

MUELLER® GAS

Line Stopper Unit No. 3SW-500™

⚠ WARNING:

1. Read and follow instructions carefully. Proper training and periodic review regarding the use of this equipment is essential to prevent possible serious injury and/or property damage. The instructions contained herein were developed for using this equipment on fittings of Mueller manufacturer only, and may not be applicable for any other use.
2. Do not exceed the pressure ratings of any components or equipment. Exceeding the rated pressure may result in serious injury and/or property damage.
3. Safety goggles and other appropriate protective gear should be used. Failure to do so could result in serious injury.
4. Pressure test, check for and repair leaks in all fittings and components each time one is installed or any joint or connection is broken. Failure to find and repair a leak from any source in the fittings, by-pass lines or equipment could result in an explosion and subsequent serious injury and/or property damage.
5. MUELLER® Drilling Machines and Equipment have been carefully designed and engineered to work together as a unit. The use of equipment manufactured by someone other than Mueller Co. may cause excessive wear or a malfunction of the MUELLER machines.

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Reliable Connections™

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All warranties, expressed or implied, for Mueller Drilling Machines are rendered null and void if the machines are used with shell cutters or equipment manufactured by someone other than Mueller Co.

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MAINTENANCE INSTRUCTIONS

Use pipe thread 'dope' on the threads of machines or equipment if required to make a pressure tight threaded connection without using a gasket or "O" ring seal.

Keep all machined and threaded surfaces of machines and equipment well lubricated with oil at all times. DO NOT USE OIL TO LUBRICATE STOPPER COVERS.

Examine stopper covers and replace covers if excessively worn or damaged. See Pages 46 and 47.

LINE STOPPER UNIT NO. 3SW-500

INSTRUCTIONS FOR INSTALLING AND STOPPING-OFF 4", 6" AND 8" LINE STOPPER FITTINGS

500 p.s.i. Maximum Working Pressure at 100° F.; 250° F. Maximum Temperature Rating at 375 p.s.i.

The line pressure and temperature must not exceed these amounts during the use of this equipment. The line pressure and temperature may be increased to the maximum working pressure and temperature of the fitting after it is fully installed with the completion cap in place.

CAUTION: The maximum working pressure for the H-17265 and H-17266 Mechanical Joint Fittings is 175 psi. The maximum working pressure for the H-17250, H-17254, H-17255, H-17260 and H-17270 Welding Fittings is 230 psi. When using these Fittings, the line pressure must not exceed the amounts indicated.

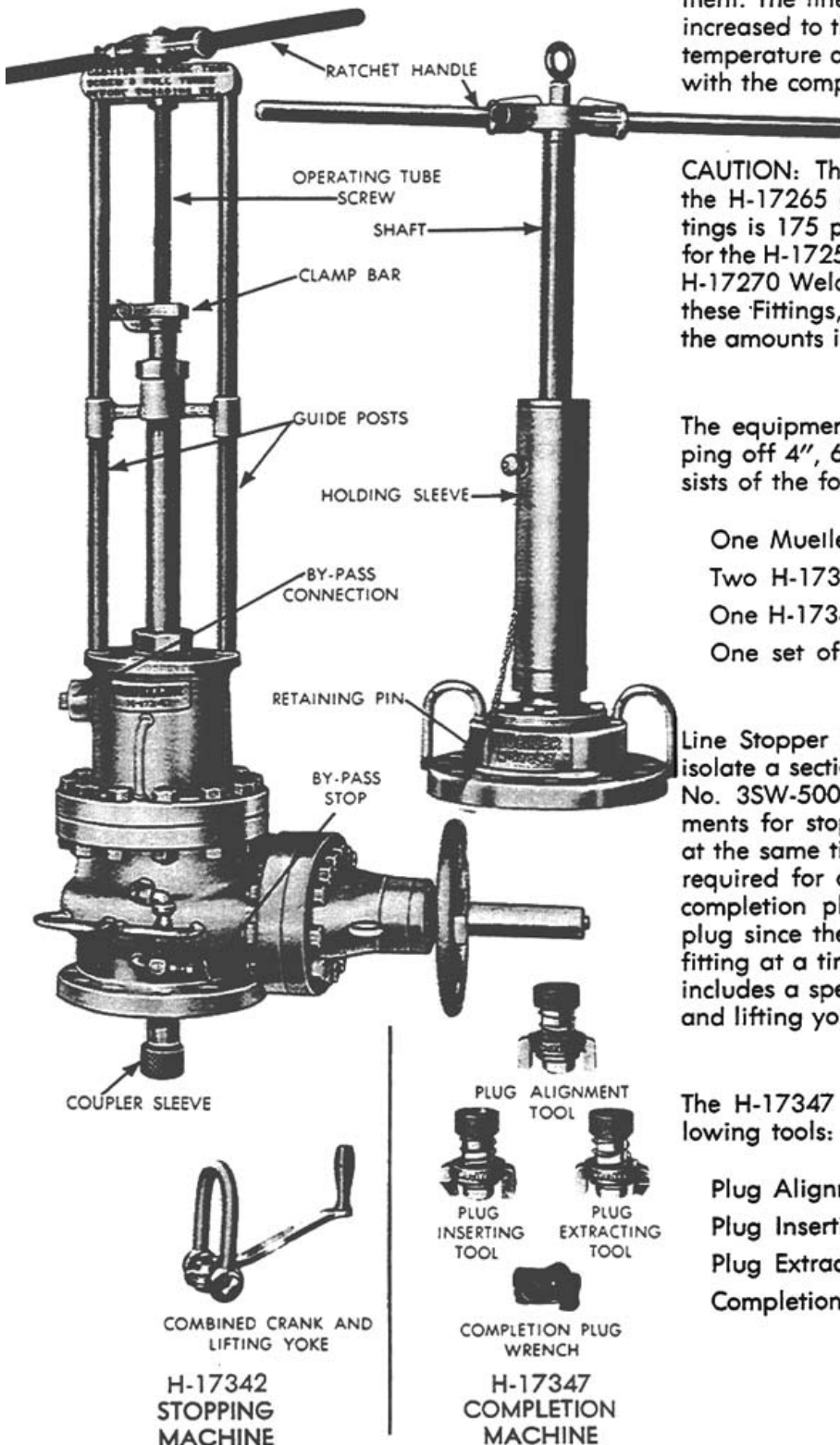
The equipment required for installing and stopping off 4", 6" and 8" Line Stopper Fittings consists of the following:

- One Mueller CC-36 or C1-36 Drilling Machine
- Two H-17342 Stopping Machines
- One H-17347 Completion Machine
- One set of Unit No. 3SW-500 Attachments

Line Stopper Fittings are often used in pairs to isolate a section of pipe line. For this reason Unit No. 3SW-500 consists of machines and attachments for stopping-off two Line Stopper Fittings at the same time. Only one set of attachments is required for drilling the pipe line, inserting the completion plug and extracting the completion plug since these operations can be done on one fitting at a time. The H-17342 Stopping Machine includes a special 9" gate valve, combined crank and lifting yoke and necessary bolts and gaskets.

The H-17347 Completion Machine includes following tools:

- Plug Alignment Tool (part no. 83250)
- Plug Inserting Tool (part no. 83237)
- Plug Extracting Tool (part no. 83238)
- Completion Plug Wrench (part no. 36424)

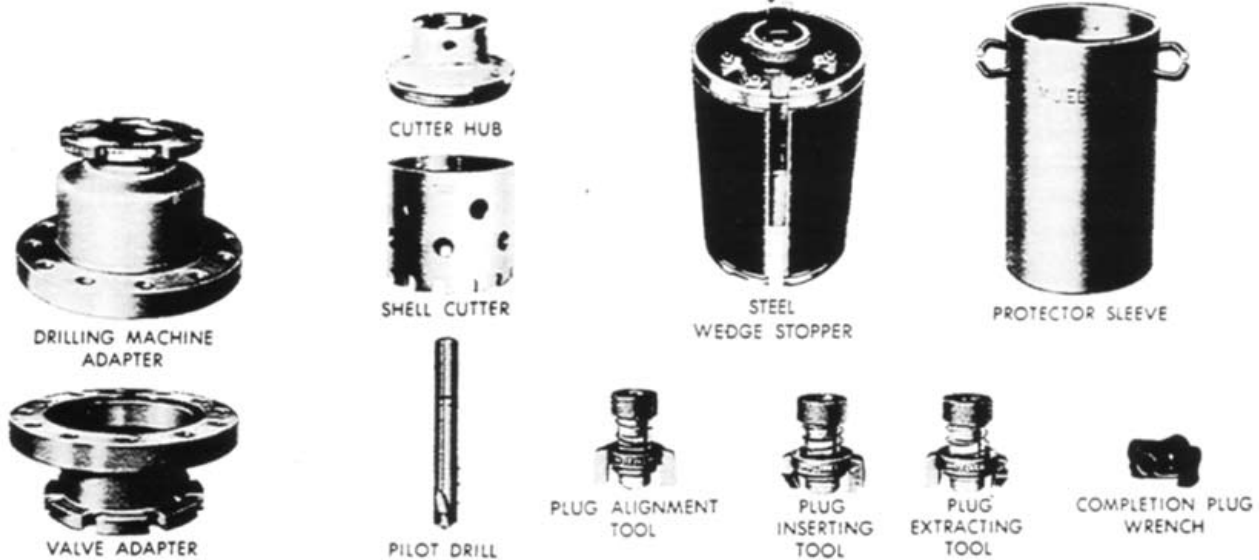


**INSTRUCTIONS FOR INSTALLING
AND STOPPING OFF 4", 6" AND 8"
LINE STOPPER FITTINGS**

LINE STOPPER UNIT NO. 3SW-500

Line Stopper Fittings 3" in size and larger as now furnished have a completion plug with an "O" ring seal at the top of the thread and a pressure equalizing valve located in the center of the plug.

Tools furnished with H-17347 Completion Machine are designed for use with fittings having an equalizing valve in the completion plug. They are entirely satisfactory for use with fittings without an equalizing valve.



Attachments listed in the chart below are for use with regular Line Stopper Fittings when using the CC-36 or C1-36 Drilling Machine.

See page 6 for Attachments to use with Fittings for THIN WALL Steel Pipe.

SELECT ATTACHMENTS ACCORDING TO SIZE AND CATALOG NUMBER OF LINE STOPPER FITTING

Name of Attachment	Quan. Req.	Size and Catalog Number of Line Stopper Fitting								
		4"			6"			8"		
		H-17250 H-17254 H-17255 H-17260 H-17265 H-17266 H-17270	H-17250 H-17254 H-17255 H-17260 H-17265 H-17266 H-17270	H-17250 H-17254 H-17255 H-17260 H-17265 H-17266 H-17270	H-17256 H-17257 H-17261 H-17264 H-17271 H-17272	H-17256 H-17257 H-17261 H-17264 H-17271 H-17272	H-17256 H-17257 H-17261 H-17264 H-17271 H-17272	H-17258 H-17269	H-17258 H-17269	H-17258 H-17269
Drilling Machine		CC-36 or C1-36	CC-36 or C1-36	CC-36 or C1-36	CC-36 or C1-36	CC-36 or C1-36	CC-36 or C1-36	CC-36 or C1-36	CC-36 or C1-36	CC-36 or C1-36
Valve Adapter	2	501361	63205	63193	500021	63261	—	501982	63244	63381
Drilling Machine Adapter	1	83730	83730	83730	83730	83730	83730	83730	83730	83730
Shell Cutter	1	4 1/4" 36472	6 1/4" 36548	8 1/4" 36521	4 1/4" 36472	6 1/4" 36548	8 1/4" 36521	4 1/4" 36472	6 1/4" 36548	8 1/4" 36521
Pilot Drill	1	580585	580585	580586	580585	580585	580586	580585	580585	580586
Cutter Hub	1	54526	54501	54653	54526	54501	54653	54526	54501	54653
Steel Wedge Stopper* or Steel Wedge Stopper**	2	89694 or 580634	89696 or 580612	89698 or 580613	89694 or 580634	89696 or 580612	89698 or 580613	89694 or 580634	89696 or 580612	89698 or 580613
Plug Inserting Tool†	1	83772	83237	83237	83772	83237	83237	83772	83237	83237
Plug Extracting Tool†	1	83773	83238	83238	83773	83238	83238	83773	83238	83238
Plug Alignment Tool†	1	83774	83250	83250	83774	83250	83250	83774	83250	83250
Completion Plug Wrench†	1	36404	36424	36424	36404	36424	36424	36404	36424	36424
Thread Cleaning Tool	1	89317	89320	89320	89317	89320	89320	89317	89320	89320

*Steel Wedge Stopper with Positive Control Cover for use with Gas.

**Steel Wedge Stopper with Neoprene Cover for use with Petroleum.

†Tools for 6" and 8" Fittings are furnished with the H-17347 Completion Machine. Tools for 4" Fittings must be ordered separately.

LINE STOPPER UNIT NO. 3SW-500

INSTRUCTIONS FOR INSTALLING AND STOPPING-OFF 4", 6" AND 8" LINE STOPPER FITTINGS

THIN WALL Line Stopper Fittings are for use with pipe within the range of pipe dimensions shown in the chart below. Attachments for these Fittings are listed in the chart below.

See page 5 for Attachments to use with regular Line Stopper Fittings.

THIN WALL Fittings are easily identified by the following:

1. Welding Fittings have two bars welded to the side of the Flange.
2. Welding and Mechanical Joint Fittings have the words "THIN WALL" stamped on the top of the Completion Plug.
3. The tops of both Fitting Flanges and Completion Plugs are painted bright red.

