting posts.

(2) *Remove chain assembly.* Loosen hex nut on idler sprocket shaft (fig. 26) and place some slack in the chain assembly (fig. 23) on vertical power leveler. Remove the two cotter

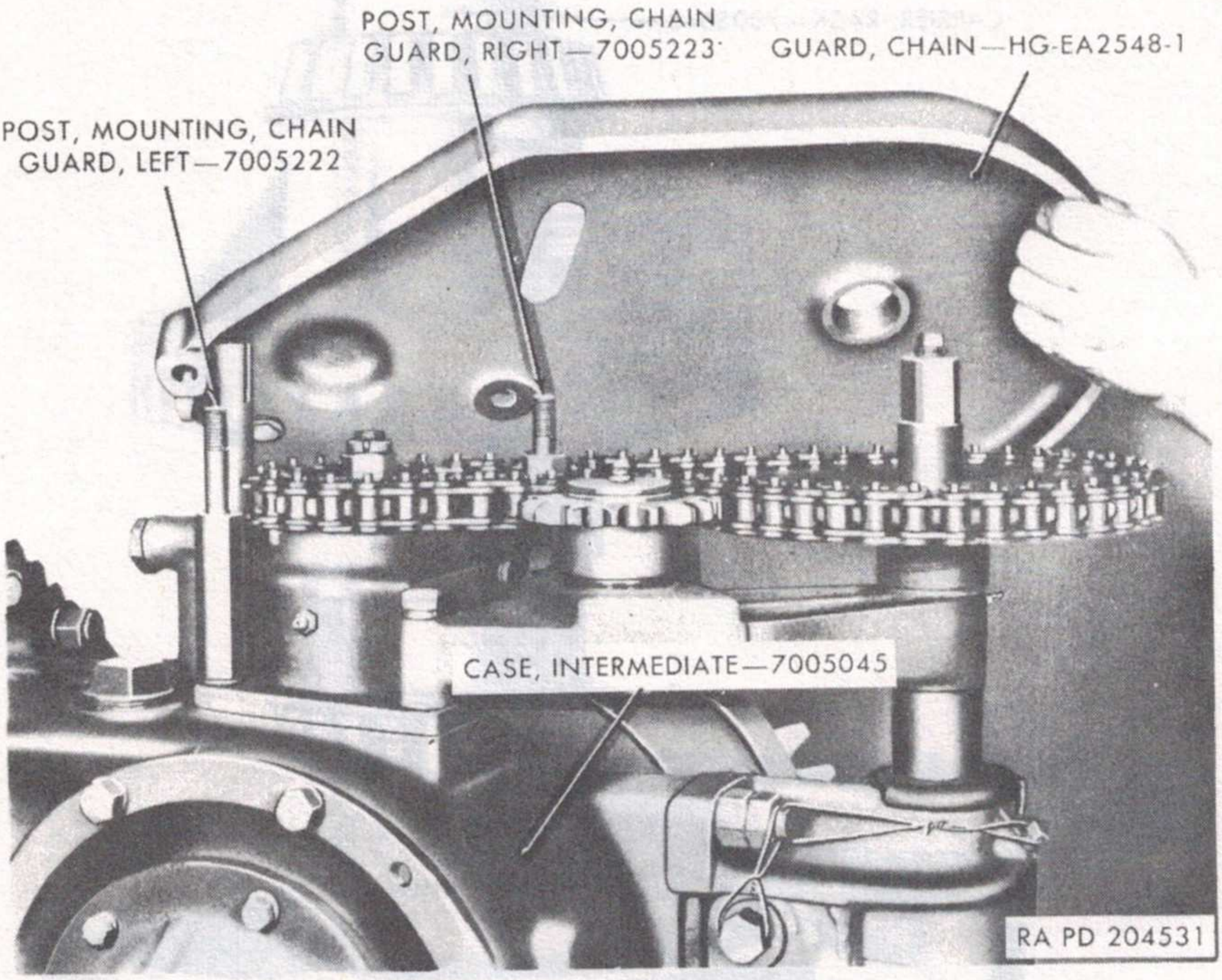


Figure 22. Removing chain guard.

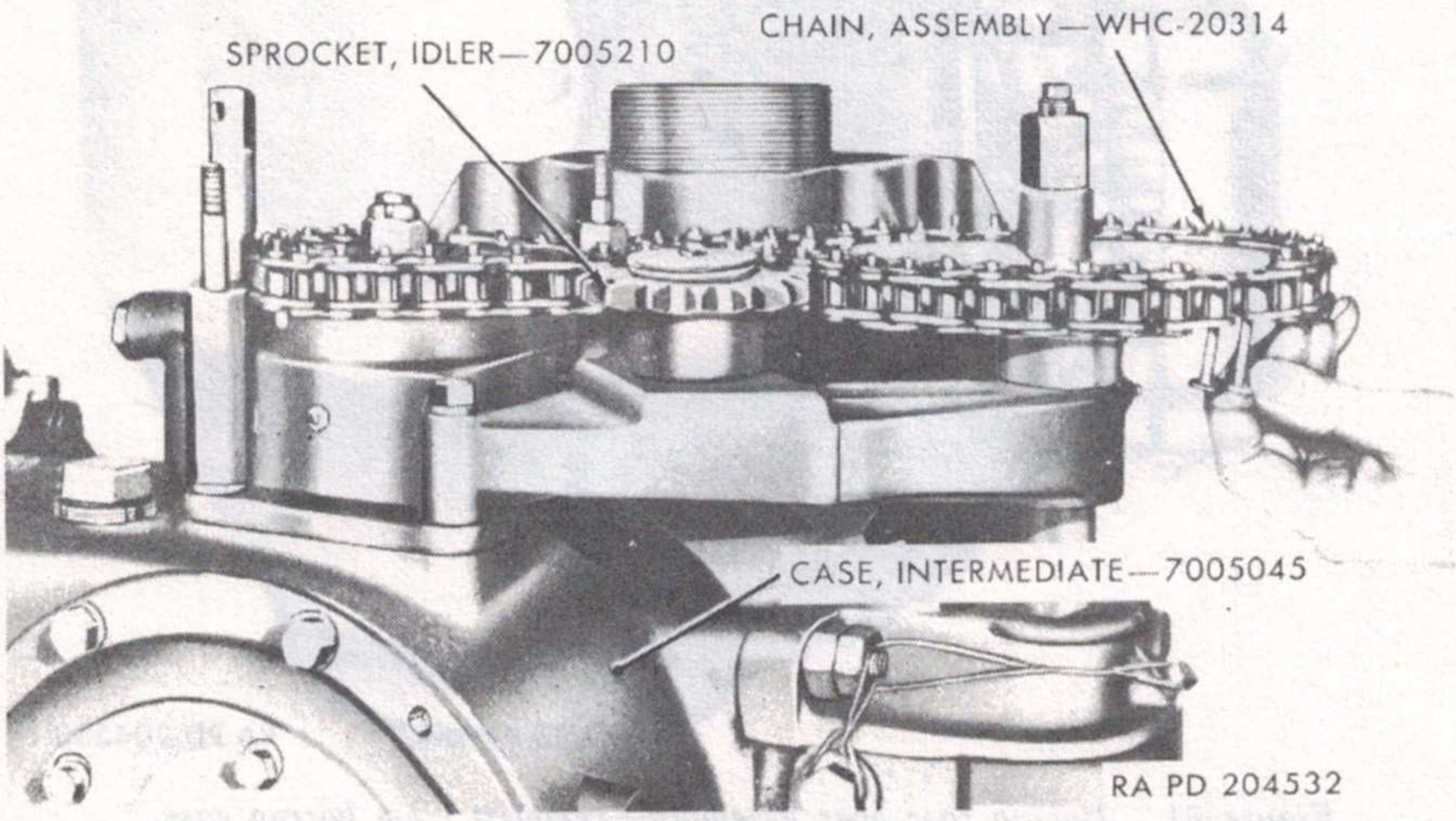


Figure 23. Removing chain assembly.

pins holding a connecting link plate on two adjacent connecting pins. Remove connecting link plate from connecting pins. Tap out two connecting pins from the chain assembly and remove the two pins and a second connecting link plate from the chain. Remove chain assembly from power leveler.

(3) *Remove drive housing assembly.*

Caution: The intermediate case gear assembly must be retracted one-quarter inch in the intermediate case to facilitate removal of drive housing assembly. Retraction of the intermediate gears frees the drive pinion (fig. 24) of possible contact with the first reduction feed gear in the intermediate case which would otherwise prevent the pinion from readily disengaging from the first reduction drive gear in the case. Remove the two pipe plugs from intermediate case and allow lubricant to drain from case. Install pipe plugs in case. Remove two of the eight hex-head cap screws holding inter-

Figure 24. Drive housing assembly.

mediate case flange to intermediate case. Loosen the remaining six hex-head cap screws one-quarter inch. Install the two cap screws that were removed into the threaded holes in the flange. Using these two cap screws as screw jacks, retract flange one-quarter inch from intermediate case. The intermediate case gears attached to the flange will move this distance to allow clearance for the clutch pinion of drive housing assembly past the first reduction feed gear of intermediate case gear assembly. Remove two hex-head cap screw, lockwashers, and chain guard right and left mounting posts holding housing assembly on intermediate case. Turn idler sprocket assembly to one side and remove housing assembly from intermediate case (fig. 25). Remove and discard housing mounting gasket.

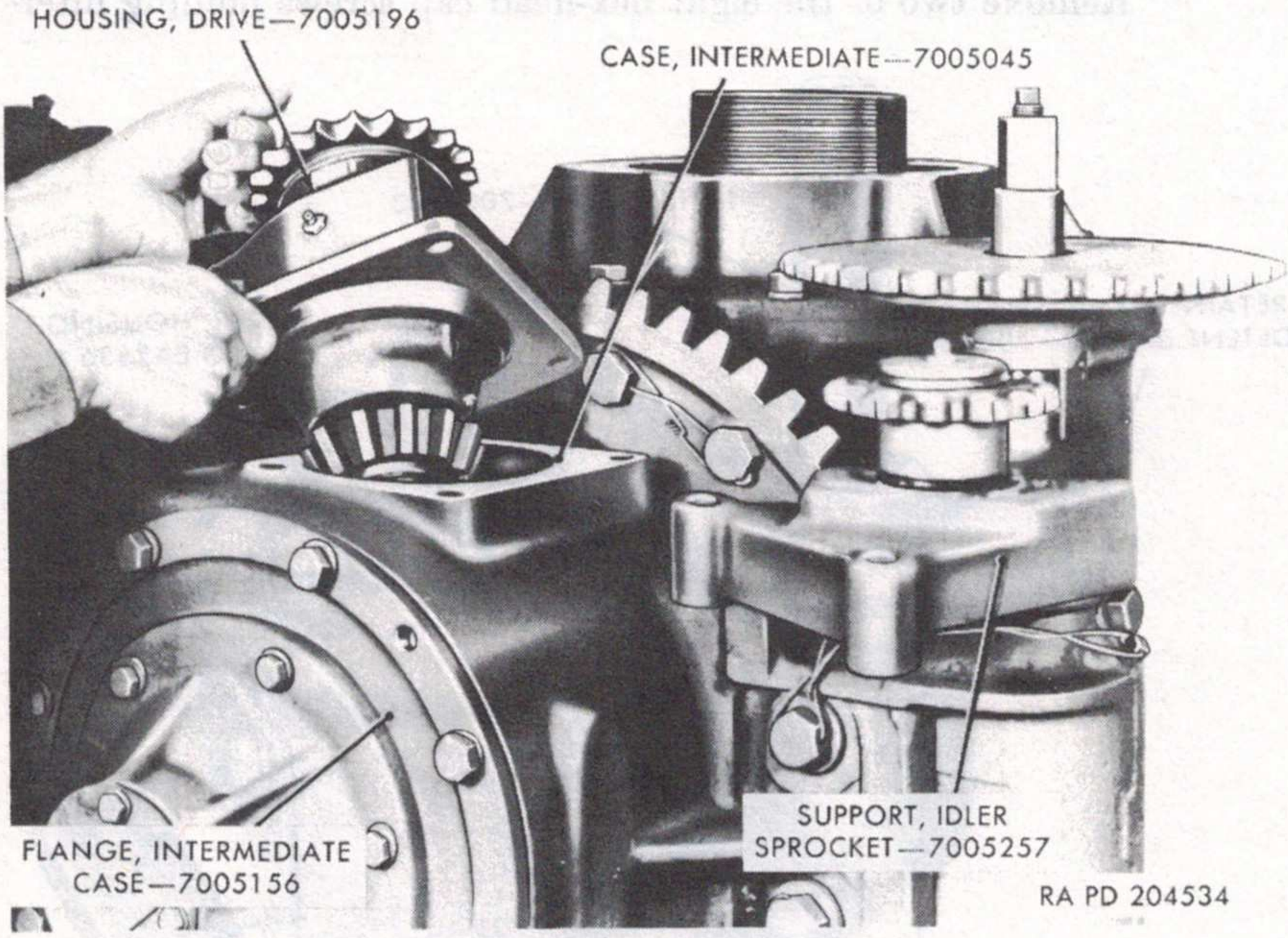


Figure 25. Removing drive housing assembly.

(4) *Remove idler sprocket assembly* (fig. 26). Remove locking wire securing the set screw in vertical leveling worm shaft sprocket. Loosen set screw and remove worm shaft sprocket from vertical leveling worm shaft. Remove square key from shaft. Remove idler sprocket assembly with attached vertical leveling worm shaft sprocket support from worm shaft.

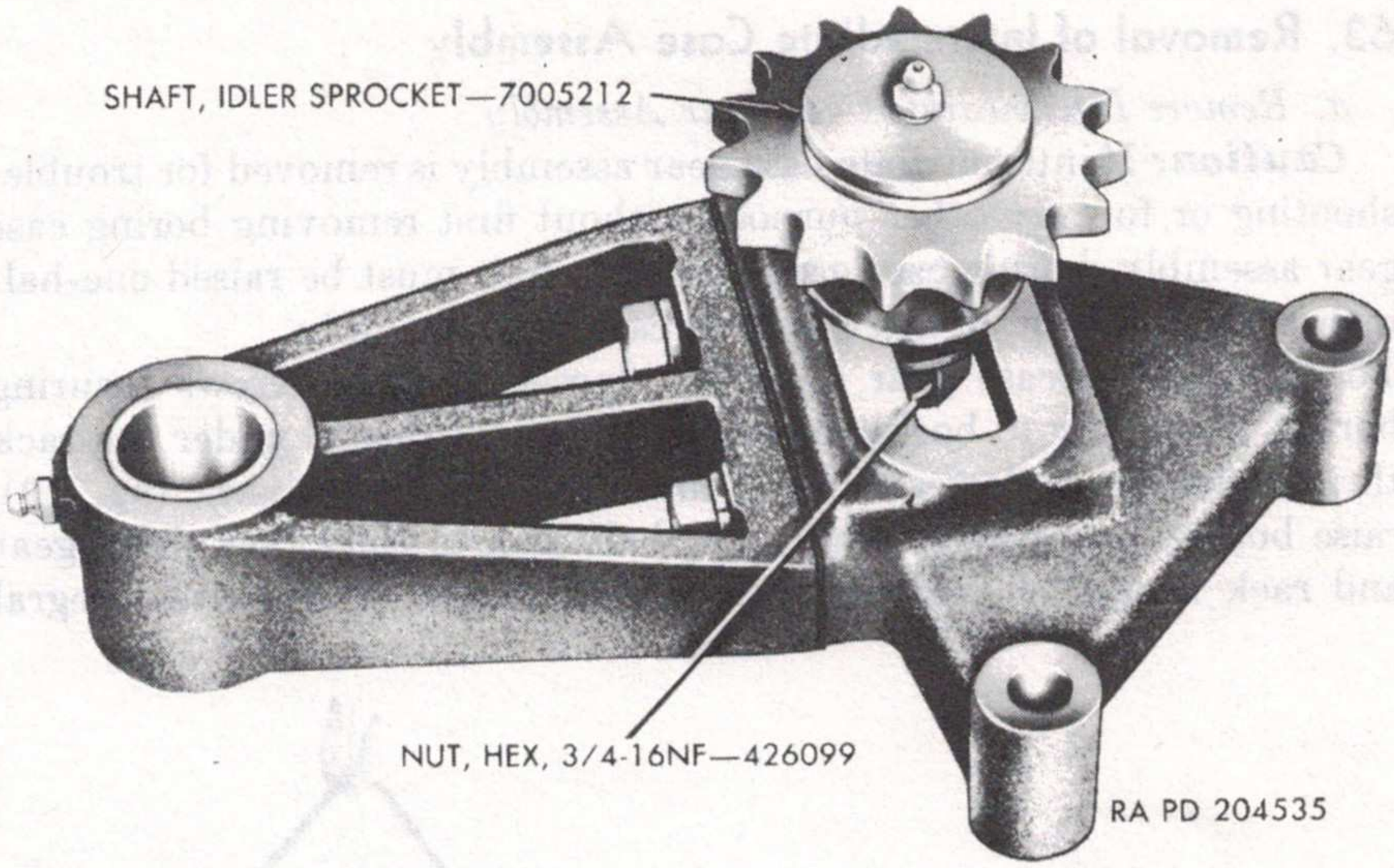


Figure 26. Idler sprocket assembly with vertical leveling worm shaft support attached.

e. Remove Vertical Leveling Worm Assembly (fig. 47). Remove locking wire from vertical leveling worm studs, cap screws, and set screws on intermediate case and vertical leveling worm housing. Remove the four hex nuts from vertical leveling worm studs and the two hex-head cap screws and plain washers from leveling worm housing.

Note. If there is a vertical leveling worm housing shim set between worm housing and intermediate case, be sure to remove shim set after removing the housing.

Remove leveling worm housing assembly with vertical leveling worm and vertical leveling worm housing shim sets from intermediate case. Check and record the thickness of shims removed to insure that shims of the same thickness are used in installation (par. 95*b*).

f. Remove Boring Case.

Note. The key letters noted in parentheses are in figure 38.

Remove locking wire from cap screws (GG) on vertical leveling worm gear (DD) and boring-case-to-intermediate-case retainer (FF). Remove the three hex nuts (F), and seven cap screws (EE and GG), and lockwashers (E) holding case retainer to boring and intermediate cases. Remove retainer from the cases. Rotate the boring case (A) until leveling worm gear is at top of case, then supporting the weight of case, remove the four hex nuts and eight cap screws and lockwashers holding worm gear to boring and intermediate cases. Remove worm gear from the cases. Remove boring case from intermediate case.

63. Removal of Intermediate Case Assembly

a. Remove Intermediate Case Gear Assembly.

Caution: If intermediate case gear assembly is removed for trouble-shooting or for any other purpose without first removing boring case gear assembly, boring case gear assembly first must be raised one-half inch before removal of intermediate case gear assembly.

