

DEPARTMENT OF THE ARMY
TECHNICAL MANUAL

TM 5-1343

DEPARTMENT OF THE AIR
FORCE TECHNICAL ORDER

TO 19-40AAD-6

~~ERVALLE~~
GEREGISTREERD

5-76

vervangen door:

4 JAN. 1950

140 BBV

SCRAPER, ROAD

TOWED-TYPE

CABLE-OPERATED

8 CU. YD.

HEIL MODEL OC-9

bibliotheek van de
inspectie der genie



DEPARTMENTS OF THE ARMY AND THE AIR FORCE

APRIL 1954

INSPECTIE DER GENIE

Centrale Documentatie
Oude Waalsdorperweg 25/35
K 14, Barak 14, Tel 185070 T.500

Boekwerk nr : <i>TM 5-1343</i>			
Tijdschrift : <i>4/54</i>			
Uitgeleend aan:	op	tot	terug
<i>H. Hofmeester</i>	<i>24/1060</i>	<i>onbek</i>	

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TECHNICAL MANUAL
No. 5-1343
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DEPARTMENTS OF THE ARMY AND
THE AIR FORCE
WASHINGTON 25, D. C., 30 April 1954

SCRAPER, ROAD, TOWED TYPE, CABLE OPERATED 8 CU YD, HEIL MODEL OC-9

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*This manual supersedes TM 5-1343/to 19-40AAD-6, 23 April 1953.

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1. Scope

a. This manual is published for the information and guidance of the personnel to whom this scraper is issued. It contains information on the operation and organizational maintenance of the scraper as well as a description of the major units and their functions in relation to other components of the materiel.

b. Supply manuals, technical manuals, and other publications applicable to the equipment covered by this manual are listed in Appendix I, References. Appendix II, Identification of Replaceable Parts, tabulates the replaceable parts available for the equipment. Appendix III, On-equipment Tools, lists the tools issued with and carried on or with the equipment.

2. Record and Report Forms

Maintenance record forms listed and briefly described in Appendix I will be used in the maintenance of the 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. *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 services and technical inspections.

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

d. *DA Form 478, MWO and Major Unit Assembly Replacement Record and Organizational Equipment File.* Major repairs or rebuilding, replacement of major unit assemblies, and accomplishment of equipment modifications are recorded on this form.

e. *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 No. 468 is not used for reporting failures, isolated materiel defects, or malfunctions of materiel resulting from fair wear and tear or accidental damage. Form No. 468 is not used to report issue of parts and equipment, or for reporting replacements and repairs.

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

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

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

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

j. DA Form 5-13, Spot Check Inspection Report of Organizational Maintenance of Engineer Equipment. Organizations having engineer field maintenance responsibility use this form for reporting the results of semiannual spot check inspections.

k. DA Form 5-14, Annual Technical Inspection Report of Engineer Equipment. Organizations having engineer field maintenance responsibility use this form for reporting the results of annual technical inspections.

Section II. DESCRIPTION AND DATA

3. Description

(fig. 1)

a. General. The Heil Company road scraper Model OC-9 is a towed-type, cable operated road scraper with a rated capacity of 9 cubic yards and a minimum struck capacity of 8 cubic yards. The unit will dig, carry, scrape and grade. At the fill, the scraper spreads its load with a positive mechanical pushout action. Discharge is accomplished by a rear pushout ram which pushes the tilt floor up to a maximum discharge angle of 75 degrees. The scraper is mounted on four pneumatic-tired wheels and is secured to the towing vehicle by a swivel hitch type drawbar.

b. Bowl. The main part of the scraper is the bowl which carries the load. It consists of two heavily reinforced sides joined by sturdy cross members to form a box-like structure.

c. Lift Frame. The lift frame is the heavily reinforced forward member of the scraper. It is joined to the sides of the bowl at pivot points located back of and above the cutting blade. The forward part of the lift frame has a post that secures to the drawbar by means of a clevis.

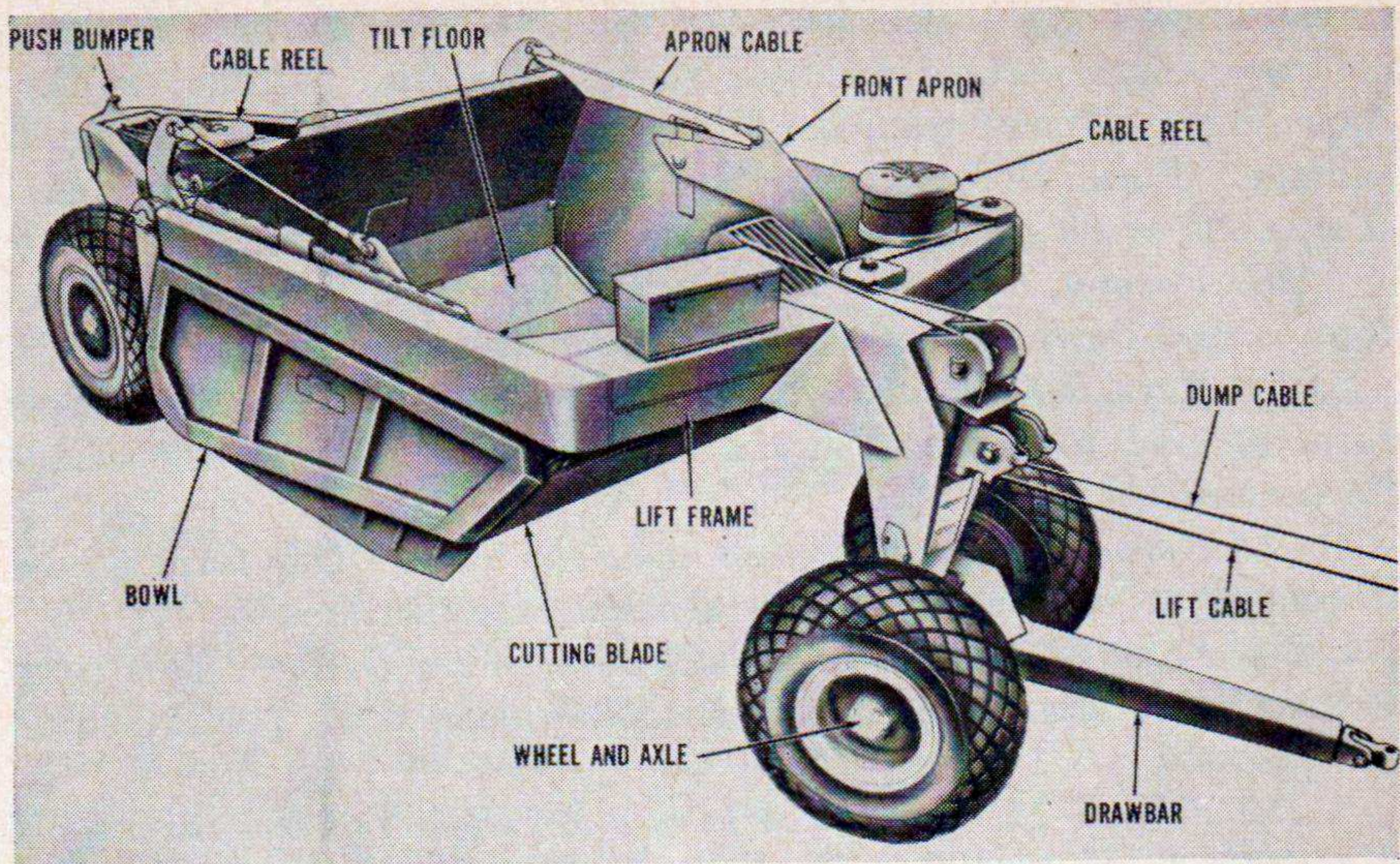


Figure 1. Cable operated road scraper.

d. Cutting Blade. The scraper has a three-piece cutting bit or blade made of heat treated, wear-resisting high carbon alloy steel. It is bolted to its supporting bed, which is permanently attached to the bottom sides of the bowl. The blade is double edged, and may be reversed when one edge shows excessive wear.

e. Tilting Floor. The tilting floor is a hinged steel constructed floor inside the bowl which is used to discharge the load. It is pushed up and forward to a discharge angle of 75 degrees by a rear push ram.

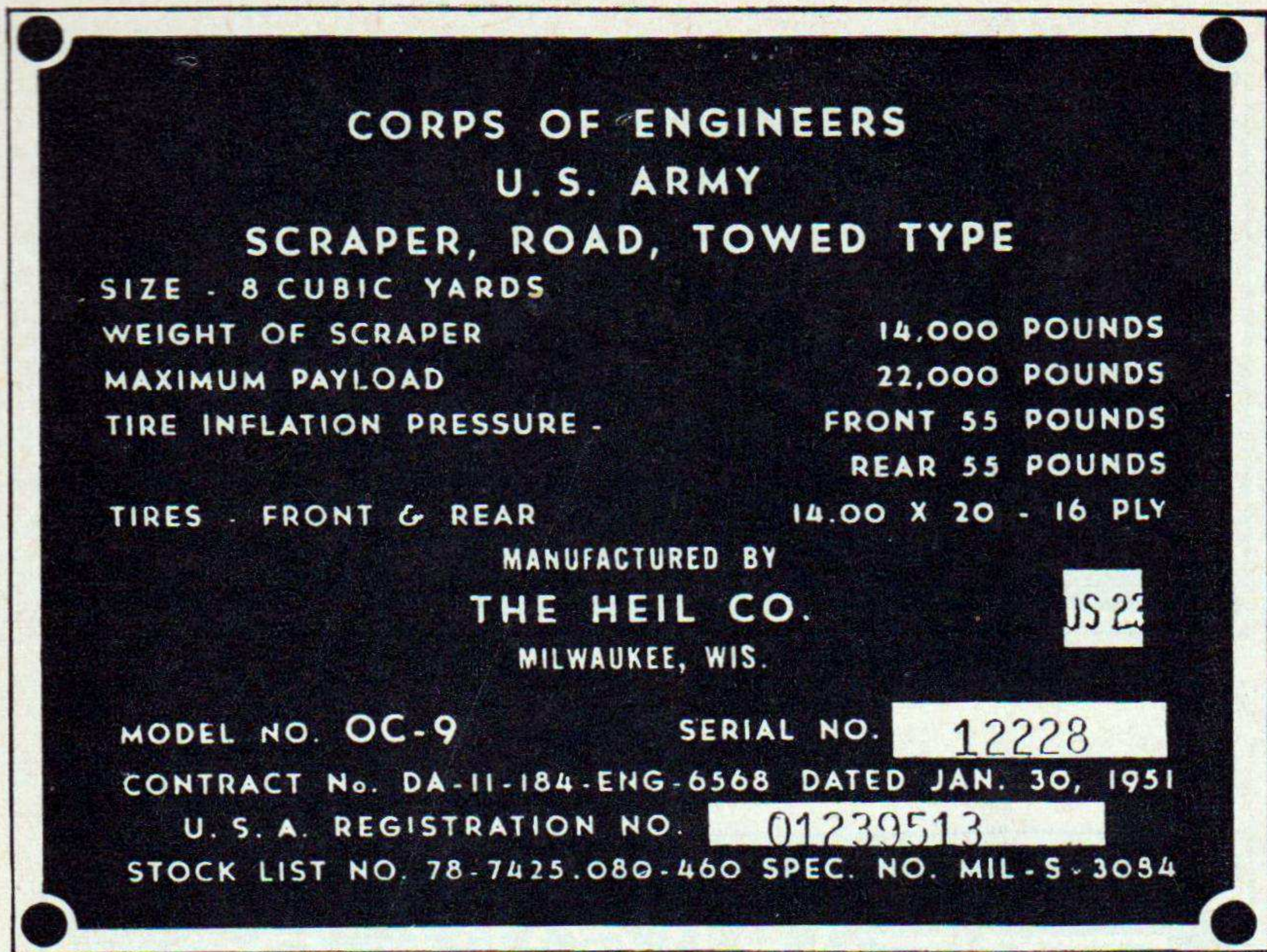
f. Front Apron. The front apron is attached to the front end of the bowl. When digging and loading the apron is opened slightly to allow the material to enter the bowl. The apron is closed when the scraper is filled to hold material within the bowl.

g. Drawbar. The box-beam tongue is fitted with a drawbar swivel hitch at its forward end and a universal swivel and clevis at the front axle assembly. The drawbar is attached to the prime mover for the purpose of towing the scraper.

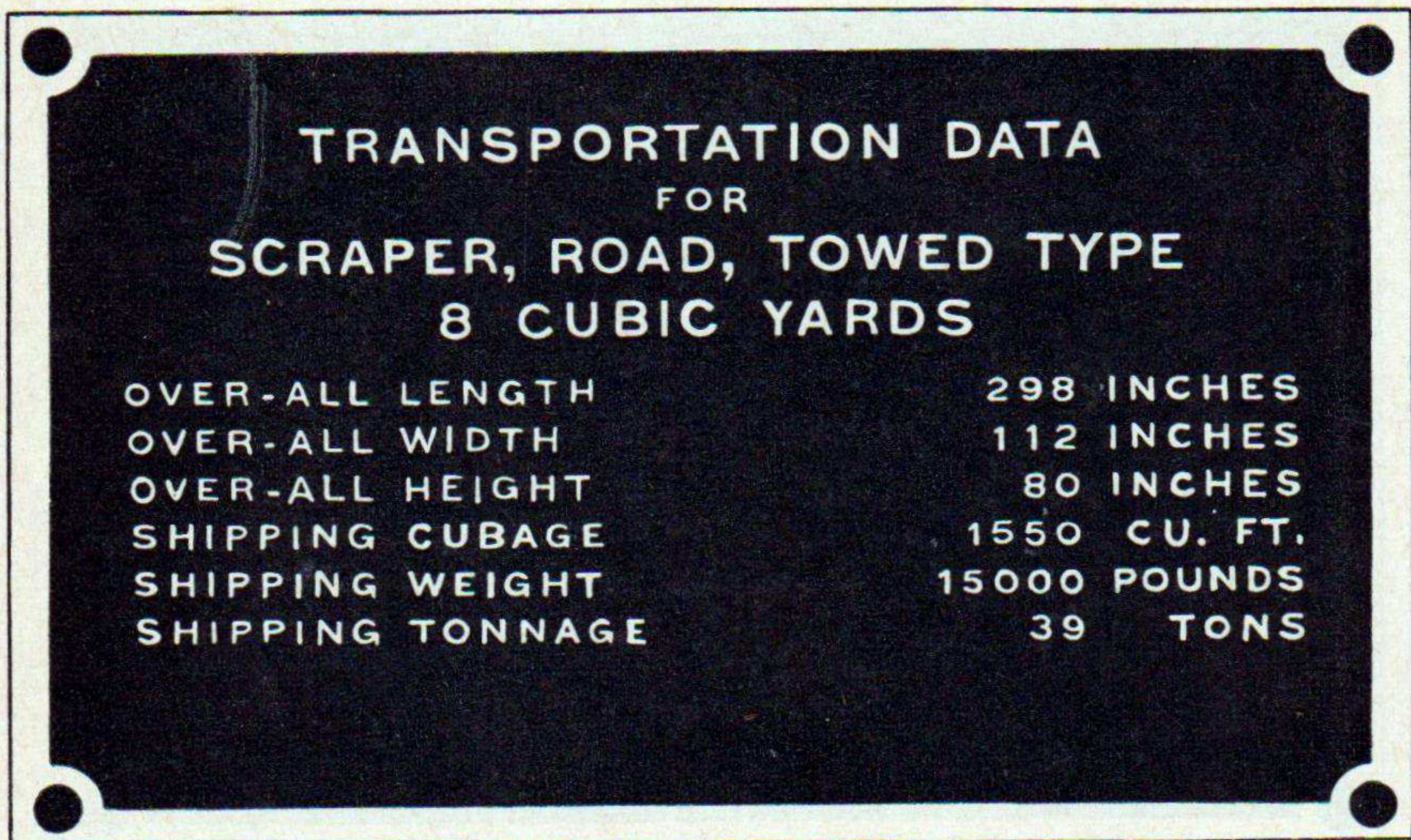
h. Lift Cable. The lift cable controls the raising and lowering of the bowl and its cutting edge.

i. Dump Cable. The dump cable actuates the front apron and the dumping discharge ram, which is located between the rear wheels.

j. Axles and Wheels. The scraper has four stub wheel axles. The axles are firmly fixed to the scraper with axle brackets. Front axle brackets are welded to the drawbar, and rear axle brackets are welded to the rear cross member of the bowl. The scraper wheels are one-piece fabricated type which ride on tapered roller bearings.



A



B

Figure 2. Identification plates.

4. Identification

(fig. 2)

The scraper has four identification plates. Identification plate (A), located on the left front side of the lift frame is the manufacturer's name plate which gives the model and serial number of the scraper. A lifting attachment instruction plate (B), located on the front of the lift frame indicates the location and capacity of lifting ears. The transportation data plate (C), located on the front of the lift frame, gives the overall length, width, height, and weight of the scraper. The Corps of Engineers identification plate (D), located on the front of the lift frame, specifies the official nomenclature, the model number, and serial number of the equipment. When requisitioning spare parts for this equipment, specify the Department of the Army registration and serial number of the scraper.

5. Differences in Models

This manual covers only one road scraper, the Heil Company Model OC-9.

6. Tabulated Data

a. Dimensions and Weight.

Overall length (includes tongue)	28 ft. 7½ in.
Overall width	9 ft. 4 in.
Overall height (carrying position)	80 in.
Overall height (loading position)	80 in.
Wheelbase (in carrying position)	16 ft. 9 in.
Ground clearance (at front axle)	18 in.
Ground clearance of bowl (hauling position)	12 in.
Width required for nonstop turn	22 ft.
Bowl (inside) :	
Height of sides	49 in.
Size of bottom (back of blade)	62 in.
Cutting blade :	
Overall length	96 in.
Length, center offset section	57¼ in.
Width and thickness, center offset section	¾ in. x 12 in.
Length, end sections	18½ in.
Width and thickness, end sections	¾ in. x 8 in.
Depth of cut	UNLIMITED
Depth of spread	15 in.
Front apron opening	63 in.
Tires (front and rear) standard	14 x 20 16 ply.
Sheaves number and diameter	28—8 in.
Cable required : (6 x 19, 7/16 in.)	
Tilting floor cable	98 ft.
Bowl lifting cable	74 ft.
Weight of scraper	14,000 lb.

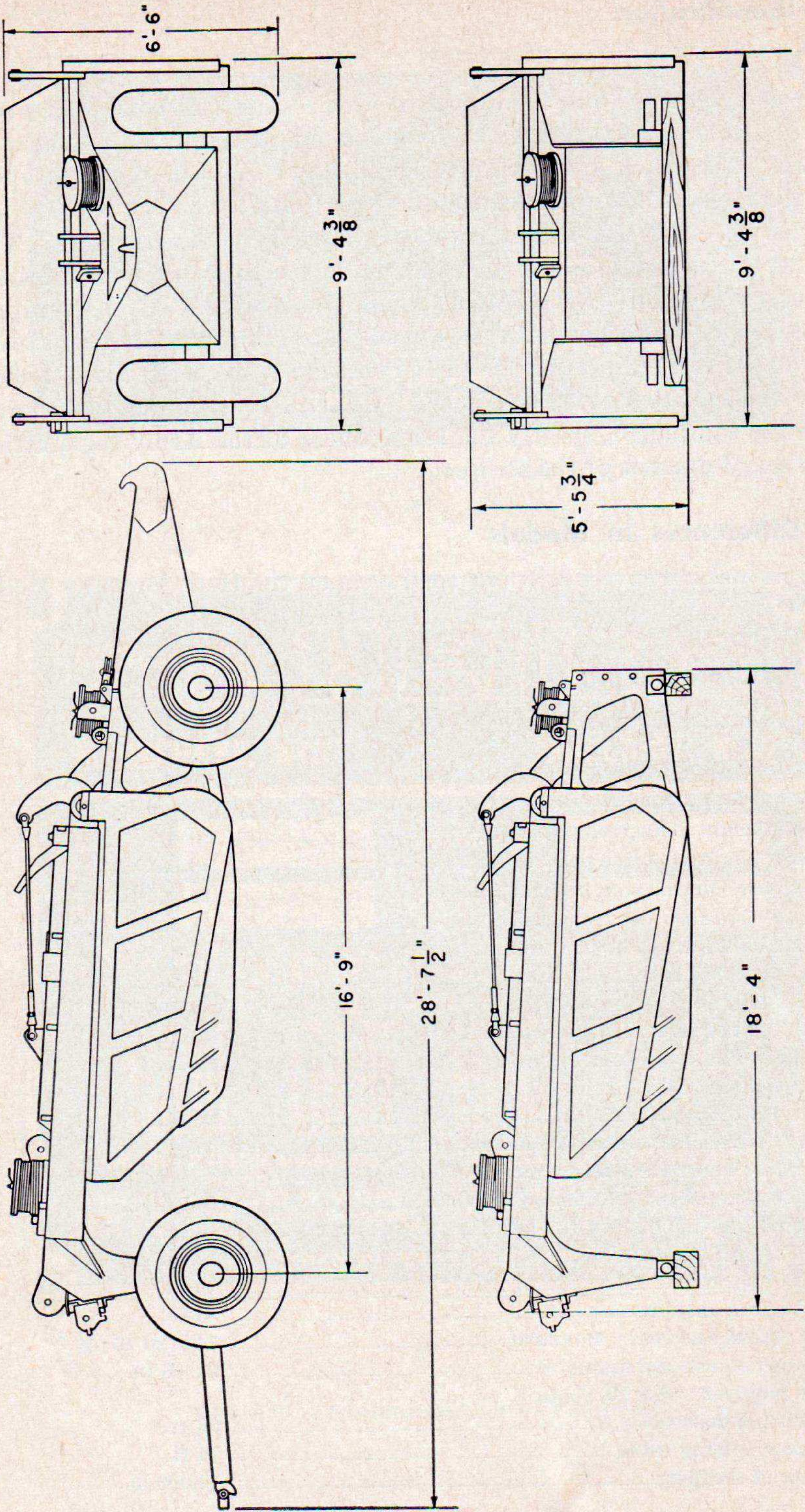


Figure 3. Scraper shipping dimensions, disassembled.

b. Capacity

Rated capacity	-----	9 cu yd.
Struck capacity	-----	8 cu yd.
Maximum payload	-----	22,000 lb.
Recommended tractor (H. P.)	-----	60-75 hp.
Tire pressure (front)	-----	55 lb.
Tire pressure (rear)	-----	55 lb.

CHAPTER 2

OPERATING INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

7. New Equipment

a. General. The Heil Model OC-9 scrapers are shipped mounted and blocked to railway flatcars (fig. 4). Two scrapers are mounted per flatcar and all scrapers' wheels are securely braced and blocked with wood blocking.

b. Unloading. The scrapers are unloaded with a lifting crane and slings or with the use of an unloading ramp at the end of the railway flatcar.

- (1) *Lifting crane.* To remove scrapers with a lifting crane and slings, attach the slings to the four lifting eyes on the scraper. See the lifting instruction plate (fig. 2) for sling placement and lift points. Raise the scraper slowly until it clears the blocking on the flatcar. Swing the lifted scraper away from the railway flatcar and slowly lower it to the ground.
- (2) *Unloading ramp* (fig. 5). If a lifting crane is not available construct an unloading ramp at the end of the railway flatcar. Use 6 x 6 lumber for constructing ramp runners (1) and vertical supports (2). Secure the runners (1) and vertical supports (2) with 2 x 4 cross members (3). After this construction has been completed on each side of flatcar nail 2 x 12 boards to the top of the runners (1) for a ramp surface. After

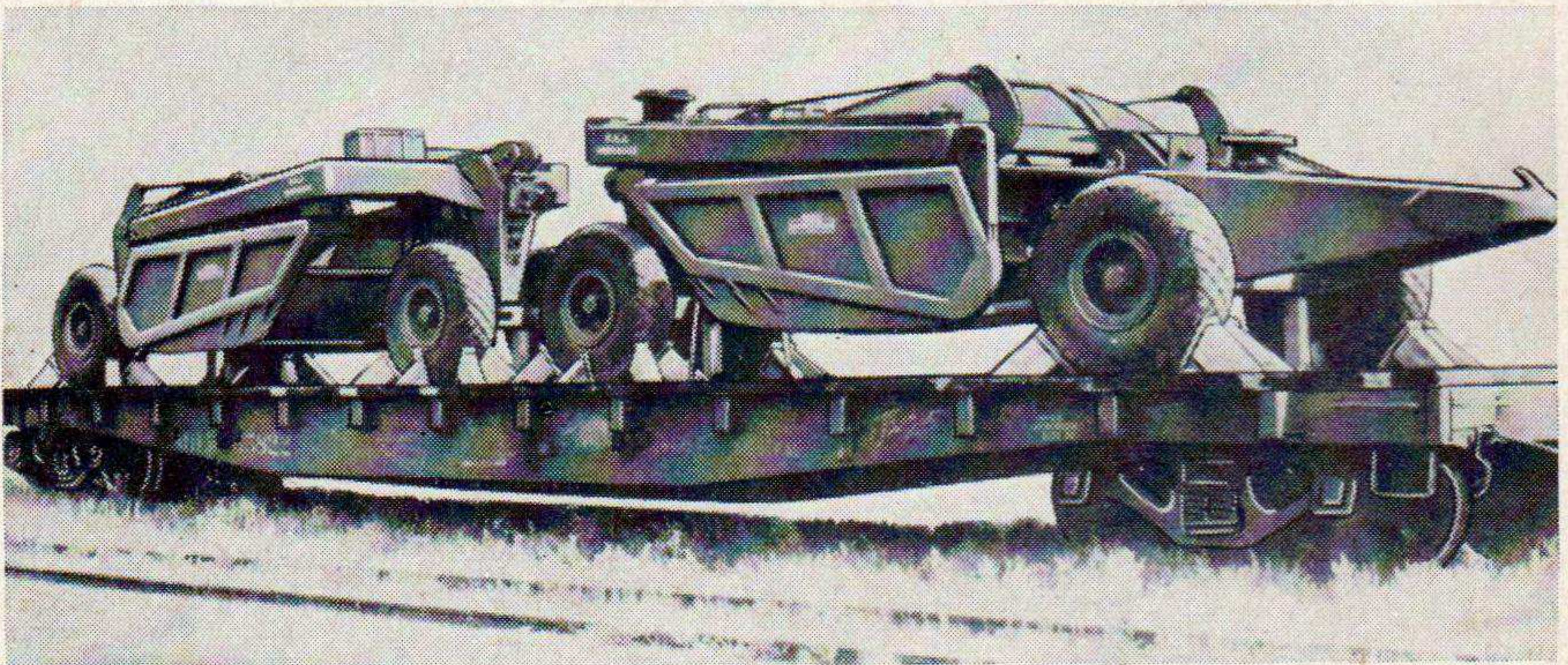
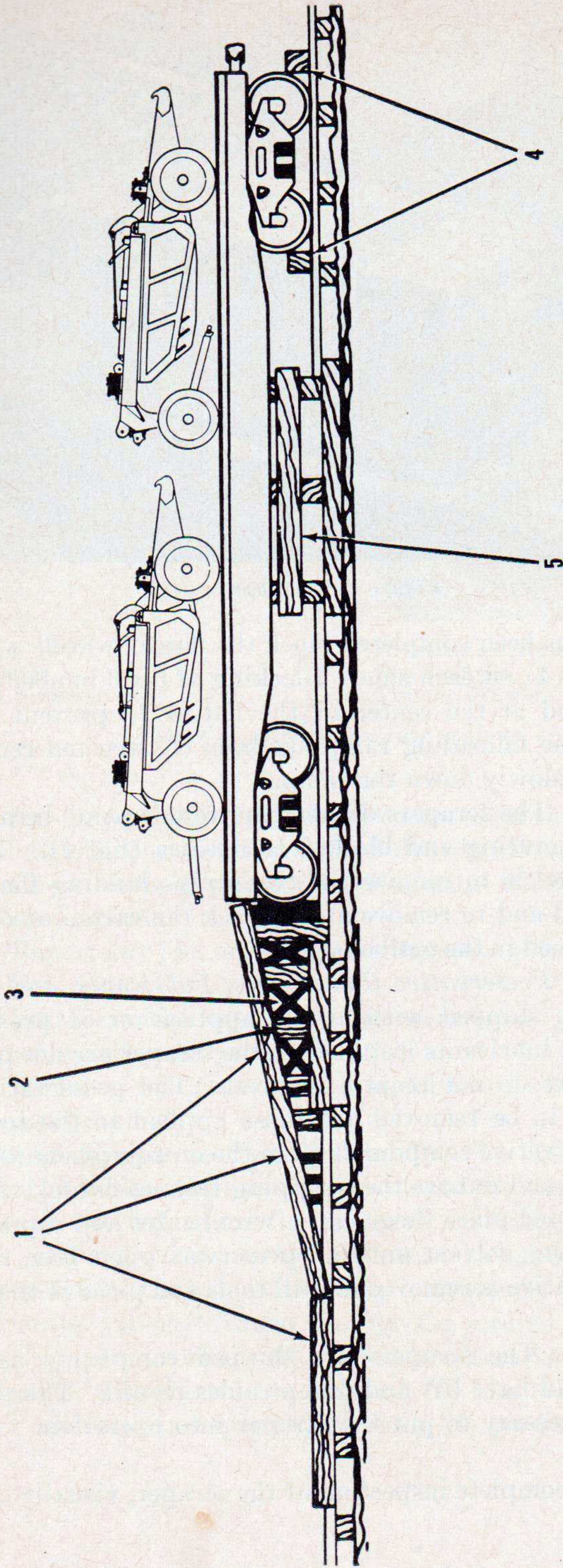


Figure 4. Scrapers blocked for shipment.



- 1. Ramp runners 6 x 6
- 2. Vertical support 6 x 6
- 3. Cross supports 2 x 4

- 4. Wheel blocking 6 x 6
- 5. Side blocking 6 x 6

Figure 5. Special ramp for unloading scrapers.

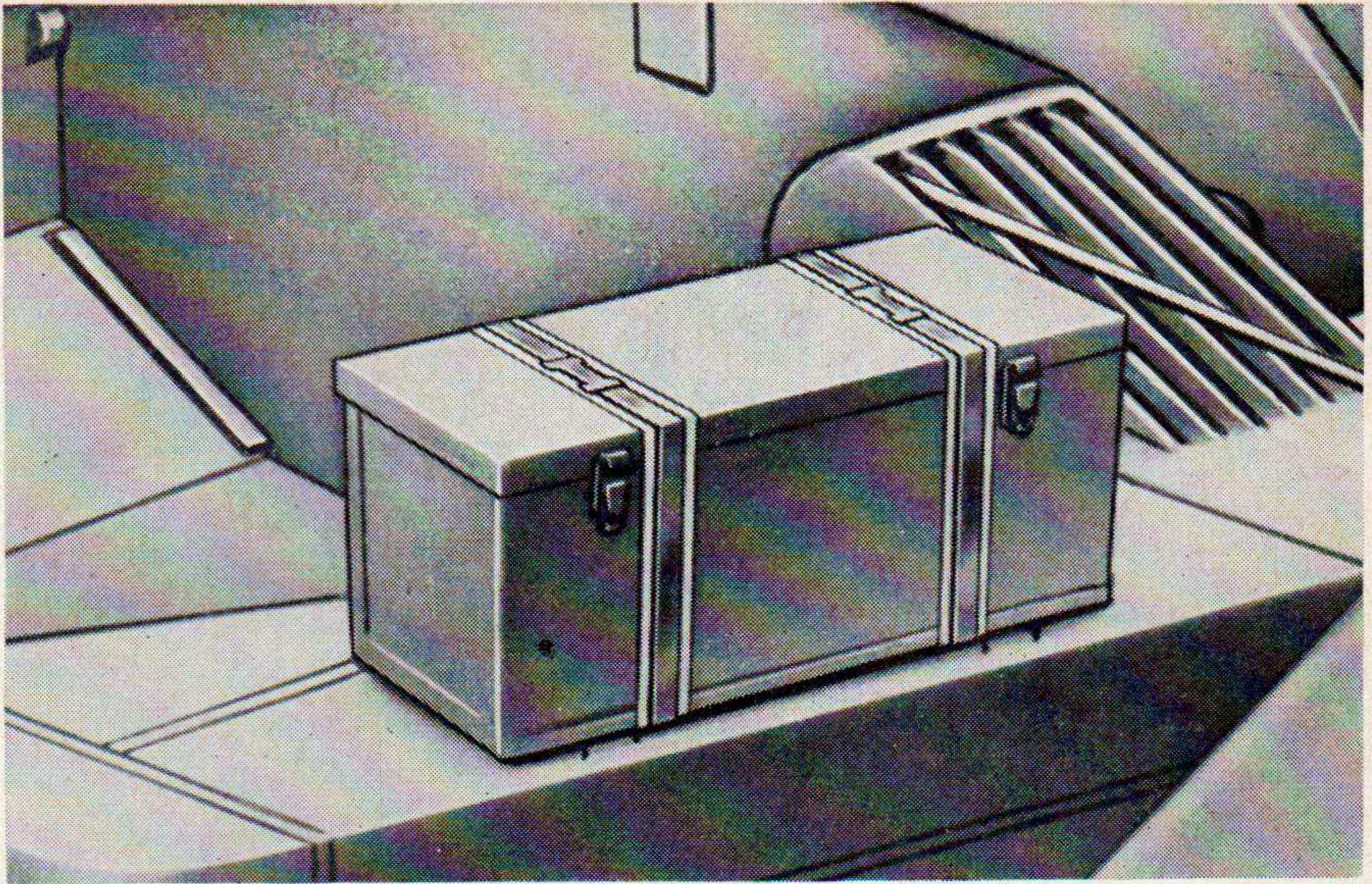


Figure 6. Toolbox.

ramp has been completed block the flatcar wheels with 6 x 6 lumber (4) on each side. Blocking of 6 x 6 lumber (5) may be placed at the center of the flatcar to prevent rocking. After the unloading ramp has been constructed remove the scraper slowly down the ramp.