Name of Attachment	Quan. Req.	Size and Catalog Number of Line Stopper Fitting					
		6"	8"	6"	8"	6"	8"
		H-17275 H-17280 H-17285 H-17286	H-17275 H-17280 H-17285 H-17286	H-17276 H-17277 H-17281 H-17282 H-17287	H-17276 H-17277 H-17281 H-17282 H-17287	H-17278 H-17283	H-17278 H-17283
Drilling Machine		CC-36 or C1-36	CC-36 or C1-36	CC-36 or C1-36	CC-36 or C1-36	CC-36 or C1-36	CC-36 or C1-36
Valve Adapter	2	63205	63193	63261	—	63244	63381
Drilling Machine Adapter	1	83730	83730	83730	83730	83730	83730
Shell Cutter	1	6 1/2" 63146	8 1/2" 63115	6 1/2" 63146	8 1/2" 63115	6 1/2" 63146	8 1/2" 63115
Pilot Drill	1	83639	83675	83639	83675	83639	83675
Cutter Hub	1	83760	83762	83760	83762	83760	83762
Steel Wedge Stopper* or Steel Wedge Stopper**	2	89700 or 89183	89702 or 89184	89700 or 89183	89702 or 89184	89700 or 89183	89702 or 89184
Plug Inserting Tool†	1	83237	83237	83237	83237	83237	83237
Plug Extracting Tool†	1	83238	83238	83238	83238	83238	83238
Plug Alignment Tool†	1	83250	83250	83250	83250	83250	83250
Completion Plug Wrench†	1	36424	36424	36424	36424	36424	36424

*Steel Wedge Stopper with Positive Control Cover for use with Gas.

**Steel Wedge Stopper with Neoprene Cover for use with Petroleum.

†These tools are furnished with the H-17347 Completion Machine.

CAUTION: The maximum working pressure for the H-17275, H-17280 and H-17286 Welding Fittings is 230 psi. The maximum working pres-

sure for the H-17285 Mechanical Joint Fitting is 175 psi. When using these Fittings, the line pressure must not exceed the amounts indicated.

RANGE OF PIPE DIMENSIONS

Type of Pipe	Size of Fitting	Outside Diameter of Shell Cutter Required	PIPE DIMENSIONS			
			Outside Diameter of Pipe	Maximum Wall Thickness	Minimum Wall Thickness	Maximum Inside Diameter
THIN WALL	6"	6 1/2"	6.625"	.280" (Schedule 40)	.125"	6.375"
	8"	8 1/2"	8.625"	.322" (Schedule 40)	.125"	8.375"
THICK WALL	6"	6 1/4"	6.625"	.432" (Schedule 80)	.250"	6.125"
	8"	8 1/4"	8.625"	.406" (Schedule 60)	.250"	8.125"

INSTRUCTIONS FOR INSTALLING AND STOPPING OFF 4", 6" AND 8" LINE STOPPER FITTINGS

LINE STOPPER UNIT NO. 3SW-500

A—SELECT THE ATTACHMENTS REQUIRED

1. From the chart, pages 5 or 6, select the attachments required according to the size and catalog number of the fitting to be used. See instruction "H" page 13 for arrangement of piping.

B—INSTALL A LINE STOPPER FITTING*

TO INSTALL A WELDING LINE STOPPER FITTING (Figure 1) FOLLOW INSTRUCTIONS 1 THROUGH 8.

1. Thoroughly clean the pipe on which the fitting is to be attached.
2. Remove completion cap.
3. Remove completion plug from the fitting.
4. Place the two halves of the fitting around the pipe. Block up under the bottom half and lower the top half onto the bottom half. Check to be sure the two halves are in exact alignment with each other.
5. Tack weld the four corners together with enough space between the two halves so that they can be rotated around the pipe.
6. Weld both halves of fitting together but free of pipe. The fitting can be rotated so that the side welding is done horizontally on top of the pipe. Figure 2.
7. Locate the fitting in the desired position and weld each end permanently to the pipe.
8. When using Bottom-Out Fittings, weld new piping to the bottom openings of the fittings.

TO INSTALL A MECHANICAL JOINT LINE STOPPER FITTING (Figure 3) FOLLOW INSTRUCTIONS 9 THROUGH 16.

9. Thoroughly clean the pipe on which the fitting is to be attached.
10. Remove completion cap. (For protection during shipment, the end screws are placed under completion cap of fitting.)

***IMPORTANT** — The horizontal center line of the fitting must be concentric with the center line of the pipe. The fitting should be installed in a vertical position if possible; however, it may be rotated around the pipe to any angle as long as it remains concentric with the axis of the pipe.



FIGURE 1



FIGURE 2



FIGURE 3

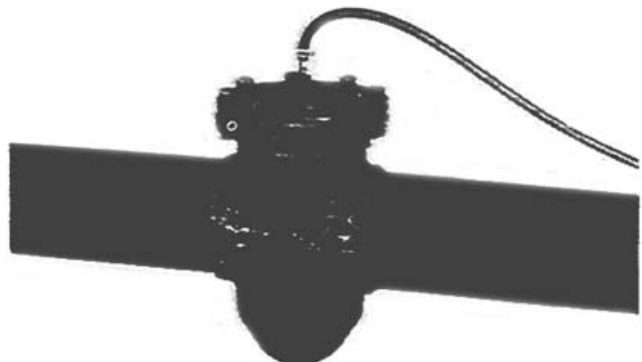


FIGURE 4

LINE STOPPER UNIT NO. 3SW-500

INSTRUCTIONS FOR INSTALLING AND STOPPING-OFF 4", 6" AND 8" LINE STOPPER FITTINGS

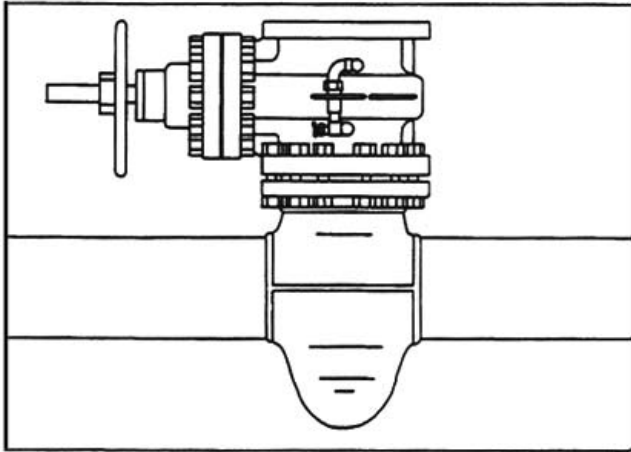


FIGURE 5

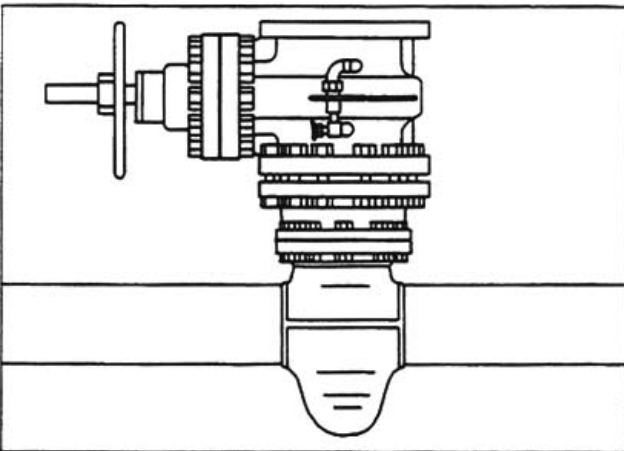


FIGURE 6

11. Separate top and bottom halves of fitting by running off the side bolt nuts only. Do not remove end gaskets, end gasket followers, side bolts, or side gaskets.
12. Back out pipe gripping set screws.
13. Lubricate rubber gaskets with soapsuds (add glycerin in freezing weather).
14. Place two halves of fitting on pipe and tighten side bolts evenly by pulling up each one a small amount at a time until completely tight. Maximum range of torque is 75 foot-pounds. This is the torque an average man might apply with a wrench having a 12" handle.
15. Locate the fitting in the desired position. Insert and tighten end screws with a small wrench. Start at the top and work around the fitting tightening each one a little at a time until all are evenly tightened to a torque of 17 foot-pounds.

16. Tighten pipe gripping set screws to hold fitting firmly in place to a torque of 17 foot-pounds.

C—TEST THE INSTALLATION—Figure 4

1. Remove completion plug, if not already removed.
2. Bolt completion cap to fitting being sure gasket is in good condition and in place. Remove test plug and attach air hose. (The completion cap of previously designed fittings does not have a test plug. Use separate test cap which is tapped.)
3. Apply air pressure and test for leaks with soapsuds (add glycerin in freezing weather) or bubble type leak detection fluid.
4. Remove completion cap or test cap.
5. Replace test plug in completion cap.

D—ATTACH GATE VALVE

1. The gate valve is a special 9" MUELLER gate valve for use with 4", 6" and 8" Line Stopper Fittings and must be installed with the rubber faced disc up since the pressure aids in seating the gate and keeping it tight when closed.
2. Attach gate valve or gate valve and adapter to fitting.
 - a. 8" line stopper fittings having Class 300 or 400 flanges do not require a valve adapter between the fitting and gate valve. **Figure 5.** Check to be sure the gasket is in good condition and in place. The bolt nuts should be loose at this point to permit the gate valve to be shifted slightly if necessary.
 - b. All 4" fittings and all 6" fittings and 8" fittings having Class 150 or 600 flanges require a valve adapter between the fitting and the valve. **Figure 6.** At both of these flanged joints check to be sure the gaskets are in good condition and in place. The bolt nuts for both joints should be loose at this point to permit gate valve and valve adapter to be shifted slightly if necessary.

INSTRUCTIONS FOR INSTALLING AND STOPPING OFF 4", 6" AND 8" LINE STOPPER FITTINGS

LINE STOPPER UNIT NO. 3SW-500

3. Open gate valve, check to be sure it is **fully** open. (Approximately 30 turns to open.)
4. Open by-pass valve on gate valve.
5. Attach plug alignment tool to completion plug.
 - a. Push fork to rearmost position and tighten thumb screw.
 - b. Screw the end of the tool into the inside threads in the top of the completion plug.
 - c. Loosen thumb screw so that the fork lugs will engage with the slot in the completion plug.
6. Attach plug alignment tool, with the completion plug attached to it, to shaft of completion machine.
 - a. Remove protector nut from end of shaft.
 - b. Insert lug on shaft into matching recess or slot in plug alignment tool.
 - c. Screw coupler sleeve on plug alignment tool to shaft threads.
7. Withdraw shaft to rearmost position, raise holding sleeve and place retaining pin through hole in holding sleeve to prevent the shaft and completion plug from falling while completion machine is being placed on gate valve.
8. Attach completion machine to gate valve. **Figure 7.** It is not necessary to use all the bolts at this point.
9. Hold back on shaft and holding sleeve, remove retaining pin, lower holding sleeve into position and slowly advance shaft until completion plug contacts fitting threads. **IMPORTANT—DO NOT LET SHAFT DROP. Figure 8.**
10. At this point it may be necessary to slightly shift the gate valve on the fitting and possibly the completion machine on the gate valve to align the completion plug threads with the fitting threads.
11. Rotate shaft **clockwise** until completion plug threads are engaged with fitting threads at least $\frac{1}{2}$ ".
12. Securely bolt gate valve to fitting (or gate valve to valve adapter and valve adapter to fitting) and mark the position of the completion machine flange location in relation to the gate valve flange. This is for reference so that the completion machine may be properly positioned for the final installation of the completion plug when the job is finished.

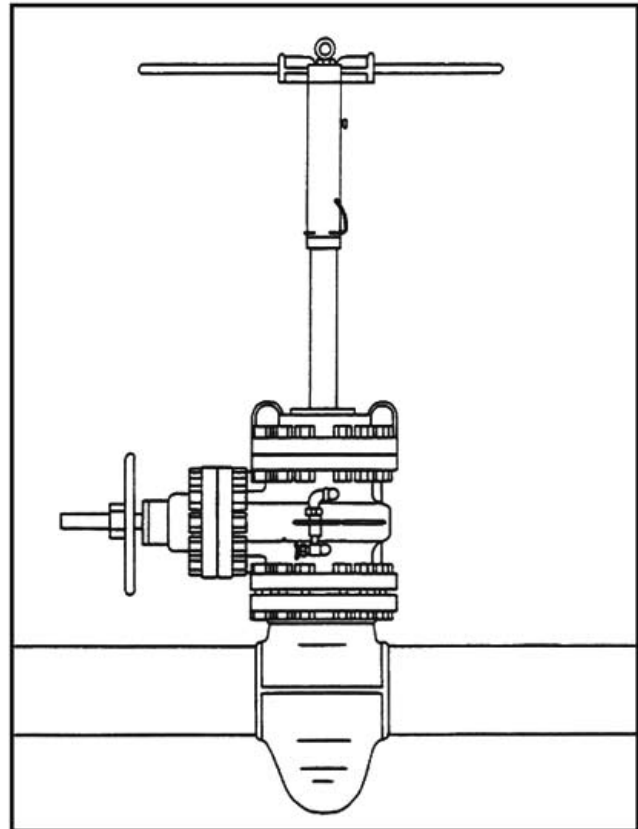


FIGURE 7

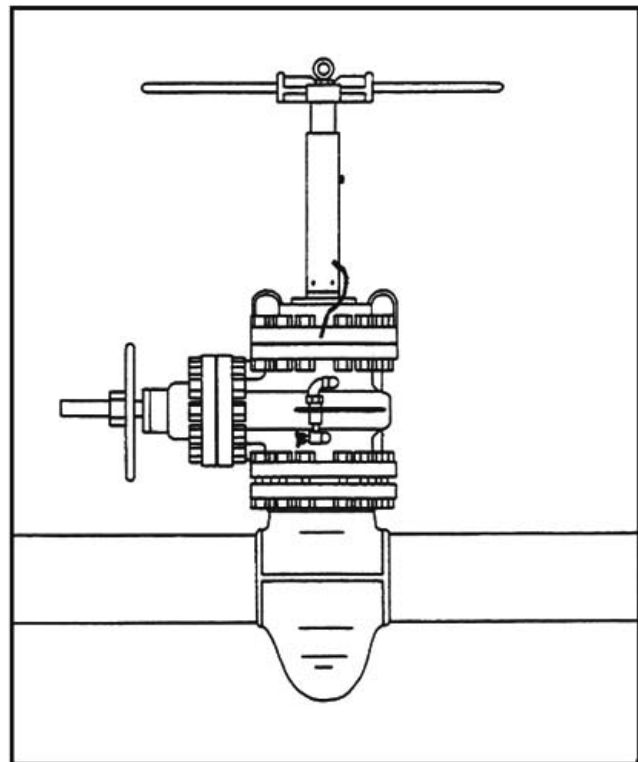
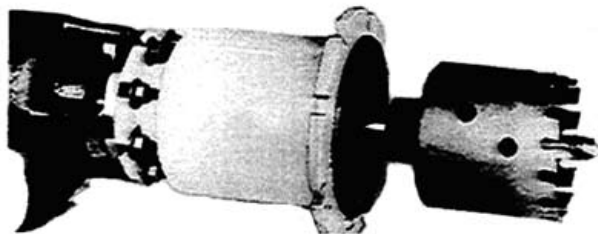


FIGURE 8

LINE STOPPER UNIT NO. 3SW-500

INSTRUCTIONS FOR INSTALLING AND STOPPING-OFF 4", 6" AND 8" LINE STOPPER FITTINGS



13. Rotate shaft **counter-clockwise** until completion plug is unscrewed from fitting. Withdraw shaft to rearmost position, raise sleeve and place pin in sleeve.
14. Remove completion machine from gate valve.
15. Hold back on shaft and sleeve, remove pin, lower sleeve and advance shaft until completion plug and plug alignment tool are exposed.
16. Remove completion plug and plug alignment tool from shaft and place protector nut on end of shaft.
17. Remove plug alignment tool from completion plug.