To raise boring case gear assembly, loosen the cap screws securing boring case cover to boring case. With a jack placed under the rack thrust plate cage lower cap on underside of boring case (fig. 19), raise boring case gear assembly one-half inch to clear rack drive gear and rack feed idler gear of the second reduction drive with integral

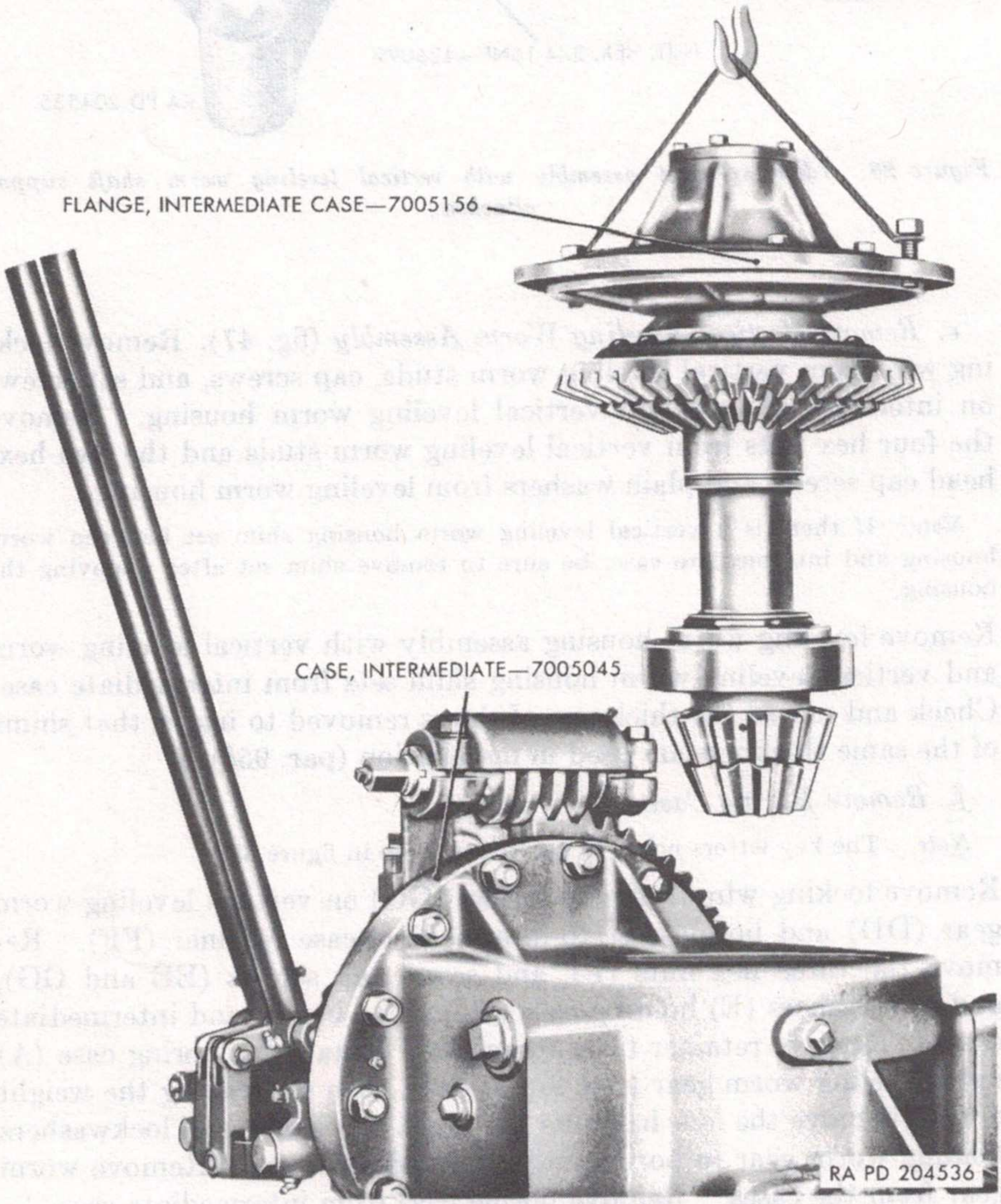


Figure 27. Removing intermediate case gear assembly.

shaft and the second reduction feed pinion with integral shaft that protrudes from intermediate case into boring case. Remove the cap screws and lockwashers holding intermediate case flange to intermediate case. With a hoist attached to the two cap screws threaded into holes in the intermediate case flange (fig. 27), remove flange and attached intermediate case gear assembly from intermediate case.

b. Remove Horizontal Leveling Worm Assembly (fig. 7). Remove locking wire from the horizontal leveling worm studs, cap screws, and set screws on feed and tube rear support (fig. 28) and horizontal leveling worm housing. Remove the four hex nuts from leveling worm studs and the two hex-head cap screws and plain washers from leveling worm housing.

Note. If there is a horizontal leveling worm housing shim set between worm housing and rear support, be sure to remove shim set after removing housing.

Remove leveling worm housing assembly with horizontal leveling worm and horizontal leveling worm housing shim sets from rear support. Check and record the thickness of shims removed to insure that shims of the same thickness are used in installation (par. 93*b*).

c. Remove Intermediate Case. Remove hex jam nut, six hex nuts, seven cap screws, and seven lockwashers securing intermediate-case-to-tube-rear-support retainer (L, fig. 49) to intermediate case (R, fig. 49). Remove retainer from intermediate case. Turn intermediate case until horizontal leveling worm gear (P, fig. 49) is at the top. Supporting the weight of intermediate case, remove hex jam nut, six hex nuts, eight cap screws, and eight lockwashers holding worm gear to case. Remove worm gear from intermediate case. Remove inter-

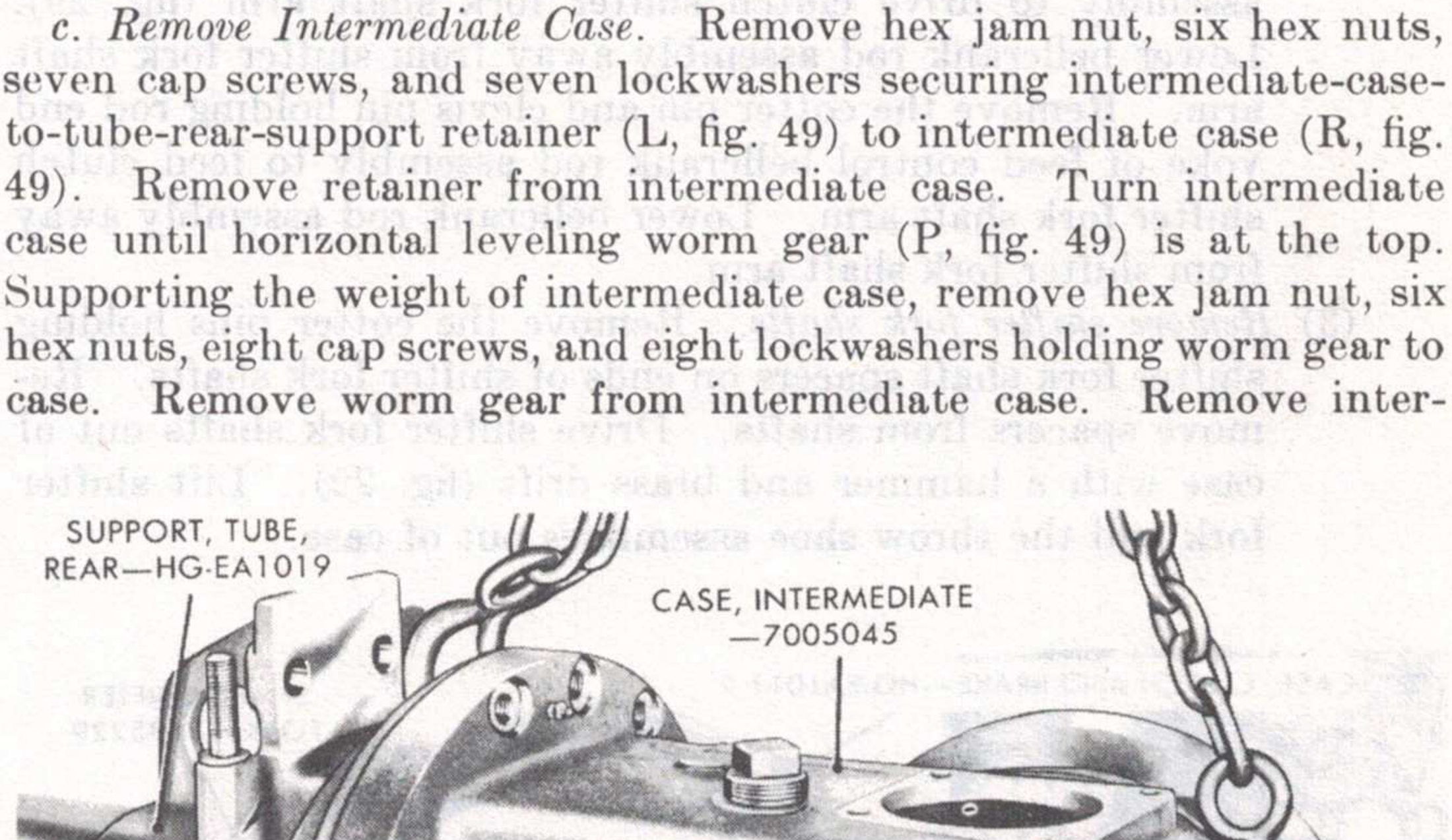


Figure 28. Removing intermediate case.

mediate case (fig. 28) from rear tube support with a chain hoist being careful not to damage pinions and bearing on the feed and drive clutch shafts.

64. Removal of Clutch and Brake Case Assembly

(fig. 7)

a. Remove Clutch and Brake Case Top Cover and Shifter Fork Shafts.

Note. The key letters noted in parentheses are in figure 55, except where otherwise indicated.

(1) *Remove clutch and brake case top cover.* Open top drain cock on the side of clutch and brake case (P). Remove the pipe plug on bottom of case and allow lubricant to drain from case. Install pipe plug in case and shut off the drain cock. Remove eight hex-head cap screws holding clutch and brake case top cover (C) on case and remove top cover from case. Remove and discard the clutch and brake case top cover gasket (E).

(2) *Disconnect control lever linkage.* Remove the cotter pin and clevis pin holding rod end yoke of drive control bellcrank rod assembly to drive clutch shifter fork shaft arm (fig. 29). Lower bellcrank rod assembly away from shifter fork shaft arm. Remove the cotter pin and clevis pin holding rod end yoke of feed control bellcrank rod assembly to feed clutch shifter fork shaft arm. Lower bellcrank rod assembly away from shifter fork shaft arm.

(3) *Remove shifter fork shafts.* Remove the cotter pins holding shifter fork shaft spacers on ends of shifter fork shafts. Remove spacers from shafts. Drive shifter fork shafts out of case with a hammer and brass drift (fig. 29). Lift shifter fork and the throw shoe assemblies out of case.

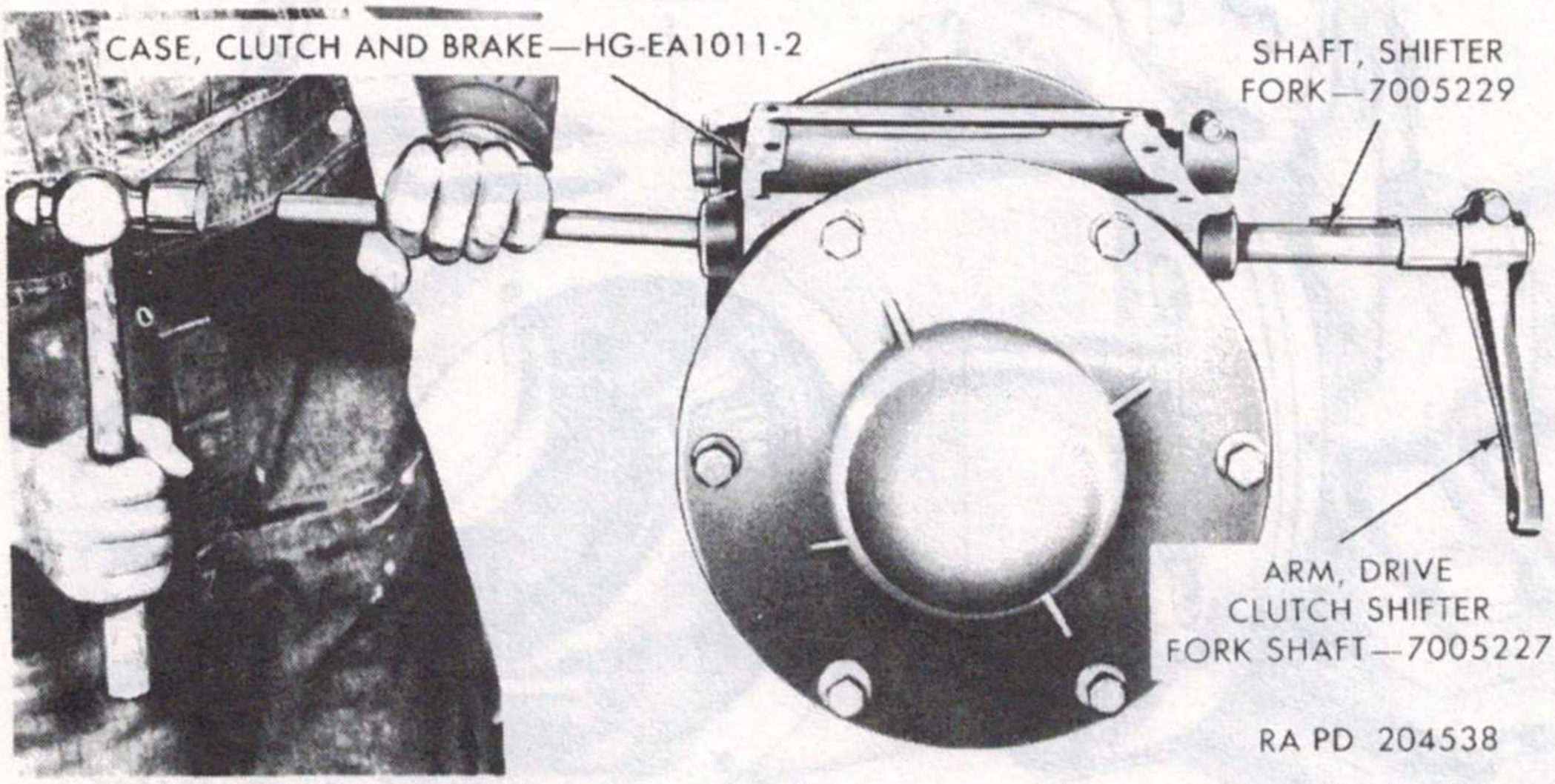


Figure 29. Removing shifter fork shaft.

b. Remove Drive Clutch and Brake Assembly.

Note. The key letters noted in parentheses are in figure 30, except where otherwise indicated.

(1) *Remove clutch and brake case end cover.* Remove four hex nuts and six cap screws and lockwashers holding clutch and brake case end cover (B) on clutch and brake case. Remove end cover from the case leaving drive brake housing with integral gear (L) remaining on the case.

Caution: Be sure not to pry off brake housing or damage drive clutch shaft sleeve ball bearing (H) when removing case end cover.

Remove drive clutch shaft sleeve front bearing shim set (E) from end cover. Check and record the thickness of shims removed to insure that shims of the same thickness are used in assembly (par. 94*f* (2)).

(2) *Remove drive brake and sleeve assembly.* Remove cotter pin and castle nut on end of drive clutch shaft (U, fig. 34). Remove drive clutch shaft shim set from shaft. Check and record the thickness of shims removed to insure that shims of the same thickness are used in assembly (par. 94*d*(3)). Straighten the bent tangs on drive clutch shaft sleeve locknut tang washer (G) and remove drive clutch shaft sleeve locknut (F) from drive clutch shaft sleeve (V) with the spanner wrench provided with the V–18A/MTQ truck. Remove tang washer and first part of drive clutch shaft sleeve shim set (H) from sleeve. Check and record the thickness of shims removed to insure that shims of the same thickness are used in assembly (par. 94*d*(3)). Pull drive clutch shaft sleeve ball bearing (J) from sleeve with a standard puller. Remove the second part of shaft sleeve shim set from the sleeve. Check and record the thickness of shims removed to assure that shims of the same thickness are used in assembly (par. 94*d*(3)). Remove brake plate spacer (K) and drive-brake housing with integral gear (L) from the case.

Note. Record the number and sequence of the drive brake internal- and external-teeth plates before removing plates from brake hub.

Remove drive brake internal- and external-teeth plates (P) and drive brake pressure plate (Q) from drive brake hub (R). Wire internal- and external-plates together in the order of their removal. Install drive clutch shaft sleeve lock nut (fig. 31) back on the sleeve and pry drive sleeve and clutch assembly (fig. 63) off the drive clutch shaft with a suitable tool. Remove drive clutch shaft sleeve key from drive clutch shaft.

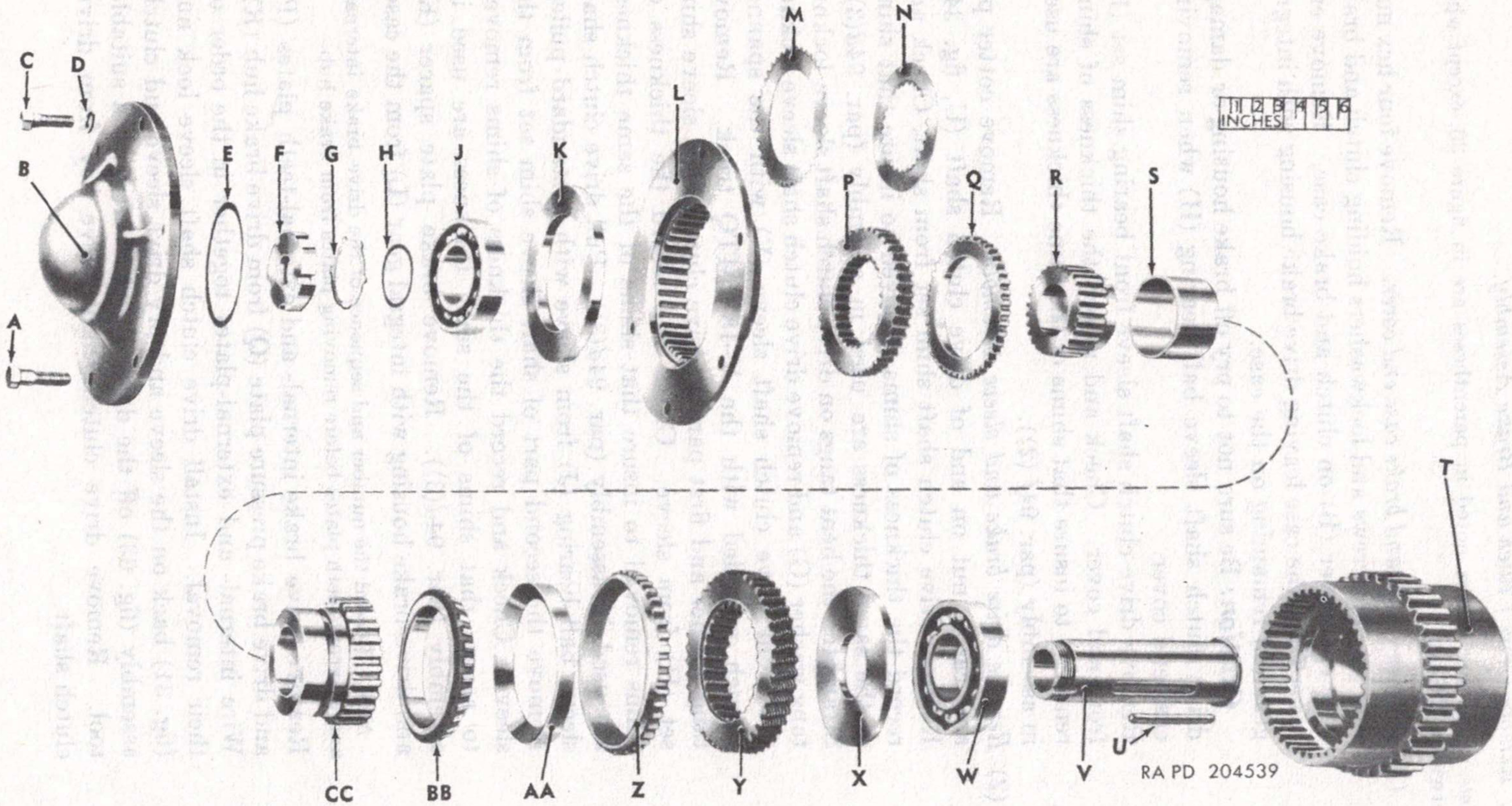


Figure 30. Drive clutch and brake assembly—exploded view.

A—Screw, cap, hex-hd, ⅝–18NF x 2¼ 429730
B—Cover, clutch and brake case, end 7005055
C—Screw, cap, hex-hd, ⅝–18NF x 1¾ 430104
D—Washer, lock, ⅝ in 121574
E—Shim set, drive clutch shaft sleeve front bearing 7374009
F—Nut, lock, drive clutch shaft sleeve 7005184
G—Washer, tang, drive clutch shaft sleeve lock nut 7005186
H—Shim set, drive clutch shaft sleeve 7005152
J—Bearing, ball, drive clutch shaft sleeve 700342
K—Spacer, brake plate 7005058
L—Housing, drive brake, w/integral gear 7005054
M—Plate, clutch and brake, feed and drive, external-teeth 7005080
N—Plate, clutch and brake, feed and drive, internal-teeth 7005081
P—{Plate, drive brake, external-teeth 7005080 / Plate, drive brake, internal-teeth 7005081}
Q—Plate, pressure, drive brake HG–EA2909
R—Hub, drive brake 7374006
S—Sleeve, clutch and brake hub HG–EA2895
T—Shell, main drive gear and clutch, w/integral gear 7005051
U—Key, drive clutch and brake hub 7712454
V—Sleeve, drive clutch shaft 7005056
W—Bearing, ball, drive clutch shaft sleeve 700342
X—Spacer, clutch plate 7005059
Y—{Plate, drive clutch, external-teeth 7005080 / Plate, drive clutch, internal-teeth 7005081}
Z—Plate, pressure, drive clutch HG–EA2896
AA—Cup, drive clutch release bearing 706885
BB—Cone, drive clutch release bearing TIM–37431
CC—Hub, drive clutch 7374005

Figure 30—Continued.