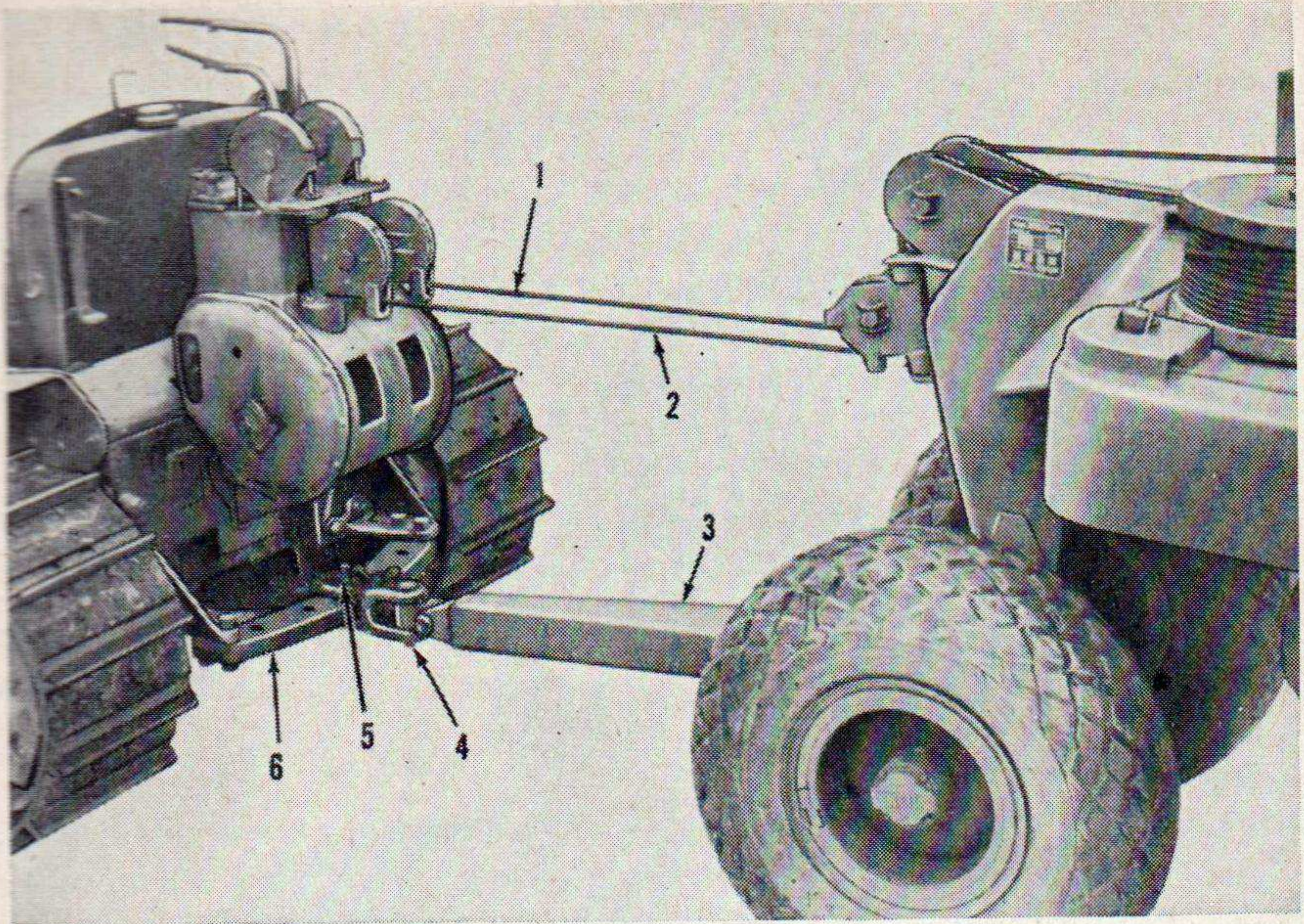
c. Uncrating. The scrapers do not require uncrating because they are shipped less crating and blocked to flatcars (fig. 4). The only uncrating required is to remove the two straps holding the toolbox lid (fig. 6) closed and to remove and unpack the carton of on-equipment tools contained in the toolbox.

d. Removal of Preservative Compounds, Lubricants, and Devices. The scrapers are shipped without the application of preservative compounds. The lubricants installed on the scraper are not preservative and therefore do not require removal. The preservative compounds that are to be removed are those applied to the tools. To remove the preservative compounds from the on-equipment tools open the paper carton, and remove the wrapping from each tool. After all tools are unwrapped place them into a wire basket and dip and soak in a strong cleaning solvent until all preservative has been removed. After all preservative is removed dry all tools and place in the scraper toolbox.

e. Assembling. The scrapers are shipped completely assembled and lubricated and have lift and dump cables reeved. Therefore, no assembling is necessary to put the scraper into operation.

f. Inspection.

(1) Make a complete inspection of the scraper, visually checking



1. Lift cable
2. Dump cable
3. Scraper drawbar

4. Drawbar swivel block
5. Drawbar pin
6. Tractor drawbar

Figure 7. Tractor-scraper hook up.

for damage which may have occurred in shipment. Inspect brackets, sheaves, wheels and drawbar connections.

(2) Check cable alignment to determine whether it is fouling at any point.

(3) Report any loss or damage on the appropriate form (par. 2).

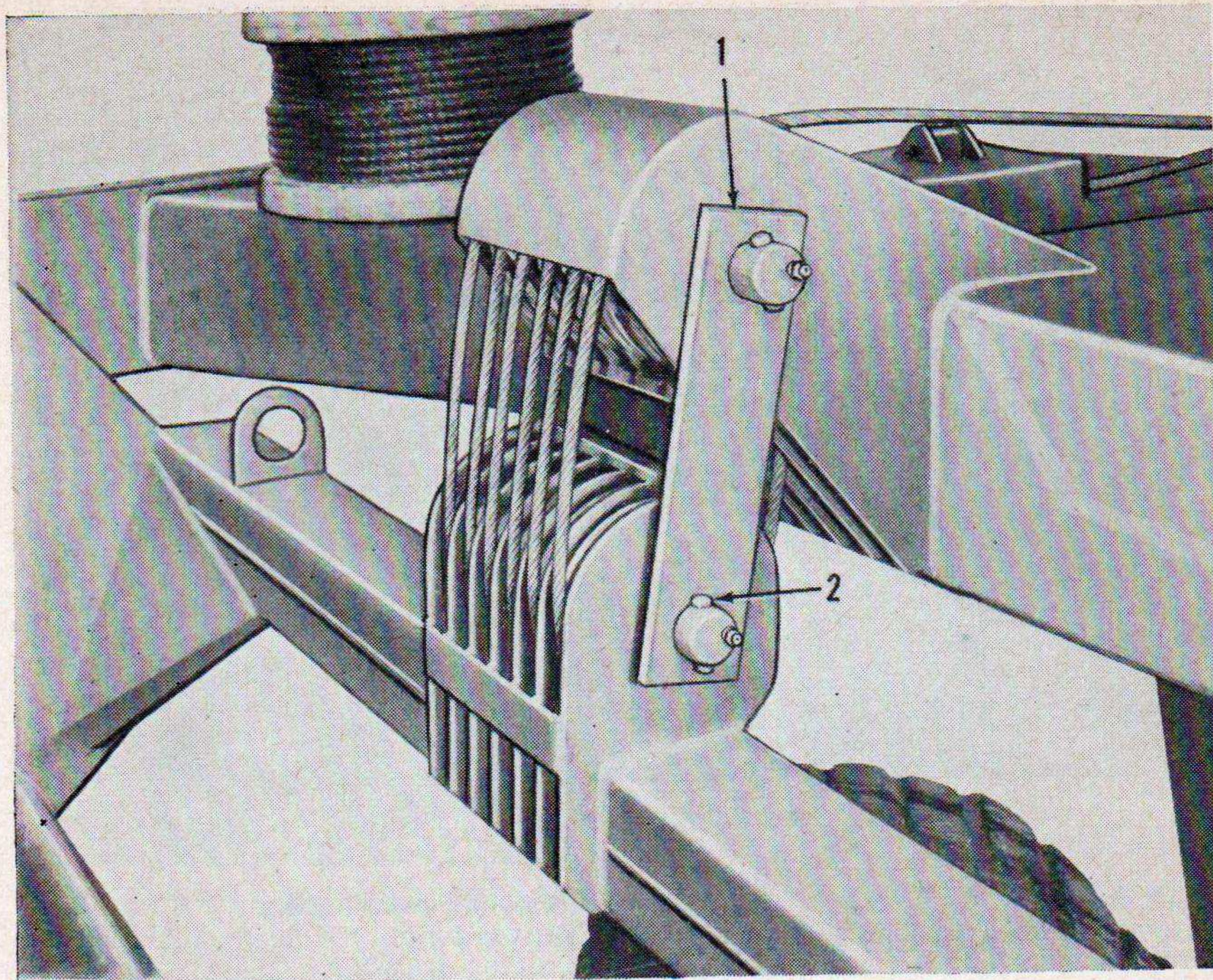
g. Service.

(1) Lubricate the equipment in accordance with instructions contained in paragraph 23.

(2) Perform the preventive maintenance services specified in paragraph 25.

h. Connect Scraper to Tractor (fig. 7). To connect the scraper to a tractor, it will not be necessary to thread the scraper cables. The cables are connected when the scrapers are shipped from manufacturer. If for any reason the cables may have been removed from the scraper follow the cable threading instructions in paragraph 37.

With the two cables threaded through the scraper, back the tractor up to the scraper drawbar (3). Raise the scraper drawbar swivel block (4) even with the tractor drawbar (6) and back up the tractor slowly. Position the scraper swivel block (4) onto the tractor draw-



1. Safety plate

2. Cap screws

Figure 8. Safety plate.

bar (6), and connect the units together by inserting the drawbar pin (5).

- (1) *Connect dump cable.* Thread the dump cable (2) through the left sheaves on the power control unit and dead end it on the left drum of the power control unit.
- (2) *Connect lift cable.* Thread the lift cable (1) through the right sheaves of the control unit and dead end it on the right drum of the power control unit.
- (3) *Remove safety plate* (fig. 8). After connecting cables to the power control unit operate the power control unit and pull the lift cable taut. This will support the scraper bowl and allow removal of safety plate.

Caution: Make certain that the lift cable is taut before attempting removal of the safety plate. If the lift cable is not taut when removing the safety plate the scraper bowl will drop and cause serious injury to personnel.

To remove the safety plate remove the cap screws (2) from the upper and lower sheave shafts and remove safety plate (1). Store the safety plate and cap screws in the scraper tool box for future use.

8. Used Equipment

Used equipment should be checked in the same manner as for new or reconditioned equipment. However, when used equipment is received it should be given a thorough inspection for excessive wear and tear on cables, pulleys and cutting blades. Also observe the condition of the tires or any other damage that may make it impractical to use. Follow the step-by-step procedures outlined in paragraph 7 above.

Section II. CONTROLS

9. General

This section describes, locates, illustrates and furnishes the operator sufficient information about the various controls for the proper operation of the materiel.

10. Controls

The scraper is controlled by means of a power control unit mounted on the rear of the tractor or prime mover. The power control unit has two operating levers, a right and left. Left and right in these instructions are treated as being the operator's left and right when seated in the tractor seat. The following paragraphs cover each control and its operating function.

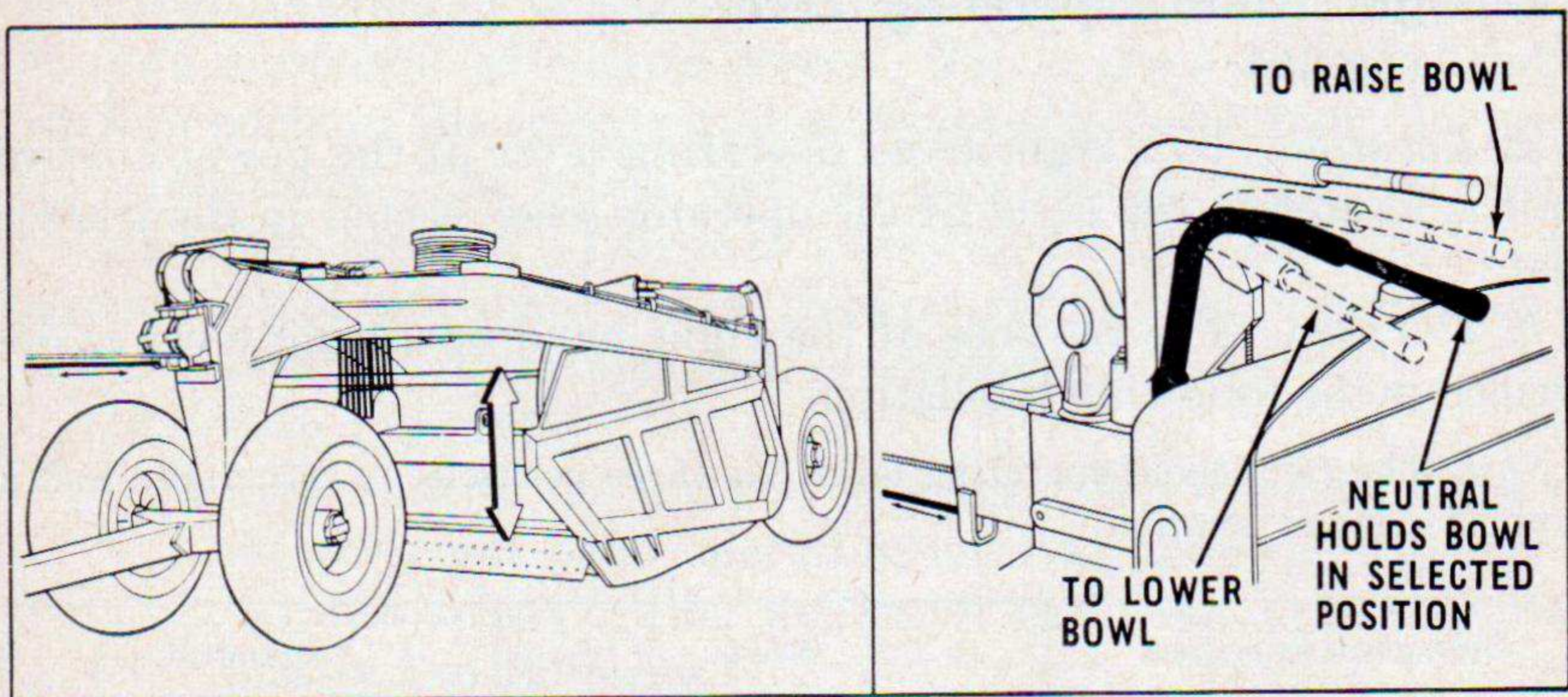


Figure 9. Bowl operating control.

11. Left Hand Operating Lever

(fig. 9)

a. Location. The left hand operating lever of the power control unit is located to right of the operator when seated in the tractor seat.

b. Purpose. The purpose of the left hand operating lever is described in the following tabulation.

Note. The left hand operating lever has three positions; toward operator's left, neutral and to operator's right.

Operating lever position	Effect	Operation
Lever toward operator	Engages clutch to lift	Raises scraper bowl.
Lever centered (neutral)	Releases clutch and engages brake.	Holds bowl in position.
Lever away from operator	Releases clutch and brake for free spooling.	Lowers scraper bowl.

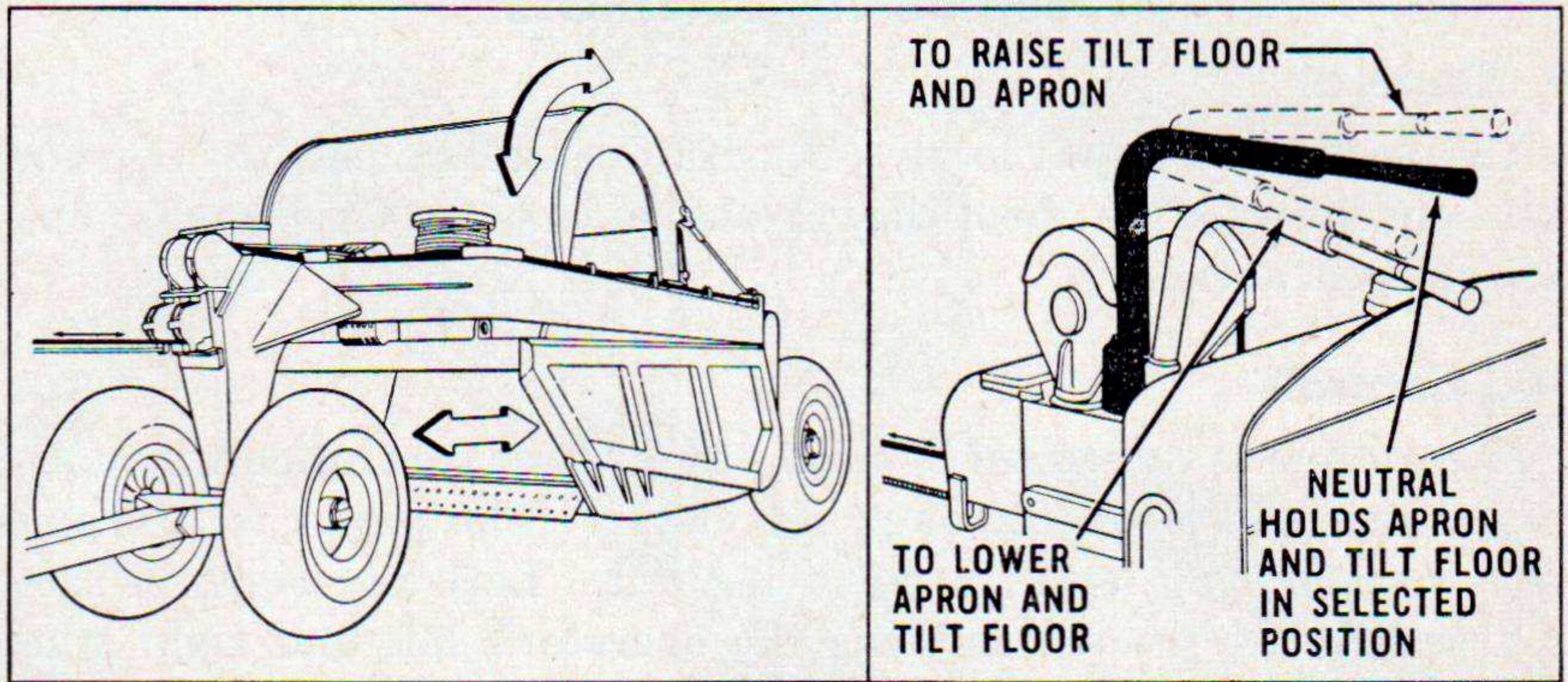


Figure 10. Apron and tilt floor control.

12. Right Hand Operating Lever

(fig. 10)

a. Location. The right hand operating lever of the power control unit is located to the right of the operator when seated in the tractor seat.

b. Purpose. The purpose of the right hand operating lever is described in the following tabulation.

Note. The right hand operating lever has three positions; a left, right, and a neutral (center) position.

Operating lever position	Effect	Operation
Lever toward operator	Engages clutch to lift	Raises scraper apron and tilt floor.
Lever centered (neutral)	Releases clutch and engages brake.	Holds apron and tilt floor in position.
Lever away from operator	Releases clutch and brake for free spooling.	Lowers apron door and tilt floor.

Section III. OPERATION UNDER USUAL CONDITIONS

13. General

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

b. It is essential that the operator knows how to perform every operation of which the scraper is capable. This section gives instructions on the basic motions of the machine, and instructions on how to coordinate the basic motions to perform the specific tasks for which the scraper is designed. Since every job presents a different problem, the operator may have to vary the given procedure to fit the individual job.

14. Operating Details

Scraper work is accomplished on what is termed as a work cycle which includes the operations of loading, hauling, unloading or spreading and returning to the cut.

The power for each of these operations is supplied by the tractor through a power control unit. Tractor power pulls the scraper blade through the ground when loading, tows the scraper traveling and supplies the power for unloading.

The power control unit controls the working parts of the scraper by either spooling or unspooling the cable drums selected by the operator's movement of control levers. The control cables extend to various parts of the scraper and actuate parts to perform the necessary functions. The cables pass through sheave blocks at various points on the scraper. This multiplies the line pull delivered by the power control unit many times, thus providing the large amount of power needed for operations such as unloading.

a. *Loading* (fig. 11)

- (1) Fully utilize the scraper capacity. When entering the cut use the right hand operating lever to place the tilt floor in extreme rear position and raise the front apron approximately 6 to 12 inches.
- (2) Move forward, and with the left hand operating lever, lower the blade onto the ground, allowing it to penetrate to the desired depth.
- (3) Keep the front apron low, leaving an opening just large enough for the dirt to enter, but not so low as to cause the dirt to bank up in front of the blade.

Note. Loading is normally done in low gear.

- (4) When the scraper is loaded, lower the front apron with right operating lever, and raise the blade an inch or two above the surface of the ground with the left operating lever.



Figure 11. Loading the scraper.

Note. Travel several feet before raising the blade to a higher position. This will spread loose material in front of the blade and thereby leave the cut smooth to pull in and out of. If possible, arrange the work so that the scraper can be loaded down hill and in the direction of the fill.

b. Traveling to the Fill.

- (1) Place tractor into highest gear possible without overloading the engine.
- (2) Raise the bowl with the left operating lever to a height that will be sufficient for clearing any objects on the haul road. This will help eliminate continual raising and lowering of the bowl.

Note. When traveling to the fill carry the bowl close to the ground. This will prevent danger of upsetting the scraper, particularly when traveling over rough haul roads.

Note. When there is a choice of two or more routes of traveling from cut to fill, the shortest route should be taken. For example, one route would be short and steep requiring travel in low gear; the other a long gradual incline that would allow travel in fourth or fifth gear. The short steep route traveled in low gear would be recommended. The reason is that maintenance costs on tracks, rollers, and bearings is higher when traveling at high speed than at low. Several factors should be considered in making the choice, the traveling time, condition of haul roads, and wear on equipment.

c. Unloading or Spreading (fig. 12). Perform the unloading or spreading operation in the highest gear possible. This, of course, depends entirely on the material and conditions. The unloading or spreading procedures are listed in the following subparagraphs.

- (1) When arriving at the fill with the loaded scraper, either raise or lower the bowl with the left operating lever, as required to give the desired thickness of spread.
- (2) Raise the apron to its full height with the right operating lever, and allow the dirt to fall out.
- (3) After the apron reached its full height drop it about twelve inches.
- (4) Use right operating lever and raise the apron again.

Note. If operating with sticky material, it may be necessary to repeat this operation several times to dislodge the dirt from the back side of the apron.

- (5) After the dirt has fallen out of the apron, use the right operating lever and start to bring the tilt forward about 12 inches at a time, letting it move back a few inches after each forward movement, until the bowl is empty.

Caution: Do not force the load out too rapidly, as this causes unnecessary strain on the tilt floor, ram, and cable. Forcing the load out too rapidly may also cause the dirt to

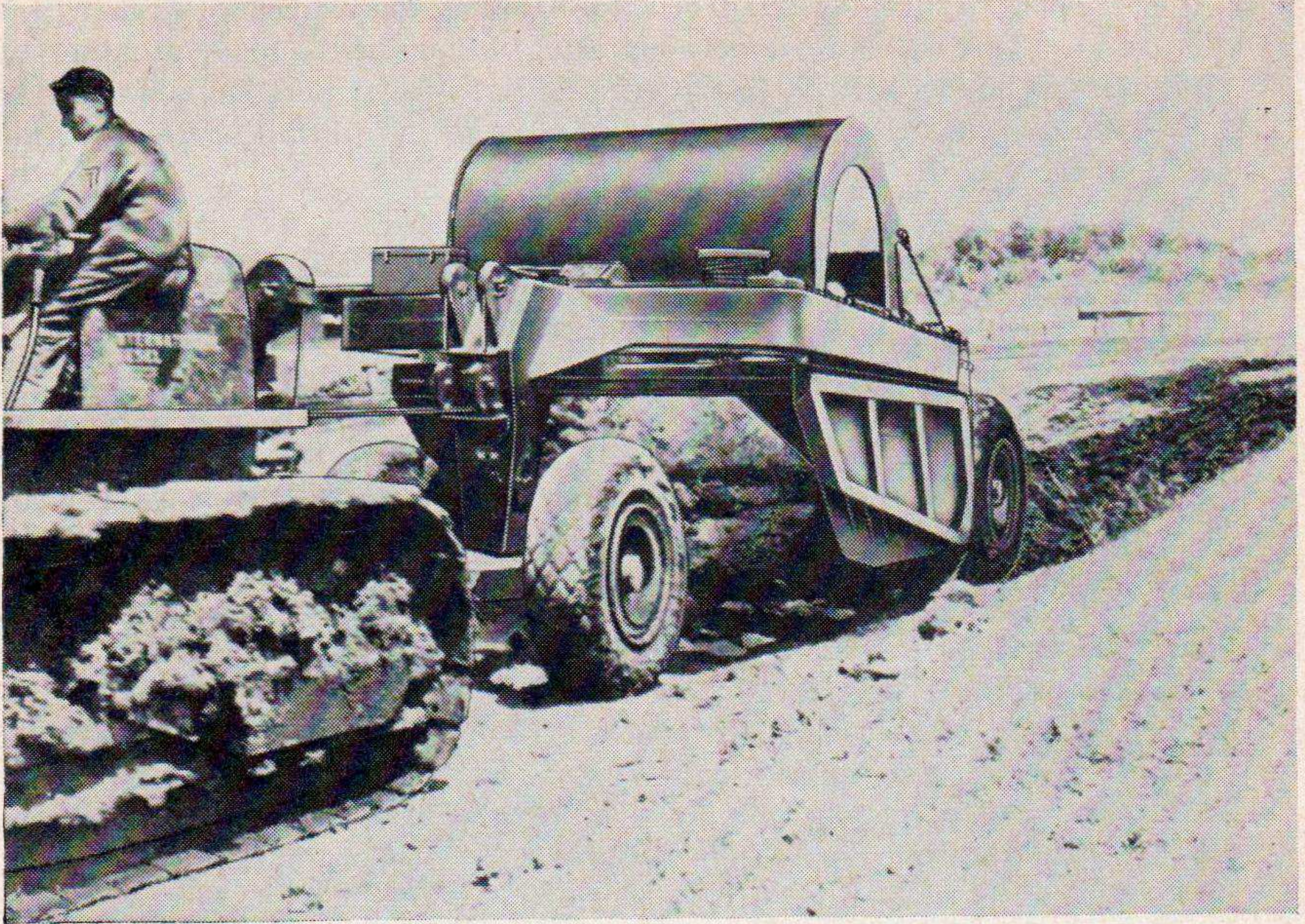


Figure 12. Unloading the scraper.

stack up in front of the blade, and add additional draft on the tractor.

- (6) When the scraper is completely emptied, return the tilt floor to its rear position and lower the apron with the right operating lever.
- (7) After lowering the apron, raise the bowl to the desired traveling position with the left operating lever and return to the cut.

Warning: Never return to the cut with the apron raised and the tilt floor in the extreme forward position. This will cause cable breakage when turning or traveling over unlevel ground.

d. Returning to the Cut. Returning to the cut is usually done in as high a gear as conditions permit. The bowl should be carried comparatively close to the ground, but high enough to clear any rocks or obstructions in the path of travel. This will help eliminate repeated raising and lowering of the bowl and prevent upsetting.

Note. It is sometimes advisable to smooth up the haul road with the empty scraper by dragging the blade on the ground. With the apron raised and the tilt floor within approximately 8 to 12 inches of the extreme forward position, an action similar to that of a dozer or grader is obtained.

Warning: When using the scraper blade to smooth up haul roads never have the tilt floor in the extreme forward position. If the tilt

floor is in extreme forward position, cable breakage might occur when turning or traveling over unlevel ground.

e. Wet or Sticky Material. When operating in wet or sticky material you may have difficulty in unloading or spreading. The following procedures should be used when operating in wet or sticky material.

- (1) Do not try to make too thin a spread when unloading.
- (2) Keep the bowl high enough to allow the material to pass under the scraper. Material not having enough room to pass under the scraper will roll up inside the bowl into a solid mass that will be difficult for the tilt floor to eject.

Caution: Do not try to force the load out too fast, as this too will cause the material to roll up in front, and might result in cable breakage.

- (3) For best results in wet or sticky material, bring the tilt floor forward about 12 inches at a time. After each forward movement, return the tilt floor approximately 6 inches. This allows the material inside the bowl to settle back and loosen up. Repeat this operation until the bowl is emptied.

f. Loose Sand. When loading loose sand, there is a tendency of this material to float ahead in front of the blade rather than enter the bowl. The following procedures should be used when loading loose sand.

- (1) Start the load with the front apron raised 6 to 12 inches and with the tilt floor in the rear position. Move forward with the blade in the ground, loading in the conventional manner.
- (2) When the bowl has become approximately half filled, lower the apron into the pile of sand that will have stacked up in front of the blade and then raise the bowl approximately 2 inches.
- (3) While moving forward drop the bowl about 3 or 4 inches. This will force more sand up into the bowl. By repeating this operation, the scraper can usually be fully loaded.

Note. The above method of raising and lowering the bowl to obtain a load is sometimes referred to as "pumping in a load". When lowering the bowl in this operation, do not leave the hoist brake released long enough to allow the cable to become slack on the drum as that would cause unnecessary cable wear and possible breakage.

- (4) When unloading loose sand, make the spread as thin as possible. This will give better compaction and will make traveling over the fill easier.

g. Gravel. When loading gravel, it may be necessary to follow a procedure similar to that for loading loose sand in order to obtain a full load. While working in gravel you may experience an occasional failure of the apron door closing. This will be due to interference by large stones and will usually result in a partial loss of the load.

Note. If the apron door fails to close properly, back the scraper up a few inches and at the same time lower the apron and raise the bowl. As the bowl is raised, the apron will usually drop into the completely closed, carrying position.

h. Large Rocks and Stumps. Rocks and stumps that are too large for the tractor and scraper to pass over can be loaded into the scraper. Load large rocks or stumps by handling the scraper as follows:

- (1) With the apron raised and the tilt floor in the rear position, move forward with the tractor and scraper, heading straight toward the rock or stump.
- (2) Just before the tractor reaches the object, turn sharply either to the right or to the left, and start to move past the object along either side.
- (3) When the front wheels of the scraper have moved up alongside the object, turn the tractor sharply toward the rock or stump and at same time lower the blade to the ground. By turning the scraper in this manner, the front wheels will pass around the object but the blade will swing in behind it.
- (4) Turn the tractor back into its original direction of travel and, with the rock or stump between the front wheels and the blade, pull forward, loading the object into the bowl of the scraper.

Note. It is sometimes necessary to load a little dirt into the scraper after the object is loaded in order to push the object far enough into the bowl to allow the apron to close.

- (5) Unload the rock or stump by using the regular unloading procedure.

Note. If in unloading, a large rock should be tilted up inside the bowl so that it will not pass under the apron, it is necessary to return the tilt floor to the rear to allow the rock to settle back to its flat position.

- (6) After the object has fallen out, turn the tractor and back up so that the front wheels or the front axle structure will not hit the object when pulling away.

i. Making Side Hill Cuts.

- (1) Start a side hill with the scraper by approaching the slope stakes from the lower side of the slope and at a right angle to the row of slope stakes.
- (2) When the front of the tractor reaches the line of stakes, swing the tractor around parallel to the slope stakes and at the same time lower the scraper blade into the ground. As the tractor moves forward, the scraper will also turn parallel to the row of slope stakes and the side of the blade nearest the stakes will cut into the hill.
- (3) Repeat the operation above till there is a level bank on which to start loading.

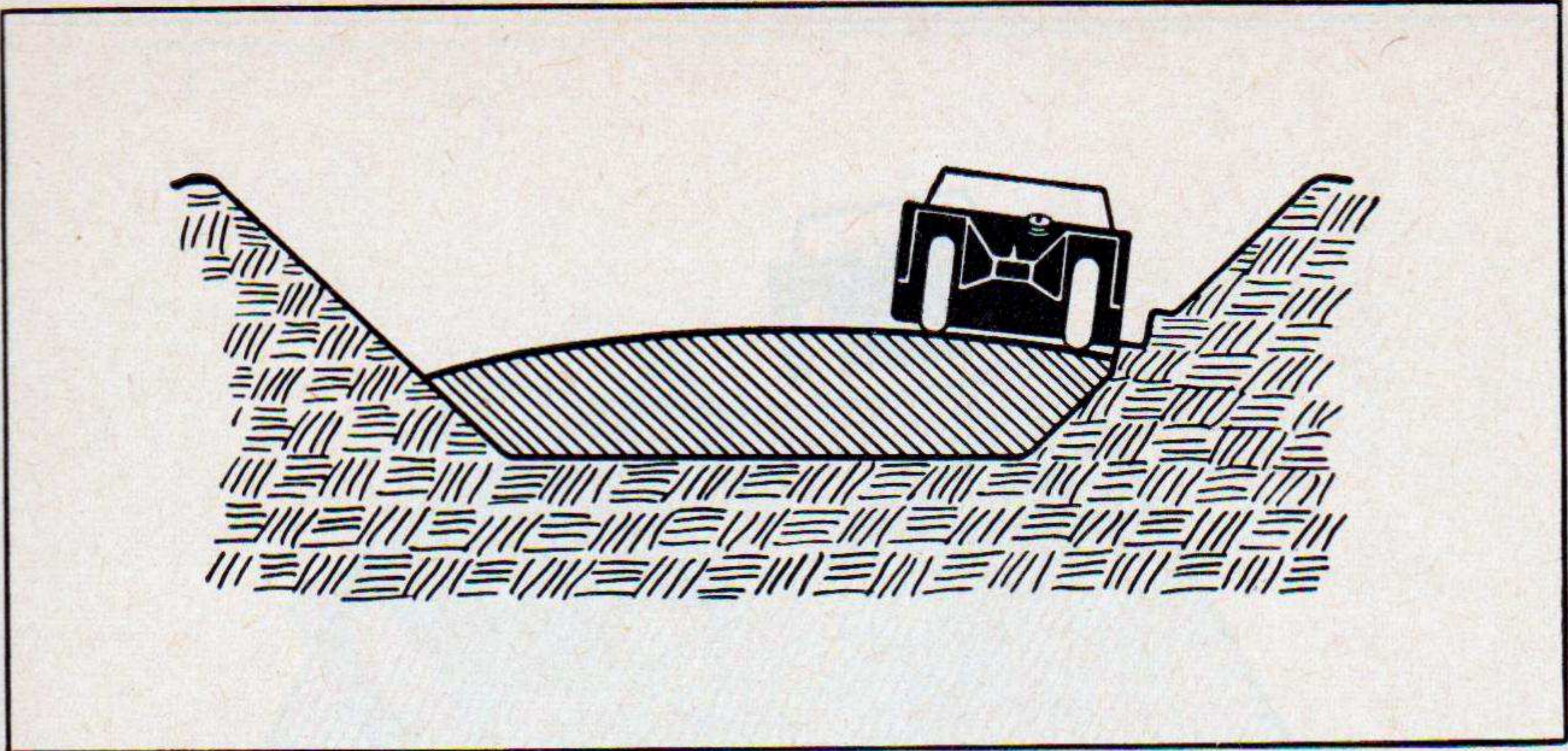


Figure 13. Making through-hill cuts.

Note. Always keep a side hill cut low next to the bank and high on the outside. The result will be a neat, easily controlled slope with a minimum of finishing necessary.

- (4) To make the side of the cut slope down at the desired angle, follow the procedures of “stepping” in away from the bank or slope with each successive depth of cut, as covered in paragraph *j*, making through-hill cuts. If the slope finishing is done with a scraper, the finishing operations should be done as the work progresses. For finishing instructions see paragraph *m*.

j. Making Through-Hill Cuts (fig. 13). In making through-hill cuts, always keep the cut low next to the slopes or sides of the cut and high in the center. This will help maintain a better slope and also make the loads larger and more uniform. Plan the work so that the sides of the cut, slope down at the desired angle. This can be done by “stepping” in away from the bank or slope with each successive depth of cut, just enough to cause the slope to taper down at the desired angle. The slope can be finished by the scraper, or by other accepted methods of back-sloping. If finishing with a scraper, the slope should be finished as the cut progresses, or, in other words, the newly cut part of the slope should be finished each time that the unfinished part reaches a width or height equal to the width of the scraper blade. For finishing instructions see paragraphs *l* and *m*.

k. Building a Fill (fig. 14). In building a fill, it is important to keep the outside or shoulders of the fill higher than the center. This prevents the scraper from sliding over the shoulder when dumping close to the edge. It also helps make the sides of the fill slope at the correct angle as the fill is built up. When the shoulders have reached grade level, the center can be filled quickly just before the final leveling and finishing.