E—ATTACH AND OPERATE DRILLING MACHINE

(For detailed instructions see OPERATING INSTRUCTIONS FOR CC-36 OR C1-36 DRILLING MACHINES.)

1. Sharpen shell cutter and pilot drill before each cut by honing the front edge of the cutter teeth. If the shell cutter is very dull, it should be returned to Mueller Co., Decatur, Illinois, for reconditioning. Check pilot drill detents to be sure they operate correctly.
2. Bolt drilling machine adapter to the front of the drilling machine. Check to be sure that gasket is in good condition and in place.
NOTE: Make certain machined recess on adapter and lip on machine flange mate properly. Visually check adapter flange and machine flange to be sure they are flush.
3. Release automatic feed by pulling out automatic feed knob. (Directions are indicated on panel on rear of torque tube.)
4. Advance boring bar by rotating feed crank **counter-clockwise** until bolt hole in boring bar is exposed beyond face of adapter. (Directions are indicated on panel on rear cover of torque tube.) Remove hub retaining bolt.
5. Assemble drilling equipment.
 - a. When using CC-36 or C1-36 drilling machines assemble the shell cutter and cutter hub. Insert the shank of pilot drill into the socket in the boring bar. Slide

cutter hub and shell cutter over the end of the boring bar. Align holes in the cutter hub, boring bar and pilot drill and attach to boring bar with hub retaining bolt. **Figure 9.**

- b. Coat shell cutter and pilot drill thoroughly with Mueller cutting grease.
6. Retract boring bar to rearmost position by rotating feed crank **clockwise**.
7. Place the machine (with adapter and drilling equipment assembled) in drilling position on gate valve and bolt adapter solidly to valve flange. **Figure 10.** Check to be sure that the gasket is in good condition and in place.
8. Be sure that the welded fitting is cool before cut is started.
9. Rotate feed crank **counter-clockwise** to advance boring bar until pilot drill contacts the pipe.
Turn feed crank **clockwise** ¼ turn which retracts the boring bar slightly to release tension between pilot drill and the pipe (1 revolution of the feed crank moves the boring bar 1/6 of an inch - 6 revolutions equals 1 inch).

Catalog Number of Fitting	Approximate Number of Turns of Feed Crank Required for Pilot Drill to Contact Pipe		
	4"	6"	8"
H-17250	116	122	114
H-17254	116	122	114
H-17255	116	122	114
H-17256	116	122	77
H-17257	116	122	77
H-17258	116	122	114
H-17260	116	122	114
H-17261	116	122	77
H-17264	116	122	77
H-17265	117	123	115
H-17266	117	123	115
H-17269	116	122	114
H-17270	116	122	114
H-17271	116	122	77
H-17272	116	122	77
H-17275*	—	122	114
H-17276*	—	122	77
H-17277*	—	122	77
H-17278*	—	122	114
H-17280*	—	122	114
H-17281*	—	122	77
H-17282*	—	122	77
H-17283*	—	122	114
H-17285*	—	122	114
H-17286*	—	122	114
H-17287*	—	122	77

*THIN WALL Fittings

**INSTRUCTIONS FOR INSTALLING
AND STOPPING OFF 4", 6" AND 8"
LINE STOPPER FITTINGS**

LINE STOPPER UNIT NO. 3SW-500

NECESSARY TRAVEL TO COMPLETE CUT

Size and Kind of Pipe	From Point of Pilot Drill Contact on Pipe	From Point of Shell Cutter Contact on Pipe
4" Steel	6½"	4¾"
4" Cast Iron	6⅞"	5⅛"
6" Steel	8⅝"	6⅞"
6" Cast Iron	9"	7¼"
8" Steel	10⅝"	8⅞"
8" Cast Iron	11⅞"	9⅜"

Above dimensions include ¼" of overtravel.

10. Set feed indicator to zero. Mark the point on feed indicator shield that the arrow will reach to complete the cut.
11. Engage automatic feed by pushing in on automatic feed knob.
12. Operate the drilling machine.
 - a. When using the CC-36 Machine:
Place ratchet handle on machine so that it cuts when ratchet handle is pushed toward pipe. Observe note on ratchet casting and arrow on drive box boss. Always operate the machine according to instructions with one man only on ratchet handle and using automatic feed to assure correct drilling rate. If cut becomes too difficult for one man **DO NOT FORCE MACHINE** as this may cause damage to cutter or machine. See detailed instructions for the CC-36 Machine.
 - b. When using the C1-36 Machine and the MUELLER H-600 Air Motor:
Loosen the pivot set screw. This permits pivot pin to be removed so that air motor holder may be attached to the holder pivot on the drive box of the Drilling Machine. Position air motor holder and replace pivot pin. Tighten the pivot set screw and latch the small hook on the air motor holder to the pin on the machine drive box to prevent movement of the air motor holder. Examine air motor on ground with air pressure on. Position throttle lever for forward operation, this will turn drive spindle **clockwise**.

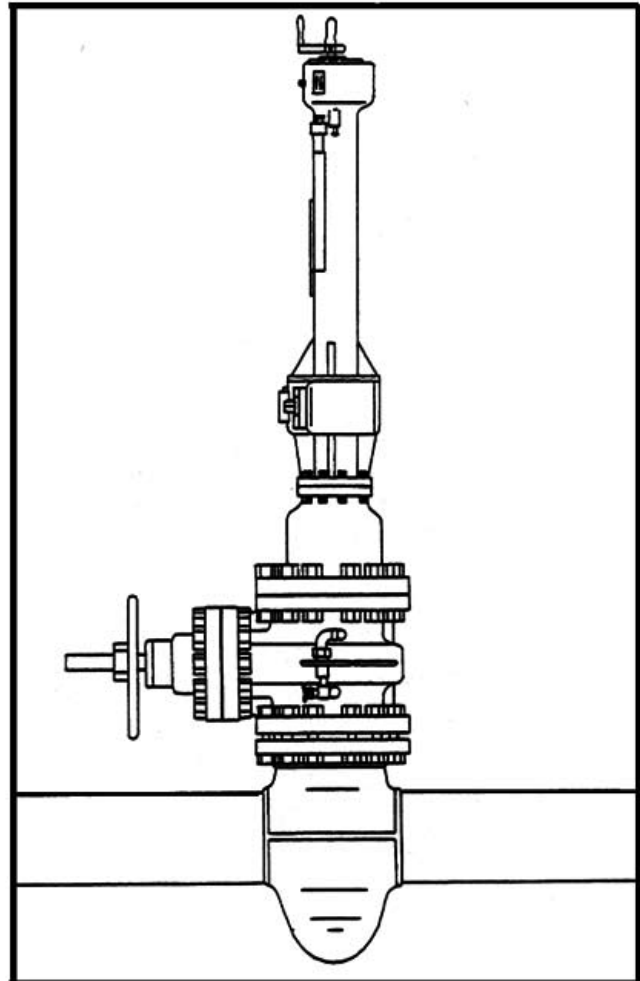


FIGURE 10

Place air motor in holder, open throttle slightly. Spindle will turn until square in motor spindle aligns with square on drive spindle. Motor will then drop into place. Screw feed screw in top of motor back into countersink in top of holder. Slide hook clamp into position on air motor torque handle and tighten.

Open air motor throttle **fully** so that motor is operating at proper speed (50 to 60 rpm). **IMPORTANT—MAINTAIN PRESSURE OF 90 P.S.I. WE RECOMMEND THE USE OF A GAGE AT THE THROTTLE TO DETERMINE THE ACTUAL PRESSURE OF AIR AT THE AIR MOTOR.** If cutting becomes difficult and motor stalls, see detailed instructions for the C1-36 Machine.

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INSTRUCTIONS FOR INSTALLING AND STOPPING-OFF 4", 6" AND 8" LINE STOPPER FITTINGS

- c. When drilling through bottom-out fittings, purge air from new bottom-out line by opening the downstream gate valve slightly when the pilot drill penetrates the pipe through the upstream fitting. The by-pass valve on the gate valve should be in the closed position.
13. Continue the cutting operation until the pipe is cut completely through and the arrow reaches the point marked on the feed indicator shield, or until the cutter stops cutting. If power is being used, shut off motor.
14. Check completion of cut by releasing automatic feed and attempting to advance cutter by rotating feed crank **counterclockwise**. If it does not advance easily, the cut is not completed and automatic feed knob must be pushed in for further cutting.

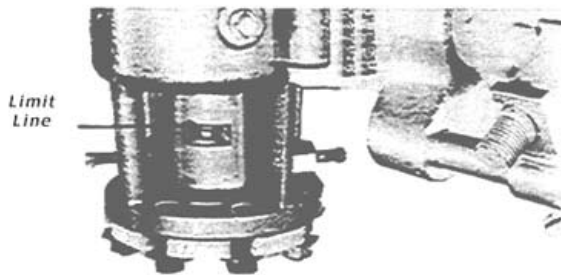


FIGURE 11

CAUTION: STOP ADVANCING THE BORING BAR WHEN THE LIMIT LINE ON THE BORING BAR BECOMES VISIBLE THROUGH THE DRIVE BOX DRAIN HOLE. **Figure 11.**

15. When cut is completed, release automatic feed and retract cutter to its rearmost position by rotating feed crank **clockwise**.

F—REMOVE DRILLING MACHINE

1. Close gate valve. (Approximately 30 turns required to completely close the valve.) And close by-pass valve.
2. Do not force gate valve closed as that may destroy the rubber seat of the valve.
3. Open the blow-off valve on the gate valve. This exhausts the pressure above the gate and also indicates whether or not the gate is shut tightly.
4. Remove bolts from the joint between the gate valve flange and the drilling machine adapter flange. Remove the drilling machine and drilling machine adapter from the gate valve as a unit.

5. Advance boring bar by rotating feed crank **counterclockwise** until hub retaining bolt is exposed beyond face of adapter. (Directions are indicated on rear cover of torque tube.)
6. The drilling operation cuts completely through the pipe removing 2 sections of pipe. One section is removed from the top of the pipe and a second section is removed from the bottom of the pipe. These two cut-out sections of pipe are held inside the shell cutter by the pilot drill. Remove hub retaining bolt, cutter hub and pilot drill from the boring bar of the machine.
7. Remove the pilot drill from the cut-out section of pipe.
8. Remove the cut-out sections of pipe from inside the shell cutter by sliding them straight forward one at a time. Insert two screw drivers in the holes in the shell cutter and pry evenly against the cut out sections of pipe to aid in sliding them forward. (If the cut-out section tilts it may bind on the inside of the cutter.)
9. See page 45 for using the H-17619 Inspection Flange.

G—ATTACH STOPPER TO STOPPING MACHINE

1. Attach combined crank and lifting yoke to stopping machine.
2. Rotate crank **counterclockwise** until operating tube and guide tube are exposed.
3. Remove stopper from protector sleeve by turning square end of expander screw **counterclockwise** until stopper is free from sleeve.
4. Check stopper to be sure it is fully contracted. Lower conical expanding wedge should be positioned against slotted nut on bottom of expander screw. Be sure expander screw threads in stopper are well lubricated with gear oil.
5. Attach stopper.
 - a. Insert square on expander screw into operating tube.
 - b. Align lug on top expanding wedge with matching recess or slot in end of guide tube.
 - c. Slide stopper coupler nut into position over top expanding wedge threads and tighten securely by hand.

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NOTE: Early models of the stoppers were made with a hole drilled through the square on the expander screw permitting the operating tube to be pinned to the stopper with a stopper coupler screw. This screw was used to limit turning the expander screw too far to the left (when contracting the stopper) thus preventing the bottom expanding wedge from unscrewing and dropping off into the bottom of the fitting.

Improvements in construction caused the expander screw to be made slightly longer and a lock nut is screwed on the bottom and secured in place with a cotter pin. Since there is no longer any possibility of accidentally disassembling the stopper, the hole in the square and the stopper coupler screw for new stoppers and stopping machines have been eliminated.

Old style stoppers are easily identified due to the hole in the square on the expander screw and later style by its absence.

New style stoppers can be used with both new style and old style stopping machines. However, if used with old style stopping machines, the stopper coupler screw is not used. **Old style stoppers cannot be used with new style stopping machines.**

If old style stoppers are to be used with old style stopping machines **a stopper coupler screw must be used.**

When old style machines are used with old style stoppers it is necessary to remove stopper coupler screw, insert stopper shaft in operating tube shaft, align the holes and insert the stopper coupler screw. The screw must be flush or below flush with outside of operating shaft. Stopper may then be secured by the use of the stopper coupler nut.