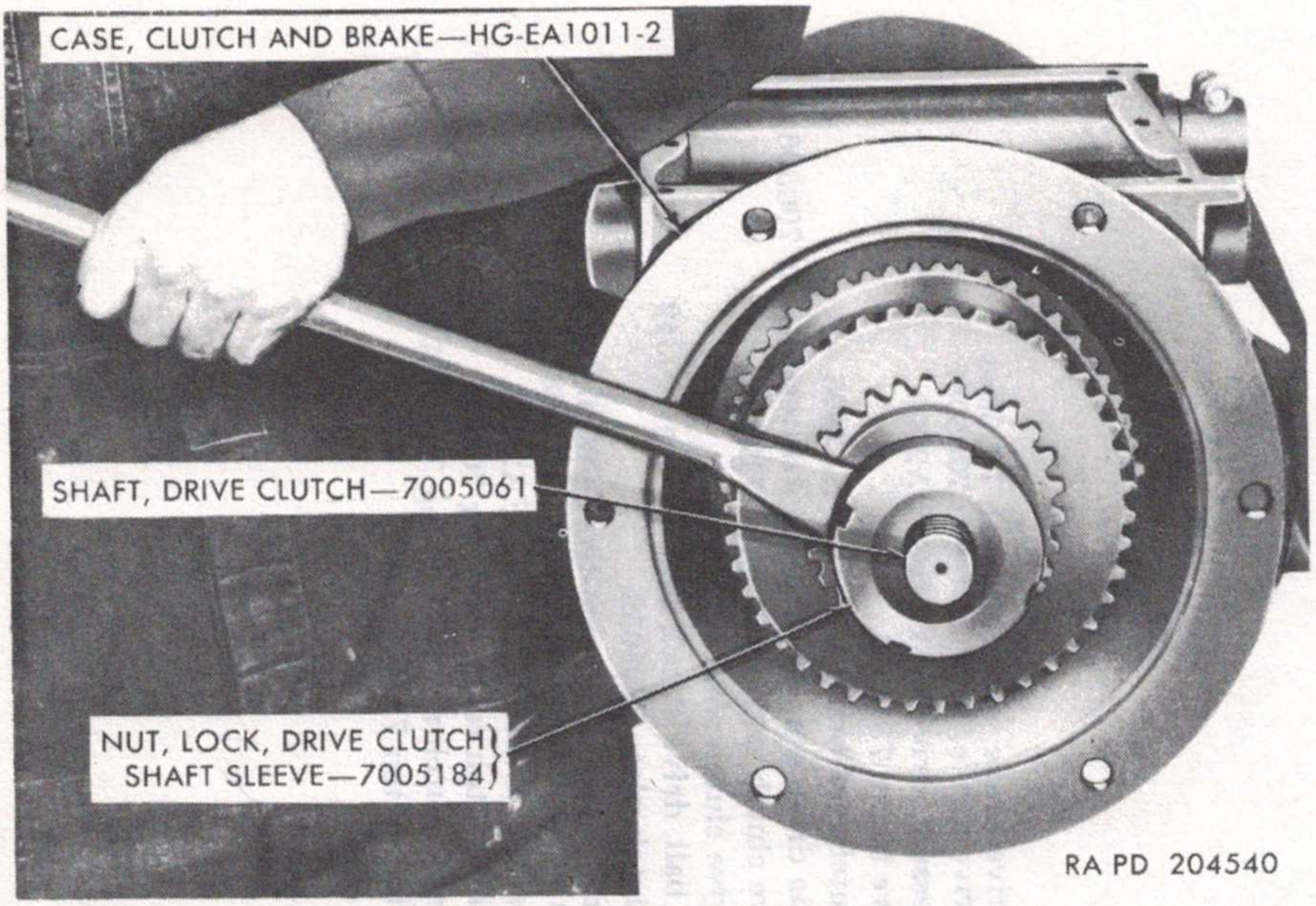


Figure 31. Removing drive sleeve and clutch assembly.

c. Remove Clutch and Erake Case and Main-Drive-Gear-and-Clutch Shell with Integral Gear.

(1) *Remove clutch and brake case* (fig. 64). Supporting the clutch and brake case by a chain hoist or some other means, remove four hex nuts, lockwashers, and hex-head cap screws holding lower part of the rear of the case to tube front support of feed and drive clutch shaft tube assembly. Remove the two remaining cap screws, leaving cap screws in place in front support and feed-brake housing with integral gear that is between front support and clutch and brake case.

Caution: In removing clutch and brake case, be sure not to remove feed brake housing or to damage the main-drive-gear-and-clutch shell with integral gear.

Pry clutch and brake case from brake housing and front support and remove case from the assembly.

(2) *Remove main-drive-gear-and-clutch* shell with integral gear (fig. 62).

Caution: Be careful not to damage feed clutch and internal- and external-teeth plates and feed clutch shaft front ball bearing when removing main-drive-gear-and-clutch shell with integral gear.

Remove the shell by driving it off of feed clutch assembly with a soft hammer.

d. Remove Drive Clutch Shaft.

Note. The key letters noted in parentheses are in figure 34.

At the rear of feed and drive clutch shaft tube assembly, remove cotter pin and drive clutch shaft first reduction pinion nut (Q) holding first reduction drive pinion (R) on drive clutch shaft (U). Remove pinion from shaft with a suitable puller. Remove drive clutch shaft first reduction pinion key (JJ) from shaft. Remove drive shaft from the front end of feed clutch shaft (Z) at clutch and brake case assembly. Remove first reduction feed pinion bushing-type bearing (L) from inner diameter of first reduction feed pinion (M) on rear of feed clutch shaft.

Note. The key letters noted in parentheses are in figure 32.

e. Remove Feed Clutch and Brake Assembly.

Remove left-hand feed clutch shaft lock nut (B) from feed clutch shaft with the spanner wrench provided with the V–18A/MTQ truck after bending back the tangs on feed clutch shaft locknut tang washer (C). Remove tang washer from shaft and pull feed clutch shaft front ball bearing (D) from shaft with a suitable puller. Remove clutch plate spacer (E) from shaft.

Note. Record the number and sequence of the feed clutch internal- and external-teeth plates (F) before removing the plates from feed clutch hub.

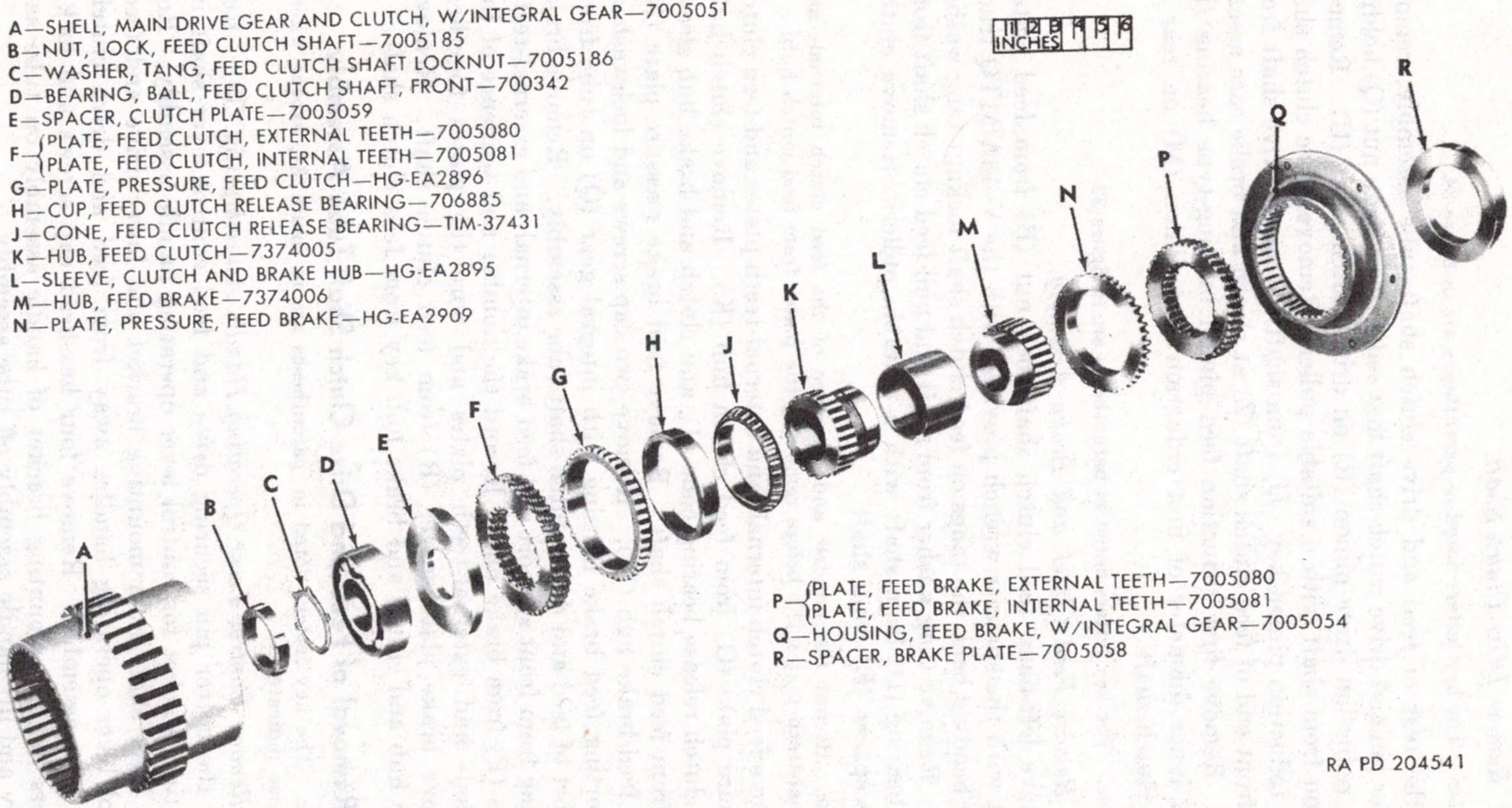
Remove feed clutch internal- and external-teeth plates and feed clutch pressure plate (G) from feed clutch hub (K). Remove clutch hub, feed clutch release bearing cone (J), and clutch and brake hub sleeve (L) from feed clutch shaft. Remove feed brake pressure plate (N) from feed brake hub (M). Remove two cap screws and lockwashers supporting feed brake housing with integral gear (Q) on tube front support of feed and drive clutch shaft tube assembly. Remove brake housing from front support and feed brake internal- and external-teeth plates (P) from brake hub. Record the number and sequence of the internal- and external-teeth plates and wire the plates together. Remove brake plate spacer (R) from feed clutch shaft. Remove brake hub and clutch and brake hub key from feed clutch shaft.

65. Removal of Feed and Drive Clutch Shaft Tube Assembly

Note. The key letters noted in parentheses are in figure 34, except where otherwise indicated.

a. Remove Control Lever Operating Handle Assembly (fig. 33). Remove the cotter pin securing drive and feed control lever shaft in mounting bracket for control lever operating handle assembly. Remove lever shaft from mounting bracket and lower drive and feed control lever operating handles away from feed and drive clutch shaft tube assembly. Remove four hex-head cap screws and lockwashers holding mounting bracket of handle assembly on tube assembly and lift handle assembly off tube assembly.

A—SHELL, MAIN DRIVE GEAR AND CLUTCH, W/INTEGRAL GEAR—7005051
B—NUT, LOCK, FEED CLUTCH SHAFT—7005185
C—WASHER, TANG, FEED CLUTCH SHAFT LOCKNUT—7005186
D—BEARING, BALL, FEED CLUTCH SHAFT, FRONT—700342
E—SPACER, CLUTCH PLATE—7005059
F—{PLATE, FEED CLUTCH, EXTERNAL TEETH—7005080
F—{PLATE, FEED CLUTCH, INTERNAL TEETH—7005081
G—PLATE, PRESSURE, FEED CLUTCH—HG-EA2896
H—CUP, FEED CLUTCH RELEASE BEARING—706885
J—CONE, FEED CLUTCH RELEASE BEARING—TIM-37431
K—HUB, FEED CLUTCH—7374005
L—SLEEVE, CLUTCH AND BRAKE HUB—HG-EA2895
M—HUB, FEED BRAKE—7374006
N—PLATE, PRESSURE, FEED BRAKE—HG-EA2909



P—{PLATE, FEED BRAKE, EXTERNAL TEETH—7005080
P—{PLATE, FEED BRAKE, INTERNAL TEETH—7005081
Q—HOUSING, FEED BRAKE, W/INTEGRAL GEAR—7005054
R—SPACER, BRAKE PLATE—7005058

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Figure 32. Feed clutch and brake assembly—exploded view.

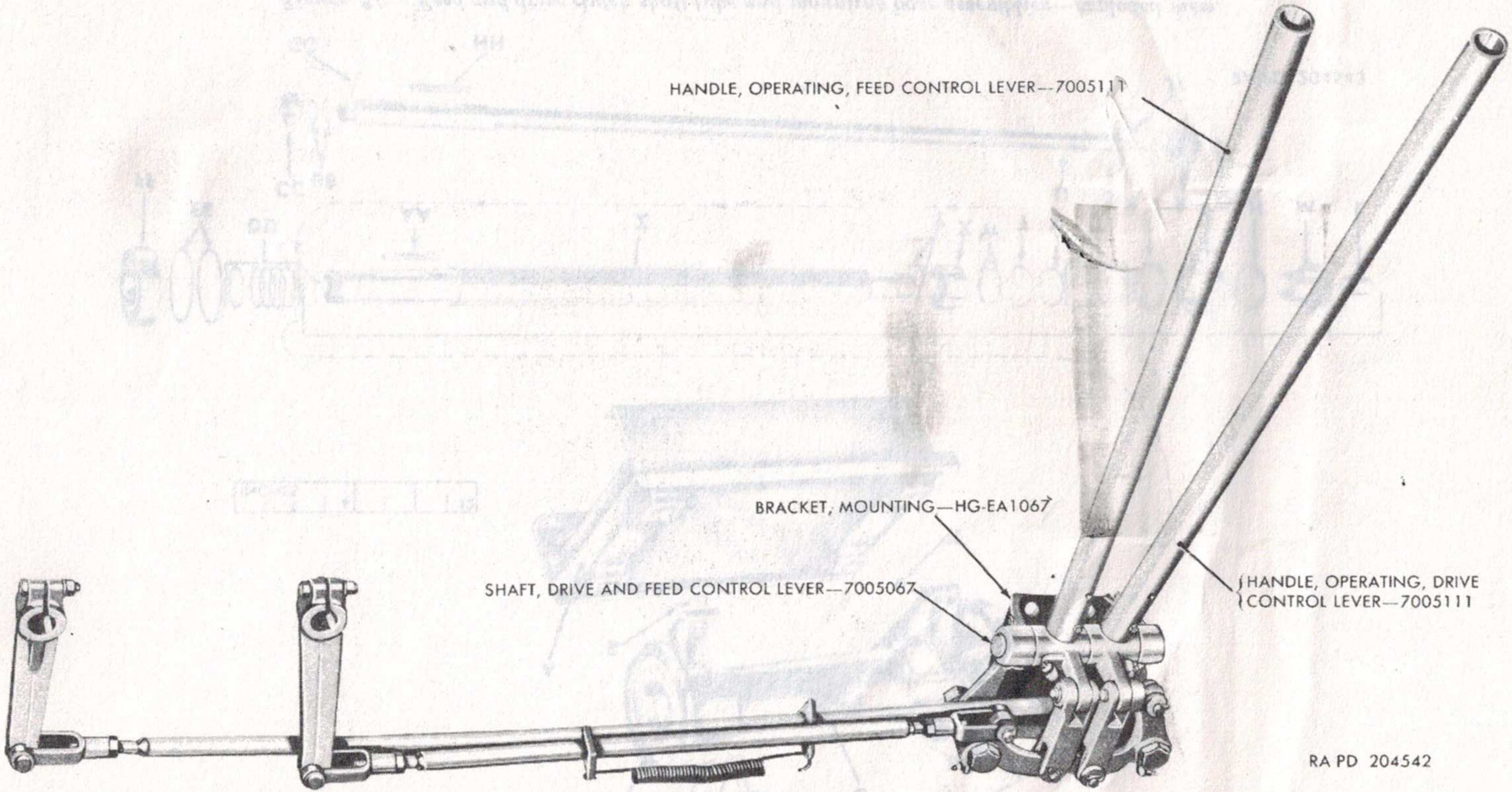


Figure 33. Control lever operating handle assembly.

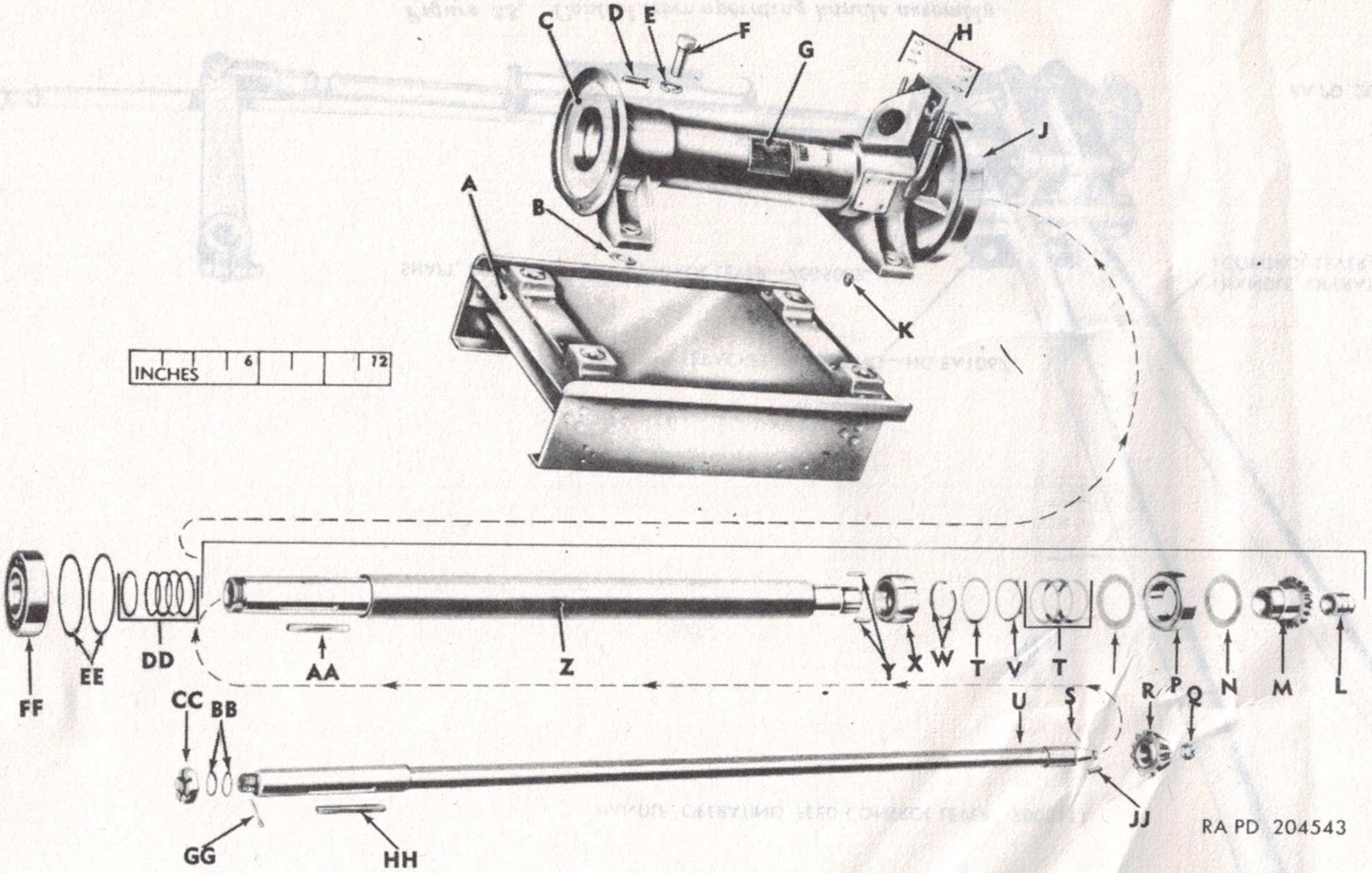


Figure 34. Feed and drive clutch shaft tube and mounting base assemblies—exploded view.

