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5-3040B

DEPARTMENT OF THE ARMY  
TECHNICAL MANUAL

TM5-3040B

DEPARTMENT OF THE AIR  
FORCE TECHNICAL ORDER

TO 19-75AJ-139

# TRACTOR CRAWLER TYPE

DIESEL-DRIVEN  
(28,100 TO 38,000 LBS.  
DRAWBAR PULL)

## STANDARD CATERPILLAR

D-8, 78-INCH GAGE  
(TRACTOR SERIAL NO.  
2U14765 AND UP)

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DEPARTMENTS OF THE ARMY AND THE AIR FORCE  
DECEMBER 1953

TECHNICAL MANUAL  
No. 5-3040B  
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DEPARTMENTS OF THE ARMY AND  
THE AIR FORCE  
WASHINGTON 25, D. C., 17 December 1953

**TRACTOR, CRAWLER TYPE, DIESEL DRIVEN (28,100 to  
38,000 lbs. Drawbar Pull) STANDARD CATERPILLAR D-8,  
78-INCH GAGE (Tractor Serial No. 2U14765 and up)**

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## SUMMARY OF SAFETY PRECAUTIONS

Correct or report any mechanical deficiencies that may result in damage to the machine if operation is continued.

Always stop the engine before making repairs or adjustments on any part of the unit.

Avoid operating at excessive speed over rough roads, down steep grades, or where vision is limited.

Keep machine in gear and leave clutch engaged when traveling down-grade.

After starting the engine, allow it to warm up at fast idling speed before applying load.

Always return choke button to closed position after engine is warmed up.

Always engage clutches carefully. Sudden engagements cause undue strain on tractor.

Make sure that fuel and oil containers are clean.

Always provide a metallic contact between container and tank when adding gasoline.

Always run engine at idling speed for a few minutes before stopping.

Be sure brakes are in good working order.

# CHAPTER I

## INTRODUCTION

---

### Section I. GENERAL

#### 1. Scope

*a.* This manual is published for the use of the personnel to whom this tractor is issued. It contains information on the operation and organizational maintenance of the tractor as well as a description of the major units and their functions in relation to other components of the tractor. It applies only to the Caterpillar D-8 Tractor, serial No. 2U14765 and up.

*b.* Supply catalogs, technical manuals, and other publications applicable to the equipment covered by this manual are listed in appendix I. Appendix II lists the tools and other items issued with and carried on or with this equipment.

#### 2. Records and Report Forms

Maintenance record forms listed and briefly described in the following subparagraphs will be used in the maintenance of this equipment.

*a. DD Form 110, Vehicle and Equipment Operational Record.* This form is used by equipment operators for reporting the accomplishment of daily preventive maintenance services, and for reporting any equipment deficiencies observed during operation.

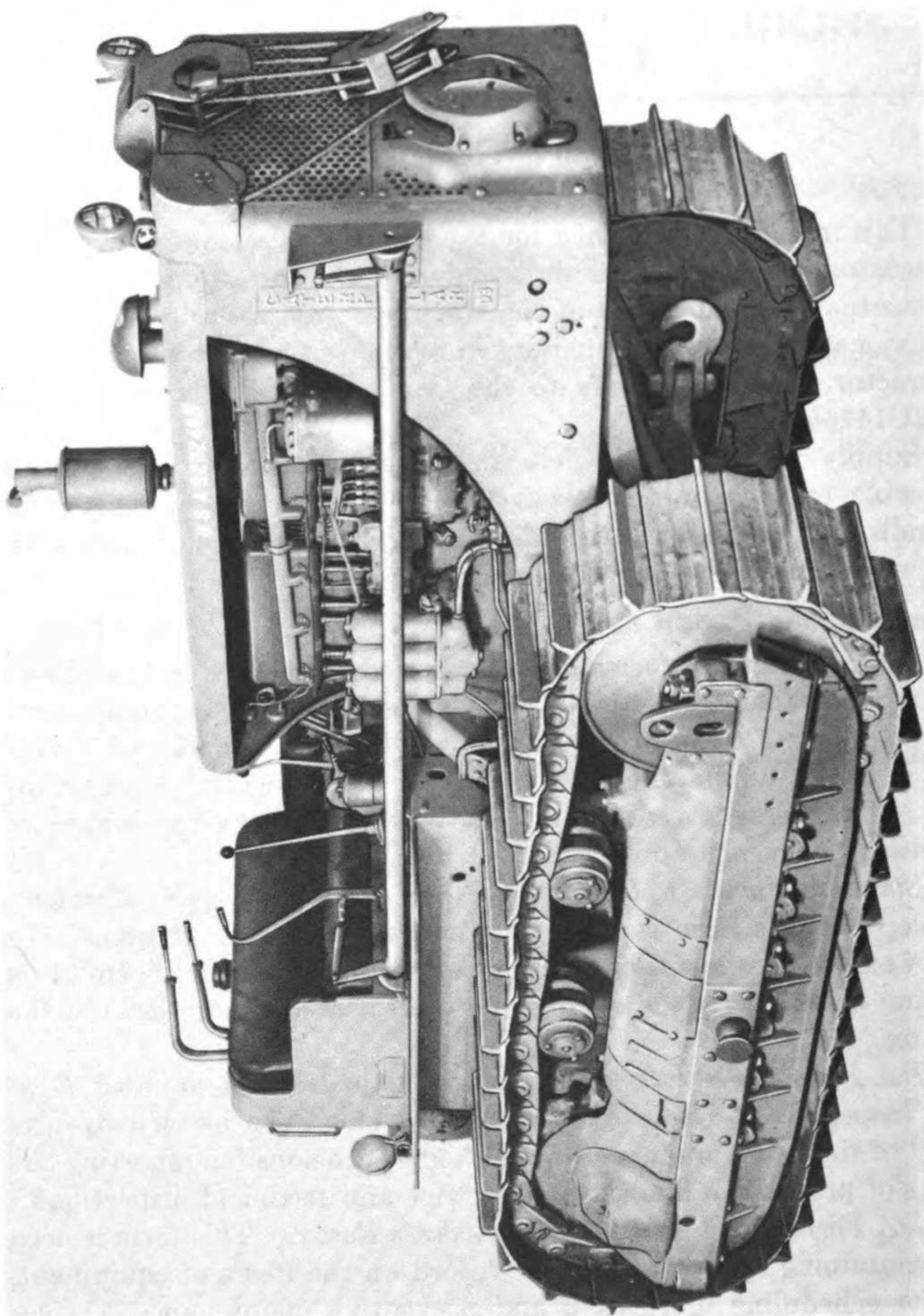
*b. Standard Form 91, Operator's Report of Motor Vehicle Accident.* One copy of this form is kept with the equipment at all times. In case of an accident resulting in injury or property damage, Form 91, is filled out immediately (or as promptly thereafter as is practical) by the operator.

*c. DA Form 464, Work Sheet for Preventive Maintenance and Technical Inspection of Engineer Equipment.* This form is used by personnel of the using organization and higher echelons for reporting the results of preventive maintenance service and technical inspections.

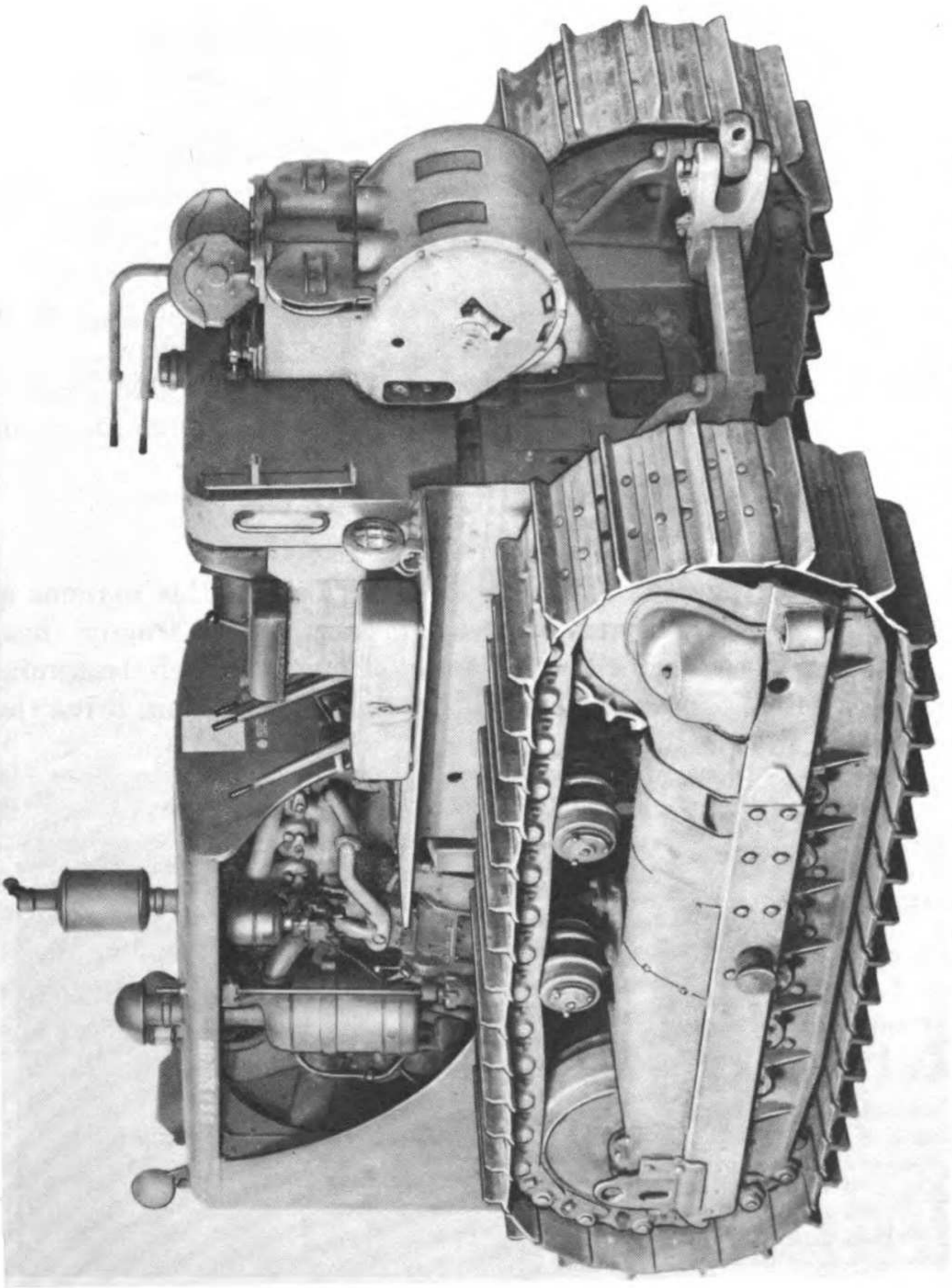
*d. DA Form 460, Preventive Maintenance Roster.* This form is used for maintaining an operating time record on the items of equipment, and for scheduling lubrication and preventive maintenance services at proper intervals.

*e. DA Form 478, Organizational Equipment File.* Major repairs or rebuilding, replacement of major unit assemblies, and accomplishment of equipment modifications are recorded on this form.

*f. DA Form 9-69, Spot-Check Inspection Report for all Full-Track and Tank-Like Wheeled Vehicles.* This form may be used instead of DA Form 464 as a check list for applicable items to be inspected during spot-check inspection.



*Figure 1. Three-quarter right front view of tractor.*



*Figure 2. Three-quarter left rear view of tractor with rear power control unit.*

*g. DA Form 468, Unsatisfactory Equipment Report.* This form is used for reporting manufacturing, design, or operational defects in the materiel, with a view to correcting such defects; it is also used for recommending modifications of the materiel. Form 468 is not used for reporting failures, isolated materiel defects, or malfunction of materiel resulting from fair wear and tear or accidental damage. Form 468 is not used to report issue of parts and equipment, or for reporting replacements and/or repairs.

*h. DD Form 6, Report of Damaged or Improper Shipment.* This form is to be used for reporting damages incurred in shipment.

*i. DA Form 9-81, Exchange Part or Unit Identification Tag.* This form is used to accomplish the direct exchange of unserviceable for serviceable parts.

*j. DA Form 811, Work Request and Job Order.* This form is used to request work done by higher echelon organizations.

*k. DA Form 867, Status of Modification Work Order.* This form is used to maintain records of all modification work performed on equipment.

## Section II. DESCRIPTION AND DATA

### 3. Description

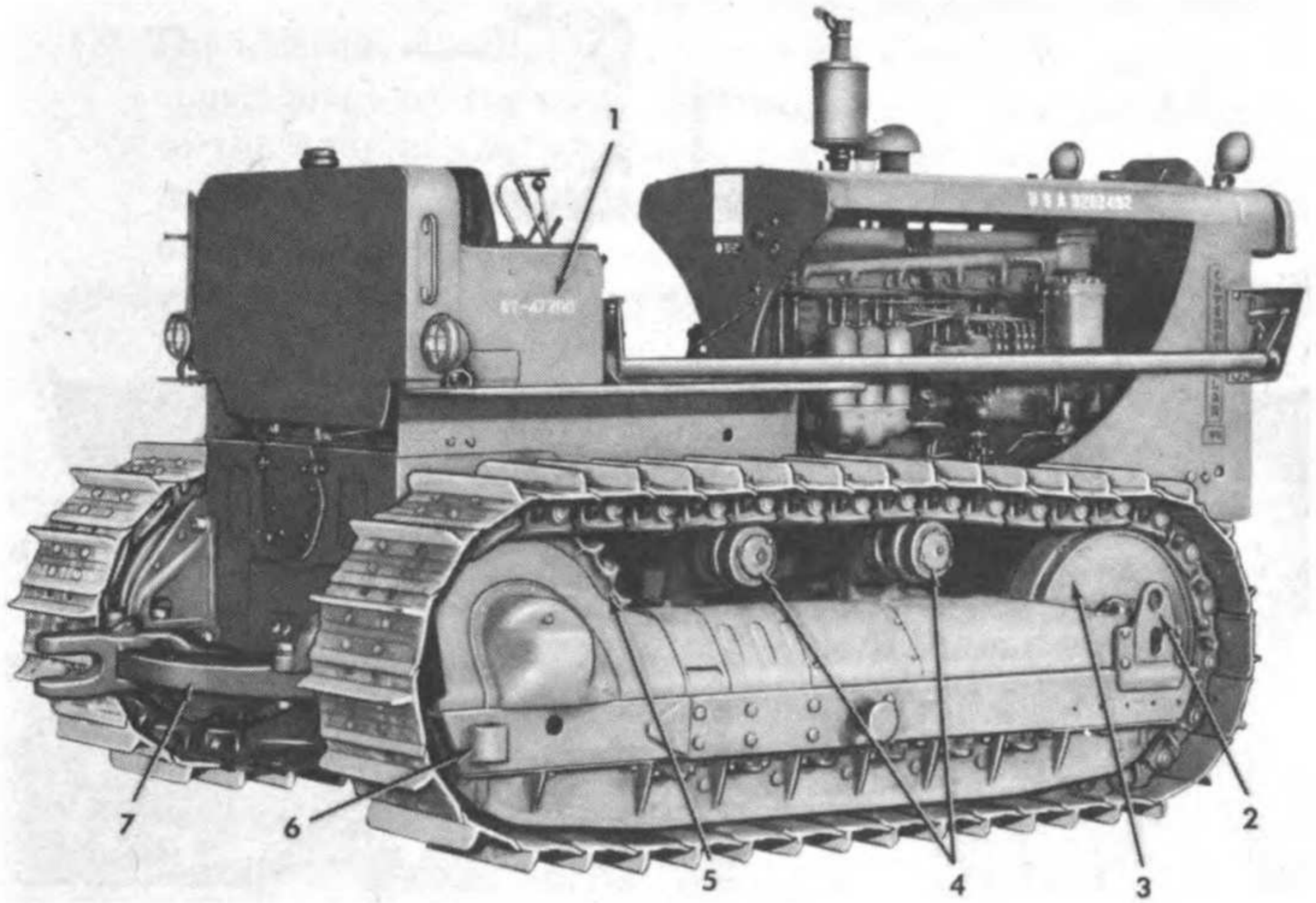
*a. General Information.* The tractor described in this manual is a Caterpillar, D-8, track crawler, rear sprocket driven tractor (figs. 1 and 2). It is self-propelled by a diesel engine which transmits power to two final drive sprocket wheels which engage and drive the tracks around the sprocket and front idler wheels (figs. 3).

- |                             |                            |
|-----------------------------|----------------------------|
| 1 Tractor weight            | 5 Rear sprocket            |
| 2 Tractor front lifting eye | 6 Tractor rear lifting eye |
| 3 Front idler wheel         | 7 Drawbar                  |
| 4 Track carrier rollers     |                            |

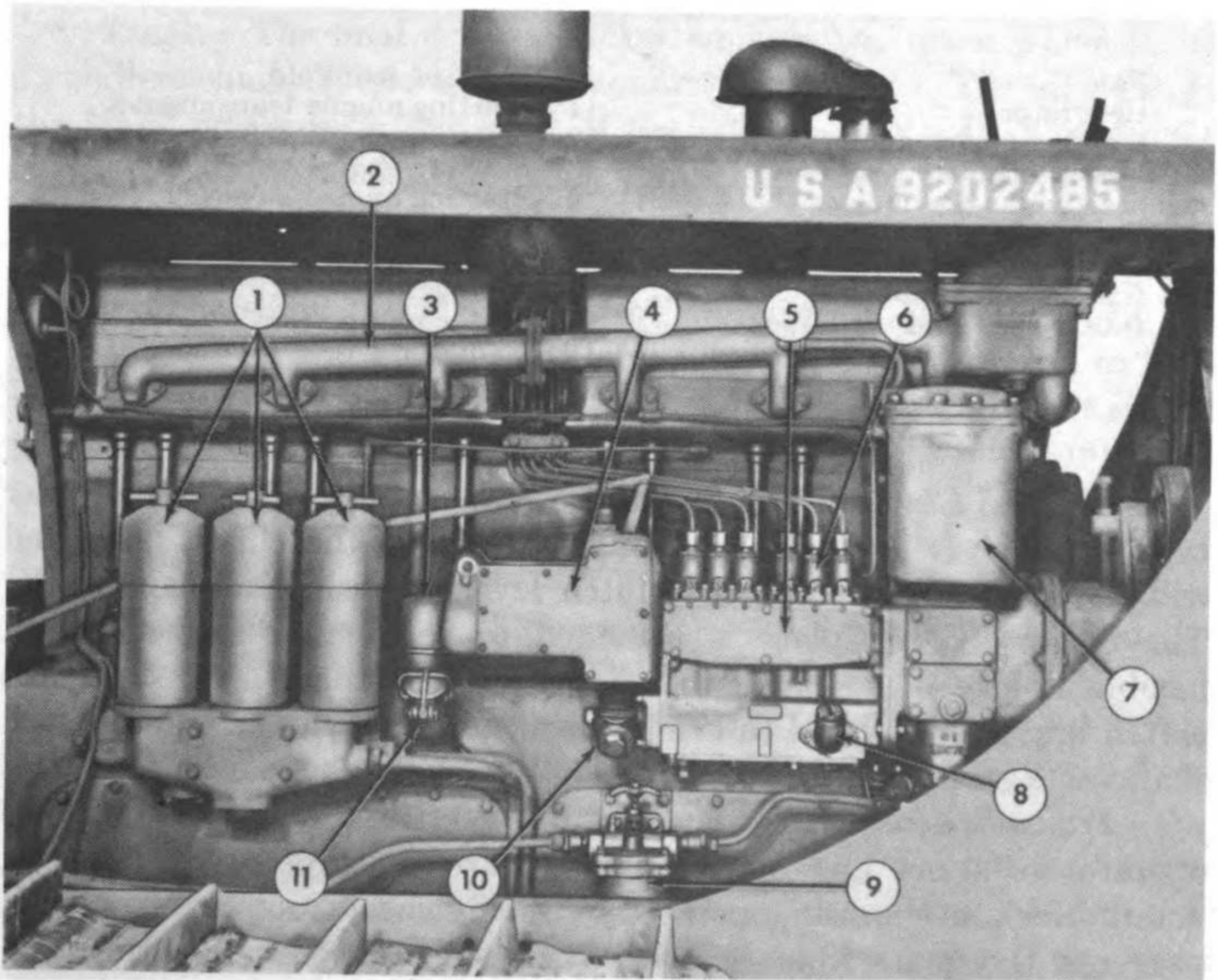
*b. Diesel Engine (fig. 4).* The engine which powers the D-8 tractor is a six-cylinder, four-stroke cycle, valve-in-head, Caterpillar diesel engine. The diesel engine is similar to the spark-ignition engine except that in the diesel engine, fuel is injected into the cylinders and is ignited by the heat of compression.

- |                           |                                  |
|---------------------------|----------------------------------|
| 1 Lubricating oil filters | 7 Fuel filter housing            |
| 2 Coolant manifold        | 8 Injection pump housing filler. |
| 3 Crankcase breather      | 9 Fuel filter                    |
| 4 Governor housing        | 10 Hour meter                    |
| 5 Injection pump housing  | 11 Oil filler                    |
| 6 Injection pump          |                                  |

*c. Starting Engine.* An independent 2-cylinder, 24-horsepower Caterpillar gasoline engine is used to start the diesel. The starting engine power is transmitted to the diesel engine flywheel through a pinion which is manually engaged with the flywheel ring gear. It will crank the diesel, with compression on, for as long as necessary and the pinion automatically releases when the diesel engine starts.

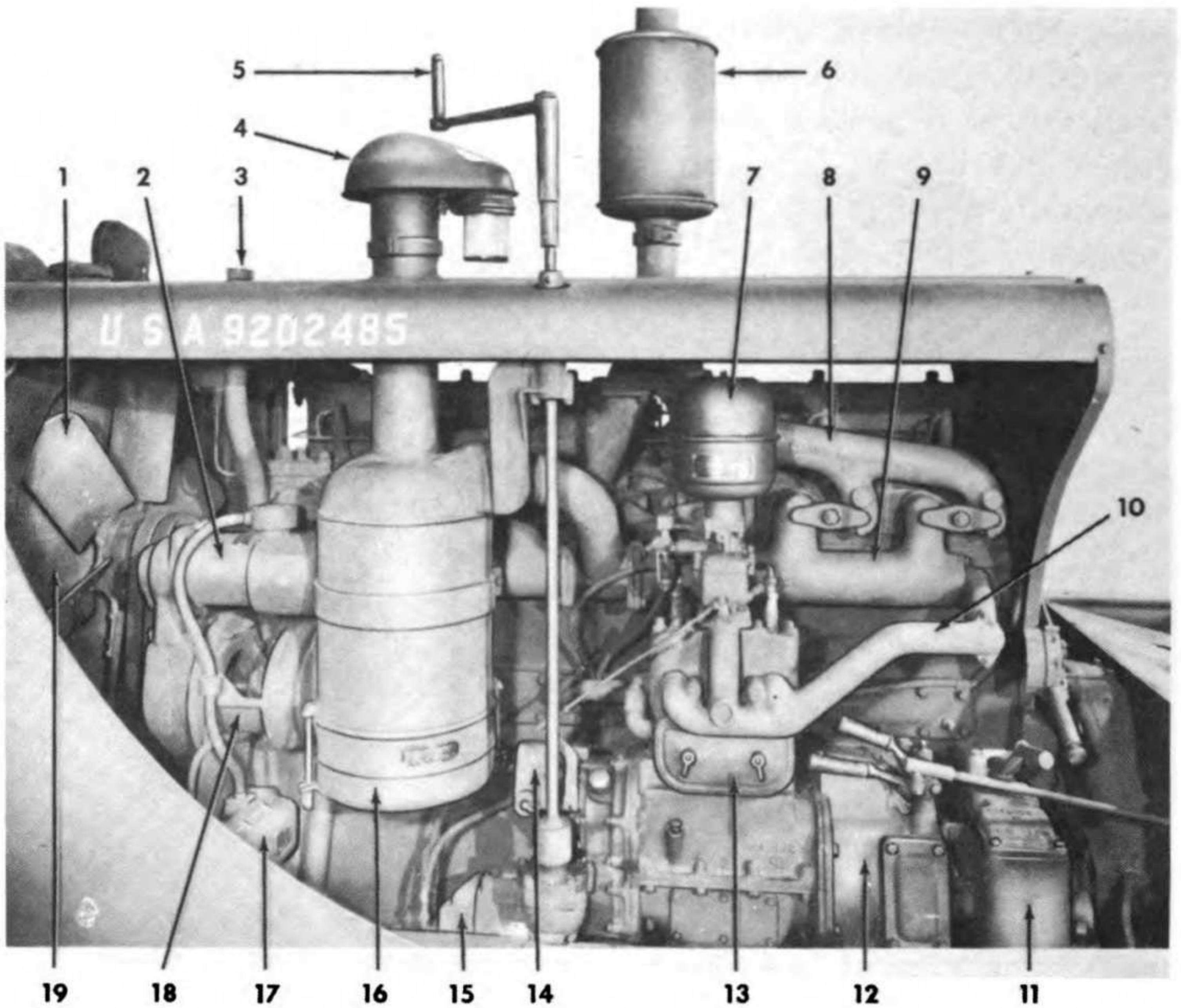


**Figure 3. D-8 tractor nomenclature.**



**Figure 4. Diesel engine installed (right side).**





- |   |                             |    |                               |
|---|-----------------------------|----|-------------------------------|
| 1 | Fan                         | 10 | Exhaust manifold              |
| 2 | Generator                   | 11 | Starting engine transmission  |
| 3 | Starting engine exhaust     | 12 | Starting engine clutch        |
| 4 | Pre-cleaner                 | 13 | Starting engine valve housing |
| 5 | Starting engine crank       | 14 | Starting engine governor      |
| 6 | Diesel muffler              | 15 | Magneto                       |
| 7 | Starting engine air cleaner | 16 | Air cleaner                   |
| 8 | Exhaust manifold            | 17 | Voltage regulator             |
| 9 | Intake manifold             | 18 | Water pump                    |
|   |                             | 19 | Radiator                      |

Figure 5. Diesel engine installed (left side).

*d. Flywheel Clutch.* The flywheel clutch is a dry plate, over center type clutch. It is engaged by pulling back on the clutch lever and will remain engaged until the clutch lever is pushed forward again. The clutch driving plate is attached to the engine flywheel with flexible links. The driven disk is splined to the clutch shaft. A clutch brake is provided to bring the rotating clutch and transmission shafts to a stop when the clutch is disengaged.

*e. Transmission.* The transmission gearshift lever enables the operator to select any one of five forward or three reverse speeds. An interlock mechanism, operated by the flywheel clutch control lever, prevents the gears from being shifted while the clutch is engaged. Power is transmitted through gears from the upper shaft to the pinion shaft which drives the bevel gear.

*f. Steering Clutches and Brakes.*

- (1) The steering clutches are dry, multiple-disk clutches, held in engagement by springs. The steering clutches are attached to the ends of the bevel gear shaft. The outer drums are mounted on the final drive pinion. The brake bands operate on the outer drums.
- (2) Steering is accomplished by disengaging either clutch and applying the brake which stops one track and allows full power to go to the other track.

*g. Final Drive Assembly.* The final drive housings are bolted to the sides of the transmission and steering clutch case. The power is transmitted from the steering clutches through the final drive pinion, to the sprocket which is mounted on the final drive gear hub. Bellows type, self-aligning seals on each side of the sprocket seal the final drive gear case. The sprocket shaft, pressed into the transmission case, extends through the final drive gear hub and supports the outer bearing.

*h. Track Roller Frame Assemblies.* The tractor is supported on the track roller frame assemblies at the front by the equalizer spring and at the rear by the sprocket shafts. This construction allows the track roller frames to move up and down independently when the tractor is operated over rough ground. The track rollers, which are mounted on the track roller frames, support the entire weight of the tractor on the tracks.

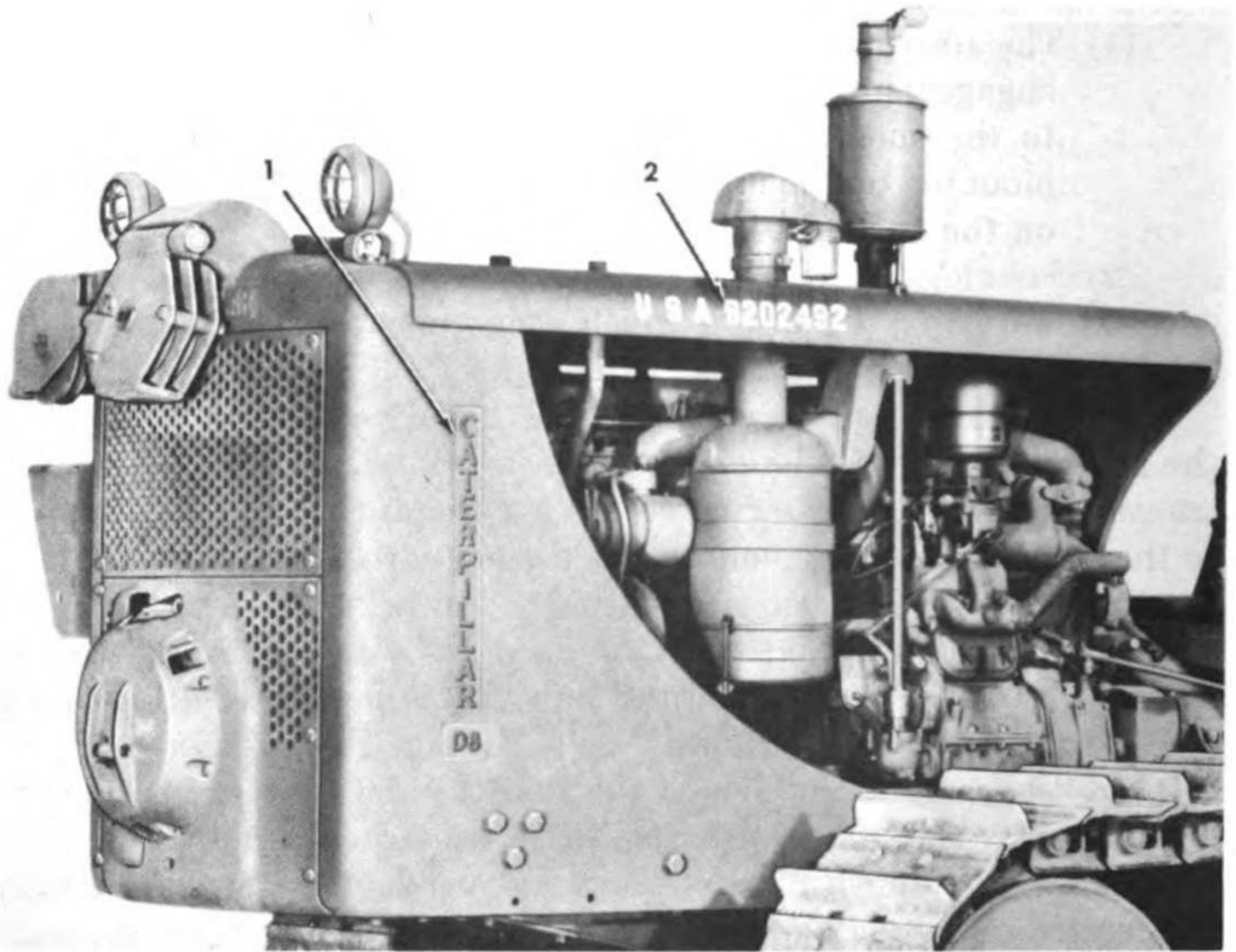
*i. Track.* The final drive sprocket engages the track which forms an endless chain around the sprocket and front idler. The idler guides the track into position in front of the track rollers. It is connected to the recoil spring by the track adjusting screw which determines the position of the idler on the track roller frame. The recoil spring bolt holds the recoil spring in compression which prevents the spring from ever pushing the idler ahead of the position determined by the adjusting screw and at the same time allows the recoil spring to form a cushion for the idler, letting it move back if a foreign object should get between the track and rollers or if the track should run into a solid object.

