

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATOR'S MANUAL
CLEANING MACHINE
FUEL CAN AND DRUM
(BARNES MODELS
4310CA AND 15801CA)

This reprint includes all changes in effect at the time of
publication; Changes 1 and 4.

HEADQUARTERS, DEPARTMENT OF THE ARMY
JANUARY 1960

Changes in force: C 1 and C 4

TM 10-4940-201-10

*C 4

Change
No. 4 }
}

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D.C., 13 April 1973

**Operator's Manual
CLEANING MACHINE, FUEL CAN AND DRUM
(BARNES MODEL 4310CA, ARMY MODEL SPE19)
FSN 4940-268-9771
(BARNES MODEL 15801CA, ARMY MODEL SPE19A)
FSN 4940-658-2889**

TM 10-4940-201-10, 28 January 1960, is changed as follows: The title is changed as shown above: *Page 3.* Paragraph 1 is superseded as follows:

1. Scope

a. This manual is for your use in operating and maintaining the cleaning machine.

b. General information relating to the 50-gallon-per-minute dispenser, a component of the cleaning machine, is covered in TM 10-1125.

Page 3. Paragraph 2 is superseded as follows:

2. Maintenance Forms and Records

Maintenance forms and records that you are required to use are explained in TM 38-750.

Page 3. Paragraph 3 is superseded as follows:

3. Reporting of Equipment Publication Improvements

The reporting of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to Publications) and forwarded direct to: Commander, US Army Mobility Equipment Command, ATTN: AMSME-MPP, 4300 Goodfellow Boulevard, St. Louis, Mo. 63120.

Page 28. Appendix I is superseded as follows:

*This change supersedes Change 3, 2 Feb 1970.

By Order of the Secretary of the Army:

Official:

VERNE L. BOWERS
Major General, United States Army
The Adjutant General

CREIGHTON W. ABRAMS
General, United States Army
Chief of Staff

Distribution:

To be distributed in accordance with DA Form 12-25A (qty rqr block No. 309) Operator's Maintenance Requirements for Cleaning.

**APPENDIX I
REFERENCES**

1. Fire Protection

TB 5-4200-200-10

Hand Portable Fire Extinguishers for Army Users.

2. Maintenance

TM 10-1101

TM 10-4320-202-15

Petroleum Handling, Equipment Operation.

Operators Organizational, Direct and General Support: pumping assembly, flammable, liquid, bulk transfer 50 GPM (Barnes model 9117CA) Army model SPE 16, FSN 4320-728-0265 (Barnes model 15671CA) Army model SPE 16A, FSN 4320-658-2888 (Barnes model 4074CA) FSN 4320-271-1858.

TM 38-750

The Army Maintenance Management System (TAMMS).

Page 29. Appendix II is superseded as follows:

**APPENDIX II
BASIC ISSUE ITEM LIST AND ITEMS
TROOP INSTALLED OR AUTHORIZED**

Section I. INTRODUCTION

1. Scope

This appendix lists basic issue items, items troop installed or authorized which accompany the cleaning machine and are required by the crew/operator for operation, installation, or operator's maintenance.

2. General

This basic issue items, items troop installed or authorized list is divided into the following sections:

a. Basic Issue Items List - Section II. Not applicable.

b. Items Troop Installed or Authorized List - Section III. A list in alphabetical sequence of items which, at the discretion of the unit commander, may accompany the end item, but are NOT subject to be turned in with the end item.

3. Explanation of Columns

The following provides an explanation of columns in the tabular list of Basic Issue Items List, Section II, and Items Troop Installed or Authorized, Section II.

a. Source, Maintenance, and Recoverability Code(s) (SMR): Not applicable.

b. Federal Stock Number. This column indicates the Federal stock number assigned to the item and will be used for requisitioning purposes.

c. Description. This column indicates the Federal item name and any additional description of the item required.

d. Unit of Measure (U/M). A 2-character alphabetic abbreviation indicating the amount or quantity of the item upon which the allowances are based, e.g., ft, ea, pr, etc.

e. Quantity Authorized (Items Troop Installed or Authorized Only). This column indicates the quantity of the item authorized to be used with the equipment.

Section III. ITEMS TROOP INSTALLED OR AUTHORIZED LIST

(1)	(2)	(3)	(4)	(5)
SMR code	Federal stock number	Description Ref No. & mfr code	Usable on code Unit of meas	Qty auth
	7520-559-9618	CASE: Manual	ea	1

**Operator's Manual
CLEANING MACHINE
FUEL CAN AND DRUM
(BARNES MODELS 4310CA AND 15801CA)**

CHANGE }
No. 1 }

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 6 February 1964

TM 10-4940-201-10, 28 January 1960, is changed as follows:

3. Forms, Records, and Reports

(Superseded)

The forms, records, and reports to be used in the operation and the first-echelon maintenance of this cleaning machine are listed and described in TM 38-750.

38. Preventive Maintenance Services

(Superseded)

Preventive maintenance services are the minimum inspections which are performed to insure that defects may be discovered and corrected before they result in serious damage to or failure of the equipment. When defects are discovered during operation of the equipment, they must be corrected as soon as operation has ceased. If continued operation would result in

damage to the equipment, the defects must be corrected at once. All deficiencies and shortcomings that are discovered and all corrective action that is taken will be recorded on DA Form 2404 as soon as possible.

39. Operator's Daily Services

(Superseded)

The preventive maintenance services listed on figure 16 are the minimum daily inspections to be performed by the operator. The services will be performed in the sequence in which they are numbered.

40. Corrective Action

(Rescinded)

APPENDIX I

REFERENCES

* * * * *

TM 38-750 The Army Equipment Record System and Procedures

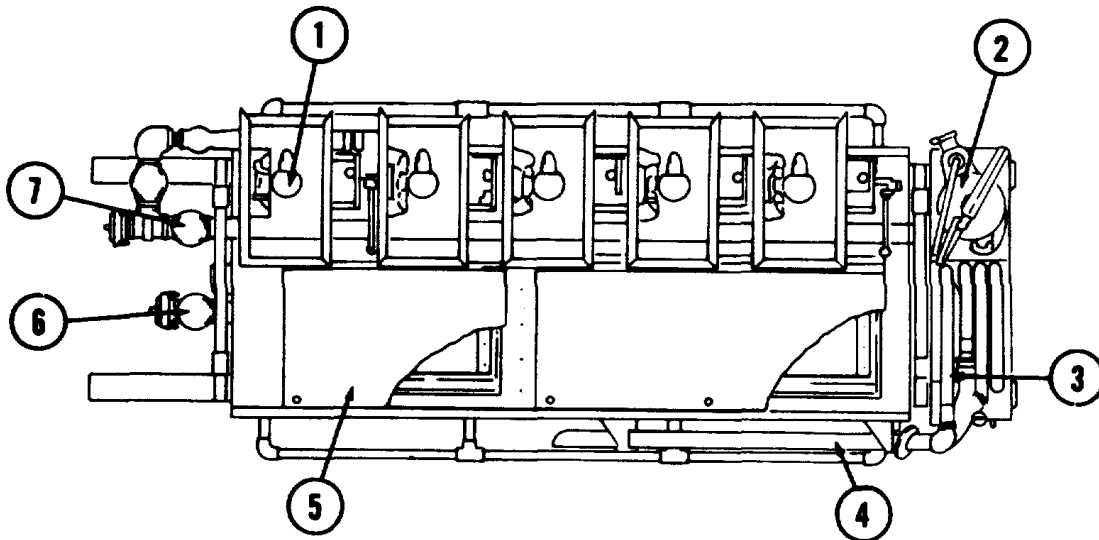
PREVENTIVE MAINTENANCE SERVICES

DAILY

TM 10-4940-201-10

BARNES MODELS 4310CA
AND 15801 CA

CLEANING MACHINE
FUEL CAN AND DRUM



LUBRICATE IN ACCORDANCE WITH CURRENT LUBRICATION ORDER

ITEM		PAR REF
1	<u>CRADLE VALVES.</u> During operation, inspect cradle valves for leaks. Inspect cradle valves and nozzles for improper operation.	
2	<u>FIRE EXTINGUISHER.</u> Inspect extinguisher for broken seal.	
3	<u>HOSES.</u> Inspect all hoses for cracks, cuts, leaks, deterioration, kinks and clogging.	
4	<u>DRUM WASHER ASSEMBLIES.</u> Inspect suction and flushing tubes for clogging. During operation, check nozzles and tubes for leaks, and improper operation.	
5	<u>FILTERS.</u> Inspect filters for tears and clogging.	
6	<u>PRESSURE GAGES.</u> During operation, check pressure gages for 23 psi normal operating pressure.	
7	<u>CONTROLS.</u> During operation, check gate valves and float valve for improper operation.	
	<u>NOTE 1. OPERATION.</u> During operation observe for unusual noises or vibration.	

MSC 4940-201-10/16

Figure 16. (Added) Daily preventive maintenance service.

By Order of the Secretary of the Army:

EARLE G. WHEELER,
United States Army,
Chief of Staff.

Official:

J. C. LAMBERT,
Major General, United States Army,
The Adjutant General.

Distribution:

Active Army:

USASA (1)	USAMOCOM (2)	USMA (1)
DCSLOG (1)	USAWECOM (5)	Army Depots (4)
CNGB (1)	USAMICOM (5)	POE (2)
C/Army Res (1)	USAMUCOM (5)	USA Trans Tml Comd (2)
C of Engrs (6)	USAECOM (5)	Army Tml (2)
C of Spt S (1)	USATECOM (5)	Arsenals (2)
CofT (1)	USASMCOM (1)	PG (2)
CSigO (1)	QMRECEN (2)	USAOSA (2)
USCONARC (2)	USA Spt Cen (Phila) (10)	Instl (2)
ARADCOM (2)	USA Mbl Spt Cen (36)	Units org under fol TOE:
ARADCOM Rgn (2)	Svc Colleges (2)	(2 copies each)
OS Maj Comd (3)	Br Svc Sch (2) except	10-105
LOGCOMD (1)	USAQMS (10)	10-107
MDW (1)	USAQMTC (4)	10-377
Armies (5)	USA Tech Equip Pubs Fld	10-445
USAMC (12)	Ofc, (Ft Lee) (2)	

NG: State AG (3).

USAR: None.

For explanation of abbreviations used, see AR 320-50.

**CLEANING MACHINE, FUEL CAN, AND DRUM
 (BARNES MODELS 4310CA AND 15801CA)**

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*This manual supersedes applicable portions of TM 10-1140, 24 June 1952.

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CHAPTER 1 INTRODUCTION

Section I. GENERAL

1. Scope

This manual is published for personnel responsible for operating the Cleaning Machine, Fuel Can, and Drum, and performing first echelon maintenance. This equipment hereafter will be referred to as the cleaning machine. This manual includes a description of the equipment and an explanation of its functions. Information relating to the 50-gallon-per-minute dispenser, a major component of the cleaning machine, is limited, since it is discussed and fully explained in TM 10-1125. Repair parts for the dispenser are listed in TM 10-4320-20220P and TM 10-4320-20235P. The maintenance allocation chart is published in TM 104940-201-20.

2. Appendixes

Appendix I contains references pertaining to the cleaning machine. Appendix II, Basic Issue Items List, includes the items required for stockage by first echelon maintenance units.

3. Maintenance Forms and Records

DD Form 110, Vehicle and Equipment Operational Record, is to be used by the operator in performing the services listed on the reverse side of the form and is the operator's authority for operating the equipment.

4. Orientation

a. General. Information within this publication relates to two models of the cleaning machine, Barnes Model 4310CA and Barnes Model 15801CA. Since the two models differ slightly in design only, separate operating instructions are not required. Parts of each model of the cleaning machine are used in illustrations throughout the manual and are so identified in the figure captions where appropriate. Variations in the design of the two models will be explained throughout the manual where necessary.

b. Terms.

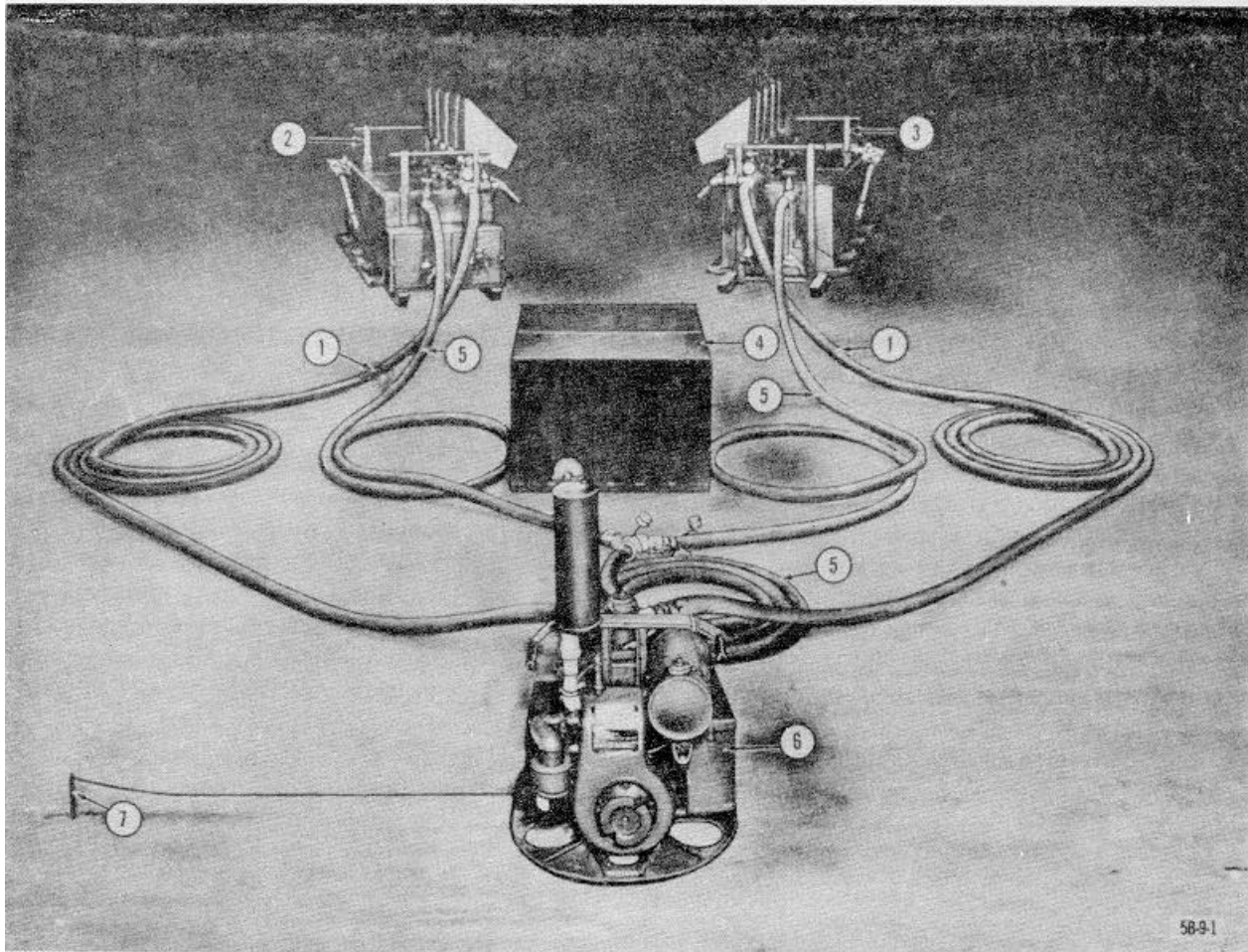
- (1) *Front.* Front is that end of the cleaner assembly to which the controlling gate valves and pressure gage are attached.
- (2) *Fill side.* Fill side is that side of the cleaner assembly where the hatches for filling the sedimentation tank are located.
- (3) *Operating side.* The operating side is that side of the cleaner assembly where the cradles, used by the operator during the can-washing operations, are mounted.
- (4) *Rear.* Rear is that end of the cleaner assembly to which the fire extinguisher and the hose compartment for the 55gallon drum washer are attached.