A—Base, mounting HG–EA4093D
B—Bushing, mounting 7005156
C—Support, tube, front HG–EA1020
D—Screw, cap, hex-hd, ⅝–18NF x 1¾ 430104
E—Washer, lock, 1¼-in 131050
F—Screw, cap, hex-hd, 1¼ 7005164
G—Tube, feed and drive clutch shaft HG–EA1076
H—Shim set, horizontal leveling worm 7005168
J—Support, tube, rear HG–EA1019
K—Plug, pipe, ¾-in 219302
L—Bearing, bushing-type, first reduction feed pinion 7005163
M—Pinion, first reduction feed 7005123
N—Retainer, oil, first reduction feed pinion bearing HG–EA2465
P—Bearing, ball, first reduction feed pinion 701067
Q—Nut, drive clutch shaft first reduction pinion 7005158
R—Pinion, first reduction drive 7005124
S—Pin, cotter, ⅛ x 2 103389
T—Shim set, first reduction feed pinion bearing 7005161
U—Shaft, drive clutch 7005061
V—Washer, tang, feed clutch shaft coupling 7005160
W—Collar, half, feed clutch shaft coupling 7005159
X—Coupling, feed clutch shaft 7005103
Y—Key, feed clutch shaft first reduction pinion 7005162
Z—Shaft, feed clutch 7005060
AA—Key, clutch and brake hub 7712454
BB—Shim set, drive clutch shaft 7005105
CC—Nut, drive clutch shaft 7005183
DD—Shim set, feed clutch shaft 7005152
EE—Shim set, feed clutch shaft rear bearing 7374009
FF—Bearing, ball, feed clutch shaft, rear 700394
GG—Pin, cotter, 3/16 x 2¾ 103414
HH—Key, drive clutch shaft sleeve 7712454
JJ—Key, drive clutch shaft first reduction pinion 7005157

Figure 34—Continued.

b. Remove Mounting Base. Remove the pipe plug (K) from tube rear support (J) of feed and drive clutch shaft tube assembly and allow lubricant to drain from tube assembly. Install plug in the support. Remove four hex-head cap screws (F) and lockwashers (E) holding tune assembly on mounting base (A). Remove tube assembly from mounting base. Remove four mounting bushings (B) from mounting base.

Section III. REBUILD OF INTEGRAL DERRICK ASSEMBLY

66. Disassembly

a. General. Refer to paragraph 70*a* before beginning disassembly of integral derrick assembly.

b. Disassemble Derrick Sheave Assembly.

Note. The key letters noted in parentheses are in figure 35.

Remove hex nut (E), lockwasher (F), and hex-head bolt (M) holding derrick sheave (D) in derrick sheave support block (G). Remove derrick sheave from support block. Remove derrick sheave bearing sleeve (B) from derrick sheave bushing-type bearing (C) in derrick sheave. Do not remove bushing-type bearing from sheave unless inspection (par. 68) indicates the necessity. If necessary, press bearing out of sheave with an arbor press. Remove two flat-head machine screws (P) and hex nuts (N) holding derrick sheave cover (A) to support block. Remove sheave cover from block. The derrick tube cap (H) was removed during removal of derrick sheave assembly (par. 61).

c. Disassemble Derrick Tube Base Assembly.

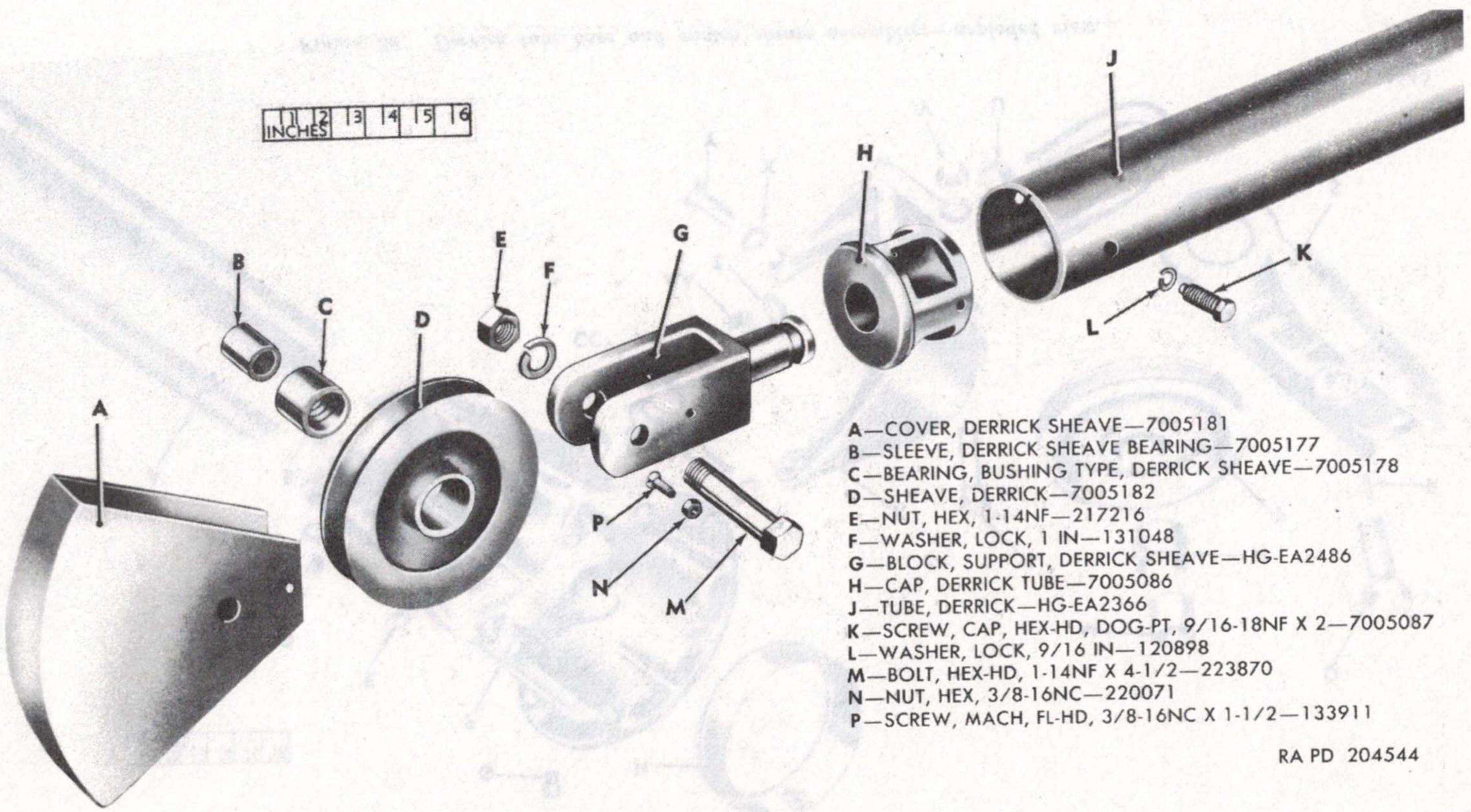
Note. The key letters noted in parentheses are in figure 36.

Remove two rack lock cam ring studs (G) and rack lock cam ring handle (CC) holding rack lock cam ring (H) in derrick tube base (F). Remove cam ring from tube base. Remove three hex nuts (D), lockwashers (C), and hex-head cap screws (B) from derrick tube clamp flanges on tube base.

d. Disassemble Snatch Sheave Assembly.

Note. The key letters noted in parentheses are in figure 36.

Remove two hex nuts (AA) and lock washers (Z) from snatch sheave "U" bolt (T) holding snatch sheave housing (S) to snatch sheave anchor bracket (K). Remove "U" bolt and sheave housing assembly from anchor bracket. Remove "U" bolt from sheave housing and remove two hex nuts (U) from "U" bolt. Remove snatch sheave bolt (Q) holding snatch sheave (P) in sheave housing. Remove snatch sheave bearing spacer dowel pin (R) from housing and snatch sheave bearing spacer (M). Remove snatch sheave from snatch sheave housing. Remove bearing spacer from snatch sheave bushing-type bearing (N) in sheave. Do not remove bushing-type bearing



A—COVER, DERRICK SHEAVE—7005181
B—SLEEVE, DERRICK SHEAVE BEARING—7005177
C—BEARING, BUSHING TYPE, DERRICK SHEAVE—7005178
D—SHEAVE, DERRICK—7005182
E—NUT, HEX, 1-14NF—217216
F—WASHER, LOCK, 1 IN—131048
G—BLOCK, SUPPORT, DERRICK SHEAVE—HG-EA2486
H—CAP, DERRICK TUBE—7005086
J—TUBE, DERRICK—HG-EA2366
K—SCREW, CAP, HEX-HD, DOG-PT, 9/16-18NF X 2—7005087
L—WASHER, LOCK, 9/16 IN—120898
M—BOLT, HEX-HD, 1-14NF X 4-1/2—223870
N—NUT, HEX, 3/8-16NC—220071
P—SCREW, MACH, FL-HD, 3/8-16NC X 1-1/2—133911

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Figure 35. Derrick sheave assembly—exploded view.

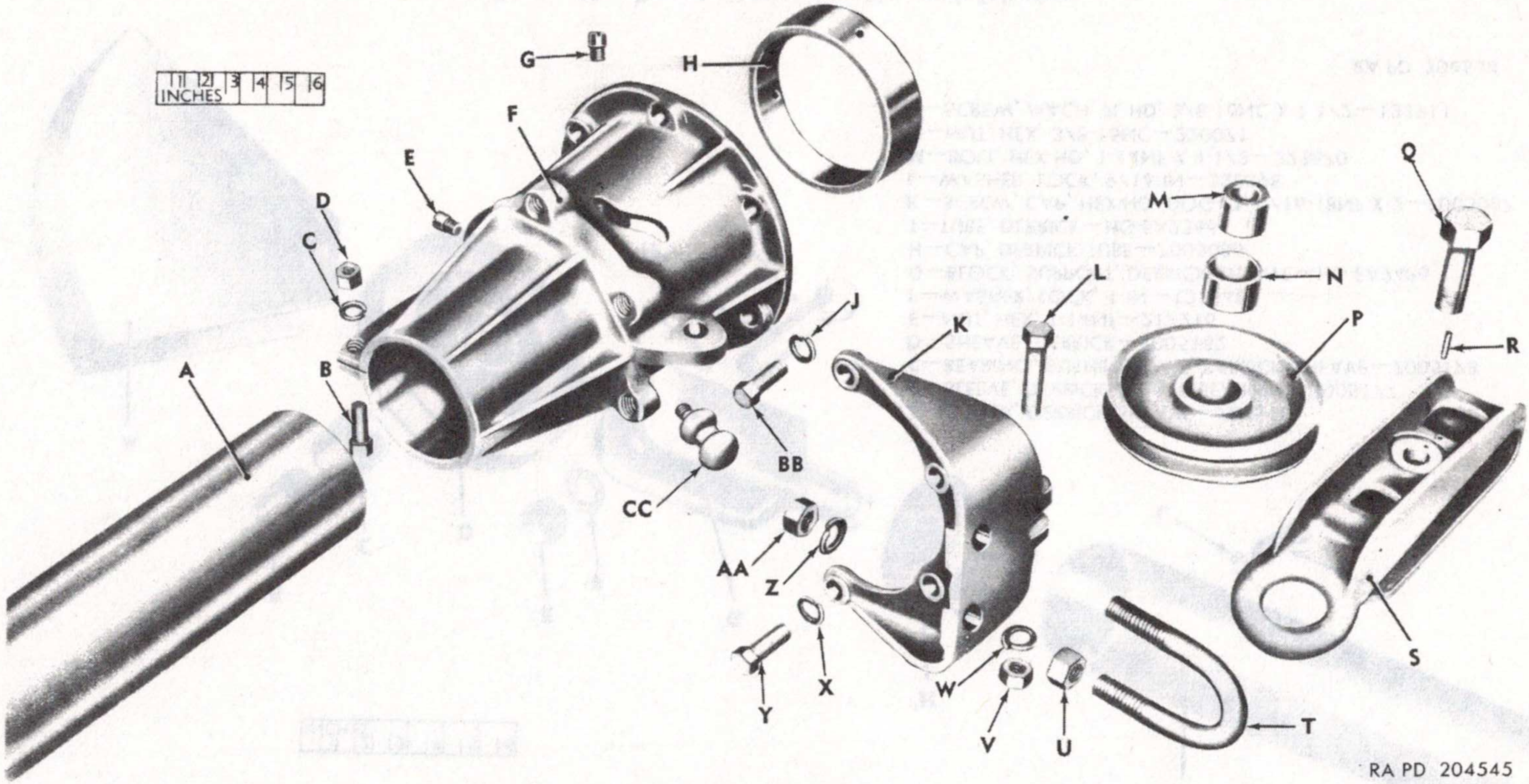

Figure 36. Derrick tube base and snatch sheave assemblies—exploded view.

A—Tube, derrick HG–EA2366
B—Screw, cap, hex-hd, ⅝–18NF x 1¾ 430104
C—Washer, lock, ⅝-in 121574
D—Nut, hex, ⅝–18NF 426754
E—Stud, rack lock cam ring 7005039
F—Base, derrick tube HG–EA1099
G—Stud, rack lock cam ring 7005039
H—Ring, cam, rack lock 7005038
J—Washer, lock, ¾-in 131046
K—Bracket, anchor, snatch sheave 7005106
L—Screw, cap, hex-hd, ¾–16NF x 3 426907
M—Spacer, snatch sheave bearing 7374013
N—Bearing, bushing-type, snatch sheave 7005191
P—Sheave, snatch 7005189
Q—Bolt, snatch sheave 7005240
R—Pin, dowel, snatch sheave bearing spacer 7701747
S—Housing, snatch sheave 7005248
T—Bolt, "U", snatch sheave HG–EA1107
U—Nut, hex, ⅞–14NF 426767
V—Nut, hex, ¾–16NF 426099
W—Washer, lock, ¾-in 131046
X—Washer, lock, ¾-in 131046
Y—Screw, cap, hex-hd, ¾–16NF x 2 430115
Z—Washer, lock, ⅞-in 131047
AA—Nut, hex, ⅞–14NF 426767
BB—Screw, cap, hex-hd, ¾–16NF x 2 430115
CC—Handle, rack lock cam ring HG–EA527

Figure 36—Continued.

from sheave unless inspection (par. 68) indicates the necessity. If necessary, press out bearing with an arbor press.

67. Cleaning

Clean all parts according to procedure in paragraph 71.

68. Inspection and Repair

a. General. Refer to paragraph 72*a* before beginning inspection and repair.

b. Derrick Sheave, Derrick Sheave Bearing Sleeve, and Derrick Sheave Support Block (fig. 35). Inspect derrick sheave and derrick support block for wear, cracks, and other damage. Repair cracked parts by welding or replace cracked, worn, or damaged parts. Check derrick sheave bearing sleeve and derrick sheave bushing-type bearing for wear according to fits and limits specified in repair and rebuild standards (par. 201), and for nicks, cracks, and burs. Remove raised metal with a fine mill file. Replace a worn sleeve. Remove a worn or defective bearing (par. 66) and install a new bearing in derrick sheave (par. 69). Ream or burnish a new bearing to size (par. 201).

c. Derrick Tube Base and Derrick Tube (fig. 36). Inspect derrick tube base for cracks and other damage. Repair a cracked tube base by welding or replace a cracked or damaged base. Inspect derrick tube for bends, cracks, or flattening.

Warning: Do not hot-work a derrick tube. A softened tube is dangerous to equipment and personnel during pole setting operations. Repair a cracked tube by welding, cold-straighten a slightly bent tube, or replace a badly bent, cracked, or flattened tube.

d. Snatch Sheave, Snatch Sheave Housing, "U" Bolt, and Snatch Sheave Anchor Bracket (fig. 36). Inspect snatch sheave, snatch sheave housing, and snatch sheave anchor bracket for wear, cracks, and other damage. Repair cracked parts by welding or replace cracked, worn, or damaged parts. Check snatch sheave bearing spacer and snatch sheave bushing-type bearing for wear according to fits and limits specified in repair and rebuild standards (par. 201). Inspect for scoring, nicks, cracks, and burs. Remove raised metal with a fine mill file. Remove a worn or defective bearing (par. 66) and install a new bearing in snatch sheave (par. 69). Replace a worn spacer. Ream or burnish a new bearing to size (par. 201). Inspect "U" bolt for wear, cracks, damage, and signs of stretching. Inspect "U" bolt for worn or damaged threads. Replace a defective "U" bolt.

69. Assembly

a. General. Refer to paragraph 73*a* before beginning assembly of integral derrick assembly.

b. Assemble Derrick Sheave Assembly.

Note. The key letters noted in parentheses are in figure 35.

If derrick sheave bushing-type bearing (C) was removed from derrick sheave (D) after inspection (par. 68), press a new bearing into derrick sheave with an arbor press. Install derrick sheave cover (A) on derrick sheave support block (G) with two ⅜–16NC x 1½ flat-head machine screws (P) and ⅜–16NC hex nuts (N). Place derrick sheave bearing sleeve (B) inside of bushing-type bearing in the derrick sheave and install sheave in derrick sheave support block. Insert 1–14NF x 4½ hex-head bolt (M) through support block and sheave and secure the bolt in the assembly with one 1-inch lockwasher (F) and 1–14NF hex nut (E). Derrick tube cap (H) is installed on support block during installation of sheave assembly on derrick tube (par. 96).

c. Assemble Derrick Tube Base Assembly.

Note. The key letters noted in parentheses are in figure 36.

Install rack lock cam ring (H) in derrick tube base (F) with rack lock cam ring studs (E and G) and rack lock cam ring handle (CC). Install three ⅝–18NF x 1¾ hex-head cap screws (B), ⅝-inch lockwashers (C), and ⅝–18NF hex nuts (D) in derrick tube clamp flanges on tube base.

d. Assemble Snatch Sheave Assembly.

Note. The key letters noted in parentheses are in figure 36.

If snatch sheave bushing-type bearing (N) was removed from snatch sheave (P) after inspection (par. 68), press a new bearing into snatch sheave with an arbor press. Install snatch sheave bearing spacer (M) in bushing-type bearing in snatch sheave. Install snatch sheave in snatch sheave housing (S) and insert snatch sheave bearing spacer dowel pin (R) through housing into spacer in sheave. Insert and thread snatch sheave bolt (Q) through sheave and into housing. Install two ⅞–14NF hex nuts (U) on snatch sheave "U" bolt (T) and fasten snatch sheave housing assembly to snatch sheave anchor bracket (K) with "U" bolt, two ⅞–inch lockwashers (Z), and ⅞–14NF hex nuts (AA).

Section IV. REBUILD OF BORING CASE ASSEMBLY

70. Disassembly

a. General. During disassembly procedure, caution must be taken to prevent damage to equipment and its parts. As parts are removed from an assembly, place the removed parts, away from dirt and water, in the order of removal. These precautions prevent damage or loss of parts and also aid in assembly of the subassembly after cleaning, inspection, and repair procedures. When rusted or corroded parts are found during disassembly, carefully wipe clean and place in a container

containing a suitable rust-preventive or corrosion inhibitor. No part, regardless of its condition, is to be discarded or destroyed before inspection indicates replacement is necessary or before receipt of a replacement part.

b. Disassemble Rack Thrust Plate Cage Cap Assemblies.

Note. The key letters noted in parentheses are in figure 37.

(1) *Disassemble rack thrust plate cage upper cap.* Remove two rack lock return springs (D and PP) from rack lock return spring studs (B, E, NN, and QQ) on rack lock (C) and rack thrust plate cage upper cap (L). Remove hex-head cap screw (H) and lockwasher (J) holding rack lock pin (K) in upper cap. Remove rack lock pin from upper cap. Remove rack lock from upper cap. Remove two return spring studs from upper cap and two studs from rack lock. Remove locking wire (KK) and four rack thick and thin thrust plate dowel pins (N, Q, LL, and MM) from rack thrust plate cage (P). Rack thick and thin thrust plates (R, S, HH, and JJ) were removed from cage during removal of cage from rack carrier (par. 62).