6. Lubricate stopper cover with Mueller lubricant.
7. Retract stopper to rearmost position by rotating crank **clockwise**.

H—ATTACH STOPPING MACHINE TO GATE VALVE

1. Position stopping machine on gate valve flange. FOR BEST SHUT-OFF OPERATION OF STOPPER, THE BY-PASS CONNECTION

IN STOPPING MACHINE BODY SHOULD ALWAYS FACE THE SECTION TO BE ISOLATED OR SHUT-OFF. Stopper may be reversed at some loss in shut-off effectiveness. Bolt stopping machine solidly to gate valve with gasket between valve and stopping machine.

2. See **Figure 12** when using two stopping machines to isolate a section of pipe and using an integral by-pass line to maintain service. Also see page 50 for flow data through this type of by-pass.
 - a. Assemble a by-pass line between the by-pass connections on the stopping machines.
 - b. Install a Save-A-Valve drilling nipple in the section of pipe to be stopped off and near the downstream stopping machine (stopping machine away from the source of pressure). This is a purging connection.
3. See **Figure 13** when using two stopping machines to isolate a section of pipe and using a separate by-pass line to maintain service.
 - a. Install a Save-A-Valve drilling nipple in the pipe on the pressure side of each stopping machine. Connect these two Save-A-Valve drilling nipples to form a by-pass line around the two stopping machines and the section of pipe to be isolated.
 - b. Install a third Save-A-Valve drilling nipple in the section of the pipe to be stopped off and near the downstream stopping machine (stopping machine away from the source of pressure in the pipe). This is a purging connection.
 - c. Tighten the plugs in the by-pass connections of the stopping machine bodies.
4. See **Figure 14** when using two stopping machines to isolate a section of pipe and maintain service downstream through bottom-out line.
 - a. Install a Save-a-valve drilling nipple in the section of pipe to be stopped off near the downstream stopping machine (stopping machine away from the source of pressure). This is used to blow down this section before removing.

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INSTRUCTIONS FOR INSTALLING
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LINE STOPPER FITTINGS

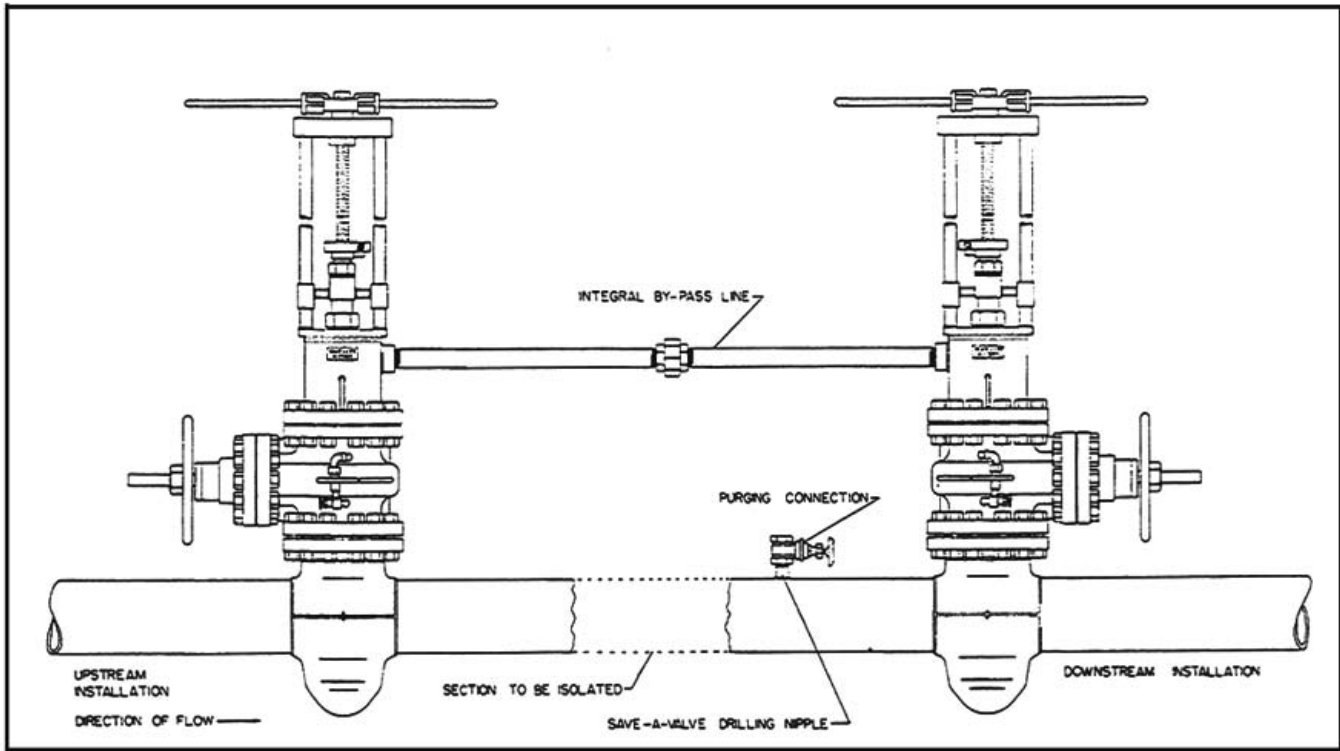


FIGURE 12

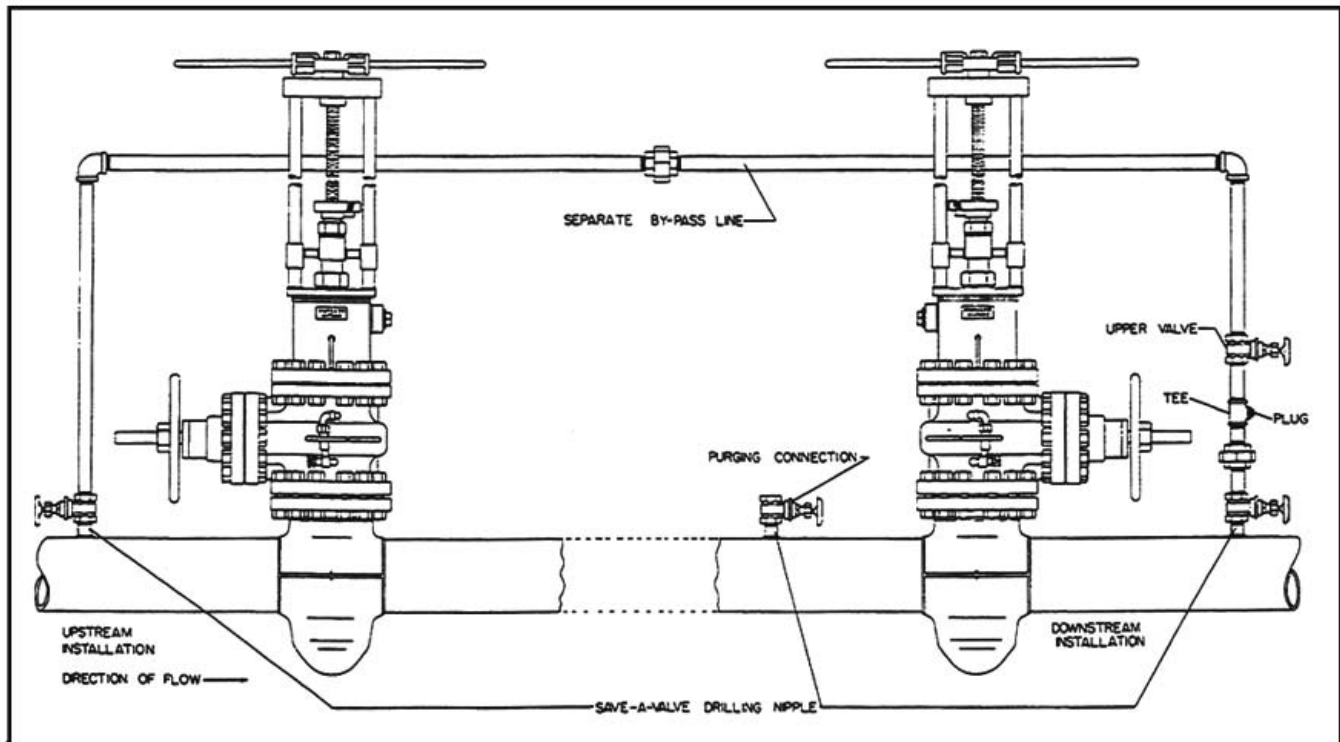


FIGURE 13

**INSTRUCTIONS FOR INSTALLING
AND STOPPING OFF 4", 6" AND 8"
LINE STOPPER FITTINGS**

LINE STOPPER UNIT NO. 3SW-500

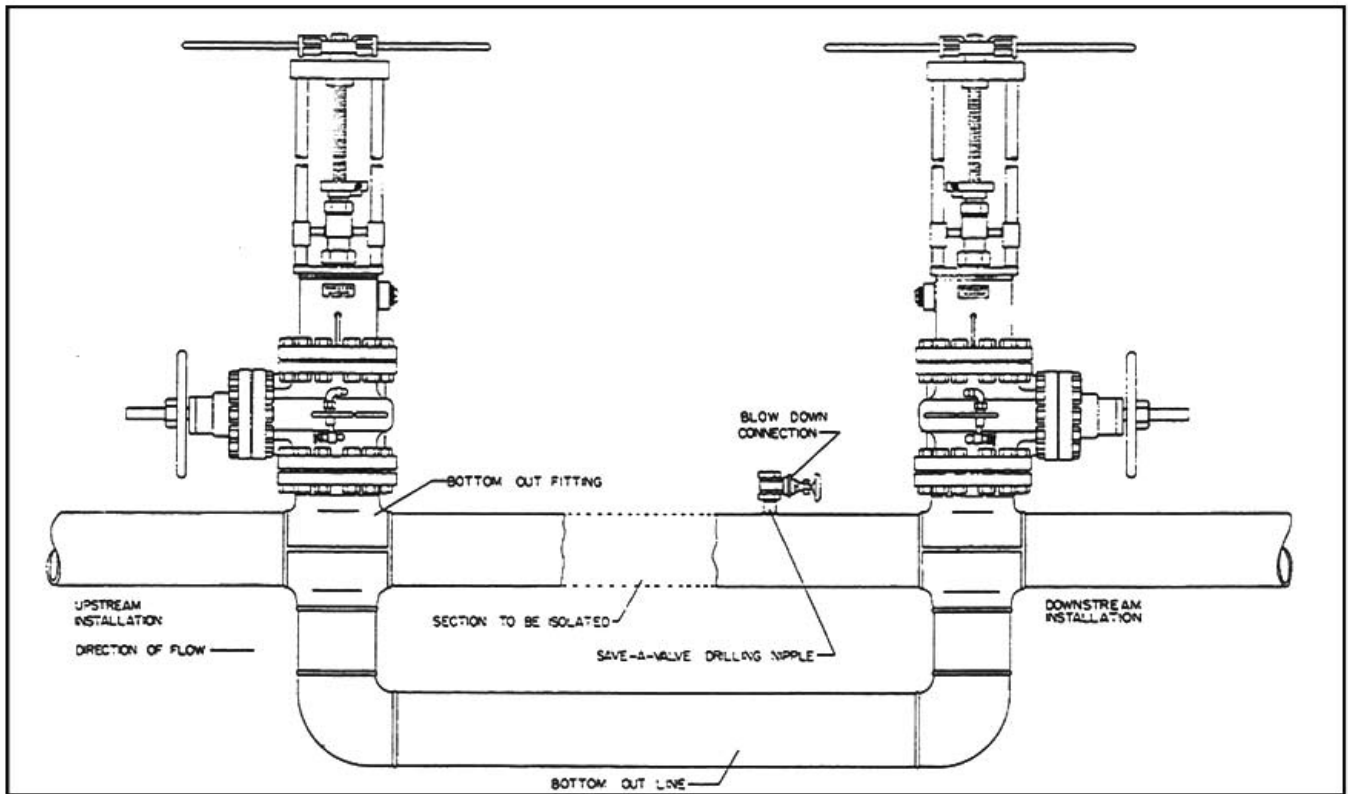


FIGURE 14

- b. The bottom-out line serves as the by-pass connection.
- c. Tighten the plug in by-pass connections of the stopping machines.
- 5. See **Figure 15** when using one stopping machine to stop-off pipe.
 - a. Install a Save-A-Valve drilling nipple in the pipe on the stopped off side of the stopping machine. This is a purging connection.
 - b. Tighten the plug in by-pass connection of the stopping machine body.

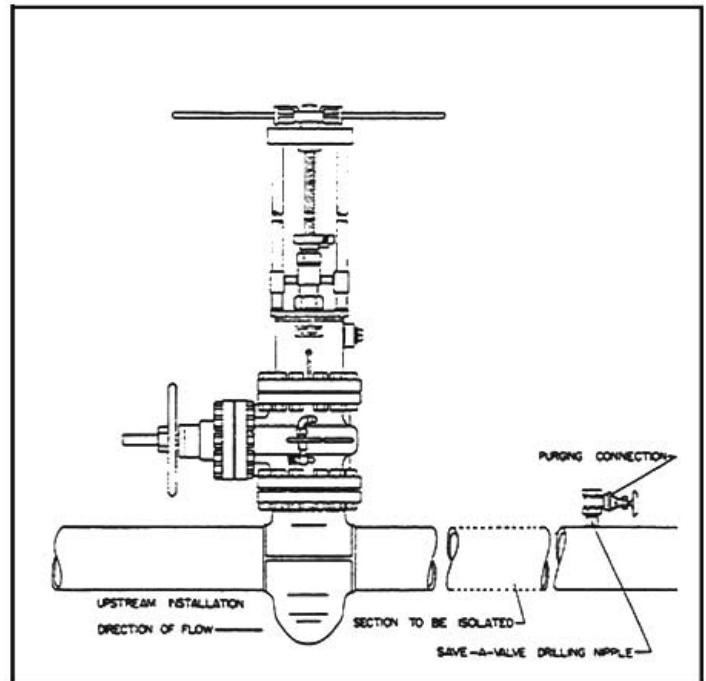


FIGURE 15

LINE STOPPER UNIT NO. 3SW-500

INSTRUCTIONS FOR INSTALLING AND STOPPING-OFF 4", 6" AND 8" LINE STOPPER FITTINGS



FIGURE 16

I—INSTALLATION OF SAVE-A-VALVE DRILLING NIPPLES—3" IN SIZE AND SMALLER—Fig. 16

(See MUELLER GAS DISTRIBUTION PRODUCTS CATALOG for machines and equipment needed to perform this operation.)