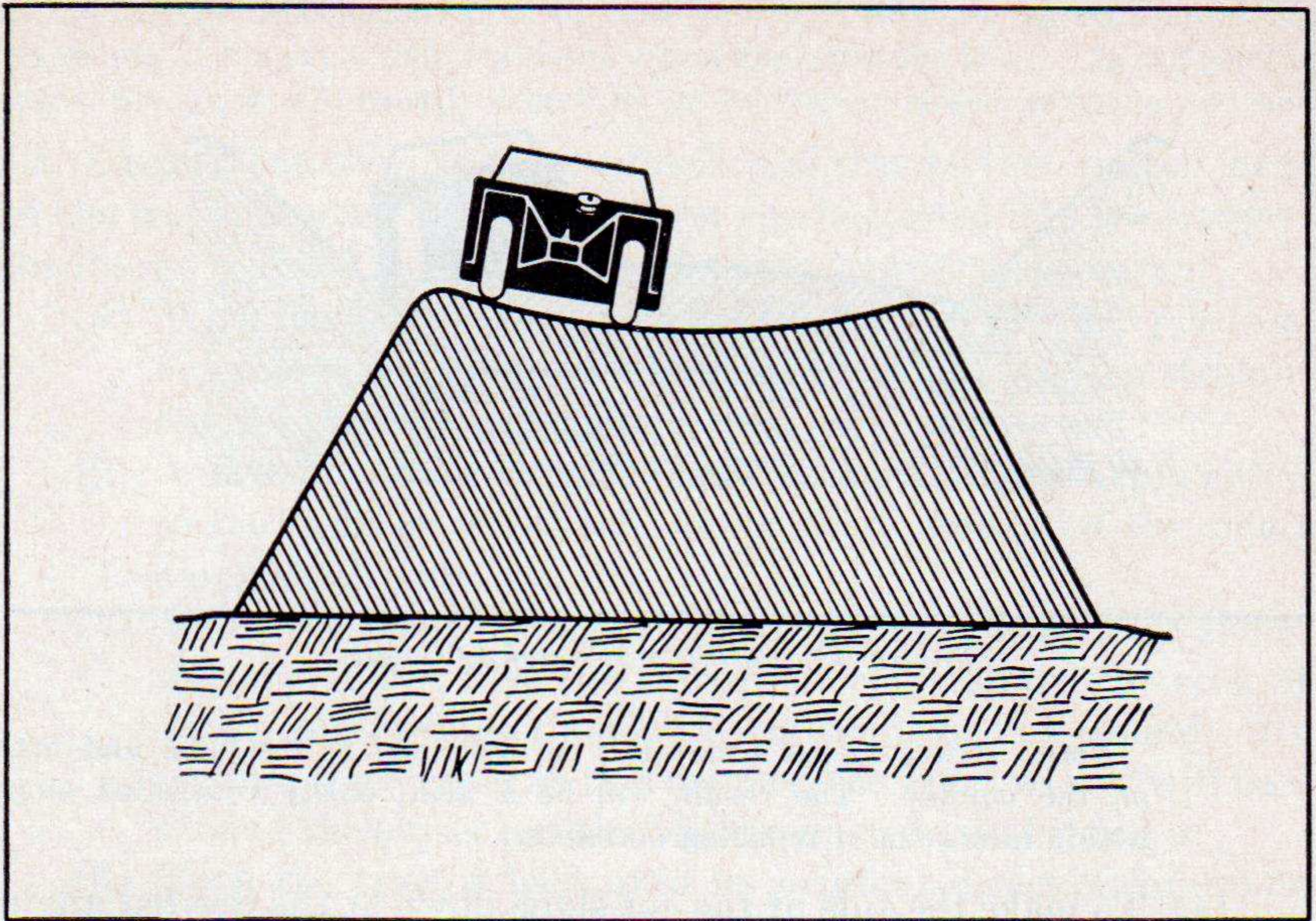


Figure 14. Building a fill.

Note. When building a fill, always fill in the low center before closing down the job for the night, or any period of time. The filled center will provide better drainage in the event it should rain.

l. Finishing Level Ground. For preliminary finishing where it is necessary to skim off dirt in some spots and fill in others, the scraper can be operated in somewhat the normal manner. That is, pick up part of a load at one spot and spread it at another. To do final finishing, raise the tilt floor forward to within approximately 8 inches of its extreme forward position. The scraper can then be used similar to an angledozer, bulldozer or grader.

Note. Keep the tires inflated to equal air pressure. Unequal tire pressures will cause the blade to cut low on one side.

m. Finishing Slopes (fig. 15). Slopes that are not too steep can be finished with a scraper without difficulty. For best results and greater safety, the slope should be finished as the work progresses. Each time that the scraper has cut the slope down far enough to cause the unfinished part of the slope to equal the approximate width of the scraper blade, it should then be used to finish the unfinished part by running one tractor track and one side of the scraper up onto the slope with the other track and wheels running along the bottom of the slope. To finish the slope pull the tilt floor forward within 8 inches of its extreme forward position. With the scraper set properly on the slope and tilt floor positioned the scraper can travel along

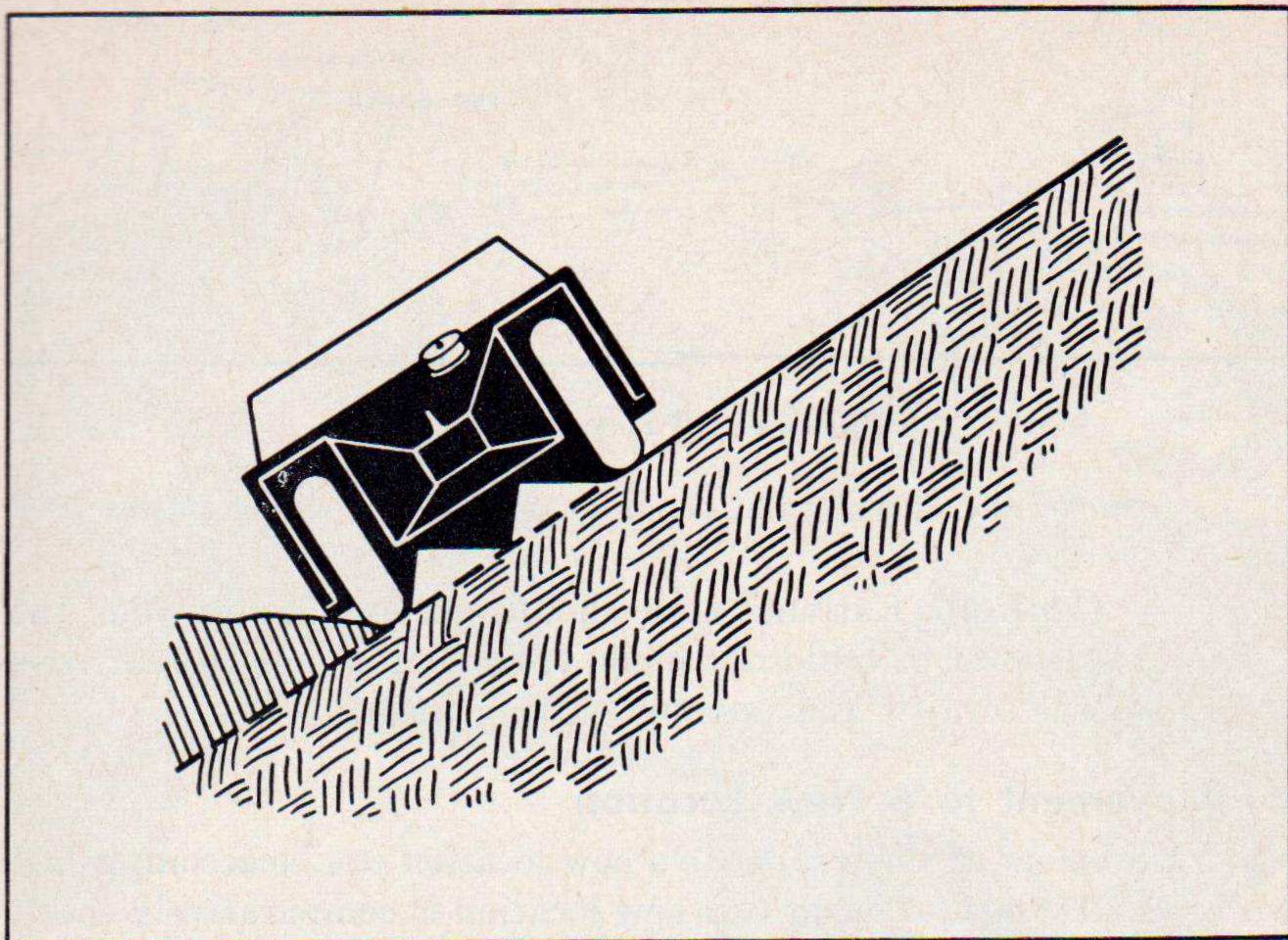


Figure 15. Finishing slopes.

the side of the slope, skimming off the surplus dirt, thus finishing the slope as you go.

Note. When finishing, do not attempt to load the bowl on a slope or the dirt will fall to the low side of the bowl, causing that side to cut deeper than the other and as a result dig a ditch in the slope.

n. Pusher Loading. The Heil scraper is equipped with a push bumper so that it can be pusher loaded by an angledozer or bulldozer. By using a pusher tractor when loading the scraper, larger loads can be obtained and the loading time decreased. Pusher loading also lengthens tractor life because less effort is required by the pulling tractor. The following procedures should be used when pusher loading.

- (1) The scraper operator should load the scraper in the normal manner when using a pusher tractor (fig. 16).

Note. It is highly important that operator of the scraper keep the units moving in a straight line in order to prevent them from jack-knifing.

- (2) When loading, operate the pulling tractor at wide open throttle.
- (3) The pusher tractor should synchronize with the pulling tractor so that it moves along with the scraper and assists in the loading.

Note. Whenever the pulling tractor starts to lug down, the pushing

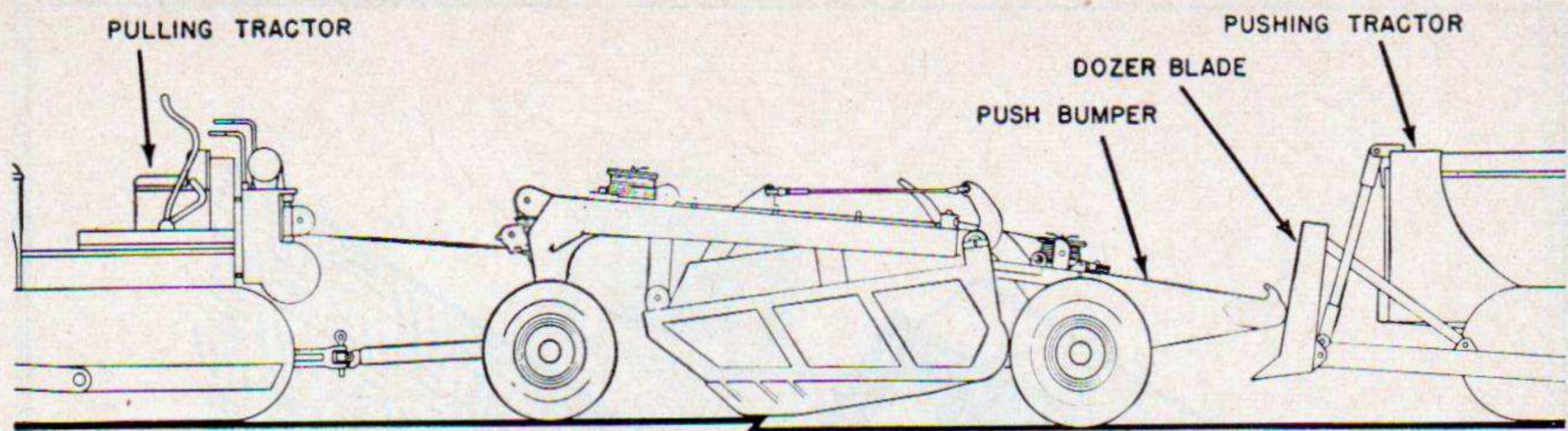


Figure 16. Pusher loading.

tractor should apply full power to prevent the pulling tractor from stalling.

Caution: Extreme care should be used to prevent the angledozer or bulldozer blade from contacting the rear tires of the scraper and possibly cutting them.

15. Movement to a New Location

The movement of the scraper to a new location can be accomplished two ways. If the movement to a new location is comparatively short, the scraper can be towed. However, if the distance of movement to a new location covers many miles scraper can be loaded onto a flatcar (fig. 4), or bed trailer, and hauled to the new site. Whichever method is used, prepare the scraper for travel by following the procedures below.

a. Install Safety Lock Plate. Raise the bowl to a height that will permit the installation of safety lock plate as shown in figure 8. Secure the lock plate to the sheave pins by installing the two cap screws and nuts.

b. Disconnect Cables from Power Control Unit. Disconnect the dump and hoist cable from the power control unit drums. After making the disconnection place the cable ends in the scraper bowl.

c. Move Scraper to New Location. After installing the safety lock plate and disconnecting cable from power control unit the scraper is ready for either towing or hauling to the new location.

Section IV. OPERATION OF MATERIEL USED IN CONJUNCTION WITH ROAD SCRAPER

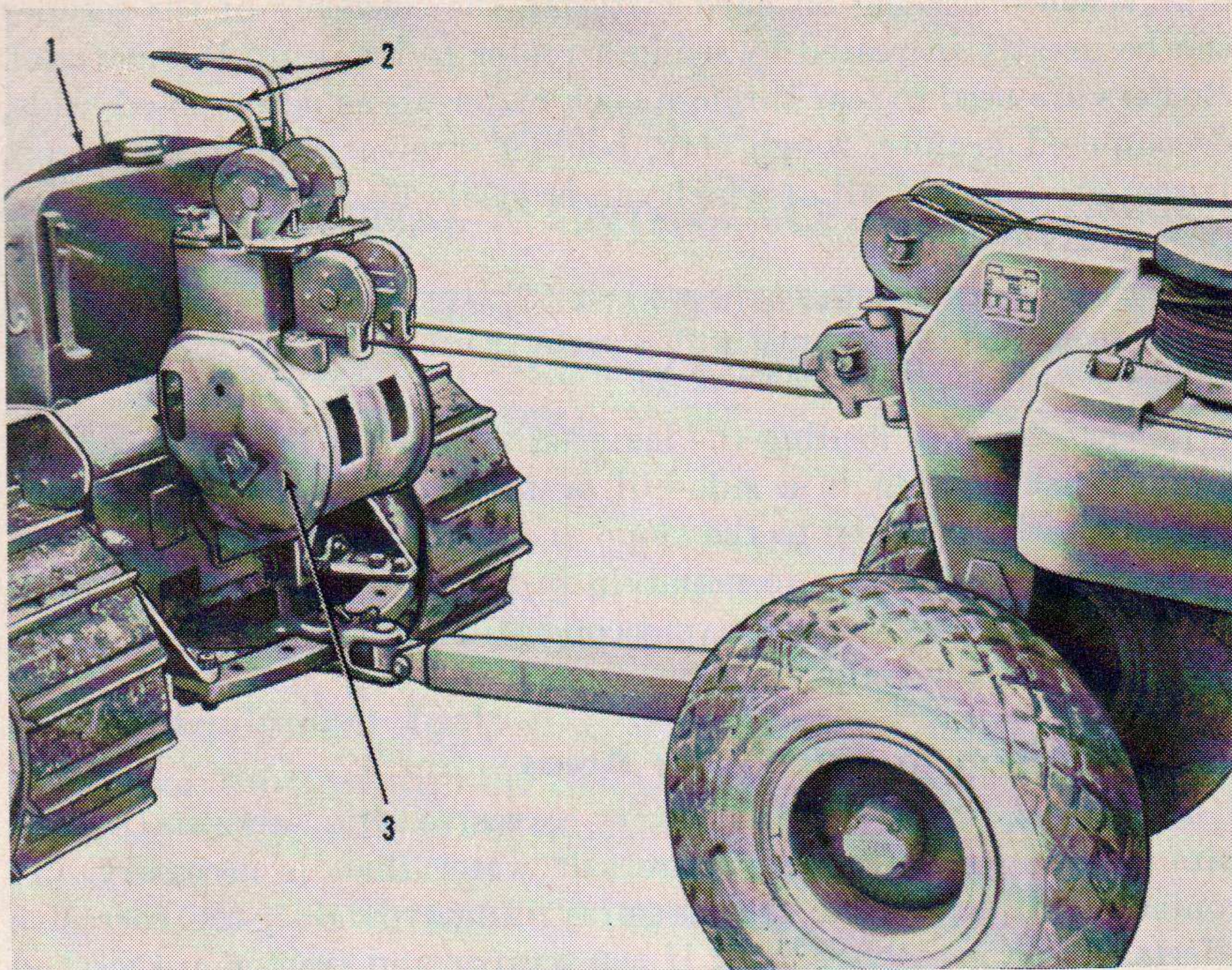
16. Tractor

The Heil OC-9 scraper is designed for use behind a crawler tractor of 60-75 hp. The tractor supplies all the working power for scraper work.

a. Starting. The type of tractor used for towing the OC-9 scraper will be the caterpillar D-7. For starting instructions see TM 5-3068.

b. Operation. For complete operating details see TM 5-3068.

c. Stopping. To stop tractor see TM 5-3068.



1. Tractor

2. Power unit controls

3. Power control unit

Figure 17. Power control unit, mounted.

17. Power Control Unit

(fig. 17)

The Heil OC-9 scraper will be operated by the power control unit (3) that is attached to the Caterpillar D-7 tractor (1).

a. Operation. For operation of power control unit see TM 5-9957.

b. Adjustment. For proper adjustments of power control unit see TM 5-9957.

Section V. OPERATION UNDER UNUSUAL CONDITIONS

18. Operation on Hard or Frozen Ground

a. When operating on hard or frozen ground it may be necessary to use a roter to break up the top soil ahead of the scraper. Use lighter grease when operating in cold temperatures as specified in par 23.

Note. Be sure there is no load left in the bowl at end of a shift in cold weather, for it will freeze by morning and require thawing before the load can be ejected. When shutting down at night during cold weather lower the bowl onto planks rather than onto the ground. This will prevent the scraper bottom from freezing tight to the ground.

b. When operating on hard material, the efficiency of the scraper can be greatly increased by using a rooter to break up the material. Rooters are used to tear through such materials as decomposed shale, decomposed granite, tough clay, boulder strewn ground, black top, frozen ground, etc., all of which can be easily loaded into the scraper if properly rooted.

Note. Rooting with fewer teeth provides deeper penetration and larger breakage in tough ground. Rooting with a larger number of teeth will provide a shallow penetration and finer breakage.

For best scraper loading the material should not be broken up too fine. When rooting in a side-hill or through-hill cut, always root parallel with and close to the slope and work away from the slope. This allows the scraper to maintain proper slopes as the work progresses. Plan this work to avoid congestion and interference of the scrapers with the rooters.

19. Operation in Salt Water Areas

a. *General.* Salt water has a very corrosive action on metal. Take care to avoid contact with more salt water than is necessary. If contact with salt water or salt spray is unavoidable, the corrosive effects can be greatly reduced if the scraper and tractor are washed down with fresh water as soon as possible after exposure.

b. *Operation.* Operation of the tractor and scraper will be governed by the type of material to be handled. See paragraph 14.

c. *Cleaning Interval.* If fresh water is available for cleaning vehicles, the scraper should be washed down as soon as possible after being wet with salt water. If the scraper is parked where it will be subject to salt water spray it will add to the life of the unit if it is washed with fresh water at least once a week.

CHAPTER 3

ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I. SPECIAL ORGANIZATIONAL TOOLS AND EQUIPMENT

20. Special Tools

The complement of standard tools issued with the scraper is all that the using organization needs to perform its required work. Therefore no special service tools are needed.

21. On-Equipment Tools

The tools supplied with the Heil OC-9 scraper are those illustrated and listed in Appendix III of this manual.

Section II. LUBRICATION AND PAINTING

22. General Lubrication Information

a. LO 5-1343 prescribes first and second echelon lubrication maintenance for the Heil Model OC-9 Scraper.

b. A lubrication order is published for each item of equipment. The lubrication order shown in figure 18 is a reproduction of an approved lubrication order for this scraper. For the current LO 5-1343, refer to SR 310-20-4.

c. Lubrication orders prescribe approved first and second echelon lubrication procedures. The instructions contained therein are mandatory.

23. Detailed Lubrication Information

a. Care of Lubricant. All lubricants used on the scraper should be kept clean. When lubricating take care that dirt and dust will not enter containers. After using lubricants, the containers should be tightly sealed and stored in such a place that will prevent contamination from dirt and water.

b. Points of Application. Follow the detailed lubrication instructions given beneath each lubrication point illustration. Each of these indicate the procedures to be followed at each point. Apply the lubricant indicated on the lubricant chart.

c. Cleaning. If the scraper has worked in muddy areas it is advisable to wash or steam clean the scraper before lubrication. If the

LUBRICATION ORDER
LC 19-40AAD-9

LO 5-1343
9 September 1953

**SCRAPER, ROAD, TOWED TYPE, CABLE OPERATED,
8-CU YD, HEIL MODEL OC-9**

Reference: TM 5-1343, TB 5-1343-1

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

Clean fittings before lubricating.

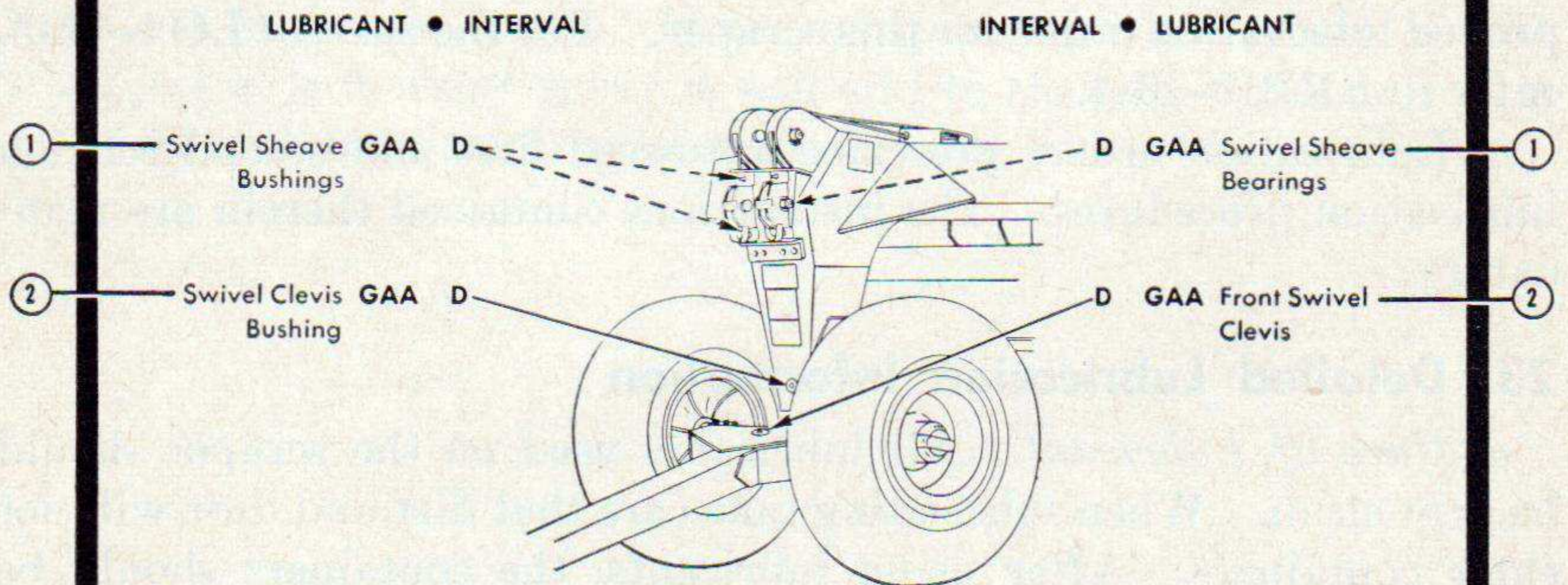
Relubricate after washing or fording.

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

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

— KEY —

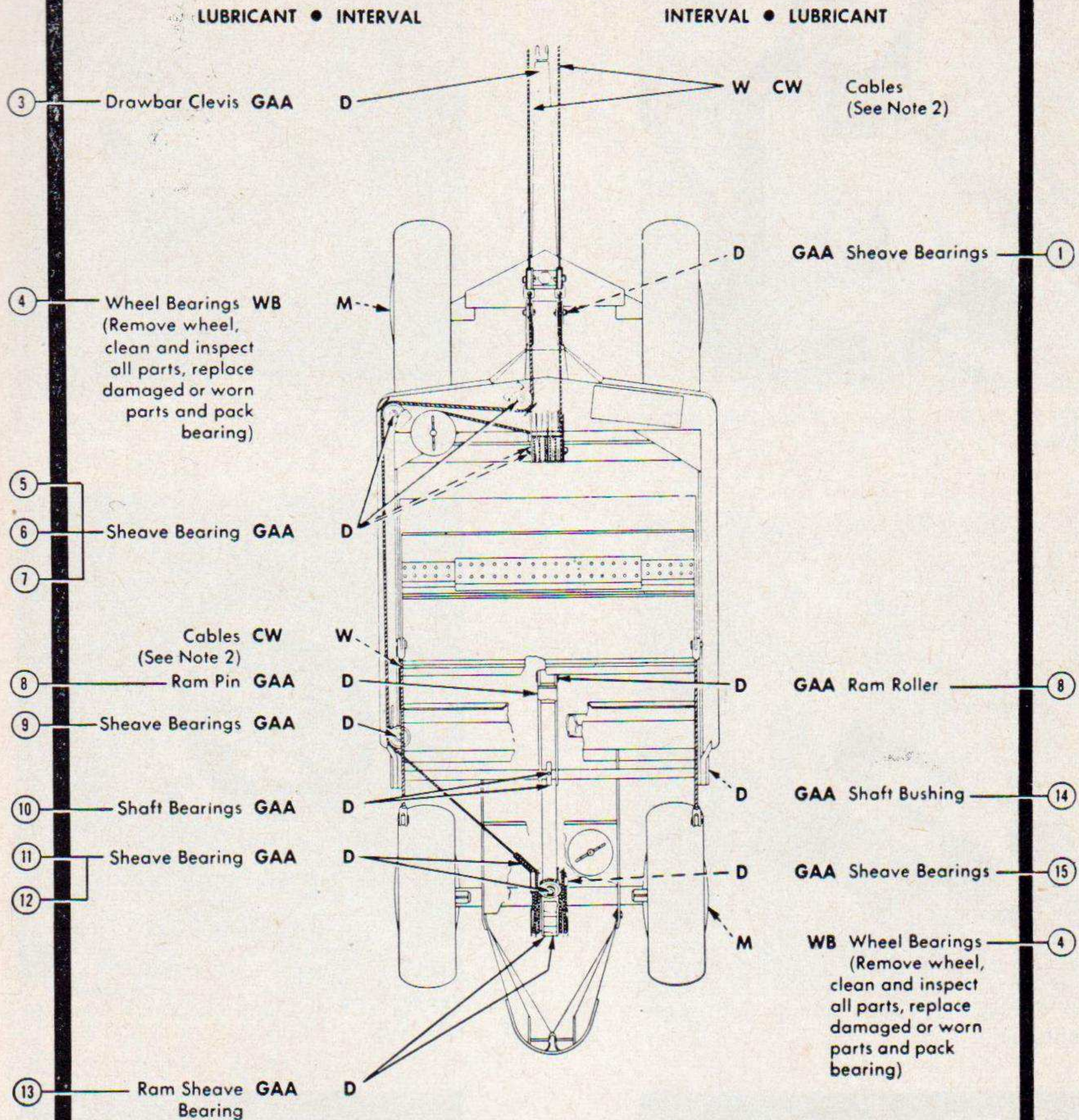
LUBRICANT	EXPECTED TEMPERATURES			INTERVALS
	Above +32 F	+32 F to -10 F	Below -10 F	
WB—GREASE, General Purpose, No. 2	WB 2	WB 2	GAA	D—Daily W—Weekly M—Monthly
GAA—GREASE, Automotive and Artillery				
CW—Lubricant, Exposed Gears and Wire Rope				



CONTINUED ON
FOLLOWING PAGE

Figure 18. Lubrication order.

CONTINUED FROM
PRECEDING PAGE



NOTES:

1. FOR OPERATION OF EQUIPMENT IN PROTRACTED COLD TEMPERATURES BELOW -10° F. Clean parts with SOLVENT, dry-cleaning. Relubricate with lubricants INDICATED in the KEY for below -10° F temperatures.

2. CABLES—Weekly clean cables with SOLVENT, dry-cleaning, and wire brush. The CW-IIA should be heated and applied to cable liberally with brush.

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 SECRETARIES OF THE ARMY AND THE AIR FORCE

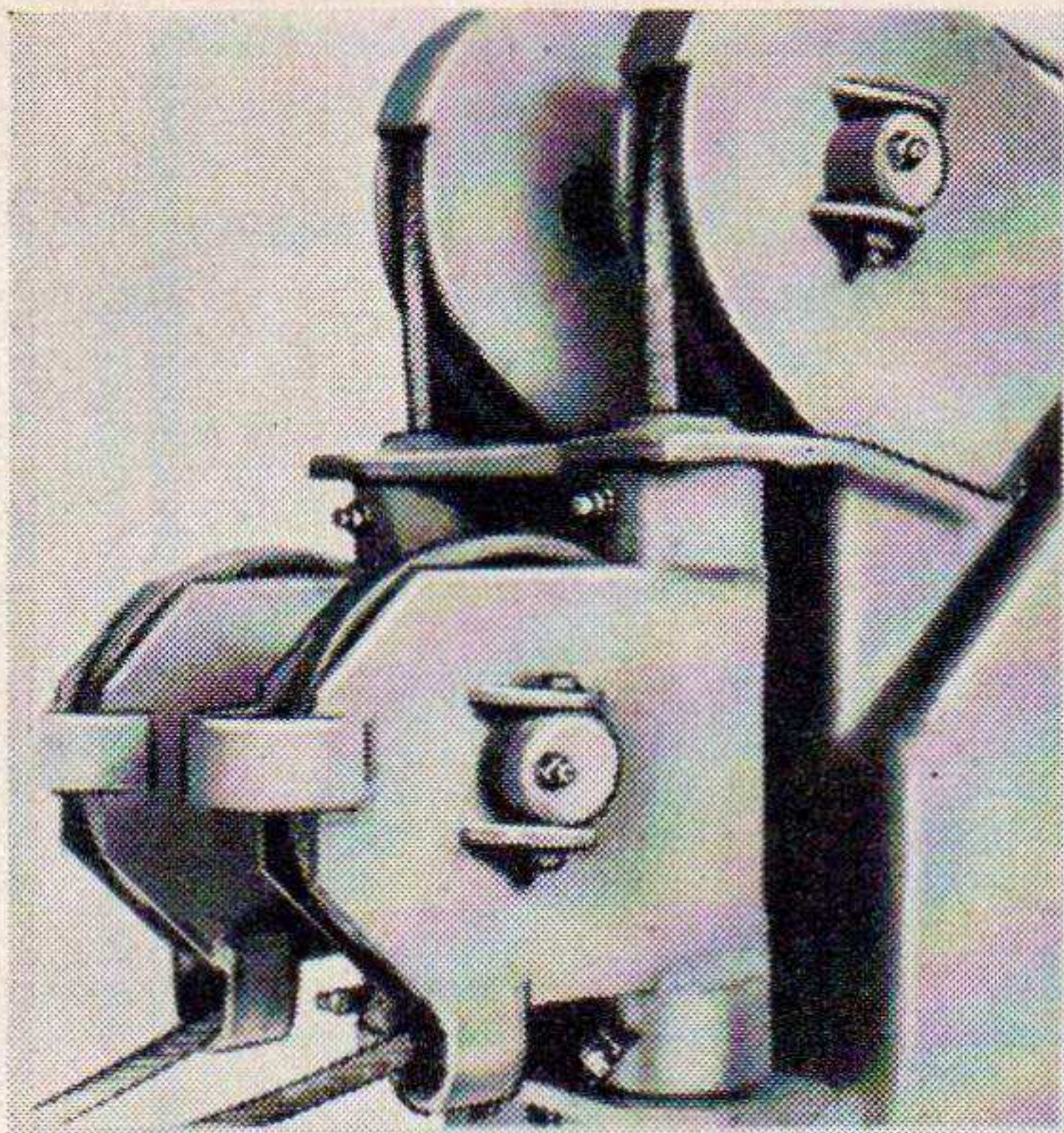
OFFICIAL:
WM. E. BERGIN,
Major General, United States Army
The Adjutant General

M. B. RIDGWAY,
General, United States Army,
Chief of Staff

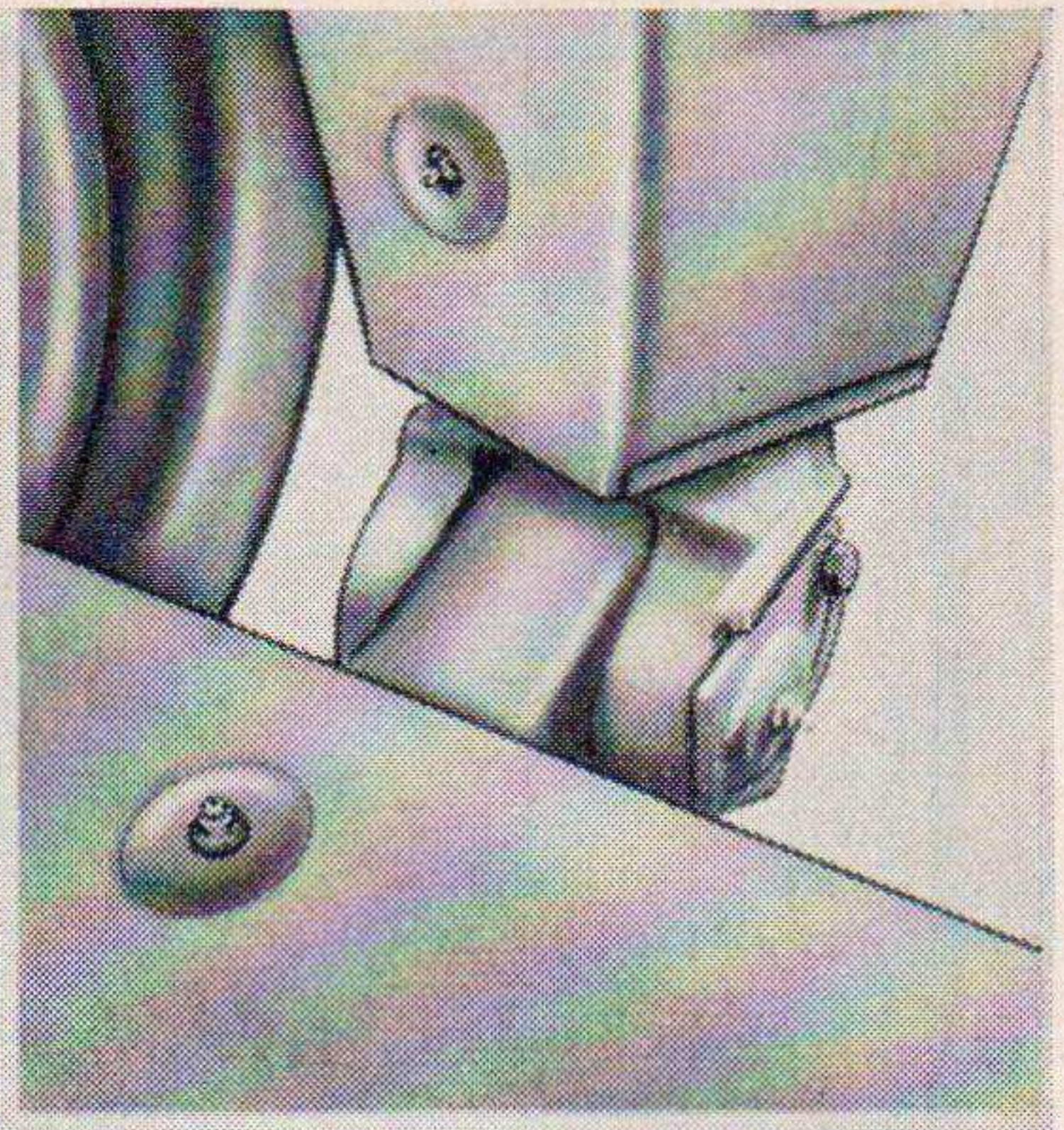
OFFICIAL:
K. E. THIEBAUD,
Colonel, United States Air Force,
Air Adjutant General.