(2) *Disassemble rack thrust plate cage lower cap assembly.*

Note. The key letters noted in parentheses are in figure 38.

Remove hex nut (X) on the hex-head cap screw (T) used to tighten rack thrust plate cage lower cap (U) to rack carrier. Remove hex-head cap screw and lockwasher from lower cap. Remove locking wire (Y) and four rack thick and thin thrust plate dowel pins (Q, S, Z, and AA) from rack thrust plate cage (R). Rack thick and thin thrust plates (N, P, BB, and CC) were removed from cage during removal of cage from rack carrier (par. 62).

c. Disassemble Boring Case Cover Assembly.

Note. The key letters noted in parentheses are in figure 37, except where otherwise indicated.

(1) *Disassemble rack vertical position plumb assembly.* Remove hex nut (Y) and lockwasher (Z) holding the "J" bolt (BB) of rack vertical position plumb assembly on rack vertical position plumb bracket (V). Remove "J" bolt and rack vertical position plumb (CC) from bracket. Remove plumb from "J" bolt. Remove remaining hex nut (AA) from "J" bolt.

(2) *Disassemble boring case cover.* It is not necessary to remove boring case cover oil seal (T) from boring case cover (DD) unless inspection (par. 72) indicates the necessity. If necessary, press oil seal from cover with an arbor press. It is not necessary to remove rack carrier upper bearing cup

(A, fig. 43) from boring case cover unless inspection (par. 72) indicates the necessity. If necessary, press bearing cup from cover with an arbor press.

d. Disassemble Boring Case Gear Assembly.

Note. The key letters noted in parentheses are in figure 43, except where otherwise indicated.

(1) *Remove rack carrier upper bearing cone.* Pull rack carrier upper bearing cone (B) from upper end of rack carrier (Q) with a standard puller. Remove rack carrier bearing shim set (C) from rack carrier. Check and record the thickness of shims removed to insure that shims of the same thickness are used in assembly (par. 73*e*(7)).

(2) *Remove rack thrust roller.* Remove cotter pin (N) and slotted hex nut (MM) holding rack thrust roller shaft support (NN) on rack thrust roller shaft (M). Remove roller shaft support from the shaft with two ⅜–24NF screws. Remove the roller shaft from rack thrust roller (QQ) and rack carrier (Q). Remove roller from carrier. Remove rack thrust roller bearing (PP) from roller.

(3) *Remove rack feed driven pinion* (fig. 40). Remove locking wire from drilled square-head set screw (VV) holding rack feed driven pinion shaft (J) in rack carrier (Q). Remove set screw from rack carrier and pinion shaft. Remove pinion shaft from rack carrier and rack feed driven pinion (D). Roll rack feed driven pinion out of its position in rack carrier and remove pinion. Remove rack feed driven pinion inner and outer roller bearings (E and F) from pinion. Remove rack feed driven pinion thrust washer (H) from rack feed driven pinion thrust washer retaining pin (G) in rack carrier (fig. 41). If retaining pin is loose in rack carrier, remove pin from carrier.

(4) *Remove rack feed pinion* (fig. 39). Remove cotter pin (L) and slotted hex nut (LL) holding rack feed pinion shaft support (KK) on rack feed pinion shaft (K). Using two ⅜–24NF screws, remove rack feed pinion shaft support from pinion shaft. Remove pinion shaft from rack carrier (Q) and rack feed pinion (GG). Remove locking wire from drilled square-head set screw (P) holding rack feed pinion. Remove rack feed pinion oil seal retainers (EE and SS) from rack carrier. Remove locking wire (TT) holding oil seal retainers and rack feed pinion oil seals (FF and RR) around feed pinion. Remove retainers and oil seals from pinion. Remove two rack feed pinion roller bearings (HH and JJ) from rack feed pinion. It is not necessary to remove oil seals from seal retainers unless inspection (par. 72) indicates the necessity.

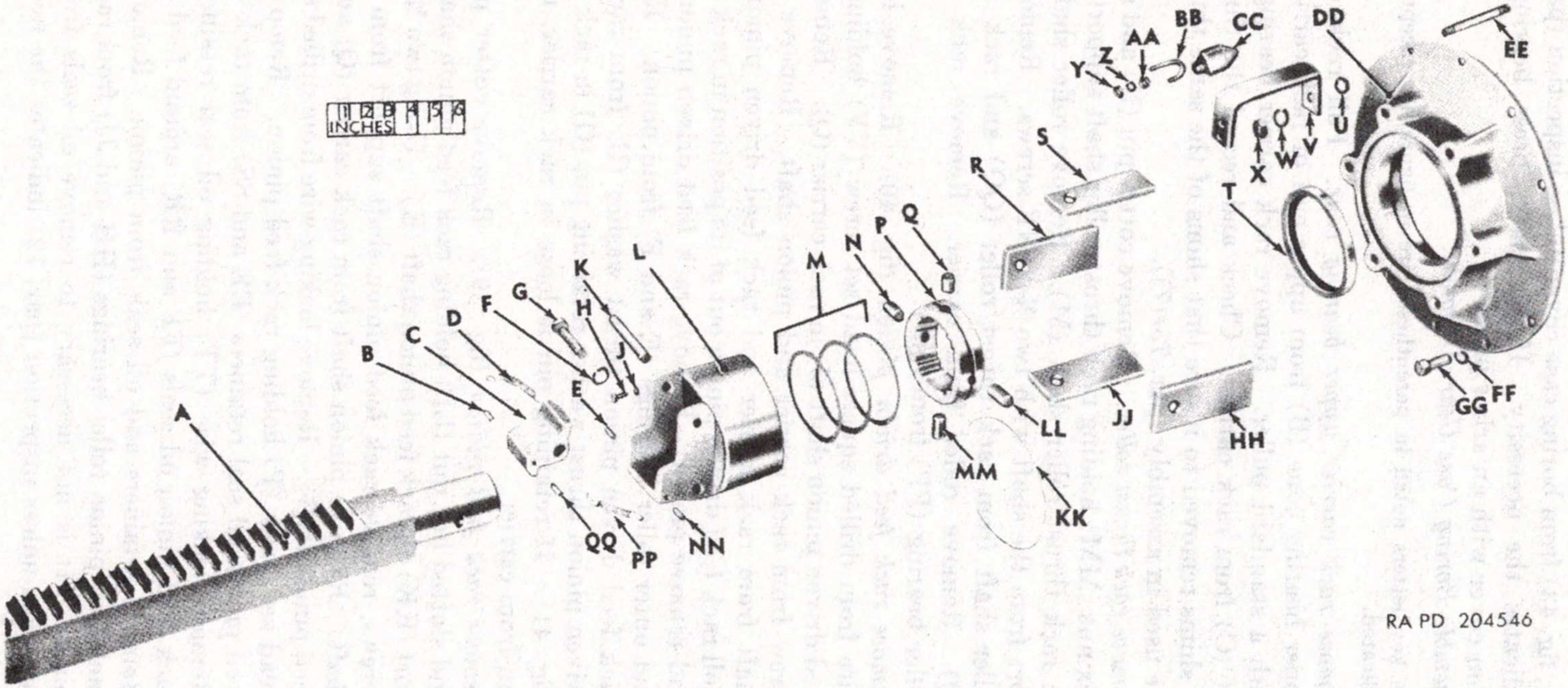

Figure 37. Boring case cover and rack thrust plate cage upper cap assemblies—exploded view.

A—Rack, auger 7376890
B—Stud, rack lock return spring 7005144
C—Lock, rack 7005040
D—Spring, return, rack lock 7005145
E—Stud, rack lock return spring 7005144
F—Washer, lock, ⅝-in 121574
G—Screw, cap, hex-hd, ⅝–18NF x 3¾ 429736
H—Screw, cap, hex-hd, 5/16–18NC x ⅝ 7005143
J—Washer, lock, 5/16-in 120214
K—Pin, rack lock 7340559
L—Cap, rack thrust plate cage, upper 7005049
M—Spacer set, rack thrust plate cage upper cap 7005129
N—Pin, Dowel, rack thick thrust plate 7005076
P—Cage, rack thrust plate 7005068
Q—Pin, dowel, rack thin thrust plate 7005077
R—Plate, thrust, rack, thick 7005070
S—Plate, thrust, rack, thin 7005071
T—Seal, oil, boring case cover 500212
U—Washer, lock, ⅝-in 121574
V—Bracket, rack vertical position plumb HG–121E70
W—Washer, lock, ⅝-in 121574
X—Nut, hex, ⅝–18NF 426754
Y—Nut, hex, ¼–28NF 218584
Z—Washer, lock, ¼-in 120380
AA—Nut, hex, ¼-28NF 218584
BB—Bolt, "J" ¼–28NF x 1½ HG–121E71
CC—Plumb, rack vertical position HG–121E72
DD—Cover, boring case 7005047
EE—Stud, plumb bracket HG–FA4258A
FF—Washer, lock, ⅝-in 121574
GG—Screw, cap, hex-hd, ⅝–18NF x 1½ 430092
HH—Plate, thrust, rack, thick 7005070
JJ—Plate, thrust, rack, thick 7005070
KK—Wire, locking, diam 0.080-in 22–W–1633–160
LL—Pin, dowel, rack thick thrust plate 7005076
MM—Pin, dowel, rack thick thrust plate 7005076
NN—Stud, rack lock return spring 7005144
PP—Spring, return, rack lock 7005145
QQ—Stud, rack lock return spring 7005144

Figure 37—Continued.

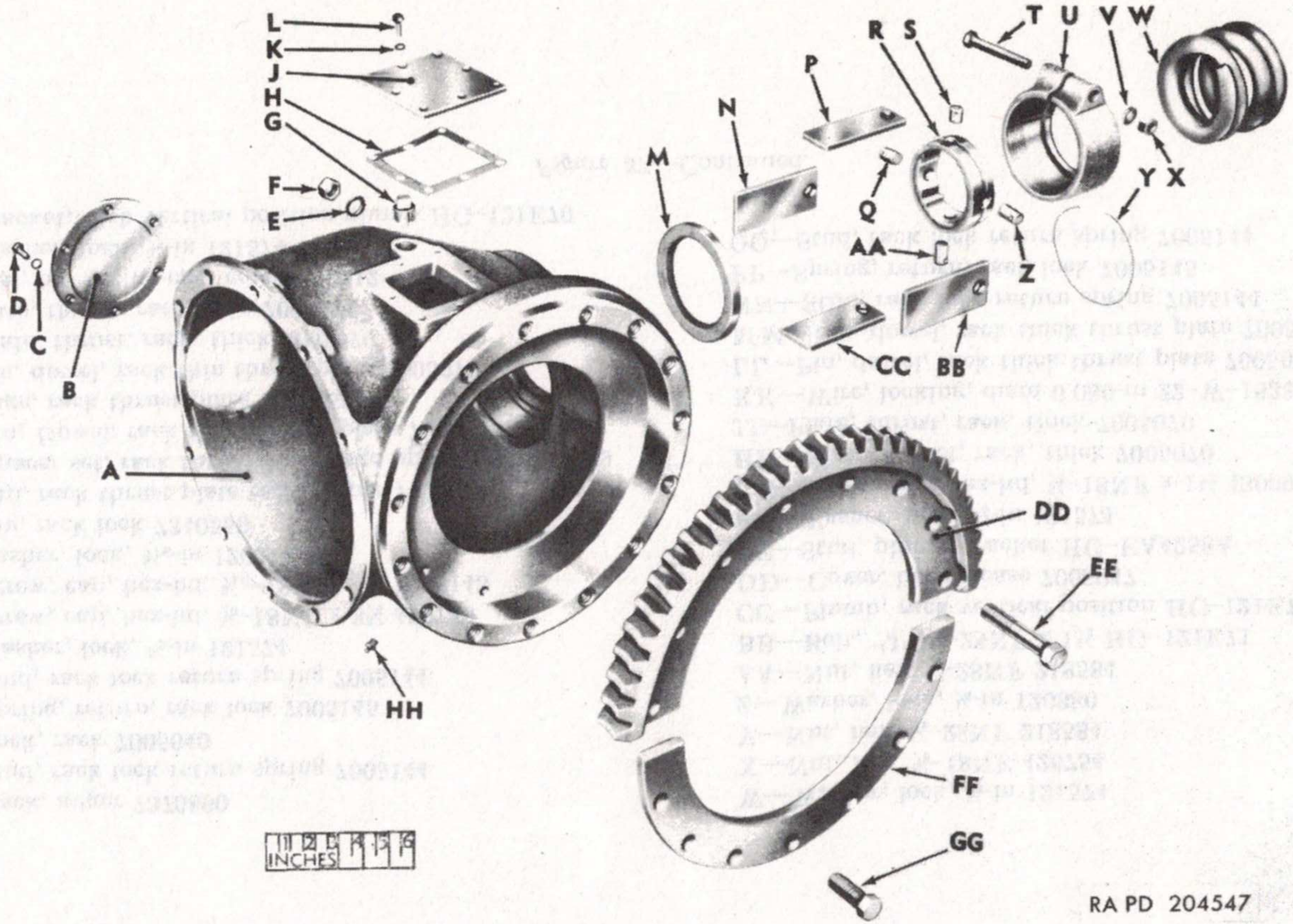

Figure 38. Boring case parts and rack thrust plate cage lower cap assembly—exploded view.

A—Case, boring 7005044
B—Cover, access, boring case 7005137
C—Washer, lock, ⅜-in 120382
D—Screw, cap, hex-hd, ⅜–24NF x 1 120647
E—Washer, lock, ¾-in 131046
F—Nut, hex, ¾–16NF 426099
G—Plug, pipe, ¾-in 219302
H—Gasket, boring case inspection plate HG–EA2407
J—Plate, inspection, boring case 7005085
K—Washer, lock, 5/16-in 120214
L—Screw, cap, hex-hd, 5/16–24NF x ⅞ 120213
M—Seal, oil, boring case 500212
N—Plate, thrust, rack, thick 7005070
P—Plate, thrust, rack, thin 7005071
Q—Pin, dowel, rack thick thrust plate 7005076
R—Cage, rack thrust plate 7005068
S—Pin, dowel, rack thin thrust plate 7005077
T—Screw, cap, hex-hd, ⅝–18NF x 4¼ 216009
U—Cap, rack thrust plate cage, lower 7005138
V—Washer, lock, ⅝-in 121574
W—Spring, bumper, rack 7005146
X—Nut, hex, ⅝–18NF 426754
Y—Wire, locking, diam 0.080-in 22–W–1633–160
Z—Pin, dowel, rack thick thrust plate 7005076
AA—Pin, dowel, rack thick thrust plate 7005076
BB—Plate, thrust, rack, thick 7005070
CC—Plate, thrust, rack, thick 7005070
DD—Gear, vertical leveling worm 7005114
EE—Screw, cap, hex-hd, ¾–16NF x 3¾ 429744
FF—Retainer, boring-case-to-intermediate-case 7005121
GG—Screw, cap, hex-hd, dld, ¾–16NF–2 x 1¾ HG–EA2438
HH—Fitting, lubr 504208

Figure 38—Continued.

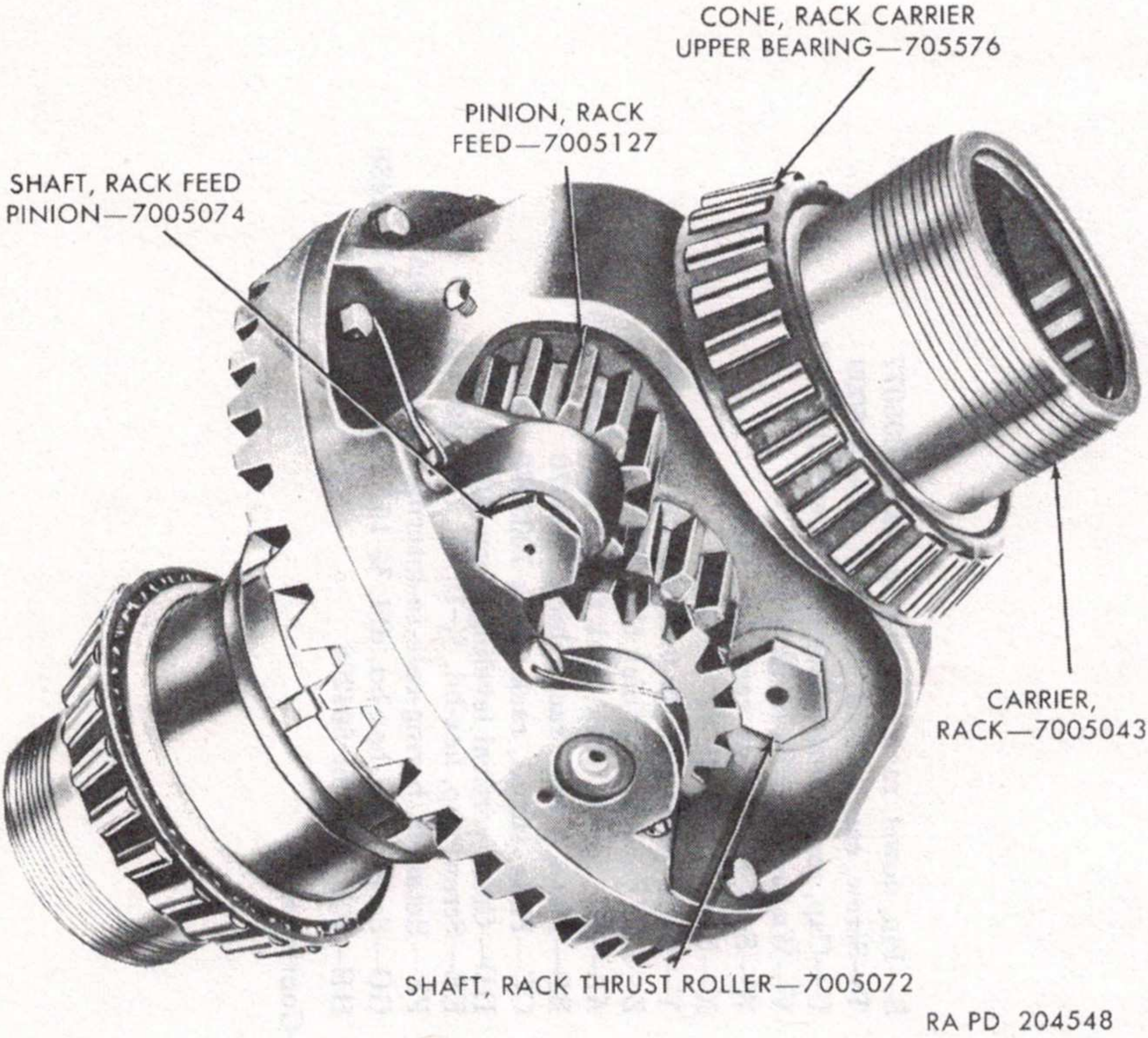

Figure 39. Boring case gear assembly.

If necessary, remove oil seals from retainers with a sharp-pointed tool.

(5) *Remove rack drive gear* (fig. 42). Remove locking wire from nine hex-head cap screws and three fillister-head machine screws holding rack drive gear (S) on rack carrier (Q). Remove 12 screws from rack carrier and remove rack drive gear and rack drive gear shim set (R) from carrier. Check and record the thickness of shims removed to insure that shims of the same thickness are used in assembly (par. 73*e* (5).

(6) *Remove rack carrier lower bearing cone* (fig. 42). Pull rack carrier lower bearing cone (CC) from rack carrier (Q) with a standard puller. Remove rack carrier bearing shim set (BB) from carrier. Check and record the thickness of shims removed to insure that shims of the same thickness are used in assembly (par. 73*e* (6)). Remove rack carrier lower bearing spacer (AA) from rack carrier.