For installation of Save-A-Valve drilling nipples, 4", 6" and 8" in size, see page 34.

1. Clean surface where nipple is to be welded or service clamps attached.
2. Remove plug and cap before welding operation.
3. Place nipple in position and weld to line or attach service clamp to line and then attach nipple to clamp.
4. Screw test cap on nipple, apply air pressure and test for leaks with soapsuds.
5. Remove test cap.
6. Attach Mueller gate valve and open gate valve fully. (The smaller size drilling nipples require a bushing between the nipple and gate valve).
7. Attach proper size machine adapter nipple and drilling tools to Mueller "T-W," "E-4," "E-5," "EH-1," "D-4," "D-5" or "DH-2" Drilling Machine. For detailed instructions see operating instructions for these machines.
8. Apply MUELLER cutting grease to drill.
9. Place drilling machine and drilling machine adapter nipple on gate valve and tighten drilling machine adapter nipple into gate valve.
10. Advance boring bar until drill contacts pipe. Retract boring bar a small amount.
11. Start drilling operation. When hand operating the drilling machine, begin with a light, even feed, then a heavier feed, then finish drilling the hole with a light, even feed.
12. Continue drilling until hole is drilled. (This can be determined by feel of feeding mechanism, the pull on ratchet handle, or by measuring the advance of boring bar.)

13. After drilling is completed retract the boring bar to its rearmost position so that the drill safely clears the valve gate.
14. Close gate valve.
15. Remove drilling machine and drilling machine adapter from gate valve as a unit.

J—PLACE BY-PASS LINE IN OPERATION

1. If integral by-pass line is being used between two stopping machines, (Figure 12) the air is purged from the by-pass line by:
 - a. Open by-pass valve on upstream stopping machine gate valve.
 - b. Open upstream stopping machine gate valve slightly.
 - c. Open blow-off valve on downstream stopping machine gate valve to purge air from by-pass line and stopping machines. When air is purged from by-pass line and machines, close blow-off valve. Pressure will now build up in by-pass line.
 - d. Open both stopping machine gate valves **fully**. By-pass line is now in operation.
2. If separate by-pass line is being used (Figure 13) the air is purged from the by-pass line by:
 - a. Remove the plug from the tee in the by-pass line.
 - b. Open gate valve on upstream by-pass connection slightly.
 - c. Open upper valve in by-pass line until all air is purged from by-pass line, then close upper valve in by-pass line.
 - d. Replace plug in tee in by-pass line and open gate valve on downstream by-pass connection slightly.
 - e. Open upper valve in by-pass line. Pressure will now build up in by-pass line.
 - f. Open gate valves **fully** on both upstream and downstream by-pass connections. By-pass line is now in operation.
3. When using bottom-out fittings and bottom-out line—the by-pass line is the bottom-out line and is already in operation. Figure 14.

K—INSERT STOPPER INTO FITTING

Note: When using a by-pass line to maintain service around a section of pipe to be isolated by two stopping machines, it is advisable to insert and expand the upstream stopper first.

1. Open by-pass valve on gate valve.

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2. Open stopping machine gate valve **fully**. Advance stopper by rotating crank (or double handled ratchet) **counter-clockwise** until squared section on operating tube screw is exposed. See **Figure 17**.

NOTE: The LOWER squared section of the operating tube screw is used to expand stoppers in all 4", 6" and 8" fittings, EXCEPT for the 8" H-17256, 8" H-17257, 8" H-17261, 8" H-17264, 8" H-17271, 8" H-17272, 8" H-17276, 8" H-17277, 8" H-17281, 8" H-17282 and 8" H-17287. When using these fittings, the UPPER squared section of the operating tube screw is used to expand the stopper.

See **Figure 18** for LOWER squared section. See **Figure 19** for UPPER squared section. ADVANCE CAREFULLY UNTIL STOPPER CONTACTS BOTTOM OF FITTING. DO NOT FORCE STOPPER AGAINST BOTTOM OF FITTING SINCE THIS IS MERELY A POSITIONING OPERATION.

IMPORTANT—ROTATE CRANK (OR DOUBLE HANDLED RATCHET) **CLOCKWISE** FOR THREE (3) FULL TURNS TO PROVIDE ADEQUATE CLEARANCE FOR FREE EXPANSION OF STOPPER.

L—EXPAND STOPPER IN FITTING

1. Loosen wing nut and shift clamp bar from contact with guide post to contact with squared section of operating tube screw. This places expanding mechanism in operation. Tighten wing nut.
2. If crank has been used to insert stopper, replace it with double handled ratchet.
3. Set ratchet dog for **clockwise** rotation and rotate ratchet to expand stopper. Approximately 6 or 7 revolutions will effect a shut-off, depending upon the line pressure being shut-off and condition of stopper seating surface in fitting.
4. With both stoppers expanded, open the gate valve on Save-A-Valve drilling nipple used as a purging connection to blow down the stopped off section of pipe. (Stopper tightness will be indicated at this point.)
5. Proceed with the work to be done on the stopped-off section of pipe.
6. When using bottom-out fittings—cut-off and remove the isolated section of pipe. Weld caps on the stub ends of the pipe.

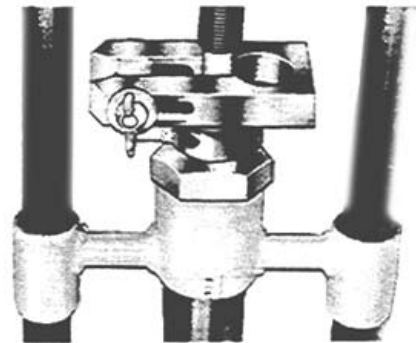


FIGURE 17

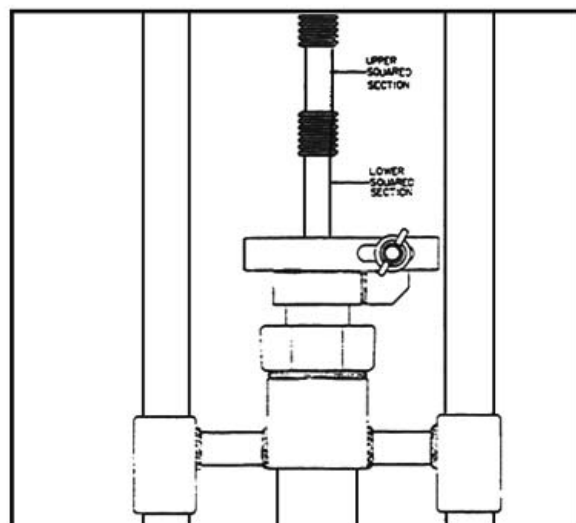


FIGURE 18

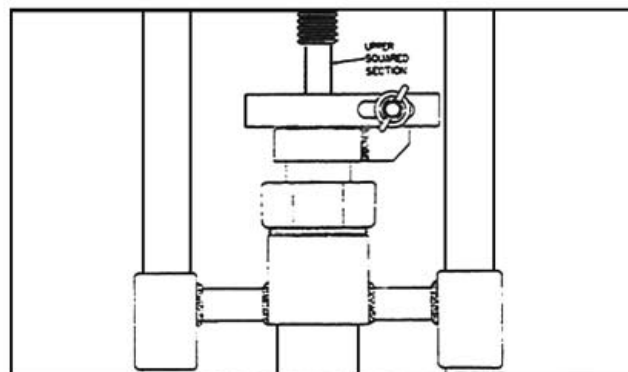


FIGURE 19

NOTE: When cutting or welding near line stopper fittings containing stoppers, maintain the following minimum distance to prevent damage to stopper.

- 4" fitting — minimum distance 12"
- 6" fitting — minimum distance 14"
- 8" fitting — minimum distance 16"

Where this distance cannot be maintained, use wet rags or burlap around the fittings to keep temperature down.

LINE STOPPER UNIT NO. 3SW-500

INSTRUCTIONS FOR INSTALLING AND STOPPING-OFF 4", 6" AND 8" LINE STOPPER FITTINGS

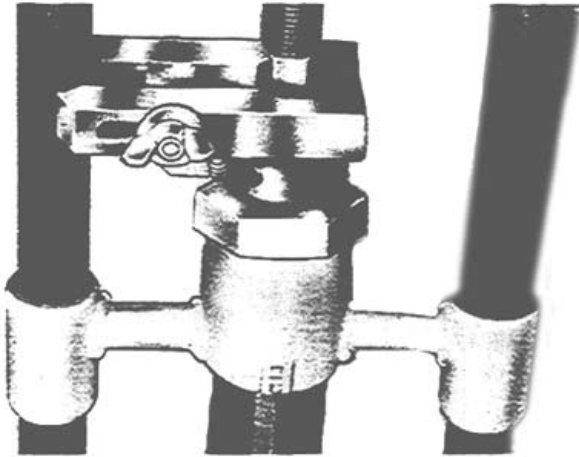


FIGURE 20

M—CONTRACT STOPPER IN FITTING

1. When all desired work has been done on the stopped-off section of pipe, check to be sure that all welded joints are cool.
2. Contract upstream stopper first. Set ratchet dog for **counter-clockwise** rotation and rotate ratchet the same number of turns as required to stop-off the line, or until the ratchet handle comes to a solid stop.
3. After stopper reaches the limit of **counter-clockwise** rotation, reverse ratchet dog and rotate handle approximately one turn **clockwise**. This releases tension on lower wedge retaining nut (or the stopper coupler screw, if previous design of machine is being used) and permits easy removal later.
4. Open gate valve on purging connection until all air has been purged from stopped-off section. Close this gate valve.
5. Test all joints when pressure has built up in section that was stopped-off.
6. Contract downstream stopper.

N—EXTRACT STOPPER FROM FITTING

1. Loosen wing nut and shift clamp bar from contact with squared section of operating tube screw to contact with guide post. **Figure 20**. Tighten wing nut.
2. Rotate ratchet handle (or replace with crank) **clockwise** to retract stopper to rear-most position.
3. Close stopping machine gate valves, and by-pass valves.
4. Open blow-off valves on gate valves. Flow from blow-off valves will blow down by-pass line. When using a separate by-pass line, close gate valves on upstream by-pass connection and downstream by-

pass connection. Close upper valve in by-pass line. Remove plug from tee in by-pass line and open upper valve in by-pass line.

5. Remove by-pass line and stopping machines.

O—PLUG AND CAP THE DRILLING NIPPLES

(See MUELLER GAS DISTRIBUTION PRODUCTS CATALOG for machines and equipment needed to perform this operation.)

1. Screw drilling nipple completion plug on the inserting tool of the "E-4," "E-5," "EH-1," "D-4," "D-5" Drilling Machine or H-17145 Completion Machine or directly on the boring bar of the "T-W" Drilling Machine or H-17045 Completion Machine. Lubricate these threads and check to be sure that these threads screw together freely without binding.
2. Apply non-hardening pipe thread 'dope' to plug threads.
3. Attach drilling or completion machine to valve.
4. Open valve, advance boring bar and screw completion plug into drilling nipple securely by rotating boring bar **clockwise**.
5. Remove inserting tool from plug by turning handle **counter-clockwise** to take up slack and striking handle of the machine a sharp blow **counter-clockwise**. Boring bar should now be free to turn.
6. Rotate **counter-clockwise** until inserting tool is free from plug.
7. Remove drilling machine (or completion machine) and gate valve.
8. Tighten plug with wrench.
9. Apply pipe thread 'dope' to completion cap threads and screw cap tightly on nipple. Test for leaks with soapsuds (add glycerin in freezing weather.)

P—INSTALL COMPLETION PLUG IN LINE STOPPER FITTING

NOTE: Latest design of completion plugs have an "O" ring seal and a pressure equalizing valve in the center of the completion plug. The end of the inserting or extracting tool will open the equalizing valve.

1. Hold back on shaft and sleeve, remove pin, lower sleeve and advance shaft of completion machine.

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2. Attach plug inserting tool to the completion plug.
 - a. Push fork to rearmost position.
 - b. Hold fork in this position and screw the end of the inserting tool into the inside threads in the top of the completion plug.
 - c. Check to be sure that the inserting tool has opened the equalizing valve.
 - d. Release fork so that the fork lugs will engage with the slots in the completion plug. (This may require backing off inserting tool slightly.)
3. Attach plug inserting tool, with the completion plug assembled to it, to the shaft of completion machine.
 - a. Remove protector nut from end of shaft.
 - b. Insert lug on shaft into matching recess or slot in plug inserting tool.
 - c. Screw coupler sleeve on plug inserting tool to shaft threads.
4. Coat the threads and "O"-ring on the completion plug with a heavy grease.
5. Withdraw shaft to rearmost position, raise sleeve and place pin through hole in sleeve to prevent the shaft and completion plug from falling while the completion machine is being placed on gate valve.
6. Place completion machine on gate valve in same position as marked in paragraph "D-12." With gasket in place, bolt the completion machine to the gate valve. See **Figure 7**.
7. Open by-pass valve on gate valve.
8. Open gate valve.
9. Hold back on shaft and sleeve, remove pin, lower sleeve, advance shaft and screw completion plug into fitting securely by rotating shaft **clockwise**.
10. Remove plug inserting tool from the completion plug by turning the shaft **counter-clockwise**.
11. Open blow-off valve to determine tightness of plug.
12. Unbolt and remove gate valve and completion machine from fitting as a unit.