N. F. TWINING,
Chief of Staff,
United States Air Force

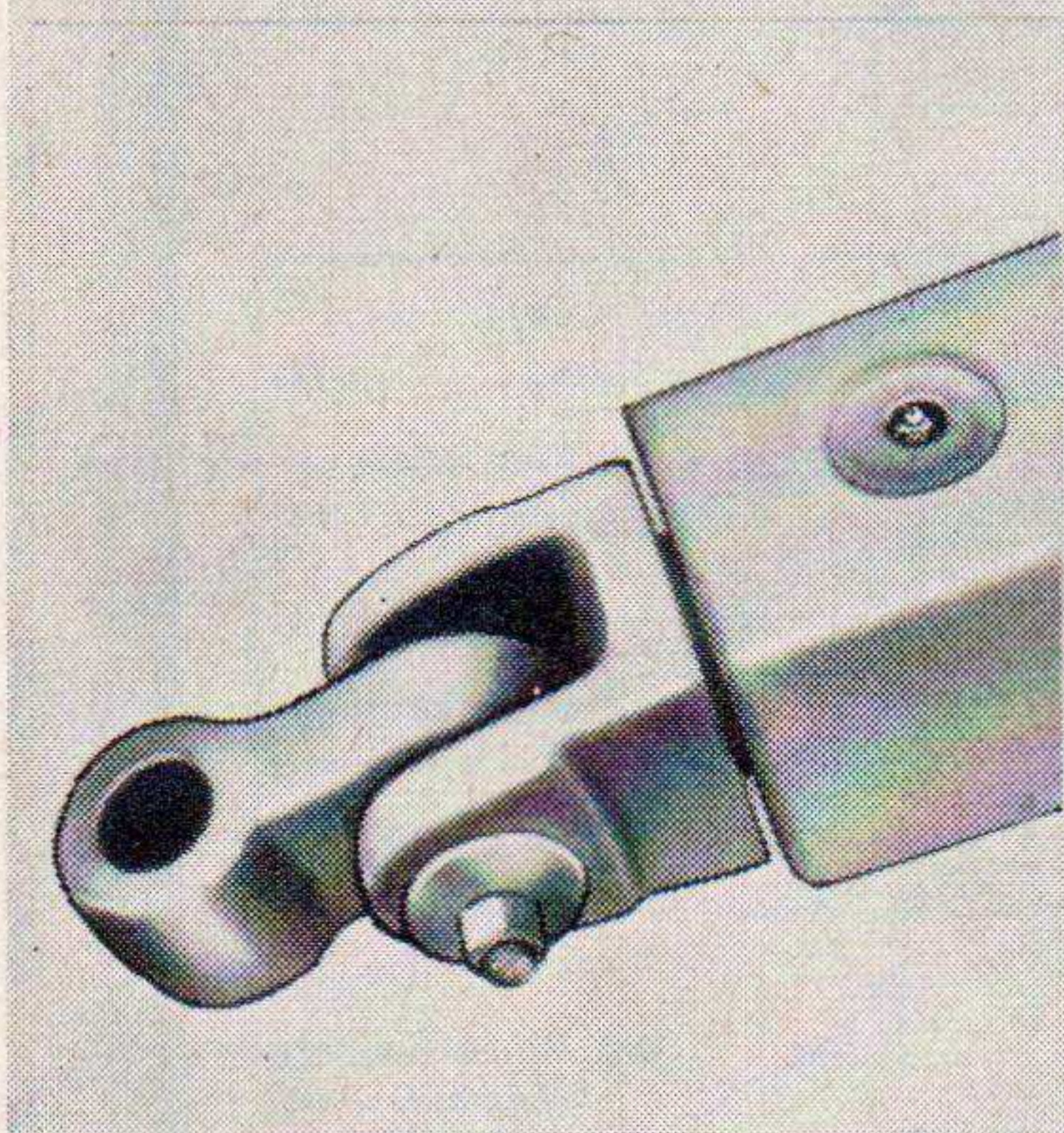
Figure 18. Lubrication order—Continued



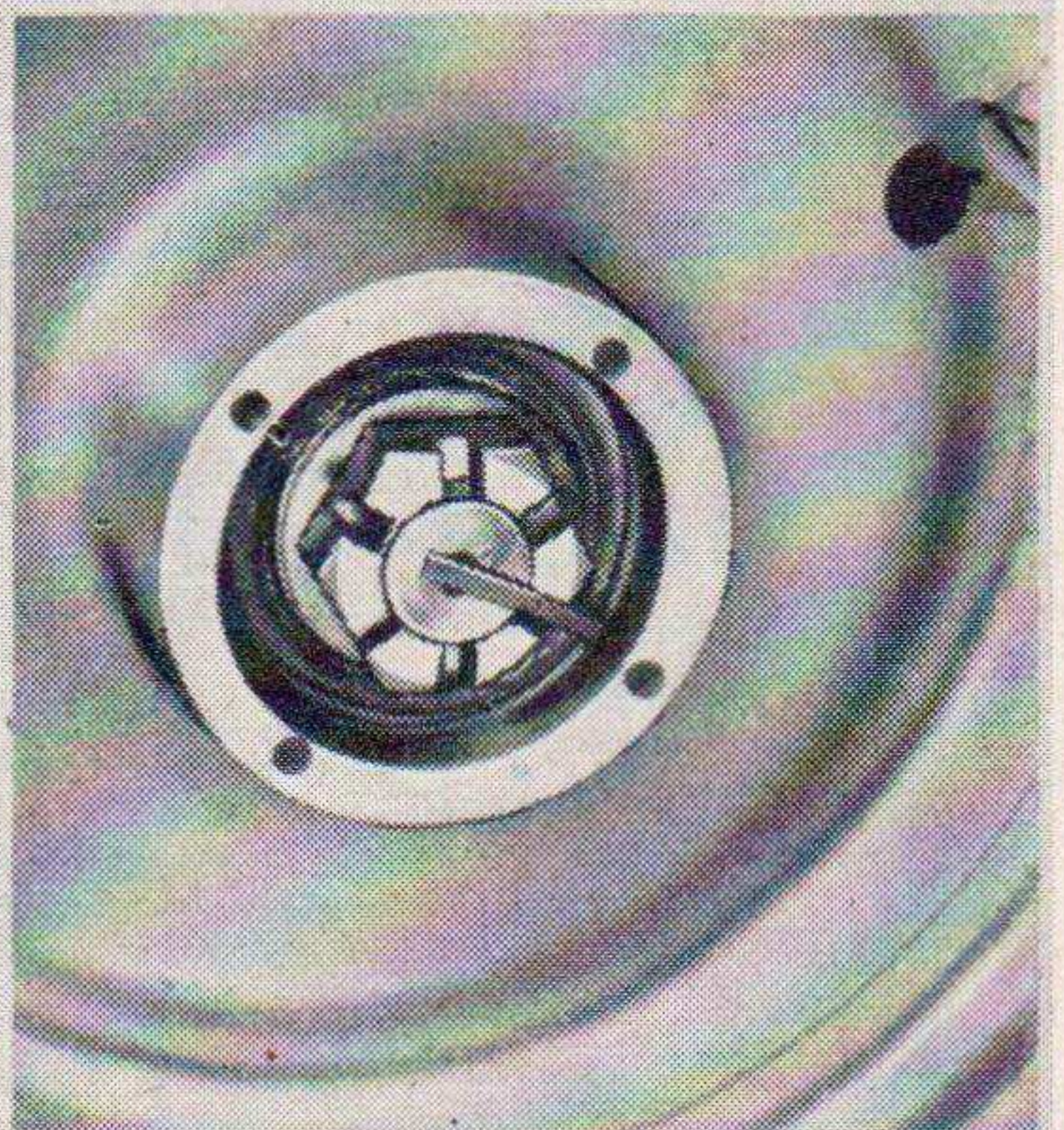
REFERENCE 1: Clean fittings and apply lubricant.



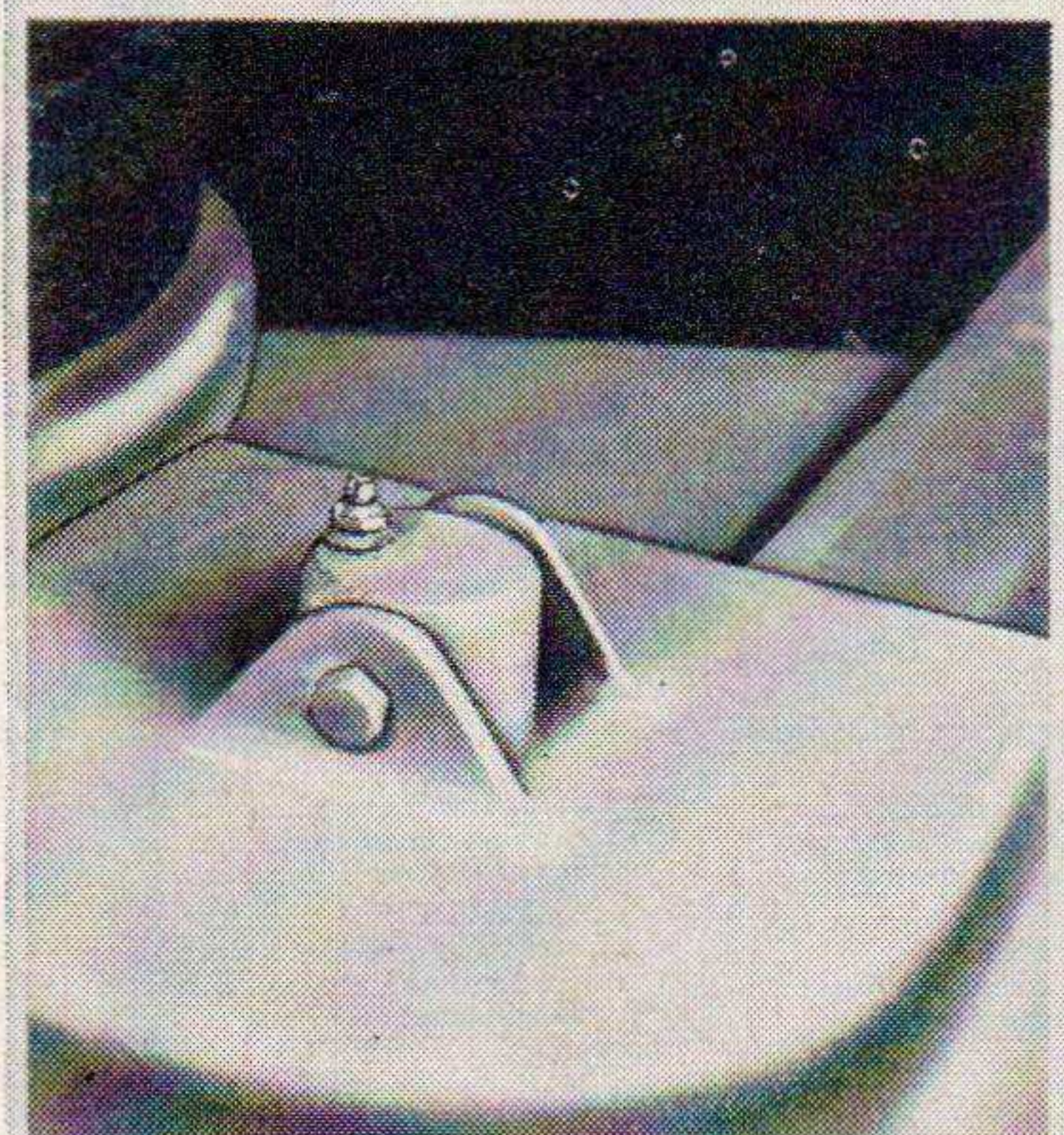
REFERENCE 2: Clean fittings and apply lubricant.



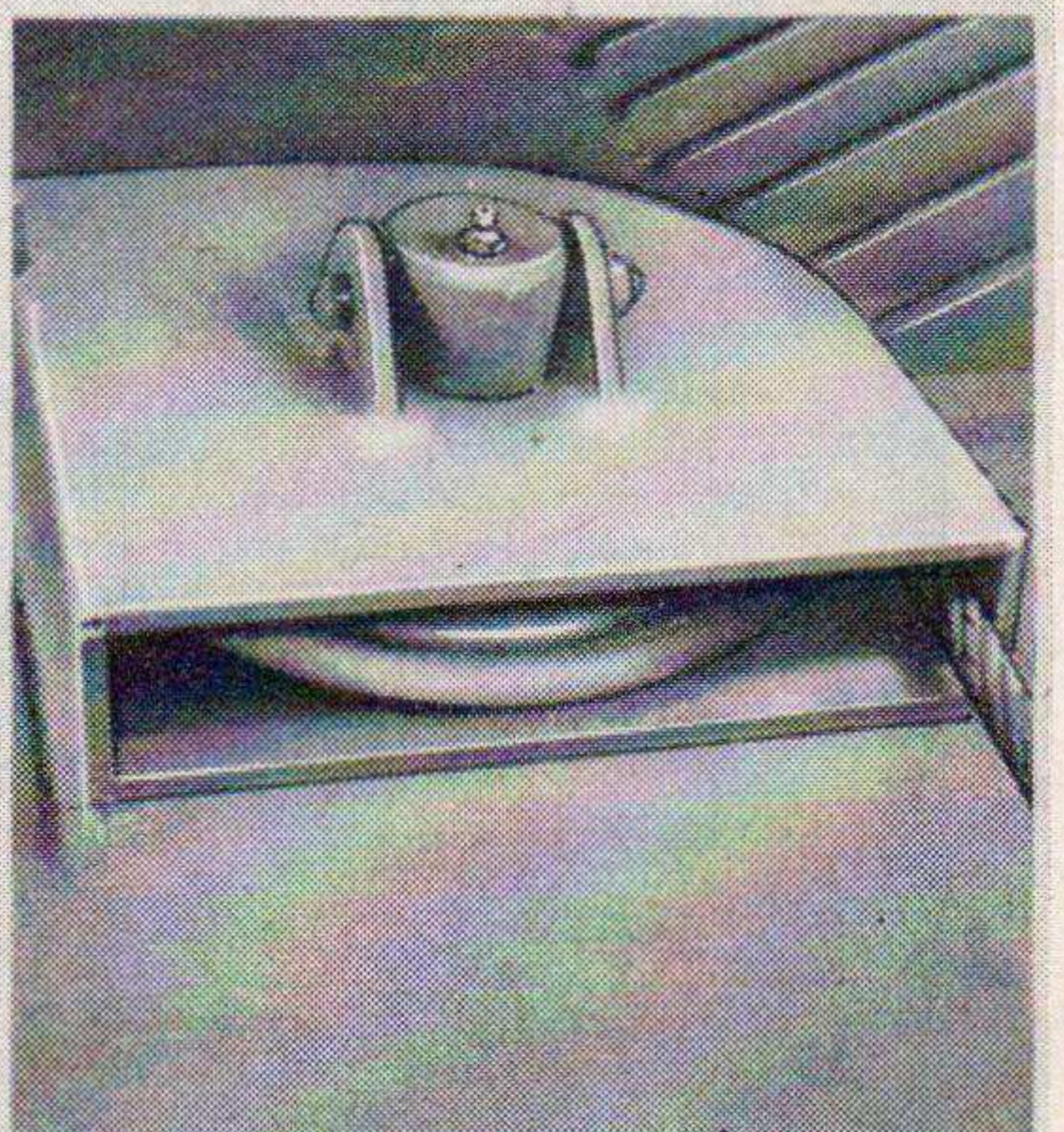
REFERENCE 3: Clean fittings and apply lubricant.



REFERENCE 4: Clean and pack bearings with WB.

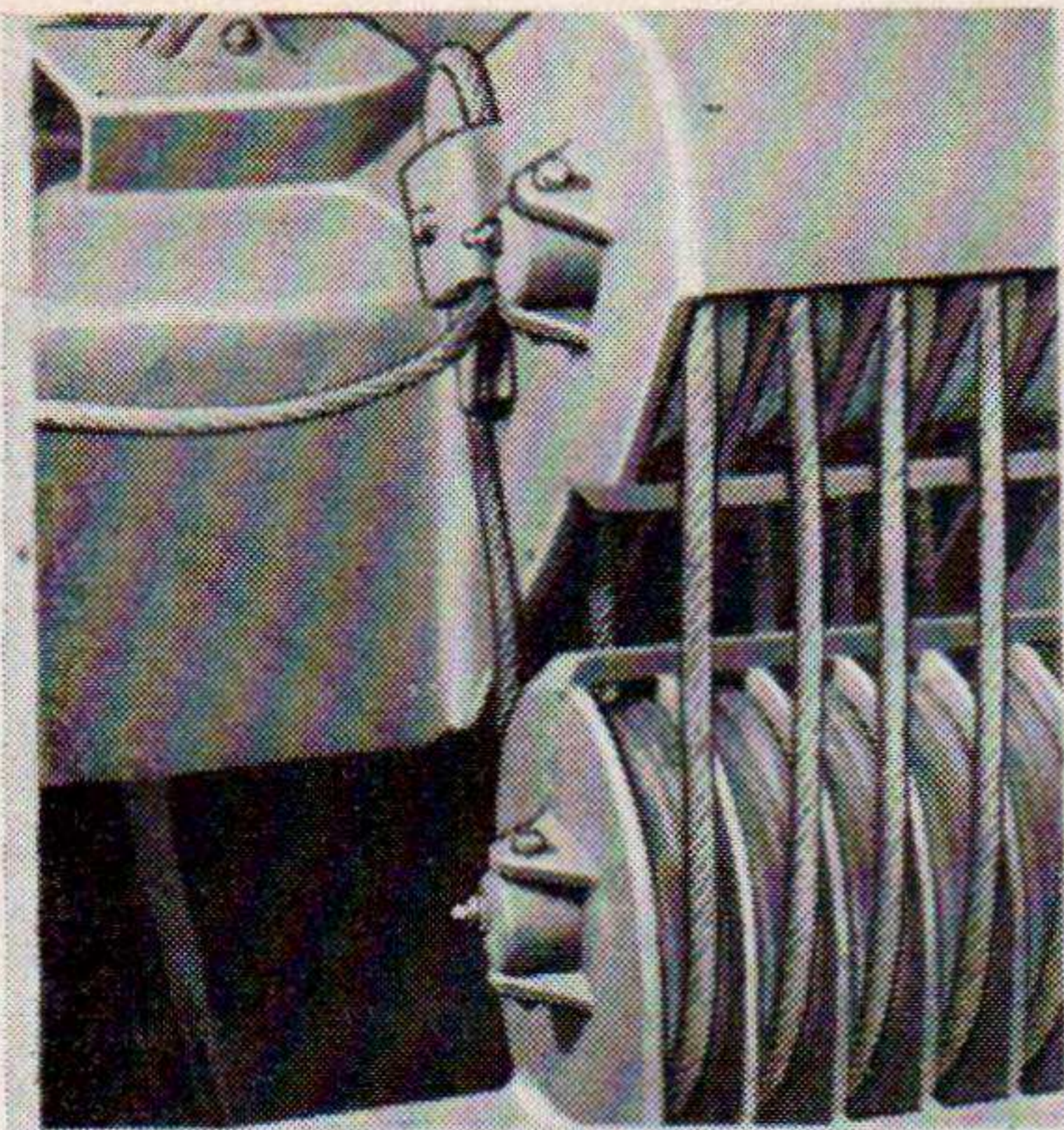


REFERENCE 5: Clean fitting and apply lubricant.

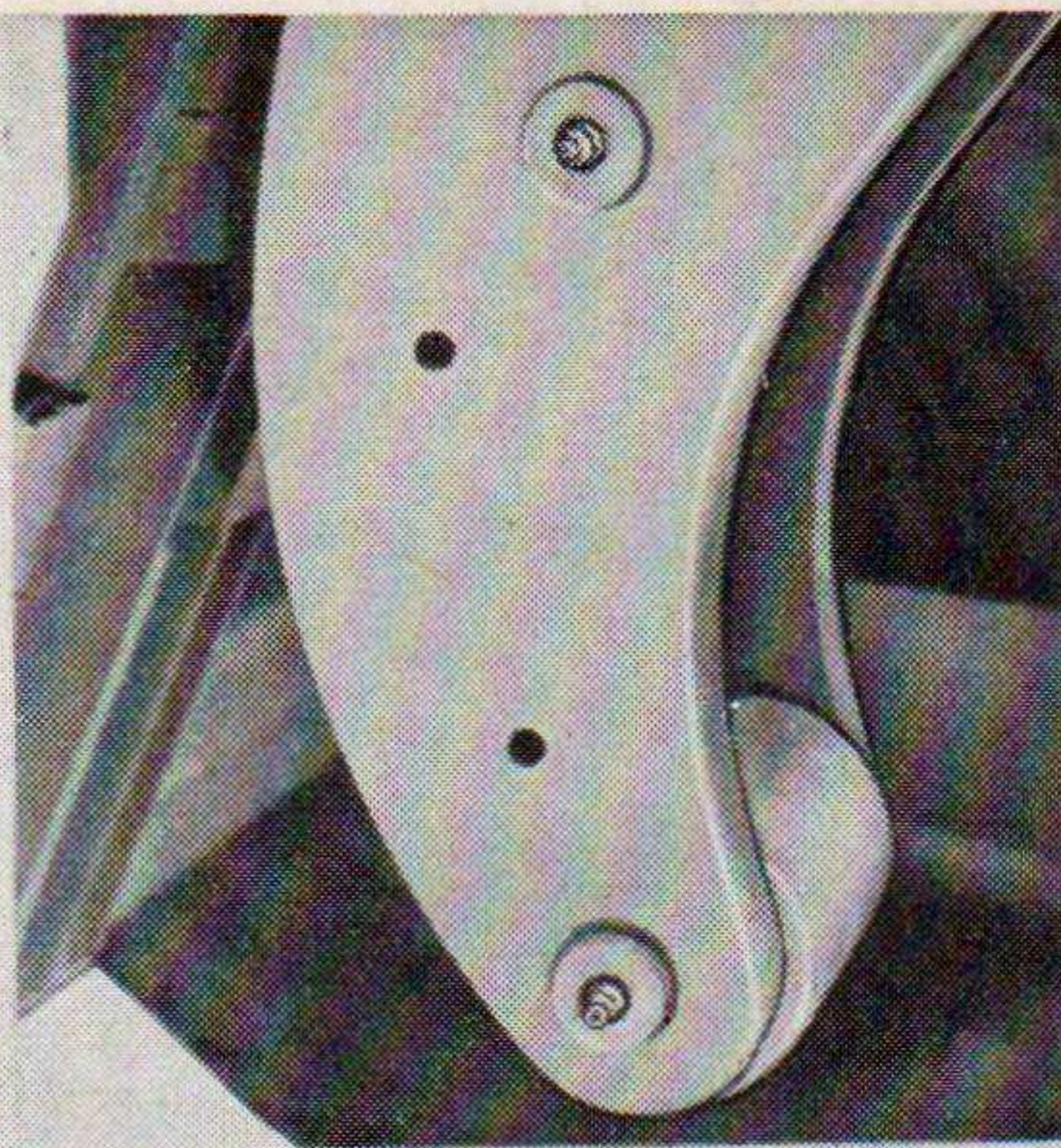


REFERENCE 6: Clean fitting and apply lubricant.

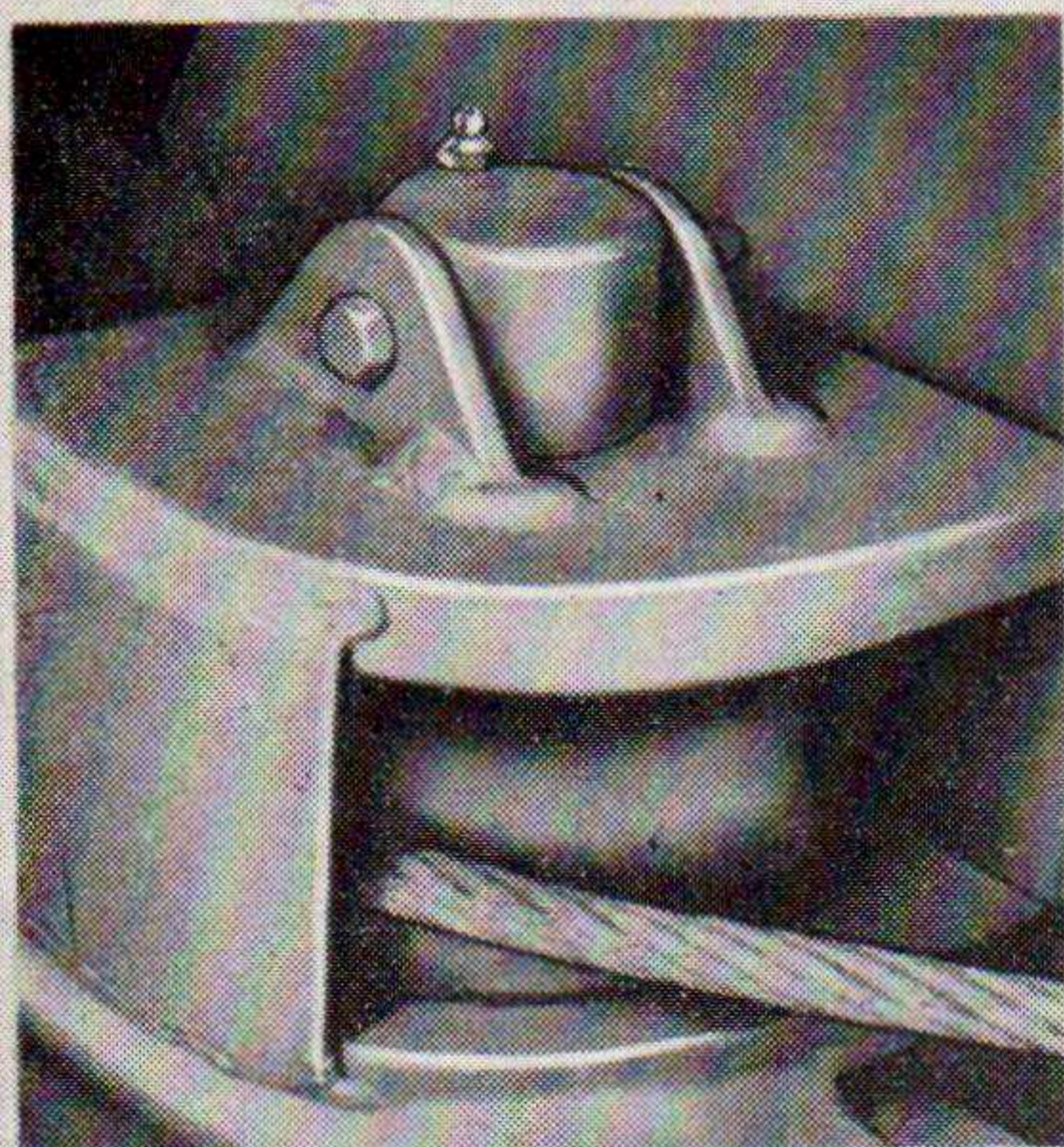
Figure 18. Lubrication order—Continued



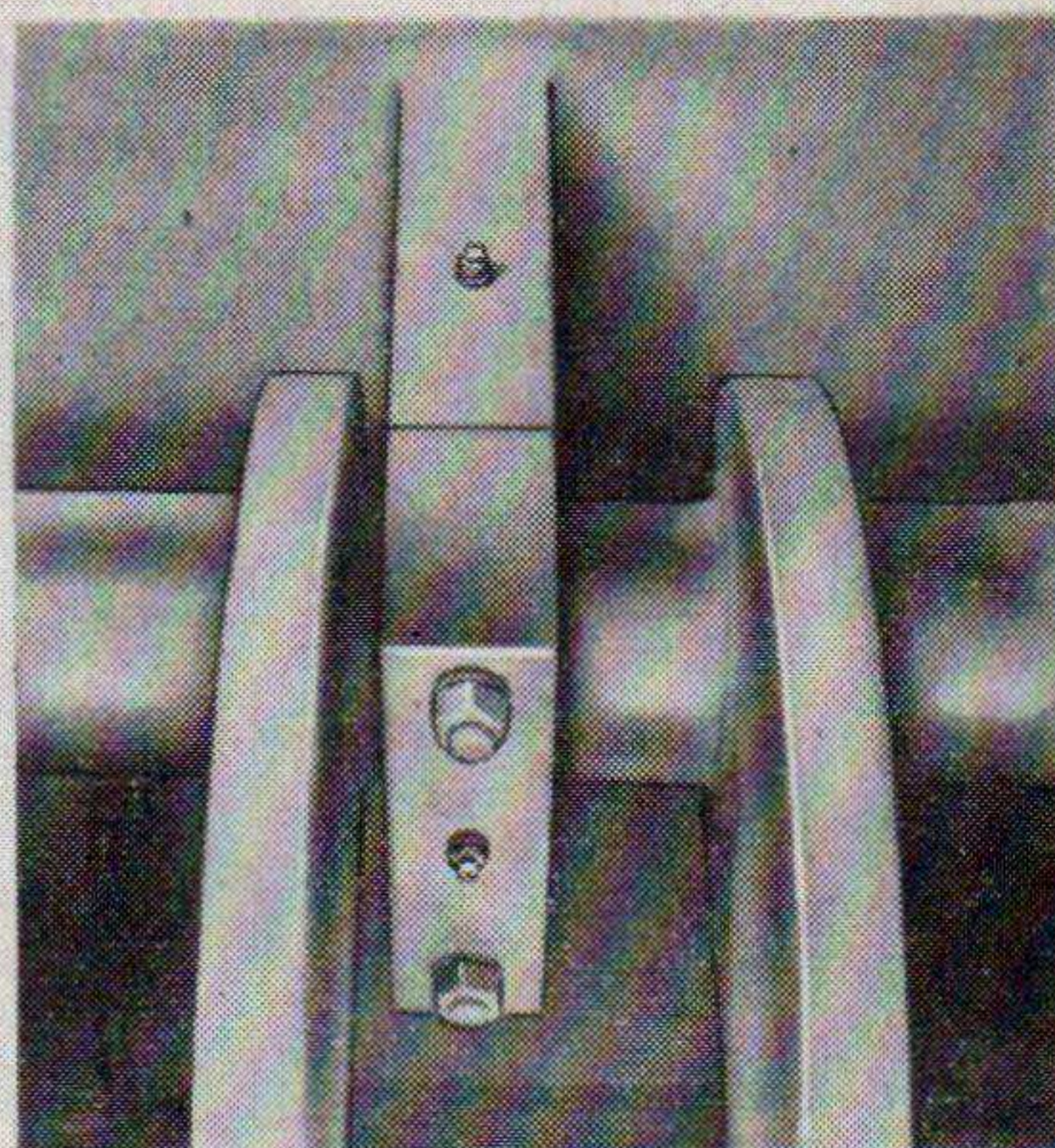
REFERENCE 7: Clean fittings and apply lubricant.



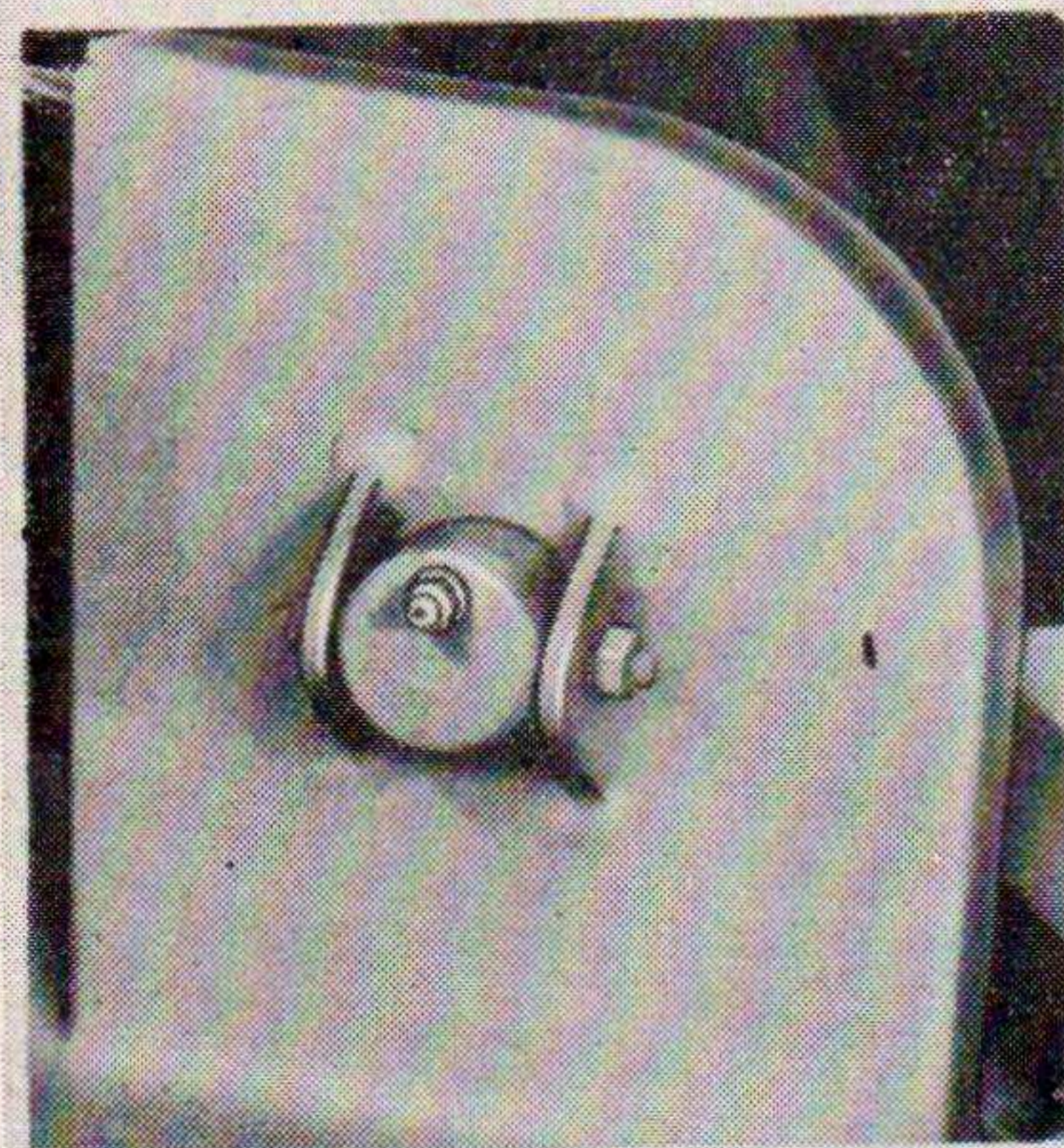
REFERENCE 8: Clean fitting and apply lubricant.