(7) *Remove rack feed idler gear* (fig. 42). Turn back the bent tangs on rack feed idler gear bearing adjusting nut tang washer (Y) and remove rack feed idler gear bearing adjust-

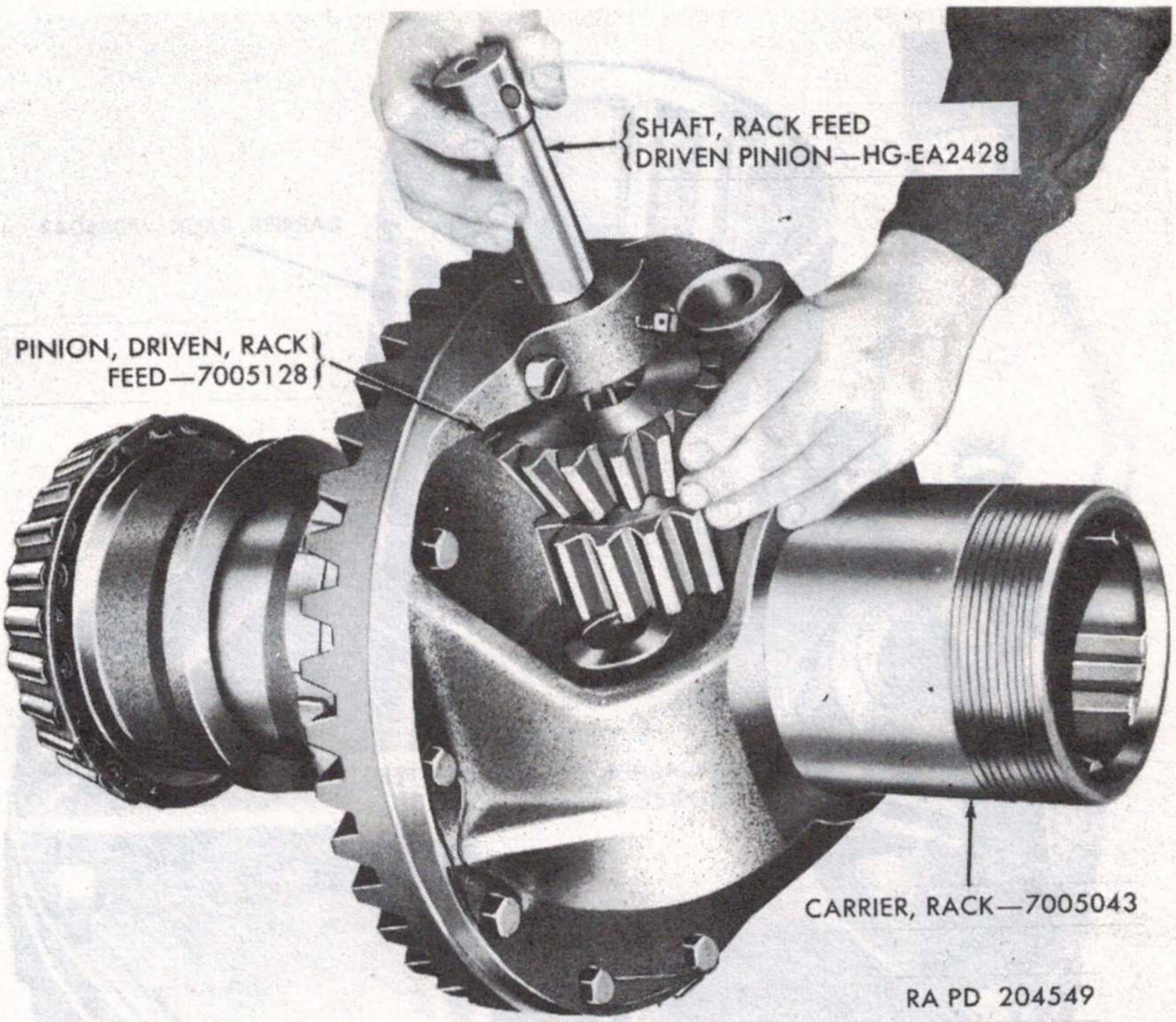

Figure 40. Removing rack feed driven pinion and pinion shaft.

ing nut (Z) and tang washer from rack carrier with the spanner wrench provided with the vehicle. Remove the other rack feed idler gear bearing adjusting nut (X) from rack carrier with same wrench. Remove rack feed idler gear tapered roller bearing cone (W), rack feed idler gear (V), and the other rack feed idler gear tapered roller bearing cone (U) from rack carrier. Check and record the thickness of shims removed to insure that shims of the same thickness are used in assembly (par. 73*c* (1)).

e. Remove Boring Case Parts.

Note. The key letters noted in parentheses are in figure 38, except where otherwise indicated.

Remove eight hex-head cap screws (L) and lockwashers (K) holding boring case inspection plate (J) on boring case (A). Remove inspection plate from case. Remove and discard boring case inspection plate gasket (H). Remove six hex-head cap screws (D) and lockwashers (C) holding boring case access cover (B) on boring case. Remove access cover from case. Remove lubricating fitting (HH) from boring case. Remove two pipe plugs (G) from boring case. It is not necessary to remove boring case oil seal (M) from boring case

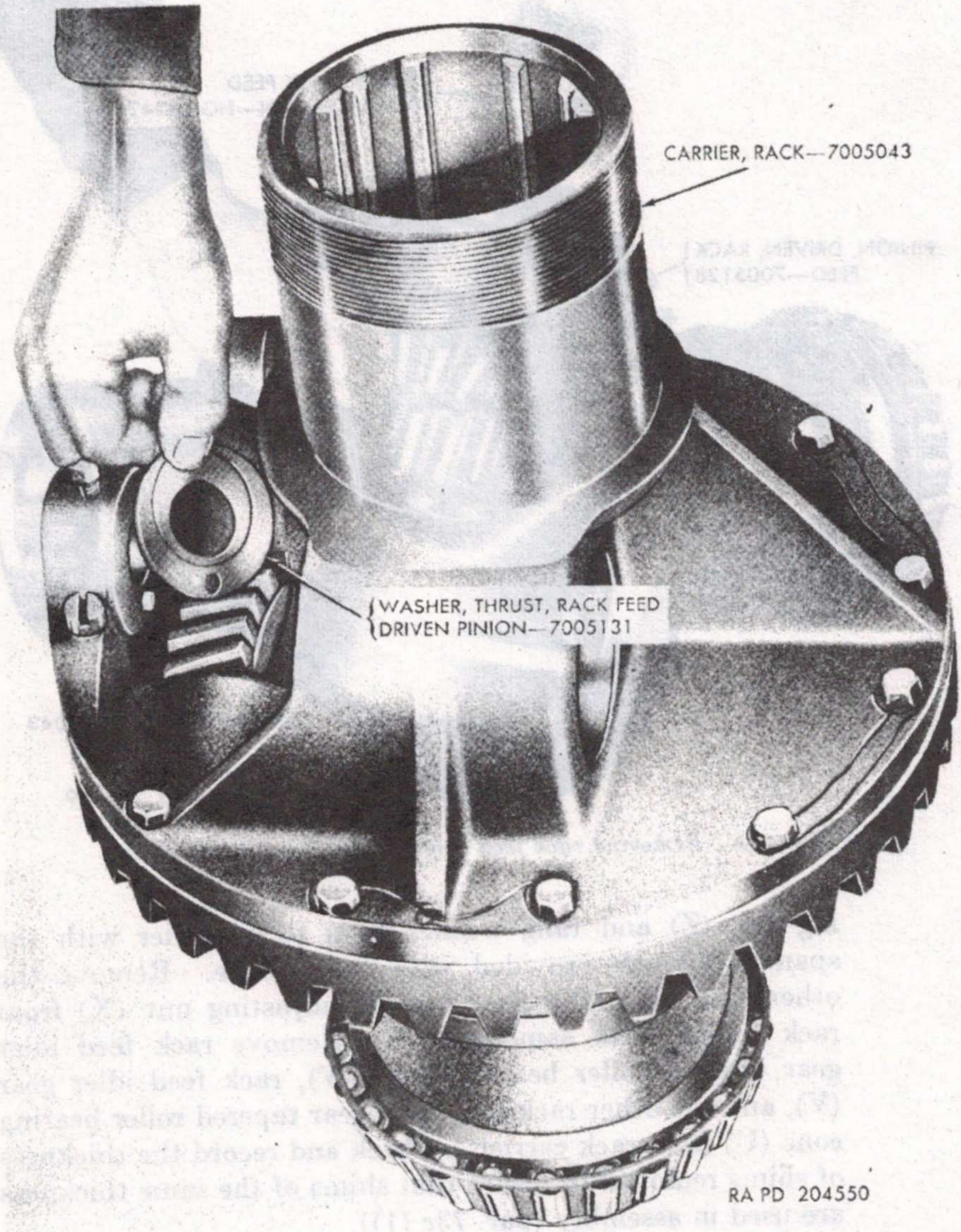

Figure 41. Removing rack feed driven pinion thrust washer.

unless inspection (par. 72) indicates the necessity. If necessary, press oil seal from boring case with an arbor press. It is not necessary to remove rack carrier lower bearing cup (DD, fig. 43) from boring case unless inspection (par. 72) indicates the necessity. If necessary, press bearing cup from boring case with an arbor press. The remainder of the boring case parts were removed during removal of boring case (par. 62).

f. Disassemble Vertical Power Leveler.

Note. The key letters noted in parentheses are in figure 46, except where otherwise indicated.

(1) *Remove clutch sliding jaw.* Remove four hex-head cap screws and lockwashers holding housing cover (fig. 24) on drive housing. Remove cover and housing cover gasket from housing and discard gasket. Remove cotter pin, castle nut, and plain washer holding drive pinion on drive shaft. Pull drive pinion from shaft with a suitable puller. Remove square key from drive shaft. Remove drive pinion shim set from drive shaft. Check and record the thickness of shims removed to insure that shims of the same thickness are used in assembly (par. 73*c* (6)). Remove drive shaft assembly from housing with one hand while removing clutch sliding jaw (fig. 44) from side opening in housing with the other hand.

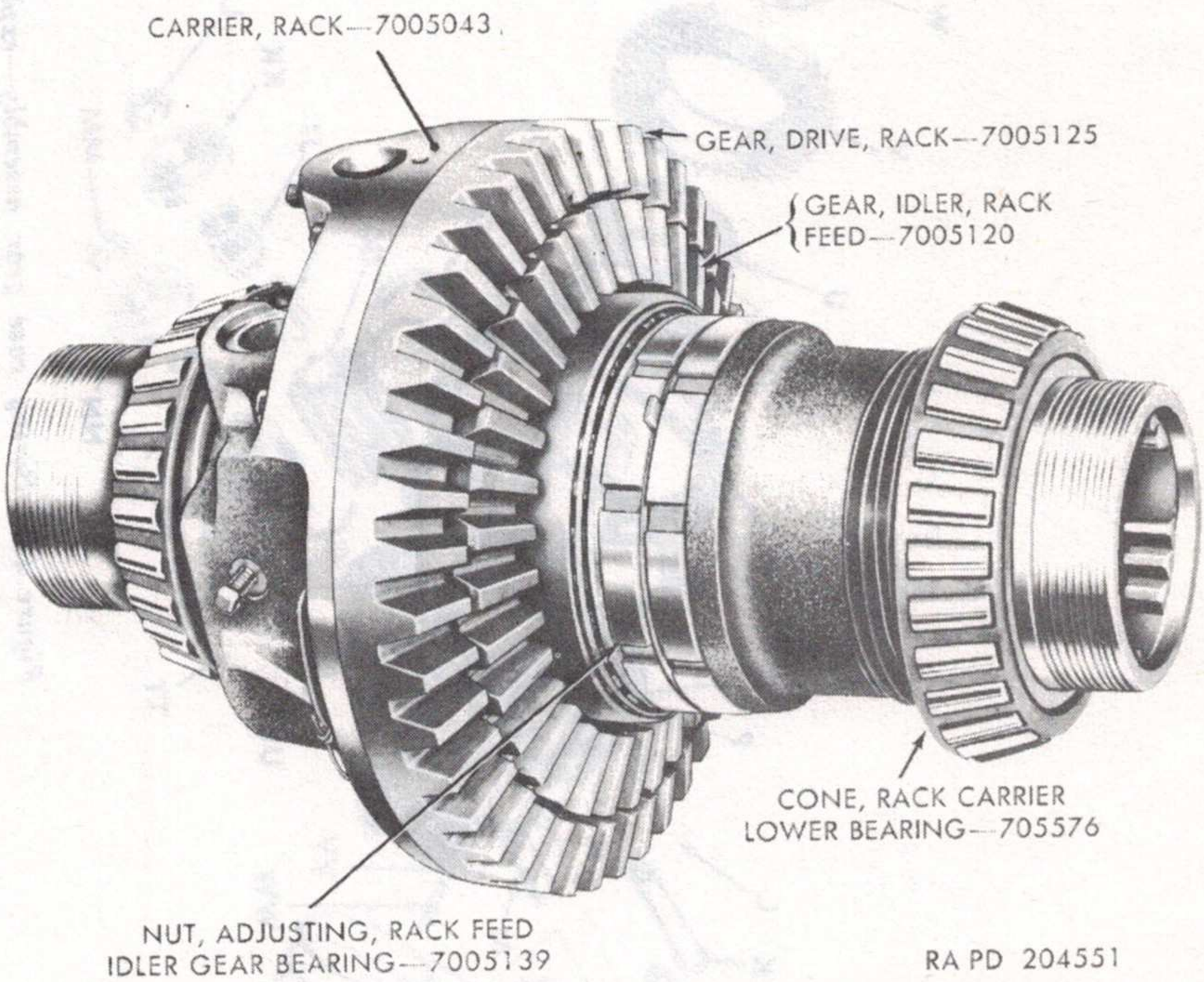

Figure 42. Boring case gear assembly—partially disassembled view.

(2) *Disassemble drive shaft assembly* (fig. 44). Remove cotter pin, castle nut, and stationary clutch jaw retainer holding stationary clutch jaw with integral sprocket on drive shaft. Remove clutch jaw from shaft. Do not remove stationary clutch jaw bushing-type bearing from clutch jaw unless

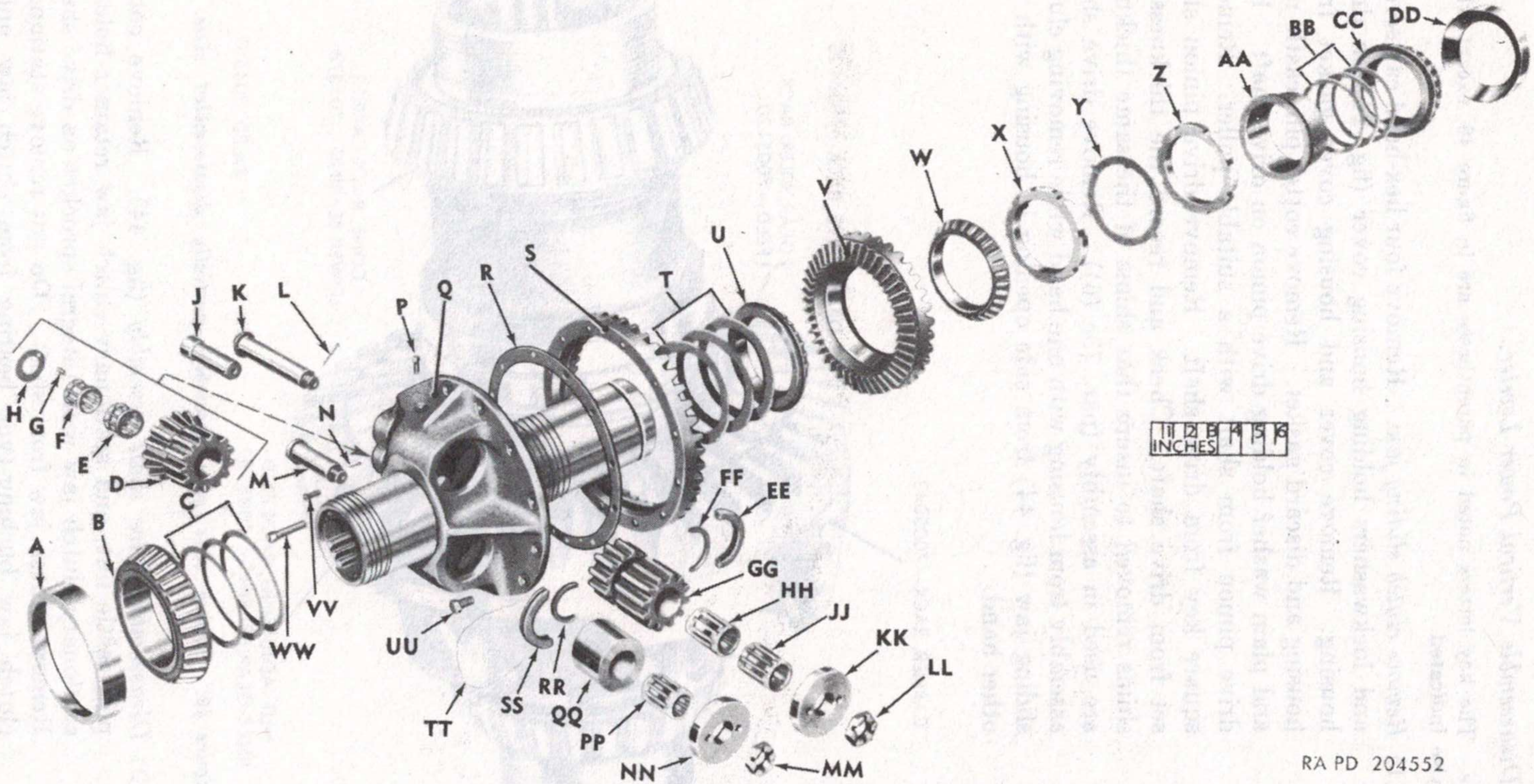

Figure 43. Boring case gear assembly—exploded view.

A—Cup, rack carrier upper bearing TIM–74850
B—Cone, rack carrier upper bearing 705576
C—Shim set, rack carrier bearing 7005140
D—Pinion, driven, rack feed 7005128
E—Bearing, roller, rack feed driven pinion, inner 7538044
F—Bearing, roller, rack feed driven pinion, outer 7538045
G—Pin, retaining, rack feed driven pinion thrust washer HG–EA2437
H—Washer, thrust, rack feed driven pinion 7005131
J—Shaft, rack feed driven pinion HG–EA2428
K—Shaft, rack feed pinion 7005074
L—Pin, cotter, ⅛ x 2¼ 103390
M—Shaft, rack thrust roller 7005072
N—Pin, cotter, ⅛ x 2¼ 103390
P—Screw, set, sq-hd, dld, ⅜–16NC x ⅞ 7005095
Q—Carrier, rack 7005043
R—Shim set, rack drive gear 7005136
S—Gear, drive, rack 7005125
T—Shim set, rack feed idler gear 7005142
U—Cone, tapered roller bearing, rack feed idler gear 705782
V—Gear, idler, rack feed 7005120
W—Cone, tapered roller bearing, rack feed idler gear 705782
X—Nut, adjusting, rack feed idler gear bearing 7005139
Y—Washer, tang, rack feed idler gear bearing adjusting nut 7005141
Z—Nut, adjusting, rack feed idler gear bearing 7005139
AA—Spacer, rack carrier lower bearing 7005069
BB—Shim set, rack carrier bearing 7005140
CC—Cone, rack carrier lower bearing 705576
DD—Cup, rack carrier lower bearing TIM 74850
EE—Retainer, rack feed pinion oil seal 7005135
FF—Seal, oil, rack feed pinion HG–EA2434
GG—Pinion, rack feed 7005127
HH—Bearing, roller, rack feed pinion 7538043
JJ—Bearing, roller, rack feed pinion 7538043
KK—Support, rack feed pinion shaft 7005075
LL—Nut, hex, sltd, 1–14NF 7005147
MM—Nut, hex, sltd, 1–14NF 7005147
NN—Support, rack thrust roller shaft 7005075
PP—Bearing, roller, rack thrust roller 7538043
QQ—Roller, thrust, rack 7005073
RR—Seal, oil, rack feed pinion HG–EA2434
SS—Retainer, rack feed pinion oil seal 7005135
TT—Wire, locking, diam 0.0625-in 22–W–1631–110
UU—Screw, cap, hex-hd, dld, ½–20NF x 1 1/16 7005133
VV—Screw, set, sq-hd, dld, ⅜–16NC x ⅞ 7005095
WW—Screw, mach, fil-hd, dld, ½–20NF x 2⅛ 7005132

Figure 43—Continued.

inspection (par. 72) indicates the necessity. If necessary, press bearing from clutch jaw with an arbor press.

(3) *Remove shifter fork.* Remove hex jam nut locking shifter shaft detent spring retainer in drive housing (fig. 24). Unscrew detent spring retainer and remove spring retainer, shifter shaft detent spring, and shifter shaft detent from housing. Unscrew shifter shaft from shifter fork and remove shaft from housing. Remove fork through side opening in drive housing (fig. 45).