Section II. DESCRIPTION AND DATA

5. General

The cleaning machine (fig. 1) is designed to remove sand, dirt, loose rust, and sediment from the interior of the 5-gallon can and the 55-gallon drum by the spraying action of cleaning solvent delivered under pressure into the interior of the container. The

equipment consists primarily of two cleaner assemblies, one 50gallon-per-minute dispenser, three 25-foot lengths of 1 1/2-inch suction hose, and two 50-foot lengths of 1 1/2-inch discharge hose. Although Stoddard solvent is the cleaning agent normally used, kerosene may be used in an emergency.



- | | |
|----------------------------------|----------------------------------|
| 1 Discharge hose | 5 Suction hose |
| 2 Right-hand cleaner assembly | 6 50-gallon-per-minute dispenser |
| 3 Left-hand cleaner assembly | 7 Ground rod |
| 4 Hose and dispenser compartment | |

Figure 1. Assembled can and drum-cleaning equipment (Model 15801CA).

6. Dispenser

The 50-gallon-per-minute dispenser circulates the cleaning solvent from tank to tank through the suction and discharge hose and exerts sufficient pressure upon the solvent to flush the containers effectively. Operating and maintenance instructions are contained in TM 10-1125.

7. Cleaner Assemblies

Each cleaner assembly (figs. 1 through 4) consists of a sedimentation tank (fig. 2) with filters, five cradles and cradle valves (figs. 2 and 3), a suction system and a pressure system, gate valves to direct the flow of cleaning solvent (5, 7, and 8, fig. 3), and a drum-washer assembly (fig. 3). Each assembly is mounted in a frame and is equipped with a fire extinguisher and hose compartment (fig. 4) for housing the discharge

hose of the drum-washer assembly. Included in the serial number on each assembly is the letter R or L, which indicates right- or left-hand cleaner assembly. The assemblies may also be identified as right or left by the location of the cradles. When one looks from the front of the assemblies toward the rear, the cradles for the right-hand assembly are to the right and those for the left-hand assembly are to the left (fig. 1). The two assemblies are identical except for the location of the cradles and the attachment of a toolbox to the right-hand assembly.

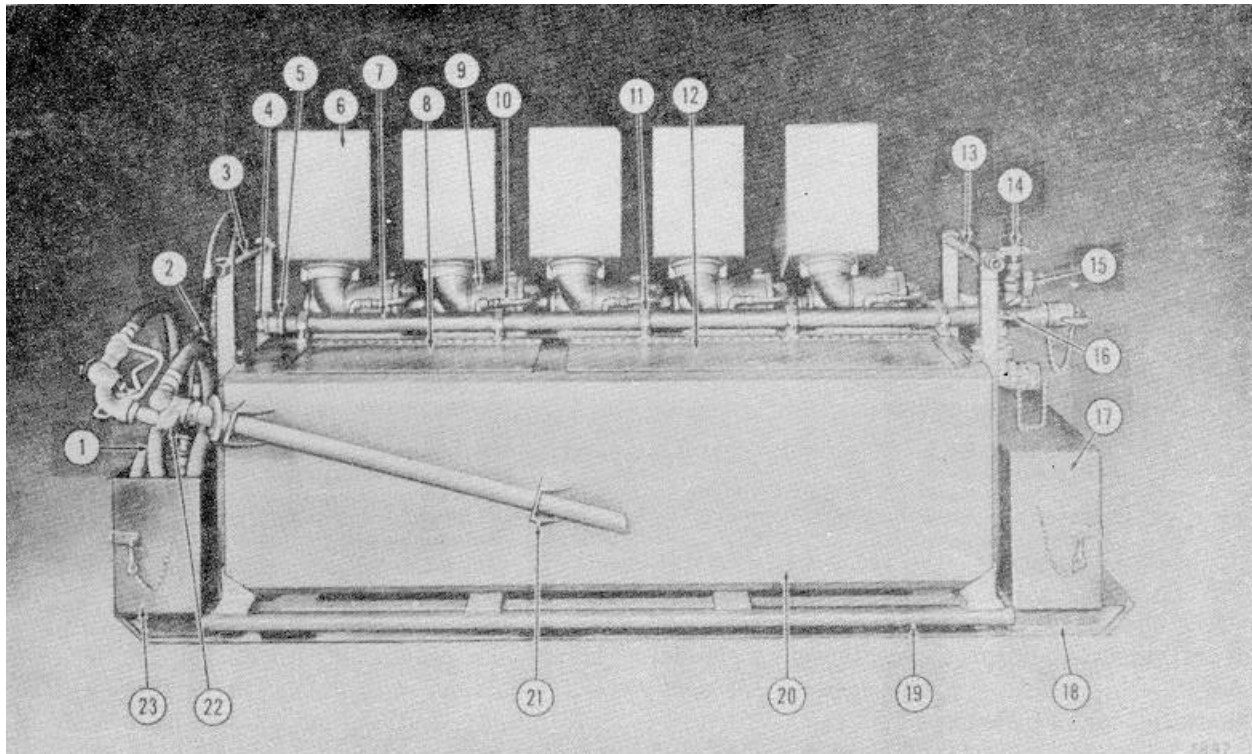
8. Sedimentation Tanks

The sedimentation tank (fig. 2) of each cleaner assembly is constructed of aluminum. The tank serves as a reservoir for the cleaning

solvent and as a place of deposit for the sediment removed from the containers. Two baffle plates, one several inches higher than the other, are located inside each tank and assist in trapping and removing foreign matter from the solvent. They run lengthwise, with clearance between the bottom of the baffles and the tank floor. The higher baffle is located nearer the operating side. A suction pipe, with a wire-mesh filter screen, and two basket-type strainers are also located in the tank. The sedimentation tank has a large and a small hatch. Two drain plugs, located in the bottom of the tank, permit removal of sediment and permit complete drainage. The interior space under the hatches provides a storage area for hose and cradles when the unit is in transit or temporary storage.

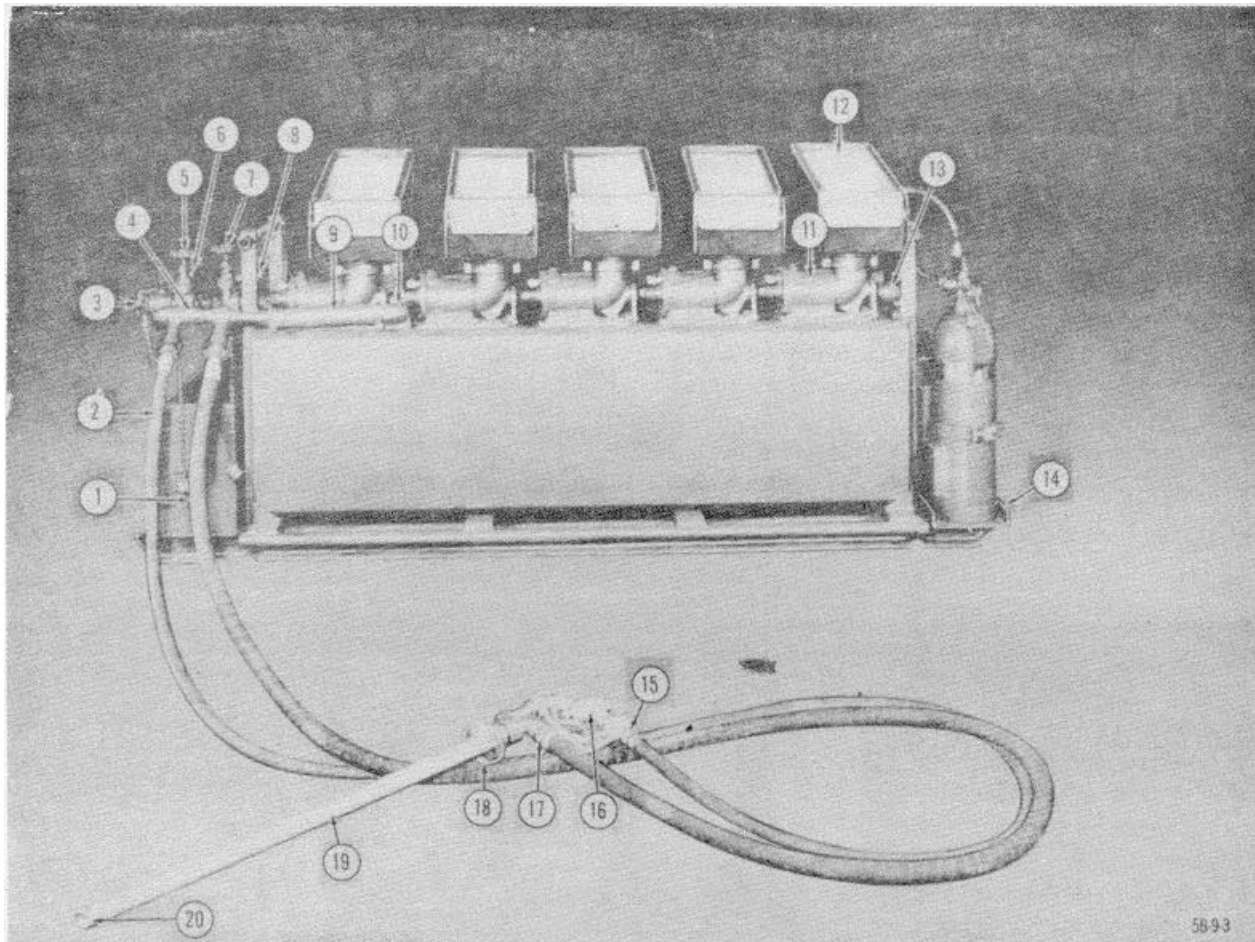
9. Frame Assemblies

a. *Model 15801CA.* The frame assemblies of Model 15801CA are bolted-type assemblies which permit the tanks to be separated from the frames in the event that tanks or frames require repair or replacement. Each frame assembly (fig. 5) consists of two I-beam skid sections; four top and four bottom tank brackets, which steady the tanks in the framework; and removable handles, which are bolted to the uprights of the frame. The four top tank brackets are also bolted and are removable. The I-beam skids are provided with sockets to accommodate the uprights of the second cleaner assembly when the equipment is stored or shipped.



- | | |
|--------------------------------|---|
| 1 Hose (55-gallon drum washer) | 13 Removable handle (frame) |
| 2 Fire extinguisher | 14 Gate valve No. 1 |
| 3 Removable handle (frame) | 15 Pressure gage |
| 4 Pipe plug, 1 1/2-inch | 16 Gate valve No. 3 |
| 5 Pipe coupling | 17 Toolbox |
| 6 Cradle assembly | 18 Skid mounting (frame) |
| 7 Supply-line manifold | 19 Lifting rail (frame) |
| 8 Small hatch | 20 Sedimentation tank |
| 9 Cradle-valve assembly | 21 Bracket (55-gallon drum washer) |
| 10 Feeder pipe (copper tube) | 22 Assembly, 55-gallon drum washer |
| 11 Pipe support | 23 Hose compartment (55-gallon drum washer) |
| 12 Large hatch | |

Figure 2. Cleaner assembly, fill side (Model 15801CA).