#### **4. Identification**

*a. Nameplate (fig. 6).* The manufacturer's name and model designation are stamped on plates attached to the radiator guard.

*b. USA Registration Number (fig. 6).* The Department of the Army (USA) registration number is stenciled on the right and left sides of the engine hood by the manufacturer.

*c. Tractor Serial Number (fig. 7).* The tractor serial number is stamped on two metal plates. One plate is attached on the left side of the diesel engine crankcase immediately above the starting engine transmission, and the other plate is attached on the steering clutch case at the rear of the tractor.



- 1 Manufacturer's nameplate
- 2 Registration number

*Figure 6. Vehicle identification information.*



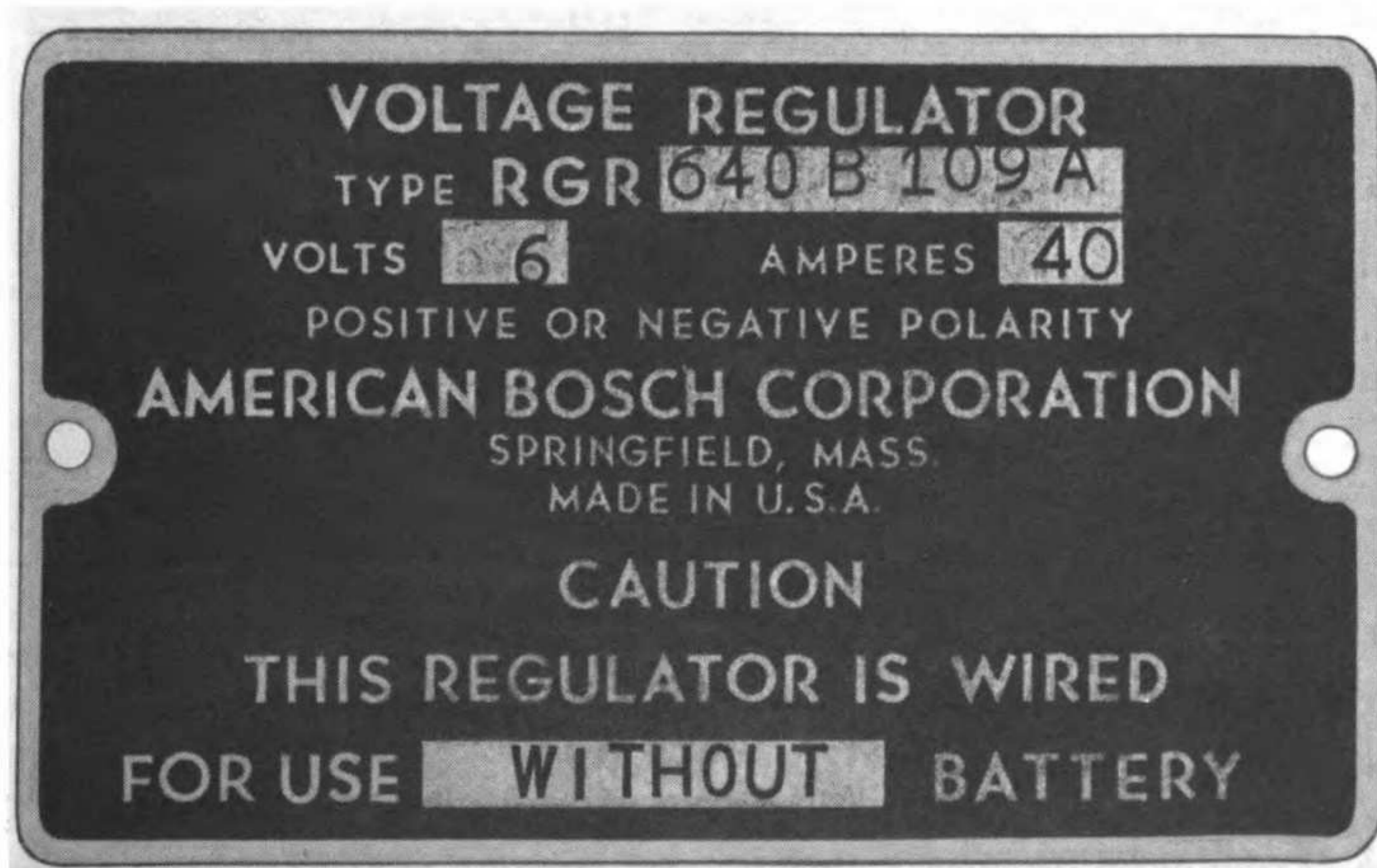
*Figure 7. Tractor serial number.*

d. *Generator Serial Number* (fig. 8). The generator serial number is stamped on a plate which is attached to the generator housing. The plate also contains data pertinent to the operation and output of the generator.



*Figure 8. Generator serial number.*

e. *Voltage Regulator Serial Number* (fig. 9). The voltage regulator serial number is stamped on a plate which is attached to the voltage regulator housing.



*Figure 9. Voltage regulator serial number.*

f. *Magneto Serial Number* (fig. 10). The magneto serial number is stamped on a plate which is attached to the magneto housing.



Figure 10. Magneto serial number.

g. *Data Plates* (fig. 11). Two data plates are attached to the left side of the tractor seat, and contain applicable identification and transportation information.



Figure 11. Vehicle data plates.

## 5. Differences in Models

a. This manual covers Caterpillar D-8 tractors bearing serial numbers 2U14765 and up.

b. Principal difference between these tractors and those built prior to this serial number is the transmission.

c. Tractors covered by this manual are equipped with a synchro-mesh transmission, with six speeds forward and three reverse. Earlier tractors were equipped with spur-gear type transmissions, with six speeds forward and two reverse. For information on these tractors see TM 5-3040.

## 6. Tabulated Data

### a. Detailed Specifications.

#### (1) Diesel engine.

Operating cycle	four-stroke
Cooling	liquid
Lubrication (separate transmission system)	pressure
Number of cylinders (in line)	6
Bore and stroke	5 $\frac{3}{4}$ x 8 in.
Piston displacement	1246 cu. in.
Firing order	1-5-3-6-2-4
Crankshaft speed (at maximum load)	1000 rpm
Piston speed (at 1000 rpm)	1333 fpm
Power rating	79.35 hp
Weight (including starting engine)	5650 lbs.

#### (2) Starting engine.

Operating cycle	four-stroke
Cooling (integral with diesel engine)	liquid
Ignition	magneto
Lubrication	splash system
Number of cylinders	2
Bore and stroke	3 $\frac{5}{8}$ x 4 in.
Piston displacement	82.56 cu. in.
Crankshaft speed	2700 rpm
Power rating (at 2700 rpm)	24 hp
Low idle speed	800 rpm
High idle speed	2850 rpm
Weight	400 lb.

#### (3) Accessories.

Generator (lighting), American Bosch 6 volt, 40 amp. Model GRB-640 B-207.

Magneto, starting engine, American Bosch Model 4-2 180° C-319.

Voltage regulator, American Bosch Model PGR 640 B-105A.

Carburetor, starting engine, Zenith Series 22.

Spark plug, starting engine, 18 mm, Champion 15A.

Fuel injection system, Caterpillar D-8.

Air cleaner, diesel engine, Donaldson Model A1247.

Air cleaner, starting engine, Donaldson Model B-654.

## 6. Tabulated Data—Continued

### (4) *Tractor dimensions and weights.*

Gage (center-to-center of tracks) .....	78 in.
Ground contact area .....	4389 sq. in.
Ground clearance .....	10½ in.
Overall length w/front and rear power controls (length is same with or without rear control).	194 in.
Overall length w/o front and rear power controls.	188 in.
Overall width .....	103¾ in.
These vary with different equalizer springs. {	
Overall height .....	112 in.
Height without muffler and precleaner.	95 in.
Gross weight (shipping weight) bare tractor.	36,550 lb.
Shipping cubage (Bare D8 less muffler and precleaner, approximately).	1075
Approximate weight of auxiliary equipment:	
Front power control unit .....	680 lb.
Rear power control unit .....	1920 lb.
Straight blade bulldozer for front power control unit.	5472 lb.
Straight blade bulldozer for rear power control unit.	5610 lb.
Angling blade bulldozer for front power control unit.	6010 lb.
Angling blade bulldozer for rear power control unit.	6280 lb.

*b. Performance.* The following data applies to the tractor when operated at sea level:

Drawbar horsepower .....	130
Belt horsepower .....	148
Drawbar pull through gear speed range:	
First .....	28,700 lb.
Second .....	21,700 lb.
Third .....	16,650 lb.
Fourth .....	11,900 lb.
Fifth .....	8,600 lb.
Drawbar pull through gear speed range at maximum engine torque:	
First .....	31,600 lb.
Second .....	23,900 lb.
Third .....	18,300 lb.
Fourth .....	13,310 lb.
Fifth .....	9,500 lb.

**Tractor speed through gear speed range forward:**

First.....	1.7 mph
Second.....	2.3 mph
Third.....	2.8 mph
Fourth.....	3.7 mph
Fifth.....	4.8 mph

**Tractor speed through gear speed range reverse:**

First.....	2.2 mph
Second.....	3.0 mph
Third.....	3.7 mph

**c. Capacities.**

Air cleaner, diesel engine.....	5 qt.
Air cleaner, starting engine.....	$\frac{3}{4}$ qt.
Cooling system.....	25 gal.
Crankcase, diesel engine.....	34 qt.
Crankcase, starting engine.....	$2\frac{1}{4}$ qt.
Final drives (each).....	20 qt.
Fuel injection pump housing.....	$\frac{3}{4}$ qt.
Fuel tank, diesel engine.....	$68\frac{1}{2}$ gal.
Fuel tank, starting engine.....	$4\frac{1}{2}$ qt.
Transmission, starting engine.....	$\frac{3}{4}$ qt.
Transmission, diesel engine.....	41 qt.



# CHAPTER II

## OPERATING INSTRUCTIONS

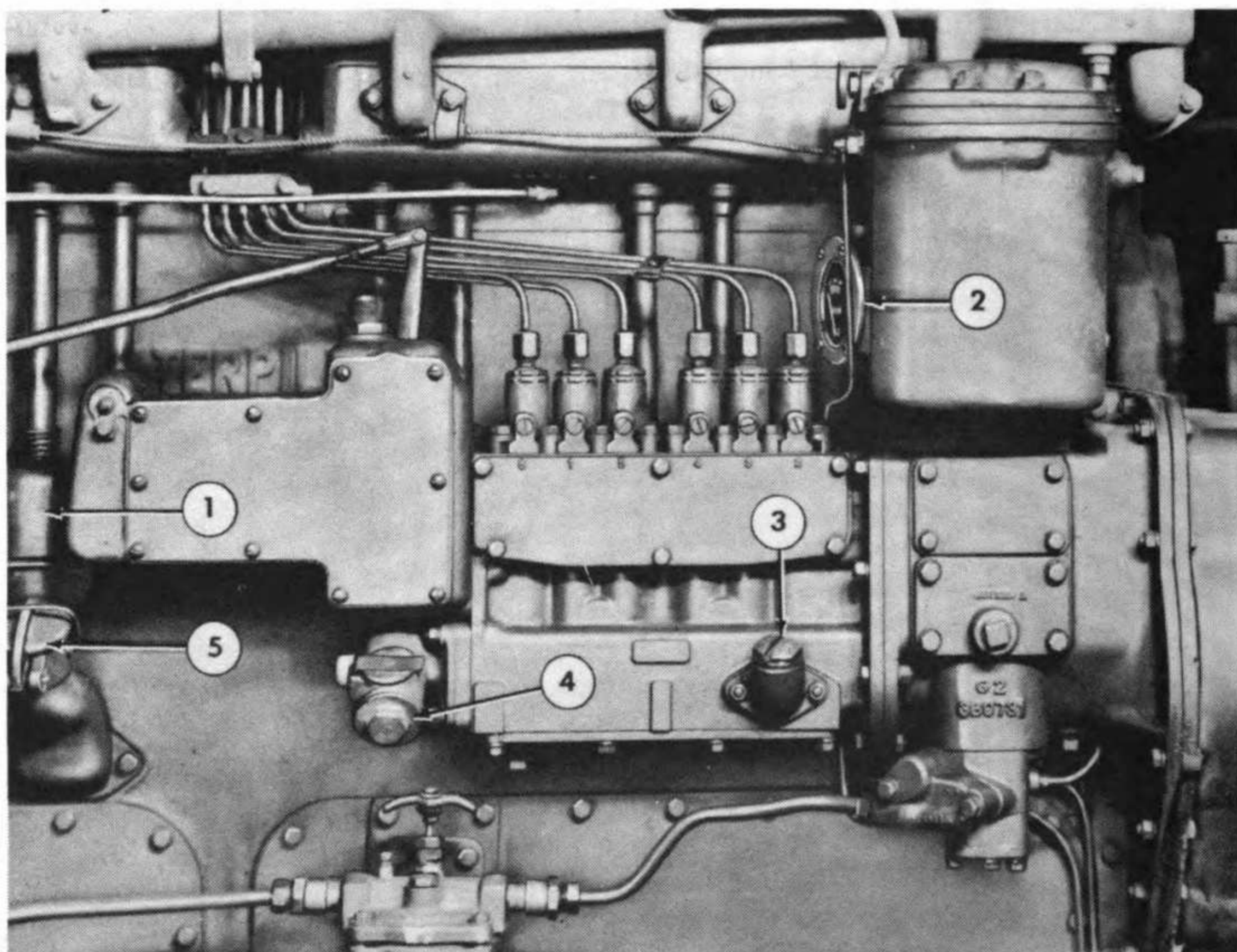
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### Section I. SERVICE UPON RECEIPT OF EQUIPMENT

#### 7. New Equipment

*a. General.* New machines and attachments are processed to meet military requirements for domestic or oversea shipment. To prevent corrosion, all vulnerable openings in engines and gear compartments are sealed. Exposed moving parts and unpainted machined surfaces are covered with rust preventive compounds. This preparation makes definite services necessary before a machine can be operated.

*b. Remove Tie-Down Devices.* Remove all tie wires, steel strapping, tie rods, and blocking. Handle heavy parts carefully to avoid injury.



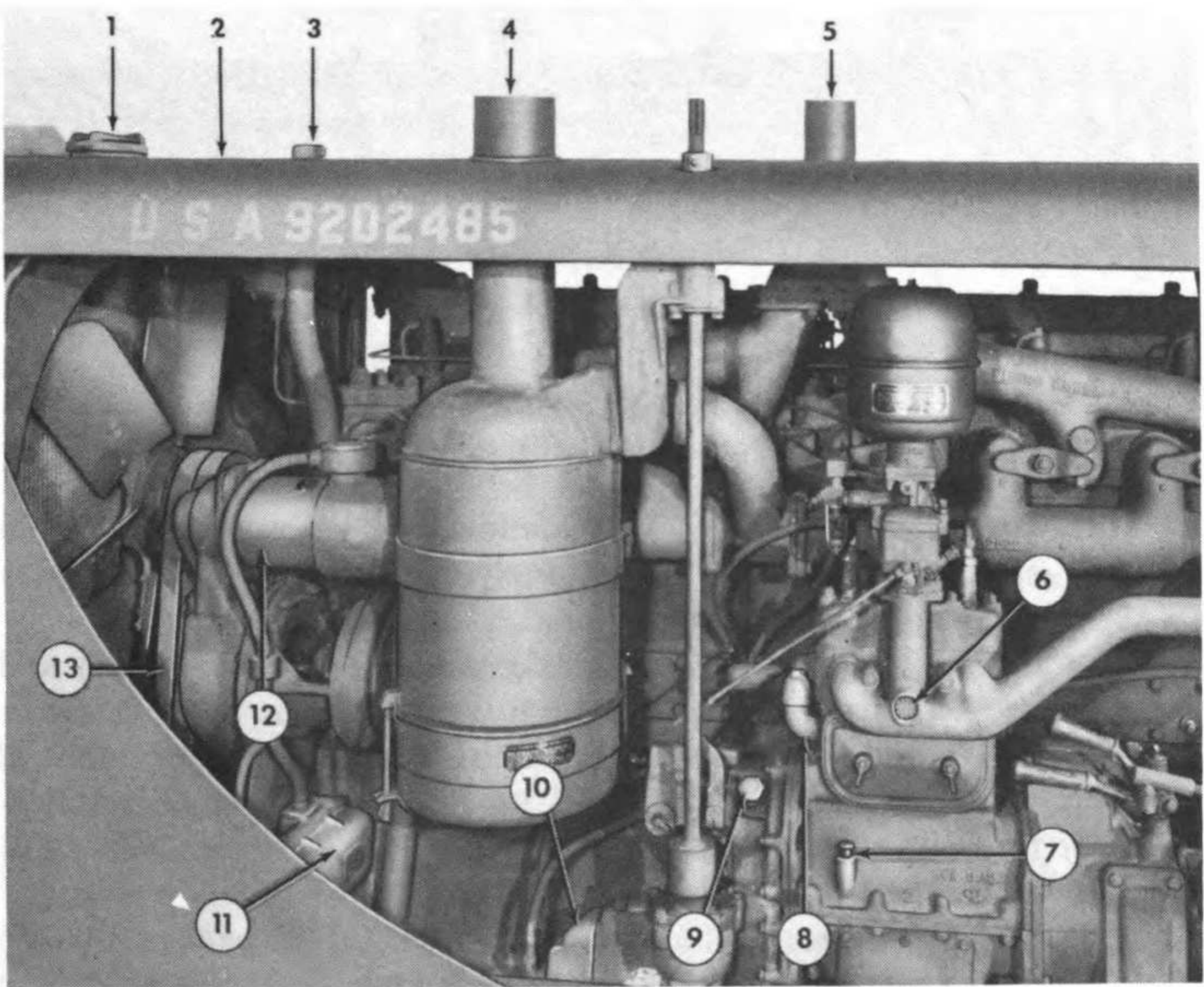
- |                                 |              |
|---------------------------------|--------------|
| 1 Crankcase breather            | 4 Hour meter |
| 2 Fuel pressure gage            | 5 Oil filler |
| 3 Injection pump housing filler |              |

*Figure 12. Corrosion preventive sealing—engine right side.*

c. *Hoisting Vehicle.* Refer to paragraph 103b for hoisting instructions.

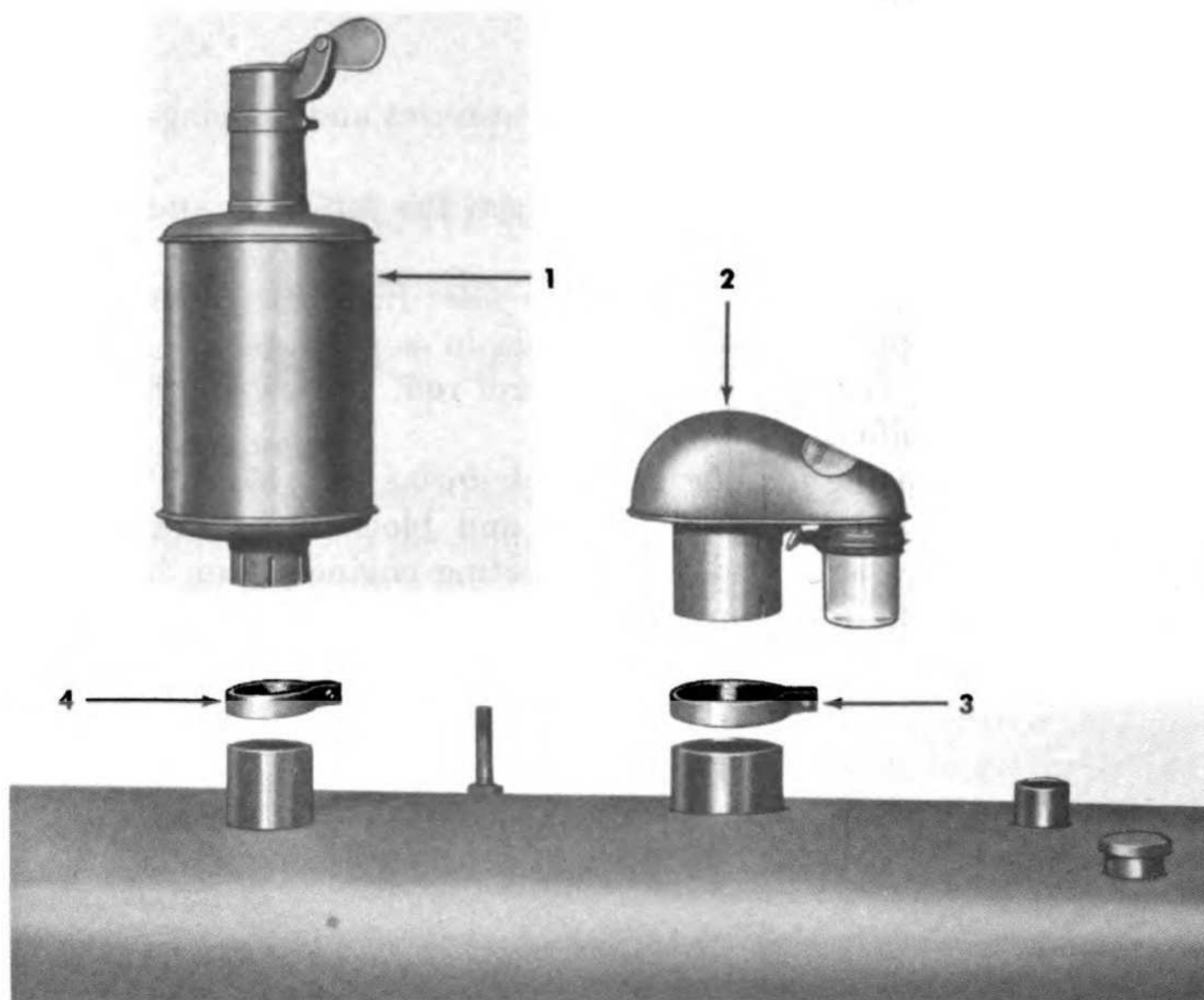
d. *Remove Seals.*

- (1) Remove the seals from the accessories and openings pointed out in figures 12 and 13.
- (2) Remove the paper from between the fan belts and the fan drive pulleys.
- (3) *Starting engine manifold drain filter* (fig. 13). The starting engine manifold drain filter is in a sack attached to the starting engine governor control rod. Screw the filter into the manifold.
- (4) *Diesel engine radiator and block drains* (fig. 15). The diesel engine radiator drain valve and block drain plug are in separate sacks tied to the starting engine pinion lever rod. Screw the plug into the block (1) and the drain valve into the radiator outlet pipe (2).



- |                                  |                      |
|----------------------------------|----------------------|
| 1 Radiator cap                   | 8 Breather           |
| 2 Gasoline tank filler           | 9 Oil filler         |
| 3 Starting engine exhaust        | 10 Magneto           |
| 4 Air cleaner inlet              | 11 Voltage regulator |
| 5 Diesel exhaust                 | 12 Generator         |
| 6 Manifold drain                 | 13 Fan belts         |
| 7 Starting engine oil level gage |                      |

*Figure 13. Corrosion preventive sealing—engine left side.*



- |              |                    |
|--------------|--------------------|
| 1 Muffler    | 3 Precleaner clamp |
| 2 Precleaner | 4 Muffler clamp    |

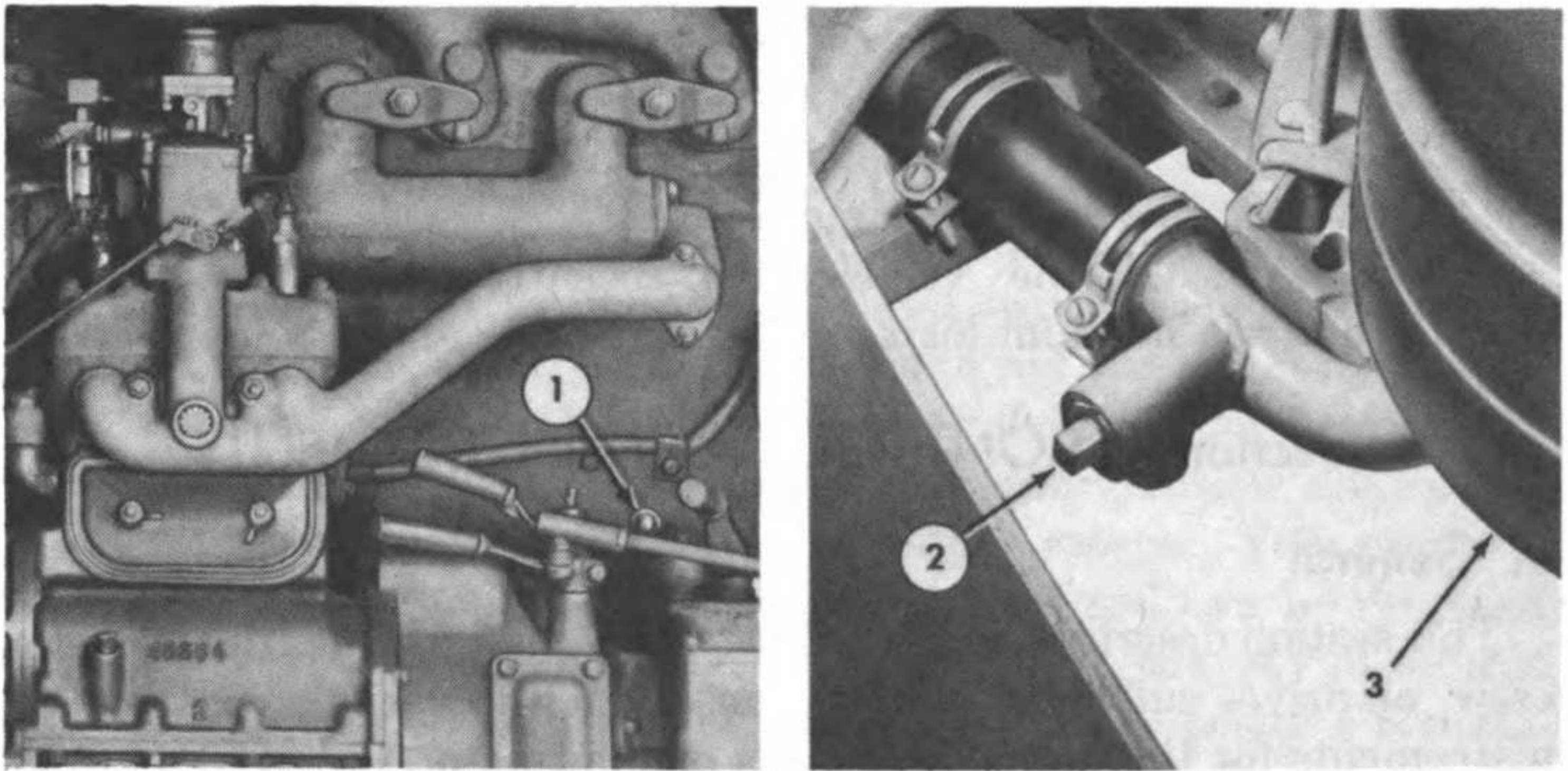
Figure 14. Muffler and precleaner installation.

(3) Corrosion preventive compounds can be removed with a steam cleaner. If a steam cleaner is not available, dry cleaning solvent can be used.

*e. Inspection.* Inspect the tractor for damage, missing parts, and for evidence of tampering. Report any damaged or missing parts. Check the tools and spare parts against the applicable Department of the Army Supply Manual, and check to be certain that all publications are present. Report any missing items.

*f. Assembly.*

(1) *Precleaner* (fig. 14). The precleaner (2) is packed on top of the starting engine transmission and the clamp is located around the gear shaft control lever. Slide the clamp (3) over the diesel engine air cleaner stack and press the precleaner down over the stack so that the glass trap jar is toward the rear of the vehicle. Raise the clamp, seat the precleaner, and secure it on the stack by tightening the clamp.



- 1 Block drain plug
- 2 Radiator drain plug
- 3 Air cleaner

Figure 15. Block and radiator drain plugs installed.

- (2) *Muffler* (fig. 14). The muffler (1) is packed at the front of the tractor on the left side. The clamp (4) is located around the gearshift control lever. Attach the muffler to the exhaust pipe, as in figure 14.
- (5) *Spark plug wires*. Attach the starting engine spark plug wires to the magneto and the spark plugs.
- (6) *Lights* (fig. 1). Attach two of the lights at the front end of the tractor at the top corners of the radiator guard. Attach the other two lights to the rear ends of the fenders. Be sure the paint is removed from the points of attachment, and connect the wires.
- (7) *Fan belts*. Adjust the tension on the fan belts in accordance with instructions in paragraph 73c.
- (8) *Supplementary instructions*. Consult the applicable technical manuals and bulletins for supplementary assembly instructions. These publications are listed in appendix I.

*g. Lubrication.* Lubricate the entire tractor in accordance with LO 5-3040-B.

*h. Preparation for Operation.* The radiator, fuel tanks, and air cleaners will be tagged with instructions for draining and filling.

## 8. Used Equipment

*a. General.* Perform applicable operations as outlined in paragraph 7, above.

*b. Inspection.* Give a used or reconditioned vehicle a thorough inspection as specified in paragraph 49. Check for loose nuts and cap screws, broken or missing parts. Check all adjustments. Try

the transmission in all speeds. Be sure the engine is firing on all cylinders.

*c. Lubrication.* Check the oil, water, and fuel supply and lubricate the vehicle as specified in paragraph 44.

*d. Operation.* If the vehicle has recently been reconditioned, operate under a medium load for the first 64 hours.