13. Completion plugs furnished with an "O" ring will be tightened to their seat by the machine with no further tightening needed. For plugs without "O" rings, tighten completion plug with completion plug wrench. Place a pipe or rod through the wrench to aid in tightening the completion plug.
14. Place gasket in fitting recess and put completion cap in place.
15. Bolt cap solidly to fitting flange. **Figure 21**.
16. Test fitting again with soapsuds.
17. Refill trench.

Q—FUTURE REMOVAL OF COMPLETION PLUG

1. Remove completion cap.
2. Examine the completion plug to determine whether or not it has an equalizing valve. The equalizing valve is located in center recess. **Figure 22** shows plug with equalizing valve and **Figure 23** shows plug without equalizing valve.
3. If completion plug does not have an equalizing valve, loosen the plug slightly using completion plug wrench.
4. Bolt the gate valve to the fitting.
 - a. 8" line stopper fittings having Class 300 or 400 flanges do not require a valve adapter between the fitting and gate valve. Check to be sure the gasket is in good condition and in place. The bolt nuts should be loose at this point to permit the gate valve to be shifted slightly if necessary.
 - b. All 4" fittings and all 6" fittings and 8" fittings having Class 150 or 600 flanges require a valve adapter between the fitting and the valve. At both

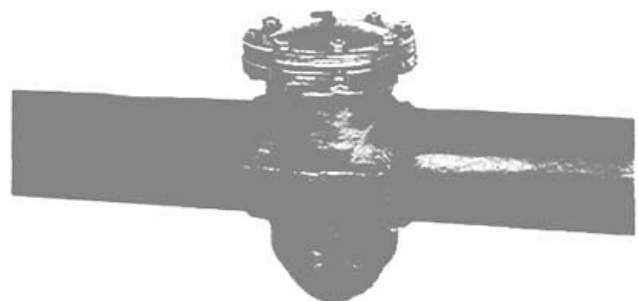


FIGURE 21

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INSTRUCTIONS FOR INSTALLING AND STOPPING-OFF 4", 6" AND 8" LINE STOPPER FITTINGS



FIGURE 22



FIGURE 23

of these flanged joints check to be sure the gaskets are in good condition and in place. The bolt nuts for both joints should be loose at this point to permit gate valve and valve adapter to be shifted slightly if necessary.

5. Open gate valve **fully**.
6. Open blow-off valve on gate valve.
7. Attach plug alignment tool to shaft of completion machine.
 - a. Remove protector nut from end of shaft.
 - b. Insert lug on shaft into matching recess or slot in plug alignment tool.
 - c. Screw coupler sleeve on plug alignment tool to shaft threads.
 - d. Push the fork on plug alignment tool to rearmost position and tighten thumb screw to hold the fork in this position.
8. Withdraw shaft to rearmost position. Raise sleeve and place pin through hole in sleeve to prevent the shaft from falling while completion machine is being placed on gate valve.
9. Attach completion machine to gate valve. It is not necessary to use all the bolts at this point.
10. Hold back on shaft and sleeve, remove pin, lower sleeve into position and slowly advance shaft until plug alignment tool contacts the completion plug. **IMPORTANT—DO NOT LET SHAFT DROP.**
11. At this point it may be necessary to slightly shift the gate valve on the fitting or the completion machine on the gate valve to align the plug alignment tool with the completion plug threads.
12. Rotate shaft **clockwise** until plug alignment tool threads are engaged with threads in the completion plug at least $\frac{1}{2}$ ".
13. Securely bolt gate valve to fitting (or gate valve to valve adapter and valve adapter to fitting) and mark the position of the completion machine flange location in relation to the gate valve flange. This is for reference so that the completion machine may be properly positioned for the final installation of the completion plug when the job is finished.
14. Rotate shaft **counter-clockwise** until plug alignment tool is unscrewed from threads in the completion plug.
15. Withdraw shaft to its rearmost position, raise sleeve and place pin through hole in sleeve.
16. Remove completion machine from gate valve.
17. Hold back on shaft and sleeve, remove pin from sleeve, lower sleeve and advance shaft until plug alignment tool is exposed.
18. Remove plug alignment tool from shaft.
19. Attach plug extracting tool to shaft of completion machine.
 - a. Insert lug on shaft into matching recess or slot in plug extracting tool.
 - b. Screw coupler sleeve on plug extracting tool to shaft threads.

**INSTRUCTIONS FOR INSTALLING
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LINE STOPPER FITTINGS**

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20. Withdraw shaft to rearmost position, raise sleeve and place pin through hole in sleeve to prevent the shaft from falling while completion machine is being placed on gate valve.
 21. Place completion machine on gate valve in same position as marked in paragraph "Q-13" on page 20. With gasket in place bolt the completion machine to the gate valve.
 22. Hold back on shaft and sleeve, remove pin, lower sleeve and slowly advance shaft until plug extracting tool contacts the completion plug.
 23. Rotate shaft **clockwise** until plug extracting tool firmly engages the threads in the top of the completion plug.
 24. If the completion plug has an equalizing valve, it will be opened by the end of the extracting tool. Flow from the blow-off valve on gate valve will indicate that equalizing valve is open. Close blow-off valve and open by-pass valve. **DO NOT**
- ATTEMPT TO REMOVE COMPLETION PLUG
UNTIL PRESSURE IS EQUALIZED.**
25. Rotate shaft **counter-clockwise** until completion plug is unscrewed from the fitting.
 26. Withdraw shaft to rearmost position, raise sleeve and place pin through hole in sleeve. Check to be sure that the completion plug clears the valve gate.
 27. Close gate valve and by-pass valve and test for tightness by opening the blow-off valve.
 28. Remove completion machine from gate valve.
 29. Hold back on shaft and sleeve, remove pin from sleeve, lower sleeve and advance shaft until completion plug and plug extracting tool are exposed.
 30. Remove completion plug and plug extracting tool from shaft and place protector nut on end of shaft.
 31. Refer back to instruction "G" and proceed with the use of the fitting.

LINE STOPPER UNIT NO. 3SW-500

INSTRUCTIONS FOR STOPPING OFF 4", 6" AND 8" EXTENSION STOPPER FITTINGS

THESE INSTRUCTIONS APPLY TO H-17251 FITTING WHICH IS INSTALLED IN NEW PIPING AS IT IS LAID



FIGURE 24 ABOVE SHOWS H-17251 FITTING. FOR DEAD END EXTENSION USE, BEFORE BEING INSTALLED.

EQUIPMENT REQUIRED FOR STOPPING-OFF H-17251 FITTING

Name of Attachment	4"	6"	8"
	H-17251	H-17251	H-17251
Valve Adapter	501361	63205	63193
Steel Wedge Stopper*	89694	89696	89698
or Steel Wedge Stopper**	580634	580612	580613
Plug Inserting Tool†	83772	83237	83237
Plug Extracting Tool†	83773	83238	83238
Plug Alignment Tool†	83774	83250	83250
Completion Plug Wrench†	36404	36424	36424

*Steel Wedge Stopper with Positive Control Cover for use with Gas.

**Steel Wedge Stopper with Neoprene Cover for use with Petroleum.

†Tools for 6" and 8" Fittings are furnished with the H-17347 Completion Machine. Tools for 4" Fittings must be ordered separately.

Extension Stopper Fittings 3" in size and larger as now furnished have a completion plug with an "O" ring seal at the top of the thread and a pressure equalizing valve located in the center of the plug.

Tools furnished with H-17347 Completion Machine are designed for use with fittings having an equalizing valve in the completion plug. They are entirely satisfactory for use with fittings without an equalizing valve.

230 p.s.i. Maximum Working Pressure at 100° F.;
250° F. Max. Temperature Rating at 200 p.s.i.

The line pressure and temperature must not exceed these amounts during the use of this fitting.

A—SELECT THE EQUIPMENT REQUIRED

1. From the chart select the equipment required according to the size of the fitting. See instruction "H," page 13 for arrangement of piping.

B—REMOVE COMPLETION PLUG

1. Remove completion cap.
2. Examine the completion plug to determine whether or not it has an equalizing valve. The equalizing valve is located in center recess. **Figure 22** shows plug with equalizing valve and **Figure 23** shows plug without equalizing valve.
3. If completion plug does not have an equalizing valve, loosen the plug slightly using completion plug wrench.
4. Bolt the valve adapter to the fitting, then bolt the gate valve to the valve adapter. See **Figure 6**. Be sure all gaskets are in good condition and in place. Bolt nuts should be loose at this point to permit gate valve to be shifted slightly if necessary.
5. Open gate valve **fully**.
6. Open blow-off valve on gate valve.
7. Attach plug alignment tool to shaft of completion machine.
 - a. Remove protector nut from end of shaft.
 - b. Insert lug on shaft into matching recess or slot in plug alignment tool.
 - c. Screw coupler sleeve on plug alignment tool to shaft threads.
 - d. Push the fork on plug alignment tool to rearmost position and tighten thumb screw to hold the fork in this position.

**INSTRUCTIONS FOR
STOPPING OFF 4", 6" AND 8"
EXTENSION STOPPER FITTINGS**

LINE STOPPER UNIT NO. 3SW-500

THESE INSTRUCTIONS APPLY TO H-17251 FITTING WHICH IS INSTALLED IN NEW PIPING AS IT IS LAID

8. Withdraw shaft to rearmost position. Raise sleeve and place pin through hole in sleeve to prevent the shaft from falling while completion machine is being placed on gate valve.
9. Attach completion machine to gate valve. See **Figure 7**. It is not necessary to use all the bolts at this point.
10. Hold back on shaft and sleeve, remove pin, lower sleeve into position and slowly advance shaft until plug alignment tool contacts completion plug. **IMPORTANT — DO NOT LET SHAFT DROP.**
11. At this point it may be necessary to slightly shift the gate valve on the fitting or the completion machine on the gate valve to align the plug alignment tool with the completion plug threads.
12. Rotate shaft **clockwise** until plug alignment tool threads are engaged with threads in the completion plug at least $\frac{1}{2}$ ".
13. Securely bolt gate valve to valve adapter and valve adapter to fitting and mark the position of the completion machine flange location in relation to the gate valve flange. This is for reference so that the completion machine may be properly positioned for the final installation of the completion plug when the job is finished.
14. Rotate shaft **counter-clockwise** until plug alignment tool is unscrewed from threads in the completion plug.
15. Withdraw shaft to its rearmost position, raise sleeve and place pin in sleeve.
16. Remove completion machine from gate valve.
17. Hold back on shaft and sleeve, remove pin from sleeve, lower sleeve and advance shaft until plug alignment tool is exposed.
18. Remove plug alignment tool from shaft.
19. Attach plug extracting tool to shaft of completion machine.
 - a. Insert lug on shaft into matching recess or slot in plug extracting tool.
 - b. Screw coupler sleeve on plug extracting tool to shaft threads.
20. Withdraw shaft to rearmost position, raise sleeve and place pin through hole in sleeve to prevent the shaft from falling while completion machine is being placed on gate valve.
21. Place completion machine on gate valve in same position as marked in paragraph "B-13" on this page. With gasket in place bolt the completion machine to the gate valve.
22. Hold back on shaft and sleeve, remove pin from sleeve, lower sleeve and slowly advance shaft until plug extracting tool contacts the completion plug.
23. Rotate shaft **clockwise** until plug extracting tool firmly engages the threads in the top of the completion plug.
24. If the completion plug has an equalizing valve, it will be opened by the end of the extracting tool. Flow from the blow-off valve on gate valve will indicate that equalizing valve is open. Close blow-off valve and open by-pass valve. **DO NOT ATTEMPT TO REMOVE COMPLETION PLUG UNTIL PRESSURE IS EQUALIZED.**
25. Rotate shaft **counter-clockwise** until completion plug is unscrewed from the fitting.
26. Withdraw shaft to rearmost position, raise sleeve and place pin in sleeve. Check to be sure completion plug clears valve gate.
27. Close gate valve and by-pass valve and test for tightness by opening blow-off valve.
28. Remove completion machine from gate valve.
29. Hold back on shaft and sleeve, remove pin, lower sleeve and advance shaft until completion plug and plug extracting tool are exposed.

LINE STOPPER UNIT NO. 3SW-500

INSTRUCTIONS FOR STOPPING OFF 4", 6" AND 8" EXTENSION STOPPER FITTINGS

THESE INSTRUCTIONS APPLY TO H-17251 FITTING WHICH IS INSTALLED IN NEW PIPING AS IT IS LAID

30. Remove completion plug and plug extracting tool from shaft and place protector nut on end of shaft.
31. Proceed with the use of these fittings by following the instructions for line stopper fittings beginning with instruction "G" on page 12.

NOTE: Once the fitting has been stopped off, cut off the capped end of the fitting and weld extension of piping to the outlet end of the fitting. **Figure 25.**

NOTE: When cutting or welding near line stopper fittings containing stoppers, maintain the following minimum distance to prevent damage to stopper.

4" fitting — minimum distance 12"

6" fitting — minimum distance 14"

8" fitting — minimum distance 16"

Where this distance cannot be maintained, use wet rags or burlap around the fitting to keep temperature down.