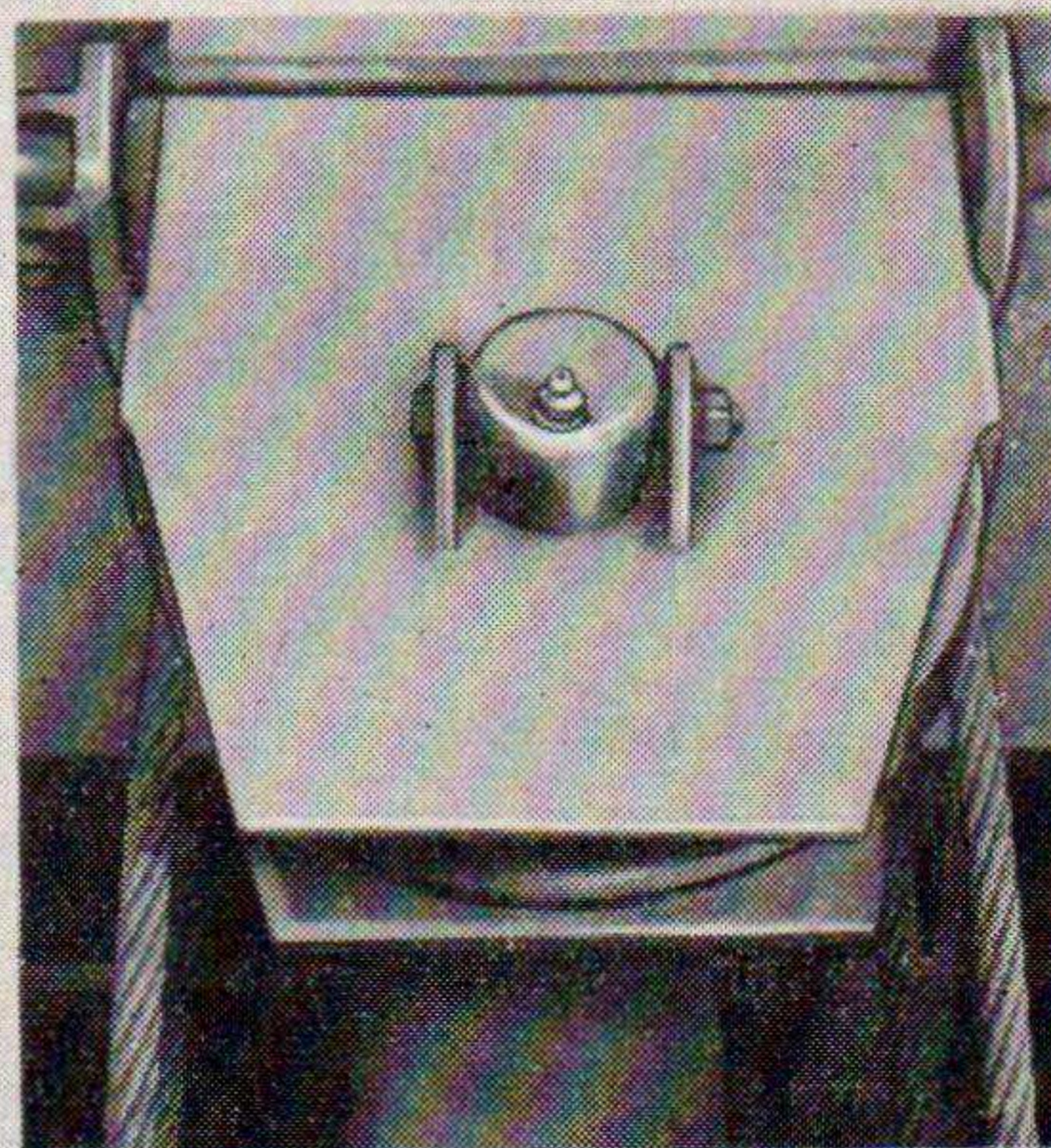
REFERENCE 9: Clean fitting and apply lubricant.



REFERENCE 10: Clean fittings and apply lubricant.

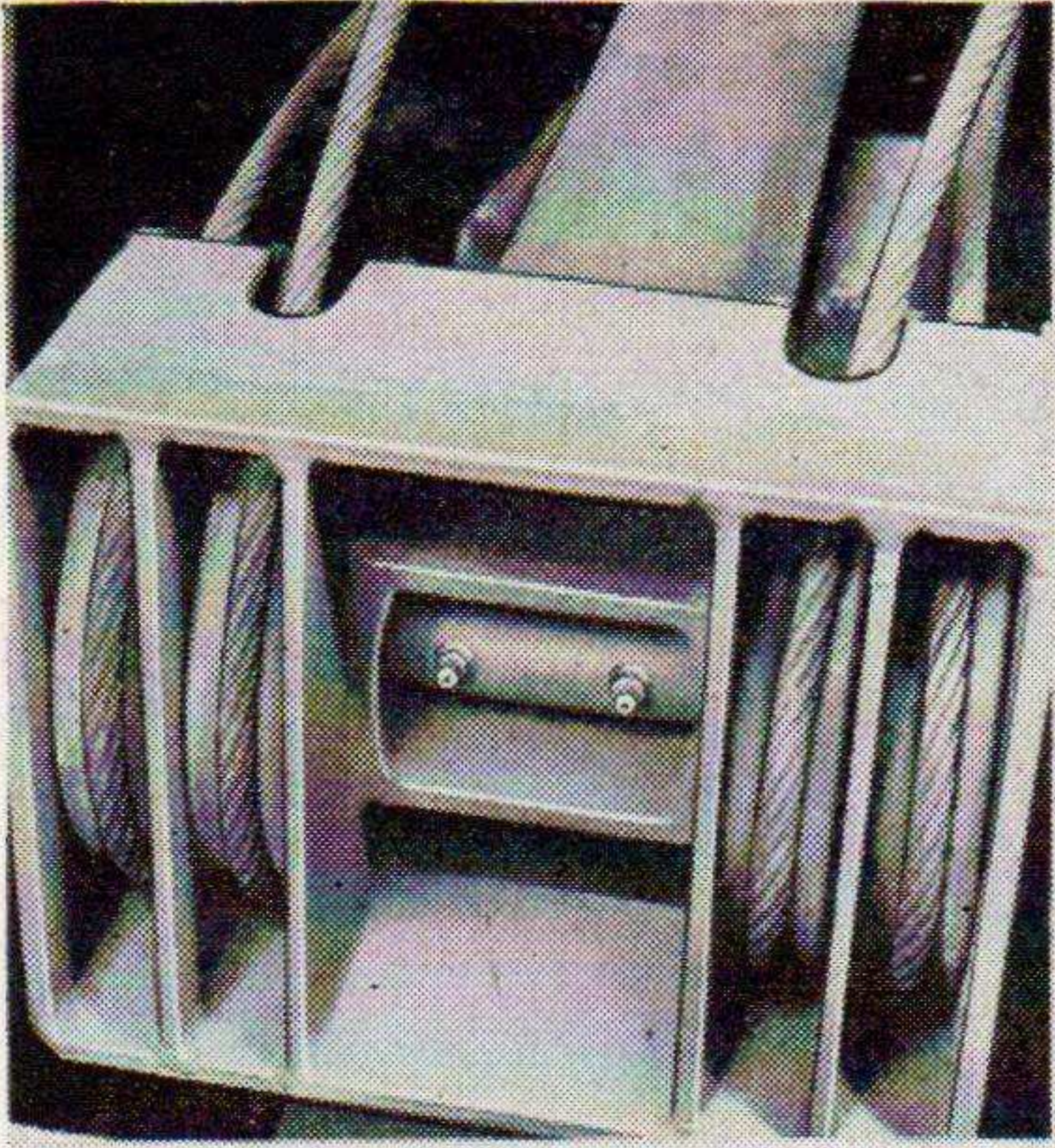


REFERENCE 11: Clean fitting and apply lubricant.

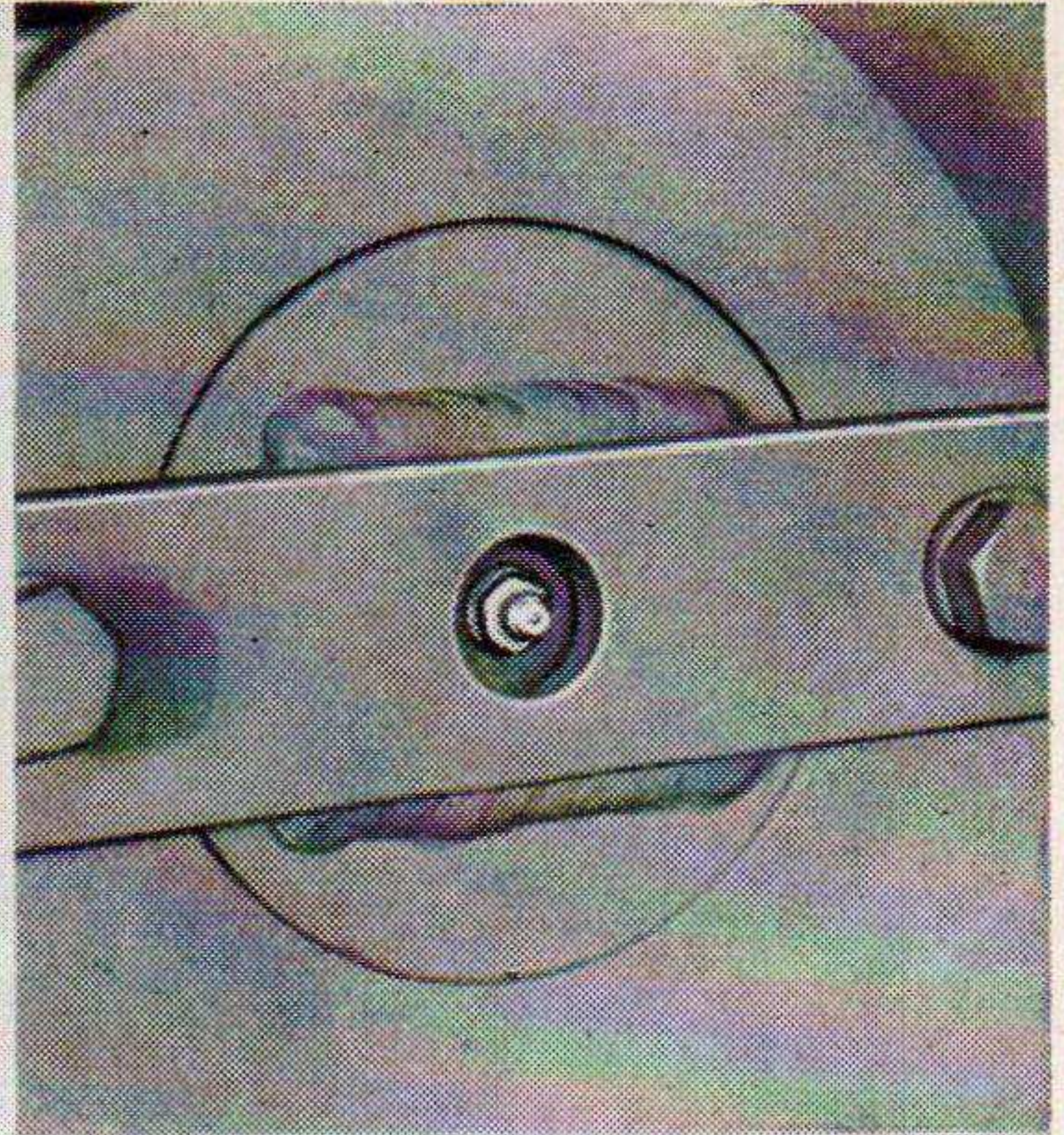


REFERENCE 12: Clean fitting and apply lubricant.

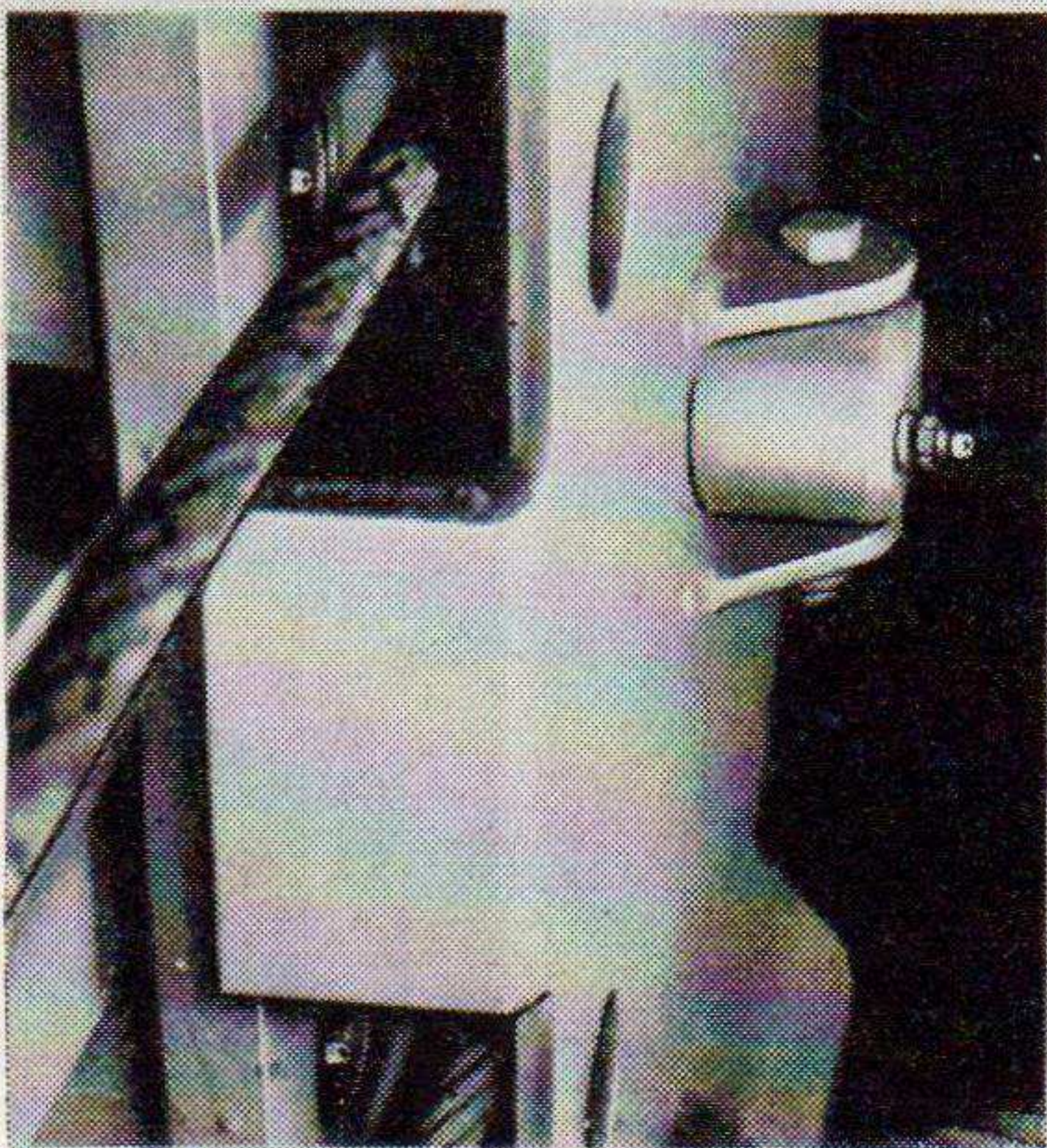
Figure 18. Lubrication order—Continued



REFERENCE 13: Clean fittings and apply lubricant.



REFERENCE 14: Clean fitting and apply lubricant.



REFERENCE 15: Clean fittings and apply lubricant.

Figure 18. Lubrication order—Continued

unit is fairly clean it will only be necessary to wipe off the grease fittings before applying clean grease.

d. Operation Immediately After Lubrication. If the scraper is hooked to a crawler tractor operate the bowl, front apron and tilt floor several times after lubrication is completed. This will help to work the clean fresh grease into pins, bearings, etc.

e. Cables.

- (1) Lubricant should be applied so that individual wires are protected from corrosion and excessive wear.
- (2) Make sure that cables are lubricated internally as well as externally.
- (3) The lubricant used should be thin enough to penetrate the inner wires and clinging enough to remain and lubricate them.

- (4) Clean cable thoroughly with kerosene and wire brush before lubricating.

24. Painting

a. The scraper shall be painted whenever the surface has been scratched, marred or defaced. Use wire cloth to clean and smooth the surface before painting.

b. Identification plates, machined surfaces, lubrication fittings, cables, and tires should not be painted and must be masked before applying paint. The painting requirements are standard procedure and are covered in TM 9-2851.

Section III. PREVENTIVE MAINTENANCE SERVICES

25. General

The operator of the scraper and the organizational maintenance personnel must perform their preventive maintenance services regularly, to make sure the scraper operates well and to lessen the chance of mechanical failure.

26. Operator Maintenance

a. Inspections. Inspections must be made before operation, during operation, at halt, and after operation, as described in this section. All inspections of assemblies, subassemblies, or parts must include any supporting members or connections and must determine whether the unit is in good condition, correctly assembled, secure, or excessively worn. Any mechanical condition which may result in further damage to the unit must be corrected before the equipment is operated.

- (1) The inspection for "good condition" is usually an external visual inspection to determine whether the unit is damaged beyond safe or serviceable limits, or to determine if it is in such a condition that damage will result from operation. The term "good condition" is further defined as: not bent or twisted; not chafed or burned; not broken or cracked; not bare or frayed; not dented or collapsed; not torn or cut; adequately lubricated.
- (2) Inspection of a unit to see that it is "correctly assembled" is usually an external visual inspection to determine whether it is in its normal assembled position in the equipment.
- (3) Check of a unit to determine if it is "secure" is usually an external inspection, a hand-feel, or a pry-bar or wrench check for looseness in the unit. Such an inspection should include brackets, lockwashers, locknuts, locking wires, or cotter pins used in the assembly.
- (4) "Excessively worn" means worn close to or beyond servicea-

ble limits, a condition likely to result in a failure if replacement of the affected parts is not made before the next scheduled inspection.

b. Reporting Deficiencies. The operator will report all deficiencies on DD Form 110.

c. Before-Operation Services. The following services will be performed to determine if the condition of the equipment has changed since it was last operated, and to make sure it is ready for operation. Any deficiencies must be corrected or reported to the proper authority before the unit is put into operation.

(1) *Tires.* See that the tires are properly inflated. The correct air pressure is 55 pounds under normal operating conditions. Pressure below 55 pounds may be necessary in the tires to increase the traction when operating on soft or sandy ground, but it should never be below 25 pounds. Examine tires for cuts and embedded foreign material.

(2) *Visual inspection.* Make a visual inspection of the entire scraper for cracks, breaks, and loose or missing bolts and nuts. Check the edge of the cutting blade for cracks or wear. Also observe the condition of the cables, all sheaves, and the drawbar. Check the operation of the power-control unit and see that the bowl, front apron, and tilt floor operate properly.

d. During-Operation Services. The operator is responsible for correcting or reporting unusual sounds or odors, deficiencies in performance, or other signs of abnormal operation.

(1) *Unusual operation.* Check for any abnormal operation such as power-control unit controls fail to operate properly or scraper bowl, front apron or tilt floor do not react properly to controls. Report any irregularity immediately to proper authority.

(2) *Unusual noises.* Check for abnormal noises. If any are noticed, stop operation and report to proper authority.

e. At-Halt Services. During halts, even for short periods, the operator should make a general check of the scraper and correct or report any deficiencies noticed, in addition to performing the following specific duties.

(1) *Tires.* See that tires are properly inflated. Check for cuts and embedded foreign material.

(2) *Visual inspection.* Make a visual inspection of the entire scraper, checking for excessively worn, bent, cracked, or broken parts, and for loose or missing bolts or pins. Inspect the cutting blade for cracks or wear; also check cable and sheaves for wear. Check for any signs of overheated wheel bearings.

f. After-Operation Services. To insure that the equipment is ready to operate at any time, the following services must be performed by the operator or crew immediately after any operating period of 8 hours or less. All deficiencies must be corrected or reported to the proper authority.

- (1) *Shutdown precautions.* Move the scraper to an area where there is the least danger of its being damaged. Park the unit on a firm level footing. If freezing temperature is expected, planks or other suitable footing may be necessary. Lower scraper body onto planking. This will prevent the bowl from freezing to the ground.
- (2) *Clean equipment.* Remove all mud, dirt, and excess oil or grease from the exterior and interior of the scraper. If freezing temperature is expected, clean mud and dirt from parts of unit where frozen material would interfere with the movement of any part of the equipment.
- (3) *Tools and equipment.* See that all tools and equipment assigned to the scraper are clean, serviceable, and properly stowed in the tool box.
- (4) *Tires.* Inspect tires for underinflation, excessive wear, cuts, embedded foreign material, and missing valve caps. Correct tire pressure is 55 pounds.
- (5) *Lubrication.* Lubricate as required by lubrication order.
- (6) *Visual inspection.* Inspect for loose or missing bolts, nuts, and pins; and for bent, cracked, or broken parts. Inspect cables for frayed or broken strands.
- (7) *Protection.* Follow instructions outlined in shutdown precautions (items 1 and 2 above) and see that tool-compartment lid is closed and fastened.

27. Maintenance and Safety Precautions

- a.* Always correct or report any mechanical deficiency that may result in damage to the scraper if operation is continued.
- b.* Never use weak or frayed cable.
- c.* Never let bowl stand loaded overnight.
- d.* Do not work under front apron or behind the tilt floor without first blocking them. Blocking will eliminate accidental release of these parts and prevent serious or fatal injuries.
- e.* Check wheel bolts regularly for looseness.

28. Organizational Maintenance

- a.* Organizational preventive maintenance is performed by organizational maintenance personnel, with the aid of the operator, at weekly and monthly intervals. The weekly interval will be equivalent

to 60 hours of use. The monthly interval will be equivalent to 4 weeks, or 240 hours, of use, whichever occurs first.

b. The column headed technical inspection is provided for the information and guidance of personnel performing technical inspection, and constitutes the minimum inspection requirements for the equipment.

c. The preventive maintenance services to be performed at these regular intervals are listed and described below. The numbers appearing in the columns opposite each service refer to a corresponding number appearing on DA Form 464, and indicates that a report of the service should be made at that particular number on Form 464. These numbers appear in either second, third, or both columns, as an indication of the interval at which the service is to be performed.

Technical in- spection	Services		
	Monthly	Weekly	
1	1	1	<i>Before-operation services.</i> Check and perform services listed in paragraph 26c.
2	2	2	<i>Lubrication.</i> Inspect the entire scraper for missing or damaged lubrication fittings and for indications of insufficient lubrications. Service according to the current lubrication order.
	2	2	Replace missing or damaged fittings. Lubricate as specified in the current lubrication order.
3	3	3	<i>Tools and equipment.</i> Inspect the condition of all tools and equipment assigned to the scraper. Check condition and mounting of tool box.
	3	3	See that all tools and equipment assigned to the scraper are clean, serviceable, and properly stowed or mounted. See that the tool box is in good condition and that it closes and fastens properly.
5	5	5	<i>Publications.</i> See that a copy of this technical bulletin, LO 5-1343, and Standard Form 91 are on the equipment and in serviceable condition.
6	6	6	<i>Appearance.</i> Inspect the general appearance of the scraper, paying particular attention to cleanness, legibility of identification markings, and condition of paint.
	6	6	Correct or report any deficiencies noticed.

Technical in- spec-tion	Services		
	Monthly	Weekly	
7	7	7	<i>Modifications.</i> See if any available modification work orders applying to this scraper have been completed and recorded on DA Form 478 (MWO and Major Unit Replacement Record—Organizational Equipment File).
68	68	68	<i>Cables.</i> Inspect cables for wear, kinks, and broken or frayed strands and for loose mounting at wedge sockets and anchor points.
	68	68	See that cables are in good condition and securely mounted. Replace cables that are damaged or worn.
76	76	76	<i>Tires.</i> Check for underinflation, wear, cuts, bruises, embedded foreign matter, and missing valve caps. Pressures below 55 pounds may be necessary on scraper tires to increase their traction when operating on soft, sandy ground, but they should never be below 25 pounds.
	76	76	Remove any foreign matter from tires. Inflate all tires to correct pressure, and replace missing valve caps. Replace worn or damaged tires.
77	77	77	<i>Tow hitch.</i> Inspect the tow hitch (drawbar) for breaks, cracks, broken welds, and for loose and missing mounting bolts.
	77	77	Tighten all loose or missing mounting bolts. See that cracks, breaks, and broken welds are repaired before further damage results.
78	78	78	<i>Rear wheels.</i> Check wheels for loose mounting bolts and leaky oil or grease seals.
	78	---	Check wheel-bearing adjustment.
	78	78	Tighten any loose mounting bolts. Adjust wheel bearings if necessary and replace defective oil or grease seals.
79	79	79	<i>Front wheels.</i> Check wheels for loose mounting bolts and leaky oil or grease seals.
	79	---	Check wheel-bearing adjustment.
	79	79	Tighten any loose mounting bolts. Adjust wheel bearings if necessary and replace defective oil or grease seals.

Technical in- spection	Services		
	Monthly	Weekly	
80	80	80	<i>Frame.</i> Inspect the frame for cracks, breaks, broken welds, and for loose and missing mounting bolts.
	80	80	Tighten all loose or missing mounting bolts. See that cracks, breaks, and broken welds are repaired before further damage results.
81	81	81	<i>Front axle assembly.</i> Check for cracks, bent parts, loose or missing nuts and bolts, and alinement of axle.
82	81	81	Replace, repair or report any deficiencies noted.
	82	82	<i>Rear axle assembly.</i> Check for cracks, bent parts, loose or missing nuts and bolts, and alinement of axle.
187	82	82	Replace, repair or report any deficiencies noted.
	187	187	<i>Lift frame.</i> Check lift-frame assembly for missing cotter pins, loose nuts, or worn bolts. Inspect frame for cracks, breaks, and broken welds. Make sure lift frame is not bent or sprung.
	187	187	Tighten or replace any loose or missing bolts. Replace missing cotter pins. Report any uncorrected condition to the proper authority.
188	188	188	<i>Tilt floor.</i> Check tilt floor operating cable for frayed or worn strands. Make sure tilt floor is free to move backward or forward without binding on any part of the bowl. See that the push-beam roller turns freely and is not worn.
	188	188	Report any broken or cracked welds to the proper authority.
189	189	189	<i>Front apron.</i> Check front-apron pins for wear. Make sure the apron is not sprung and that it closes properly. Check apron arms for breaks or cracks.
	189	189	Replace abnormally worn pins. Report any breaks or cracks to the proper authority.
190	190	190	<i>Push beam.</i> Check push-beam cable for frayed or worn strands. See that rollers turn freely and are not abnormally worn.
	190	190	Replace abnormally worn rollers. Report any breaks or cracked welds to proper authority.

Technical in- spec-tion	Services		
	Monthly	Weekly	
192	192	192	<i>Cutting blades.</i> Inspect blade for loose or missing bolts and for chipped and broken cutting edge.
	192	192	Reverse worn blades and replace broken blades. Tighten mounting bolts if necessary.
193	193	193	<i>Scraper bowl.</i> Check the bowl for bad bends or misalignment and for broken welds.
	193	193	Correct or report any deficiencies noticed.

Section IV. TROUBLE SHOOTING

29. Use of Trouble Shooting Section

This section provides information useful in diagnosing and correcting unsatisfactory operation or failure of the scraper or any of its components. Each trouble symptom stated is followed by a list of probable causes of the trouble. The possible remedy recommended is described opposite the probable cause.

30. Bowl Cannot Be Raised

<i>Probable cause</i>	<i>Possible remedy</i>
a. Cable broken.	Install new cable (par. 37).
b. Bowl frozen to ground.	Allow scraper to remain until temperature rises.
c. Power control unit clutch slipping.	Adjust power control unit hoist clutch. See TM 5-9957.

31. Bowl Cannot Be Lowered

<i>Probable cause</i>	<i>Possible remedy</i>
a. Safety plate installed.	Remove safety plate (par. 7h(3)).
b. Bowl setting on jack or blocking.	Remove blocking.
c. Bowl setting on object or material.	Move scraper forward.

32. Front Apron Cannot Be Opened

<i>Probable cause</i>	<i>Possible remedy</i>
a. Dump cable broken.	Install new dump cable (par. 37).
b. Front apron frozen closed.	Use blow torch to thaw contact areas.
c. Front apron badly bent.	Repair or replace (par. 47).

33. Tilt Floor Cannot Be Raised

<i>Probable cause</i>	<i>Possible remedy</i>
a. Dump cable broken.	Install new dump cable (par. 37).
b. Bowl badly warped or bent.	Repair or replace (par. 50).
c. Tilt floor frozen.	Thaw frozen areas with blow torch.

34. Wheel Bearing Failures

<i>Probable cause</i>	<i>Possible remedy</i>
a. Bearing improperly lubricated.	Lubricate as specified in lubrication order.
b. Bearing incorrectly adjusted.	Adjust wheel bearing (par. 40c(5)).
c. Oil seals or dust seals failed, permitting dirt or foreign matter to enter bearings.	Replace oil or dust seals (par. 40b(3)).

35. Scraper Cutting Uneven

<i>Probable cause</i>	<i>Possible remedy</i>
a. Unequal air pressure in tires.	Check air pressure and inflate to equal pressure (par. 39).
b. Use of tires with unequal diameters.	Install tires having equal diameters.

Section V. CABLE AND SHEAVE ASSEMBLY

36. Description

a. *Dump Cable.* The dump cable is strung along the left side of the scraper and connected to the discharge ram at the rear. The dump cable actuates the front apron and discharge ram, and is controlled from the left drum of the power control unit (fig. 7). Preformed cable, $\frac{7}{16}$ inch, 6 x 19 and 98 ft in length, is used for the dump cable.

b. *Lift Cable.* The lift cable is strung through the sheave group on the lift frame and bowl, and out to the right drum of the power control unit. The lift cable raises and lowers the scraper bowl and its cutting edge, and is controlled from right drum of the power control unit. Preformed cable, $\frac{7}{16}$ inch, 6 x 19 and 74 ft. in length is used for the lift cable.

c. *Sheaves.* The scraper sheaves are located outside the bowl area and away from the dirt. Lead-in sheaves are pivoted to maintain a straight in-line reeving. All sheaves have smooth grooves and are equipped with antifriction bearings.

37. Cable Reeving

The scraper incorporates two cables; the dump cable and lift cable. The procedures for reeving the cable on the scraper are listed in the subparagraphs below.

a. *Install Dump Cable* (fig. 19). To install the dump cable, proceed as follows:

- (1) Mount the cable reel (1) on the scraper and pass the cable under sheave (2) at the rear of the ram and over sheave (3) at the rear of the bowl and under sheave (4).
- (2) Run the cable from sheave (4) up to the horizontal sheave (5). Pass the cable around the horizontal sheave (5) and then over the next sheave at the rear of the ram, indicated by (6). Next, pass the cable under the vertical sheave (7) at the rear of the bowl and then out to and over sheave (8) at the rear of the ram. Pass the cable under the last vertical sheave (9) at the rear of the bowl.
- (3) Lace the cable over the vertical sheave (10) mounted on the rear of the bowl, and then through sheave (11) and (12), around sheave (13), over sheave (14) and under sheave (15).
- (4) Thread the cable into the left swivel sheave of the power control unit, and run it up to the inside of the upper left sheave, over the top, and down to the outside of the left drum. Bring the cable around underneath, and to the clamp on the drum. Place the end of the cable under this clamp, leaving about 1-inch overhang. Then pull the two nuts on the clamp studs down tight.
- (5) With the discharge ram extended as far as it will go, operate the left power control unit drum to put at least six wraps of cable around the drum. At this point lock the cable in the wedge clamp (16) near the cable reel.

b. *Install Lift Cable*. To install the lift cable, proceed as follows:

- (1) Mount the cable reel (17) on the lift frame as shown in figure 19.
- (2) Pass cable under sheave (18, fig. 20) on the bowl in the direction indicated by arrow, over sheave (19) on the lift frame, under sheave (20), over sheave (21), under (22), over (23), under (24), over (25), under (26), over (27), under (28) and over (29).
- (3) After all the sheaves in paragraph 2 above have been reeved, lace the cable over sheave (30, fig. 19), and under sheave (31).
- (4) Thread the cable into the right swivel sheave of the power control unit, and run it up to the inside of the upper right sheave, over the top, and down to the outside of the right power control unit drum. Bring the cable around underneath the drum and to the clamp. Run the cable end under this clamp, leaving about one inch overhang. Secure cable tightly by tightening the nuts on the clamp.
- (5) With the bowl in the lowered position, operate the right power control unit drum, and put at least nine wraps of cable

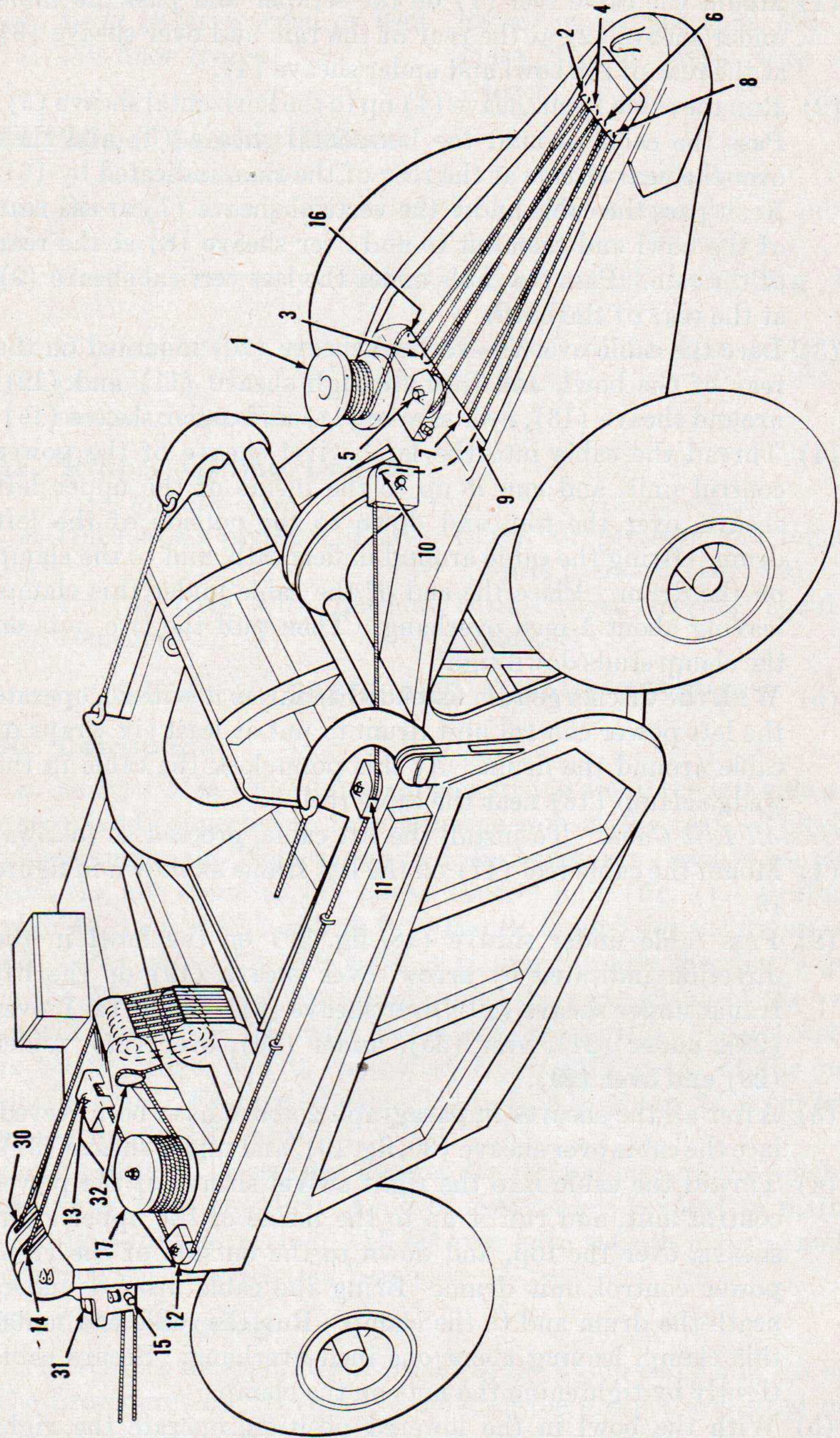


Figure 19. Cable reeving diagram.