## Section II. CONTROLS AND INSTRUMENTS

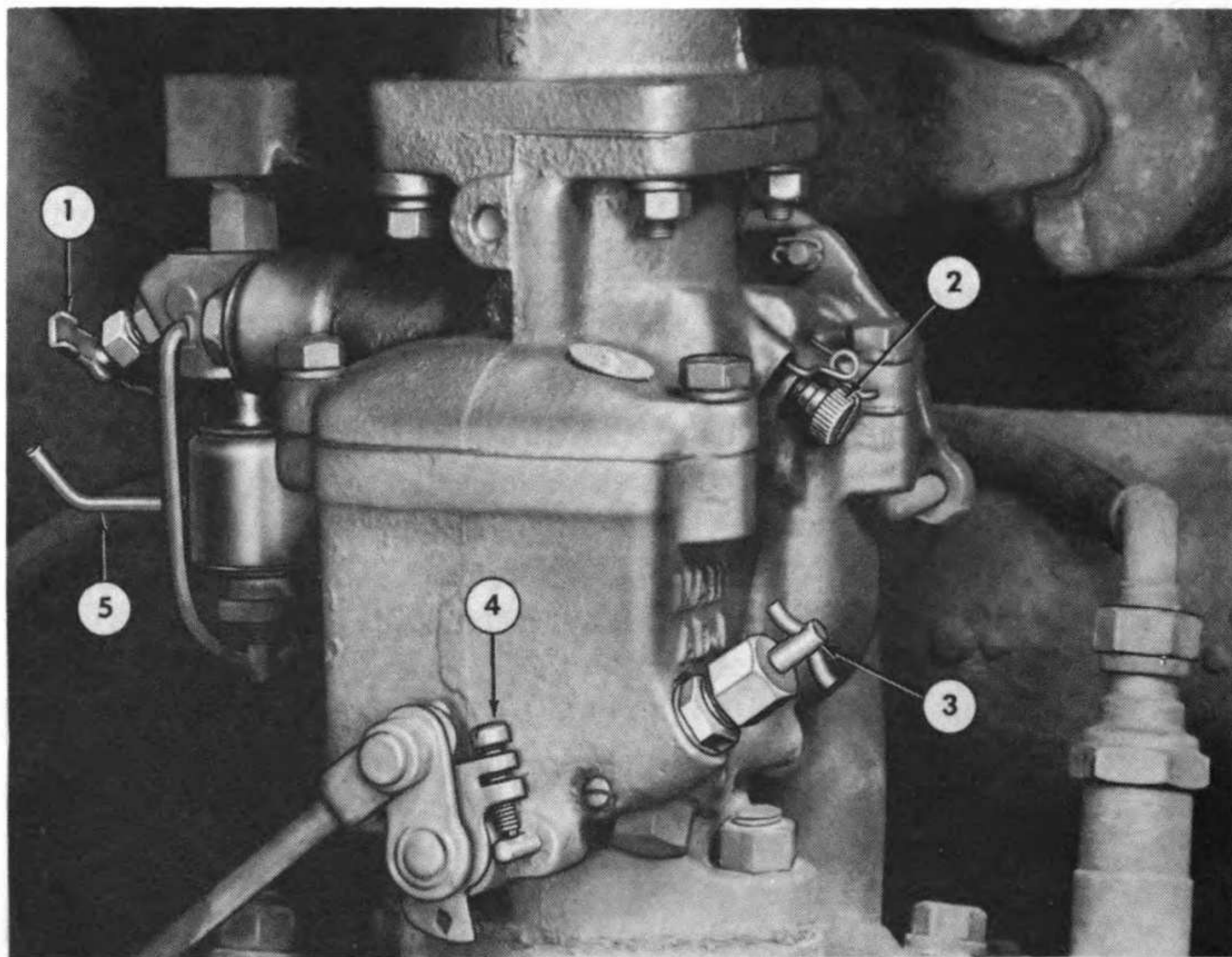
### 9. General

This section describes, locates, illustrates, and furnishes the operator, crew, or driver sufficient information about the various controls and instruments for the proper operation of the tractor.

### 10. Fuel Tank Valve

(fig. 16)

The starting engine fuel tank valve (1) is located on the carburetor just below and in front of the starting engine air cleaner. The valve shuts off fuel to the carburetor and is also used to drain the starting engine fuel tank.



- |                                    |                            |
|------------------------------------|----------------------------|
| 1 Fuel inlet valve                 | 4 Idle speed control screw |
| 2 Idling speed jet adjusting screw | 5 Choke control rod        |
| 3 High speed jet screw             |                            |

*Figure 16. Carburetor adjustments.*

## **11. Choke Control Rod**

(fig. 16)

The choke control rod is located on the starting engine carburetor adjacent to the fuel tank valve (1). The choke operates in a positive manner for three-fourths of the choke rod travel, at which position the valve is fully closed. Pulling the choke rod the last fourth of its travel trips the positive control and the valve is then held in the closed position by spring tension. The spring tension allows the choke to open automatically when the engine starts. This prevents flooding of the engine before the choke control rod can be returned to the "OFF" position. Pushing the choke rod all the way in returns the choke to the "OFF" position and reengages the positive control. For this reason, if it is necessary to choke the engine when starting, the choke control rod should always be pulled all of the way out.

## **12. Idling Latch**

(fig. 17)

A pivoted latch (7) is mounted on the starting engine governor mounting flange. When dropped in front of the starting engine governor lever (8), the latch will hold the lever in the idling position. When raised, the latch will permit the lever to move into position for full governed speed. The latch also mounts a setscrew which can be adjusted to regulate idling speed.

## **13. Starting Engine Magneto Switch**

(fig. 17)

The starting engine magneto switch is mounted on the side of the governor housing (6). It grounds the magneto when it is turned to the OFF position and stops the starting engine.

## **14. Compression Release Lever**

(fig. 17)

The compression release lever (2) which is mounted on the quadrant on the instrument panel at the left rear of the diesel engine is connected through a cam and push rod arrangement, to the exhaust valve rocker arms. When the lever is moved to the HALF position, the compression is released on half of the cylinders. When the lever is moved to the START position, the compression is released on all cylinders. This control is used to reduce the initial effort required to start the diesel engine.

## **15. Starting Engine Clutch Lever**

(fig. 17)

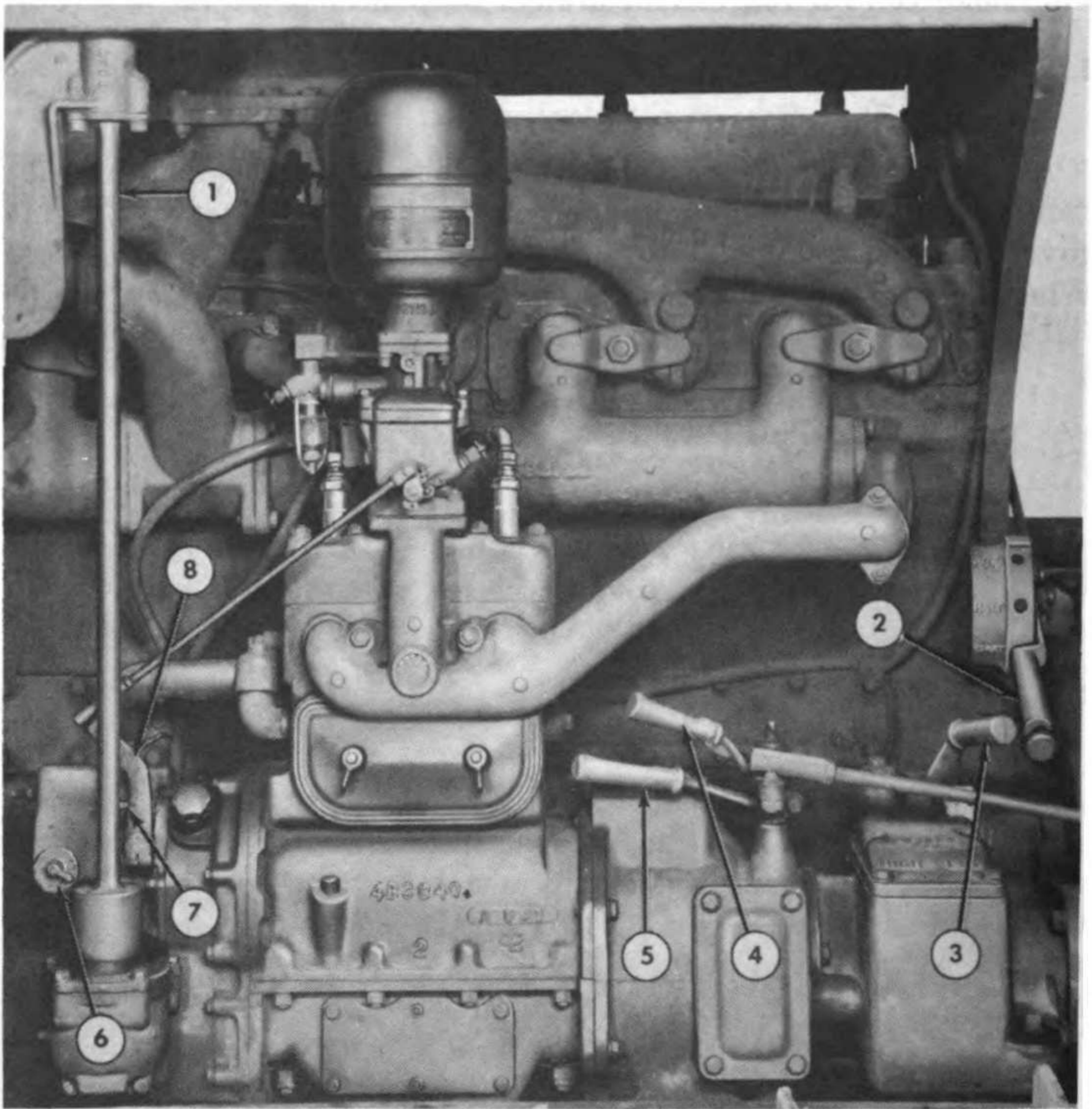
The starting engine clutch lever (5) is the lower of the two levers mounted on the starting engine clutch housing. The word CLUTCH

is cast into the handle of the lever. The lever engages the starting engine with the starter pinion when it is pulled outward and snapped over center. When the lever is pushed in towards the diesel engine block, it applies a brake to the starter pinion, enabling the operator to engage the starter pinion with the ring gear on the flywheel without clashing.

## 16. Starter Pinion Lever

(fig. 17)

The starter pinion lever (4) is the upper of two levers mounted on the starting engine clutch housing. The word PINION is cast into the handle of the lever. The lever engages the starter pinion with the ring gear on the Diesel engine flywheel.



- |                             |                                  |
|-----------------------------|----------------------------------|
| 1 Starting crankshaft       | 5 Starting engine clutch lever   |
| 2 Compression release lever | 6 Starting engine magneto switch |
| 3 Transmission shift lever  | 7 Idling latch                   |
| 4 Starter pinion lever      | 8 Starting engine governor lever |

*Figure 17. Starting engine controls.*

## 17. Starting Engine Transmission Shift Lever

(fig. 17)

The starting engine transmission shift lever (3) is mounted on the starting engine transmission. This lever permits shifting the starting engine transmission into HIGH or LOW speed. During cold weather, or any time the oil drag in the Diesel engine slows down the starting engine so the normal cranking speed cannot be reached, the starting engine transmission can be shifted into the LOW speed position.

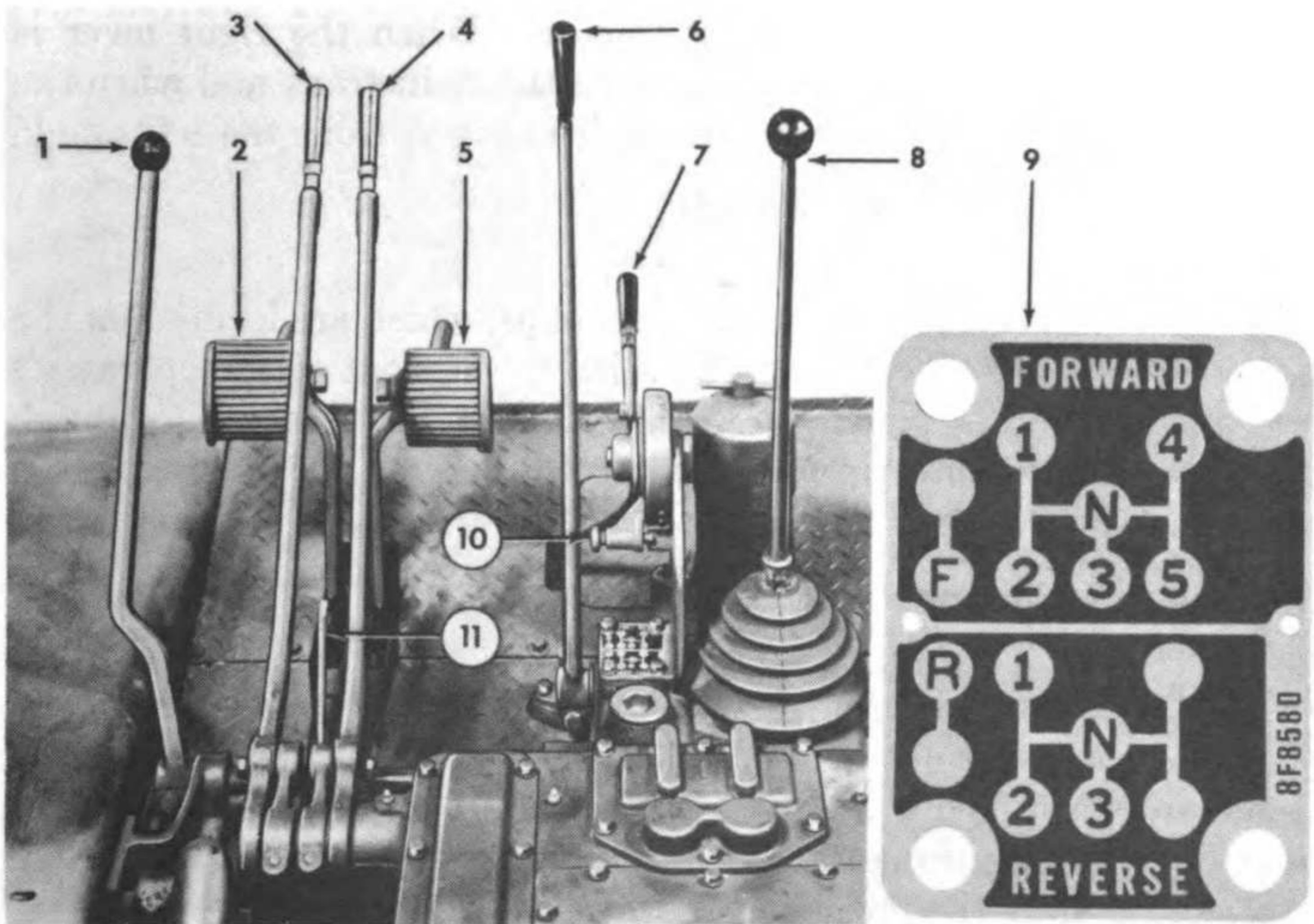
## 18. Starting Crank

The starting crank (5, fig. 5) is mounted on the starting engine starting crank shaft (1, fig. 17) which extends up from the starting gear housing and through the engine hood.

## 19. Throttle Control Lever

(fig. 18)

The throttle control lever (7) is located on the control pedestal, directly in front and to the right of the operator's seat. It is used to change the governed speed of the engine. When the lever is pulled back, the speed is increased. When the lever is pushed forward, the speed is decreased. When the plunger (10) on the bottom of the lever is pulled out and the lever pushed all the way forward, the engine will stop.



- 1 Flywheel clutch control lever
- 2 Steering clutch brake pedal
- 3 Steering clutch lever
- 4 Steering clutch lever
- 5 Steering clutch brake pedal

- 6 Forward-reverse selector lever
- 7 Throttle control lever
- 8 Gearshift control lever
- 9 Gearshift instruction plate
- 10 Throttle locking plunger
- 11 Brake locking lever

Figure 18. Operating controls.



## **20. Flywheel Clutch Control Lever**

(fig. 18)

The flywheel clutch control lever (1) is mounted in front of the operator's seat, to the extreme left of the compartment. It engages and disengages the flywheel clutch. When the lever is pulled back, it snaps into engagement and remains engaged until it is pushed forward into the clutch released position. When the clutch control lever is pressed forward beyond the released position, it applies a brake to the upper transmission shaft which permits gear shifting without clashing the gears.

## **21. Gearshift Control Lever**

(fig. 18)

The gearshift control lever (8) is mounted on the floor of the operator's compartment, just to the right of the throttle control lever. It is used to select the various speeds provided in the transmission. Five speeds forward and three speeds reverse are available (9).

## **22. Steering Clutch Levers**

(fig. 18)

The steering clutch levers (3 and 4) are located on the floor of the operator's compartment, directly in front of the operator's seat. This enables the operator to steer the tractor. When the right lever is pulled back it disengages the power from the right track and when the left lever is pulled back the power is disengaged from the left track.

## **23. Steering Clutch Brake Pedals**

(fig. 18)

The steering clutch brake pedals (2 and 5), which are located on the floor of the operator's compartment directly in front of the operator's seat, operate brakes which brake the right or left track as desired. These are an aid to steering or stopping the tractor and are worked in conjunction with the steering clutch levers.

## **24. Brake Pedal Locking Lever**

(fig. 18)

The brake pedal locking lever (11), located on the floor of the operator's compartment between the clutch brake pedals, operates a ratchet and pawl device which locks the left brake pedal in the applied position. Pushing the lever all the way forward locks the left brake pedal, and pulling the lever all the way back releases it.

## **25. Forward-Reverse Selector Lever**

(fig. 18)

The forward-reverse selector lever (6) is located on the floor of the operator's compartment, to the right of the steering clutch levers. This lever shifts the transmission from forward to reverse gears.

Pushing the lever forward engages the reverse gear train, and pulling the lever back engages the forward gear train. The lever has a neutral position which is halfway between the forward and reverse positions.

*Note.*—The forward-reverse selector lever does not affect the forward and reverse gear trains of the transmission when the gearshift control lever is in the fourth or fifth forward speed gear positions.

## 26. Lubricating Oil Pressure Gage

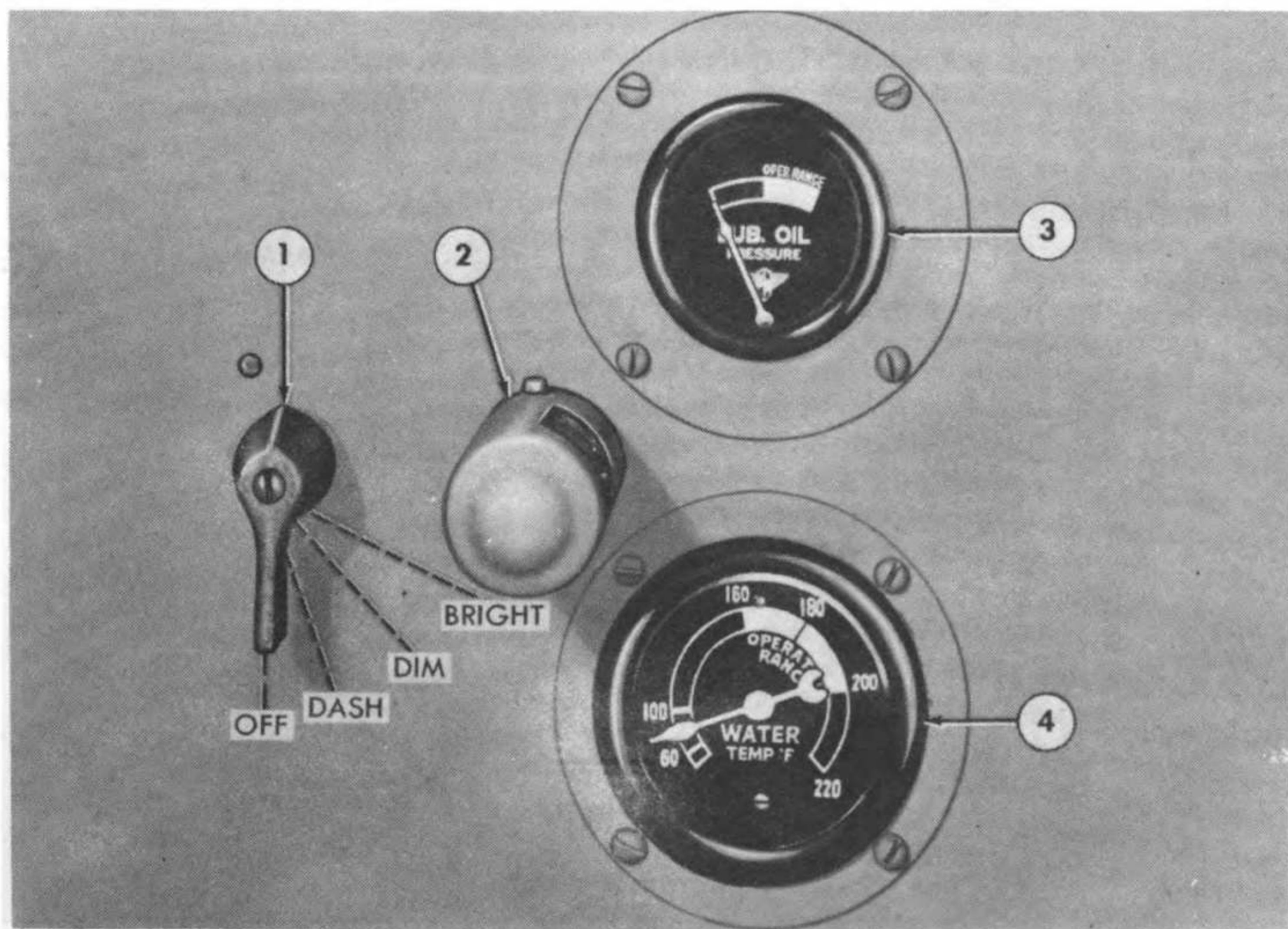
(fig. 19)

The lubricating oil pressure gage (3), located on the instrument panel in the operator's compartment, indicates the pressure of the diesel engine lubrication oil, and does not indicate the amount of oil in the crankcase. When the engine is operating, the oil pressure indicator should never fall below the operating "white" range on the gage.

## 27. Temperature Gage

(fig. 19)

The temperature gage (4), operated through a capillary tube connected to the engine thermal unit, indicates the temperatures of the coolant in the cooling system. The gage is located on the instrument panel in the operator's compartment. It is graduated from 60° to 220° F. The normal operating temperature of the engine is between 175° and 185° F.



1 Light switch  
2 Instrument light

3 Lubricating oil pressure gage  
4 Water temperature gage

Figure 19. Instrument panel.

## 28. Light Switch

(fig. 19)

The light switch (1) is located on the instrument panel in the operator's compartment, and is used to control the head and taillights of the tractor, and the instrument light (2). The four positions of the switch, OFF, DASH, DIM, and BR, are indicated on the instrument panel.

## 29. Fuel Pressure Gage

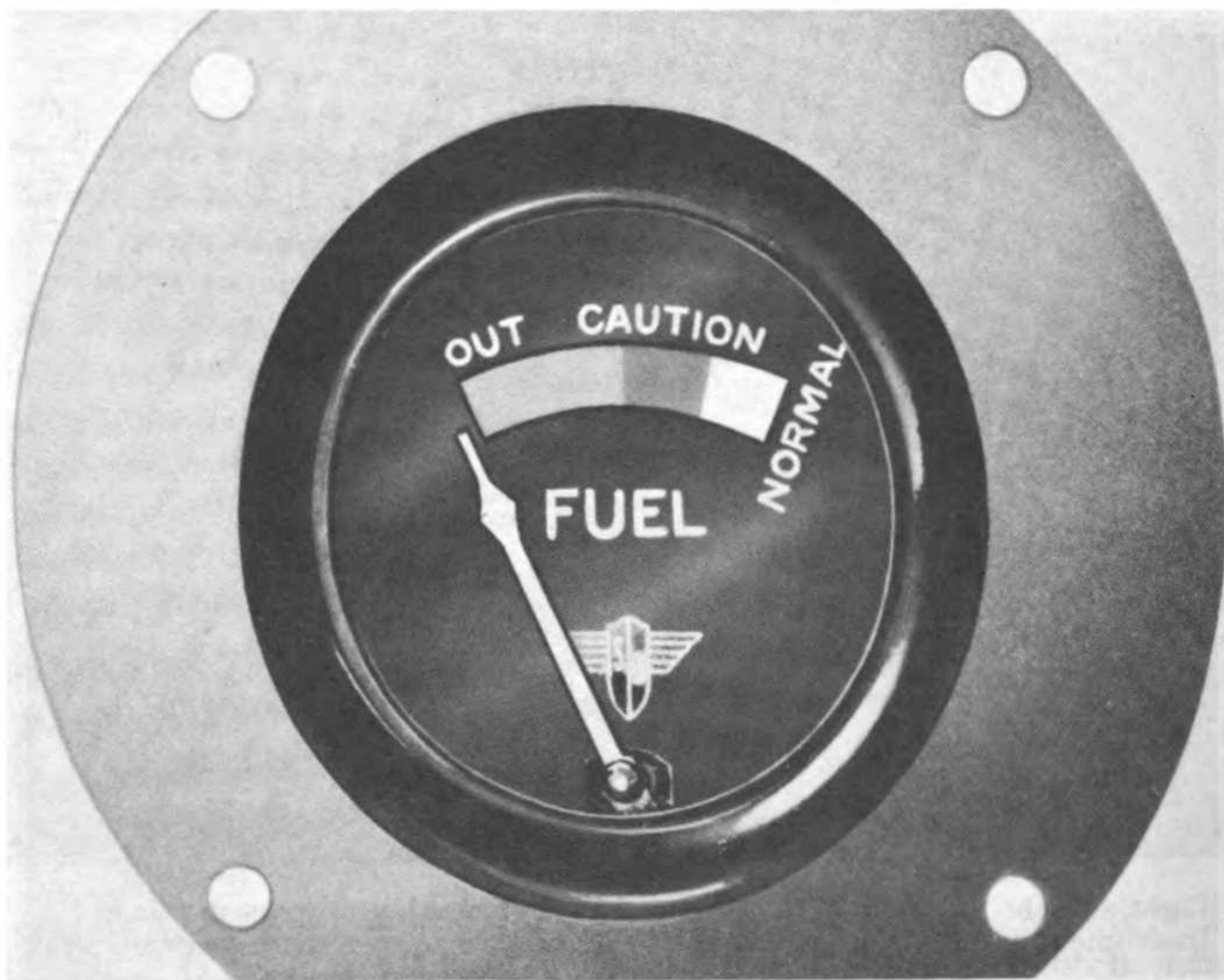
(fig. 20)

The fuel pressure gage, mounted near the top of the fuel filter housing on the right-hand side of the diesel engine, indicates the condition of the fuel filters. As the filters gradually become clogged, with the engine at normal operating speed, the fuel gage indicator will move back from the NORMAL (white) range to the CAUTION (green) range, and later to the OUT (red) range.

## 30. Hour Meter

(fig. 21)

The hour meter (2) is mounted on the rear of the fuel pump housing on the right-hand side of the engine. It records the total elapsed operating time of the diesel engine. A tachometer outlet (1) is provided on the hour meter housing.



*Figure 20. Fuel pressure gage.*

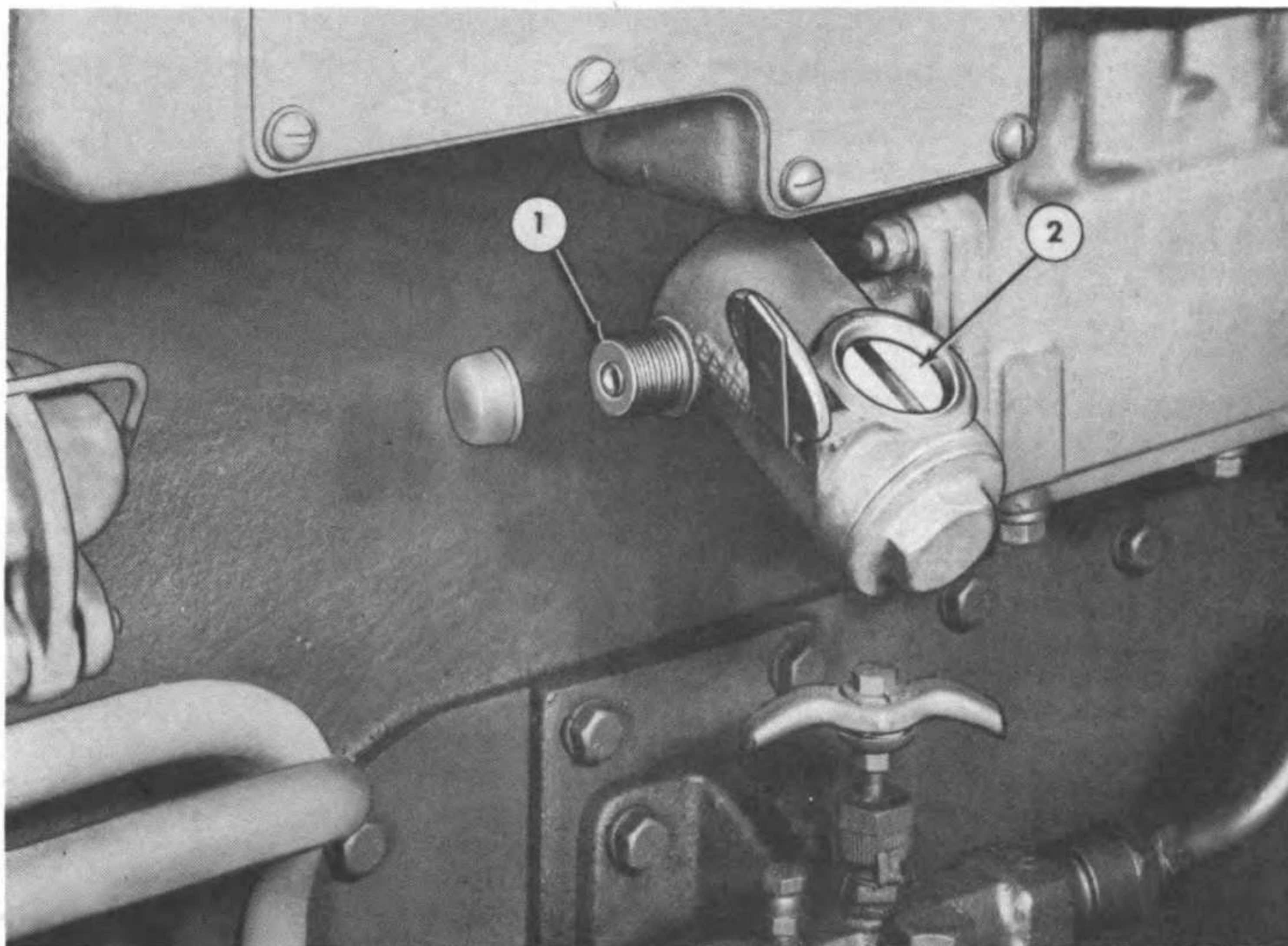


Figure 21. Hour meter installed.