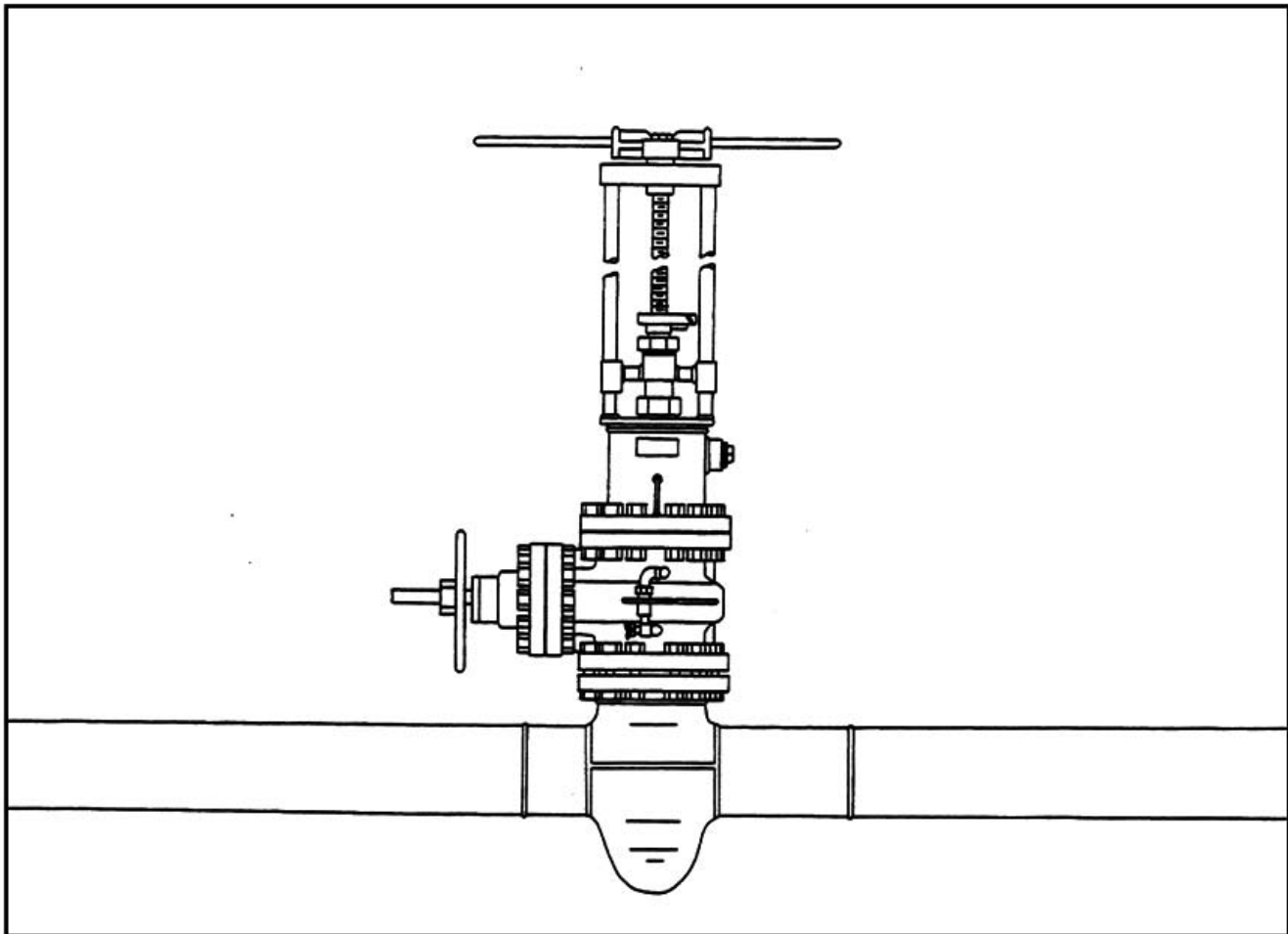


FIGURE 25

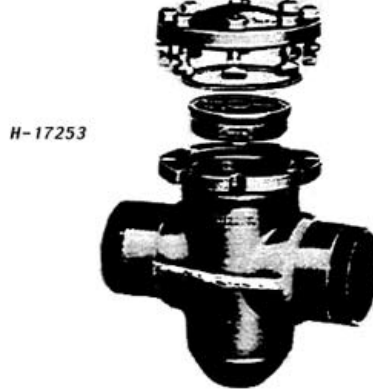
**INSTRUCTIONS FOR INSTALLING
AND STOPPING OFF 4", 6" AND 8"
EXTENSION STOPPER FITTINGS**

LINE STOPPER UNIT NO. 3SW-500

THESE INSTRUCTIONS APPLY TO FITTINGS H-17252, H-17253 AND H-17262. FIGURES 26, 27 AND 28.



H-17252



H-17253



H-17262

FIGURE 26

FIGURE 27

FIGURE 28

**230 p.s.i. Maximum Working Pressure at 100° F.;
250° F. Max. Temperature Rating at 200 p.s.i.**

The line pressure and temperature must not exceed these amounts during the use of these fittings. CAUTION: The maximum working pressure for the H-17262 Extension Stopper Fitting is 175 p.s.i.

SELECT ATTACHMENTS ACCORDING TO SIZE AND CATALOG NUMBER OF EXTENSION STOPPER FITTING AND DRILLING MACHINE TO BE USED.

Name of Attachment	Quan. Req.	4"		6"		8"		4"		6"		8"	
		H-17252 H-17253	H-17252 H-17253	H-17252 H-17253	H-17252 H-17253	H-17262	H-17262	H-17262	H-17262	H-17262	H-17262		
Drilling Machine		CC-36 or C1-36	CH-6	CC-36 or C1-36	CH-6	CC-36 or C1-36	CH-6	CC-36 or C1-36	CH-6	CC-36 or C1-36	CH-6	CC-36 or C1-36	CH-6
Valve Adapter	1	501361	501361	63205	63205	63193	63193	501361	501361	63205	63205	63193	63193
Drilling Machine Adapter	1	89434	83623	89435	83626	89436	580826	83368	83662	83369	83664	83370	580825
Shell Cutter for Steel	1	3 1/2" 33519	3 1/2" 83203	5 1/2" 36004	5 1/2" 83134	7 1/2" 33999	7 1/2" 83135	—	—	—	—	—	—
Pilot Drill for Steel	1	33976	83634	36005	83639	64244	83675	—	—	—	—	—	—
Cutter Hub	1	88340	—	63978	—	33996	—	—	—	—	—	—	—
Cutter Arbor	1	—	83637	—	83640	—	580824	—	83637	—	83640	—	580824
Shell Cutter for C.I.	1	3 1/2" 51903	—	5 1/2" 63787	—	7 1/2" 51897	—	3 1/2" 51903	3 1/2" 83203	5 1/2" 63787	5 1/2" 83134	7 1/2" 51897	7 1/2" 83135
Pilot Drill for C.I.	1	33976	—	59845	—	64245	—	33976	83634	59845	83639	64245	83675
Cutter Hub	1	88340	—	63978	—	33996	—	88340	—	63978	—	33996	—
Steel Wedge Stopper* or Steel Wedge Stopper**	1	89694 or 580634	89694 or 580634	89696 or 580612	89696 or 580612	89698 or 580613	89698 or 580613	89694 or 580634	89694 or 580634	89696 or 580612	89696 or 580612	89698 or 580613	89698 or 580613
Plug Inserting Tool†	1	83772	83772	83237	83237	83237	83237	83772	83772	83237	83237	83237	83237
Plug Extracting Tool†	1	83773	83773	83238	83238	83238	83238	83773	83773	83238	83238	83238	83238
Plug Alignment Tool†	1	83774	83774	83250	83250	83250	83250	83774	83774	83250	83250	83250	83250
Completion Plug Wrench†	1	36404	36404	36424	36424	36424	36424	36404	36404	36424	36424	36424	36424

*Steel Wedge Stopper with Positive Control Cover for use with Gas.

**Steel Wedge Stopper with Neoprene Cover for use with Petroleum.

†Tools for 6" and 8" Fittings are furnished with the H-17347 Completion Machine. Tools for 4" Fittings must be ordered separately.

LINE STOPPER UNIT NO. 3SW-500

INSTRUCTIONS FOR INSTALLING AND STOPPING-OFF 4", 6" AND 8" EXTENSION STOPPER FITTINGS

THESE INSTRUCTIONS APPLY TO FITTINGS H-17252, H-17253 AND H-17262. FIGURES 26, 27 AND 28.



FIGURE 29

A—SELECT THE EQUIPMENT REQUIRED

1. From the chart on page 25, select the equipment required according to the size and catalog number of the fitting, and the kind of pipe and drilling machine to be used. See instruction "H" on page 13 for arrangement of piping.

B—INSTALL AN EXTENSION STOPPER FITTING

1. Thoroughly clean the pipe to which the fitting is to be attached.
2. Remove completion cap.
3. Loosen completion plug slightly but do not remove. Use completion plug wrench. Latest design of completion plug has an "O" ring seal. Loosen this type of plug so that the "O" ring is exposed and not in contact with the flange of the fitting.
4. Attach the fitting to the line at the point where the lateral connection is to be made.
 - a. If using a H-17252 fitting (**Figure 26**) with a welding inlet, shape inlet to fit pipe and place it in the desired position and weld it to the pipe line. Reinforce point with split reinforcing saddle if desired.
 - b. If using a H-17262 Mechanical Joint fitting (**Figure 28**) attach a MUELLER H-615 tapping sleeve or a MUELLER H-715 tapping cross to the line in the desired position and then bolt the fitting to it. Block up under fitting to properly support weight of stopping machine and drilling machine.
 - c. If using H-17253 Fitting (**Figure 27**) with a threaded inlet, attach a service clamp or sleeve with threaded outlet to the line in the desired position and then attach the fitting to the service clamp or sleeve. Block up under the fitting to properly support weight of stopping machine and drilling machine.

C—ATTACH DRILLING EQUIPMENT

(For detailed instructions see OPERATING INSTRUCTIONS for CC-36, C1-36 or CH-6 DRILLING MACHINES.)

1. Sharpen shell cutter and pilot drill before each cut by honing the front edge of the cutter teeth. If the shell cutter is very dull, it should be returned to Mueller Co., Decatur, Illinois, for reconditioning. Check pilot drill detents to be sure they are operating correctly.
2. Bolt proper size and type of drilling machine adapter to the front of the drilling machine. Check to be sure that gasket is in good condition and in place.
3. Release automatic feed by pulling out automatic feed knob. Push in on CH-6. (Directions are indicated on panel on rear of torque tube.)
4. Advance boring bar by rotating feed crank **counter-clockwise (clockwise on CH-6)** until bolt hole in boring bar is exposed beyond face of adapter. (Directions are indicated on panel on rear cover of torque tube.) Remove hub retaining bolt.
5. Assemble drilling equipment.
 - a. When using CC-36 or C1-36 drilling machines, assemble the shell cutter and cutter hub. Insert the shank of pilot drill into the socket in the boring bar. Slide cutter hub and shell cutter over the end of boring bar. Align holes in the cutter hub, boring bar and pilot drill and attach to boring bar with hub retaining bolt. **Figure 29**.
 - b. When using CH-6 drilling machine, remove retaining screws from cutter arbor. Insert cutter arbor into socket in boring bar. Align holes in cutter arbor and boring bar. Replace retaining screw by inserting it through hole in boring bar and into cutter arbor tapped hole. Tighten securely with screw driver. NOTE: If cutter arbor is E-Z release type, tighten Allen head cap screws so that the backing ring is rigid with the cutter arbor. Lubricate cutter arbor threads and attach shell cutter, threading it onto arbor hand tight. Lubricate pilot drill, threaded shank end, and screw it securely into cutter arbor. Wrench flats are provided on pilot drill. Coat shell cutter and pilot drill thoroughly with MUELLER cutting grease.

INSTRUCTIONS FOR INSTALLING AND STOPPING OFF 4", 6" AND 8" EXTENSION STOPPER FITTINGS

LINE STOPPER UNIT NO. 3SW-500

THESE INSTRUCTIONS APPLY TO FITTINGS H-17252, H-17253 AND H-17262. FIGURES 26, 27 AND 28.

6. Retract boring bar to rearmost position by rotating feed crank **clockwise** (**counter-clockwise** on CH-6).
7. Place the machine (with adapter and drilling equipment assembled) in drilling position and bolt adapter solidly to fitting. Check to be sure the gasket is in good condition and in place.
 - a. If using H-17252 or H-17253 fitting, attach the proper size companion flange to the outlet end of the fitting and bolt the adapter solidly to it. **Figure 30**. Tack weld the companion flange or block the drilling machine to prevent the companion flange from unscrewing.
 - b. If using H-17262 fitting, bolt the drilling machine adapter directly to the fitting outlet. Lubricate the "O" ring gasket of the adapter.
8. Be sure that the welded fitting is cool before cut is started.
9. Rotate feed crank **counter-clockwise** (**clockwise** on CH-6) to advance boring bar until pilot drill contacts the pipe. Turn feed crank **clockwise** (**counter-clockwise** on CH-6) $\frac{1}{4}$ turn which retracts the

boring bar slightly to release tension between pilot drill and the pipe. (1 revolution of the feed crank moves the boring bar $\frac{1}{6}$ of an inch—6 revolutions equals 1 inch.)

10. Set feed indicator to zero. Mark the point on feed indicator shield that the arrow will reach to complete the cut. (On the CH-6 machine, the required travel is set on the automatic feed indicator and when the machine reaches this travel, the indicator will register 000.) For travel chart, see OPERATING INSTRUCTIONS for CC-36, C1-36 and CH-6 DRILLING MACHINES.

D—TEST THE INSTALLATION—Figure 31

1. Remove completion plug.
2. Bolt completion cap to fitting, being sure gasket is in good condition and in place. Remove test plug and attach air hose. (The completion cap of previously designed fittings does not have a test plug. Use separate test cap which is tapped.)
3. Apply air pressure and test for leaks with soapsuds (add glycerin in freezing weather) or bubble type leak detection fluid.
4. Remove completion cap or test cap.
5. Replace test plug in completion cap.