- | | |
|-------------------------------------|--|
| 1 Discharge hose, 1-inch | 11 Cradle-valve assembly |
| 2 Discharge hose, 3/4-inch | 12 Cradle assembly |
| 3 Quick-coupling plug | 13 Supply-line manifold |
| 4 Eductor body | 14 Brackets (fire extinguisher) |
| 5 Gate valve No. 2 | 15 Hose coupling, 3/4-inch |
| 6 Pressure gage | 16 Nozzle (55-gallon drum washer) |
| 7 Gate valve No. 1 | 17 Hose coupling, 1-Inch |
| 8 Gate valve No. 3 | 18 Shield |
| 9 Hose (eductor body to T-mounting) | 19 Combination suction and flushing tube |
| 10 T-mounting | 20 Suction tip |

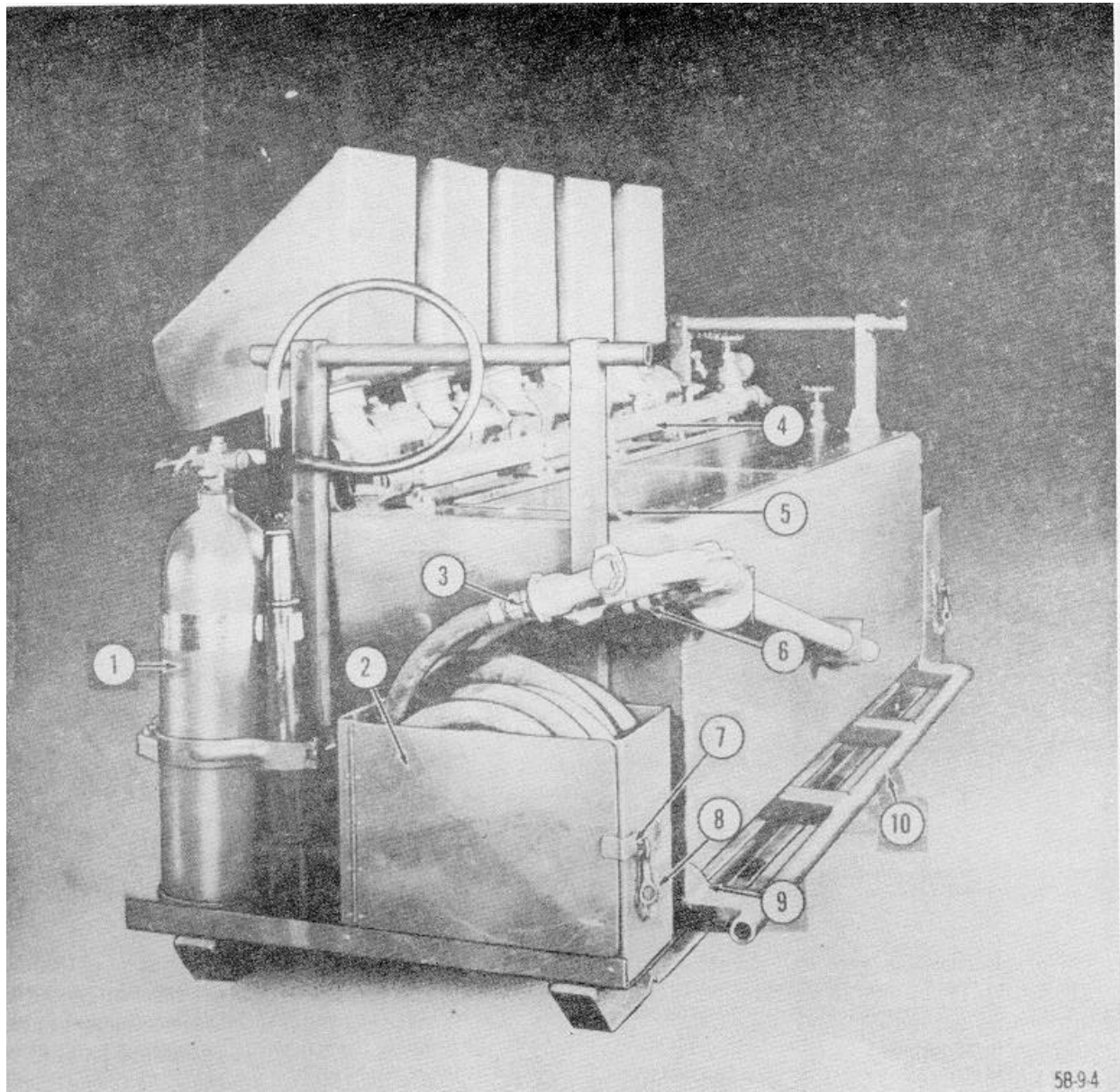
Figure 3. Cleaner assembly, operating side (Model 15801CA).

b. Model 4310CA. The frame assemblies of Model 4310CA differ from those of Model 15801CA in that they are welded to the sedimentation tanks instead of being bolted.

10. Cradle and Cradle-Valve Assemblies

a. Model 15801CA. The five cradle and cradle-valve assemblies mounted on the top of each tank are identical. The cradles (fig. 6) accommodate the 5-gallon cans being cleaned. When the can is properly positioned in the cradle, a nozzle (11), provided with suction and pressure orifices, protrudes through an opening in the can-positioning plate (13) into the interior of the can.

The nozzle is braced by a brass triangular support (13, fig. 7) with gasket, which reduces strain on the nozzle. The cradle is secured to the cradle valve by a clamp (7, fig. 6) and gasket and rotates with the cradle-valve assembly, resulting in a single operating unit. The cradle valve (4, 8, and 9) is so designed that when the cradle is rotated toward the operator, the cradle valve is in the OFF or suction position. When the cradle is rotated away from the operator, the cradle valve is in the ON or flushing position. The cradle valve thus changes a suction action into a flushing action simply by rotating the axis of the cradle.



- 1 Fire extinguisher-
- 2 Hose compartment
- 3 Pressure-hose coupling
- 4 Supply-line manifold
- 5 Bolted top tank bracket

- 6 Suction-hose coupling
- 7 Hinge-type hasp
- 8 Snap latch
- 9 Welded bottom tank bracket
- 10 Lifting rail (frame)

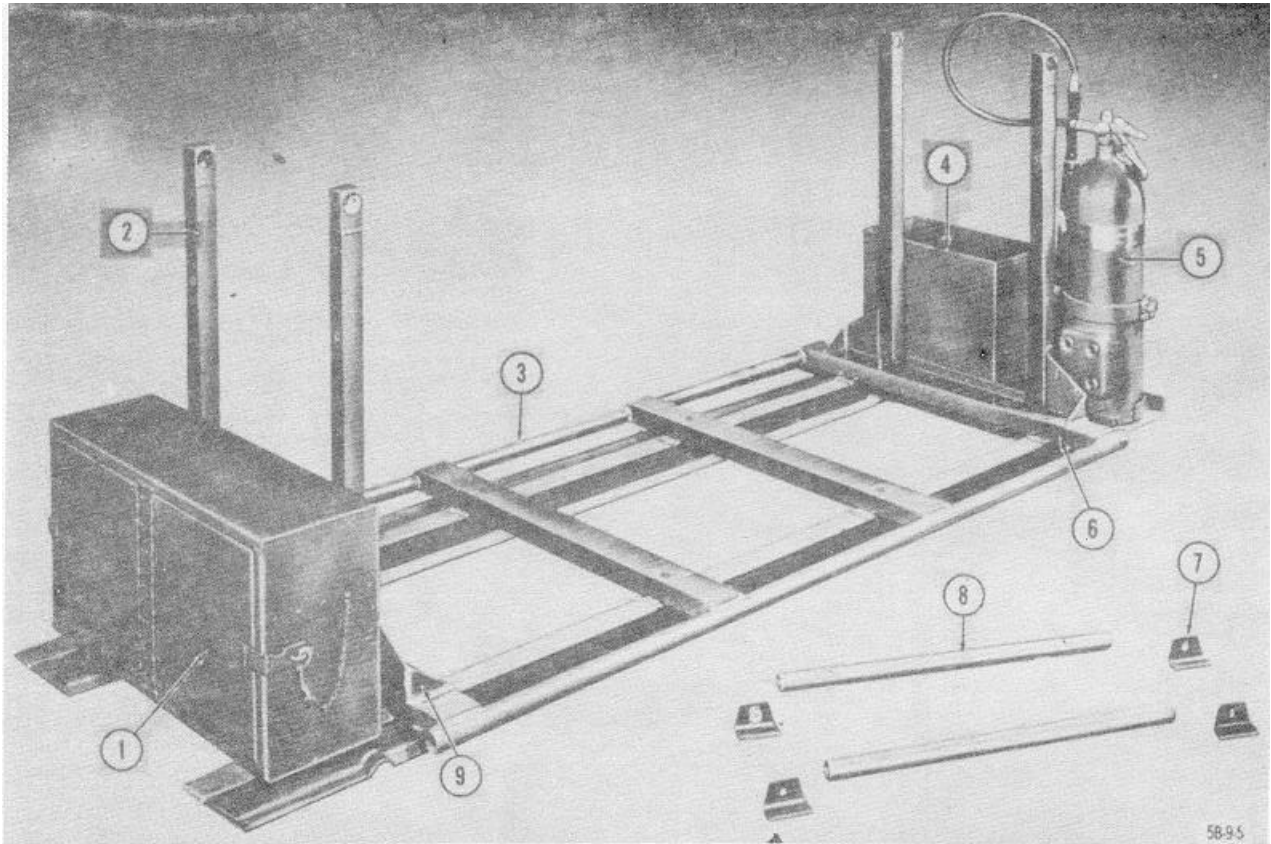
Figure .4. Cleaner assembly, rear view (Model 15801CA).

b. Model 4310CA. The cradle and cradle-valve assemblies of Model 4310CA differ from those of Model 15801CA in that brass triangular supports have not been provided for the nozzles of the assemblies.

11. Suction System

The suction system for each cleaner assembly consists of the following:

a. Suction Hose. The cleaning machine is provided with three 25-foot lengths of 1 1/2-inch suction hose (fig. 1). One end of one length of hose couples to the suction inlet of the dispenser, while the other end fits into the Y-coupling. Two additional lengths of suction hose are attached to the remaining outlets of the Y-coupling and are connected to the suction mountings of the two cleaner assemblies.



- | | |
|---------------------|--------------------------------|
| 1 Toolbox | 6 Skid mounting (frame) |
| 2 Upright | 7 Top tank bracket (bolted) |
| 3 Lifting rail | 8 Removable handle |
| 4 Hose compartment | 9 Bottom tank bracket (welded) |
| 5 Fire extinguisher | |

Figure 5. Frame assembly with sedimentation tank removed (Model 15801CA).

b. Gate Valves. A gate valve, gate valve No. 3 (22, fig. 7), is coupled to the suction mounting of the cleaner assembly.

c. Suction Mounting.

- (1) Model 15801CA. A flanged mounting is bolted on the inside of each sedimentation tank. A suction flange (5, fig. 7) on the reverse side of the mounting helps secure the entire assembly. Gate valve No. 3 is mounted on the outer part of the suction mounting. Within the tank extending vertically is a 11½-inch suction pipe (6, fig. 8), one end of which is screwed into a float-valve assembly. To steady the suction pipe within the tank, a metal support plate (3) has been welded to the top of the small baffle. The end of the plate nearest the suction pipe

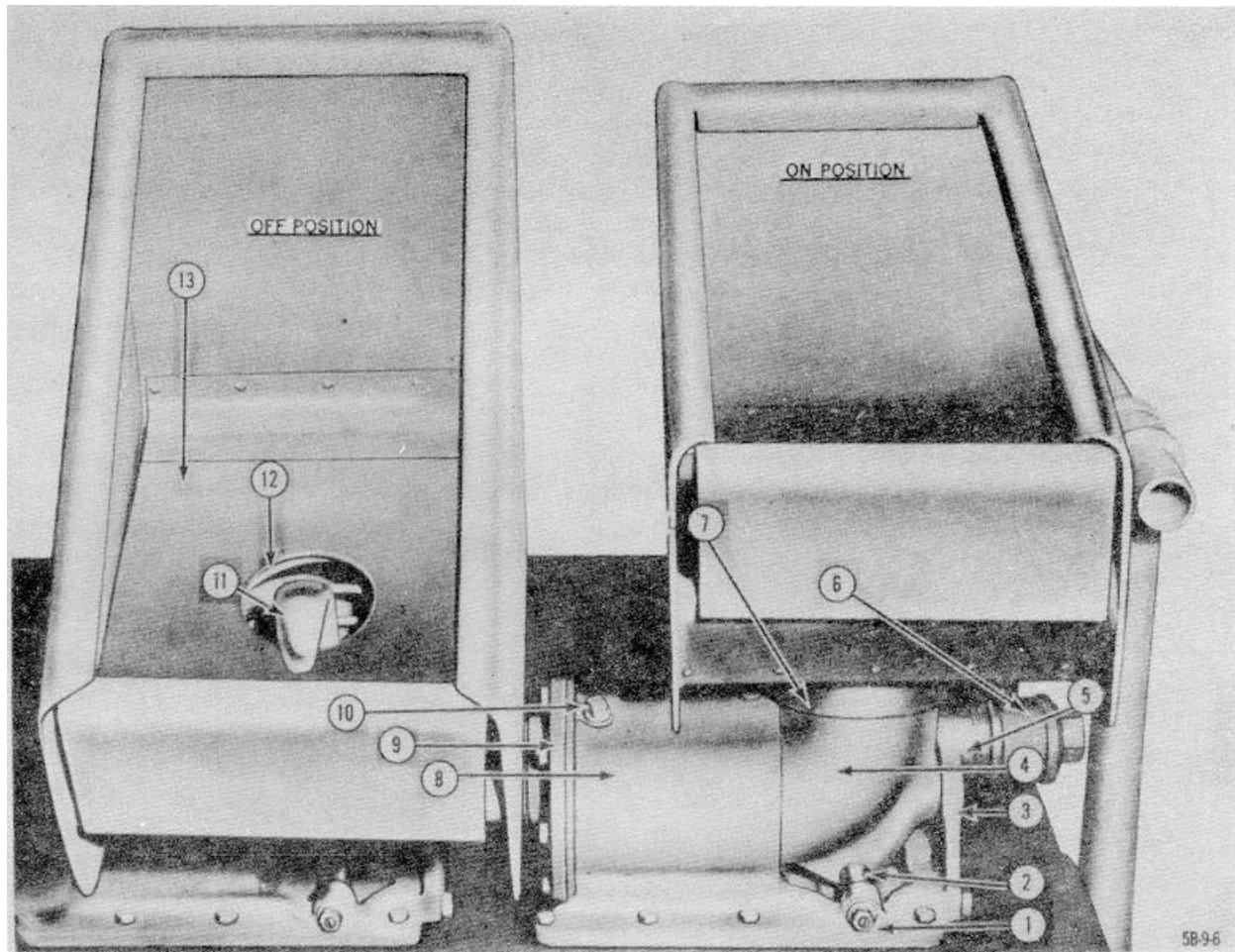
has been flanged, and a large U-bolt (7) holds the pipe firm against the flanged edge.

- (2) Model 4310CA. The suction system of Model 4310CA is the same as that of Model 15801CA except that the metal support plate for the suction pipe is welded to the inside front of the tank rather than to the small baffle.

d. Float-Valve Assembly. The suction pipe in each tank is equipped with a butterfly-type float-valve assembly.