## Section III. OPERATION UNDER USUAL CONDITIONS

### 31. General

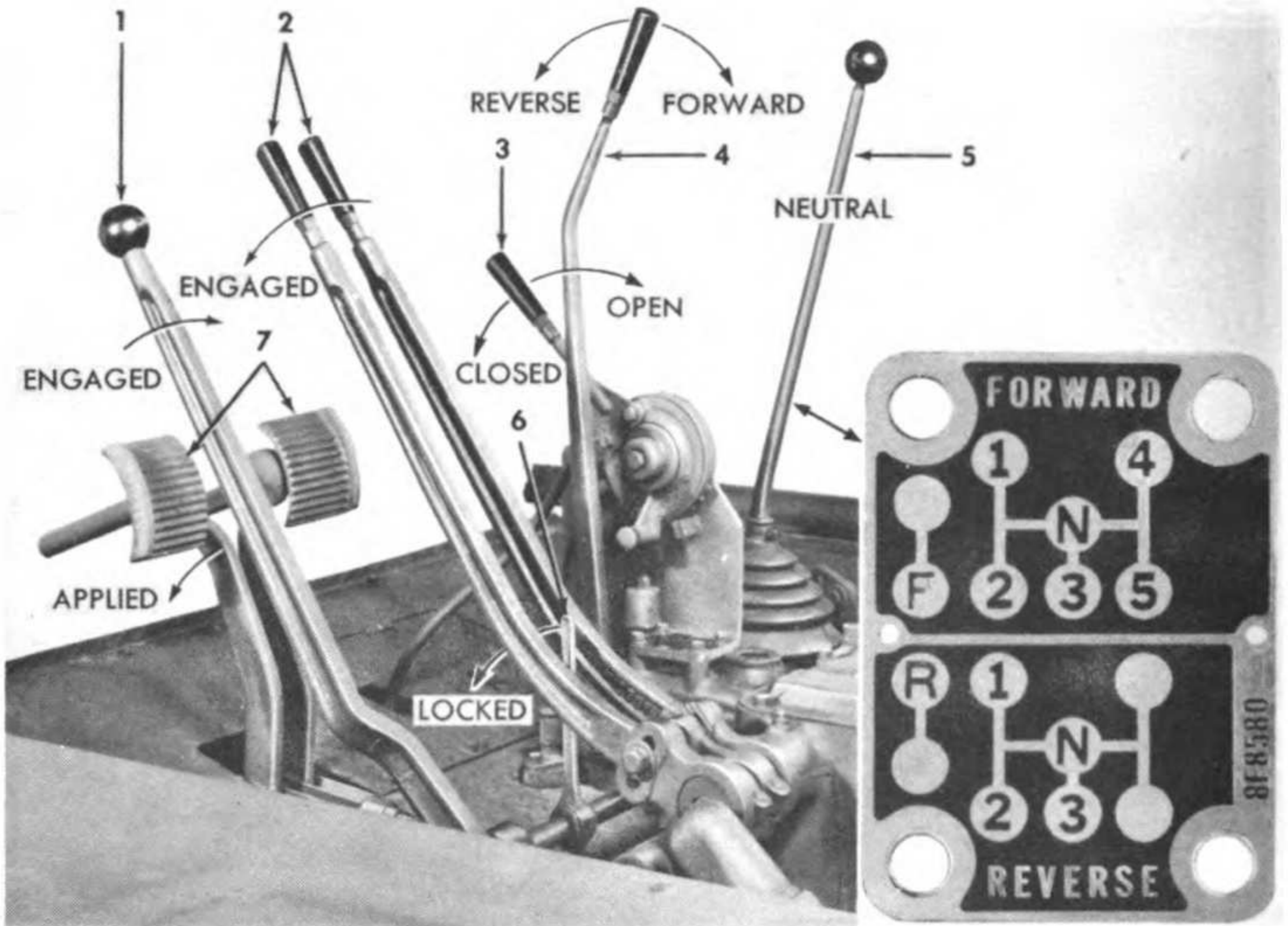
a. The instructions in this section are published for the information and guidance of the personnel responsible for the operation of this tractor.

b. It is essential that the operator know how to perform every operation of which the tractor is capable. This section gives instructions for starting and stopping, and performing the basic motions of the tractor, and co-ordinating these basic motions to perform the specific tasks for which the tractor is designed. Since nearly every job presents a different problem, the operator may have to vary the given procedure to fit the individual job.

### 32. Starting and Stopping

a. *Preparations for Starting.*

- (1) Service the tractor in accordance with paragraph 49c.
- (2) Place the gear shift lever (5, fig. 22) in neutral (N) position.
- (3) Lock the throttle lever (3) in the extreme forward, or closed position.
- (4) Disengage the flywheel clutch control lever (1) by pushing it forward.
- (5) Place forward-reverse selector lever (4) in the neutral position.
- (6) Move the compression release lever to the START position (fig. 23).



- |                                  |                                |
|----------------------------------|--------------------------------|
| 1 Flywheel clutch control lever  | 5 Gear shift control lever     |
| 2 Steering clutch levers         | 6 Brake locking lever          |
| 3 Throttle lever                 | 7 Steering clutch brake pedals |
| 4 Forward-reverse selector lever |                                |

Figure 22. Operation of tractor controls.

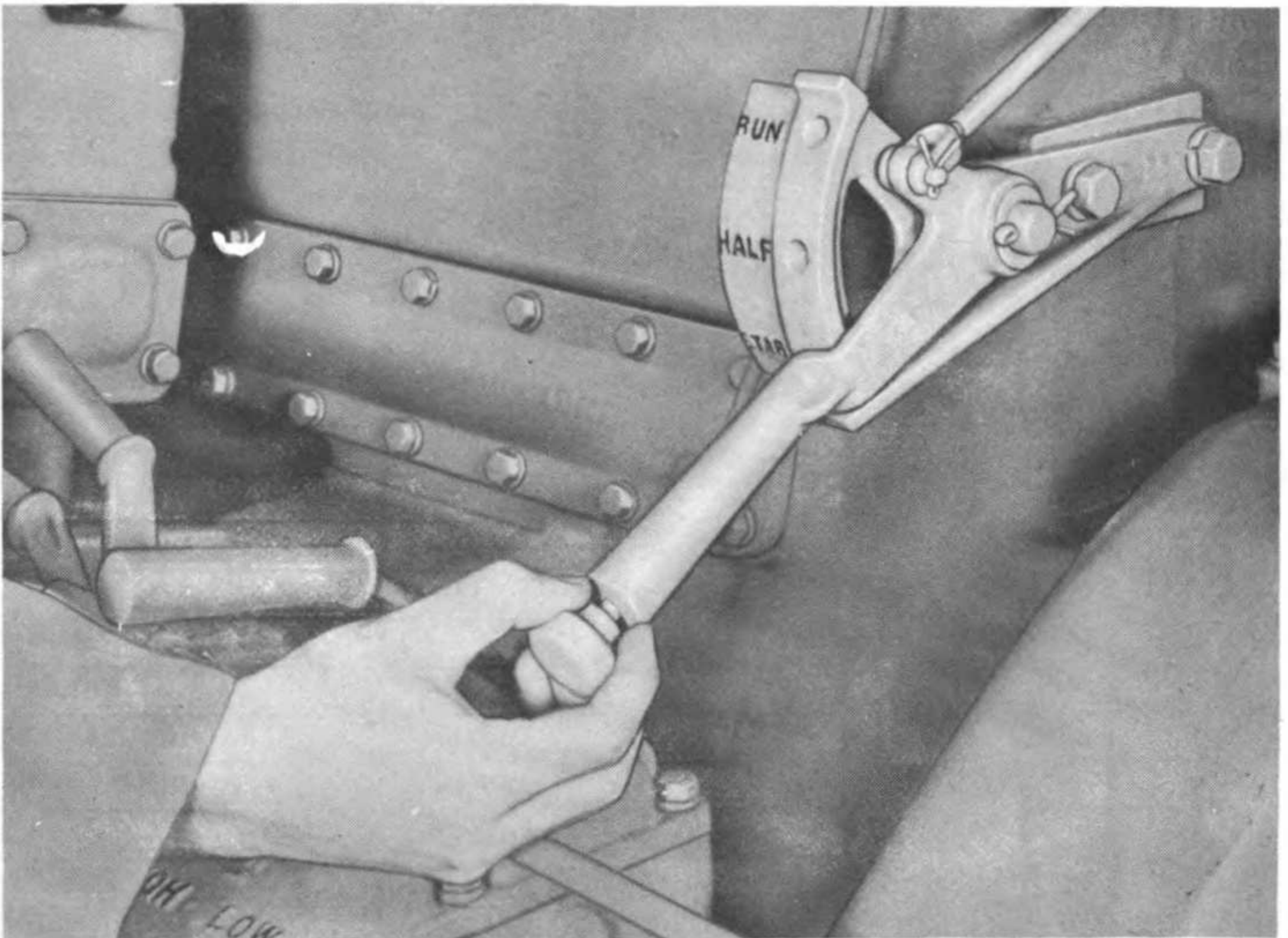


Figure 23. Compression release lever in START position.

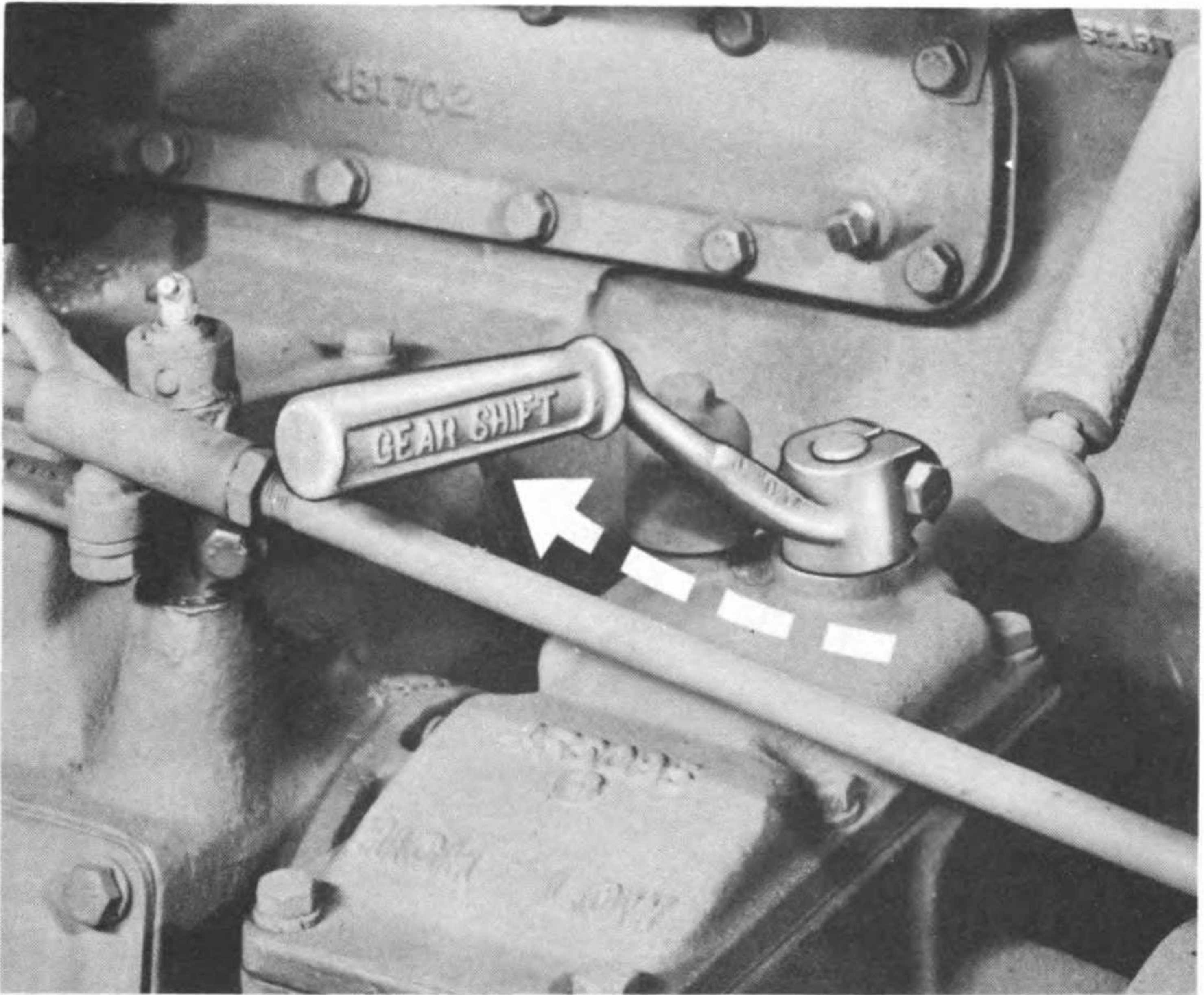


Figure 24. Transmission shift lever in *START* position.

- (7) Shift the starting engine transmission into *HIGH* (fig. 24). Use *LOW* speed for cold weather starting as directed in paragraph 36f(1).
- (8) Disengage the starting engine clutch by pushing the lever in toward the diesel engine block (fig. 25).

*b. Starting the Starting Engine.*

- (1) Open the starting engine fuel inlet valve (1, fig. 26).
- (2) Pull out the starting engine choke control rod (2, fig. 26). It is not necessary to choke an engine that is already warm.
- (3) Latch the starting engine throttle lever in the idling position by dropping the idling latch (3) in front of the lever.
- (4) Turn the starting engine magneto switch (4, fig. 26) to *ON* position.
- (5) Install the crank (1, fig. 27) on the starting-crank shaft (2) where it projects through the hood.

**Caution:** Do not attempt, in any manner, to spin or push the crank. Pull the crank through the compression strokes.

*Note.*—If the engine will not start, refer to the troubleshooting guide in paragraph 53.

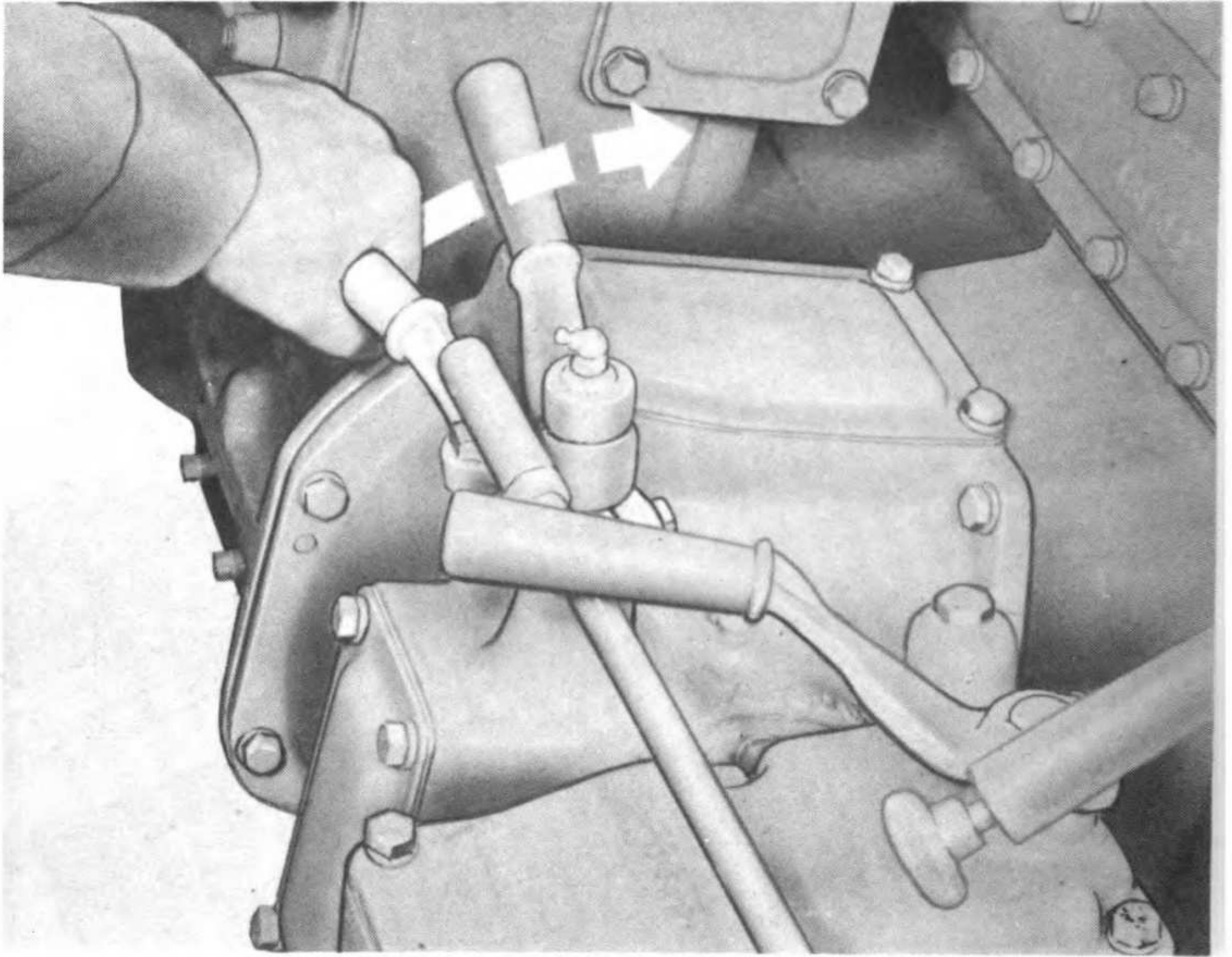


Figure 25. Disengaging starting engine clutch.

(6) *Engine warmup.*

(a) Remove the crank.

(b) Push in the choke control rod (2, fig. 26).

*Note.*—Temperature will vary the length of time it is necessary to have the choke on. Actual experience in starting will determine this interval.

(c) Permit the starting engine to warm up at idling speed before using it to start the diesel engine.

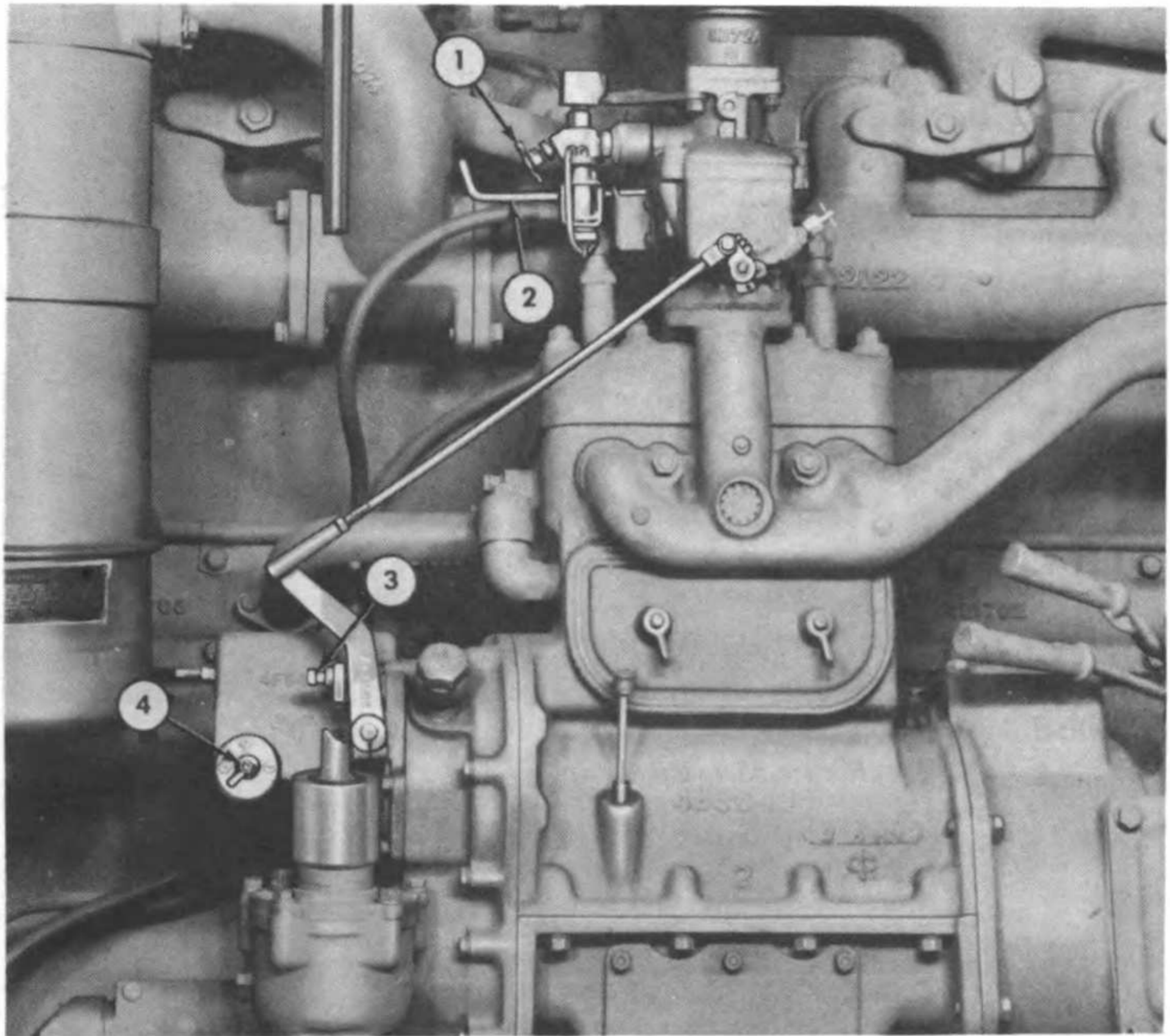
c. *Starting the Diesel Engine.*

(1) With the starting engine running at idling speed, apply the starting engine clutch brake to stop the starter pinion from rotating by pushing the flywheel clutch control lever (1, fig. 28) all the way forward and holding it there.

**Caution:** Do not attempt to engage the starter pinion before first applying the starting clutch brake.

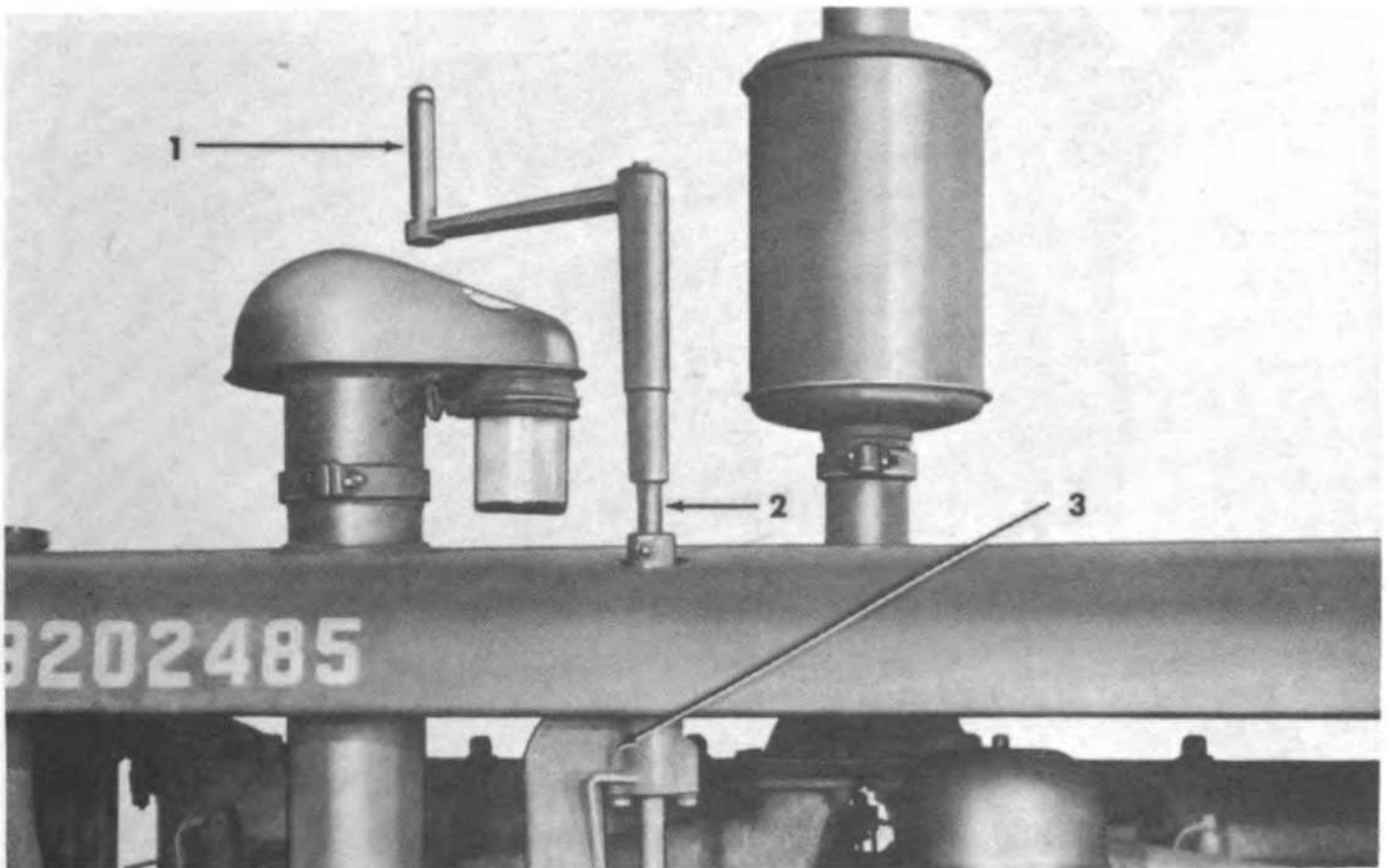
(2) Engage the starter pinion with the flywheel ring gear by pulling back on the starter pinion lever (2, fig. 28). Release the clutch brake.

(3) Raise the idling latch (3, fig. 26) to let the starting engine run at full governed speed.



- |                     |                                  |
|---------------------|----------------------------------|
| 1 Fuel inlet valve  | 3 Idle latch and adjusting screw |
| 2 Choke control rod | 4 Magneto switch                 |

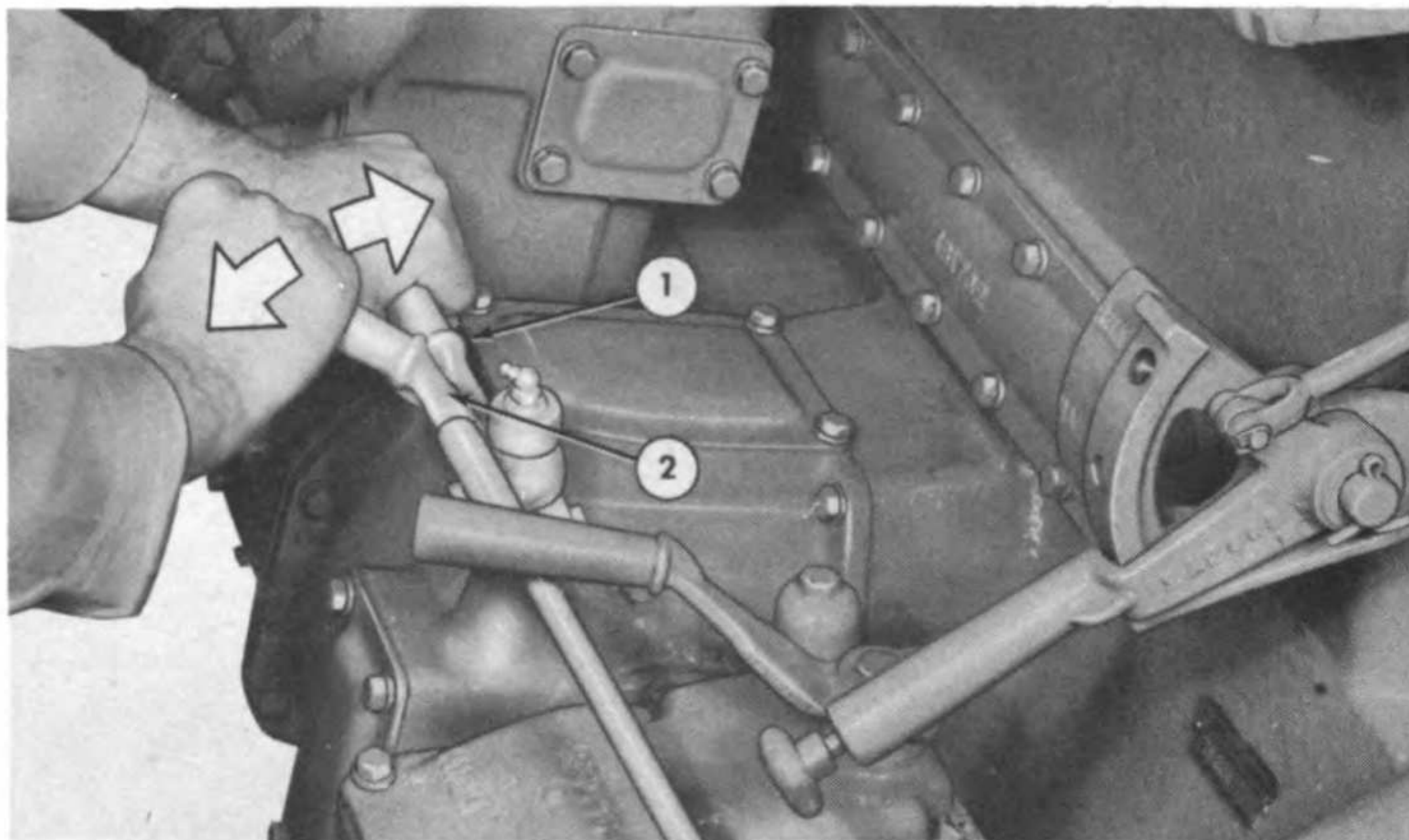
*Figure 26. Starting engine controls in START position.*



- |                              |                      |
|------------------------------|----------------------|
| 1 Starting engine crank      | 3 Crankshaft bracket |
| 2 Starting engine crankshaft |                      |