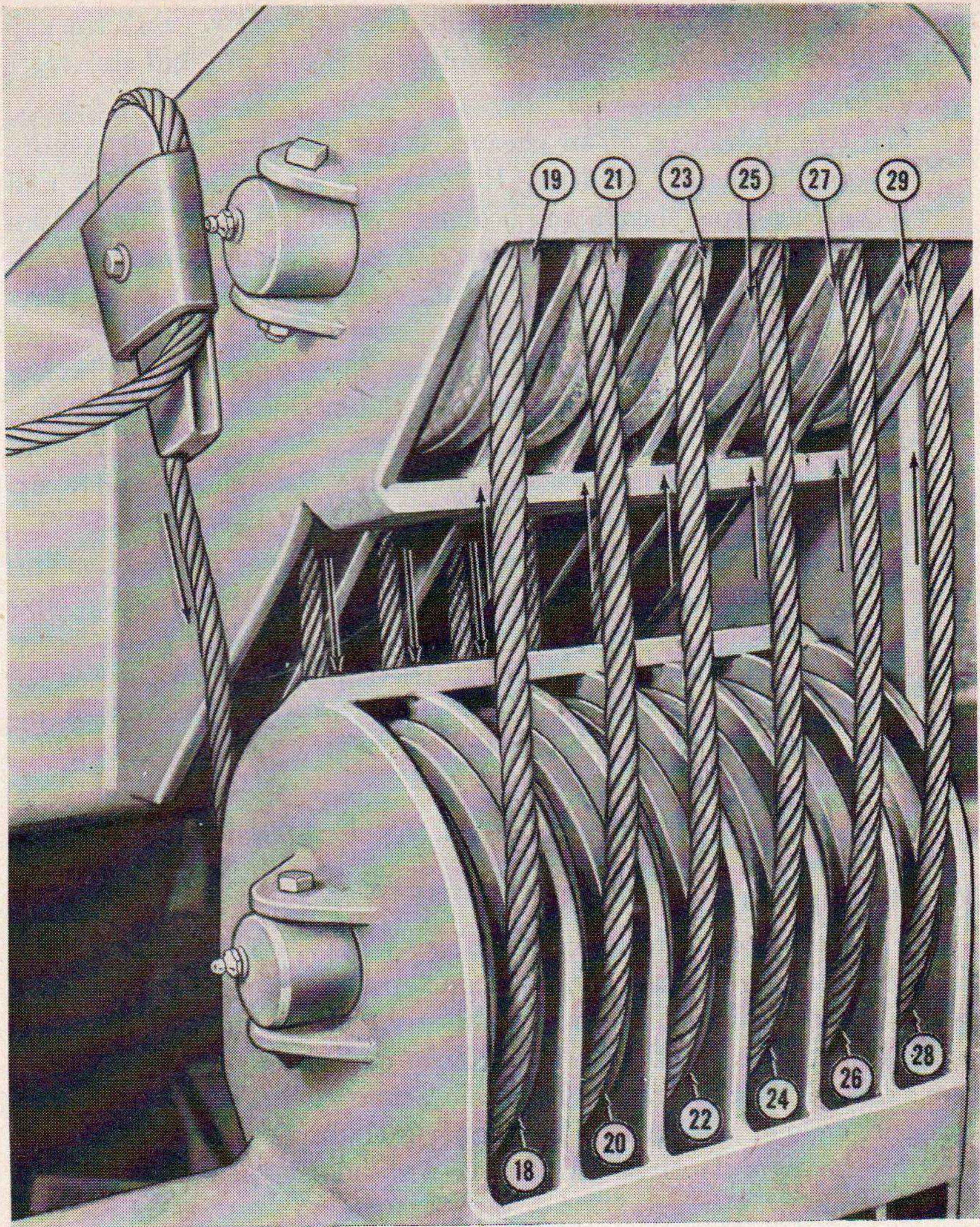


Figure 20. Reeving of lift frame and bowl sheave housings.

around the drum. After the wraps are made, secure the cable in the wedge clamp (32, fig. 19), on the left side of the lift frame sheave housing.

38. Sheaves

All sheaves on the scraper may vary slightly in size or shape but all consist of the same basic parts and are mounted and held in position in the same manner. The following subparagraphs apply to all sheaves on the scraper.

a. Removal of Sheave. To remove the scraper sheave, remove the

nut and lockwasher from the sheave pin lock cap screw. Pull the cap screw out of the sheave pin and remove the sheave pin and sheave.

b. Cleaning and Inspection.

- (1) *Cleaning.* To clean sheaves use a stiff brush and remove excessive mud or dirt. Remove the remainder of dirt and grease from sheave and bearing by placing them into a clean solution of cleaning solvent. Wash thoroughly so that all grease, dirt, and grit are completely removed. Dry parts with clean wiping cloth or compressed air.
- (2) *Inspection.* Examine the sheave for corrugations or excessive wear in the sheave groove. Replace sheave found in this condition. Examine the sheave pins for wear and replace if necessary. Inspect sheave bearing for damage and wear. To remove and install bearings, use an arbor press.

c. Installation. To install sheaves place the sheave into its housing or brackets. Next, install the sheave pin through the bracket and sheave. Secure the sheave pin by installing the sheave pinlock cap screw. Install lockwasher and nut to the cap screw and tighten securely. After sheave is installed lubricate in accordance with instructions given in paragraph 23.

Section VI. WHEEL AND AXLE ASSEMBLY

39. Description

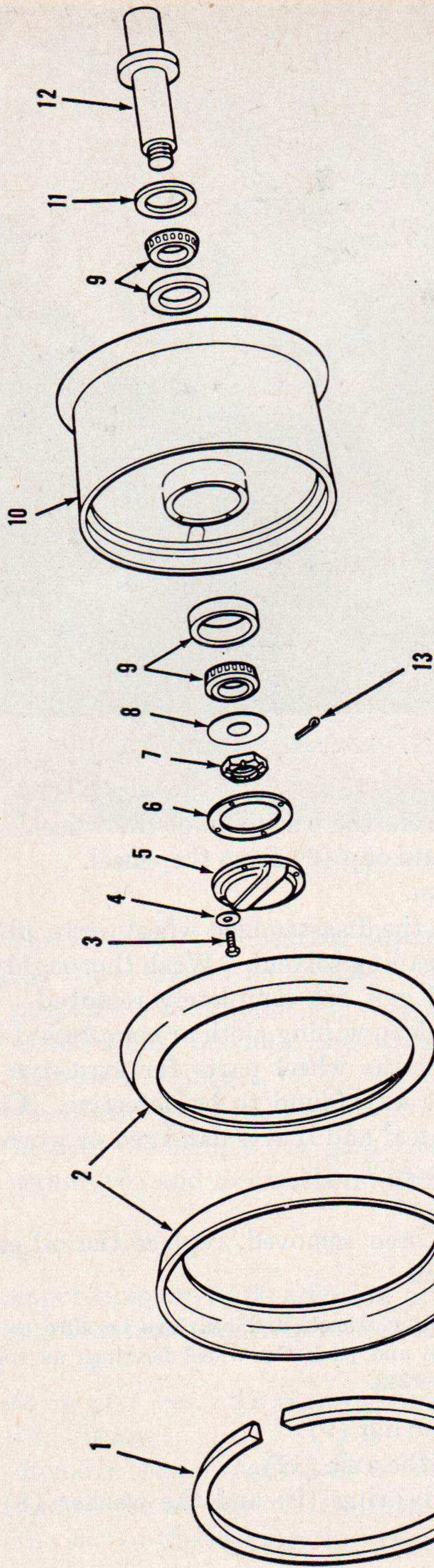
The scraper is equipped with four heavy-duty, one-piece, steel fabricated wheels, which are mounted on tapered roller bearings. The front wheels are attached to stub axles which in turn are attached to welded brackets on the drawbar. The rear wheels are attached to stub axles which are attached to axle brackets that are welded to rear cross members of the bowl. The scraper is equipped with four 14 x 20 (16 ply) heavy duty tires which have a standard operating pressure of 55 pounds.

40. Wheels

Each of the scraper wheels are identical and are removed in the same manner.

a. Removal of Wheels (fig. 21).

- (1) Jack up the scraper close to the wheel being removed.
- (2) Remove the four cap screws (3) and lockwashers (4) holding the hubcap, and remove the hubcap (5) and gasket (6).
- (3) Remove the cotter pin (13) and the large slotted bearing adjustment nut (7).
- (4) Remove the washer (8) and the outside bearing and cup (9), and slide the wheel (10) off the wheel axle (12).



- 1. Tire lock ring
- 2. Tire flange
- 3. Cap screw $\frac{3}{8}$ —24 NF2 x 1
- 4. Lockwasher
- 5. Hubcap
- 6. Hubcap gasket
- 7. Bearing locknut $1\frac{3}{4}$

- 8. Bearing locknut washer
- 9. Wheel bearing
- 10. Wheel assembly
- 11. Oil seal
- 12. Wheel axle
- 13. Cotter pin $\frac{3}{8}$ x $3\frac{1}{2}$

Figure 21. Wheel assembly (exploded).



Figure 22. Removing oil seal.

- (5) Pry oil seal (11) from the back side of the wheel. Remove the inside bearing and cup (9) from the wheel.

b. Cleaning and Inspection.

- (1) *Cleaning.* To clean the disassembled wheel parts, place them into a solution of cleaning solvent. Wash thoroughly so that all grease, dirt and grit are completely removed. Dry the wheel parts with a clean wiping cloth or compressed air.
- (2) *Inspection.* Inspect the wheel parts for excessive wear or damage and replace any found to be defective. Check the condition of the oil seal and if it is damaged or worn pry out seal as shown in figure 22.

c. Installation of Wheels.

- (1) If the oil seal has been removed, replace the oil seal (11) (fig. 21) in the wheel.

Note. Before installing wheels and bearings be sure to pack the wheel hub with grease and pack the wheel bearings as specified in lubrication order LO 5-1343.

- (2) Install the inside bearing (9).
- (3) Install the wheel on the axle (12).
- (4) Install the outside bearing (9) and the washer (8) on the axle.

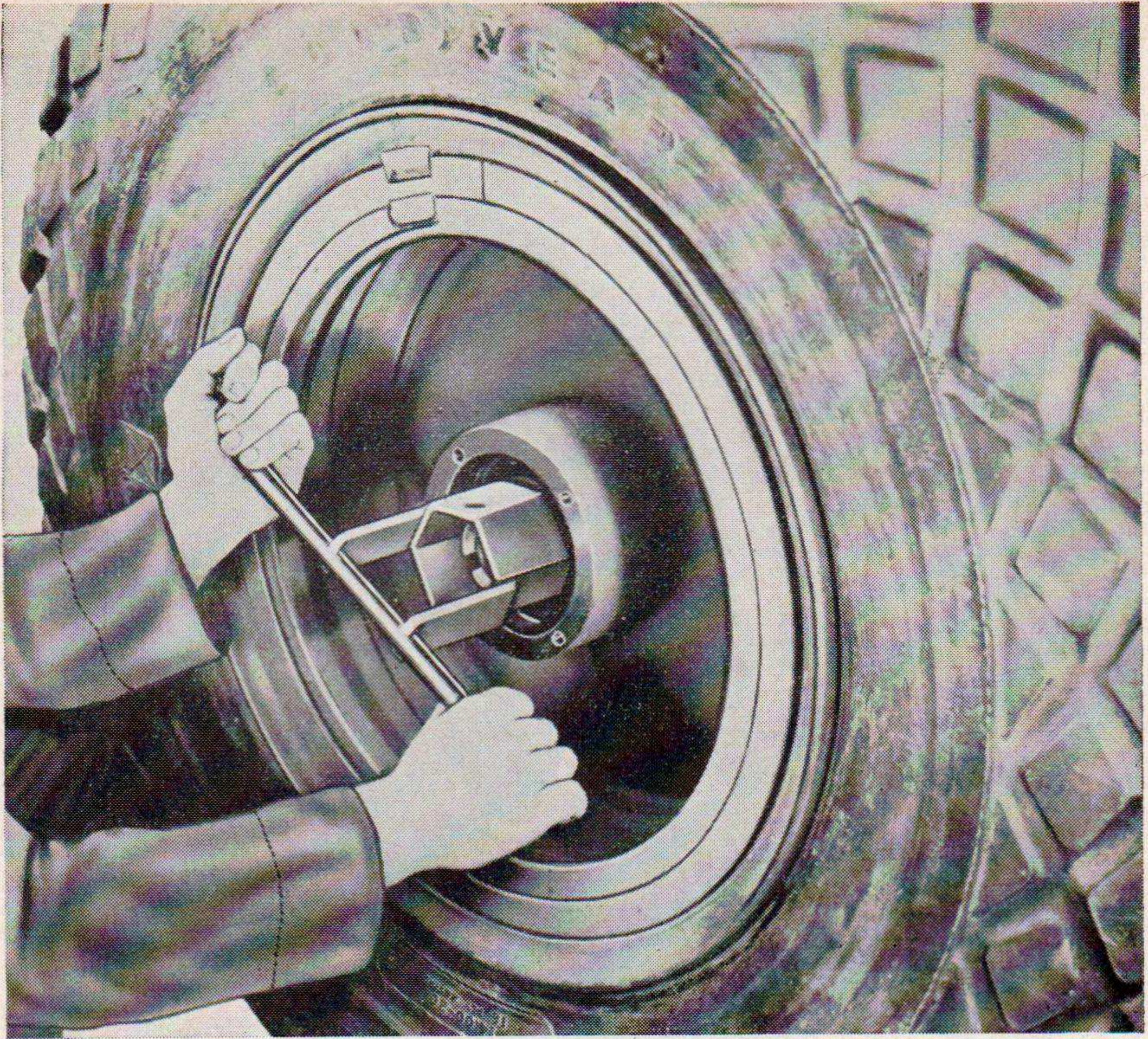


Figure 23. Adjusting scraper wheel.

- (5) Install the slotted bearing adjusting nut (7). At this point the wheel should be adjusted. Tighten the nut securely to properly seat all parts (fig. 23). Back off the nut one or two castellations, or until the wheel runs freely without perceptible end play.
- (6) Secure the nut with a cotter pin (13, fig. 21), and replace the hubcap (5) using a new gasket (6). Secure hubcap with cap screws (3) and lockwashers (4).

41. Tires

The scraper tires are 14.00 x 20 (16 ply) heavy-duty earthmoving-type tires. The front and rear wheel tires are removed in the same manner.

a. Removal of Tires. To remove the scraper tires follow the procedures listed below:

- (1) Remove the scraper wheel as outlined in paragraph 40*a*.
- (2) Let all the air out of the tire; then insert a small pry bar in the slot of the locking ring (fig. 24).

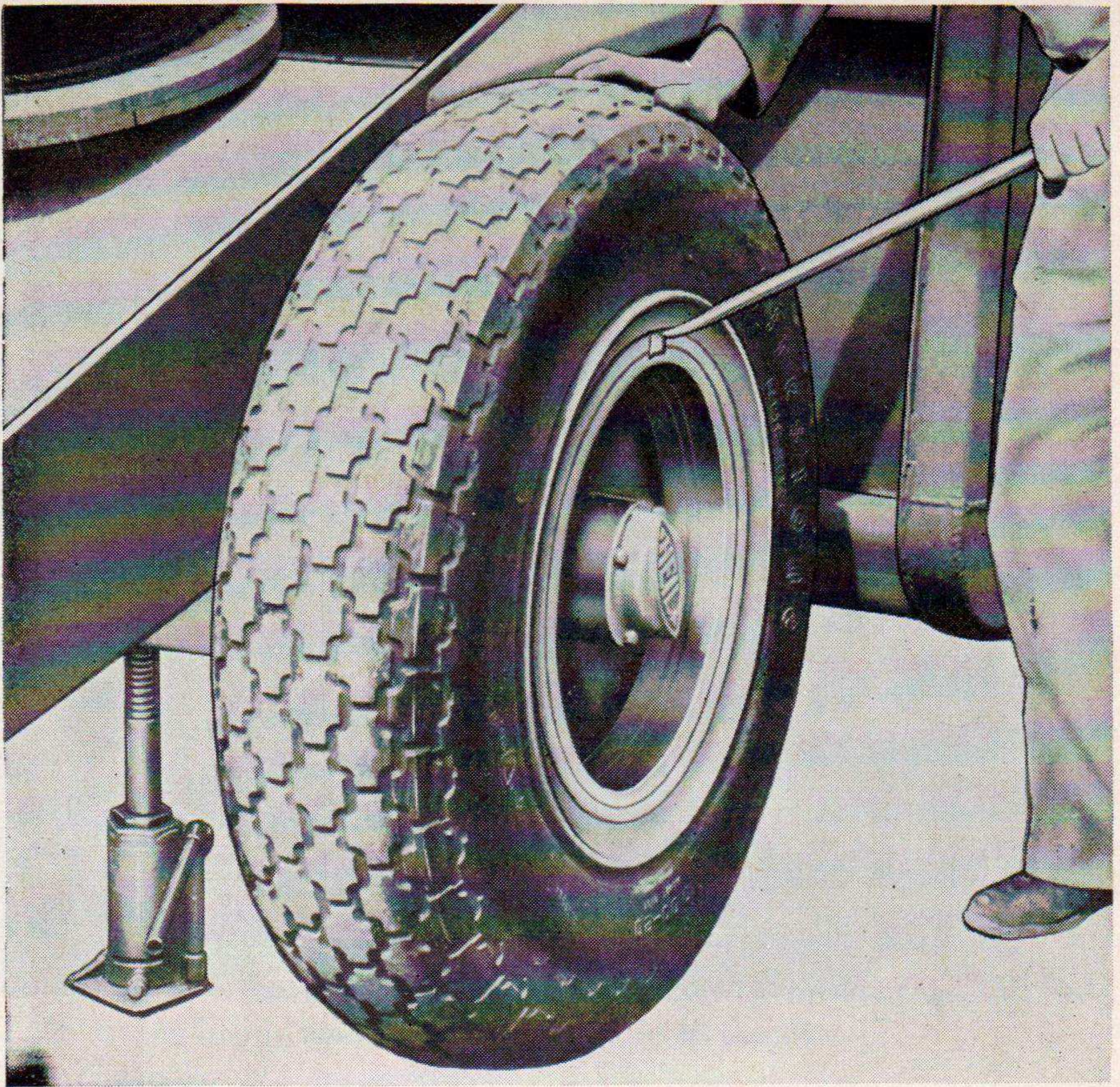


Figure 24. Removing locking ring.

- (3) Pry up on the locking ring (1, fig. 21), and at the same time use a sledge hammer and drive the tire flange (2) toward the center of the rim. This will release the locking ring (1), and both the locking ring, and the tire flange (2) can be removed from the wheel.
- (4) Place a round top valve cap on the valve stem; then push the valve stem through the rim into the tire.
- (5) Insert a pry bar between the tire and the tire flange (2) on the side of the tire opposite the locking ring, and pry the tire off the wheel.

b. Cleaning, Inspection and Repair.

- (1) *Cleaning.* After the tire has been removed from the wheel, inspect the wheel rim for rust. Remove all rust with a wire brush, and if time permits, paint the rim and allow it to dry. Remove all dirt and mud from the exterior of the tire by washing it with water. Dry the tire with compressed air.

After tire is dry blow out any dust or dirt particles from inner casing with compressed air.

- (2) *Inspection.* After the tire is completely cleaned inspect the exterior for nails, glass, stones, or any other material embedded in the tire.
- (3) *Repair.* Repair all cuts and punctures in tube by applying hot patches only. Large cuts or tears beyond approximately 1½ inches in length should not be repaired. Instead replace with a new tube.

c. Installation of Tires.

- (1) Insert the inner tube and inflate with enough air to hold the tube in place. Be sure that the valve stem is in the center of the hole in the rim.
- (2) Place tire on wheel (10, fig. 21) and with pry bar work tire on wheel. Be careful not to pinch the inner tube.
- (3) Install the tire flange (2) and locking ring (1) and inflate to recommended pressure.
- (4) Replace wheel on axle.

42. Axles

The scraper has four stub axles which are removable. Each axle is mounted in an axle bracket. The front axle brackets are welded to the drawbar (fig. 25), and the rear axle brackets are welded to a rear cross member of the bowl (fig. 26). Each axle is removed in the same manner.

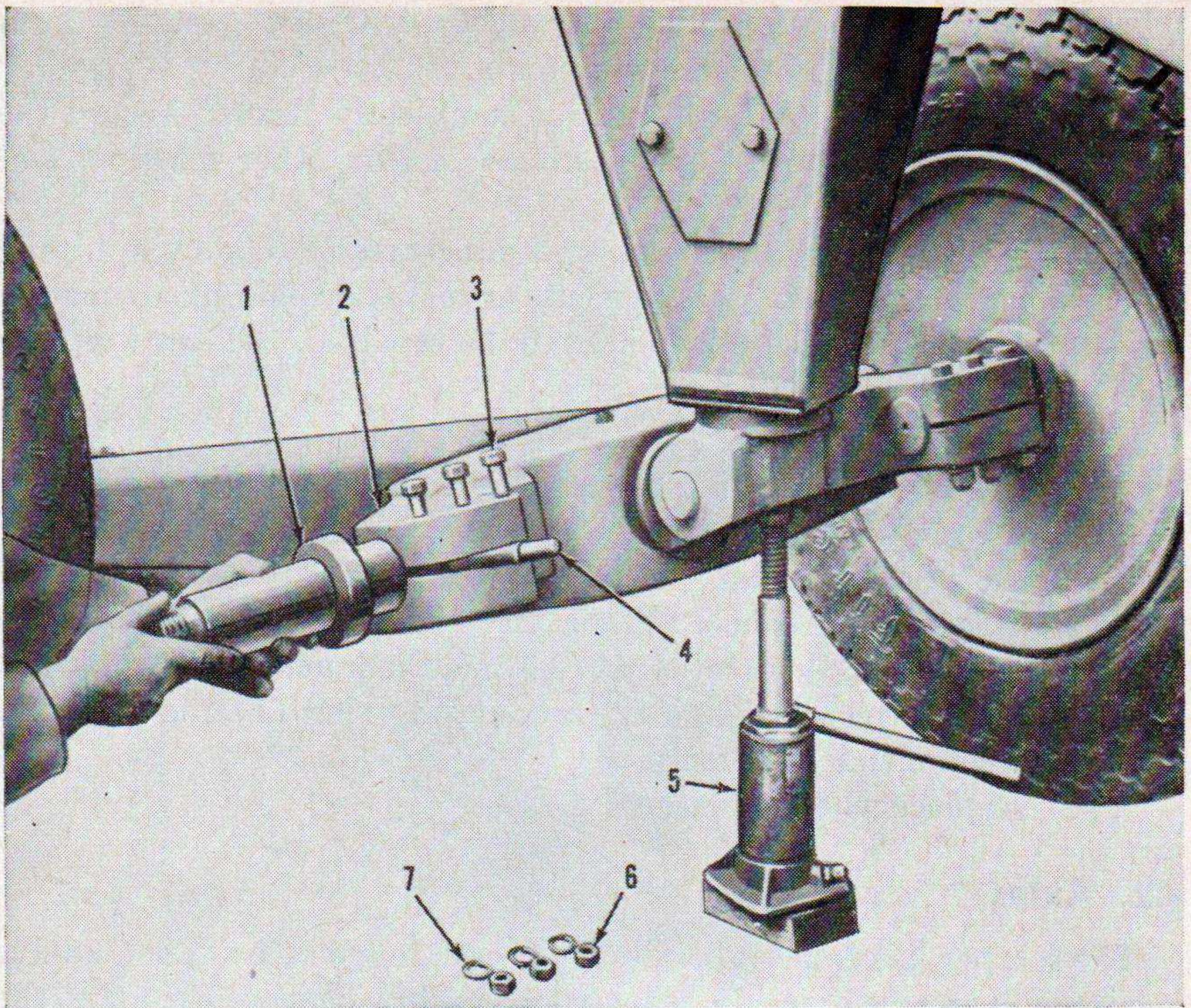
a. Removal of Axle. To remove the scraper axle follow the procedures listed below:

- (1) Remove the scraper wheel as outlined in paragraph 40a.
- (2) Remove the nuts (6, fig. 25) and lockwashers (7) from the three axle bracket bolts (3).
- (3) Drive a wedge-type chisel (4) into the slit opening in the axle bracket (2) to relax the bracket tension on the axle (1).
- (4) To remove the axle (1) pull or drive it out of the axle bracket (2).

b. Cleaning and Inspection.

- (1) *Cleaning.* To clean the axle place it in a solution of cleaning solvent. Clean thoroughly and dry with a clean cloth or compressed air.
- (2) *Inspection.* Inspect the axle for excessive wear, cracks or fractures and observe the condition of the threads. All axles found to be defective will be replaced.

c. Dressing Axle Threads. Use a thread dressing file and dress damaged axle threads. Remove all burrs and mutilated threads by filing very carefully. Check thread dressing by installing axle nut.



1. Front axle
2. Axle bracket
3. Axle bracket bolts
4. Chisel

5. Hydraulic jack
6. Nuts
7. Lockwashers

Figure 25. Removing front axle.

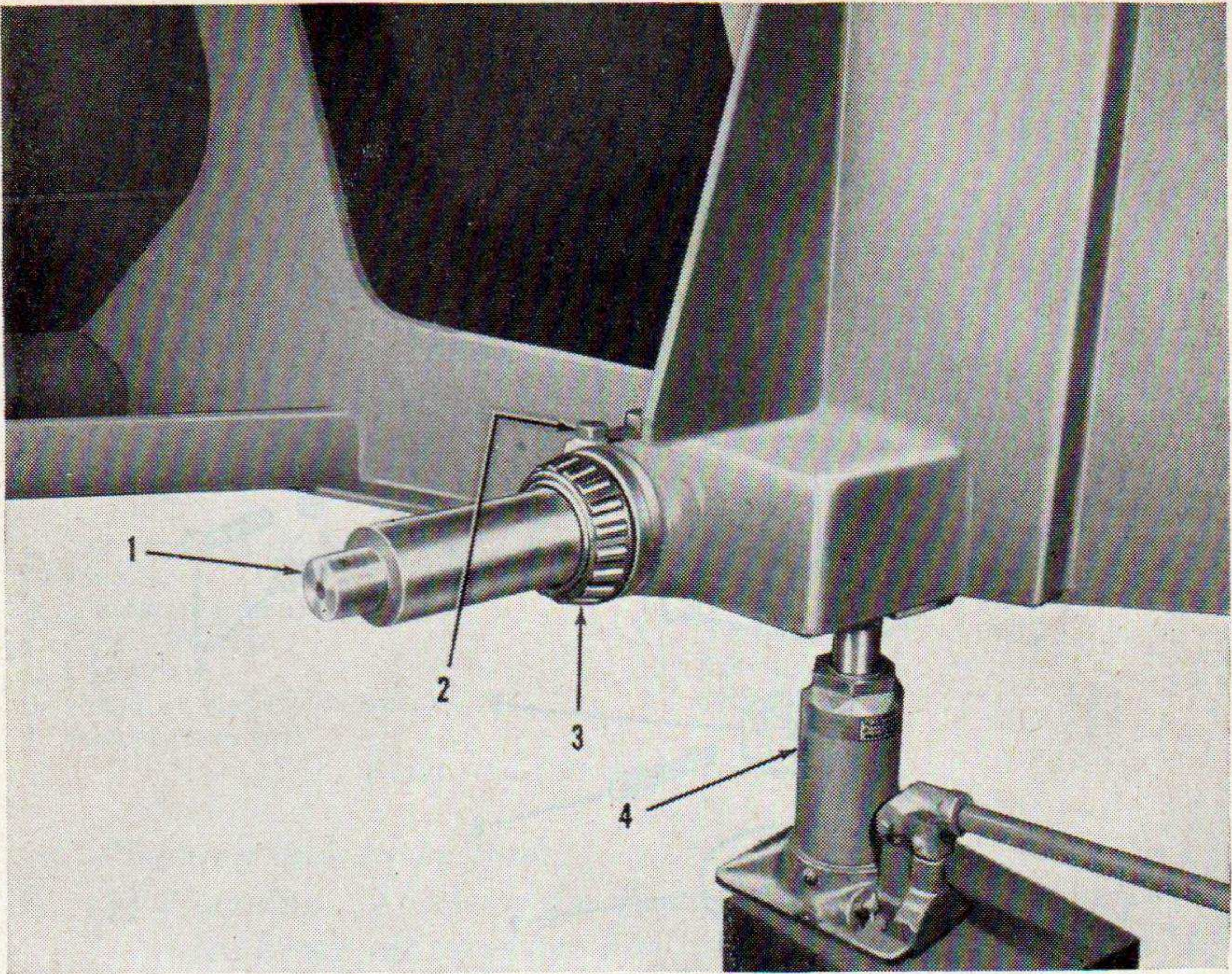
d. Installation of Axle.

- (1) Drive a wedge-type chisel (4) into the slit opening in the axle bracket (2) as shown in figure 25. This enlarges the bracket opening for easier installation.
- (2) Place the axle (1) into the axle bracket (2) and drive it into place, being careful not to damage the threads on the end of the shaft. Remove the wedge chisel (4) from the axle bracket (2).
- (3) Install the three axle bracket bolts (3) and install a lockwasher (7) and nut (6) on each bolt (3). Tighten the nuts securely.
- (4) Install the wheel as outlined in paragraph 40 *c*.

Section VII. BOWL ASSEMBLY

43. Description

The bowl assembly is the main part of the scraper that carries the load. The bowl is also the main item or structure to which other scraper parts are attached.



1. Rear axle
2. Axle bracket bolts

3. Wheel bearing
4. Hydraulic jack

Figure 26. Rear axle.

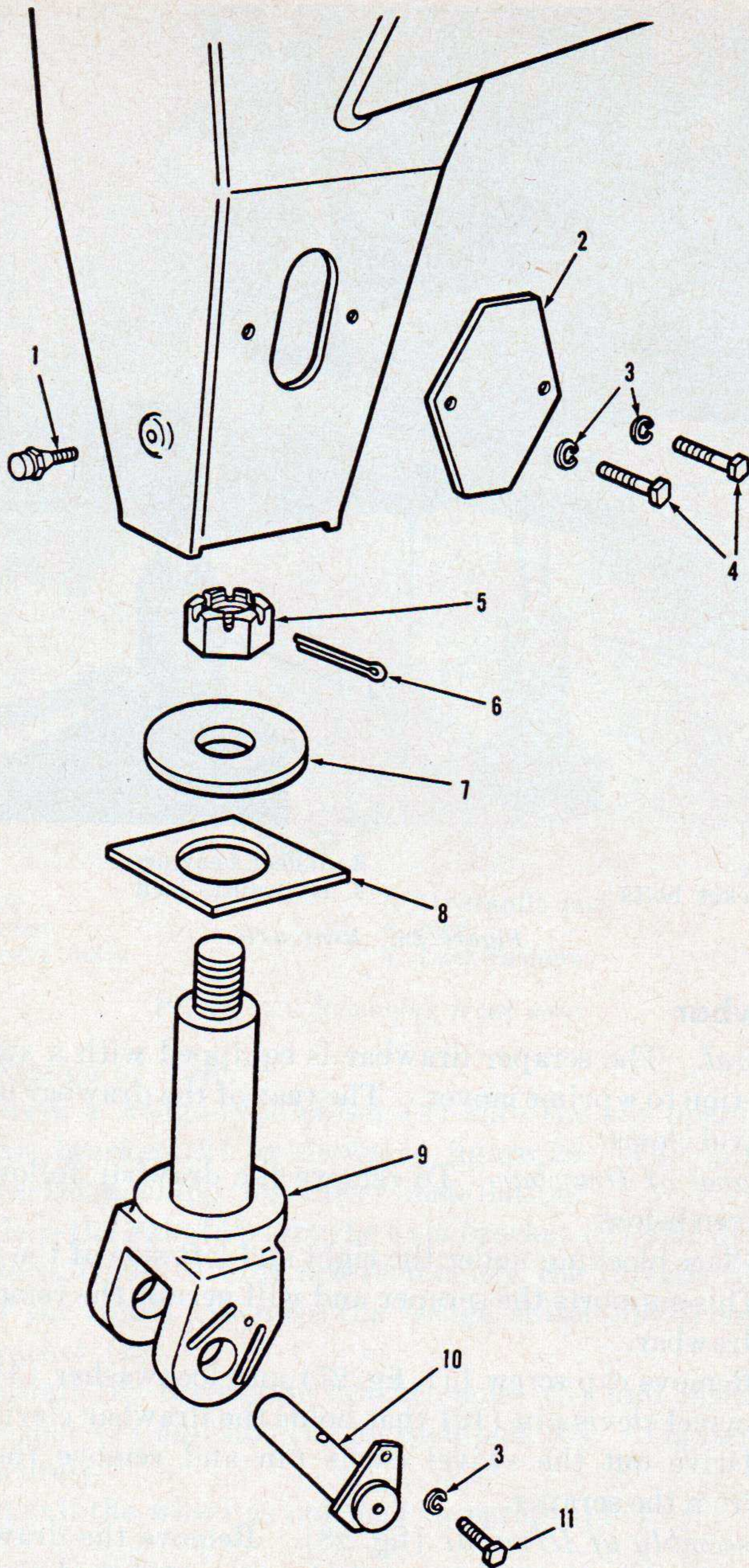
44. Drawbar

a. General. The scraper drawbar is equipped with a swivel hitch for connection to a prime mover. The rear of the drawbar is equipped with a swivel clevis.

b. Removal of Drawbar. To remove the drawbar follow the procedures given below.