12. Filters

Two sliding wire-mesh basket-type strainers are located within each sedimentation tank for the purpose of extracting coarse particles from the solvent. They are mounted on a strainer support in such a way that they slide horizontally from the operating side to the fill side of



- | | |
|-----------------------------------|--------------------------|
| 1 Adjusting nut and carriage bolt | 8 Valve housing |
| 2 Stop spring | 9 Valve faceplate |
| 3 Support plate | 10 Venturi cleanout plug |
| 4 Valve body | 11 Nozzle |
| 5 Oil filler | 12 Cradle spring |
| 6 Manifold | 13 Positioning plate |
| 7 Cradle clamp | |

Figure 6. Cradle and cradle-valve assemblies (Model 4310CA).

the cleaner assembly. These strainers are securely soldered and are free of any escape holes exceeding the mesh of the screen. In addition to the strainers mentioned above, there is a circular wire-mesh filter screen (10, fig. 8) inside each sedimentation tank located at the point where the liquid enters the suction system. It is important that the height of the liquid in the sedimentation tank be checked at intervals by the operator, since excessive levels or tank overflow will occur, if this filter becomes clogged. The liquid level should be approximately 2 inches below the top of the high baffle plate.

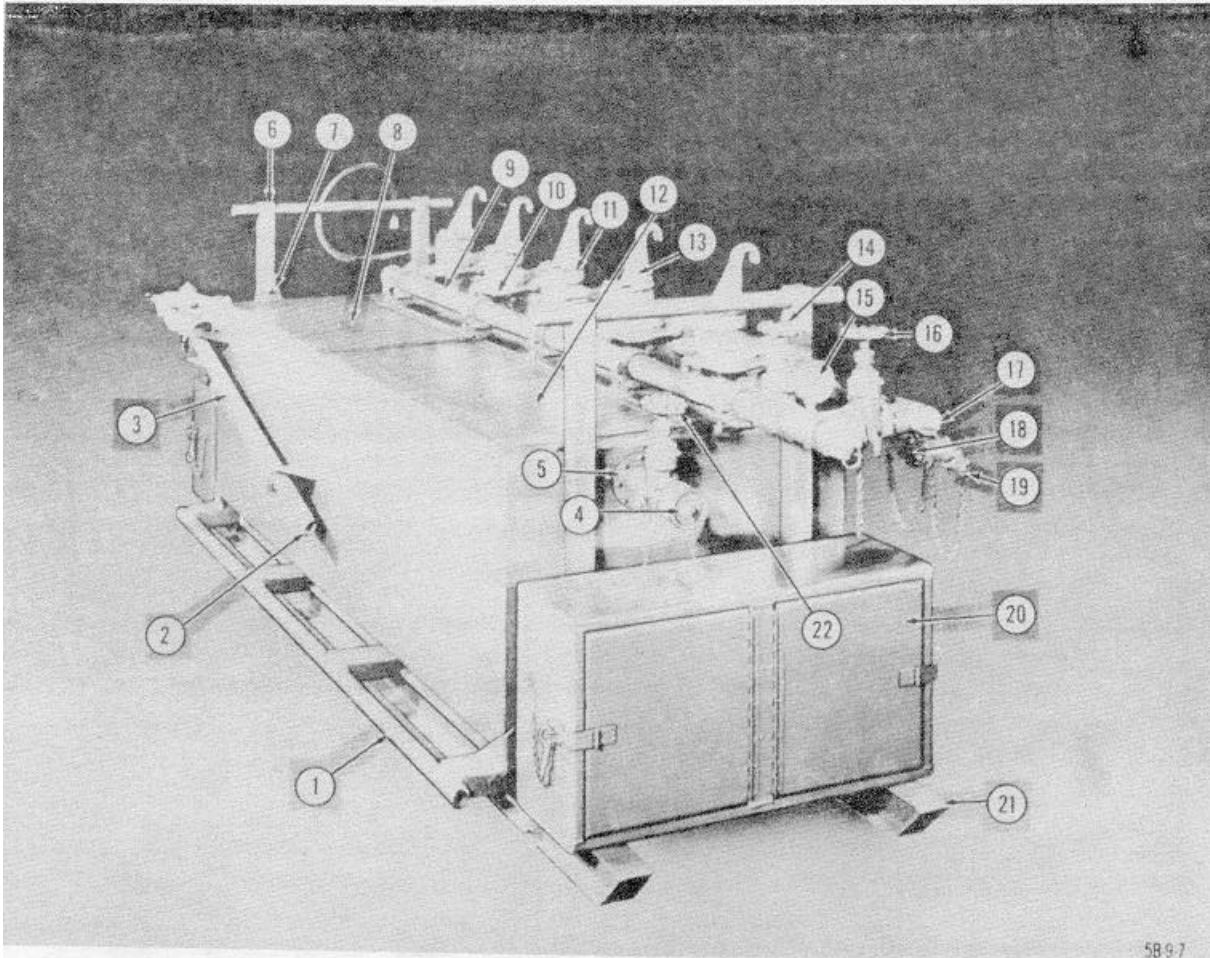
13. Pressure System

The pressure system for each cleaner assembly consists of the following:

a. *Discharge Hose.* The 1 1/2-inch discharge hose is 50 feet long. One end of the hose is connected to the discharge side of the dispenser; the other end is coupled to the quick-coupling adapter at one end of the supply-line manifold located on the top of the sedimentation tank.

b. *Pressure Gage.* A standard pressure gage (15, fig. 7) is connected to the top of the supplyline manifold and just to the rear of the pressure inlet of the cleaner assembly.

c. *Gate Valve.* A gate valve, gate valve No. 1 (14, fig. 7), is coupled to the supply-line manifold.



- | | |
|---|------------------------------------|
| 1 Lifting rail (removable frame) | 12 Large hatch |
| 2 Suction tip | 13 Nozzle with brass support |
| 3 Combination suction and flushing tube | 14 Gate valve No. 1 |
| 4 Dust plug | 15 Pressure gage |
| 5 Suction flange | 16 Gate valve No. 2 |
| 6 Upright, bolted (removable frame) | 17 Pipe plug (eductor body) |
| 7 Bolted top tank bracket | 18 Suction port (covered) |
| 8 Small hatch | 19 Pressure port (covered) |
| 9 Manifold | 20 Toolbox |
| 10 Copper feeder tube | 21 Skid mounting (removable frame) |
| 11 O-ring | 22 Gate valve No. 3 |

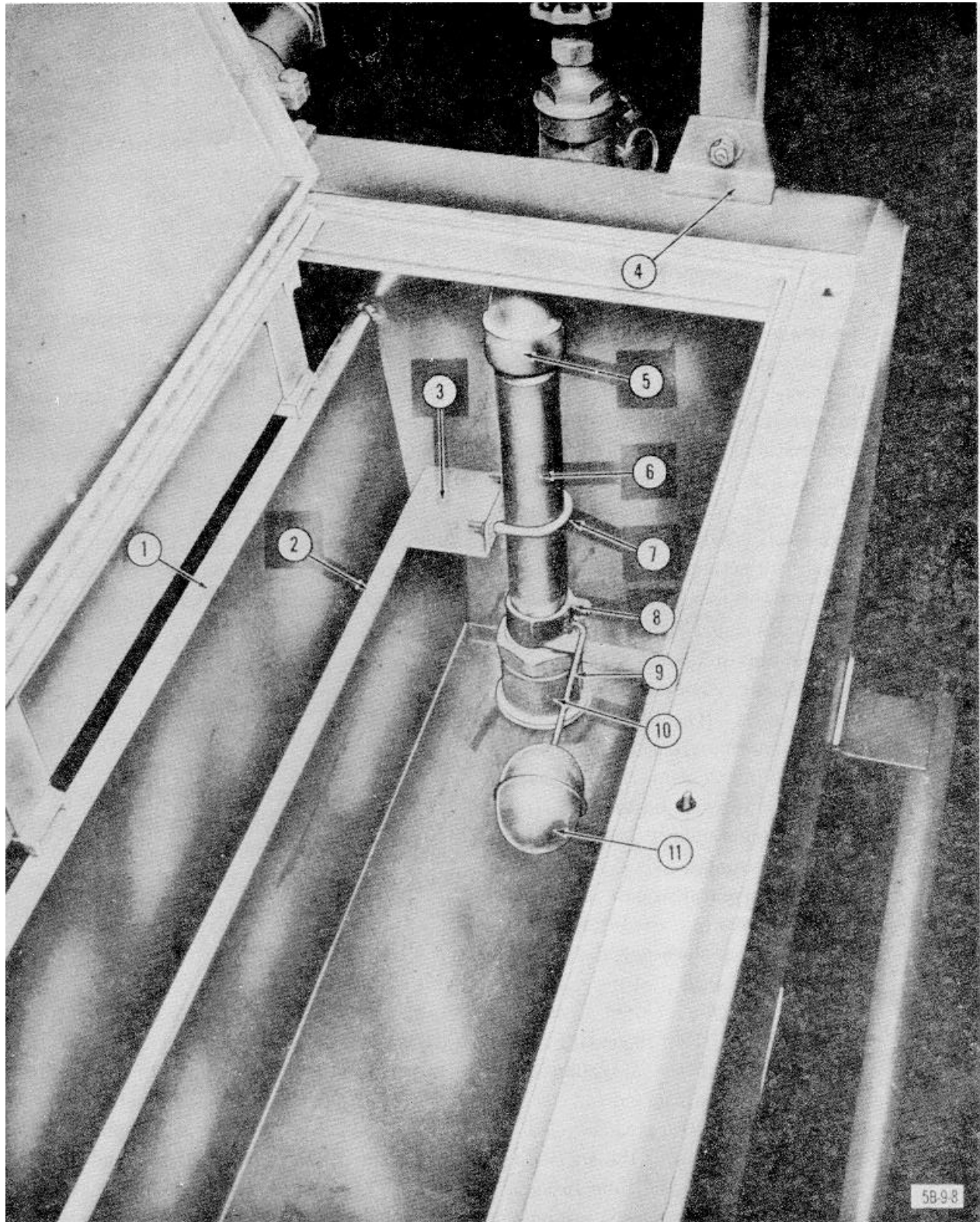
Figure 7. Cleaner assembly, front view. with cradles removed (Model 15801CA).

d. Supply-Line Manifold. The supply-line manifold (7, fig. 2), constructed of 1 1/2-inch brass pipe, runs the entire length of the top of the sedimentation tank. It supplies cleaning solvent for each cradle and cradle valve through short lengths of copper tubing (10). The manifold is mounted on five brass pipe supports (11), which in turn are bolted to the top of the sedimentation tank. The end of the manifold is sealed by a 1 1/2-inch pipe coupling (5) and pipe plug (4).

14. 55-Gallon Drum-Washer Assembly

a. Model 15801CA. A 55-gallon drumwasher assembly (fig. 3) connected to each cleaner assembly provides the suction and flushing action necessary for cleaning 55-gallon drums. Each assembly consists of the following:

- (1) Gate valve. A gate valve, gate valve No. 2 (5, fig. 3), is coupled to the supply-line body and the eductor body, (The eductor body is discussed in (5) below).



- | | | |
|-----------------------|---------------------------|-------------------|
| 1 Large baffle plate | 5 Flange suction mounting | 9 Rod |
| 2 Small baffle plate | 6 Suction pipe | 10 Suction filter |
| 3 Metal support plate | 7 U-bolt | 11 Float |
| 4 Top tank bracket | 8 Float-valve housing | |

Figure 8. Suction system in sedimentation tank (Model 15801CA).

- (2) *Discharge hose.* A 3/4-inch discharge hose (2, fig. 3), 15 feet long, connects gate valve No. 2 to the drum-washer nozzle. This hose carries cleaning solvent into the 55-gallon drum. A 1-inch discharge hose (1, fig. 3), 15 feet long, connects the suction center of the combination suction and flushing tube with the eductor body. This hose carries cleaning solvent out of the 55-gallon drum.
- (3) *Nozzle.* The nozzle (16, fig. 3) is of the trigger type, internally fitted with a spring valve. The discharge end of the nozzle carries cleaning solvent through an ell into the casing of the combination suction and flushing tube. Solvent will flow as long as the nozzle trigger is depressed and gate valve No. 2 is open. When the trigger is released, the action of the spring valve will stop the flow automatically.
- (4) *Combination suction and flushing tube.* The combination suction and flushing tube (19, fig. 3) consists of two concentric tubes. The inner tube, called the suction center, continuously evacuates cleaning solvent as long as the system is in operation and gate valve No. 2 remains open. The outer tube, called the casing, sends a fine spray of cleaning solvent through a series of small openings into the interior of the drum as long as the nozzle is depressed. The casing is welded at the nozzle discharge to provide a closed system. A shield (18, fig. 3) on the casing covers the bunghole of the 55-gallon drum when the tube is inserted for cleaning purposes. A reinforced beveled tip (20, fig. 3), known as the suction tip, fits on the end of the tube in such a way as to provide a closed system for the pressure side but an open system for the suction side. The suction tip may be removed for cleaning purposes.

- (5) *Eductor body.* The eductor body (4, fig. 3) carries cleaning solvent and contamination out of the 55-gallon drum-washer assembly into the filter system within the sedimentation tanks. Fluid reenters the tank through the T-mounting (10, fig. 3).

b. *Model 4310CA.* The drum-washer assembly of Model 4310CA differs from that of Model 15801CA in that the nozzle is offset slightly from the combination suction and flushing tube.

15. Hose Compartment

A hose compartment (2, fig. 4) is mounted on the frame to the rear of each sedimentation tank. This compartment is designed to store the discharge hose of the 55-gallon drum-washer assembly. Two brackets (21, fig. 2) for the combination suction and flushing tube are mounted on the fill side of each tank. These brackets are designed to hold the nozzle and the tube at a convenient angle.

16. Fire Extinguisher

Each cleaner assembly is equipped with a 15-pound carbon dioxide fire extinguisher (1, fig. 4), operated by a squeeze-grip-type valve. Each fire extinguisher is mounted on a retaining bracket, which is secured by bolts to the frame of the cleaner assembly. The fire extinguisher and mounting brackets are placed alongside the hose compartment of the 55-gallon washer assembly.

17. Quick Couplings

a. *Model 4S10CA.* Quick couplings for hose connections are designed in such a way that they can be quickly clamped to the suction and discharge ports of the equipment without the use of tools. Both male and female couplings are made of bronze. Dust caps and plugs with chains are also provided to eliminate foreign matter from the interior of the system.

b. *Model 15801CA.* For Model 15801CA, the male portion of the coupling is made of bronze and the female portion is made of aluminum.