*Figure 27. Starting crank installed.*

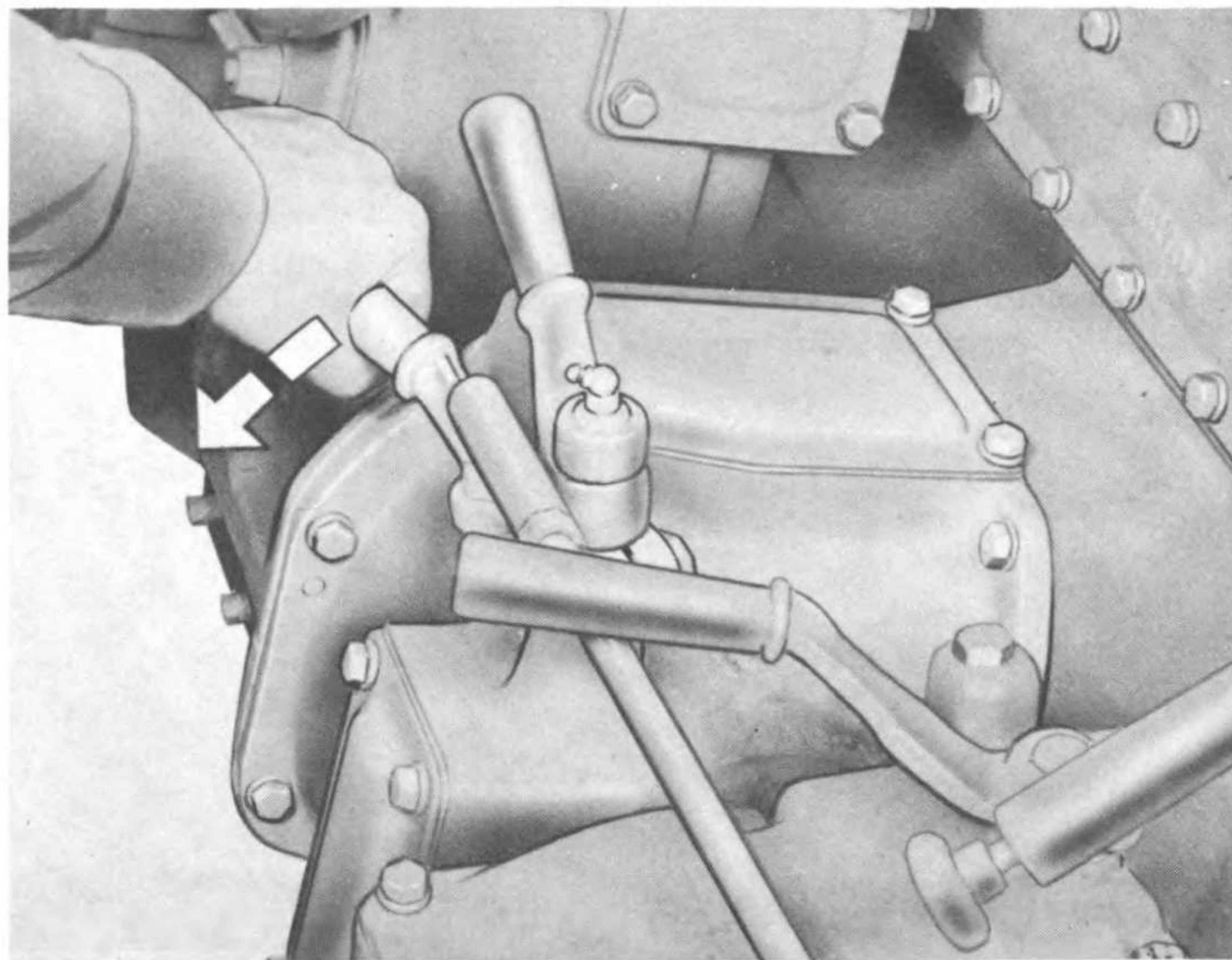




1 Clutch lever

2 Pinion lever

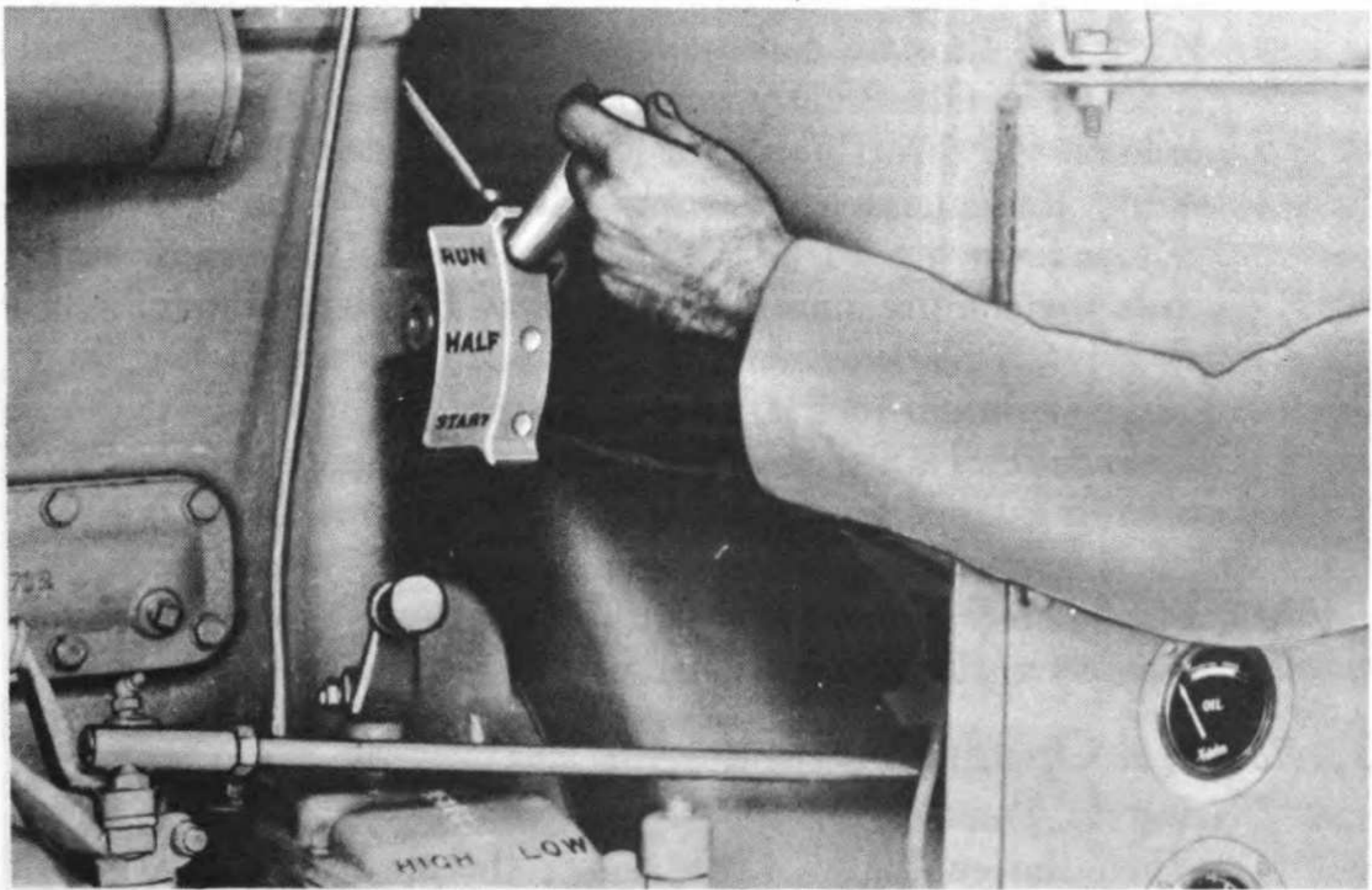
*Figure 28. Engaging the starter pinion.*



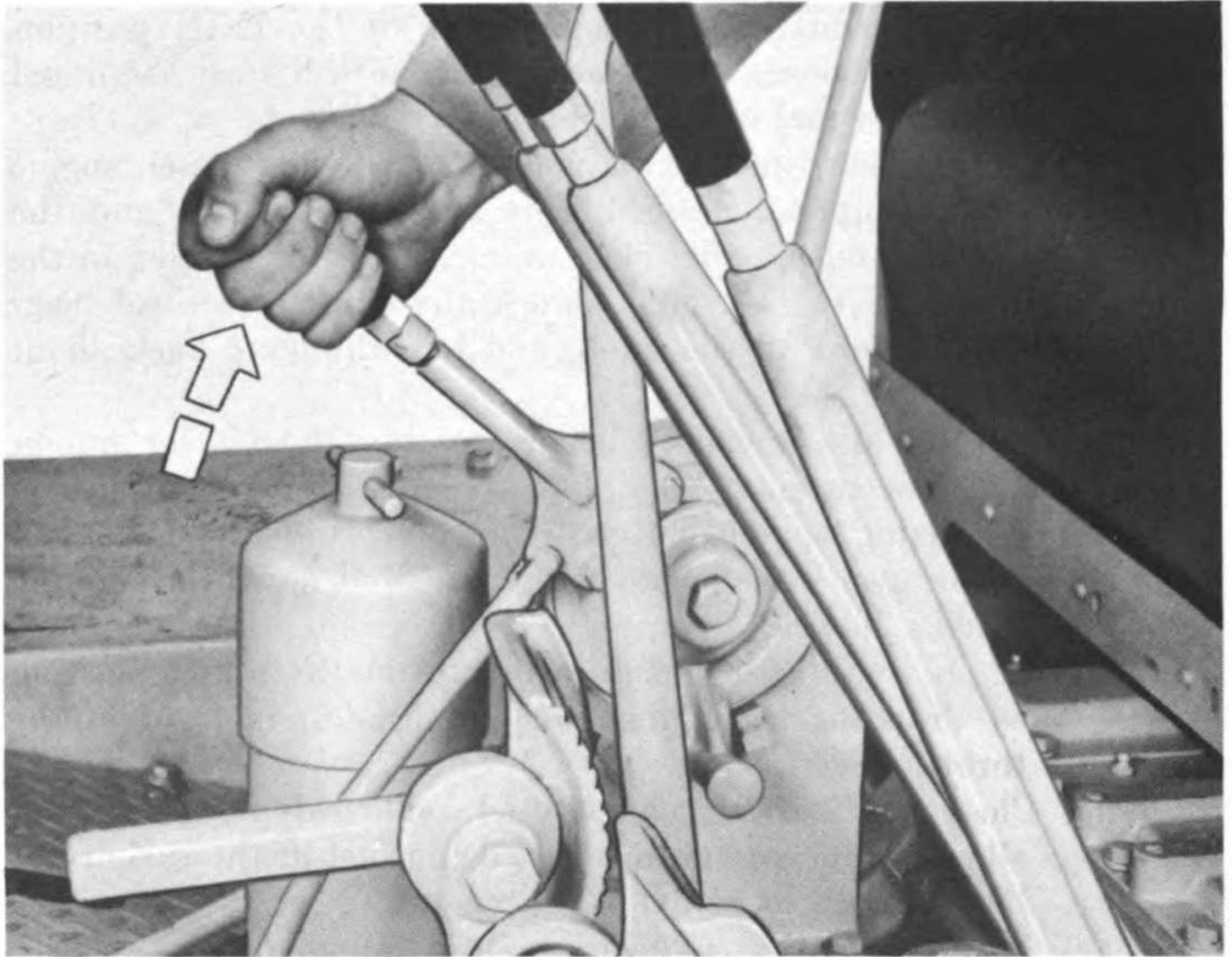
*Figure 29. Engaging the starting engine clutch.*

- (4) Engage the starting engine clutch by pulling the lever (1, fig. 28) out until it snaps over center (fig. 29). If the starting engine slows to the stalling point, when the clutch is engaged, disengage the clutch and let the engine pick up speed again.

- (5) Move the compression release lever to the RUN position (fig. 30) as soon as the starting engine will turn the diesel engine at normal cranking speed.
- (6) After the starting engine has cranked the diesel engine against compression until it is sufficiently warm and the lubricating oil pressure gage (3, fig. 19), is registering in the OPERATING RANGE, unlock the throttle control lever by pulling out on the knob, and pull the lever back about halfway (fig. 31).
- (7) When the diesel engine begins to fire, the starter pinion disengages automatically, but it is necessary to disengage the starting engine clutch by pushing the clutch control lever in toward the engine (fig. 25). Shut down the starting engine as follows:
  - (a) Latch the starting engine throttle in the idling position by dropping the idling latch (3, fig. 26) in front of the throttle lever.
  - (b) Close the starting engine fuel tank valve (1, fig. 26), allowing the engine to burn all the fuel in the carburetor before it comes to a stop.
  - (c) Turn the starting engine magneto switch (4, fig. 26) to OFF.
  - (d) Allow the diesel engine to idle 5 minutes with the throttle control in half engine speed position before applying the load.



*Figure 30. Compression release lever in RUN position.*



*Figure 31. Position of throttle control lever for starting.*

*Note.*—If the engine does not start, refer to the troubleshooting guide, paragraph 54. Cold weather starting directions are given in paragraph 36.

*d. Stopping the Diesel Engine.*

- (1) Allow the engine to idle 5 minutes with the throttle half open before stopping.
- (2) Move the throttle control lever (3, fig. 22) to the extreme forward or **CLOSED** position and drop the plunger into the hole on the throttle control bracket.
- (3) While the engine is slowing down, shift the compression release lever (fig. 23) to **START** position. After engine stops, shift the compression release lever to **RUN** position (fig. 30) so valves will be closed.
- (4) Leave the main fuel tank valve open.
- (5) If the tractor must stand without shelter, cover the exhaust pipe to exclude rain or snow. If the temperature is below freezing, or if freezing weather is expected before the engine will be started again, drain the cooling system or protect it with an antifreeze solution, see paragraph 36.

### **33. General Operation Details**

*a. Driving the Tractor (fig. 22).*

- (1) When the engine is warm, move the throttle control lever (3) to the low idling position.

- (2) Disengage the flywheel clutch by pressing the clutch control lever (1) forward. To permit shifting gears without clashing, continue to press forward on the clutch lever until the clutch stops rotating.
- (3) Carefully move the gear shift control lever (5) into the desired speed.
- (4) Move the forward-reverse selector lever (4) into the desired position.

*Note.*—The forward-reverse selector lever controls the direction of travel. Shifting from forward to reverse or reverse to forward, in any of the first three speeds, is accomplished without moving the gear shift control lever. Disengage the flywheel clutch and move the selector lever to either the forward or reverse position. The tractor will move forward in fourth or fifth gear with the forward reverse selector lever in either forward or neutral position. Always shift gears completely into mesh.

- (5) Pull the throttle control lever (3) back. Carefully engage the flywheel clutch lever (1) until the slack is taken up between the tractor and the load. Then pull the clutch lever back firmly until it snaps over center.
- (6) The forward-reverse selector lever is used when moving forward and backward for short distances in operations where low gear ratios are necessary. For example, when bulldozing to remove boulders or other obstructions.

*b. Steering the Tractor (fig. 22).*

- (1) Pull the steering clutch lever (2) all the way back on the side toward which the turn is to be made.
- (2) Apply the brake, on the same side, by pressing down on the brake pedal (7) hard enough to turn at the desired angle.
- (3) Both the brake and the steering clutch controls should be handled smoothly so the turn will be made evenly and not as a series of jerks. Just before the turn is completed, release the brake, then engage the steering clutch by releasing the control lever smoothly.
- (4) The brake must be in the fully released position during normal operation of the tractor. Keep the feet off the pedals except when it is necessary to apply the brakes. With a load behind the tractor it is seldom necessary to use the brakes in steering except for sharp turns, since the load acts as a brake. To hold the tractor on slopes, lock the left brake in position by pushing forward on the left brake pedal and then engaging the brake pedal lock lever (6).

*c. Stopping the Tractor (fig. 22).*

- (1) Disengage the flywheel clutch lever (1).
- (2) Move the throttle control (3) to the idling position.
- (3) Shift the gear shift control lever (5) into neutral position.

- (4) Shift the forward-reverse selector lever (4) into neutral position.
- (5) Engage the flywheel clutch. Do not allow the tractor to idle with the flywheel clutch disengaged.

### **34. Specific Operation**

*a. Towing.* The tractor is equipped with a drawbar to which chains or cables may be attached to perform towing operations or any tasks which require pulling force.

*b. Bulldozing.* When equipped with a bulldozer blade and necessary controls the tractor may be used for excavating, leveling, clearing, or any other operation requiring a pushing force. For further information on bulldozing operations see TM 5-1586.

*c. Operating Over an Obstruction.* The fact that the steering clutches are controlled by separate levers may be used to advantage in running over an obstruction such as a log or a ditch bank. Both of the clutches may be released slightly until the tractor balances on top of the obstruction. Then one clutch may be engaged gradually so that the tractor moves forward at an angle, over and down. If the tractor is being operated without a load, it may be necessary to use the brakes.

*d. Steering Downgrade.* When going downgrade with the tractor pulling the load, steer in the usual manner. If the load is pushing the tractor, the operation of the steering clutches is reversed. For example, to turn to the right under these conditions, release the steering clutch on the left, but do not apply the brake. This allows the left track to travel faster, while the right track is held back by the engine which acts as a brake.

### **35. Moving to a New Location**

*a.* If it is not feasible to drive the tractor to a new work site, drive tractor onto a platform trailer or truck by means of a ramp.

*b.* If necessary, remove exhaust extension and precleaner to protect from damage.

*c.* Place the tractor squarely on the truck or trailer bed, and make sure that the tracks have solid footing for their full length.

*d.* Secure tractor to truck or trailer bed as described in paragraph 107 *a* (11).

## **Section IV. OPERATION UNDER UNUSUAL CONDITIONS**

### **36. Cold Weather Operation**

*a. General.* Low temperatures make additional preparation and maintenance necessary to assure starting and prevent damage to the tractor.

*b. Protection of Cooling System.*

- (1) Ethylene glycol is prescribed for use as an antifreeze solution. The following table gives the quantity required to protect the cooling system of this tractor at the indicated temperatures.

<i>Temperature</i> (°F.)	<i>Quarts</i> <i>Ethylene</i> <i>Glycol</i>	<i>Temperature</i> (°F.)	<i>Quarts</i> <i>Ethylene</i> <i>Glycol</i>	<i>Temperature</i> (°F.)	<i>Quarts</i> <i>Ethylene</i> <i>Glycol</i>
10	28	-20	49	-50	63
0	35	-30	56	-60	70
-10	42	-40	63		

- (2) The following precautions should be taken before installing the antifreeze compound:

- (a) Flush the cooling system thoroughly. If necessary, remove scale as described in paragraph 71.
- (b) Check the cooling system for leaks. Replace hoses and pump packing if they show signs of deterioration.
- (c) Inspect the fan belt. Adjust or replace if necessary, see paragraph 73.

*c. Lubrication.* Lubrication at temperatures below  $-10^{\circ}$  F. is covered in the lubrication order, LO 5-3040-B, and details are given in paragraph 46.

*d. Fuel System.*

- (1) In sub-zero weather, use grade X Diesel fuel.
- (2) The following precautions should be taken to avoid the formation of ice in the fuel system:
  - (a) Always keep the fuel tanks as full as possible. This will reduce the condensation of water from the free air space above the fuel.
  - (b) Use caution when handling fuel to prevent the entrance of snow or ice.
  - (c) Open the fuel tank drain cock and remove the filter housing drain plug regularly to drain off accumulated water.

*e. Starting the Starting Engine.* The following instructions are intended to supplement the starting procedure covered in paragraph 32b.

- (1) Fill the fuel tank with gasoline.
- (2) Before every start, see that there is no ice on the spark plugs, wiring or magneto.
- (3) Sometimes moisture will collect on the starting engine spark plugs. Remove and dry the plugs by pouring gasoline over the electrodes and igniting it.
- (4) Pouring a small amount of gasoline on spark plug electrodes before they are replaced is more effective in promoting combustion than priming the cylinders with raw gasoline.

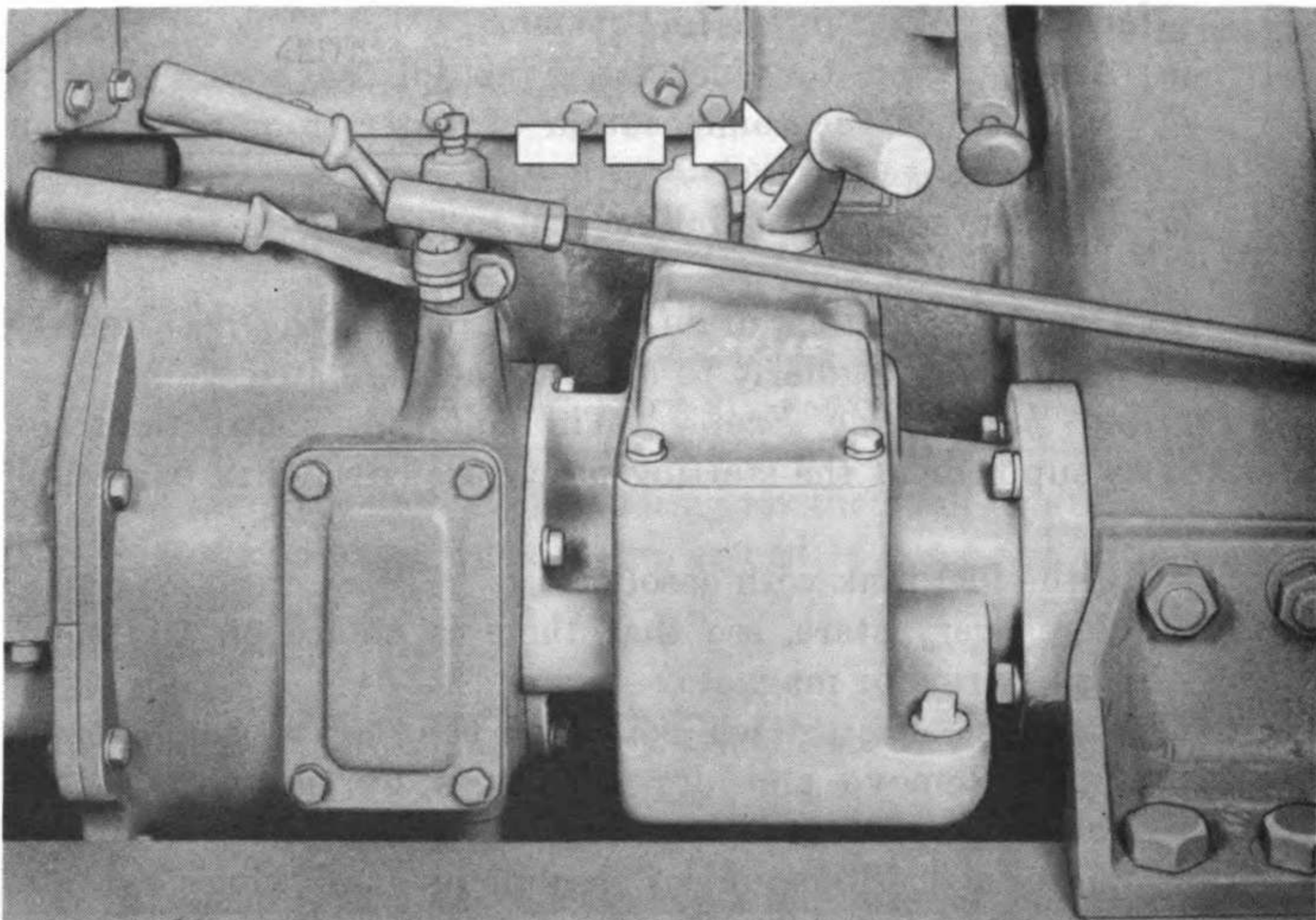
*f. Starting the Diesel Engine.* The following instructions are intended to supplement the starting procedure covered in paragraph 32c.

- (1) The starting engine transmission provides a LOW speed (fig. 32) to start to crank the cold diesel engine. Be sure the starting engine clutch is disengaged and the diesel engine flywheel has stopped turning before the transmission is shifted into HIGH. Shift the transmission into HIGH to start the diesel.
- (2) When the oil "drag" of the diesel engine prevents the starting engine from turning the diesel engine fast enough to start it, move the compression release lever to the HALF position (fig. 33). When the lever is in this position, the compression is released on half of the cylinders and allows faster cranking. Move the compression release lever to RUN (fig. 30) as soon as the starting engine can turn the diesel engine with the lever in that position.

### 37. Hot Weather Operation

#### *a. Cooling System.*

- (1) In extremely high temperatures, the water in the cooling system should be checked more frequently than under normal conditions.
- (2) Inspect the fan belt adjustment at frequent intervals (par. 73).
- (3) Keep trash out of the fins in the oil cooler and water radiator cores.



*Figure 32. Transmission shift lever positioned for cold weather starting.*

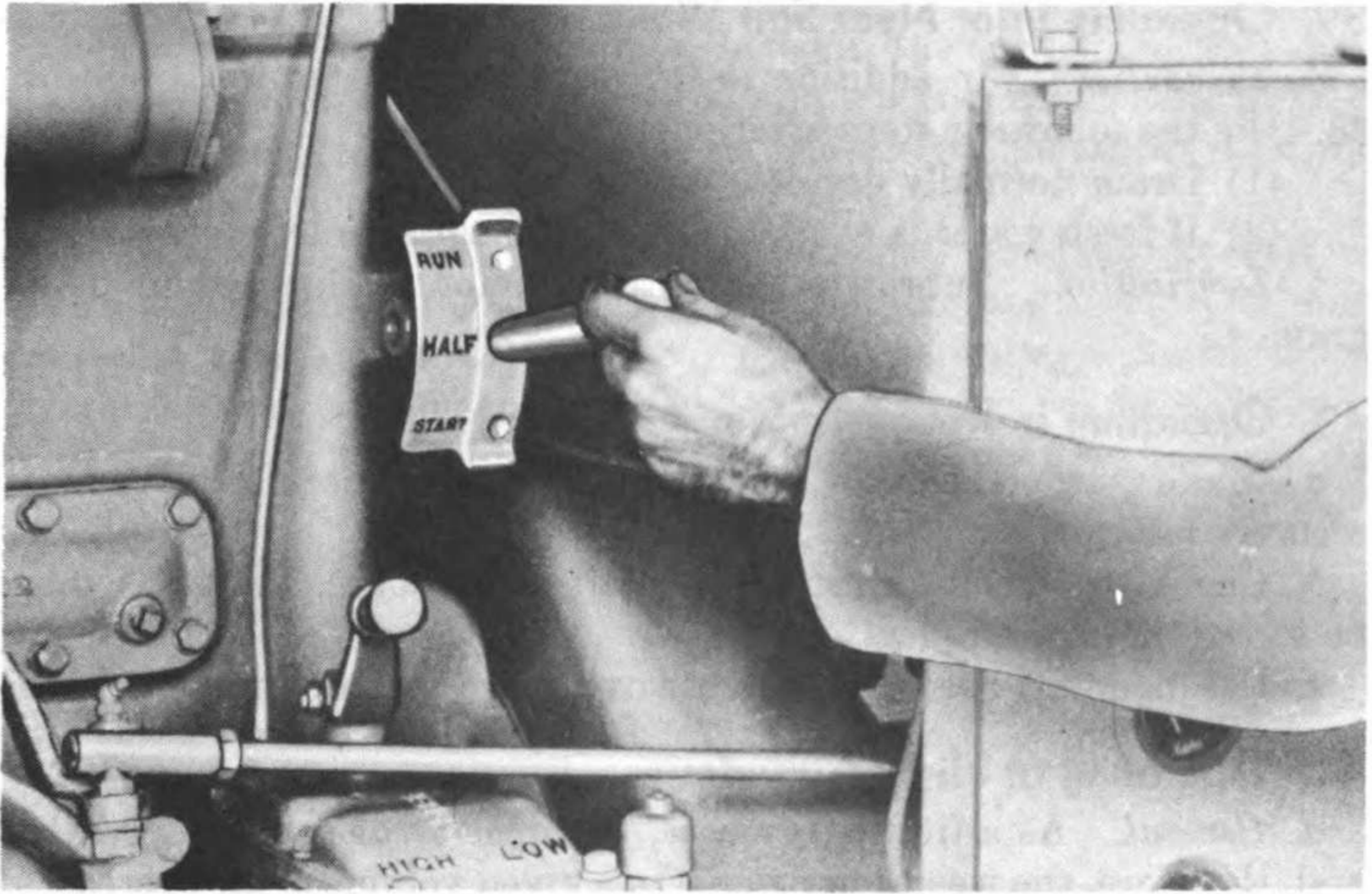


Figure 33. Compression release in "Half" position.

- (4) Use only clean water. Do not use water that contains alkali or other substances which may cause scale formation.
- (5) If the engine overheats, have the water temperature regulator and water pump checked.

*b. Lubrication.* Special attention should be given to lubrication. Consult the lubrication order (fig. 35) and the instructions in paragraph 46.

### 38. Operation in Deep Mud or Water

*a. Lubrication.* Special attention should be given to lubrication. Consult the lubrication order (fig. 35) and the instructions in paragraph 46.

*b. Fan.* If there is danger of dropping into deep water, remove the fan belt to prevent the fan from pulling into the radiator.

*c. Freeing Mired Tractor.* When a tractor mires down in deep mud, there are several ways to get out without the aid of another tractor:

- (1) *Winch.* If the tractor is equipped with a winch, it may be possible to run the winch line out and anchor it to a tree or rock. When the line is anchored, the tractor can winch itself out.
- (2) *Timber.* If a timber of any size is available, lay it in front of the tracks, at the front or rear of the tractor, so that it will be caught by the track shoes as the track revolves. The tractor will pull itself out.



### 39. Operating in or Near Salt Water

a. *Precautions.* In addition to the precautions listed in paragraph 38, take the following steps after operation:

- (1) Drain normally dry compartments.
- (2) If fresh water is available, flush the entire tractor.

b. *Lubrication.* Lubricate the entire tractor as directed in paragraph 45.

### 40. Operating in Rough Terrain

a. Make sure crankcase and radiator guards are in place and securely fastened.

b. Check the track adjustment. If it is too loose, the track may be forced off of the rollers.

c. Use moderate speed and operate over large obstructions with care.

### 41. Operating at High Altitudes

a. *General.* As altitude increases, the density of the air decreases and, therefore, the weight of oxygen in a given volume of air decreases. The volume of fuel that can be burned and the horsepower developed within the cylinders likewise will decrease.

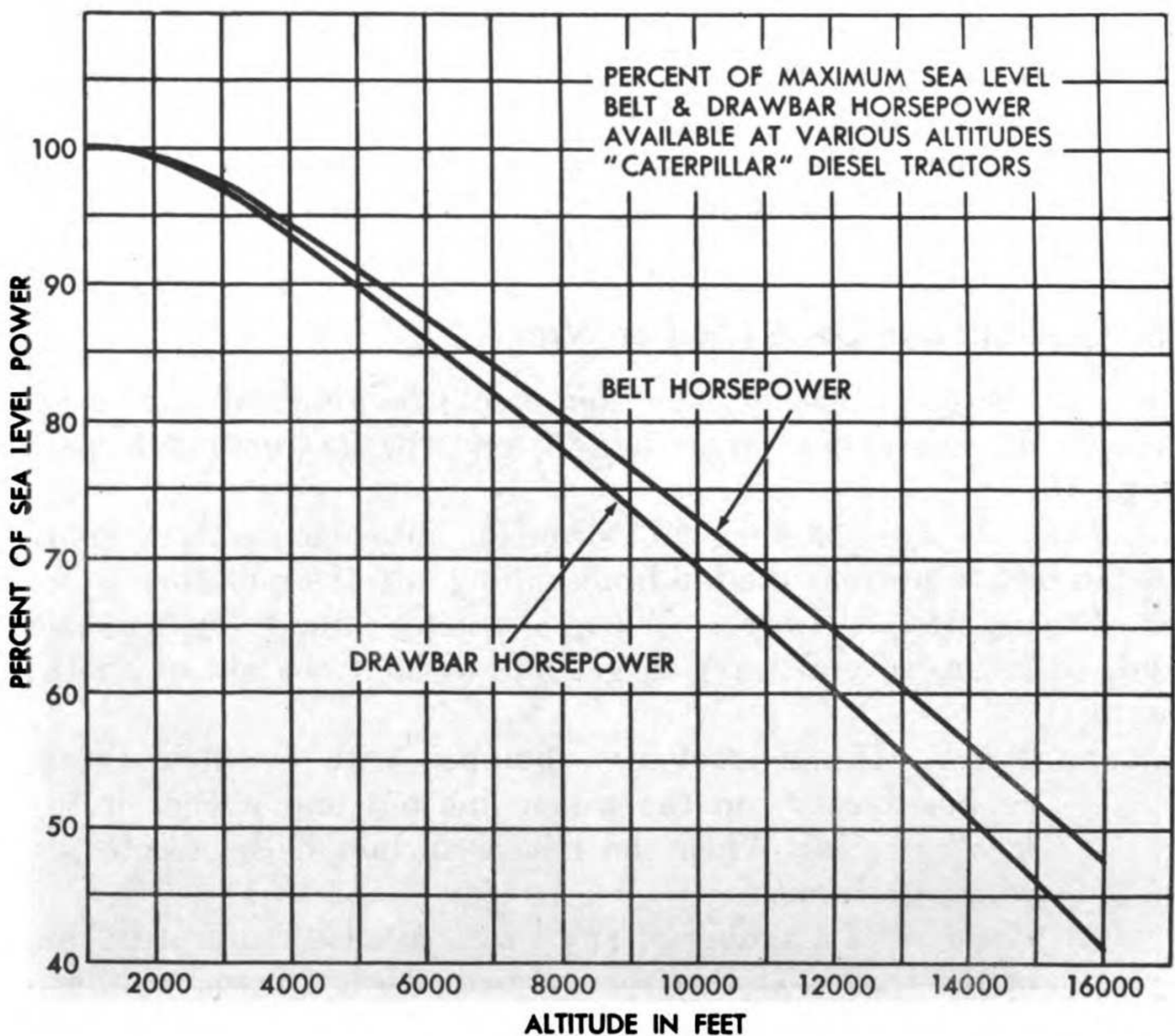


Figure 34. Altitude horsepower loss curve.