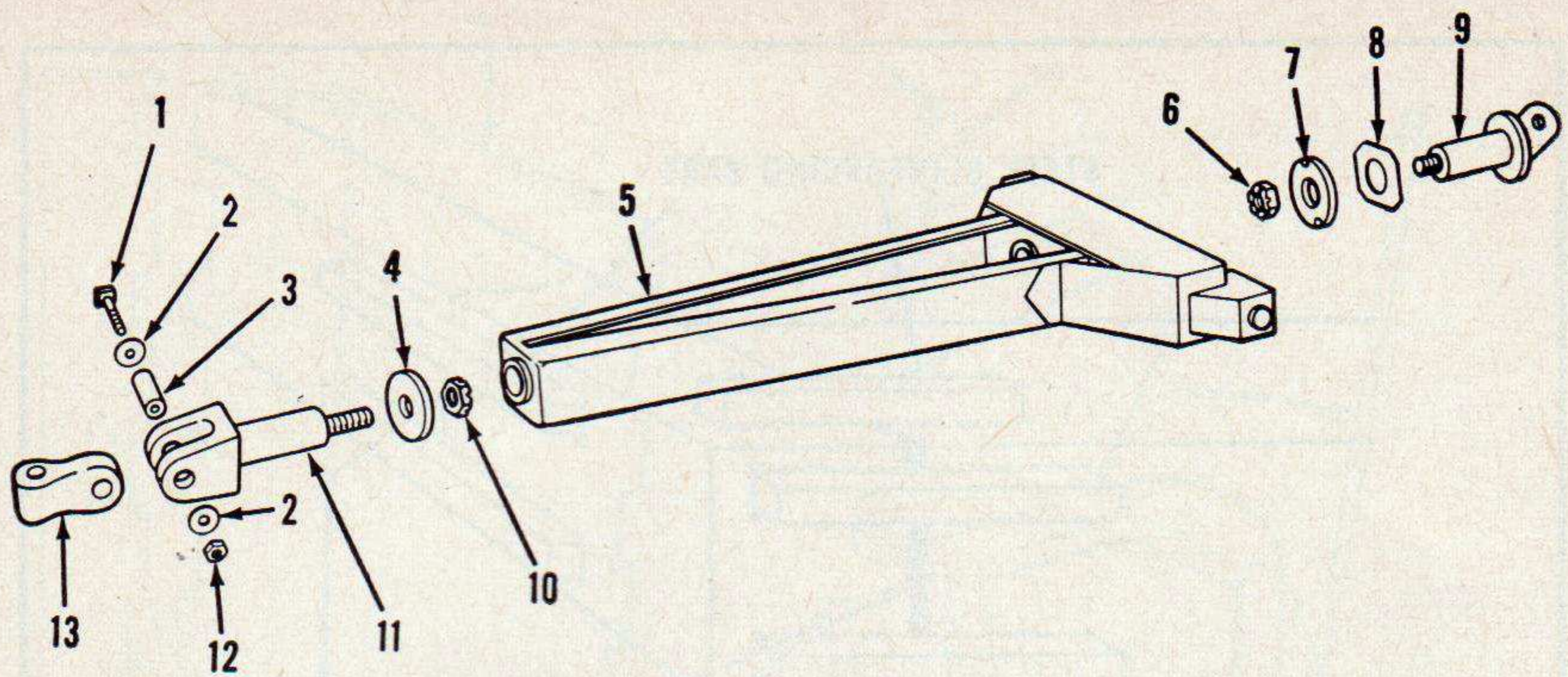
- (1) Place blocking under the right and left side of the lift frame. This supports the scraper and will permit the removal of the drawbar.
- (2) Remove cap screw (11, fig. 27) and lockwasher (3) from the swivel clevis pin (10) that holds the drawbar clevis.
- (3) Drive out the swivel clevis pin and remove the drawbar from the scraper.

c. Disassembly of Drawbar (fig. 28). Remove the drawbar clevis (11) from the drawbar (5) by removing nut (10) and clevis washer (4). To remove the swivel block (13), remove the nut (12), cap screw (1), bearing washers (2), and clevis tube bearing (3) from the drawbar clevis (11) and remove the swivel block (13). Next, remove nut (6) and jam nut (7) from the front swivel clevis (9) and pull out the clevis bearing plate (8) from the rear end of the drawbar (5).



- | | |
|--|---------------------------------------|
| 1. Grease fitting | 7. Swivel clevis washer |
| 2. Cover plate | 8. Bearing plate |
| 3. Lockwasher | 9. Swivel clevis |
| 4. Cap screw $\frac{1}{2}$ -13 NC2x1 $\frac{1}{2}$ | 10. Swivel clevis pin |
| 5. Swivel clevis locknut 4 $\frac{1}{2}$ NC2 | 11. Cap screw $\frac{1}{2}$ -13 NC2x1 |
| 6. Cotter pin $\frac{3}{8}$ x 5 | |

Figure 27. Swivel clevis.



- | | |
|--|------------------------------|
| 1. Cap screw $\frac{3}{4}$ -16 NFx6- $\frac{1}{2}$ | 8. Clevis bearing plate |
| 2. Washer | 9. Front swivel clevis |
| 3. Clevis tube bearing | 10. Drawbar clevis nut 2 NC |
| 4. Clevis washer | 11. Drawbar clevis |
| 5. Drawbar | 12. Nut $\frac{3}{4}$ -16 NF |
| 6. Front swivel clevis nut 2 $\frac{1}{2}$ NC | 13. Swivel block |
| 7. Special jam nut | |

Figure 28. Drawbar (exploded).

d. *Cleaning and Inspection.*

(1) *Cleaning.* To clean the disassembled parts of the drawbar, wire brush off excessive dirt and mud. Place the parts in a solution of cleaning solvent and clean thoroughly. Dry with clean wiping cloth or compressed air.

(2) *Inspection.* Inspect the front swivel clevis and drawbar clevis for excessive wear and replace if found defective. Inspect the drawbar for breaks in welds or cracks, and repair all breaks or cracks that are found before putting scraper into service.

e. *Repair.* The only repairs that can be made to the drawbar other than replacing with new parts are welding repairs. To repair breaks or cracks use only alloy steel for reinforcing, and coated arc electrodes for welding. To repair a break in a weld or a crack appearing on a boxbeam, first "V" out the old weld or crack and re-weld, filling the "V" section with weld metal flush with the surface of the boxbeam. Then reinforce the point of failure by placing steel bars across the break or crack as illustrated in figure 29. Weld along both sides of the reinforcing bars, but leave both ends unwelded.

f. *Reassembly of Drawbar* (fig. 28). To reassemble the drawbar place the clevis bearing plate (8) on the front swivel clevis (9). Place the front swivel clevis into the drawbar (5) and secure it with the jam nut (7) and nut (6). Next, install the drawbar clevis (11) into the drawbar (5) and secure it by installing the clevis washer (4) and nut (10). Place the swivel block (13) into the drawbar clevis and install the clevis tube bearing (3). Secure the swivel block with cap screw (1), washers (2) and nut (12).

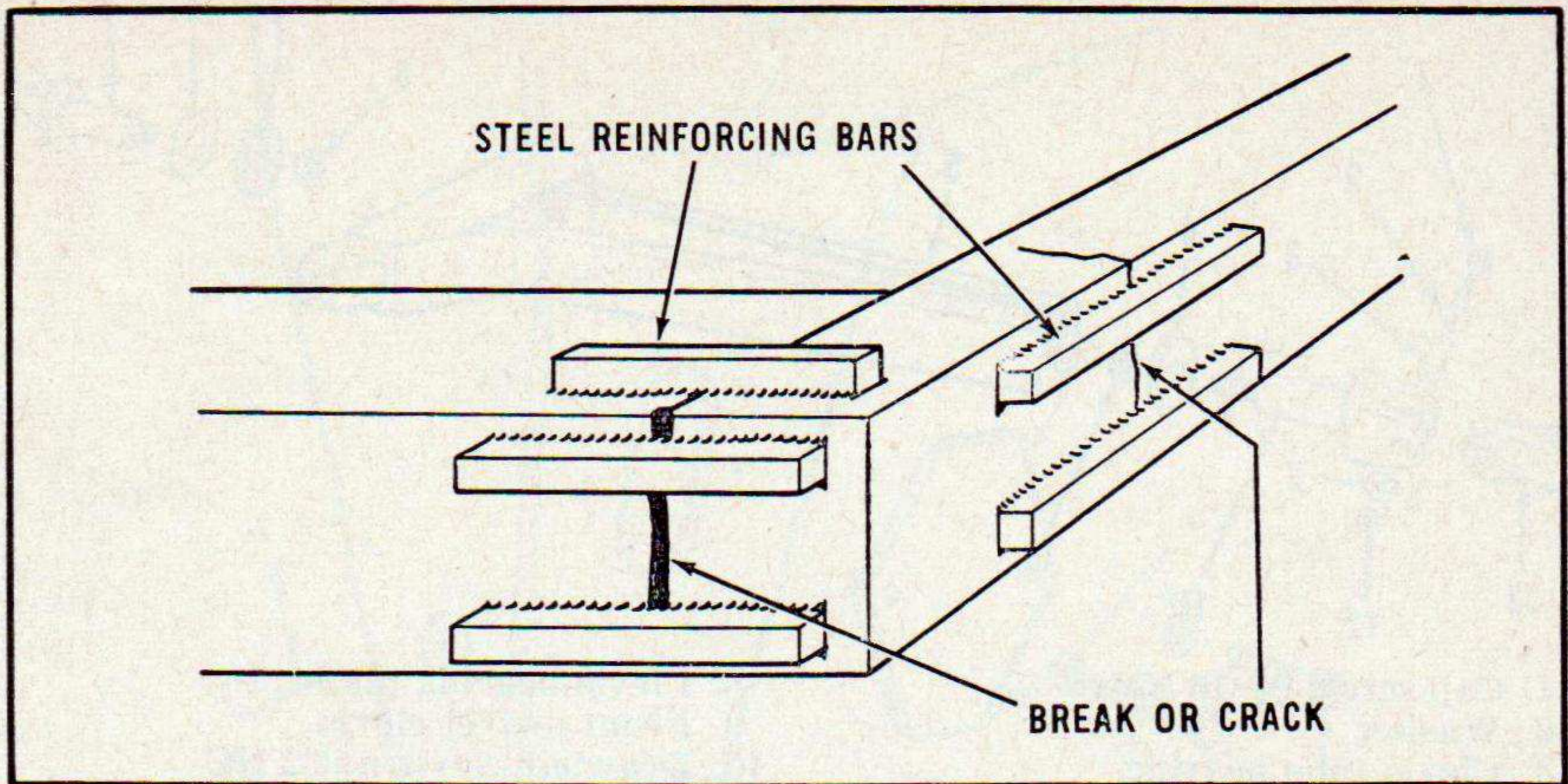


Figure 29. Method of repairing breaks or cracks.

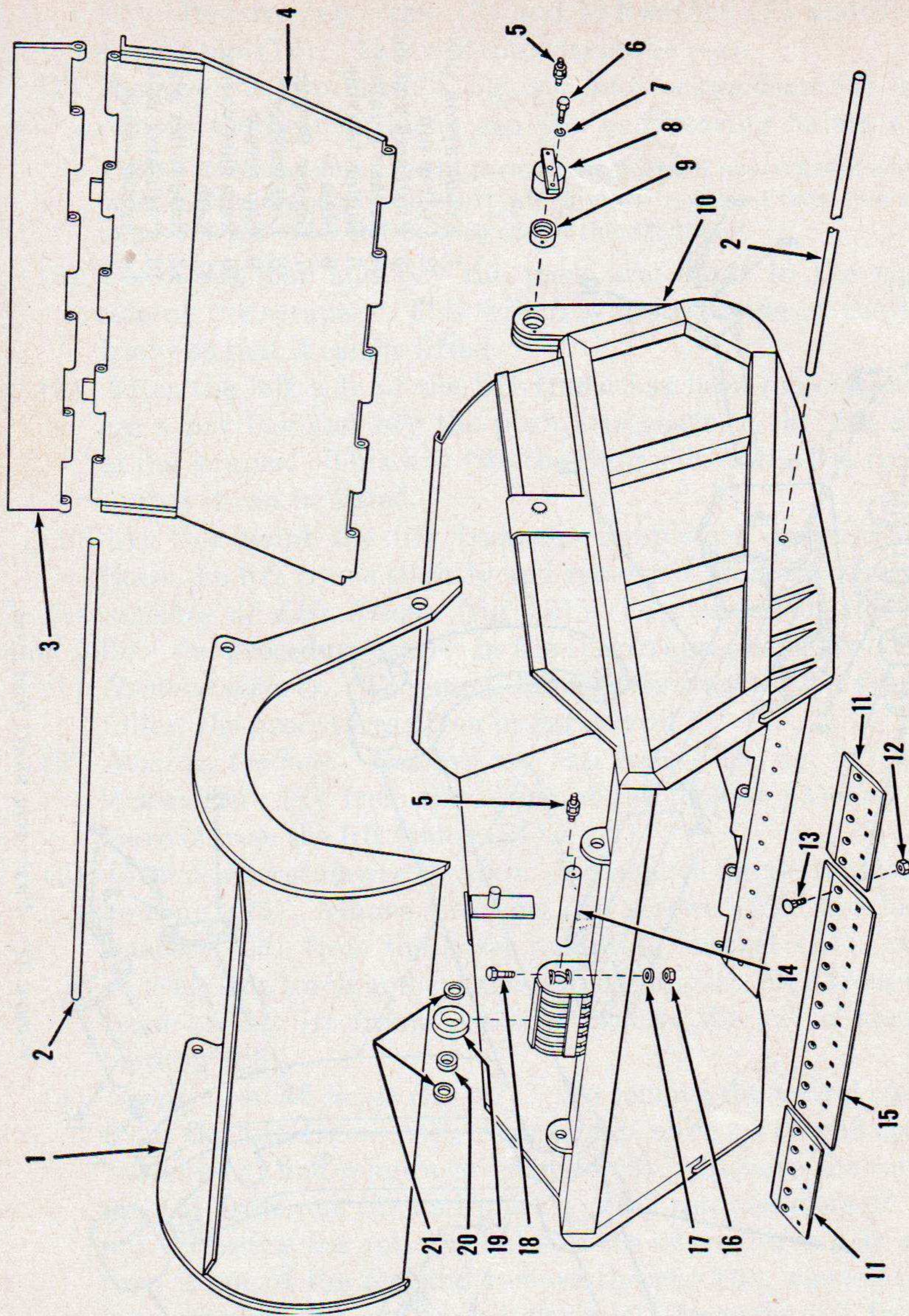
g. Installation of Drawbar. Position the drawbar in place and connect it to the swivel clevis (9, fig. 27) by installing the swivel clevis pin (10). Secure the pin in place with lockwasher (3) and cap screw (11). After the drawbar is connected lubricate in accordance with lubrication instructions given in paragraph 23.

45. Lift Frame

a. General. The scraper lift frame is the heavily reinforced forward member of the scraper (fig. 1). It is joined to the sides of the bowl at points located back of and above the cutting blade. The forward part of the lift frame has a post that secures the drawbar by means of a clevis.

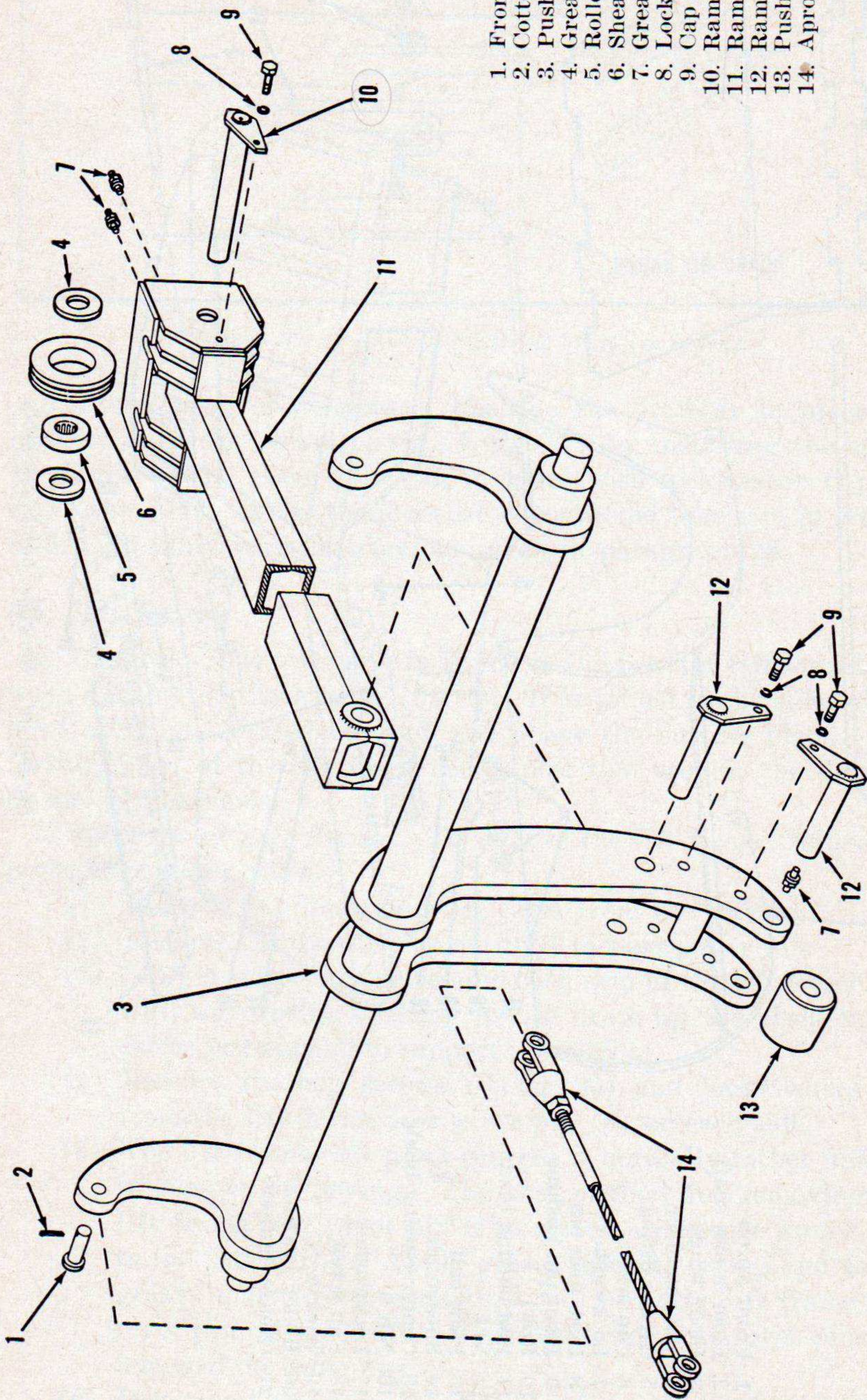
b. Removal of Lift Frame. To remove the lift frame, follow the procedures given below.

- (1) Remove the dump and lift cable from the scraper.
- (2) Remove the drawbar as outlined in paragraph 44*b*.
- (3) Sling a support cable around each arm of the lift frame and with an overhead lifting device draw up the slack in the cables just enough to support its weight.
- (4) Remove the cap screws (6, fig. 30) and lockwashers (7) from the lift frame rear pivot pin (8) on each side.
- (5) The lift frame rear pivot pin (8) is normally rather difficult to remove by prying. The best method for removing the lift frame rear pivot pin is to attach a pressure grease gun to the fitting (5). Apply grease into the fitting and as the grease under pressure enters, it will force the lift frame rear pivot pin off the shaft. Both lift frame rear pivot pins are removed the same way.
- (6) Disconnect the ram (11, fig. 31) from the push arm shaft



1. Front apron
2. Floor hinge shaft
3. Floor hinge
4. Movable floor
5. Grease fitting
6. Cap screw
7. Lockwasher
8. Push arm pin
9. Pivot pin bushing
10. Bowl
11. End cutting blade
12. Nut
13. Plow bolt
14. Sheave pin
15. Center cutting blade
16. Nut
17. Lockwasher
18. Cap screw
19. Sheave
20. Roller bearing
21. Grease retainer

Figure 30. Scraper bowl assembly.



- 1. Front apron pin
- 2. Cotter pin
- 3. Push arm and shaft
- 4. Grease retainer
- 5. Roller bearing
- 6. Sheave
- 7. Grease fitting
- 8. Lockwasher
- 9. Cap screw
- 10. Ram sheave pin
- 11. Ram
- 12. Ram roller pin
- 13. Push arm roller
- 14. Apron cable

Figure 31. Push arm shaft and ram.

(3). Remove cap screw (9) and lockwasher (8) and drive out the pin (12). This will disconnect the ram.

- (7) Remove the two nuts (4, fig. 34) and lockwashers (5) and remove the bearing block cap (6) and bearing halves (7).

Note. The disconnections in paragraphs 5 and 6 above are made in order to free the push arm shaft which must be moved from one side to the other in order to free each end of the lift frame.

- (8) Use a pry bar and pry the push arm shaft to the right side of the scraper. This will free the left side of the lift frame so that it can be lifted.

- (9) After the left side of the lift frame has been disconnected, use a pry bar and pry the push arm shaft to the left side of the scraper. This will free the right side of the lift frame so that it can be lifted.

- (10) At this point the lift frame is completely disconnected.

Raise the lift frame slightly and remove it from the scraper.

c. Disassembly of Lift Frame (fig. 32). To disassemble the lift frame follow the procedures given in the subparagraphs below.

- (1) *Remove sheaves.* To remove the sheaves from the lift frame, follow the procedures given in paragraph 38.

- (2) *Remove toolbox.* Remove the cap screws (1, fig. 32) and lockwashers (2) from the inside of the toolbox (3) and remove it from the lift frame (21).

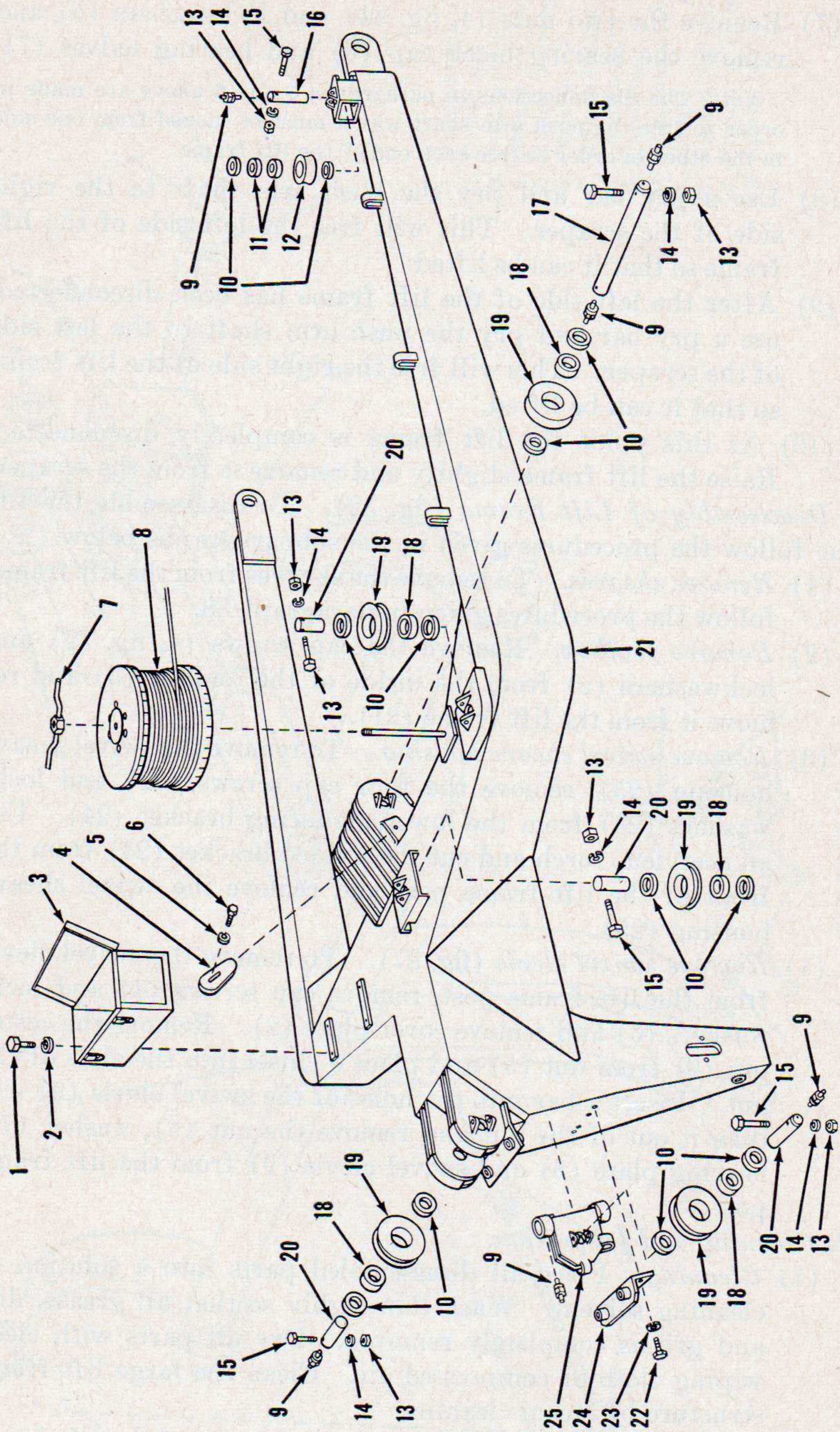
- (3) *Remove swivel sheave housing.* To remove the swivel sheave housing (25), remove the four cap screws (22) and lockwashers (23) from the lower mounting bracket (24). Use an acetylene torch and cut the welded bracket (24) from the front of the lift frame post and remove the swivel sheave housing (25).

- (4) *Remove swivel clevis* (fig. 27). To remove the swivel clevis from the lift frame post, remove cap screws (4) and lockwashers (3) and remove cover plate (2). Remove the cotter pin (6) from nut (5) and place a chisel into the slots of the nut. Insert a bar into the holes of the swivel clevis (9) and turn it out of the nut and remove the nut (5), washer (7), bearing plate (8) and swivel clevis (9) from the lift frame post.

d. Cleaning and Inspection.

- (1) *Cleaning.* Place all disassembled parts into a solution of cleaning solvent. Wash thoroughly so that all grease, dirt and grit is completely removed. Dry all parts with clean wiping cloth or compressed air. Clean the large lift frame structure by steam cleaning.

- (2) *Inspection.* Inspect all disassembled parts of the lift frame for excessive wear or damage and replace all found to be de-



1. Cap screws $\frac{3}{8}$ -24 NF 2 x 1
2. Lockwasher $\frac{3}{8}$
3. Toolbox
4. Cable lock
5. Lockwasher $\frac{1}{2}$
6. Cap screw $\frac{1}{2}$ -13 NC 2 x $2\frac{1}{2}$
7. Special wingnut
8. Lift cable
9. Grease fitting
10. Grease retainers
11. Roller bearings
12. Sheave
13. Hex nut $\frac{3}{8}$ -16 NC 2

14. Lockwasher $\frac{3}{8}$
15. Cap screw $\frac{3}{8}$ -16 NC 2 x $3\frac{1}{4}$
16. Sheave pin
17. Sheave pin
18. Roller bearing
19. Sheave
20. Sheave pin
21. Lift frame
22. Cap screw $\frac{3}{4}$ -10 NC 2 x $2\frac{1}{4}$
23. Lockwasher $\frac{3}{4}$
24. Sheave mounting bracket
25. Left hand sheave housing

Figure 32. Lift frame assembly.

fective. Carefully check the entire lift frame for breaks in welds or cracks and repair all that are found before reassembly.

e. Repair. The major portion of repair to the lift frame is done by replacing all defective and worn parts. If breaks or cracks are found repair as described in paragraph 44*d*(3) and illustrated in figure 29.

f. Reassembly of Lift Frame. To reassemble the lift frame, follow the procedures given in the subparagraphs below.

- (1) *Install lift frame sheaves.* To install lift frame sheaves follow the procedures in paragraph 38*c*.
- (2) *Install swivel sheave housing* (fig. 32). Place the swivel sheave housing (25) into place on the lift frame and install the lower mounting bracket (24). Secure the lower bracket with four cap screws (22) and lockwashers (23). Tighten securely and weld bottom edge of bracket to the lift frame.
- (3) *Install swivel clevis* (fig. 27). Place the bearing plate (8) onto the swivel clevis (9) and install the swivel clevis in the lift frame post. Place washer (7) on the swivel clevis and secure with nut (5). Draw the nut tight enough to take out any play and secure with cotter pin (6). Install cover plates (2) on each side of post and secure with cap screws (4) and lockwashers (3).
- (4) *Install toolbox* (fig. 32). Place the toolbox (3) into position on right side of the lift frame. Secure the toolbox in place with four cap screws (1) and lockwashers (2).

g. Installation of Lift Frame. To install the lift frame follow the procedures given below.

- (1) Place cable around each arm of the lift frame and with a lifting device place it into position on the scraper bowl.
- (2) Install the push arm shaft (3, fig. 31) into the lift frame.
- (3) Position the push arm shaft and lift frame into rear end of the scraper bowl.
- (4) Secure the push arm shaft end by installing the lift frame and push arm pin (8, fig. 30) and pin bushing (9) on each side and secure with cap screws (6) and lockwashers (7).
- (5) Install bearing halves (7, fig. 34) on center of push arm shaft and secure with bearing block cap (6), nuts (4) and lockwashers (5).
- (6) Connect the ram (11, fig. 31) to the push arm shaft (3) with pin (12) and secure with cap screw (9) and lockwasher (8).
- (7) Install the drawbar as indicated in paragraph 44*f*.
- (8) Install dump cable, see par 37*a*.
- (9) Install lift cable, see par 37*b*.
- (10) Lubricate entire scraper in accordance with instructions given in paragraph 23.

46. Ram

(fig. 31)

a. General. The push ram is mounted back of the scraper tilt floor. It is actuated by the dump cable which runs it forward and tilts the scraper floor to a discharge angle of 75 degrees.

b. Removal of Ram. To remove the ram from the scraper follow the procedures listed below.

- (1) Disconnect and remove the dump cable from the ram (11).
- (2) Disconnect the ram (par. 45*b*(6)).
- (3) Push the ram forward and lower the rear (sheave end) to the floor. Pull the ram shaft out of the push arm (3) and remove it from the rear end of the scraper.

c. Disassembly of Ram.

- (1) Remove the cap screw (9) and lockwasher (8) and drive out ram sheave pin (10) and remove the four sheaves (6). To remove grease retainers (4) and bearing (5) place the sheave in an arbor press and press out.

d. Cleaning and Inspection.

- (1) *Cleaning.* Place the disassembled parts into a solution of cleaning solvent. Wash thoroughly so that all dirt, grease, and grit are removed. Steam clean the large ram. Dry all parts with clean wiping cloth or compressed air.
- (2) *Inspection.* Check the condition of the sheave bearings and grease retainers and replace all found defective.

e. Repair. The only repair that can be made to the ram is welding breaks or cracks. To repair breaks or cracks see paragraph 44*d*(3).

f. Reassembly of Ram. If sheave bearings and retainers have been removed press in new bearings and retainers. Place the four sheaves (6) into ram (11) and secure them by installing ram sheave pin (10). Secure the sheave pin (10) with cap screw (9) and lockwasher (8).

g. Installation of Ram.

- (1) Install the ram (11) into push arm shaft (3). Secure the ram by installing ram pin (12). Secure the ram pin with cap screw (9) and lockwasher (8).
- (2) Reeve the dump cable. See paragraph 37*a*.
- (3) Lubricate ram as specified in paragraph 23.

47. Front Apron

(fig. 30)

a. General. The front apron is cable operated and is used to open or close the scraper bowl area for either loading or unloading operations.

b. Removal of Front Apron.

- (1) Disconnect apron cable from the apron (1).
- (2) Use a cutting torch and remove the welded washer holding apron arms (1) to the inside of the scraper bowl.
- (3) Sling cable or chain around front apron arms and support its weight before making any further disconnections.
- (4) Use a large bar and pry the front apron arms from the mounting pins inside the scraper bowl, then remove the front apron.

c. Cleaning and Inspection.

- (1) *Cleaning.* Use a steam cleaner to remove dirt and grease from the front apron. Dry thoroughly with compressed air.
- (2) *Inspection.* Inspect the entire front apron for bad bends and cracks.

d. Repair. Repair all bad bends and weld all cracks (par. 44*d* (3)) before reassembly. If front apron is damaged beyond repair, replace with a new assembly.

e. Installation of Front Apron.

- (1) Attach cable or chain to each arm of front apron (1).
- (2) Raise front apron with lifting device and position inside of bowl for installation.
- (3) Intall front apron arms on pins inside scraper bowl.
- (4) Secure front apron mounting by welding washer on the end of each pin.
- (5) Lower front apron into the scraper bowl and remove lifting device.
- (6) Attach apron cable.

48. Tilting Floor

(fig. 30)

a. General. The scraper tilt floor is of a two piece hinge construction and is connected back of the cutting blade.

b. Removal of Tilt Floor.

- (1) Operate the dump cable and raise the tilt floor to its maximum discharge angle of 75 degrees.
- (2) Raising the tilt floor positions the top floor hinge (3) and hinge shaft (2) just above the top edge of the scraper bowl. This allows the removal of hinge shaft (2) holding floor hinge (3).
- (3) Use a brass drift and drive out hinge shaft (2) and remove floor hinge (3).
- (4) After removing floor hinge (3) lower the remaining position of the tilt floor till it rests inside the bowl.
- (5) Attach a cable through the top hinge of movable floor (4) and attach a lifting device.

- (6) Remove the bottom hinge shaft (2) holding the movable floor (4).

Note. To remove the bottom hinge shaft use a cutting torch and cut off the welded end plugs on the outside of the scraper bowl.