18. Tabulated Data

- a. *Make* *Barnes*
- b. *Federal Stock Number.*
 - Model 4310CA.....4940-268-9771
 - Model 15801CA.....4940-658-2889
- c. *Cleaning capabilities.*
 - 5-gallon cans600 per hour
 - 55-gallon drums.....120 per hour

d. **Dimensions and Weights.**

- (1) **Dimensions:**
 - Cleaner assembly:
 - Uncrated (1), without cradle:
 - Height36 inches
 - Length7 feet 10 inches
 - Width37 inches
- (2) **Weights:**
 - Cleaner assembly:
 - Crated (2).....1,950 pounds
 - Uncrated (2)1,250 pounds

CHAPTER 2 OPERATING INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF MATERIEL

19. Unloading and Uncrating

The cleaner assemblies are inclosed in a single crate, with one assembly placed on top of the other. When unloading the crate from truck or trailer, avoid rapid descent to prevent breakage of skid frames. The crate may be of domestic or export type. The export type of crate completely incloses the assemblies. On either type of crate, four carriage bolts and 2- by 4-inch planking are used to fasten a skid mounting to the bottom section of the crate. Each side and top of the export crate actually consists of three layers-crosswise sheathing constructed of wood, a topcoating material, and a waterproof barrier material. It will be necessary to disassemble the top and side of a crate before being able to unscrew the carriage bolts that are secured to the bottom section.

20. Removing Preservatives and Sealing Compounds

Preservatives and sealing compounds are to be removed with drycleaning solvent. A rapid method would be to apply the solvent with a brush and then remove it and clean the area with a rag. Preservatives and sealing compounds have been applied to all metal surfaces of tools and spare parts. All openings, including the seams on the toolbox, have been coated with a sealing compound and further sealed with tape.

21. Visual Inspection

a. Method.

- (1) Inspect each cleaner assembly for damaged and loose parts. Pay particular attention to the pressure gage, which is highly susceptible to damage during transit.
- (2) Inspect sedimentation tanks for damage, and inspect all hose connections for cracks, cuts, or swells. Check for damage to the 55-gallon drum-washer assembly.
- (3) Check for condition of the toolbox and the supporting brackets or mountings. See

that all tools and spare parts are present and securely stowed.

b. *Correction of Deficiencies.* Deficiencies discovered during the inspection will be treated as follows:

- (1) Deficiencies will be referred to the organization mechanic, and those within the scope of the organization will be corrected before the cleaning machine is put into service.
- (2) Deficiencies beyond the scope of the organization will be referred to a higher echelon for correction.
- (3) Deficiencies of a serious nature will be brought to the attention of the supplying organization through the proper channels.

22. Installation

a. *Location.* The cleaning machine should be set up in an open area that permits free circulation of air. The cleaner assemblies should be as nearly level as possible, because leaning tanks have a tendency to reduce the suction and flushing pressures. The assemblies and the 50-gallon-per-minute dispenser may be arranged in any manner that will permit maximum efficiency in accordance with working conditions. A suggested arrangement is to place the cleaner assemblies at an angle of approximately 60° and about 4 feet apart at the closest point, with the dispenser about 50 feet away on a line midway between the two tanks (fig. 1).

b. *Drainage Ditch.* Each assembly will require a suitable drainage ditch. The ditch should be at least 1 foot wide and 1 foot deep, with a runoff that slopes down and away from the operating area. Dirt taken from the ditch should be piled nearby and used as a fire-smothering agent, if necessary.

Section II. CONTROLS AND INSTRUMENTS

23. General

This section describes, locates, and illustrates the various controls and instruments provided for the proper operation of the cleaning machine.

24. Gate Valves

Gate valves are opened by turning the handwheels in a counterclockwise direction; when operated in fully open position, they should be backed off (turned clockwise one-fourth to one-half turn) to prevent sticking.

a. *Gate Valve No. 3.* Gate valve No. 3 (22, fig. 7) connects the sedimentation tank with the suction hose coming from the Y-coupling. Its function is to provide positive shutoff on the suction side of the tank, thereby permitting single tank operation.

b. *Gate Valve No. 1.* Gate valve No. 1 (14, fig. 7) is mounted on the supply-line manifold and provides positive shutoff of fluid for the cradle and cradle-valve assemblies. Gate valve No. 1 works in conjunction with gate valve No. 2. When washing 5-gallon cans, valve No. 1 is open and valve No. 2 is closed. When washing 55-gallon drums, valve No. 1 is closed and valve No. 2 is open.

c. *Gate Valve No. 2.* Gate valve No. 2 (16, fig. 7), mounted on the supply-line manifold, provides positive shutoff for the supply of cleaning solvent to the 55-gallon drum-washer assembly. This valve is open when washing 55-gallon drums and closed when

washing 5-gallon cans.

25. Pressure Gage

A 2 1/2-inch diameter, standard-design pressure gage (15, fig. 7) is screwed into the top of the gage tee connected to gate valve No. 1. It measures the pressure of the liquid delivered by the dispenser to the supply-line manifold or to the 55-gallon drum-washer assembly. It indicates pounds per square inch and shows variations from normal operating conditions. The gage should register 28 pounds per square inch when cleaning either 5-gallon cans or 55-gallon drums.

26. Float-Valve Assembly

The float-valve assembly is connected to the tank suction pipe. The assembly consists of a rod and float, and a float-valve housing containing a butterfly disk. As the float descends, the butterfly disk revolves within the suction pipe to gradually reduce the amount of cleaning solvent flowing from the tank. The outside diameter of the butterfly disk prevents any positive shutoff on the suction system, provided gate valve No. 3 remains open. Hence, if the level of cleaning solvent is greater in one sedimentation tank than in the other, pressure built up on the suction side of the dispenser will tend to draw more fluid from the tank with the higher level. The float-valve assembly equalizes fluid level between sedimentation tanks.

Section III. OPERATING UNDER USUAL CONDITIONS

27. Fire and Safety Precautions

Take necessary precautions to protect the equipment from fire. Drive the ground rod into the ground and attach the ground wire. Remove the two fire extinguishers from their brackets and place them in an unobstructed location near the cleaner assemblies. The extinguishers should be placed in a shaded area away from the direct rays of the sun. Post NO SMOKING signs and enforce the NO SMOKING rule. Keep the hatches on the sedimentation tanks closed. The cleaning machine should not be operated in a building or closed area that prevents the circulation of air. A

structure that provides overhead cover only may be used. Operating personnel will observe all applicable safety precautions outlined in TM 10-1101.

28. Filling and Testing

a. *Filling Sedimentation Tanks.* Before the tanks can be filled, it is necessary that the discharge and suction hose be properly assembled and connected. Proceed with the hose connections and filling as follows:

- (1) Couple two sections of the discharge hose to the discharge ports of the dispenser.

- (The discharge hose is the soft or collapsible hose.)
- (2) Couple the two nozzles that are stowed with the dispenser to the opposite ends of the discharge hose.
 - (3) Couple one end of the 25-foot suction hose to the suction port of the dispenser.
 - (4) Attach the drum unloader (stowed with the dispenser) to the opposite end of the suction hose.
 - (5) Insert the drum unloader into the drum of solvent to be emptied.
 - (6) Open the hatches on the sedimentation tanks and remove the cradles stored under the hatches. Slide the basket type strainers from the operating position under the cradle-valve assemblies to the fill position directly under the hatches (fig. 9).
 - (7) Remove the dust caps from the nozzles.
 - (8) With two men operating the nozzles of the discharge hose and a third man at the drum unloader, start the dispenser.
 - (9) Proceed to fill the sedimentation tanks until each tank contains approximately 110 gallons (or until the liquid level is approximately 2 inches below the top of the high baffle plate).
 - (10) Stop the dispenser.

Note

It is imperative that the cleaning solvent be filtered through the strainers, as debris in the hose or source of supply will quickly render the unit ineffective.

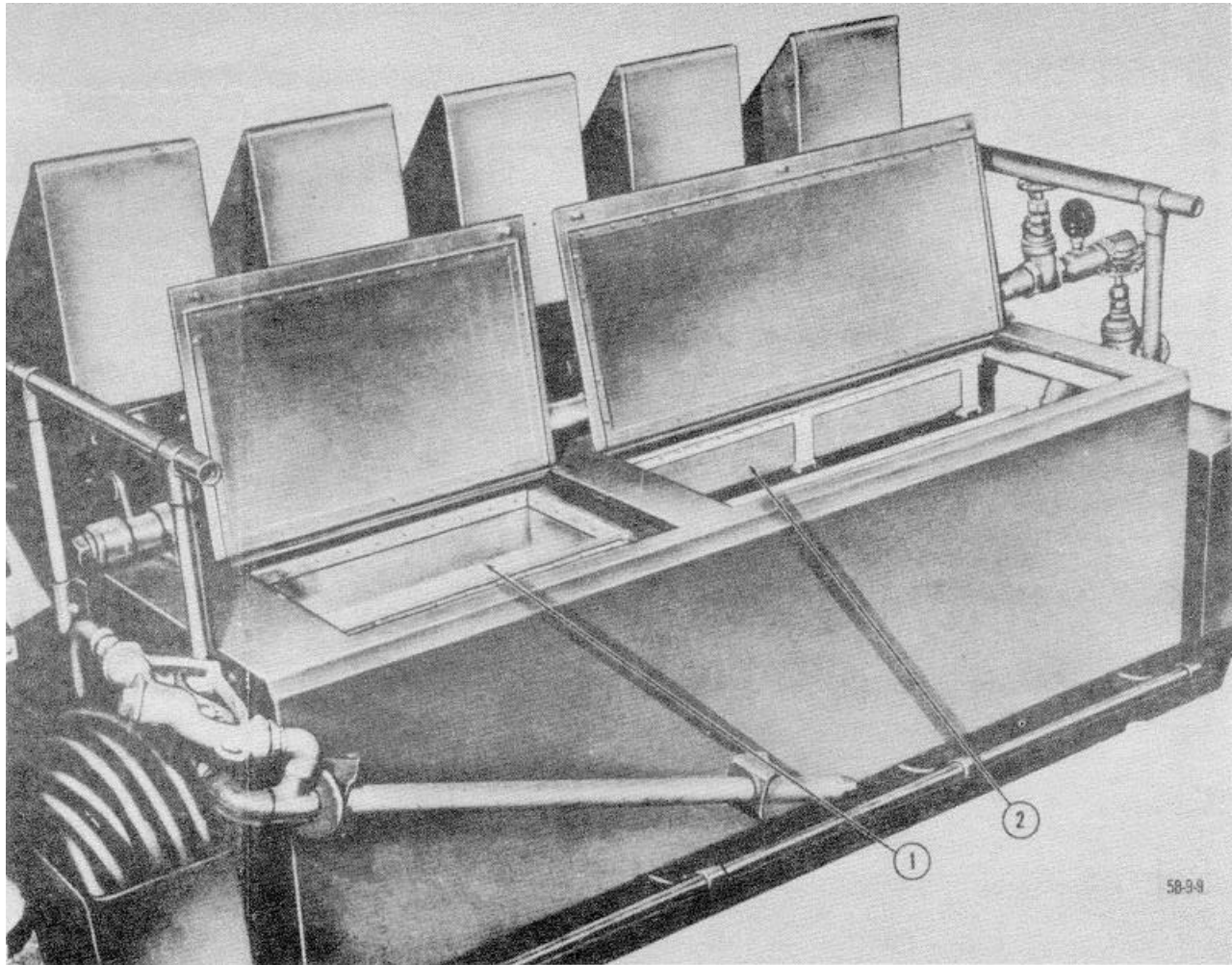
b. Testing the Equipment. Having filled the tanks, proceed with the testing of the equipment as follows:

- (1) Remove and replace the nozzles that were used in filling the tanks.
- (2) Attach the discharge hose to the pressure inlet at gate valve No. 1 on each assembly.
- (3) Remove and replace the drum unloader.
- (4) If the Y-coupling was not used in the filling operation it should now be attached to the end of the suction hose leading from the dispenser.
- (5) Couple the two remaining sections of hose to the outlets of the Y-coupling.

- (6) Couple the opposite ends of the two sections of hose to the suction outlets at gate valve No. 3 on each assembly. The suction hose should rest on top of the discharge hose (fig. 1). This is necessary in order to avoid spillage when the system is evacuated upon completion of the operation.
- (7) Slide the strainers to the normal operating position under the cradle-valve assemblies (fig. 9).
- (8) Attach the cradles to the cradle valves. To do this, engage each cradle clamp over a cradle-valve body and press down firmly on the cradle (fig. 10). Take care that the O-ring (cradle seal) is in place before mounting the cradle. Tighten the two bolts which secure each cradle clamp. Tilt each cradle to the OFF position.
- (9) Close gate valve No. 2 (16, fig. 7) and open Nos. 1 and 3.
- (10) Start the dispenser. With the engine running at approximately 2,800 revolutions per minute, the pressure on the sedimentation tank should stand at about 28 pounds per square inch. If pressure is low, the speed of the engine must be increased until proper pressure is registered. When the test is complete, stop the dispenser.
- (11) To prepare the 55-gallon drum-washing equipment for operation remove the drum-washer assembly from its support bracket and hose compartment. Remove the dust plugs from the eductor body and couple the 3/4-inch and 1-inch hose to their respective outlets.
- (12) Open gate valve No. 2 and close gate valve No. 1. Follow the procedure outlined in (10) above.

Note

Exercise extreme caution during the coupling and uncoupling of the hose to prevent dirt or other foreign matter from entering the open end of the hose. Lay the hose flat and as straight as possible to reduce the resistance to flow of the liquid. To free a stuck valve, loosen valve bonnet, and Jockey the valve handwheel. Never use a tool oil valve stem or valve handwheel.



1 Fill position

2 Operating position

Figure 9. Operating and fill position of basket-type strainers (Model 4310CA).