*b. Graph.* The power consumed between the engine and the drawbar will vary slightly with the speed and tractive conditions, but the accompanying graph (fig. 34) may be considered sufficiently accurate for estimating purposes.

*c. Calculation.* To obtain the pounds pull available at various altitudes, multiply the pounds pull given for sea level conditions (refer to tabulated data) (par. 6*b*) by the percentage shown in the graph for drawbar horsepower (fig. 34). *Example:* Sea level drawbar pull, first speed 28,700 lbs. At 12,000 feet, altitude drawbar pull=60 percent of sea level drawbar pull.  $28,700 \times 0.60 =$  drawbar pull of 17,220 lbs.

# CHAPTER III

## MAINTENANCE INSTRUCTIONS

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### Section I. SPECIAL ORGANIZATIONAL TOOLS AND EQUIPMENT

#### 42. Special Tools and Equipment

A list of special organizational tools, parts, and equipment supplied with or issued with the tractor is included in a Department of the Army supply manual.

#### 43. Initial Issue Tools

Initial issue tools are listed in appendix II.

### Section II. LUBRICATION AND PAINTING

#### 44. General Lubrication Information

*a.* Lubrication Order 5-3040-B prescribes first and second echelon lubrication maintenance for the Caterpillar D-8 Tractor.

*b.* A lubrication order is published for each item of equipment. The lubrication order shown in figure 35 is a reproduction of the approved lubrication order for this tractor. For the current LO 5-3040 refer to SR 310-20-4.

*c.* Lubrication orders prescribe approved first and second echelon lubrication instructions for mechanical equipment issued by the technical services. The instructions contained therein are mandatory.

#### 45. Detailed Lubrication Information

*a. General.* Lubrication is a highly essential part of preventive maintenance, determining to a great extent the serviceability of parts and assemblies. Lubrication instructions for this vehicle are consolidated in LO 5-3040-B (fig. 35) which specifies the points to be lubricated, the periods of lubrication, and the lubricant to be used. The circled reference numbers in the reproduction of LO 5-3040-B are keyed to detailed illustrations of the lubrication points. Paragraphs following give detailed instructions for some of the more complex lubrication operations.

# LUBRICATION ORDER **LO 5-3040-B**

(Supersedes LO 5-3040, 4 Mar 1952)

## TRACTOR, CRAWLER TYPE, DIESEL DRIVEN, 28,100 TO 38,000 LBS DRAWBAR PULL, SERIAL NUMBERS 2U1 AND UP, CATERPILLAR MODEL D-8

Reference: TM 5-3040-B TB 5-3068-1

Intervals given are maximums for normal 8-hour day operation. For abnormal conditions or activities, intervals should be shortened to compensate.

Clean fittings before lubricating.

Clean parts with SOLVENT, Dry Cleaning, or with OIL, fuel, Diesel. Dry before lubricating.

Relubricate after washing or fording.

Drain crank and gear cases only when hot after operation; replenish and check level when cool.

Lubricate points indicated by dotted arrow shafts on both sides of equipment.

- KEY -

LUBRICANT	CAPACITY	EXPECTED TEMPERATURE			INTERVALS
		Above +32°F	+32°F to -10°F	Below -10°F	
<b>OE</b> -Oil, Engine, Heavy Duty					
Diesel Crank-case	34 qts	OE 30 or 9250	OE 10 or 9110	See Note 1	D-Daily  2D-2 Day  W-Weekly  2W-2 Week  M-Monthly  2M-2 Month  Q-Quarterly
Starting Engine Crank-case	2 qts				
Diesel Air Cleaner	5 qts	OE 30 or 9250	OE 10 or 9110	OHA	
Starting Engine Air Cleaner	¼ qt				
Fuel Injection Pump Housing	¼ qt				
Other Points					
<b>GO</b> -LUBRICANT, Gear, Universal					
Transmission (before 2U5307)	38 qts	GO 90	GO 75	GOS	
Transmission (after 2U5307)	41 qts				
Final Drives (each)	20 qts				
Starting Engine Transmission	¼ qt				
<b>GAA</b> -GREASE, Automotive and Artillery					
<b>OHA</b> -OIL, Hydraulic, Aircraft, Petroleum Base					
<b>GOS</b> -LUBRICANT, Gear, Universal, Subzero					

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Figure 35. Lubrication order.

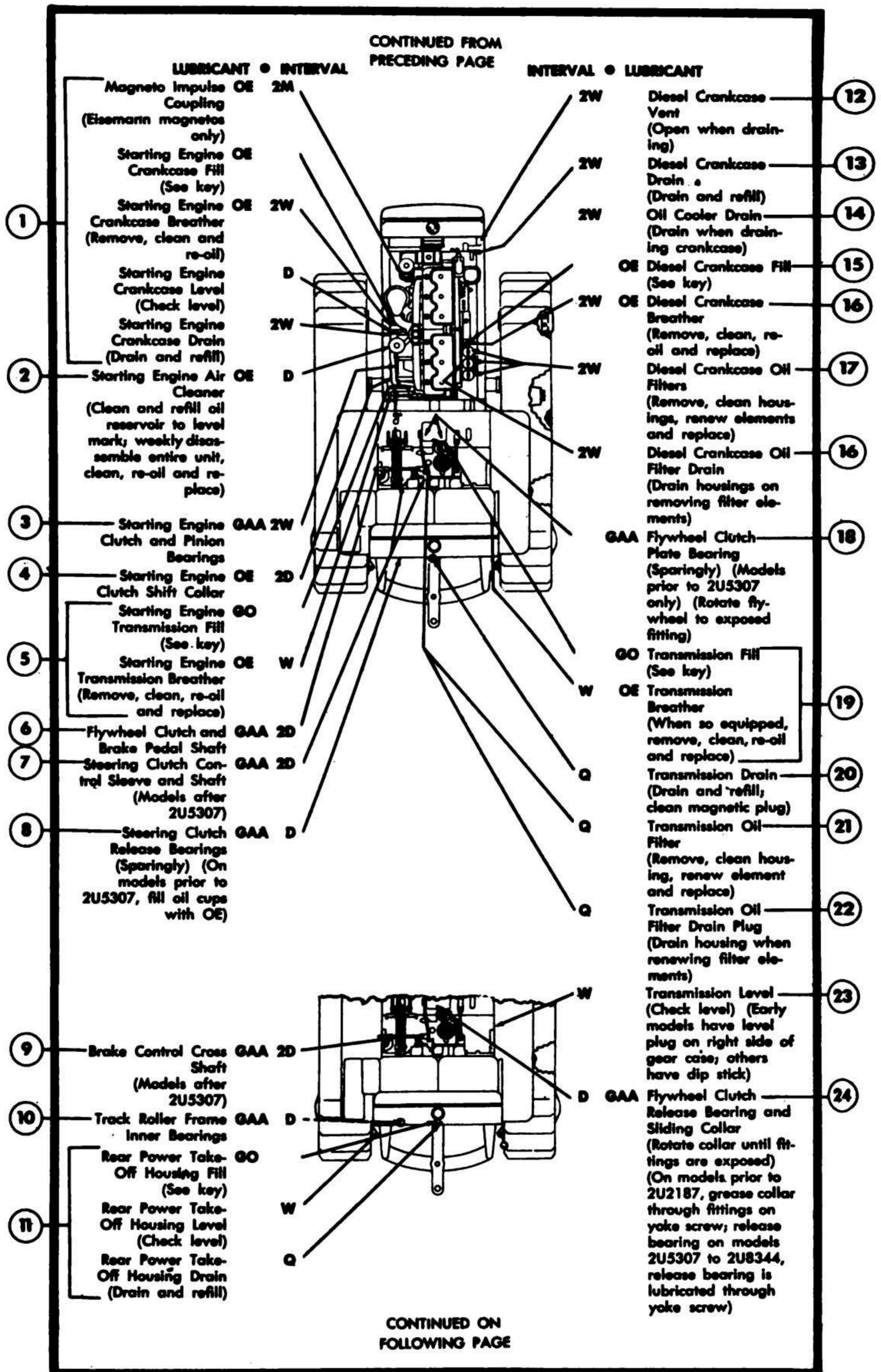
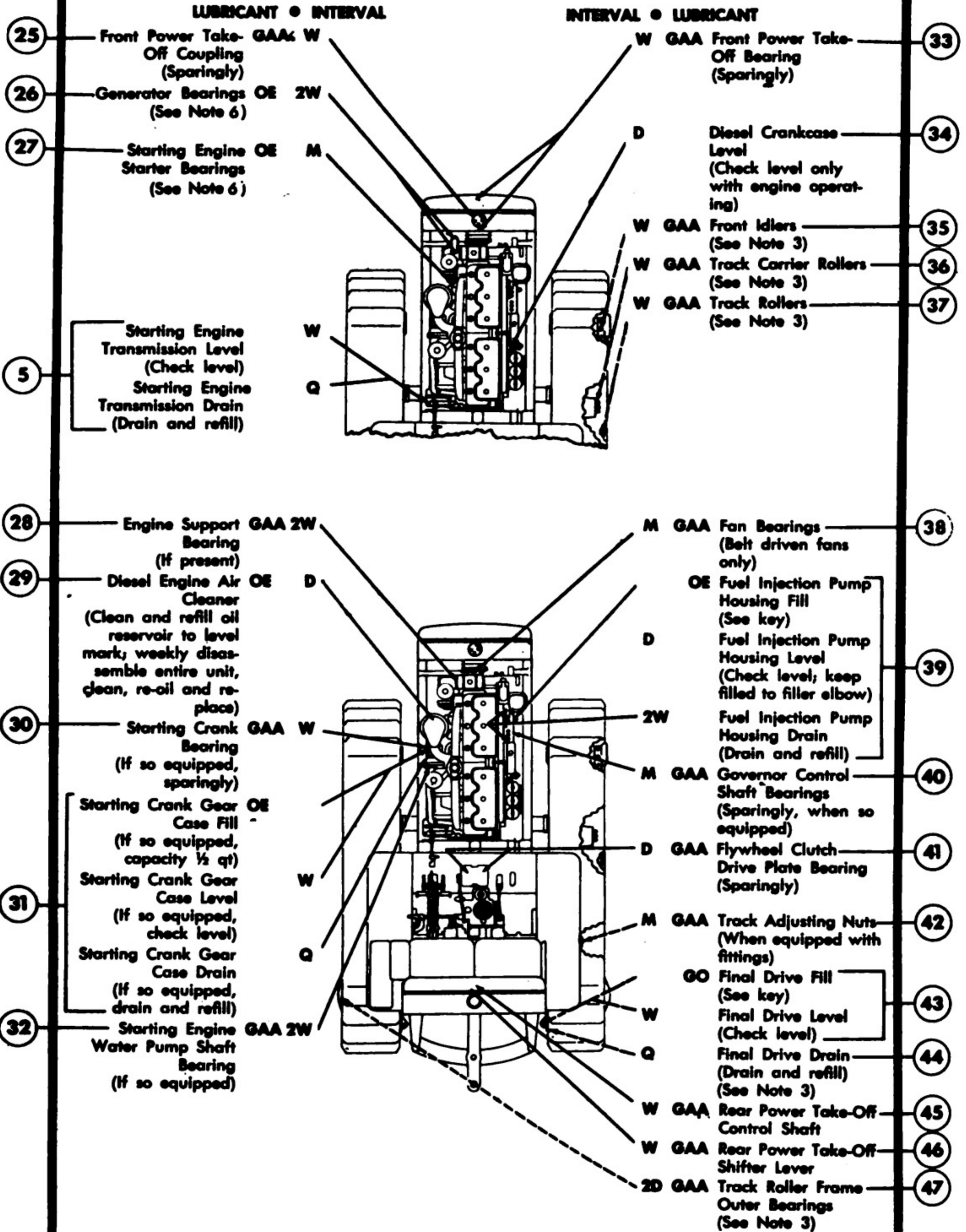


Figure 35. Lubrication order—Continued.

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Figure 35. Lubrication order—Continued.

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NOTES:

1. **COLD WEATHER** (When winterization kit is not available) Every 3 days, drain Diesel and starting engine crankcases and refill to "Full" marks with OE 10. Add 11 qts of gasoline to Diesel crankcase, ½ qt to starting engine crankcase, and run both engines 5 minutes to mix. Mark the new levels on the oil gages for future reference. **CAUTION:** Every ½ day check levels and fill to "Full" marks with OE 10. If engines are to be shut down for ½ day or more, add 11 qts of gasoline to Diesel crankcase, ½ qt gasoline to starting engine crankcase, to reach new level mark and run both engines 5 minutes to mix. **NOTE:** OIL, fuel, Diesel may be used as a temporary diluent only when sufficient gasoline is not available.

**WARNING:** Diluent used is inflammable; do not service equipment near heater or open flame.

2. **FOR OPERATION OF EQUIPMENT IN PROTRACTED COLD TEMPERATURES BELOW -10°F.** Clean parts with SOLVENT, Dry Cleaning, and drain all oil housings. Relubricate with lubricants indicated in the key for below -10°F.

3. **MUD AND DEEP WATER OPERATION**—When operating tractor with tracks partially or completely submerged in mud or water, track rollers, track carrier rollers, front idlers and track roller frame idlers should be lubricated twice daily.

4. **OIL CAN POINTS**—Weekly clean and coat hand crank lever bearings, throttle and governor linkages, clutch lever shaft bearings, yoke bearings, pins, springs, yokes, clevises and exposed threaded surfaces with OE.

5. **FINAL DRIVES**—Lubricant in final drives should be changed immediately signs of water or dirt are seen in the oil; leakage of oil from the final drives in excess of 1 qt weekly should be reported to higher authority.

6. **STARTER AND GENERATOR BEARINGS**—Lubricate sparingly. When equipped with Life-Seal bearings or oil impregnated bushings, no lubrication required; **CAUTION:** When so equipped, do not use solvents in cleaning. Wipe with an oil dampened cloth only.

Copy of this Lubrication Order will remain with the equipment at all times; instructions contained herein are mandatory and supersede all conflicting lubrication instructions dated prior to the date of this Lubrication Order.

BY ORDER OF THE SECRETARY OF THE ARMY:

OFFICIAL:

WM. E. BERGIN  
Major General, USA  
The Adjutant General

M. B. RIDGWAY  
Chief of Staff  
United States Army

Figure 35. Lubrication order—Continued.

*b. Air Cleaners.*

(1) *Starting engine air cleaner.*

- (a) *Air cleaner cup.* To change the oil in the air cleaner cup, unscrew the wing nut on top of the air cleaner and remove the filter section. Clean out the cup and refill with clean oil up to the oil level bead.
- (b) *Filter.* The filter section can be cleaned by shaking it in a pan of dry-cleaning solvent. Be sure there is a gasket between the air cleaner and its mounting, as the connection must be airtight.

(2) *Diesel engine air cleaner.*

- (a) *General.* The air cleaner does its work efficiently as long as the oil in the cup is thin enough to spray into the screen section and wash the dirt collected there back into the cup. When the oil becomes thickened with dust it is unable to do this. However, even in cold weather, the oil should not be too thin. Very thin oil can carry over in the intake manifold and carry dirt with it.
- (b) *Precleaner.* The precleaner prevents the larger particles of dust from entering the air cleaner. It will function only when the glass jar is in place. Inspect the jar regularly and empty it when it is about half full of dust. The jar is removed by unscrewing the clamp that holds it in place. Inspect the fins in the precleaner regularly, and clean when dirty.
- (c) *Air cleaner inlet pipe.* At the same time the oil in the cup is being changed, inspect the inlet pipe with the oil cup removed. Clean off any dirt that has collected on the walls of the pipe.
- (d) *Air cleaner screens.* Six of the air cleaner screens can be removed for servicing. To remove the first screen, unscrew two wing nuts that hold it in place. The other screens will come off of the air inlet pipe one at a time. If one of the screens is clean there is no reason for removing any above it. To wash the screens, shake them in a pan of diesel fuel or dry-cleaning solvent. When replacing the screens, arrange them in pairs with the cross arms facing each other. Be sure to tighten the wing nuts holding the screens to prevent them from vibrating and eventually disintegrating.

*c. Breathers.*

- (1) *General.* To insure a clean supply of air entering the crank-cases, replaceable crimped copper filter elements are used. The elements can be removed for cleaning and should be washed in diesel fuel or dry-cleaning solvent. Before replacing the elements, soak the crimped copper with lubricating oil.



- (2) *Starting engine crankcase breather* (fig. 35). The breather (8) can be unscrewed from the starting engine as a unit and then disassembled. The filter cover is held in place by a nut tightened on a stud. Remove the nut and take off the cover. The filter element can then be removed for cleaning.
- (3) *Diesel engine crankcase breather* (fig. 35). The breather (1) is mounted on the crankcase oil filler assembly. The filter element fits in the cap assembly and can be removed by unscrewing the cap and prying the element out of the cap. After the cap has been removed, the skirt assembly can be lifted off of the oil filler assembly and cleaned.

*d. Oil Filters (Diesel Engine).* Three filters on the same base, located on the right side of the engine, filter the oil as it passes through. Each filter has a replaceable filter element which consists of layers of a corrugated fibrous material in a perforated metal case. Oil enters through the perforations in the metal case, is filtered and discharged through the core or center of the element. The filter element should be replaced at every oil change. The elements are removed by unscrewing the cover holddown wing screws and removing the covers.

*e. Oil Filter (Transmission).*

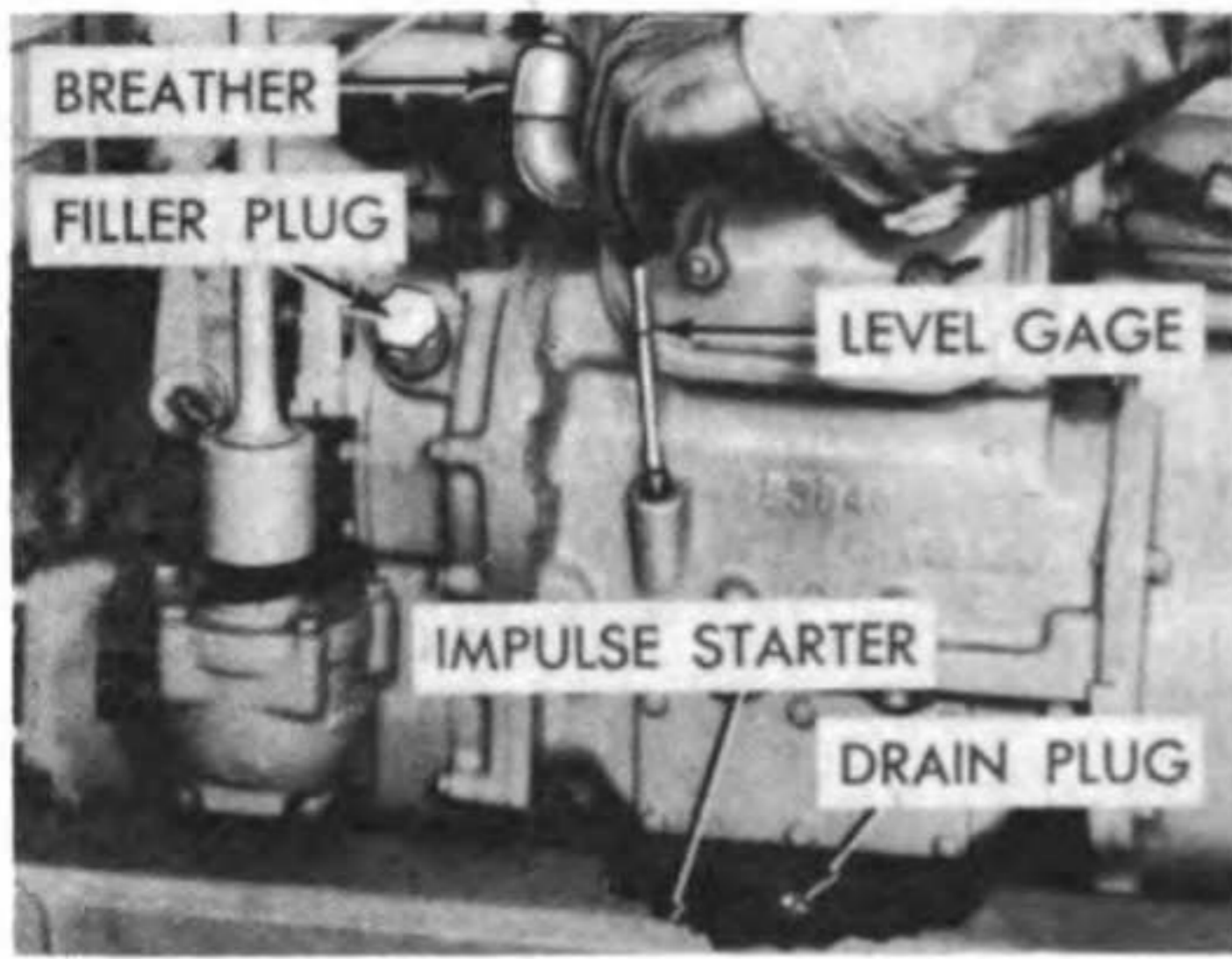
- (1) *Description.* The transmission oil filter housing is located just forward of the gear shift control lever in the operator's compartment. It contains an inner element, which is identical to those contained in the diesel fuel filter housing, and an outer, metallic, strainer element.
- (2) *Removal.* Remove the clamp nut from the top of the filter, lift off the top and lift out the inner and outer elements.
- (3) *Maintenance.*
  - (a) Periodically check the transmission oil filter element. If there is sludge or foreign matter evident on the metallic strainer element, it should be washed off with a non-inflammable cleaning fluid. If brushing is necessary, brush parallel to the windings. When heavy sludging of the metallic strainer element is observed, it is advisable to replace the inner bypass filter element with a new element.
  - (b) Service the transmission oil filter completely each time the transmission oil is drained. Drain the filter housing by removing the plug.

*f. Compartments Containing Lubricant.* Mud, dust, or water should be prevented from entering all compartments containing lubricant. Excessive leakage of oil from a compartment indicates seals or gaskets are defective and should be replaced to prevent the entrance of dirt and water. If dirt is detected in a compartment, the oil must be changed immediately and the mechanism disassembled and cleaned at the first opportunity.

## 46. Lubrication Under Unusual Conditions

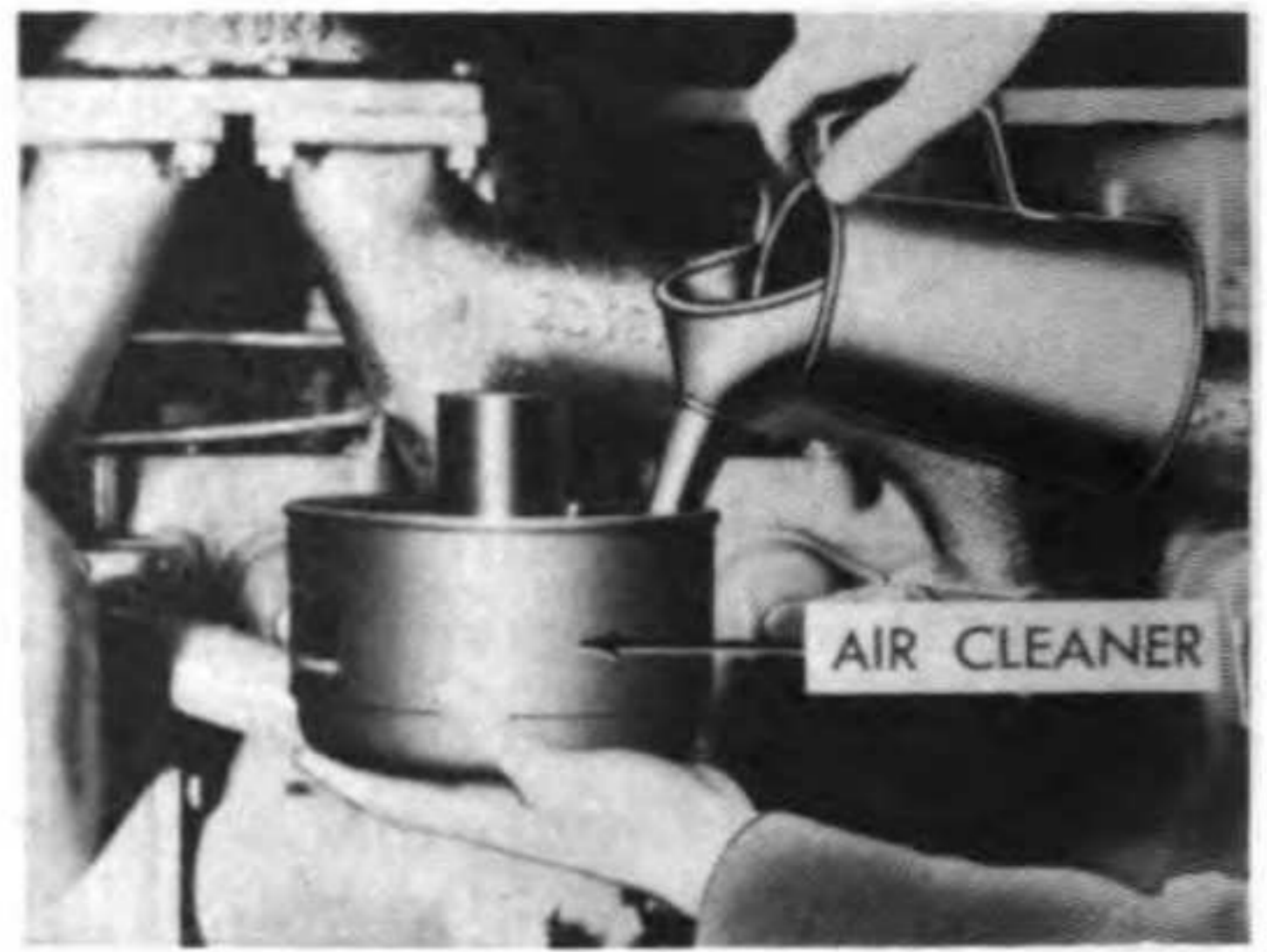
*a. Unusual Conditions.* Reduce service intervals specified on the lubrication order to compensate for abnormal operation and extreme conditions, such as high or low temperatures, prolonged periods of high speed operation, continued operation in sand or dust, immersion in water, or exposure to moisture, any one of which may quickly destroy the protective qualities of the lubricant. Intervals may be extended during inactive periods.

*b. Changing Grades of Lubricants.* Lubricants are prescribed in the "Key" (fig. 35) in accordance with three temperature ranges: above  $+32^{\circ}$  F.; from  $+32^{\circ}$  to  $-10^{\circ}$  F., and below  $-10^{\circ}$  F. Sluggish starting is an indication of lubricants thickening, and is the signal to change grades prescribed for the next lower temperature range. Ordinarily, it will be necessary to change grades of lubricants only when air temperatures are consistently in the next higher or lower range.



**Ref. 1:** Check oil level gage daily. Every quarter oil impulse starter on earlier engines equipped with Eisemann Magnetos.

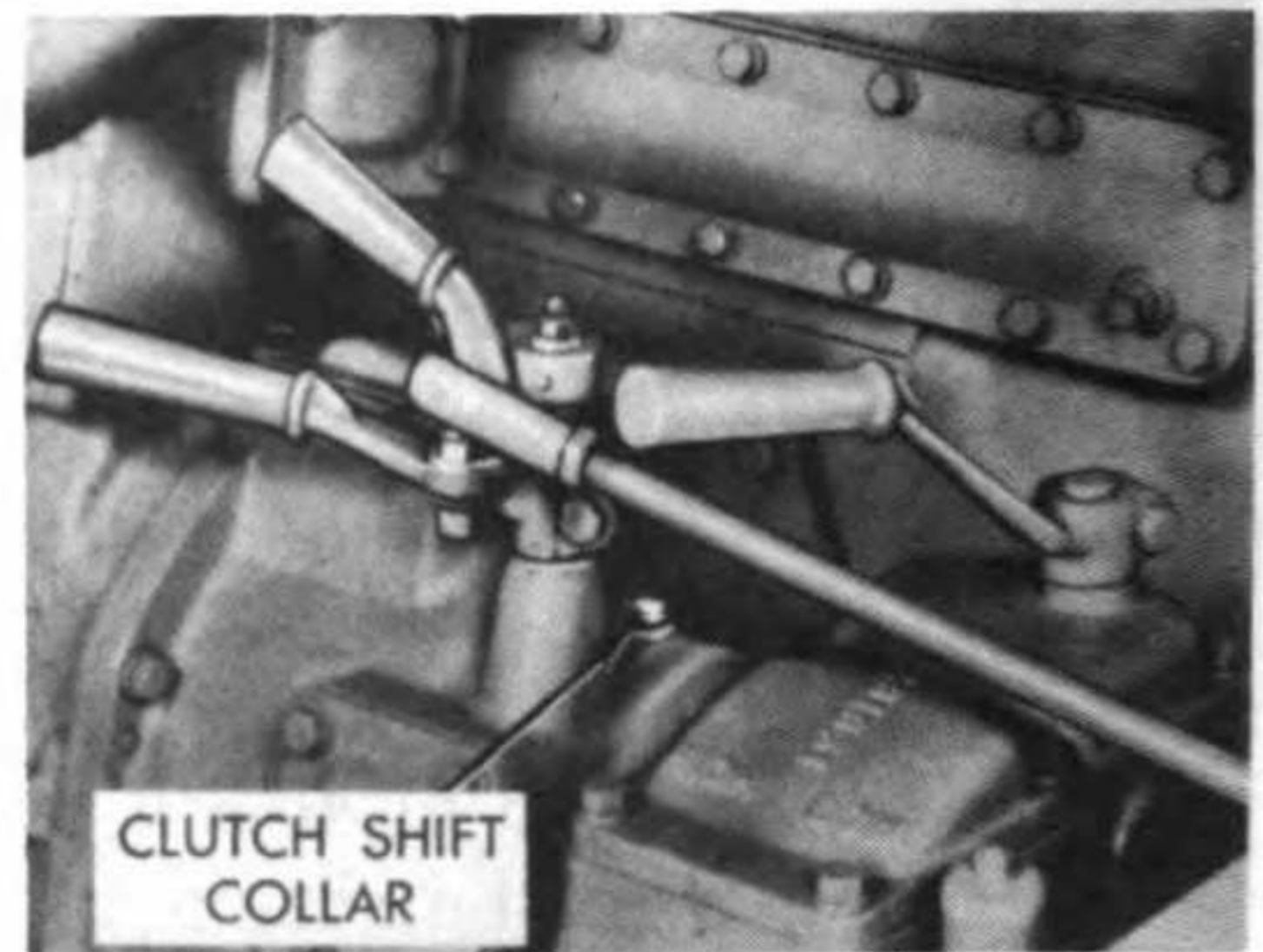
See key for draining crankcase. Drain crankcase, wash and refill to correct oil level. At every oil change, wash and oil breather.