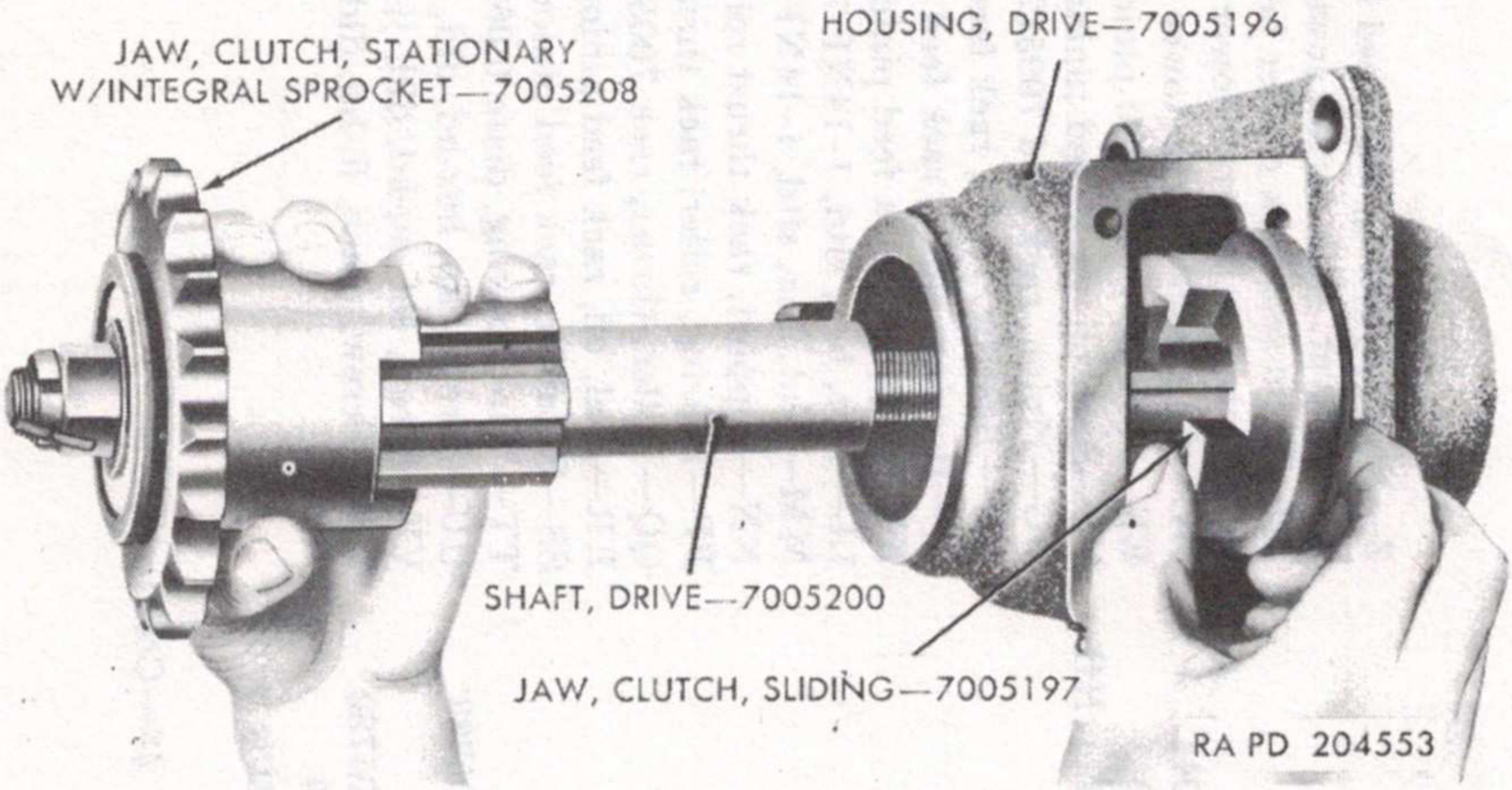

Figure 44. Removing clutch sliding jaw.

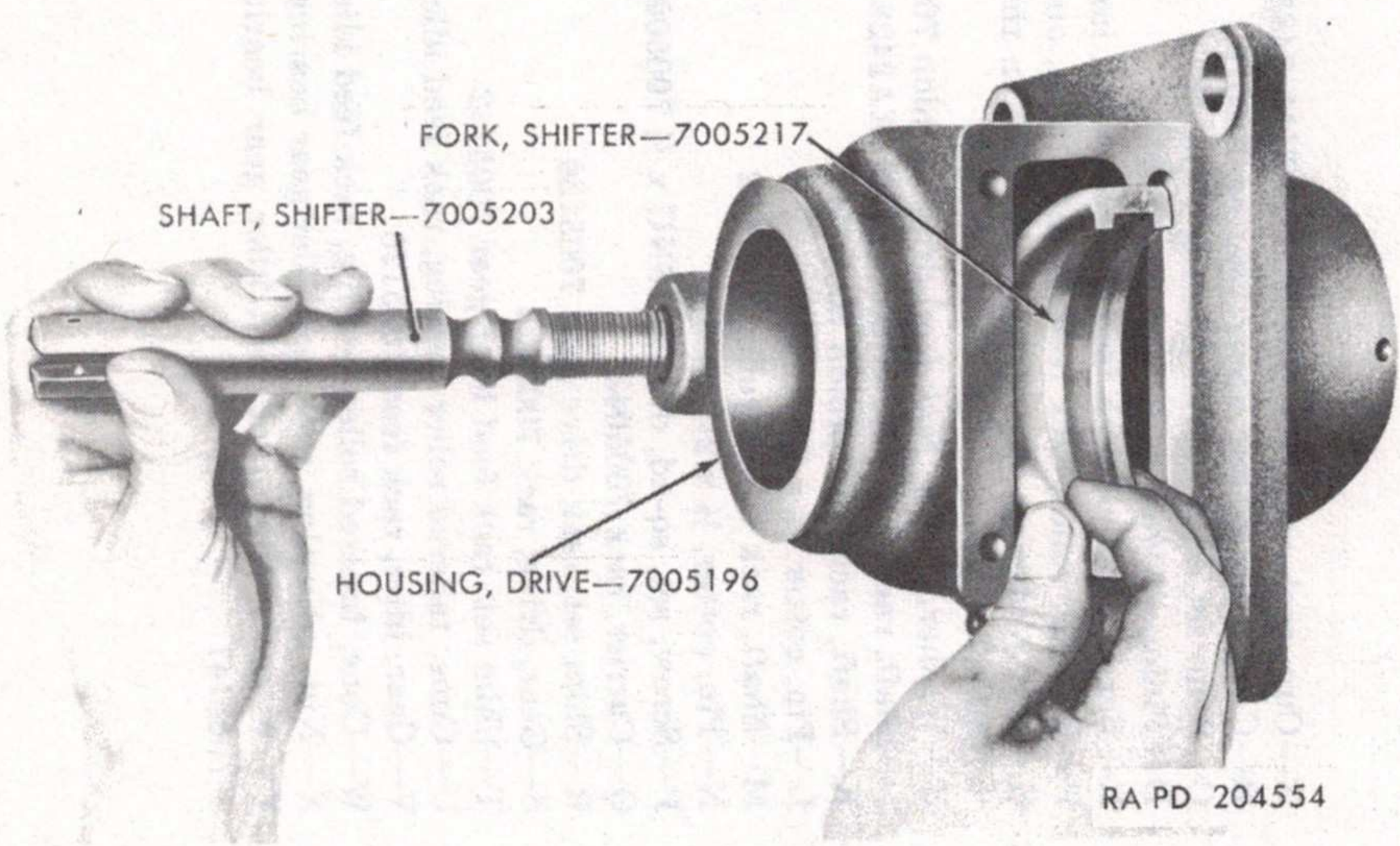

Figure 45. Removing shifter fork.

(4) *Remove drive shaft ball bearing.* Remove cotter pin (PP) holding drive shaft bearing retainer (VV) in position in drive housing (WW). Unscrew bearing retainer from housing and remove drive shaft ball bearing (QQ) from housing. Remove drive shaft collar (AF) from drive shaft oil seal (GG) in housing. It is not necessary to remove oil seal from housing unless inspection (par. 72) indicates the necessity. If necessary, press oil seal from housing with an arbor press. Remove lubricating fitting (JJ) from housing. Do not remove housing bushing-type bearing (HH) from the housing unless inspection (par. 72) indicates the necessity. If necessary, press bearing from housing with an arbor press.

(5) *Disassemble idler sprocket assembly.* Remove hex nut (Z) and plain washer (AA) holding idler sprocket shaft (G) on idler sprocket support (BB). Remove shaft assembly from support. Remove idler sprocket washer (CC) and idler sprocket (J) from shaft. Do not remove idler sprocket bushing-type bearing (DD) from idler sprocket unless inspection (par. 72) indicates the necessity. If necessary, press bearing from sprocket with an arbor press. Remove the idler sprocket washer (H) from shaft. Remove lubricating fitting (F) from shaft.

(6) *Disassemble vertical leveling worm shaft sprocket assembly.* Remove two hex-head cap screws and lockwashers holding vertical leveling worm shaft support (N) to idler sprocket support (BB). Remove worm shaft support from sprocket support. Remove vertical leveling worm shaft support shim set from worm shaft support. Check and record the thickness of shims removed to insure that shims of the same thickness are used in assembly (par. 73*c*(2)). Remove lubricating fitting (P) from worm shaft support. Remove set screw (L) from vertical leveling worm shaft sprocket (K). Do not remove vertical leveling worm shaft support bushing-type bearing (M) from support unless inspection (par. 72) indicates the necessity. If necessary, press bearing from support with an arbor press.

g. Disassemble Vertical Leveling Worm Assembly (fig. 47).

(1) *Remove worm shaft.* The worm shaft is removed from the worm housing according to procedure in paragraph 75*d*(2) with the exception that the shaft for the vertical leveling worm assembly is removed from the housing by pressing on the rounded end of the shaft.

(2) *Remove leveling worm.* The leveling worm is removed from the worm housing according to procedure in paragraph 75*d*(3).

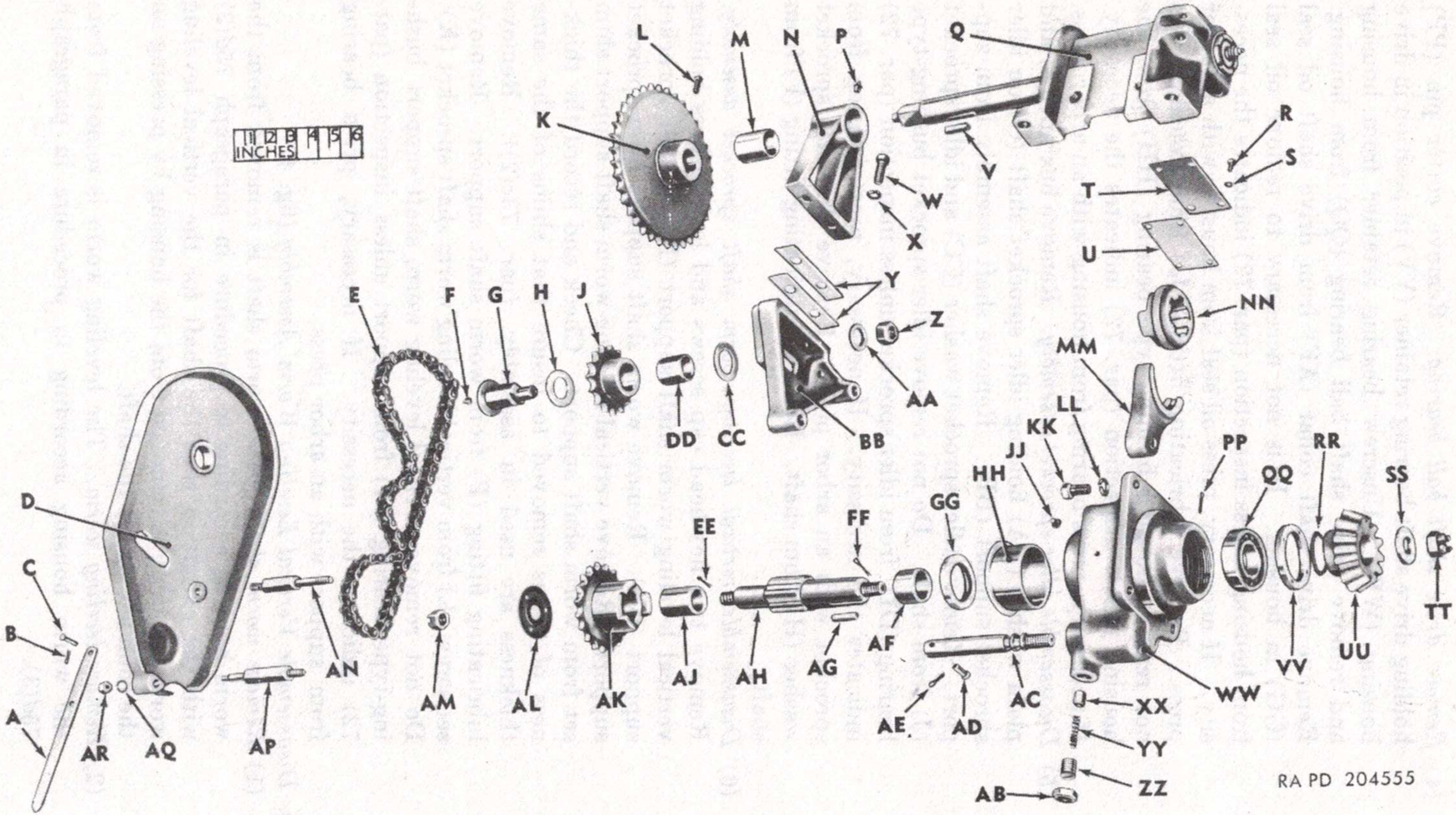

Figure 46. Vertical power leveler—partially exploded view.

A—Lever, shifter shaft HG–EA2705
B—Pin, cotter, 3/32 x 5/8 107762
C—Pin, clevis, 3/8 x 15/16 138078
D—Guard, chain HG–EA2548–1
E—Chain, assy WHC–20314
F—Fitting, lubr 504208
G—Shaft, idler sprocket 7005212
H—Washer, idler sprocket 7005211
J—Sprocket, idler 7005210
K—Sprocket, vertical leveling worm shaft 7005214
L—Screw, set, sq-hd, 3/8–16NC x 7/8 7005095
M—Bearing, bushing-type, vertical leveling worm shaft support 7005213
N—Support, vertical leveling worm shaft 7005209
P—Fitting, lubr 504208
Q—Worm, leveling, vertical, assy HG–EA3235
R—Screw, cap, hex-hd, 1/4–28NF x 1/2 213875
S—Washer, lock, 1/4-in 120380
T—Cover, housing HG–EA2536
U—Gasket, housing cover 7005206
V—Key, sq, 3/8 x 1 1/2 7005218
W—Screw, cap, hex-hd, 1/2–20NF x 1 1/2 120234
X—Washer, lock 1/2-in 120384
Y—Shim set, vertical leveling worm shaft support 7005231
Z—Nut, hex, 3/4–16NF 426099
AA—Washer, plain, 13/16-in id 131017
BB—Support, idler sprocket 7005257
CC—Washer, idler sprocket 7005211
DD—Bearing, bushing-type, idler sprocket 7005225
EE—Pin, cotter, 1/8 x 1 1/2 103387
FF—Pin, cotter, 1/8 x 1 1/2 103387
GG—Seal, oil, drive shaft 500091
HH—Bearing, bushing-type, housing 7005201
JJ—Fitting, lubr 504208
KK—Screw, cap, hex-hd, 1/2–20NF x 1 123605
LL—Washer, lock, 1/2-in 120384
MM—Fork, shifter 7005217
NN—Jaw, clutch, sliding 7005197
PP—Pin, cotter, 1/8 x 3/4 177923
QQ—Bearing, ball, drive shaft 700536
RR—Shim set, drive pinion 7005232
SS—Washer, plain, 13/16 id 7005205
TT—Nut, castle, 3/4–16NF 125063
UU—Pinion, drive 7005198
VV—Retainer, drive shaft bearing 7005199
WW—Housing, drive 7005196
XX—Detent, shifter shaft 7005215
YY—Spring, shifter shaft detent 7005216
ZZ—Retainer, shifter shaft detent spring 7005219
AB—Nut, jam, hex, 3/4–16NF 124949
AC—Shaft, shifter 7005203
AD—Pin, clevis, 3/8 x 15/16 138078
AE—Pin, cotter, 3/32 x 5/8 107762
AF—Collar, drive shaft HG–EA2533
AG–Key, sq, 3/8 x 1 1/2 7005218
AH—Shaft, drive 7005200
AJ—Bearing, bushing-type, stationary clutch jaw 7005202
AK—Jaw, clutch, stationary, w/integral sprocket 7005208
AL—Retainer, stationary clutch jaw 7005204
AM—Nut, castle, 3/4–16NF 125063
AN—Post, mounting, chain guard, right 7005223
AP—Post, mounting, chain guard, left 7005222
AQ—Washer, lock 1/2-in 120384
AR—Nut, hex 1/2–20NF 214267

Figure 46—Continued

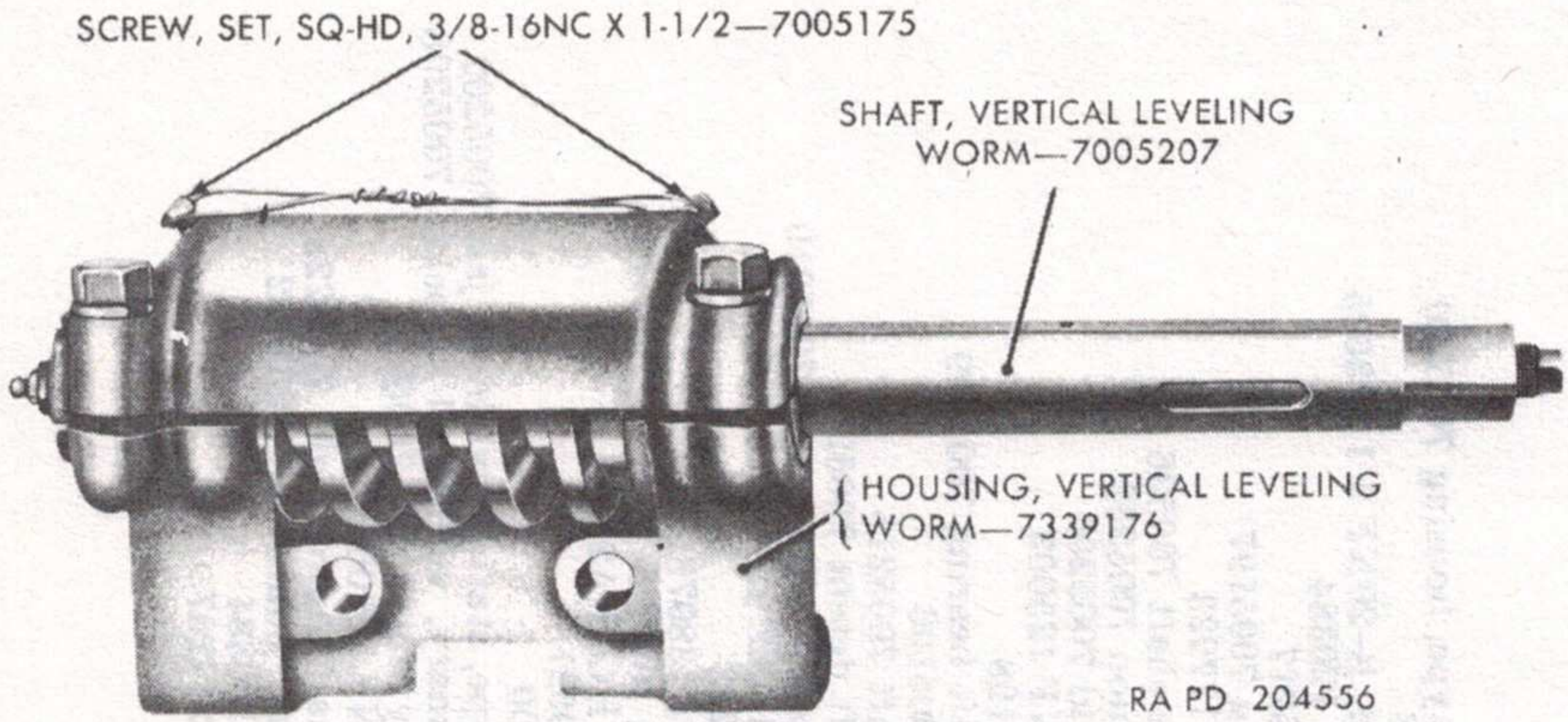

Figure 47. Vertical leveling worm assembly.