- (7) After outside end plugs have been removed from each side use a long drift and drive out hinge shaft (2) and remove tilt floor section (4) from the bowl.

c. Cleaning and Inspection.

- (1) *Cleaning.* Remove excessive dirt from the tilt floor and steam clean. Dry thoroughly with compressed air.
- (2) *Inspection.* Inspect the tilt floor and hinge shafts for bad bends or cracks.
- (3) *Repair.* Replace all parts damaged beyond repair. Staighthen all bends and repair cracks by welding (par. 44d (3)).

d. Installation of Tilt Floor.

- (1) Attach a lifting sling to the top hinge position of the movable floor (4). Position the hinge floor into the scraper bowl.
- (2) Align the hinged positions and drive in the floor hinge shaft (2).
- (3) Center the installed hinge shaft (2) and weld an end plug to both sides of the scraper. This secures the hinge shaft in the bowl.
- (4) Lower movable floor (4) into the bowl and remove lifting sling.
- (5) Operate the dump cable and position the movable floor to its maximum discharge angle of 75 degrees.
- (6) Set the floor hinge (3) into position on top of the movable floor (4) and drive in the top floor hinge shaft (2).

49. Cutting Blade

(fig. 30)

a. General. The scraper is equipped with a 3-piece offset cutting blade. The cutting blades (11) and (15) are bolted with plow bolts (13) and nuts (12) to a supporting bed which is permanently attached to the bottom sides of the bowl. The blades are doubled edged and may be reversed when one edge shows excessive wear.

b. Removal of Cutting Blades.

- (1) Raise front apron (1) to desired height and block securely to prevent accidental closing.

Warning: Be very careful to block the front apron securely with timbers before attempting to work on the cutting blades. An accidental fall of the front apron upon a worker will have a guillotine effect and cause death.

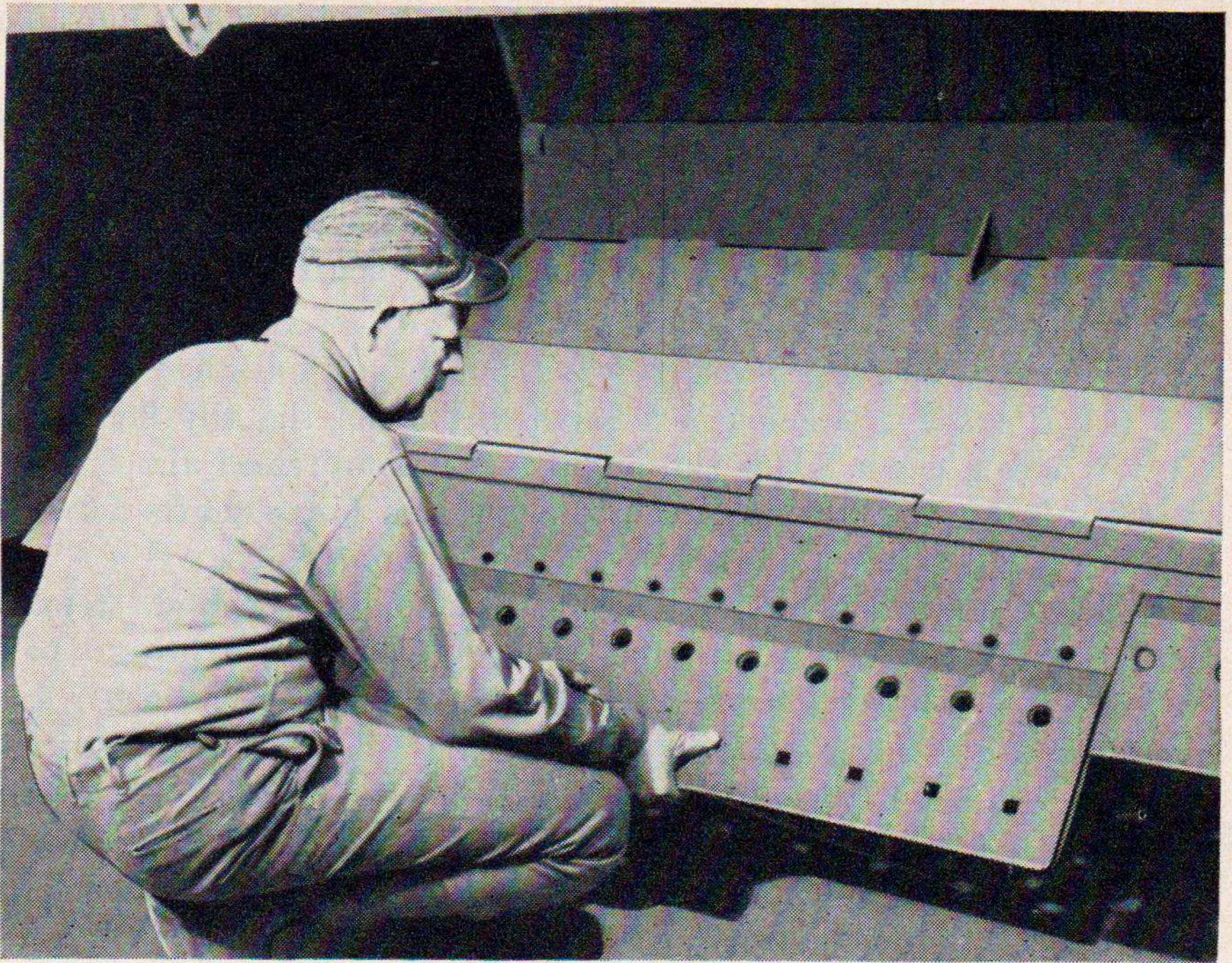


Figure 33. Reversing cutting blades.

- (2) Remove nuts (12), and plow bolts (13) and remove end cutting blades (11) and center blade (15).

c. Cleaning and Inspection.

- (1) *Cleaning.* Remove excessive dirt from the cutting blades and steam clean. Dry thoroughly with compressed air.
- (2) *Inspection.* Check the three-piece offset cutting blade for signs of wear. When the edges have worn down about 11½ inches, reverse the three sections (fig. 33). Failure to reverse the blades will cause excessive wear on the nose of the scraper bottom. If both edges of cutting blades are worn over 11½ inches, replace with new cutting blades.

d. Installation of Cutting Blades (fig. 30).

- (1) Place the cutting blades (11) and (15) on the blade bed.
- (2) Secure the three blades with plow bolts (13) and nuts (12).
- (3) Remove blocking from front apron and lower to its closed position.

50. Bowl

(fig. 34)

a. General. The bowl is the main part of the scraper. It consists of two heavily reinforced sides joined by sturdy cross members to form a box like construction.

- 1. Dump cable
- 2. Special wingnut
- 3. Grease fitting
- 4. Hex nut
- 5. Lockwasher
- 6. Bearing block cap
- 7. Half bearing
- 8. Bearing block stud
- 9. Bowl
- 10. Cap screw
- 11. Lockwasher
- 12. Cable lock
- 13. Cap screw
- 14. Lockwasher
- 15. Hex nut
- 16. Cap screw
- 17. Sheave pin

- 18. Lockwasher
- 19. Hex nut
- 20. Grease retainers
- 21. Sheave
- 22. Bushing
- 23. Ram roller
- 24. Ram roller bearing
- 25. Ram roller guide pin
- 26. Washer
- 27. Cap screw
- 28. Sheave housing pin
- 29. Swivel sheave housing
- 30. Cap screw
- 31. Nut
- 32. Push bumper
- 33. Sheave
- 34. Sheave pin

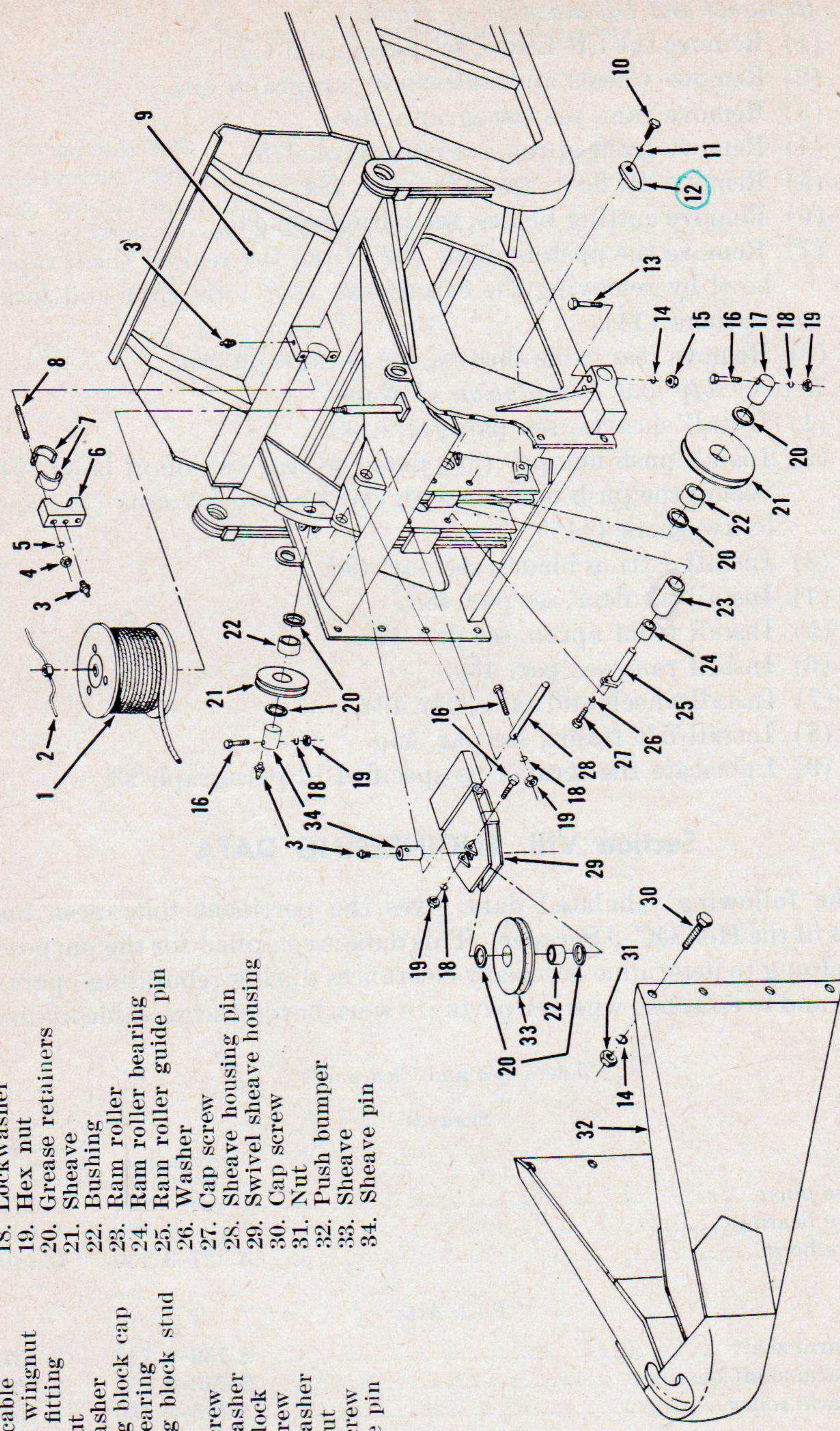


Figure 34. Bowl assembly, rear section.

b. Removal and Disassembly of Bowl.

- (1) Remove the lift frame, see paragraph 45*b*.
- (2) Remove wheels and axles, see paragraph 42*a*.
- (3) Remove ram, see paragraph 46*b*.
- (4) Remove front apron, see paragraph 47*b*.
- (5) Remove tilt floor, see paragraph 48*b*.
- (6) Remove cutting blades, see paragraph 49*b*.
- (7) Remove the push bumper (32) from the rear of the scraper bowl by removing the cap screws (30) nuts (31) and lockwashers (14).
- (8) Remove rear cable sheaves, see paragraph 38*a*.

c. Reassembly and Installation of Bowl.

- (1) Install sheaves, see paragraph 38*c*.
- (2) Install push bumper (32) onto the rear section of bowl (9). Secure the push bumper with cap screws (30) nuts (31) and lockwashers (14).
- (3) Install cutting blades, see par. 49*d*.
- (4) Install tilt floor, see par. 48*d*.
- (5) Install front apron, see par. 47*e*.
- (6) Install ram, see par. 46*g*.
- (7) Install wheels and axles, par. 42*d*.
- (8) Install lift frame, see par. 45*g*.
- (9) Lubricate the scraper as specified in paragraph 23.

Section VIII. ENGINEERING DATA

The following tabulated data gives the pertinent tolerances for parts of the Heil OC-9 Scraper. This data is compiled for the purpose of helping to determine necessary clearances during rebuilding operations and to establish whether parts are worn beyond serviceable limits.

Tolerances and Clearances

	Manufactured diameter	Minimum allowable diameter
Sheaves		
Sheave pins-----	1. 983-1. 984	1. 973
Sheave bearings-----	1. 999	2. 009
Sheave bore-----	3. 127-3. 130	3. 140
Push Arm		
Push arm shaft-----	2. 739-2. 741	2. 727
Push arm shaft bearing-----	2. 750-2. 752	2. 762
Push arm roller-----	1. 745-1. 750	1. 760
Wheels		
Wheel bearing-----	4. 999-5. 001	4. 989
Wheel axle-----	4. 749-4. 752	4. 739

Tolerances and Clearances—Continued

Torque Data

	<i>Foot- lb.</i>
Cutting blade bolts-----	100
Axle bracket bolts-----	65
Push bumper bolts-----	75
All other bolts and cap screws-----	40

CHAPTER 4

SHIPMENT, LIMITED STORAGE, AND DEMOLITION TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

51. Limited Storage

a. Inspection. Inspect the entire scraper as covered in preventive maintenance services (par. 26).

b. Cleaning and Painting.

- (1) Remove all excessive dirt from the scraper and steam clean.
- (2) Dry the entire scraper with compressed air.
- (3) After drying with compressed air check for excessive rust. Sand all rust spots and repaint.

c. Complete Lubrication. Lubricate the entire scraper in accordance with lubrication instructions.

d. Protection in Storage. When the scraper is stored for a period it is recommended that the procedure below be followed.

- (1) Lower the scraper blade onto blocks or planks.
- (2) Raise each wheel and place block under axles.
- (3) Release some air from each tire.

52. Domestic Shipment

a. General. Prepare the scraper for domestic shipment in the same manner as readying it for limited storage (par. 51).

b. Hoisting and Handling.

- (1) Prepare the scraper for hoisting and handling by stowing all loose ends of cable into the scraper bowl.
- (2) Install travel (safety plate) as shown in figure 8. This holds the scraper bowl from dropping.
- (3) Attach lifting cables to the four lifting ears on the scraper. These lifting points or ears are shown on lifting instruction plate figure 2.

c. Blocking. Carefully place two scrapers per flatcar as shown in figure 4. Block each wheel of the scrapers in the manner as shown in figure 4.

Section II. DEMOLITION OF ROAD SCRAPER TO PREVENT ENEMY USE

53. General

When capture or the abandonment of the road scraper to an enemy is imminent, the responsible unit commander makes the decision either to destroy the equipment or to render it inoperative. Based on this decision, orders are issued which cover the desired extent of destruction. Whatever method of demolition is employed, it is essential to destroy the same vital parts of all road scrapers and all corresponding repair parts.

54. Preferred Demolition Methods

Explosives or mechanical means, either alone or in combination, are the most effective demolition methods to employ. Listed below are the vital parts in order of priority of demolition for each preferred method. In each case completion of the first two steps will render the unit inoperative. Completion of the additional steps listed will further destroy the equipment.

a. Demolition by Explosives (fig. 35). Place as many charges as the situation permits and detonate them simultaneously with detonating cord and a suitable detonator.

- (1) A 4-pound charge on the ram area.
- (2) A 2-pound charge between bowl and apron on each side.
- (3) A 1-pound charge in bowl sheave block.
- (4) A 2-pound charge inside life frame post.
- (5) A 1-pound charge under each tire.

Note. The above charges are the minimum requirement for this method.

b. Demolition by Mechanical Means. Use sledge hammers, crow-bars, picks, axes or any other heavy tools which may be available, together with the tools normally included with the road scraper to destroy the following:

- (1) The sheave housings.
- (2) The sheaves.

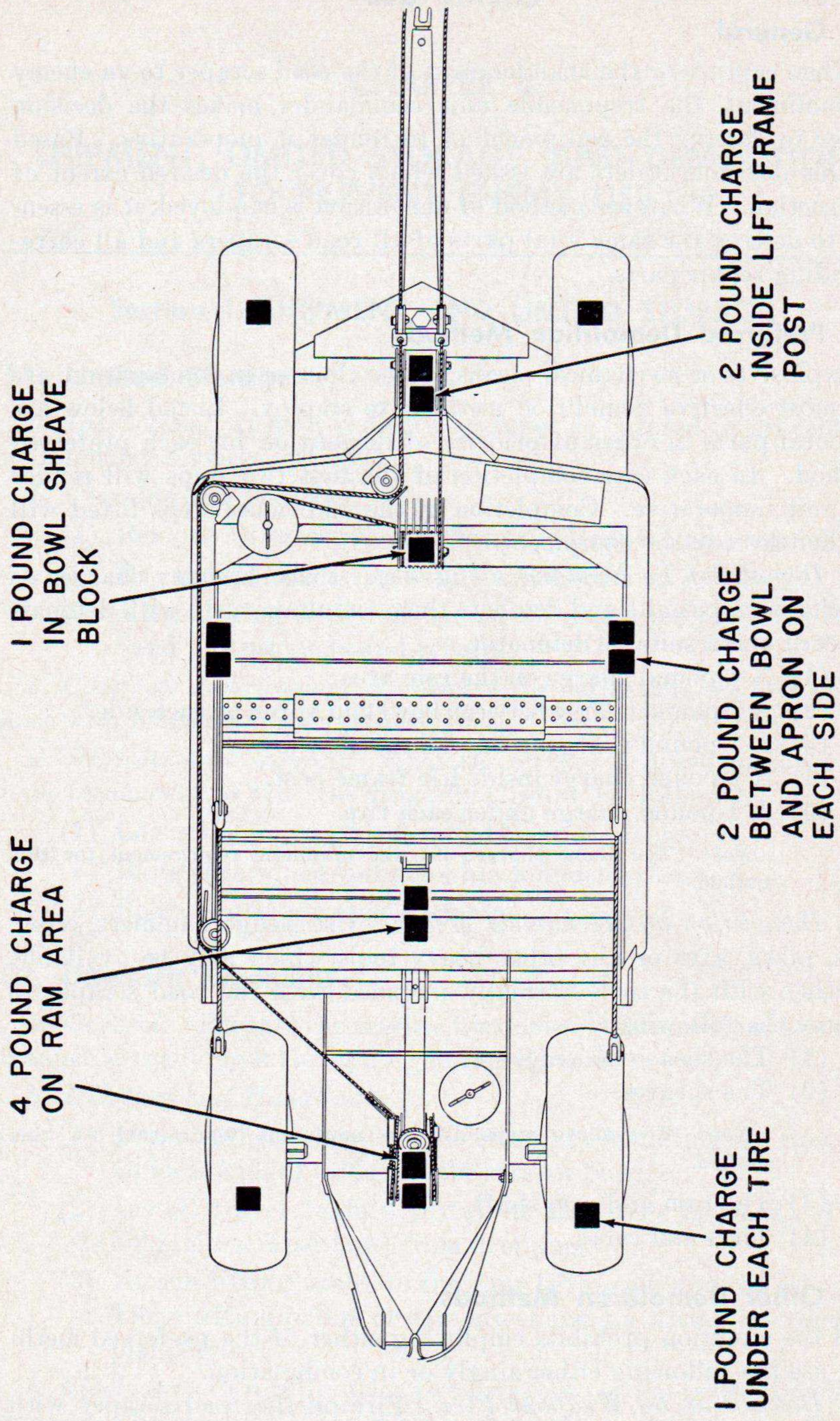
Note. The above steps are the minimum requirement for this method.

- (3) The ram and ram shaft.
- (4) Tires and tubes.

55. Other Demolition Methods

If the situation prohibits employing either of the preferred methods, use the following either singly or in combination.

a. Demolition by Weapons Fire. Fire on the road scraper with heaviest weapons available.



1 POUND CHARGE
IN BOWL SHEAVE
BLOCK

2 POUND CHARGE
INSIDE LIFT FRAME
POST

4 POUND CHARGE
ON RAM AREA

2 POUND CHARGE
BETWEEN BOWL
AND APRON ON
EACH SIDE

1 POUND CHARGE
UNDER EACH TIRE

Figure 35. Placement of charges.

b. Demolition by Scattering and Concealment. Remove all easily accessible vital parts such as wheels and scatter in dense foliage, bury them in dirt or sand, or throw them in a lake, stream or other body of water.

c. Demolition by Burning. Pack rags, clothing or canvas under and around the unit. Saturate this packing with gasoline, oil, or diesel fuel and ignite.

d. Demolition by Submersion. Totally submerge the unit in a body of water to afford some water damage and concealment. Salt water will do the greatest damage to metal parts.

56. Training

All operators should receive thorough training in the destruction of the road scraper. Simulated destruction, using all the methods listed above, should be included in the operator training program. It must be emphasized in training that demolition operations are usually necessitated by critical situations, when the time available for demolition is limited. For this reason it is necessary that operators be thoroughly familiar with all methods of destruction and be able to carry out demolition instructions without reference to this or any other manual.

APPENDIX I

REFERENCES

1. Accessory Equipment

- TM 5-3068, Tractor, Crawler, Diesel, 70 to 90-DBHP, Standard, Caterpillar Model D7, 74-in. Gage.
TM 5-9957, Power Control Units, Cable-Operating, Caterpillar Models 21, 24, and 25.

2. Dictionaries of Terms and Abbreviations

- SR 320-5-1, Dictionary of U. S. Army Terms.
SR 320-50-1, List of Authorized Abbreviations.

3. Lubrication and Painting

- LO 5-1343.
TM 9-2851, Painting Instructions for Field Use.

4. Preparation for Export Shipment

- TB 5-9711-1, Preparation of Corps of Engineers Equipment for Oversea Shipment.
TB 5-9713-1, Preparation for Export, Spare Parts for Corps of Engineers Equipment.

5. Preventive Maintenance

- TB 5-1343-1, Preventive Maintenance Services.
TM 5-505, Maintenance of Engineer Equipment.

6. Publication Indexes

- SR 110-1-1, Index of Army Motion Pictures, Kinescope Recordings, and Film Strips.
SR 310-20-3, Index of Army Training Publications.
SR 310-20-4, Index of Technical Manuals, Technical Regulations, Technical Bulletins, Supply Bulletins, Lubrication Orders, and Modification Work Orders.
SR 310-20-5, Index of Administrative Publications.
SR 310-20-6, Index of Blank Forms.
ENG 1, Introduction and Index, Department of the Army Supply Manual.

7. Supply Publications

ENG 7 & 8-1343, Organizational Allowances, Field and Depot Maintenance Initial Stock Guide, and Depot Stock Guide for Spare Parts. Scraper, Road: Towed-Type; Cable-Operated; 8 Cubic Yard; MIL-S-3084; Size I; Heil Model OC-9.

ENG 5-42, List of All Items, Stock List Federal Class 42, Hardware.

ENG 5-43, List of All Items, Stock List Federal Class 43, Bolts, Nuts and Rivets.

8. Training Aids

FM 21-8, Military Training Aids.

APPENDIX II

IDENTIFICATION OF REPLACEABLE PARTS

STANDARD HARDWARE

Fig. No.	Index No.	Engineer Stock No.		Manufacturer's Part No.		Federal Supply Class and Item Ident. No.	Description	Quantity Per Unit
		Code No.	Part No.	Code No.	Part No.			
		913	43-2818. 070. 025				Bolts, plow #3 3/4"-10 N. C. x 2 1/2"	26
			43-6777. 040. 100				Cap screw, hex head: 3/8"-16 N. C. 2 x 1"	16
			43-6777. 040. 330				3/8"-16 N. C. 2 x 3 1/4"	16
			43-6777. 050. 100				1/2"-13 N. C. 2 x 1"	1
			43-6777. 050. 150				1/2"-13 N. C. 2 x 1 1/2"	4
			43-6777. 050. 250				1/2"-13 N. C. 2 x 2 1/2"	2
			43-6777. 070. 230				3/4"-10 N. C. 2 x 2 1/4"	4
			43-6830. 070. 500				3/4"-16 N. F. 2 x 5"	12
		806	1848	806	1848		3/4"-16 N. F. x 6 1/2"	1
							Grease fitting	34
							Nut, hex:	
			43-4624. 040. 160				3/8"-16 N. C. 2	18
			43-4626. 060. 180				5/8"-18 N. F.	2
			43-4600. 070. 100				3/4"-10 N. C. 2	26
			43-4604. 070. 160				3/4"-16 N. F. 2	17
		913	43-4600. 200. 045				2"-N. C.	1

STANDARD HARDWARE—Continued

Fig. No.	Index No.	Engineer Stock No.		Manufacturer's Part No.		Federal Supply Class and Item Ident. No.	Description	Quantity Per Unit
		Code No.	Part No.	Code No.	Part No.			
28	7	248	RM82A437	248	RM82A437	-----	Nut, jam special-----	1
	8	248	RM34B5202	248	RM34B5202	-----	Plate, bearing clevis-----	1
	9	248	ARM127C21	248	ARM127C21	-----	Clevis, swivel front-----	1
	11	248	32C494	248	32C494	-----	Clevis, drawbar-----	1
	13	248	74B1782	248	74B1782	-----	Block, swivel-----	1
	1	248	ARM193E37	248	ARM193E37	-----	Apron, front-----	1
	2	248	RM8A5753	248	RM8A5753	-----	Shaft, hinge floor-----	2
	3	248	ARM5D2001	248	ARM5D2001	-----	Hinge, floor-----	1
	4	248	ARM193E36	248	ARM193E36	-----	Floor, movable-----	1
	8	248	ARM48B1504	248	ARM48B1504	-----	Pin, arm push and frame lift-----	2
	9	248	RM9A932	248	RM9A932	-----	Bushing, pin pivot rear-----	2
	10	248	ARM192F24	248	ARM192F24	-----	Bowl-----	1
	11	248	128B234	248	128B234	-----	Blade, cutting end-----	2
31	14	248	RM48C1638	248	RM48C1638	-----	Pin, sheave-----	1
	15	248	RM128C114	248	RM128C114	-----	Blade, cutting center-----	1
	19	248	RM166C186	248	RM166C186	-----	Sheave-----	6
	20	526	C99208	248	RM3A1120	-----	Bearing, roller-----	6
	21	248	RM146A174	248	RM146A174	-----	Retainer, grease-----	12
	1	248	RM97B423	248	RM97B42-3	-----	Pin, apron front-----	2
	3	248	ARM93D770	248	ARM93D770	-----	Arm, push (includes shaft)-----	1
	4	248	RM146A174	248	RM146A174	-----	Retainer, grease-----	8
	5	526	C99208	248	RM3A1120	-----	Bearing, roller-----	4
	6	248	RM166C186	248	RM166C186	-----	Sheave-----	4
	10	248	ARM48B1607	248	ARM48B1607	-----	Pin, sheave ram-----	1

11	248	ARM93D755	248	ARM93D755	Ram	1
12	248	A48A2062	248	A48A2062	Pin, roller and ram	2
13	248	RM62B302	248	RM62B302	Roller, arm push	1
14	248	ARM97B42	248	ARM97B42	Cable, apron	2
3	248	A151C299	248	A151C299	Box, tool	1
4	248	RM84A11	248	RM84A1-1	Lock, cable	1
7	248	ARM82B23	248	ARM82B23	Nut, wing special	1
8			248	RM97A22	Cable, lift	1
10	248	RM146A174	248	RM146A174	Retainers, grease	26
11	526	C99208	248	RM3A1120	Bearings, roller	2
12	248	RM166B233	248	RM166B233	Sheave	1
16	248	48B1906	248	48B1906	Pin, sheave	1
17	248	RM48C1638	248	RM48C1638	Pin, sheave	1
18	526	C99208	248	RM3A1120	Bearing, roller	12
19	248	RM166C186	248	RM166C186	Sheave	12
20	248	RM48A1499	248	RM48A1499	Pin, sheave	6
21	248	ARM37F1504	248	ARM37F1504	Frame, lift	1
24	248	ARM11B4205	248	ARM11B4205	Bracket, mounting sheave	1
25	248	ARM6D1176	248	ARM6D1176	Housing, sheave lefthand	1
1			248	RM97A22	Cable, dump	1
2	248	ARM82B23	248	ARM82B23	Nut, wing special	1
6	248	3A1759	248	3A1759	Cap, block bearing	1
7	248	3A1851	248	3A1851	Bearing, half	2
8	248	RM52A640	248	RM52A640	Stud, block bearing	2
9	248	ARM192F24	248	ARM192F24	Bowl	1
12	248	RM84A1	248	RM84A1	Lock, cable	1
17	248	RM48B1068	248	RM48B1068	Pin, sheave	1
20	248	RM146A174	248	RM146A174	Retainers, grease	8
21	248	RM166C186	248	RM166C186	Sheave	4
22	248	RM3A1120	248	RM3A1120	Bushing	5
23	248	RM62B299	248	RM62B299	Roller, ram	2

STANDARD HARDWARE—Continued

Fig. No.	Index No.	Engineer Stock No.		Manufacturer's Part No.		Federal Supply Class and Item Ident. No.	Description	Quantity Per Unit
		Code No.	Part No.	Code No.	Part No.			
	24	248	RM3A1040	248	RM3A1040	----	Bearing, roller ram	4
	25	248	RM48B1502	248	RM48B1502	----	Pin, guide roller ram	2
	28	248	RM48A1517	248	RM48A1517	----	Pin, housing sheave	1
	29	248	A6B1270	248	A6B1270	----	Housing, sheave swivel	1
	32	248	ARM80E152	248	ARM80E152	----	Bumper, push	1
	33	248	RM166C236	248	RM166C236	----	Sheave	1
	34	248	RM48A1499	248	RM48A1499	----	Pin, sheave	2

APPENDIX III

ON-EQUIPMENT TOOLS

The following list indicates the tools issued and carried in the road scraper toolbox for performing services and maintenance. Figure 36 and the following listing illustrate and describe the full complement of tools.

<i>Index No.</i>	<i>Name</i>	<i>Quantity supplied</i>
16	Socket $\frac{9}{16}$ "	1
17	Socket $\frac{5}{8}$ "	1
18	Socket $\frac{3}{4}$ "	1
19	Socket $1\frac{3}{16}$ "	1
4	Socket 1"	1
13	Socket $1\frac{1}{16}$ "	1
14	Socket $1\frac{1}{8}$ "	1
5	Adjustable wrench 15" LG	1
11	Crescent wrench 10" LG	1
20	Extension $\frac{1}{2}$ " x $2\frac{1}{2}$ " LG	1
3	Extension $\frac{3}{4}$ " x 4" LG	1
2	Sliding T handle $\frac{3}{4}$ " x $17\frac{1}{2}$ " LG	1
15	Sliding T handle $\frac{1}{2}$ " x 11" LG	1
12	Combination pliers 6"	1
7	Hammer ball peen $1\frac{1}{2}$ lb.	1
6	Machine punch	1
10	Cold chisel	1
9	Tire gage	1
1	Cable cutter	1
8	Grease gun	1

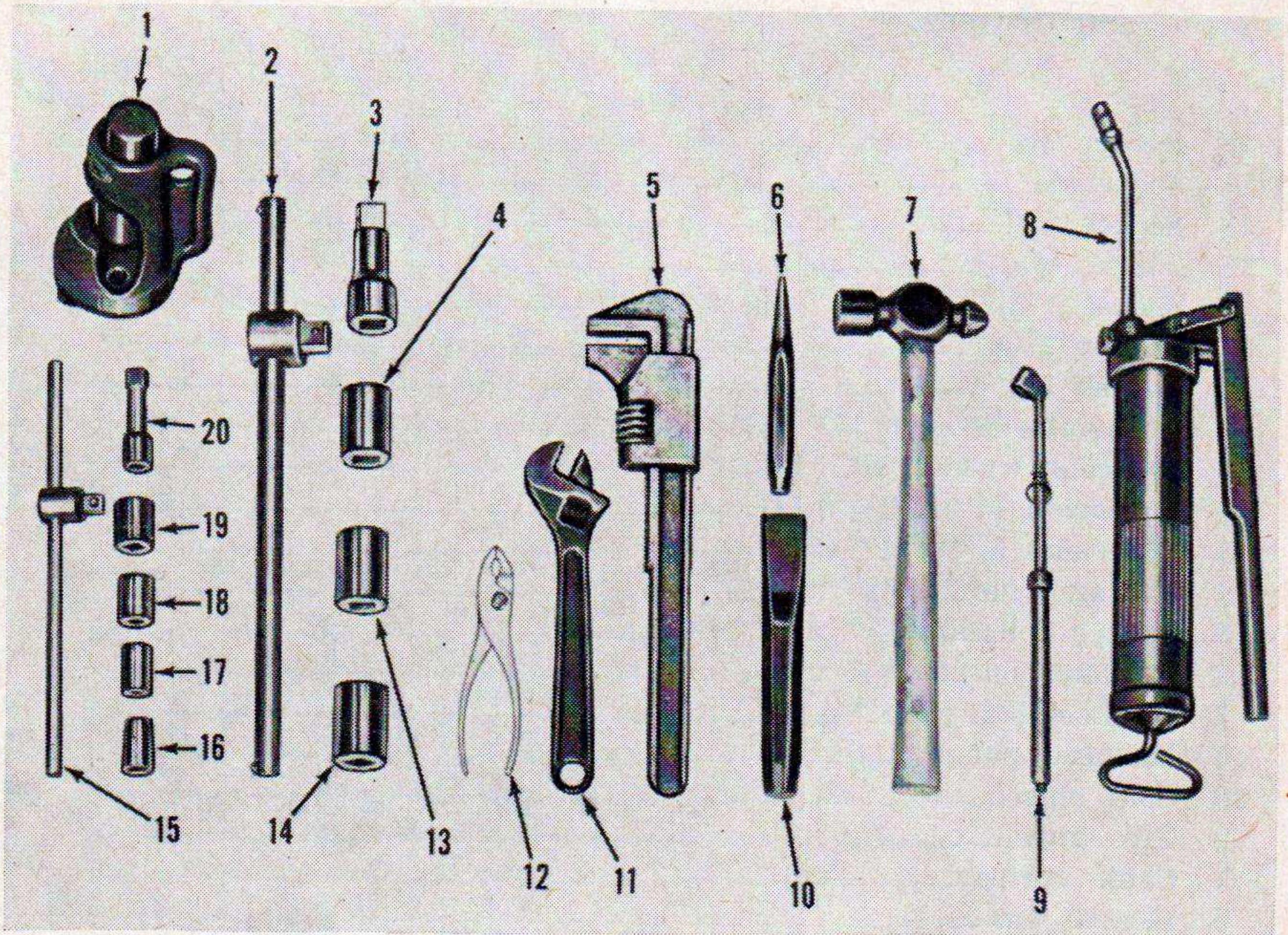


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NG: None.

USAR: None.

For explanation of distribution formula, see SR 910-90-1.

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