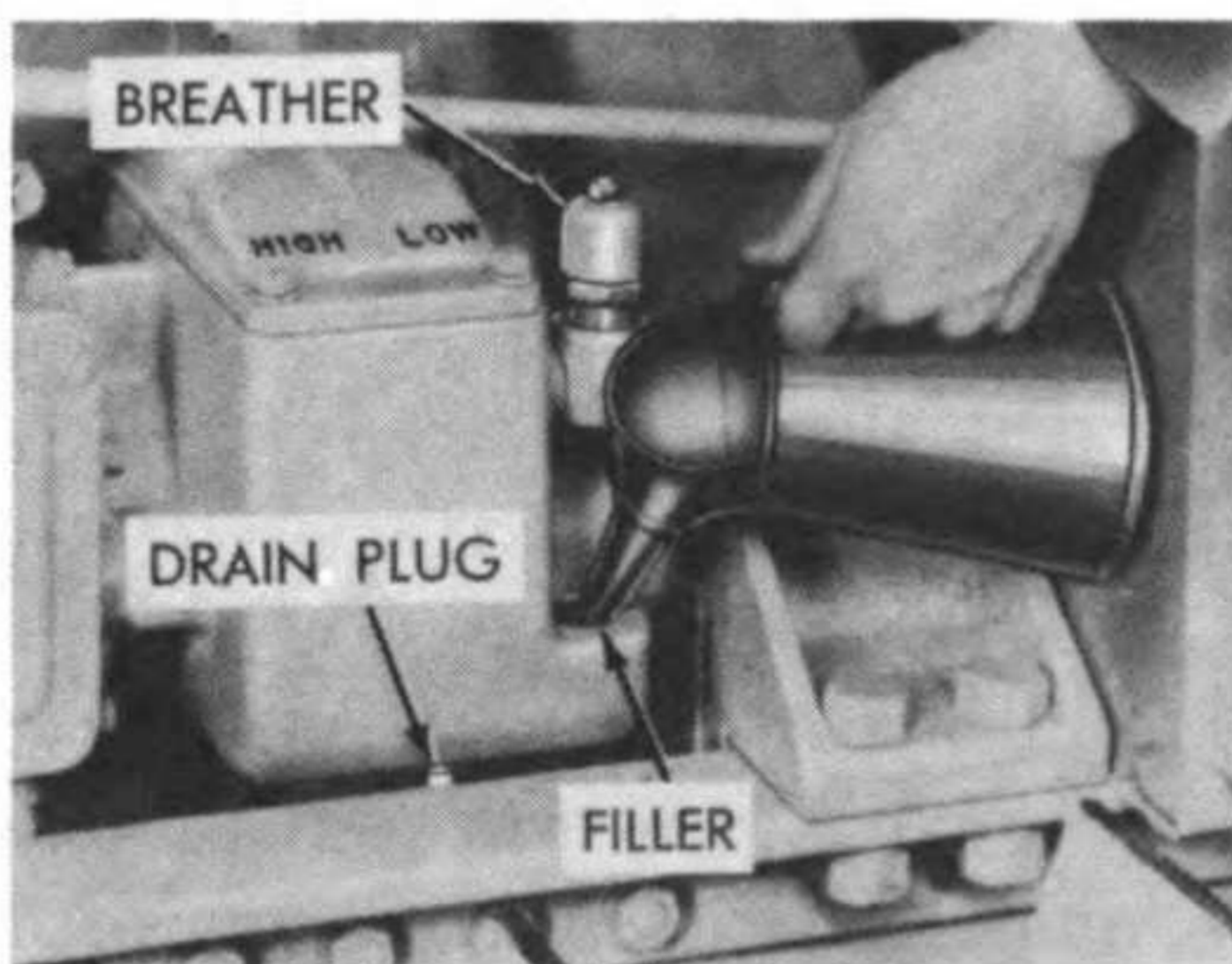
**Ref. 2:** Wash oil cup and refill to circular mark weekly. Monthly, remove and clean filter section



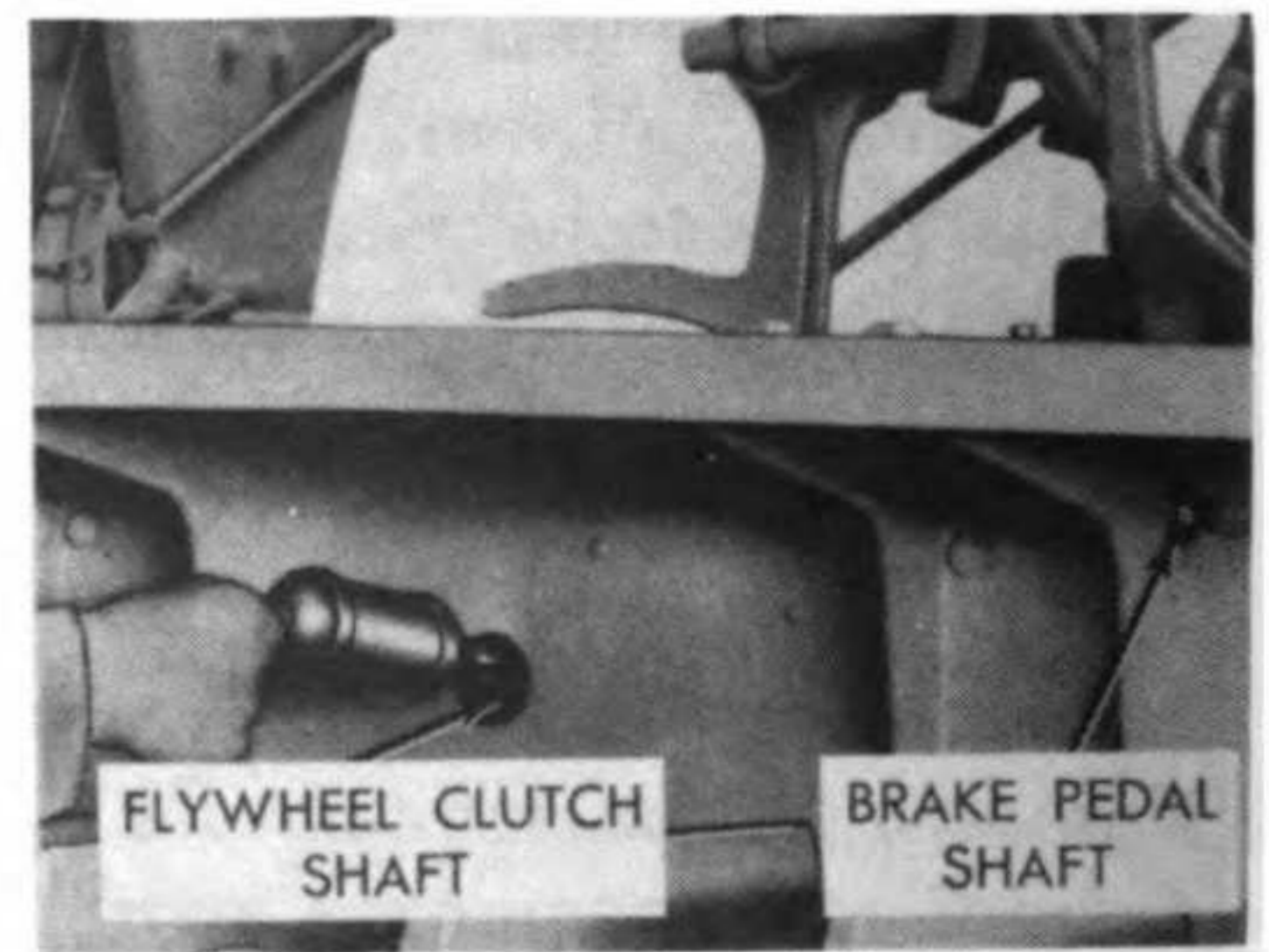
**Ref. 3:** Lubricate every 2 weeks.



**Ref. 4:** Fill oil cup every 2 days.

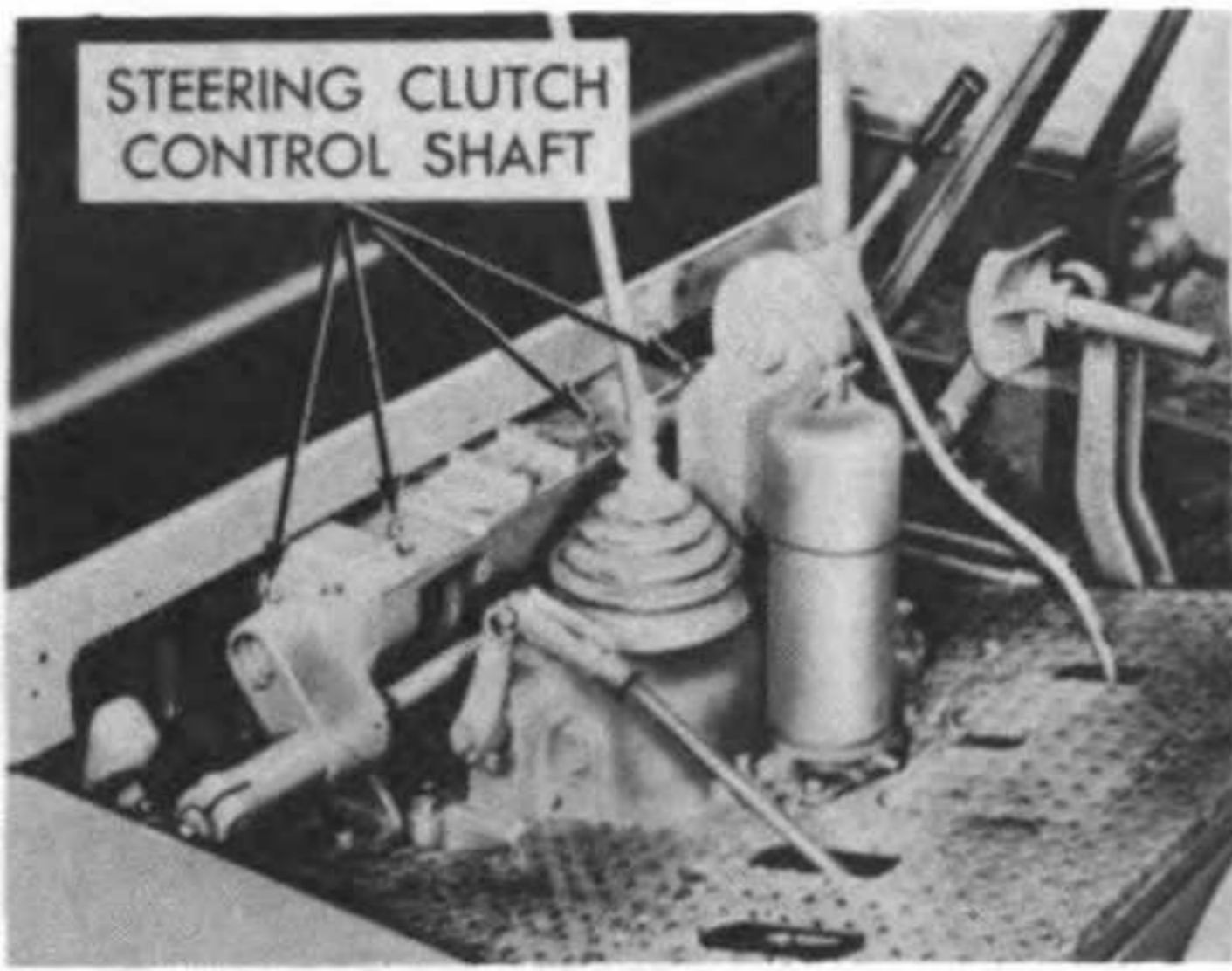


**Ref. 5:** Check transmission oil level weekly. Fill to filler opening, remove breather, disassemble and wash. Drain, wash, and refill starting engine transmission quarterly.

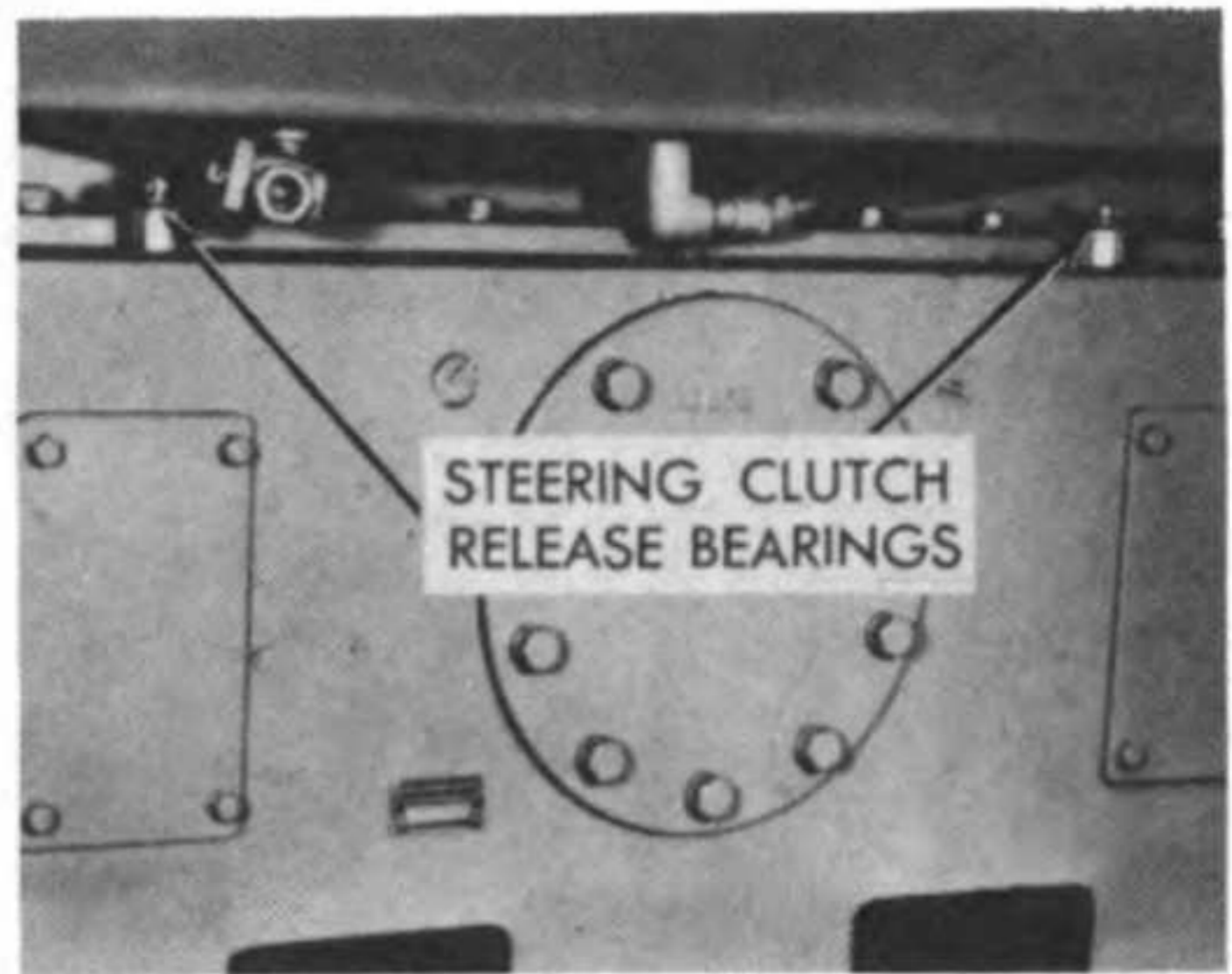


**Ref. 6:** Lubricate brake pedal shaft bearings and flywheel clutch shaft bearings every 2 days.

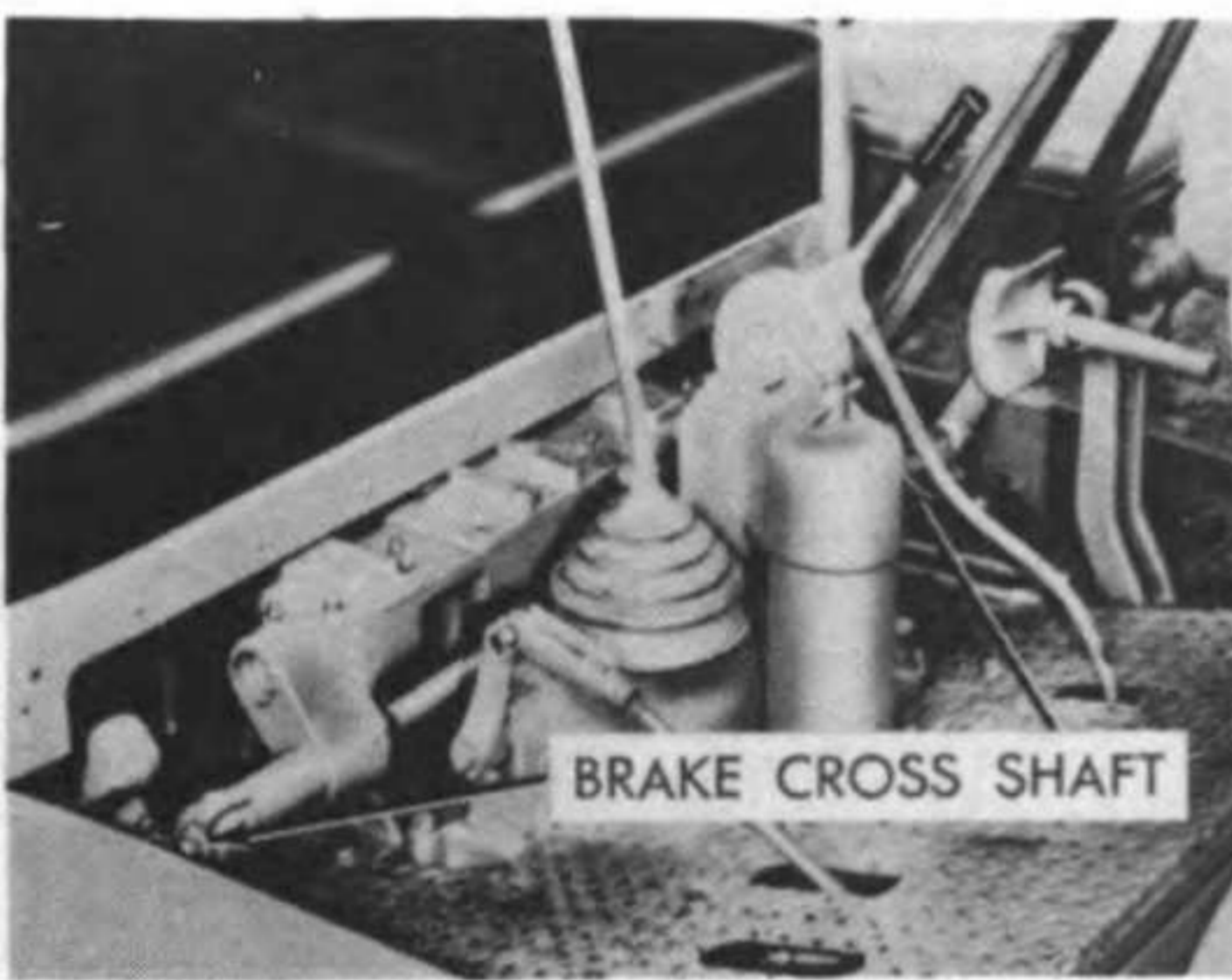
*Figure 35. Lubrication order—Continued.*



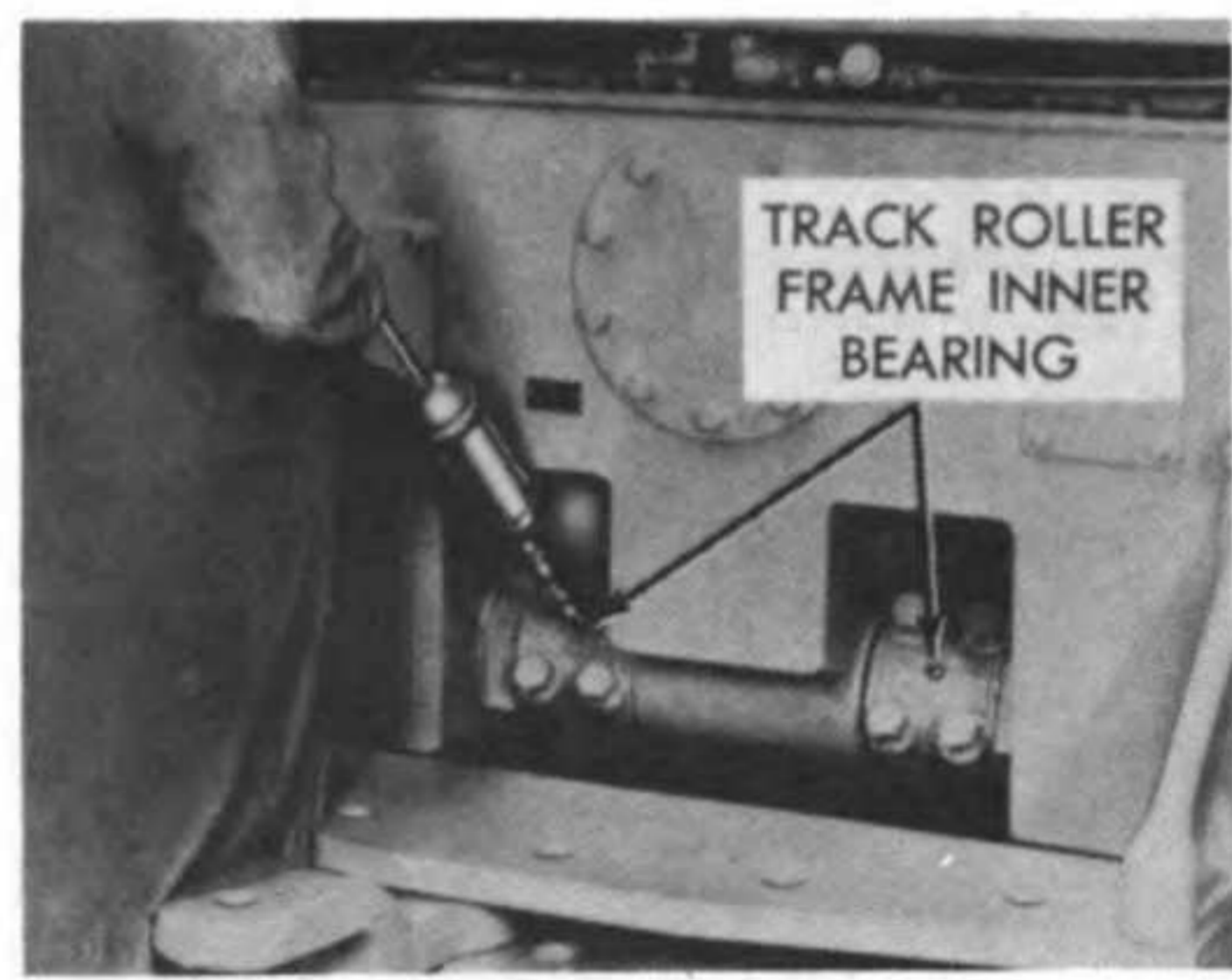
**Ref. 7: Lubricate bearings through fittings every 2 days.**



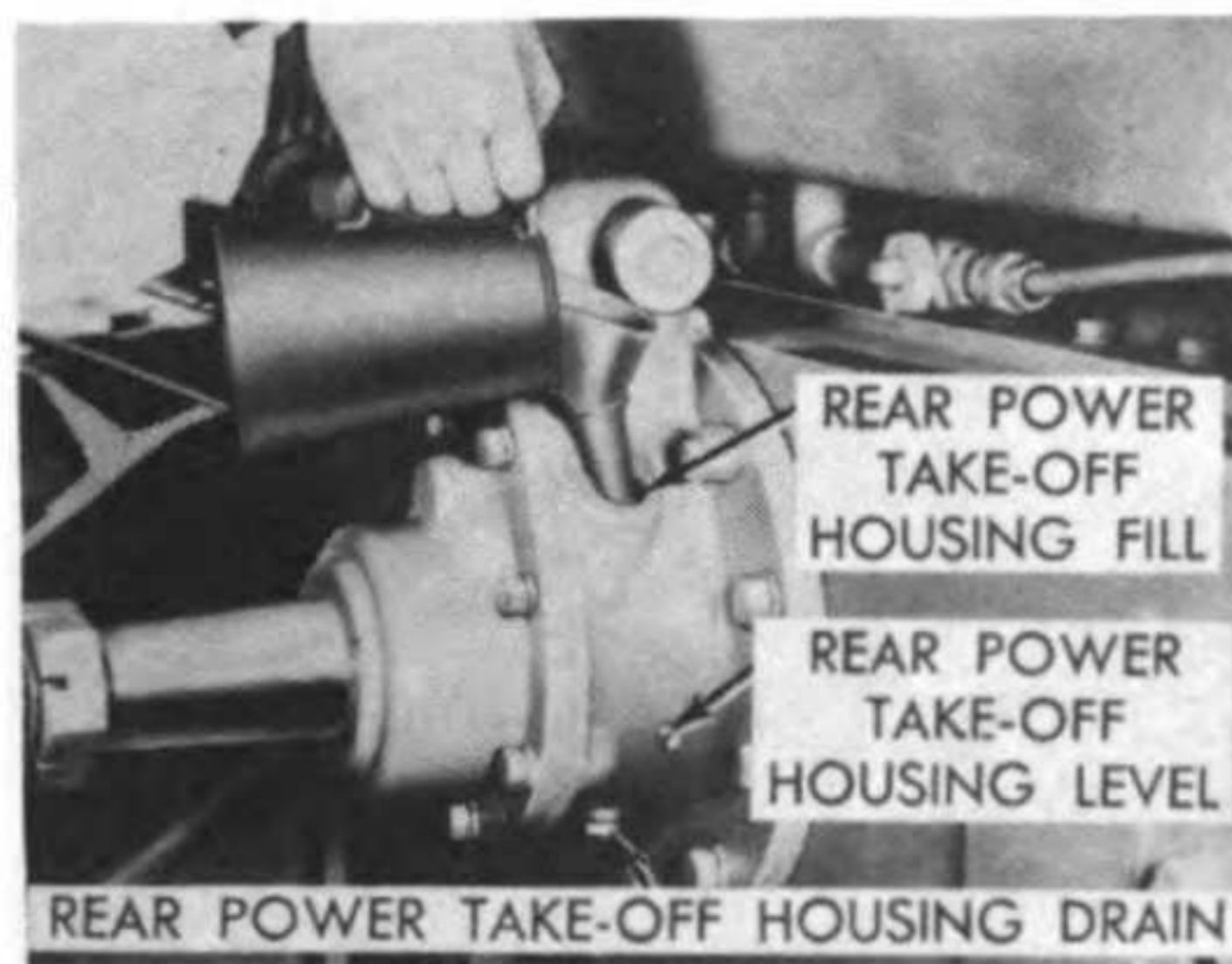
**Ref. 8: Lubricate each bearing sparingly through fittings on top rear of transmission case daily.**



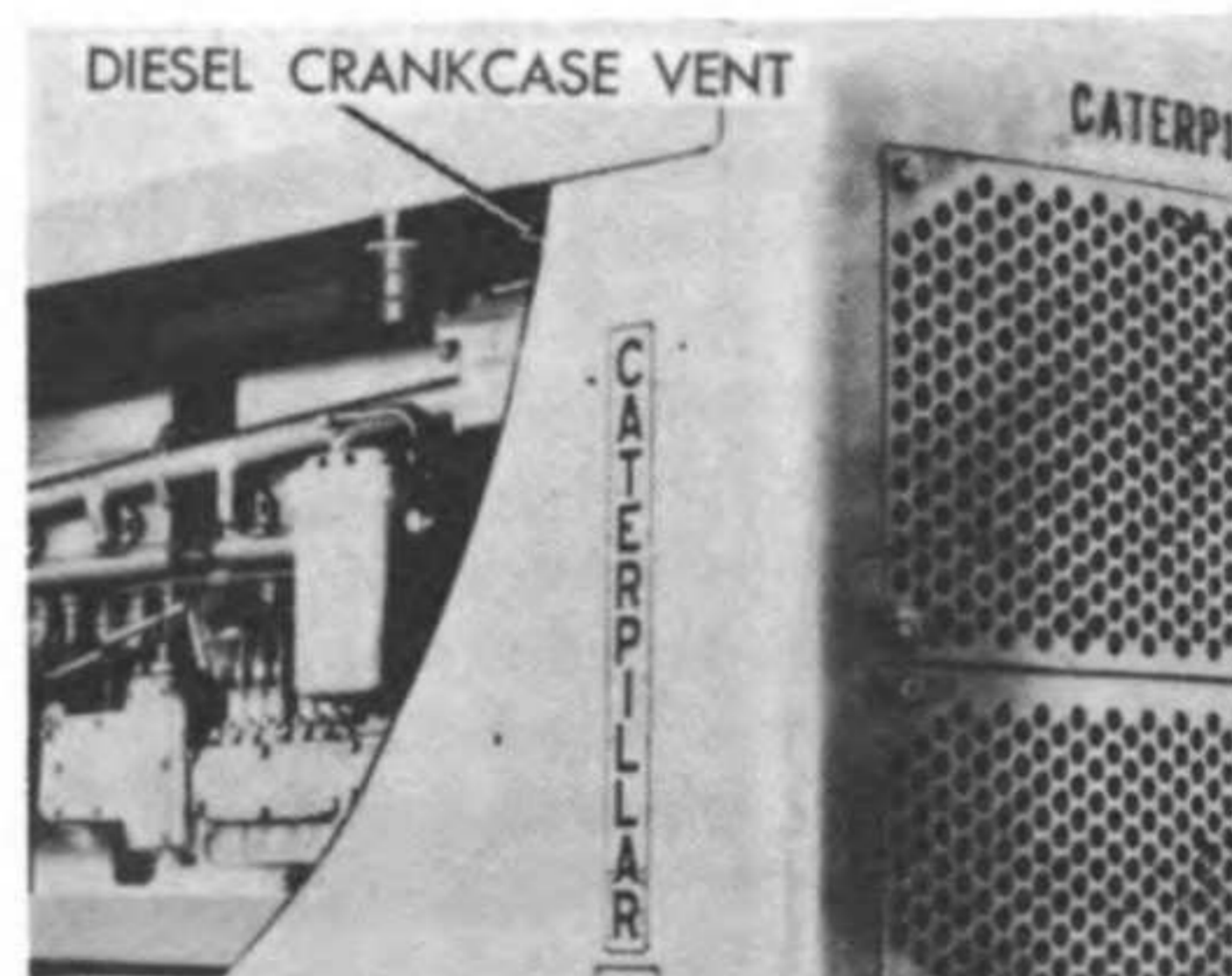
**Ref. 9: Lubricate both ends of shaft, through fittings, every 2 days.**



**Ref. 10: Lubricate two bearings daily, one fitting for each bearing. If operating in deep mud or water, lubricate every one-half day.**