71. Cleaning

a. General. All parts must be thoroughly cleaned before inspection, after repair, and before assembly. Hands and tools must be kept free of an accumulation of grease which collects dust and grit. The inner and outer surfaces of all metal parts must be cleaned with dry-cleaning solvent or volatile mineral spirits. Particular attention must be paid to all grooves, oil passages, and other narrow spaces in both cast and machined parts. When necessary, a wire probe must be used to break up gum or sludge deposits in order to admit the cleaning solvent. Passages must be blown out with compressed air to free them of foreign particles. Remove all gasket cement and portions of gaskets from housings, cases, covers, retainers, and other places where gaskets were removed. If available, steam may be used on external parts to remove grease and dirt. After cleaning by steam, all parts must be rinsed in clean solvent and dried thoroughly with compressed air. Coat all bearings and machined surfaces with a light coat of clean engine oil (OE) to prevent rusting or corrosion.

b. Gears, Sprockets, Splines, and Shafts. Clean each part thoroughly with volatile mineral spirits or dry-cleaning solvent giving special attention to oil passages, keyways, splines, threads, teeth, and other small grooves, corners, and openings. Use a suitable probe or scraper to remove accumulated dirt or grease that is difficult to remove. Dry each part thoroughly with compressed air and coat lightly with clean engine oil (OE).

c. Bearings and Bushing-Type Bearings.

(1) *Bearings.* Soak bearings in volatile mineral spirits or dry-cleaning solvent to break up sludge or gum deposits. Turn bearings slowly while immersed. Repeat procedure until bearings are free of dirt and lubricant.

Caution: Do not spin or dry bearings with compressed air. Dry bearings thoroughly and coat with clean engine oil (OE).

Note. Refer to TM 37–265 for care and maintenance of bearings.

(2) *Bushing-type bearings.* Clean bushing-type bearings in dry-cleaning solvent or volatile mineral spirits paying particular attention to oil holes and lubricant grooves. Dry thoroughly with compressed air and coat with clean engine oil (OE).

d. Oil Seals and Nonmetal Parts. Oil seals, nonmetal parts, and metal parts containing nonmetal parts or oil seals must not be submerged in cleaning solvents. The part must be cleaned with a cloth dipped in dry-cleaning solvent or volatile mineral spirits, then dried thoroughly with a clean cloth or compressed air depending on the size of the part.

e. Castings, Metal Parts, and Hardware. Clean each part thoroughly in volatile mineral spirits or dry-cleaning solvent. Particular attention must be paid to threaded, toothed, or splined parts. Dry thoroughly with compressed air. Coat all machined surfaces with a light coat of clean engine oil (OE).

72. Inspection and Repair

a. General. Careful inspection of all parts is essential to proper maintenance. Visual inspection must be done on all parts. Precision parts must be inspected with the aid of a magnifying glass, micrometers, vernier calipers, and other necessary standard measuring instruments. Magnaflux is used when available, to check for stressed or cracked gears and shafts. When necessary, test the fit of mating parts. Check for rubbing, scraping, grinding, backlash and excessive end play due to damage or wear. Burned metal, fiber, rubber, and leather may sometimes be detected by the sense of smell. If inspection reveals damage to a part, determine if the part is economically repairable with shop facilities. All wearing parts must be compared to the repair and rebuild standards to determine if the part will meet specifications after repair. Parts must be cleaned thoroughly before inspection and after repair. If inspection reveals that a part is damaged or worn beyond repair, or if it is less costly to replace a part, the part must be replaced. New parts must always be checked against the repair and rebuild standards to assure proper fits and limits.

b. Pinions, Jaws, Sprockets, and Gears (figs. 43 and 46). Examine parts for damage and wear. Inspect visually with a magnifying glass for sharp fins or burs at tooth corners and for galling or pitting of tooth faces. Check parts under magnaflux, if available, for cracks. Replace worn, damaged, cracked, or defective parts. Parts with chipped or broken teeth must be replaced. Small defects such as nicks, scores, or burs must be corrected with a hone.

c. Shafts and Splines (figs. 43 and 46).

(1) *Shafts.*

(*a*) Inspect all shafts for cracks. Use a magnifying glass or magnaflux, if available. Replace cracked shafts. Inspect machined surfaces and threads for wear or damage. Check shafts for distortion. Replace worn or damaged shafts as necessary. Raised metal, nicks, or scratches must be stoned off and polished with a crocus cloth.

(*b*) Check idler sprocket shaft, drive shaft, vertical leveling worm shaft, stationary clutch jaw with integral sprocket to fits and limits specified in repair and rebuild standards (par. 202). Replace worn or damaged shafts.

(2) *Splines.* Inspect all splines for fit with mating parts. They must enter together freely and move easily with one another. Inspect the splines for wear, scoring, burs, bends, twists, and roughness. Minor damage must be repaired with a hone and then polished with a crocus cloth. Replace worn or damaged parts.

d. Bearings, Bearing Cones, Bearing Cups, and Bushing-Type Bearings (figs. 43 and 46).

(1) *Bearings, bearing cups, and bearing cones.*

(*a*) Apply clean engine oil (OE) to the bearings and turn each bearing slowly by hand. The bearings must turn smoothly and freely without binding. Inspect the rollers or balls for flattening, grooving, pitting, wear, or other damage. Inspect the bearing cages for cracks, wear, or damage. Inspect the bearing cups for wear or damage. Replace worn or damaged bearings, bearing cups, and bearing cones.

(*b*) If inspection reveals wear or damage to rack carrier upper bearing cup in boring case cover or rack carrier lower bearing cup in boring case, remove a worn or damaged cup (par. 70) and install a new cup in the case or case cover (par. 73).

(2) *Bushing-type bearings.*

(*a*) Inspect bushing-type bearings for roughness, grooving, pitting, burs, cracks, wear, scoring, and eccentricity. Replace worn or damaged parts. Repair light damage with a hone and polish with a crocus cloth.

(*b*) Check idler sprocket bushing-type bearing, vertical leveling worm shaft support bushing-type bearing, drive housing bushing-type bearing, stationary clutch jaw bushing-type bearing, and leveling worm shaft bushing-type bearing to fits and limits as specified in repair and rebuild standards (par. 202). Ream new bearings to correct diameter after

installation (par. 202). If inspection reveals wear or damage to stationary clutch jaw bushing-type bearing, drive housing bushing-type bearing, or idler sprocket bushing-type bearing, remove bearing (par. 70) and install a new bearing. If inspection reveals damage to vertical leveling worm shaft support bushing-type bearing, remove bearing (par. 70) and install a new bearing in vertical leveling worm shaft support.

e. Oil Seals, Packing Washers and Felts, Oil Retainers, and Nonmetal Parts (figs. 37, 38, 43, and 46).

(1) *Oil seals.*

(*a*) Inspect the contact material of oil seals to make sure that material is pliable and shows no sign of burning. Inspect the thin featheredge which contacts the rotating part to make sure it is intact and can make good contact with rotating part. Replace worn or damaged part.

(*b*) If inspection reveals wear or damage to boring case cover oil seal, boring case oil seal, or drive shaft oil seal in vertical power leveler drive housing, remove defective oil seal (par. 70) and install a new seal (par. 73).

(2) *Oil retainers.* Inspect oil retainers, deflectors, and slingers for tears, wear, twist, or other damage. Replace a worn or damaged part.

(3) *Packing washers and felts.*

(*a*) Inspect packing washers, packing felts, and oil seal felts for wear, tears, and burning. Be sure that the felt or packing material is pliable and makes good sealing contact. Replace a defective packing washer and packing felt.

(*b*) If inspection reveals that rack feed pinion oil seals are worn or damaged, remove oil seals from oil seal retainers (par. 70) and install new felt oil seals in retainers (par. 73).

(4) *Nonmetal parts.* Inspect nonmetal parts for cracks, brittleness, wear, scoring, tears, and other damage. Replace defective parts.

f. Inspect castings, metal parts, and hardware (figs. 37, 38, 43, and 46).

(1) Inspect all metal parts for cracks, breaks, wear, damaged threads, twisting, stretching, damaged teeth, chips, burs, scoring, grooving, spring elasticity, and other damage. Be sure to inspect carefully around shaft, gear, bolt, stud, and screw openings for damage. Repair by welding or replace worn or damaged parts. Minor thread damage may be repaired with standard thread chaser. Stretched or cracked bolts and screws must be replaced. Minor nicks, burs, and roughness must be repaired with a fine mill file. Inspect

chain assembly for worn, cracked or broken chain links, guide links, cotter pins, and connecting pins. Replace a worn or damaged link or pin.

(2) Check rack feed driven pinion thrust washer, rack thrust roller, rack thrust thick and thin plates, drive shaft collar, vertical leveling worm thrust washer, and vertical leveling worm adjusting nut to fits and limits as specified in repair and rebuild standards (par. 202). Replace a worn part. Worn rack thrust plates must be built up, if possible, with stellate welding rod to specified limits (par. 202).

73. Assembly

a. General.

(1) *Assembly procedure.* When the parts of an assembly or piece of equipment has been processed according to repair and rebuild procedure, these parts must be assembled in proper order into the original form of the assembly or equipment. The assembly procedure, many times, may not be a reverse procedure of the disassembly of the equipment. All assembly should be done according to authorized practices.

(2) *Assembly practices.* Care must be exercised in all phases of assembly to assure satisfactory and continual performance of rebuilt equipment. A few general rules are listed in (*a*) through (*e*) below.

(*a*) Cleanliness is essential in all assembly operations. Dirt and dust, even in minute quantities, are abrasive. Be sure all parts have been cleaned as specified and be sure they are kept clean.

(*b*) Coat all bearings, shafts, and contact surfaces with clean engine oil (OE) before assembly. This is to assure lubrication of moving parts when first put into operation.

(*c*) Always use new gaskets on joints which confine oil. Be sure to seat gaskets properly using sufficient gasket cement to assure a tight joint. Be especially careful to see that all bolts, screws, studs, and nuts are secured with locknuts, washers, wire, or cotter pins as specified. Use new cotter pins and locking wire during assembly. A large proportion of lubricant leakage and equipment failure has been traced to neglect of these precautions.

(*d*) In assembling an assembly containing shims, be sure to install shims of the same thickness that were removed during disassembly.

Caution: If new parts are being used, the thickness of shims may need to be changed. If so, be sure to test the assembly during the assembly procedure to be certain the shimming is exact.

New oil seals should be soaked in light clean engine oil (OE) before installation. Be sure to seat all seals with the free edge of the sealing material toward the inside on all housings.

(*e*) Perform minor test during the assembly procedure to assure proper fitting of mating parts especially where parts have been replaced. Check backlash, end play, gear meshing, and concentricity of gear, shaft, and bearing assemblies.

b. Assemble Vertical Leveling Worm Assembly (fig. 47).

(1) *Install leveling worm.* The leveling worm is installed in the worm housing according to procedure in paragraph 78*b* (1).

(2) *Install worm shaft.* The worm shaft is installed in the worm housing according to procedure in paragraph 78*b* (2) with exception that the shaft for tke vertical leveling worm assembly is installed in the housing with the rounded end of the shaft entering the right-hand end of the housing first.

(3) *Adjust leveling worm.* The leveling worm is adjusted according to procedure in paragraph 78*b* (3).

c. Assemble Vertical Power Leveler.

Note. The key letters noted in parentheses are in figure 46, except where otherwise indicated.

(1) *Assemble idler sprocket assembly.* Install lubricating fitting (F) in idler sprocket shaft (G). Install idler sprocket washer (H) on sprocket shaft. If idler sprocket bushing-type bearing (DD) was removed from idler sprocket (J) after inspection (par. 72), press a new bearing in sprocket with an arbor press. Install sprocket and bearing on sprocket shaft. Install idler sprocket washer (CC) on shaft. Insert shaft assembly through idler sprocket support (BB) and secure shaft assembly to support with $^{13}/_{16}$ ID plain washer (AA) and $^{3}/_{4}$–16NF hex nut (Z).

(2) *Assemble vertical leveling worm shaft sprocket assembly.* Install lubricating fitting (P) in vertical leveling worm shaft support (N). If vertical leveling worm shaft support bushing-type bearing (M) was removed from shaft support after inspection (par. 72), press a new bearing in shaft support with an arbor press. Fasten leveling worm shaft support to idler sprocket support (BB) with vertical leveling worm shaft support shim set (Y), two ½-inch lockwashers (X), and two ½-20NF x 1½ hex-head cap screws (W). Be sure to install shims of the same thickness that were removed during disassembly (par. 70*f*(6). Install $^{3}/_{8}$–16NC x $^{7}/_{8}$ square-head set screw (L) in vertical leveling worm shaft sprocket (K). The remainder of the assembling is done during installation (par. 95).

(3) *Install drive shaft ball bearing.* If housing bushing-type bearing (HH) was removed from drive housing (WW) after inspection (par. 72), press a new bearing in the housing with an arbor press. Install lubricating fitting (JJ) in housing. If drive shaft oil seal (GG) was removed from the housing after inspection (par. 72), press oil seal in housing with an arbor press.

Caution: When inserting drive shaft collar through oil seal do not damage oil seal.

Insert drive shaft collar (AF) in the housing seating collar in drive shaft oil seal. Install drive shaft ball bearing (QQ) in housing with drive shaft bearing retainer (VV). Secure bearing retainer in position with ⅛ x ¾ cotter pin (PP).

(4) *Install shifter fork.* Insert shifter fork (MM) in drive housing (WW). Install shifter shaft (AC) through shaft hole in housing and screw shaft into shifter fork (fig. 45). Insert shifter shaft detent (XX), shifter shaft detent spring (YY), and shifter shaft detent spring retainer (ZZ) in detent hole in housing. Tighten spring retainer until shifter shaft engages shaft detent in the upper one of the detent grooves in shaft. Install ¾–16NF hex jam nut (AB) on spring retainer and tighten jam nut down against housing to secure retainer in position.

(5) *Assembly drive shaft assembly.* If stationary clutch jaw bushing-type bearing (AJ) was removed from stationary clutch jaw with integral sprocket (AK) after inspection (par. 72), press a new bearing in clutch jaw with an arbor press. Install clutch jaw on drive shaft (AH) with stationary clutch jaw retainer (AL), ¾–16NF castle nut (AM), and ⅛ x 1½ cotter pin (EE).

(6) *Install clutch sliding jaw.* Install clutch sliding jaw, jaws upward, in groove in shifter fork in drive housing (fig. 44). Install drive shaft assembly in housing and through clutch sliding jaw. Press drive shaft through housing until clutch jaw seats in housing being careful not to allow jaws of stationary clutch jaw to bind with jaws of clutch sliding jaw. If jaws bind, loosen shifter shaft on shifter fork and turn clutch sliding jaw slightly until jaws are free. Tighten shifter shaft into fork being sure that stationary clutch and sliding jaws remain free. Install drive pinion shim set (RR) on drive shaft. Be sure to install shims of the same thickness that were removed during disassembly (par. 70*f*(1)). Insert ⅜ x 1½ square key (AG) in shaft and press drive pinion (UU) on shaft with an arbor press. Secure pinion on shaft with $^{13}/_{16}$ ID plain washer (SS) and ¾–16NF castle nut (TT). Do not install ⅛ x 1½ cotter pin (FF) until after

final adjustment of drive pinion for backlash with its mating part (par. 95*d*(2)).

(7) *Adjust clutch sliding jaw.* Press shifter shaft down to engage shifter shaft detent in upper detent groove in shaft. Turn shaft in shifter fork until there is ⅛-inch clearance between jaws of clutch sliding jaw and stationary clutch jaw as seen through side hole in drive housing. Install housing cover gasket (U) and housing cover (T) with four ¼-inch lockwashers (S) and ¼–28NF x ½ hex-head cap screws (R). The remainder of the assembling of the power leveler is done in paragraph 95 during installation.

d. Install Boring Case Parts.

Note. The key letters noted in parentheses are in figure 38, except where otherwise indicated.

If rack carrier lower bearing cup (DD, fig. 43) was removed from boring case (A) after inspection (par. 72) press bearing cup into boring case with an arbor press being sure to seat cup flush to shoulder in case. If boring case oil seal (M) was removed from case after inspection (par. 72), press oil seal in boring case with an arbor press. Install two ¾-inch pipe plugs (G) in case. Install lubricating fitting (HH) in case. Install boring case access cover (D) on boring case with six ⅜-inch lockwashers (C) and ⅜–24NF x 1 hex-head cap screws (D). Install boring case inspection plate (J) on boring case with boring case inspection plate gasket (H), eight 5/16-inch lockwashers (K), and eight 5/16–24NF x ⅞ hex-head cap screws (L). The remainder of the installation of the boring case parts is done during installation of boring case (par. 95).

e. Assemble Boring Case Gear Assembly.

Note. The key letters noted in parentheses are in figure 43.

(1) *Install rack feed idler gear.* Install rack feed idler gear shim set (T) on the lower end of rack carrier (Q) being sure to install the same thickness of shims that were removed during disassembly (par. 70*d*(7)). Install rack feed idler gear tapered roller bearing cone (U) on rack carrier flush to shim set. Install rack feed idler gear (V) on rack carrier and seat idler gear on bearing cone. Install rack feed idler gear tapered roller bearing cone (W) on rack carrier and seat bearing cone in idler gear. Secure rack feed idler gear assembly on rack carrier with rack feed idler gear bearing adjusting nut (X) using the spanner wrench provided with the vehicle. Make sure idler gear rotates freely on bearings.

(2) *Install rack feed pinion.* If rack feed pinion oil seals (FF and RR) were removed from rack feed pinion oil seal retainers (EE and SS) after inspection (par. 72), install oil seals in retainers after soaking seals in clean engine oil (OE).

Install oil seals in retainers in oil seal groove in rack feed pinion (GG) and secure oil seal assembly with 0.0625-inch diameter locking wire (TT). Install rack feed pinion roller bearings (HH and JJ) in rack feed pinion. Install rack feed pinion in rack carrier (Q) with the narrow width pinion entering rack carrier first. Examine feed pinion from tube of rack carrier to make sure that the wide width pinion appears in feed pinion opening in tube. Insert rack feed pinion shaft (K) in rack carrier and through rack feed pinion. Install rack feed pinion shaft support (KK) on end of pinion shaft and secure support to shaft with 1–14NF slotted hex nut (LL) and ⅛ x 2¼ cotter pin (L). Install ⅜–16NC x ⅞ drilled square-head set screw (P) into rack carrier. Screw set screw down to engage rack feed pinion oil seal retainer while turning feed pinion to make sure it does not bind.

(3) *Install rack feed driven pinion.* If rack feed driven pinion thrust washer retaining pin (G) was removed during disassembly (par. 70*d*(3)), install a new retaining pin in rack carrier (Q). Install rack feed driven pinion thrust washer (H) over pin in rack carrier. Install rack feed driven pinion inner roller bearing (E) in rack feed driven pinion (D). Install rack feed driven pinion outer roller bearing (F) under bevel pinion part of driven pinion. Roll driven pinion into position in rack carrier with bevel pinion part engaged in teeth of rack feed idler gear (V) and the straight portion engaged with rack feed pinion (GG). Install rack feed driven pinion shaft (J) through driven pinion and secure shaft in rack carrier with ⅜–16NF x ⅞ drilled square-head set screw (VV). Check for minimum backlash between rack feed driven pinion and rack feed idler gear. Adjust the backlash, if necessary, by removing idler gear (par. 70*d*(7)) and adding or removing shims in rack feed idler gear shim set (T) in (1) above. If shims are added or removed, be sure to remove or add an equal thickness of shims to rack carrier bearing shim set (BB) in (6) below, and to add or remove an equal thickness of shims to rack carrier bearing shim set (C), in (7) below, to keep rack carrier upper and lower bearing cones in same relative positions on rack carrier.

(4) *Install rack thrust roller.* Install rack thrust roller bearing (PP) in rack thrust roller (QQ). Install rack roller in rack carrier (Q). Insert rack thrust roller shaft (M) in rack carrier through roller. Install rack thrust roller shaft support (NN) on roller shaft and secure support to shaft with 1–14NF slotted hex nut (MM) and ⅛ x 2¼ cotter pin (N).

(5) *Install rack drive gear.* Install rack drive gear shim set (R)