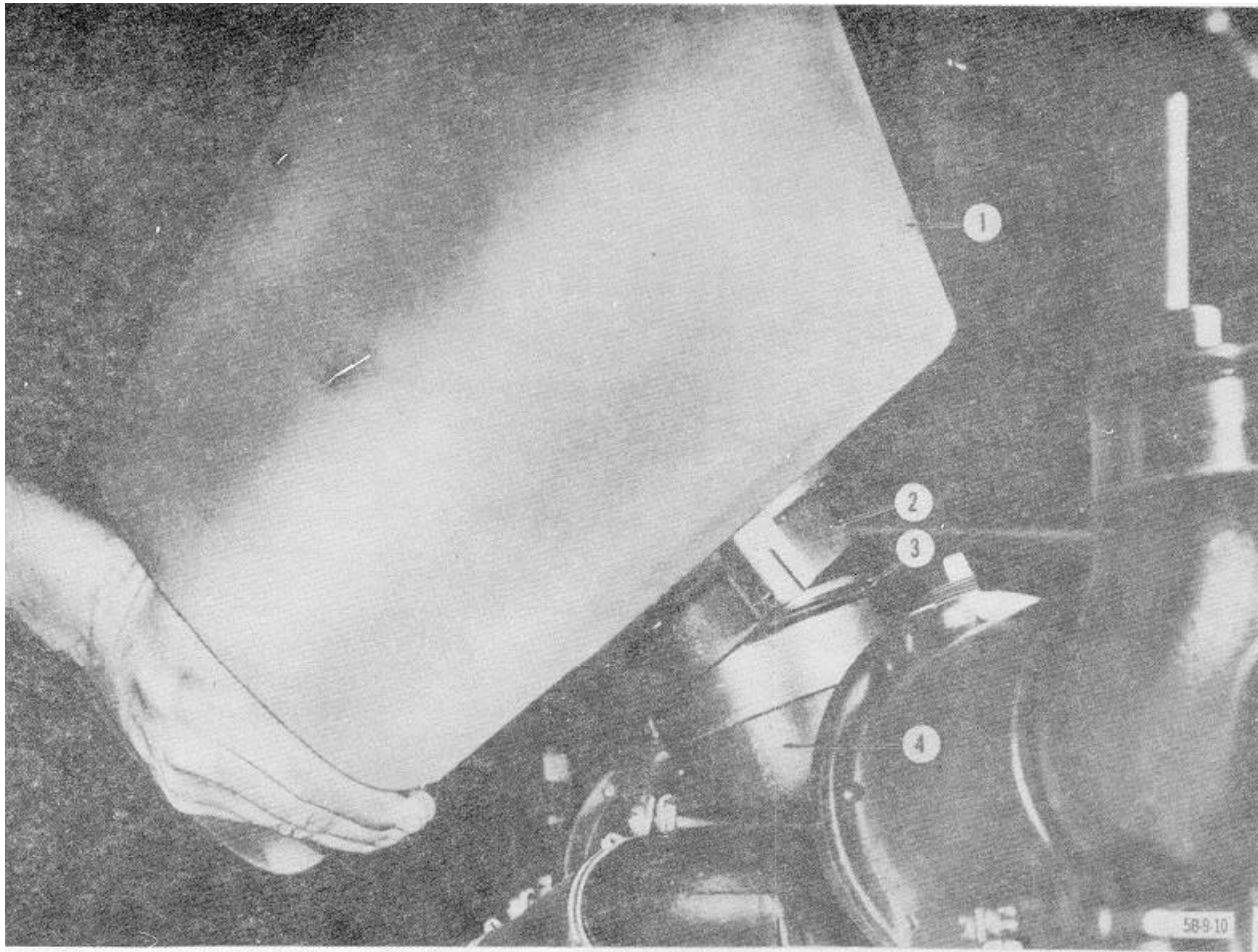
29. Can and Drum Inspection

Only those containers that have been inspected and classified by organization personnel as suitable for refilling will be washed and cleaned (TM 10-1101).

30. Cleaning 5-Gallon Cans

Before cleaning 5-gallon cans, the operator should study figures 11 and 12. When the cradle is rotated away from the operator, the cradle valve is in the ON or flushing position; when the cradle is pulled toward the operator, the cradle valve is in the OFF or suction position. When in the flushing position, solvent that is sprayed through the orifice of the nozzle loosens contamination in the can. The solvent returns to the sedimentation tank through a large opening in the can-positioning plate and is filtered while passing through basket-type strainers. When in the suction position, residual trapped at a low level in the 5-gallon can is

withdrawn through the suction orifice of the nozzle. Contaminated solvent goes through the throat of the cradle-valve body, thence through wire-mesh strainers to the sedimentation chamber of the tank. To assist the operator in knowing the prescribed limits of rotation, three markings have been placed on the cradle-valve assembly by the manufacturer; two appear on the valve body and the third appears on the valve housing. When the cradle is rotated, the markings on the valve body move with the cradle. When the cleaning machine is in the ON or flushing position, the bottom marking on the valve body should be in line with the single marking on the valve housing. When the cleaning machine is in the OFF or suction position the top marking on the valve body should be in line with the single marking on the valve housing. Absolute suction and pressure will not be obtained unless the markings are properly aligned.



- | | |
|----------------|------------------------|
| 1 Cradle | 3 O-ring (cradle seal) |
| 2 Cradle clamp | 4 Cradle valve |

Figure 10. Positioning cradle over cradle valve (Model 4310CA).

Adjustments by the organization mechanic may be required if maximum limits of movement cannot be obtained.

a. Personnel Requirements. Normally two individuals are required to operate two cleaner assemblies effectively. Any starting point may be used; however, it is usually more convenient to start at either the extreme front or the extreme rear of the tanks following the sequence outlined in the succeeding paragraphs. Necessary supply handlers will be required to provide a continuous flow of cans to and from the operators of the cleaning machine.

b. Procedure for Cleaning Cans Containing Normal Sediment.

- (1) Place a contaminated can bottom upward on each of the five cradles while the cradle valves are in the OFF position. Insert each can in its place by firmly

depressing the metal can-positioning plate and pushing can slightly forward (fig. 13). This will properly engage the nozzle of the cradle valve in the opening of the 5-gallon can.

- (2) Rotate the five cradles to the ON position to start the flushing action. Do not attempt to rotate the valve by pushing the can; apply force to the cradle only. One hand should be used to steady the can in the cradle as the valve is rotated. Allow about 40 seconds to elapse before starting continuous can-washing operations.
- (3) Pull the first and second cradle to the OFF position. After suction begins in these two cans, allow them to remain in this position for about 6 seconds to permit complete evacuation of the remaining fluid.

- (4) Remove can No. 1 by tilting outward slightly, depressing metal can-positioning plate, and pulling outward (fig. 14).
- (5) Place a contaminated can in the No. 1 cradle and rotate the cradle to the ON position.
- (6) Move in front of can No. 2 and rotate can No. 3 to the OFF position. Remove can No. 2.
- (7) Place a contaminated can in the No. 2 cradle and rotate the cradle to the ON position.
- (8) Move in front of can No. 3 and rotate can No. 4 to the OFF position. Remove can No. 3 and proceed as above.
- (9) Continue this process until all cans are cleaned and equipment is shut down.

c. *Procedure for Cleaning Cans Containing Heavy Sediment.* The following procedure is recommended for cleaning cans that contain heavy sediment or cans that fail repeatedly to be cleaned by the regular process:

- (1) Close gate valves Nos. 1 and 3 on one cleaner assembly and use the other assembly only for cleaning. This procedure uses the total pump output.
- (2) Allow contaminated cans a longer flushing period, 2 or 3 minutes as required. If this method fails to clean the cans properly, it will be necessary to forward them to appropriate channels for reclamation or salvage.

31. Cleaning 55-Gallon Drums

Each cleaner assembly can be used to clean 5-gallon cans or 55-gallon drums, but not both at the same time on one assembly. However, cans may be cleaned on one assembly and drums on the other at the same time. To clean 55-gallon drums the following procedure is recommended:

- a. Rotate all five cradles to the OFF position. Close gate valve No. 1 and open gate valve No. 2 (fig. 7). The assembly is now ready for operation.
- b. Place a contaminated drum upright with the bung hole of the drum nearest the operator. Insert the combination suction and flushing tube through the bung hole and diagonally across the drum. Tilt the drum forward until it forms an angle of approximately 45° with the ground.

- c. Depress the nozzle trigger until a maximum pressure is reached. Wash the drum about 40 seconds while it is tilted. Rotate the nozzle and combination suction and flushing tube during the wash period.

- d. At the end of the wash period, release the trigger of the nozzle, so that flushing stops and suction continues. Keep the combination suction and flushing tube in the drum about 2 seconds to completely evacuate the fluid from the bottom of the drum. Keep the drum tilted while evacuating the fluid.

- e. Return the drum to its upright position and remove the 55-gallon drum washer assembly. The clean drum is then carried away, a contaminated drum is brought up, and the process repeated.

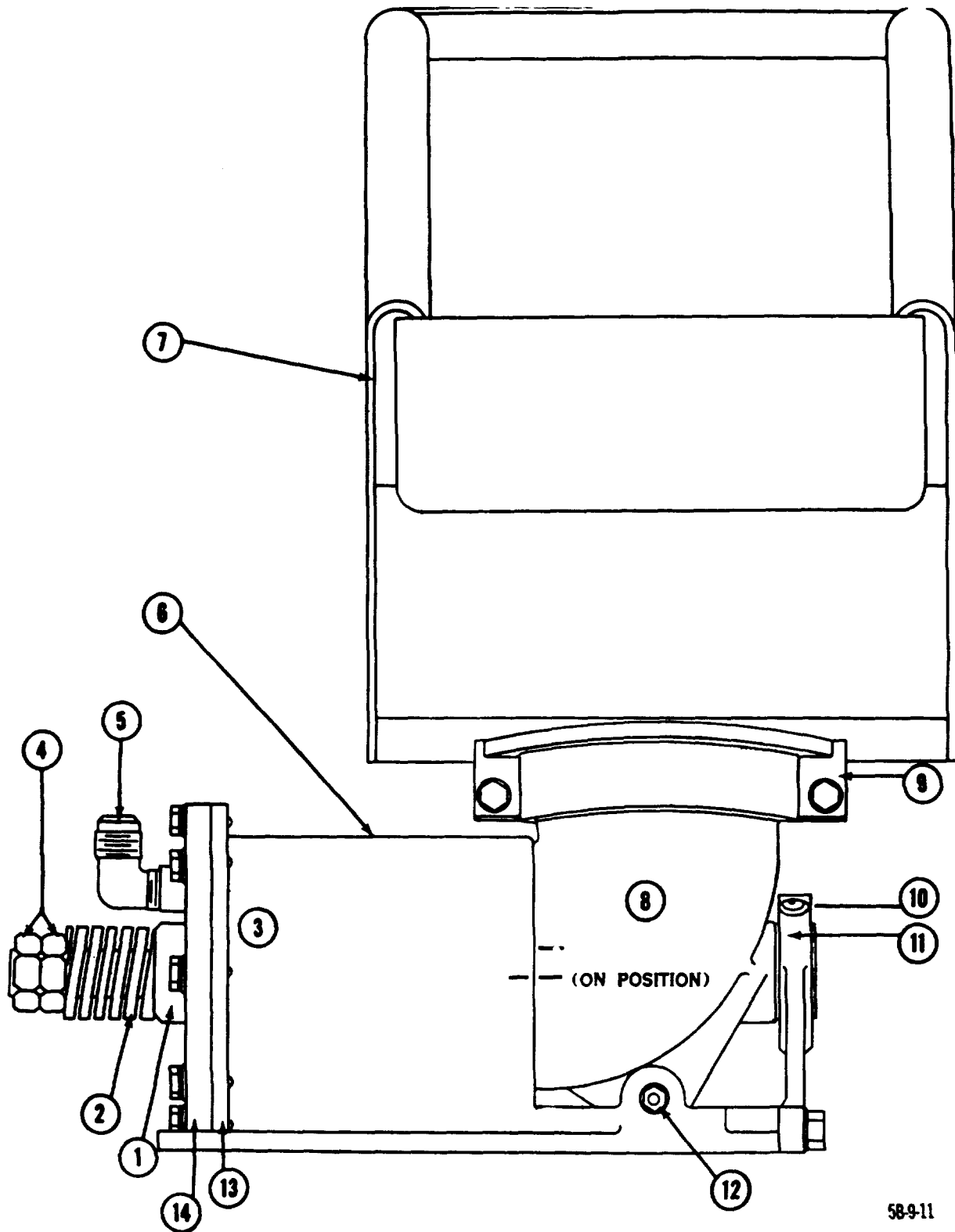
Caution

During the exchange of drums, do not let the suction tip touch the ground or come near debris. Contaminating particles may be drawn into the system, since suction is always in progress.

32. Draining the Hose

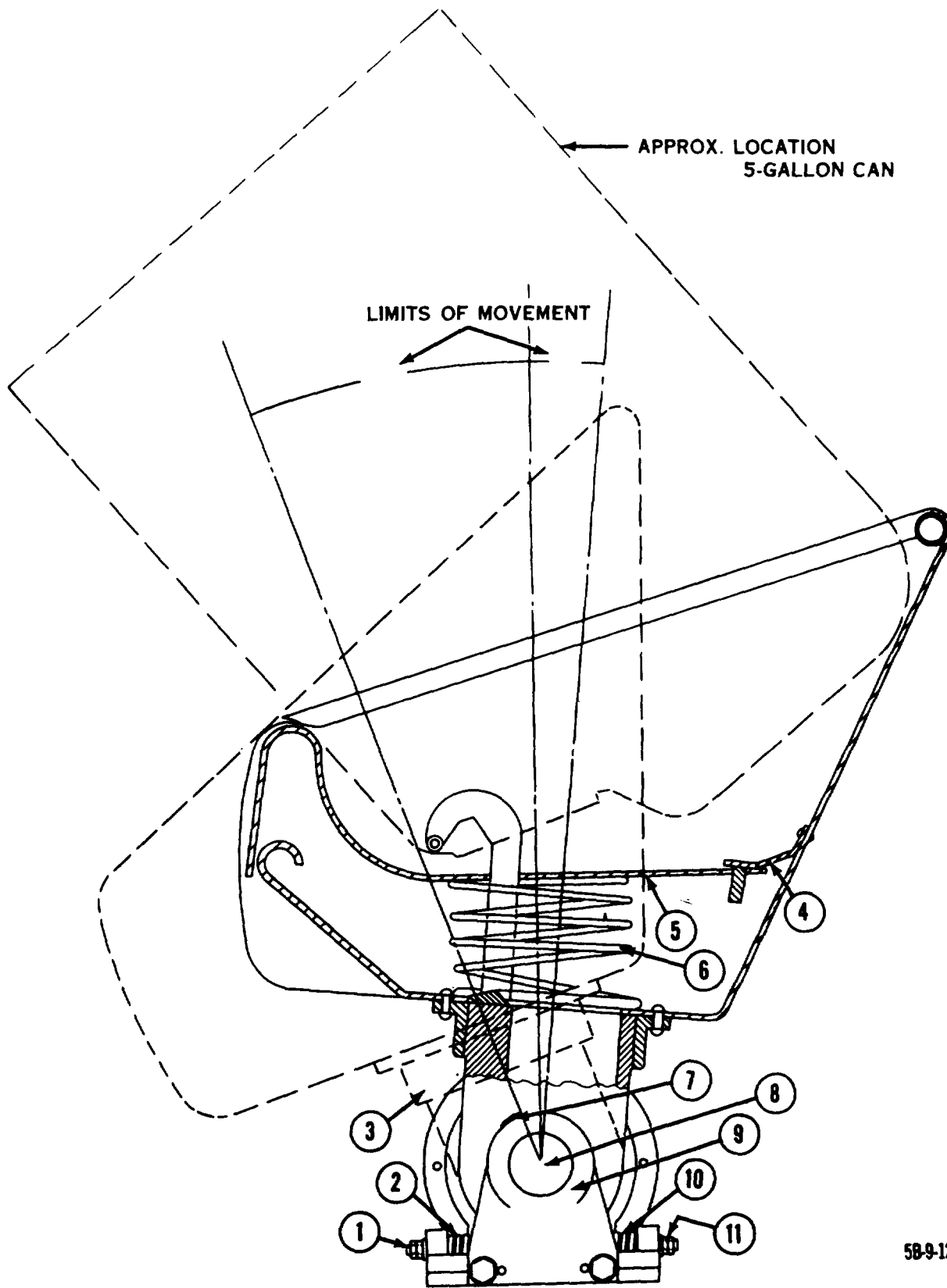
When cleaning operations have been completed it is necessary that the suction and pressure hose between the cleaner assemblies and the 50-g.p.m. dispenser be drained of all liquid. Instruct the dispenser operator to idle the dispenser to approximately half speed, and proceed as follows:

- a. Close gate valve No. 3 and disconnect the suction hose at the cleaner assembly.
- b. Raise the end of the hose as high as possible above the head and walk toward the dispenser using a hand-over-hand method of draining until the dispenser evacuates the hose.
- c. Instruct the operator of the dispenser to cease operations.
- d. Disconnect the hose from the suction port of the dispenser, and cap the open end.
- e. Open the hatches of the sedimentation tanks and move the basket-type strainers to the fill position.
- f. Close gate valve No. 1.
- g. Disconnect the discharge hose from the connection at the cleaner assembly and permit the open end to drain into the sedimentation tank through the strainer.



- | | | | | |
|------------------|--------------------------------|-------------------|------------------|-------------------------|
| 1 Thrust bearing | 4 Adjusting nuts, valve spring | 7 Cradle assembly | 10 Oil filler | 13 Valve-housing flange |
| 2 Valve spring | 5 Male flare union | 8 Valve body | 11 Support plate | 14 Valve faceplate |
| 3 Valve housing | 6 Valve assembly | 9 Cradle clamp | 12 Stop spring | |

Figure 11. Cradle and cradle-valve assemblies, showing indications of proper limits of movement of cradle, operator's view (Model 4310CA).



58-9-12

Figure 12. Cradle and cradle-valve assemblies, showing approximate limits of movements of cradle, side view (Model 4310CA).

- 1 Adjusting nuts, ON position
 - 2 Stop spring
 - 3 Cradle clamp
 - 4 Can-positioning hinge
 - 5 Can-positioning plate
 - 6 Cradle spring
 - 7 Oil filler
 - 8 Trunnion
 - 9 Support plate
 - 10 Stop spring
 - 11 Adjusting nuts, OFF position
- Figure 12-(Continued).

h. Disconnect the hose from the dispenser and replace the dust cap. Walk toward the dispenser using the hand-over-hand method of drainage described above.

33. Operating Fire Extinguisher

For a better understanding of the information that follows regarding the operation of the fire extinguisher refer to figure 15.

- a. Pull out the locking pin.
- b. Remove the discharge horn from the clamp.
- c. Squeeze the lever to open the valve.

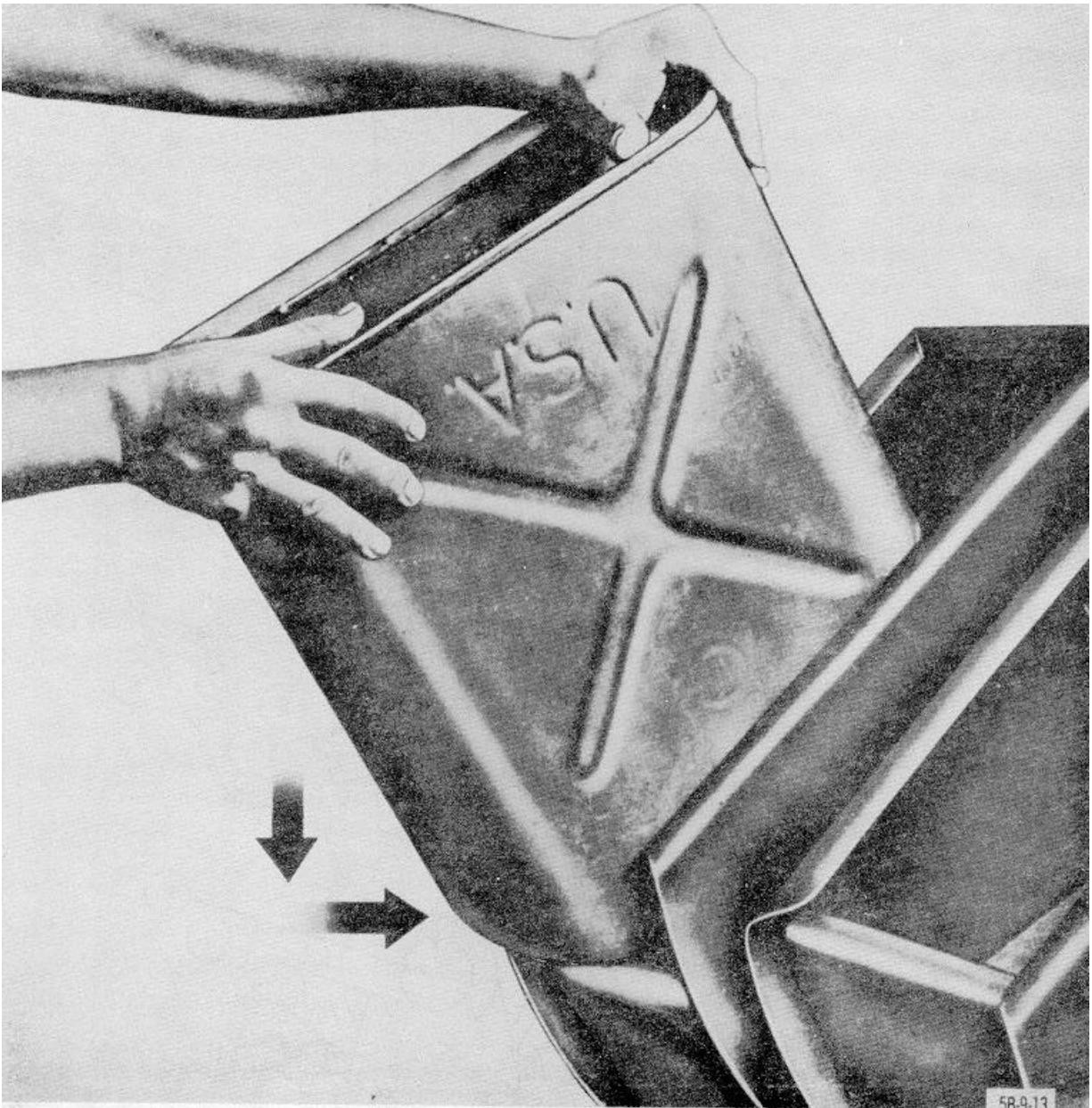


Figure 13. Inserting 5-gallon can in cradle.

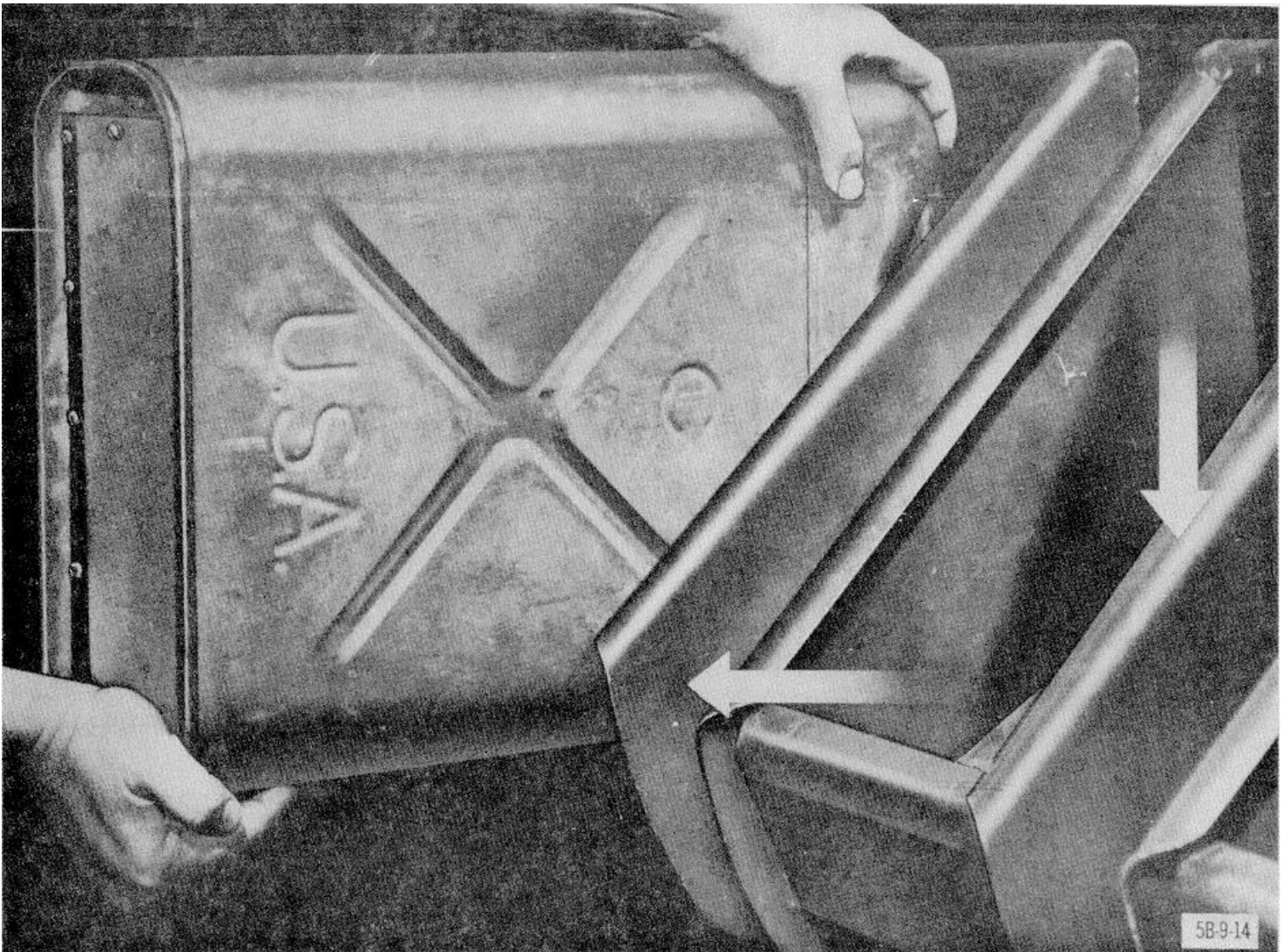


Figure 14. Removing 5-gallon can from cradle.

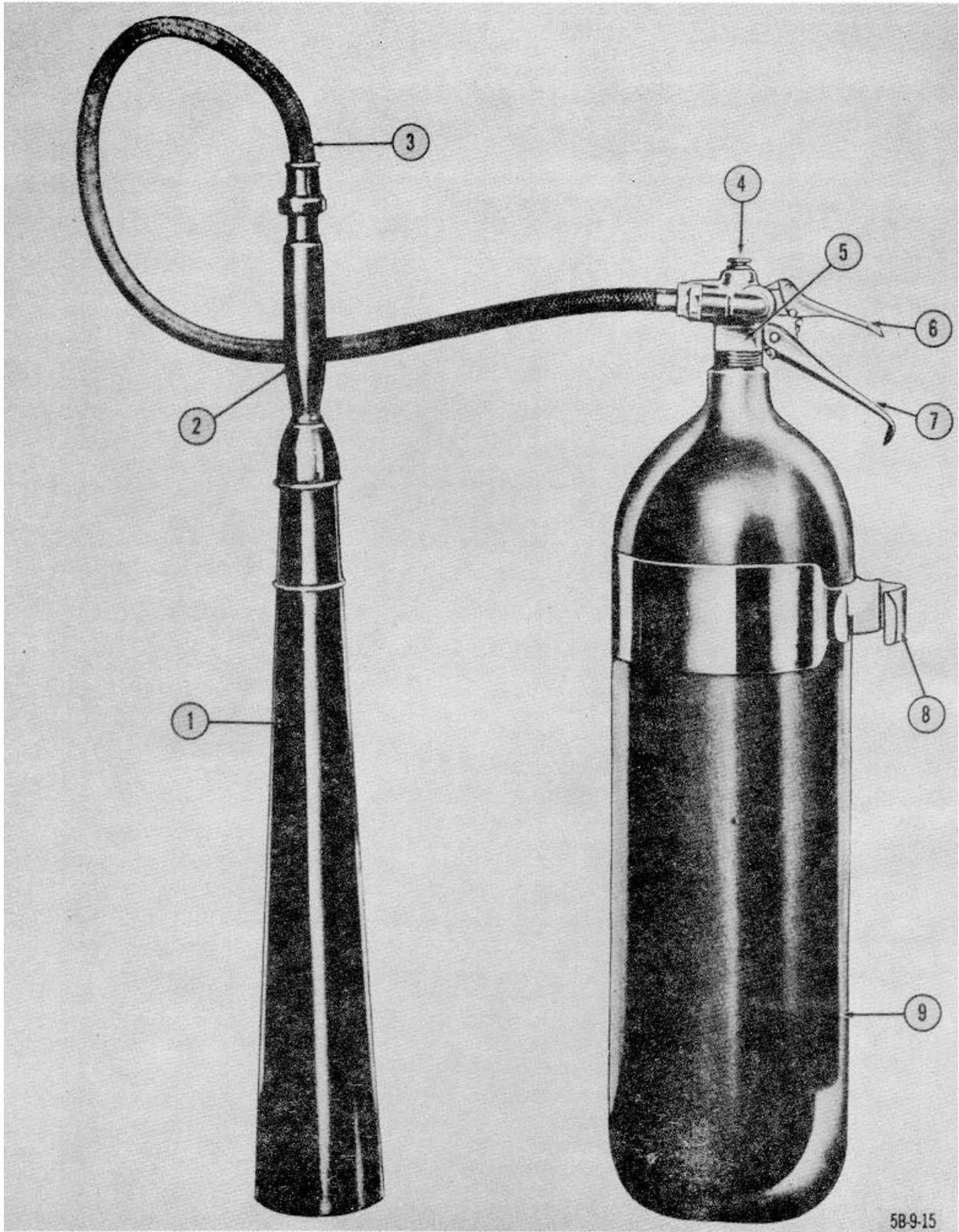


Figure 15. Fire extinguisher.