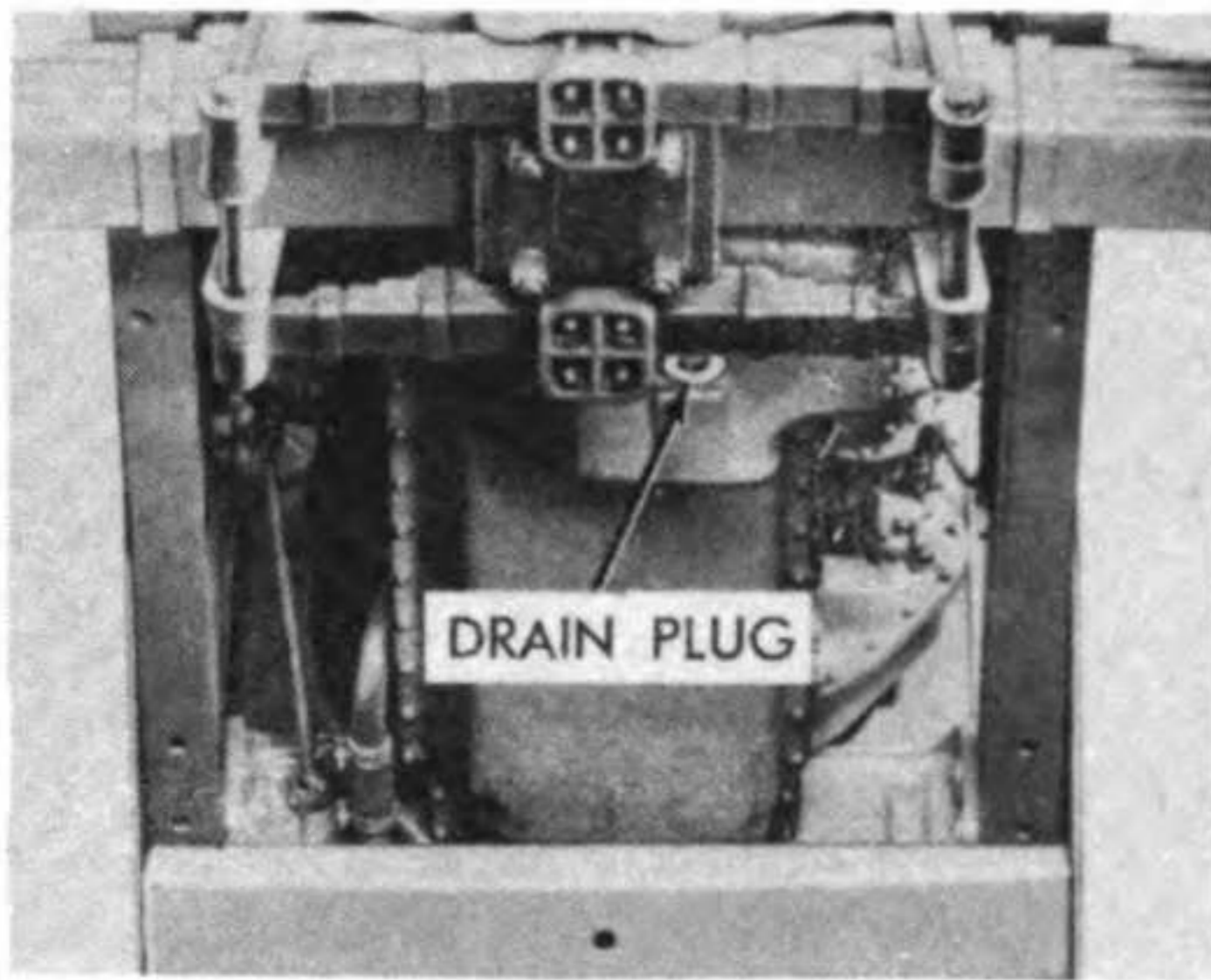


**Ref. 11: Check level once a week and maintain level at filler. Drain and refill quarterly.**

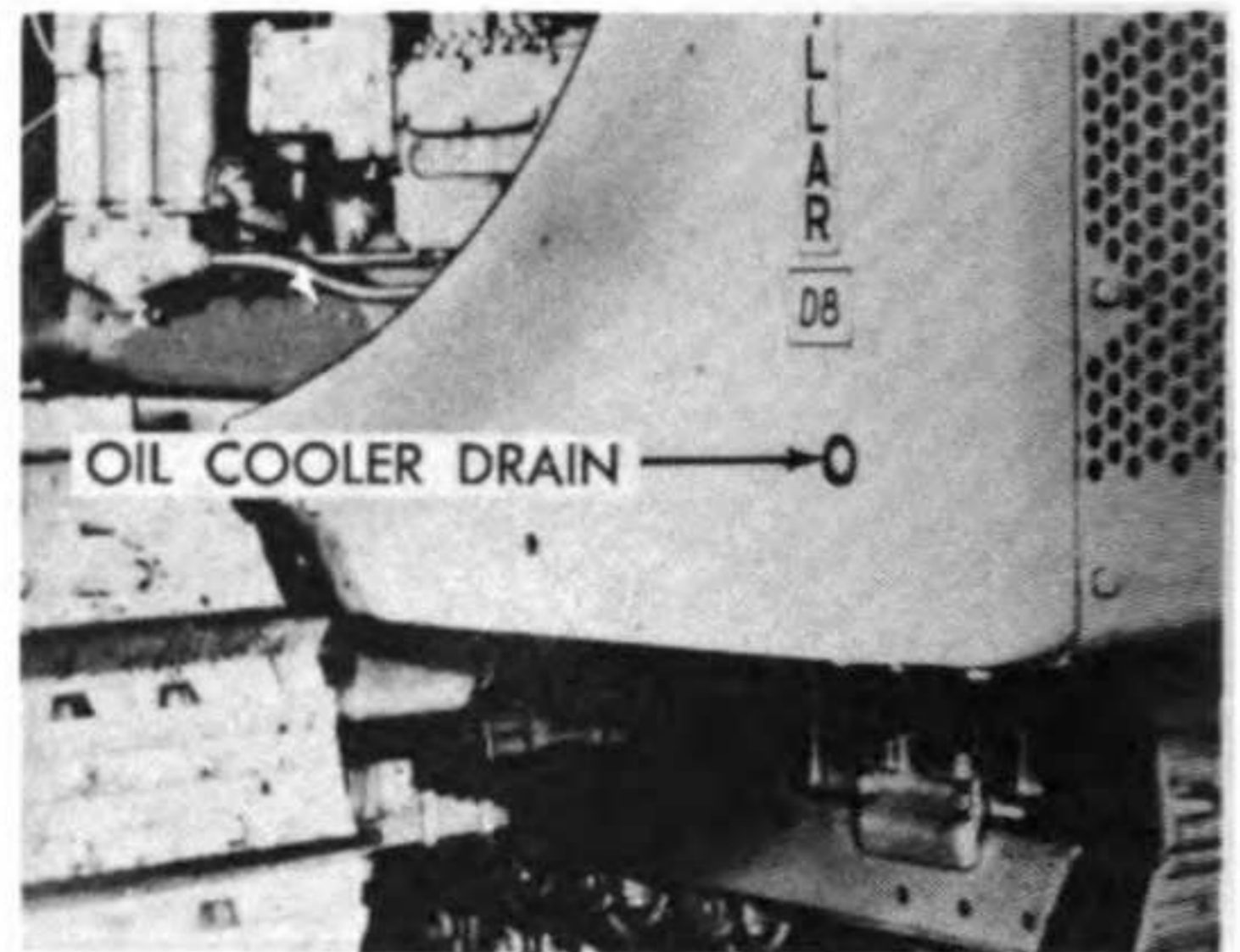


**Ref. 12: Open vent when draining crankcase.**

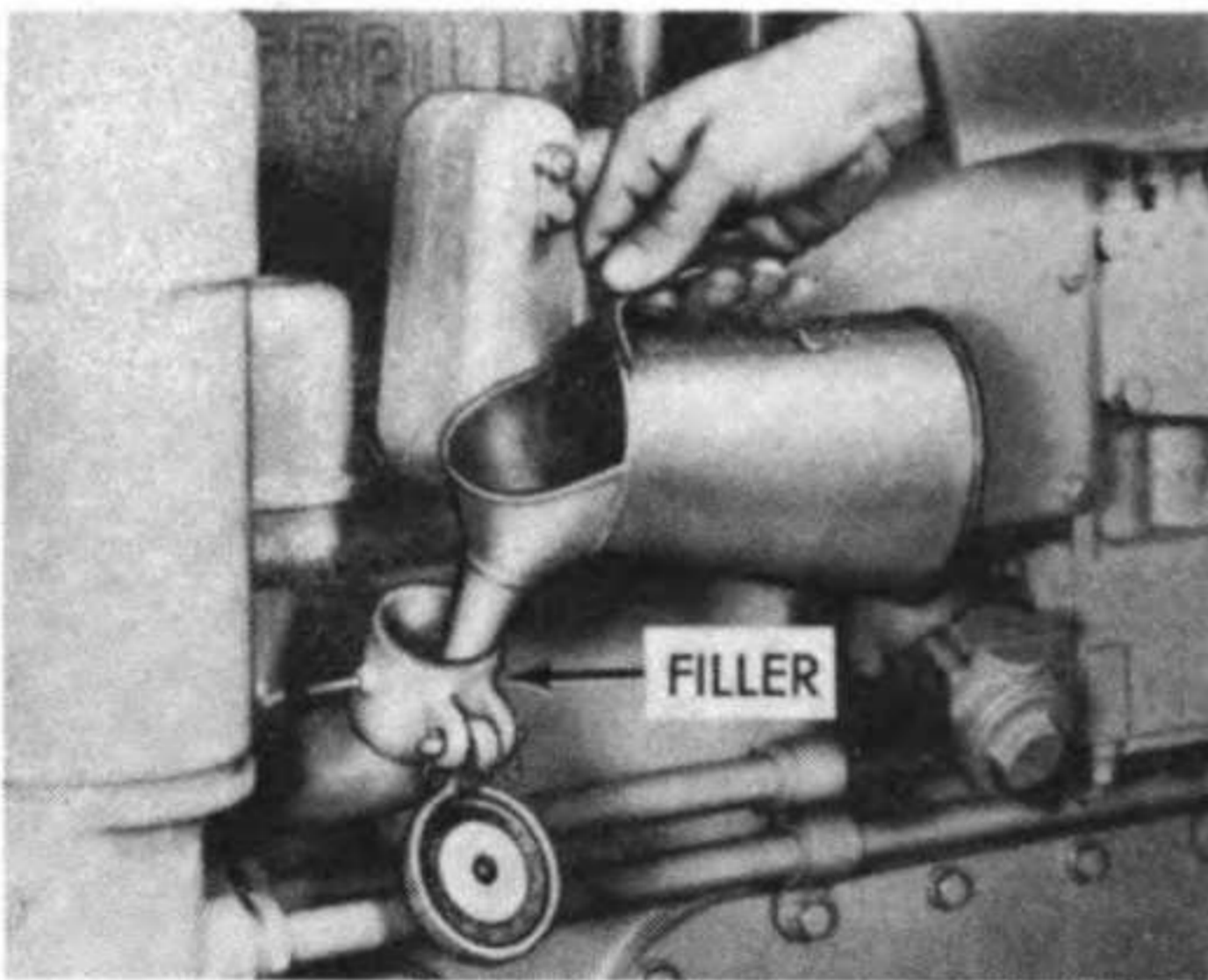
*Figure 35. Lubrication order—Continued.*



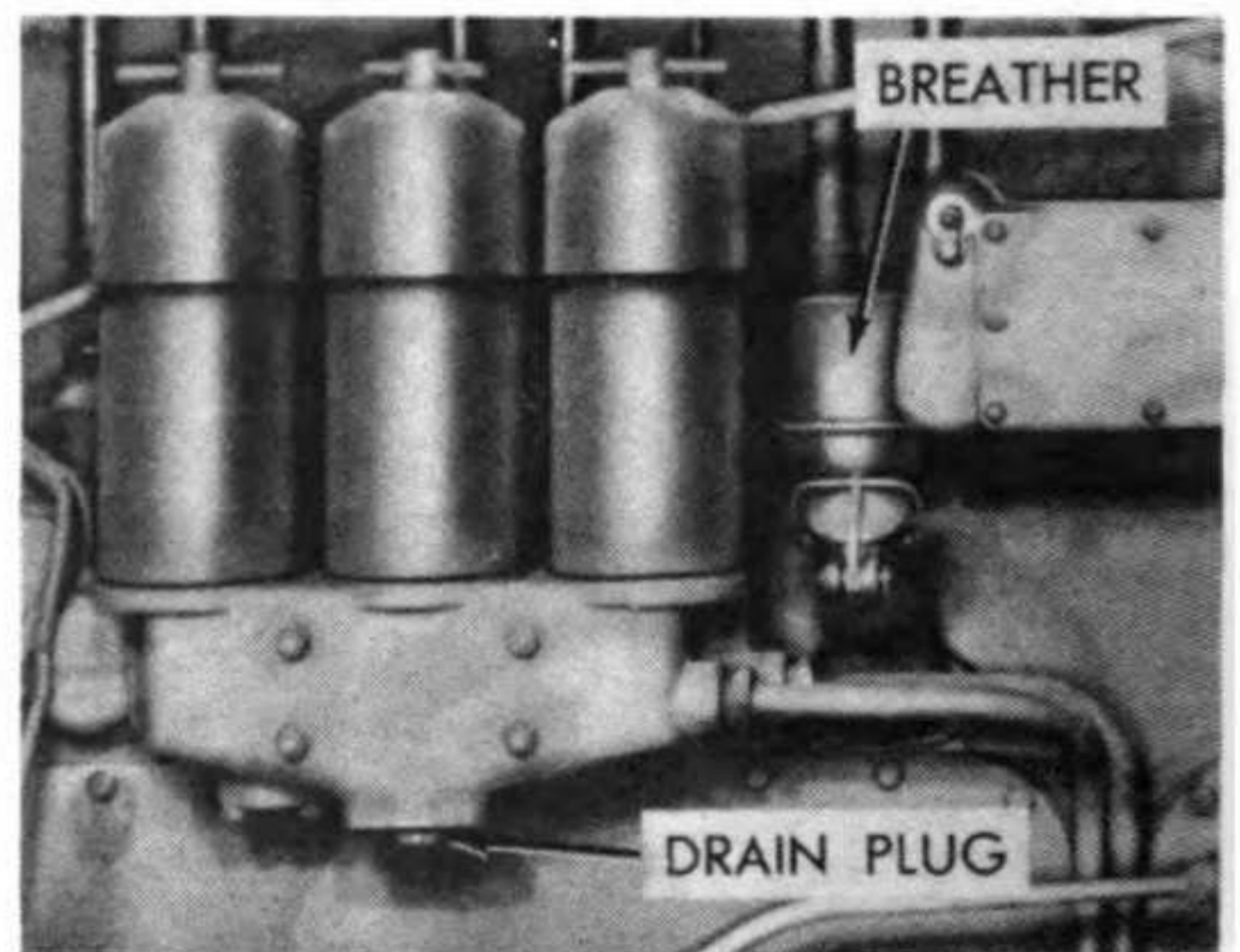
Ref. 13: Drain and refill the crankcase every 2 weeks.



Ref. 14: Drain every 2 weeks when draining crankcase and refill.



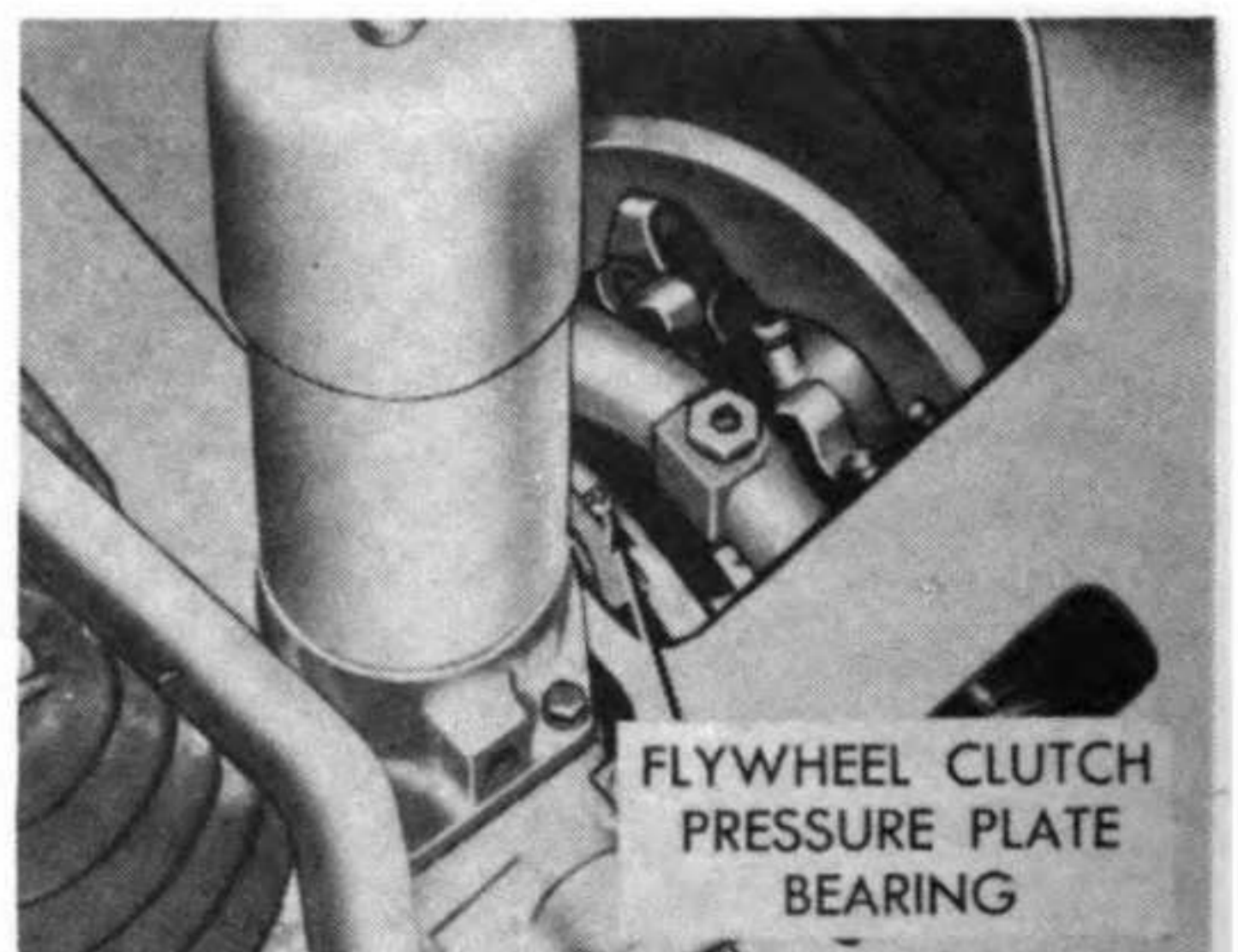
Ref. 15: After draining crankcase, refill at filler and start the diesel engine. Run engine for 2 minutes, then add oil to bring level to full mark on gage.



Ref. 16: Wash breather element each time crankcase is drained. Remove oil filter drain plug and drain oil filters at each crankcase oil change.

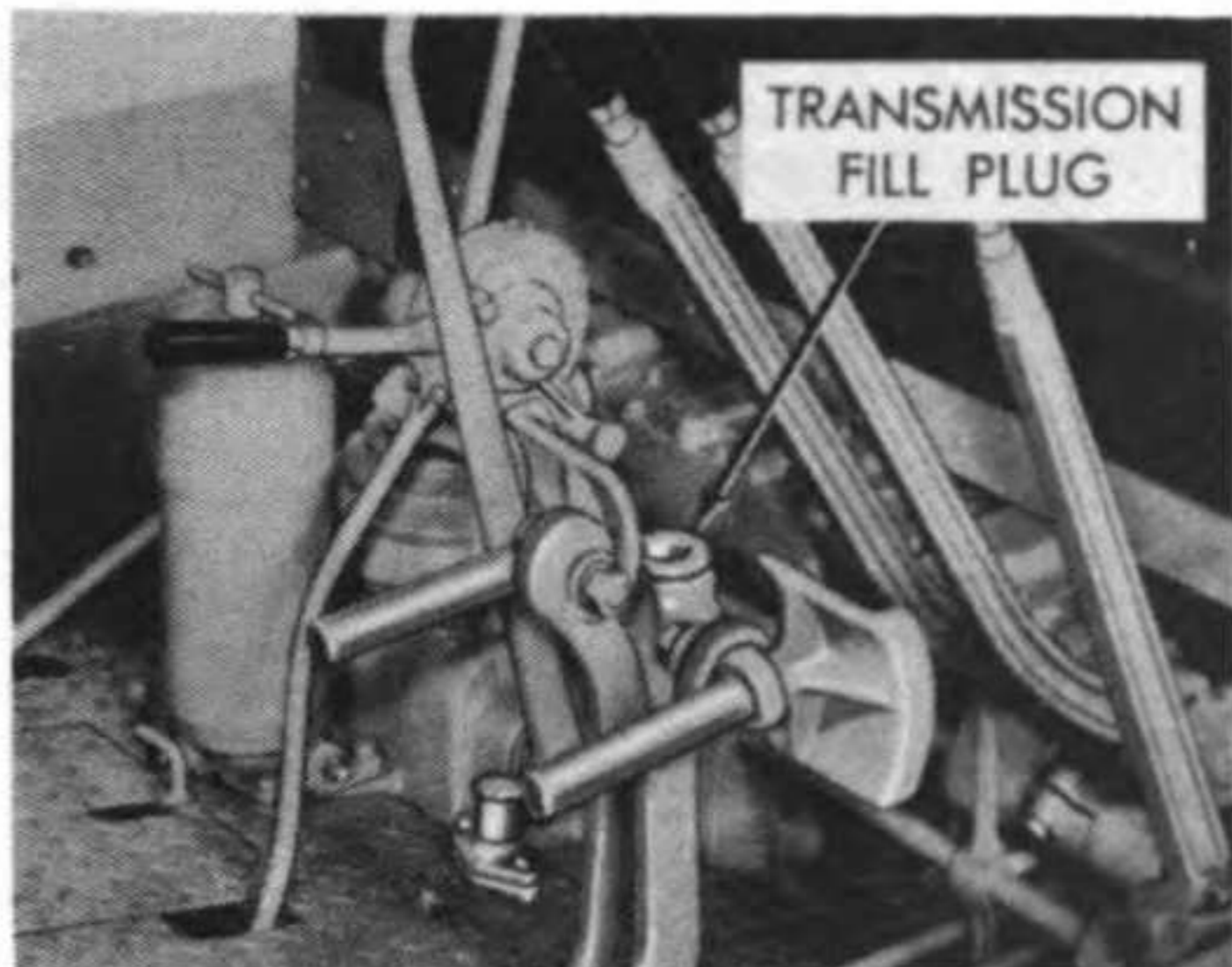


Ref. 17: At each oil change period, wash metallic strainer elements and replace inner filter elements with new elements.

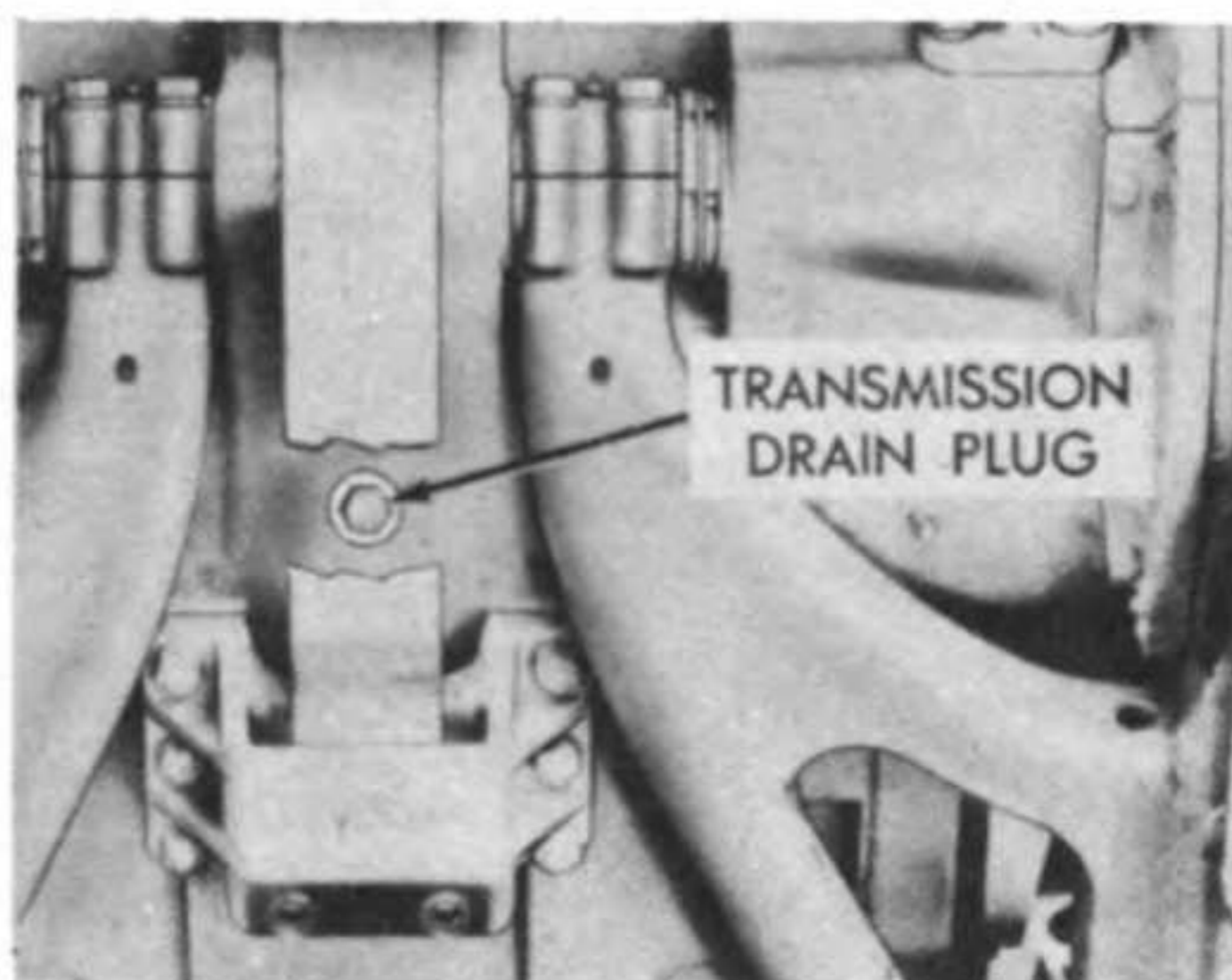


Ref. 18: Lubricate bearing sparingly. Rotate flywheel until fitting appears.

Figure 35. Lubrication order—Continued.



Ref. 19: Fill housing to full mark on gage, start the diesel engine and run for 3 minutes with the flywheel clutch engaged. This will fill the filter, oil passages and bearings with lubricant. If transmission is equipped with breather, remove, clean, re-oil, and replace breather.



Ref. 20: Drain the transmission quarterly. Wash compartment at each drain period. Clean magnet plug.



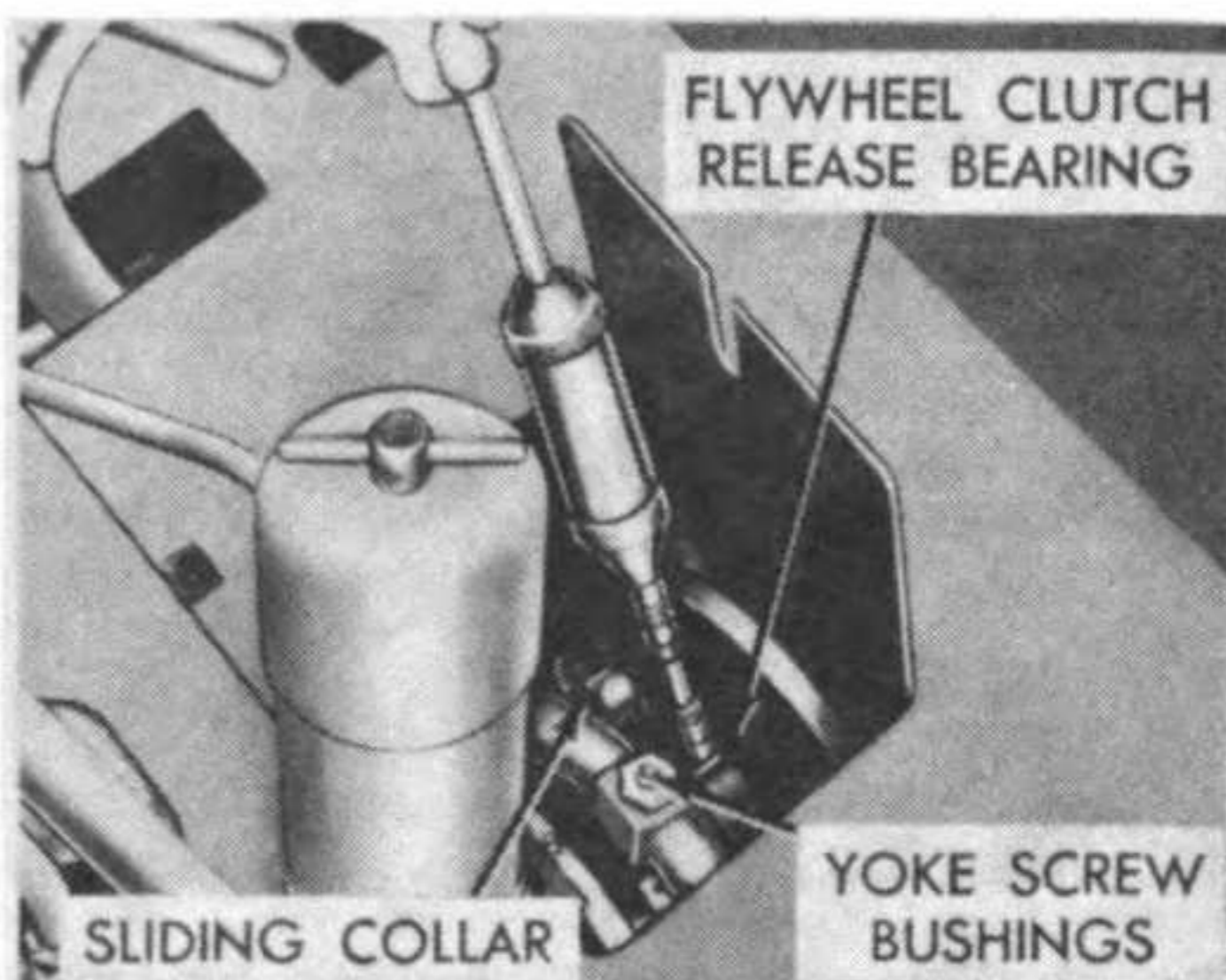
Ref. 21: Check the oil filter element weekly. If there is sludge evident on the metallic strainer element, it should be washed off with a non-flammable cleaning fluid. If brushing is necessary, brush parallel to the windings. When heavy sludging of the element is observed, it is advisable to replace the inner bypass filter element with a new element.



Ref. 22: Drain the transmission oil filter completely each time the transmission oil is drained.



Ref. 23: Check transmission oil level every week. Oil should be up to level mark on gage.



Ref. 24: Lubricate sliding collar, release bearing and yoke screw bushings through fittings. To reach fittings, turn collar until fittings appear.

Figure 35. Lubrication order—Continued.