- 1 Discharge horn
- 2 Handle, discharge horn
- 3 Hose
- 4 Recoil preventer (safety disk nut)
- 5 Squeeze-grip valve assembly
- 6 Release lever
- 7 Carrying handle
- 8 Nameband and horn clip assembly
- 9 Cylinder

Figure 15,--(Continued).

- d. Direct the discharge at the base of the flame.
- e: Release the lever to close the valve.

Warning

Do not handle the snow (discharged chemicals).

Section IV. OPERATING UNDER UNUSUAL CONDITIONS

34. General

The principal difficulties encountered in operating under conditions involving extreme heat and cold pertain to the 50-g.p.m. dispenser. TM 10-1125 covers the probable troubles and the corrective action to be taken regarding the dispenser. The information that follows relates only to the cleaner assemblies.

35. Arctic Conditions

All nozzles, tubes, and orifices designed to channel and direct the flow of a liquid are subject to freezing and the formation of ice crystals. When possible, such openings should be drained and dried when not in use. Frost on the equipment and frozen connections can be minimized by using protective measures such as windbreaks, sheds, tarpaulins, burlap, and similar means for reducing exposure to the cold. Warm water applied to the frozen part is an effective means of thawing and is the best antidote against the accumulation of frost.

36. Tropical Conditions

a. Sand and Dust. Sand and dust will sharply increase the rate of sedimentation within the tanks. Much of the deposit will filter through the basket-type strainers and possibly clog the suction filter. Operations

under such conditions require frequent checks of the liquid level within the sedimentation tanks. Hatch covers should remain tightly closed except during inspections of the liquid level. Equipment that is used daily and then remains out of doors at night should be covered and tied down with tarpaulins to reduce the damaging effects of wind, rain, and sand.

b. Vapor and Evaporation. Operating under conditions of extreme heat may cause considerable evaporation of petroleum products. When vapors are heavy and the air is still, there is apt to be a dangerous concentration within the area. Every possible safety precaution should be observed by operating personnel when such conditions exist.

c. Condensation and Corrosion. The condensation of water is greater in the tropics than in the temperate regions and will cause the interior of empty cans and drums to rust quickly. As a result, the cleaning solvent will require changing more frequently than under normal operating conditions. Corrosion of the equipment will be accelerated. Operating personnel should bear in mind that the parts of the equipment exposed to corrosion will require more attention than under usual operating conditions.

CHAPTER 3 MAINTENANCE INSTRUCTIONS

37. General

First echelon maintenance, for which the operator is responsible, is defined as that degree of maintenance performed by the user, wearer, or operator of the equipment, in providing the proper care, use, operation, cleaning, preserving, lubrication, and such adjustment, minor repair, testing, and parts replacement as may be prescribed by pertinent technical publications and tool and parts lists. Because lubrication of the cleaning machine is a function of organization mechanics, lubrication instructions are given in TM 10-4940-201-20. The maintenance instructions that follow are for the cleaner assemblies only. Similar instructions for the 50g.p.m. dispenser may be found in TM 10-1125.

38. Operator Responsibilities

The operator is required on a daily basis to perform the before-, during-, and after-operation services of the cleaning machine. Proper performance of these services does much to prolong the life of the equipment, to avoid major repairs by higher echelons of maintenance, and to assure the operator that his equipment will perform its mission consistently and dependably. The operator will be required to use DD Form 110 in performing required services. These services, plus intelligent and careful handling, constitute the operator's preventive maintenance.

39. Operator Servicing

a. Before-Operation Services.

- (1) Check the general appearance and condition of the cleaning machine to see if it has been tampered with since the previous operation.
- (2) Check basket-type strainers, hatches, drain plugs, fire extinguishers, and hoses, and report any worn, damaged, or broken parts.
- (3) Check for evidence of leakage of cleaning solvent near each cradle and cradle valve.
- (4) Check piping, valves, and quick couplings for secure mounting and tightness of fittings.

- (5) Check the rotation of each cradle valve to make sure it rotates within the prescribed limits.
- (6) Check the float valve on the float-valve assembly to see that it is free of any obstruction.
- (7) Examine the drain plugs on the bottom of each sedimentation tank for secure mounting.

b. During-Operation Services.

- (1) See that the pressure gage registers the proper pounds per square inch for the type of cleaning under way.
- (2) Examine all hose and hose connections, piping, and valves for evidence of leaks.
- (3) Check for proper tension holding the 5-gallon can in its cradle.

c. After Operation Services.

- (1) Check the suction filter in the sedimentation tank and remove any foreign matter that may have collected on the filter screen.
- (2) Remove, inspect, and clean, the basket-type strainers in the sedimentation tanks.
- (3) Replace the fire extinguisher, hose, tools, and parts that were in use during the operation.
- (4) Cover the cleaner assemblies as protection against the weather.

40. Corrective Action

The operator will take necessary action to report any deficiencies noted where corrective action by the operator is not indicated.

41. Troubleshooting

Troubleshooting is a method of detecting the trouble, determining the cause, and providing the remedy. Clogged filters and orifices through which the cleaning solvent must pass will probably cause the most difficulty

in operation. Filter screens that have become enlarged or torn permit the entry of dirt and rust particles, thereby causing tank overflow and loss of suction and pressure. Dangerous leaks are usually the result of poor gaskets, improper seating of connecting parts, or faulty hose.

These and other defects in the equipment should be observed by the operator in his before-, during-, and after-operations check.

**APPENDIX I
REFERENCES**

- | | |
|------------|--|
| AR 385-40 | Accident Reporting and Records. |
| TM 10-1101 | Petroleum Handling Operations. |
| TM 10-1125 | Pumping Assembly, Flammable Liquid, Bulk-Transfer, Gasoline-Engine-Driven, 50-Gallon-Per-Minute, Barnes Model. |

**APPENDIX II
BASIC ISSUE ITEMS LIST**

Section I. INTRODUCTION

1. Scope

This appendix lists all accessories, tools, repair parts, and the publication issued with and required for operation and first echelon maintenance of the Cleaning Machine, Fuel Can and Drum, Portable, Barnes Models 4310CA and 15801CA.

2. Explanation of Columns of Functional Parts List

a. Technical Service. Numbers appearing in this column indicate the supplying technical service basic number as follows:

- 5 Corps of Engineers.
- 10 Quartermaster Corps

b. Source, Maintenance, and Recoverability.

(1) *Source codes.* The following code symbols indicate the selection status and source of supply for items listed:

P- applied to repair parts which are high mortality parts; procured by technical services; stocked in and supplied from the technical service depot system; and authorized for use at indicated maintenance echelon.

P1- applied to repair parts which are low mortality parts; procured by technical services; stocked only in and supplied from technical service key depots; and authorized for installation at indicated maintenance echelon.

X2- applied to repair parts which are not stocked. The indicated maintenance echelon requiring such repair parts will attempt to obtain from salvage; if not obtainable from salvage, such repair

parts will be requisitioned with supporting justification through normal supply channels.

(2) *Maintenance code.* The following code symbol indicates the lowest maintenance echelon authorized to receive these items:

O- Organization maintenance.

(3) *Recoverability code.* When a repair part has been designated as a recoverable item, the following code will be used:

R- applied to repair parts and assemblies which are economically repairable and, when available, are furnished by supply on an exchange basis.

c. Federal Stock Number. This column lists the 11-digit Federal stock number for requisitioning and stockage purposes.

d. Description. This column lists the items in the nomenclature that will be used for requisitioning purposes.

e. Unit of Issue. This column lists the smallest quantity in which the item will be issued.

f. Expendability. Items will be considered expendable unless otherwise noted in this column.

g. Quantity Authorized. The number reflected in this column indicates the quantity of the item authorized for issue with the equipment.

h. Illustrations.

(1) *Figure number.* This column contains the number of the figure that illustrates the item.

(2) *Item number.* This column contains the number that identifies the item on the illustration.

Section II. FUNCTIONAL PARTS LIST

SOURCE, MAINTENANCE AND RECOVERABILITY				FEDERAL STOCK NUMBER	DESCRIPTION	UNIT OF ISSUE	EXPENDABILITY	QUANTITY	ILLUSTRATION	
TECHNICAL	SOURCE	SCHEDULE	RECOVERABILITY						FIGURE NUMBER	ITEM NUMBER
EQUIPMENT										
10	X2	O	R	4940-672-4765	Cleaner Assembly, R. H	ea	NX	1	1	2
10	X2	O	R	4940-672-4766	Cleaner Assembly, L. H	ea	NX	1	1	3
10	P1	O		4940-360-0780	Cradle Assembly, can holder			10	3	12
10	P	O	R	4320-271-1858	Pumping Assembly, 50 g.p.m. (for replacement, requisition FSN 4320-658-2888).	ea	NX	1	1	6
10	P	O			Washer, drum	ea		2	3	15-20
10	P	O		4940-360-0744	Fitting, y, aluminum, pressure-pump.....	ea		1		
10	P	O		4720-303-4992	Hose, gasoline, synthetic rubber, discharge, collapsible, w/quick-type couplers on each end, 3/4 in. id., 15 ft. long.	ea		2	3	2
10	P	O		4720-303-4984	Hose, gasoline, synthetic rubber, discharge, collapsible, w/quick-type couplers on each end, 1/2 in. id. 50 ft. long.	ea		2	1	1
10	P	O		4720-303-4978	Hose, gasoline, synthetic rubber, discharge, collapsible, w/quick-type couplers on each end, 1 in. i.d., 15 ft. long.	ea		2	3	1
10	P	O		4720-565-8325	Hose, gasoline, synthetic rubber, suction, wire stiffened, w/male and female couplings, 1 1/2 in. id., 25 ft. long.	ea		3	1	5
10	P	O		4320-377-6981	Suction Stub Assembly, aluminum, drum unloader.	ea		1		
TOOLS, OPERATIONAL										
10	P	O		7240-559-7364	Funnel, steel, galvanized finish, i-quart capacity, w/removable strainer, w/flexible-tube spout, 8-in. long spout, Fed RR-F-800, type V, class A, style 2.	ea		1		
TOOLS, MAINTENANCE										
10	P	O		5120-359-6587	Tool, clamp assembly, hose, Punch-Lok Model P-38.	ea		1		
MISCELLANEOUS ACCESSORIES										
5				4210-223-9915	Extinguisher, fire, carbon dioxide, 15 lb. manually operated.	ea		1	15	
10	X2	O	R		Box, tool and spare parts TM 10-4940-201-10, Cleaning Machine, Fuel Can and Drum (Barnes Models 4310CA and 15801CA).	ea	NX	1	7	20
REPAIR PARTS										
10	P	O		4940-360-0738	Gasket, drum washer, pressure hose coupling and dust cap, 3/4 in.	ea		2		
10	P	O		4320-360-0736	Gasket, drum washer, suction hose, coupling and dust cap.	ea		2		
10	P	O		4320-360-0595	Gasket, hose coupling and dust cap, 1 1/2 in.	ea		5		

By the order of Wilber M. Bracker, Secretary of the Army

L.L. LEMNITZER
General, United States Army
Chief of Staff,

Official:

R.V. LEE
Major General, United States Army.
The Adjutant General

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Ports of Emb (OS) (2)	55-515 (2)
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NG: State AG (3): units org under fol TOE: 10-22 (5): 10-77 (4): 10-377 (4).

USAR: Units-same as Active Army except allowance is one copy for each unit.

For explanation of abbreviations used. See AR 320-50

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

 <p style="text-align: center;"><i>THEN...JOT DOWN THE DOPE ABOUT IT ON THIS FORM. CAREFULLY TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL.</i></p>		SOMETHING WRONG WITH PUBLICATION	
		FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)	
		DATE SENT	
PUBLICATION NUMBER		PUBLICATION DATE	PUBLICATION TITLE
IN THIS SPACE, TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT.			
BE EXACT PIN-POINT WHERE IT IS			
PAGE NO.	PARA-GRAPH	FIGURE NO.	TABLE NO.
PRINTED NAME, GRADE OR TITLE AND TELEPHONE NUMBER		SIGN HERE	

The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inch
 1 decimeter = 10 centimeters = 3.94 inches
 1 meter = 10 decimeters = 39.37 inches
 1 dekameter = 10 meters = 32.8 feet
 1 hectometer = 10 dekameters = 328.08 feet
 1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
 1 decigram = 10 centigrams = 1.54 grains
 1 gram = 10 decigrams = .035 ounce
 1 decagram = 10 grams = .35 ounce
 1 hectogram = 10 decagrams = 3.52 ounces
 1 kilogram = 10 hectograms = 2.2 pounds
 1 quintal = 100 kilograms = 220.46 pounds
 1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliliters = .34 fl. ounce
 1 deciliter = 10 centiliters = 3.38 fl. ounces
 1 liter = 10 deciliters = 33.81 fl. ounces
 1 dekaliter = 10 liters = 2.64 gallons
 1 hectoliter = 10 dekaliters = 26.42 gallons
 1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
 1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
 1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
 1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
 1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
 1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
 1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
 1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

<i>To change</i>	<i>To</i>	<i>Multiply by</i>	<i>To change</i>	<i>To</i>	<i>Multiply by</i>
inches	centimeters	2.540	ounce-inches	Newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29.573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	Newton-meters	1.356	metric tons	short tons	1.102
pound-inches	Newton-meters	.11296			

Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C
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