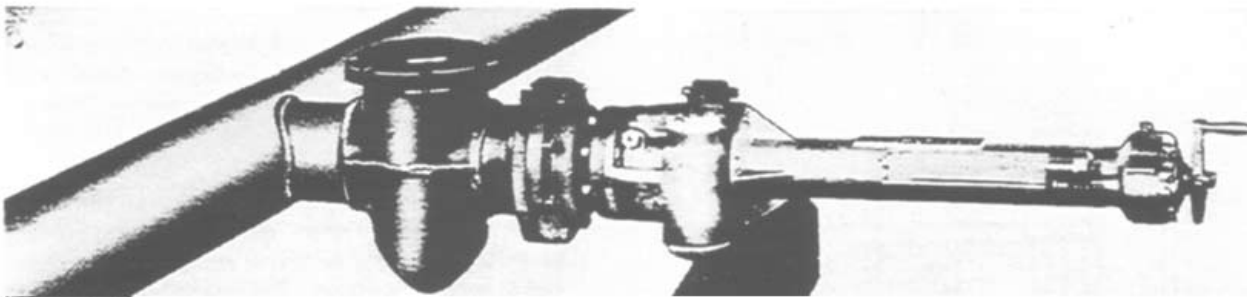


FIGURE 30

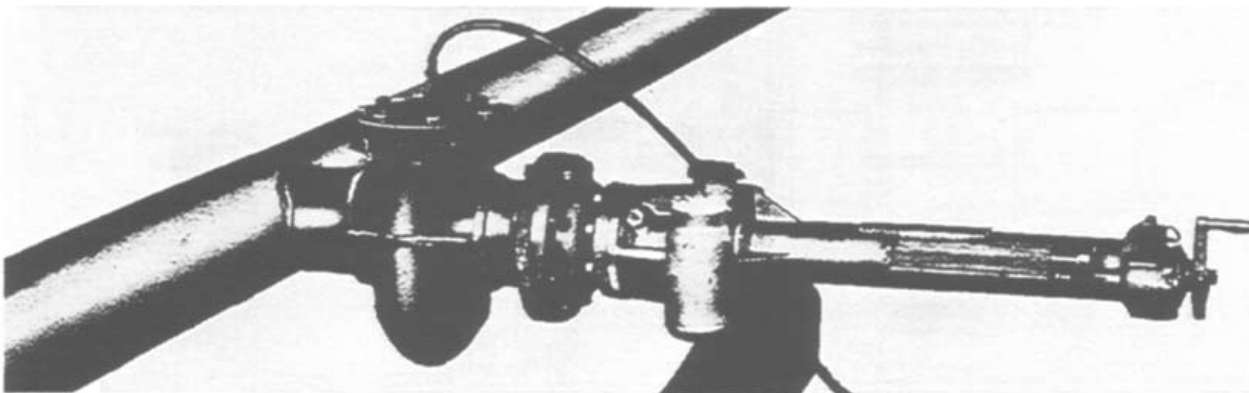


FIGURE 31

LINE STOPPER UNIT NO. 3SW-500

INSTRUCTIONS FOR INSTALLING AND STOPPING-OFF 4", 6" AND 8" EXTENSION STOPPER FITTINGS

THESE INSTRUCTIONS APPLY TO FITTINGS H-17252, H-17253 AND H-17262. FIGURES 26, 27 AND 28.

E—ATTACH GATE VALVE

1. The gate valve is a special 9" MUELLER gate valve which is furnished with the H-17342 stopping machine. It must be installed with the rubber faced disc up since the pressure aids in seating the gate and keeping it tight when closed.
2. Attach gate valve and adapter to fitting. At both of these flanged joints, check to be sure that the gaskets are in good condition and in place. The bolt nuts for both joints should be loose at this point to permit the gate valve and valve adapter to be shifted slightly if necessary.
3. Open gate valve. Check to be sure it is **fully** open (approximately 30 turns to open.)

4. Open by-pass valve on gate valve.
5. Attach plug alignment tool to completion plug.
 - a. Push fork to rearmost position and tighten thumb screw.
 - b. Screw the end of the tool into the inside threads in the top of the completion plug.
 - c. Loosen thumb screw so that the fork lugs will engage with the slots in the completion plug. (If necessary, back off the tool slightly to engage lugs in the plug.)
6. Attach plug alignment tool, with the completion plug attached to it, to shaft of completion machine.
 - a. Remove protector nut from end of shaft.
 - b. Insert lug on shaft into matching recess or slot in plug alignment tool.
 - c. Screw coupler sleeve on plug alignment tool to shaft threads.
7. Withdraw shaft to rearmost position, raise sleeve and place pin in sleeve to prevent shaft and completion plug from falling while being placed on valve.
8. Attach completion machine to gate valve. It is not necessary to use all the bolts at this point. **Figure 32.**
9. Hold back on shaft and sleeve, remove pin, lower sleeve and slowly advance the shaft until the completion plug contacts fitting threads. **IMPORTANT — DO NOT LET THE SHAFT DROP.**
10. At this point it may be necessary to slightly shift the gate valve on the fitting and possibly the completion machine on the gate valve to align the completion plug threads with the fitting threads.

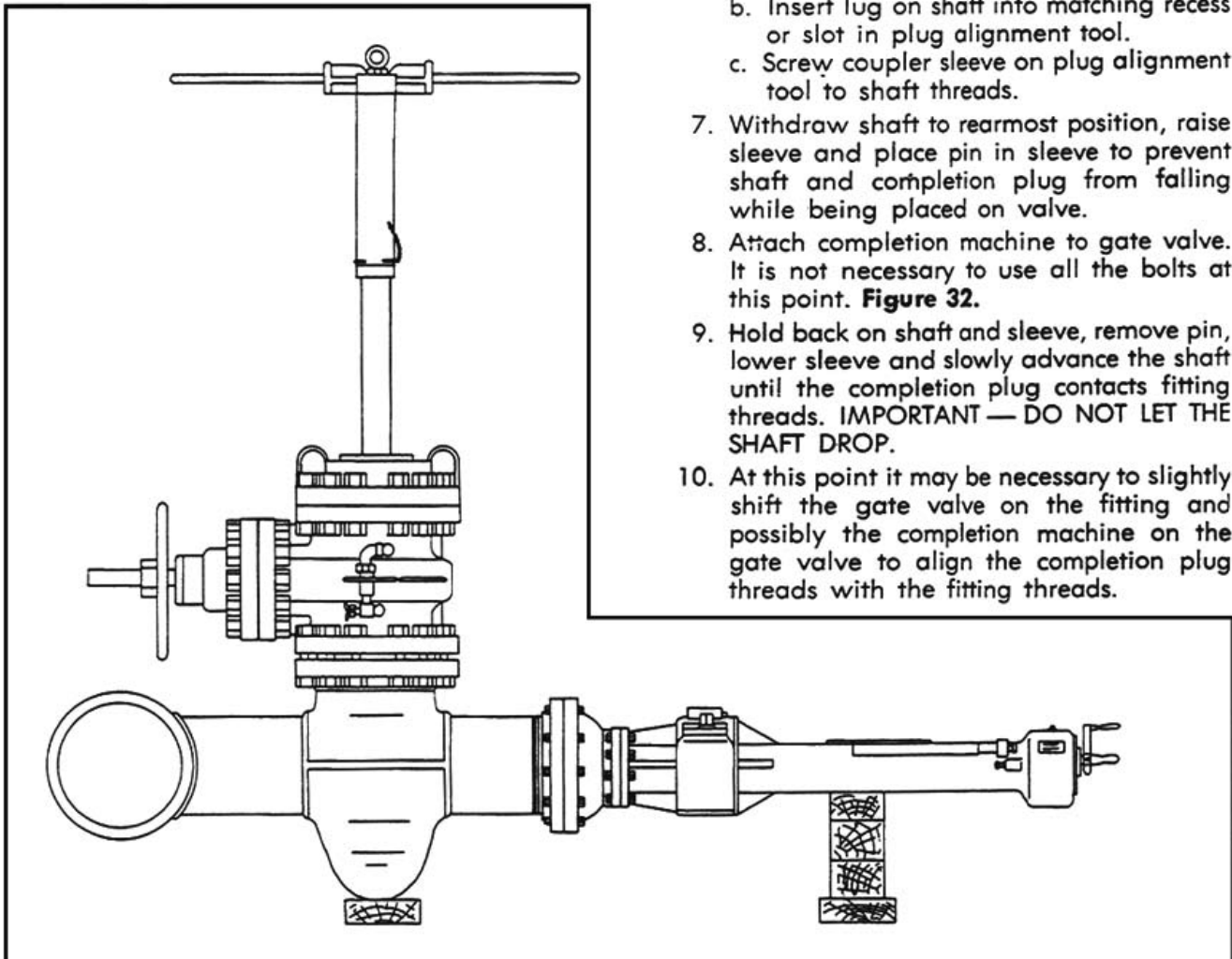


FIGURE 32

INSTRUCTIONS FOR INSTALLING AND STOPPING OFF 4", 6" AND 8" EXTENSION STOPPER FITTINGS

LINE STOPPER UNIT NO. 3SW-500

THESE INSTRUCTIONS APPLY TO FITTINGS H-17252, H-17253 AND H-17262. FIGURES 26, 27 AND 28.

11. Rotate shaft **clockwise** until completion plug threads are engaged with fitting threads at least $\frac{1}{2}$ ".
12. Securely bolt gate valve to valve adapter and valve adapter to fitting and mark the position of the completion machine flange location in relation to the gate valve flange. This is for reference so that the completion machine may be properly positioned for the final installation of the completion plug when the job is finished.
13. Rotate shaft **counter-clockwise** until completion plug is unscrewed from fitting. Withdraw shaft to rearmost position, raise sleeve and place pin in sleeve.
14. Remove completion machine from gate valve.
15. Hold back on shaft and sleeve, remove pin, lower sleeve and advance shaft until completion plug and plug alignment tool are exposed.
16. Remove completion plug and plug alignment tool from shaft and place shaft protector nut on end of shaft.
17. Remove plug alignment tool from completion plug.

F—ATTACH STOPPER TO STOPPING MACHINE

1. Attach combined crank and lifting yoke to stopping machine.
2. Rotate crank **counter-clockwise** until operating tube and guide tube are exposed.
3. Remove stopper from protector sleeve by turning square end of expander screw **counter-clockwise** until stopper is free from sleeve.
4. Check stopper to be sure it is fully contracted. Lower conical expanding wedge should be positioned against slotted nut on bottom of expander screw. Be sure expander screw threads in stopper are well lubricated with gear oil.
5. Attach stopper.
 - a. Insert square on expander screw into operating tube.
 - b. Align lug on top expanding wedge with matching recess or slot in end of guide tube.

- c. Slide stopper coupler nut into position over top expanding wedge threads and tighten securely by hand.

NOTE: Early models of the stoppers were made with a hole drilled through the square on the expander screw permitting the operating tube to be pinned to the stopper with a stopper coupler screw. This screw was used to limit turning the expander screw too far to the left (when contracting the stopper) thus preventing the bottom expanding wedge from unscrewing and dropping off into the bottom of the fitting.

Improvements in construction caused the expander screw to be made slightly longer and a lock nut is screwed on the bottom and secured in place with a cotter pin. Since there is no longer any possibility of accidentally disassembling the stopper, the hole in the square and the stopper coupler screw for new stoppers and stopping machines have been eliminated. Old style stoppers are easily identified due to the hole in the square on the expander screw and the new style by its absence.

New style stoppers can be used with both new style and old style stopping machines. However, if used with old style stopping machines, the stopper coupler screw is not used. **Old style stoppers cannot be used with new style stopping machines.**

If old style stoppers are to be used with old style stopping machines **a stopper coupler screw must be used.**

When old style machines are used with old style stoppers it is necessary to remove stopper coupler screw, insert stopper shaft in operating tube shaft, align the holes and insert the stopper coupler screw. The screw must be flush or below flush with outside of operating shaft. Stopper may then be secured by the use of the stopper coupler nut.

6. Lubricate stopper cover with Mueller stopper lubricant.
7. Retract stopper to rearmost position by rotating crank **clockwise**.
8. Position stopping machine on gate valve flange. **FOR BEST SHUT-OFF OPERATION OF STOPPER, THE BY-PASS CONNECTION IN STOPPING MACHINE BODY SHOULD ALWAYS FACE THE SECTION TO BE ISOLATED OR SHUT-OFF.** Stopper may be re-

LINE STOPPER UNIT NO. 3SW-500

INSTRUCTIONS FOR INSTALLING AND STOPPING-OFF 4", 6" AND 8" EXTENSION STOPPER FITTINGS

THESE INSTRUCTIONS APPLY TO FITTINGS H-17252, H-17253 AND H-17262. FIGURES 26, 27 AND 28.

versed at some loss in shut-off effectiveness. Bolt stopping machine solidly to gate valve with gasket between valve and stopping machine.

6. Tighten plug in body by-pass connection.

G—DRILL THE PIPE LINE

1. Engage automatic feed by pushing in on automatic feed knob. (Pull out on CH-6.)

2. Operate the drilling machine.

- a. When using the CC-36 Machine:

Place ratchet handle on machine so that it cuts when ratchet handle is pushed toward pipe. Observe note on ratchet casting and arrow on drive box boss. Always operate the machine according to instructions with one man only on ratchet handle and using automatic feed to assure correct drilling rate.

If cut becomes too difficult for one man **DO NOT FORCE MACHINE** as this may cause damage to cutter of machine. See detailed instructions for the CC-36 Machine.

- b. When using the C1-36 or CH-6 Machine and the MUELLER H-600 Air Motor:

Loosen the pivot set screw. This permits pivot pin to be removed so the air motor holder may be attached to the holder pivot on the drive box of the Drilling Machine. Position air motor holder and replace pivot pin. Tighten the pivot set screw and latch the small hook on the air motor holder to the pin on the machine drive box to prevent movement of the air motor holder.

Examine air motor on ground with air pressure on. Position throttle lever for forward operation, this will turn drive spindle **clockwise**.

Place air motor in holder, open throttle slightly. Spindle will turn until square in motor spindle aligns with square on drive spindle. Motor will then drop into place. Screw feed screw in top of motor back into countersink in top of holder. Slide hook clamp into position on air motor torque handle and tighten.

Open air motor throttle fully so that motor is operating at proper speed (50 to 60 rpm). **IMPORTANT—MAINTAIN**

PRESSURE OF 90 P.S.I. WE RECOMMEND THE USE OF A GAGE AT THE THROTTLE TO DETERMINE THE ACTUAL PRESSURE OF AIR AT THE AIR MOTOR.

If cutting becomes difficult and motor stalls, see detailed instructions for the C1-36 or CH-6 Machine.

3. Continue the cutting operation until the hole is drilled and the arrow reaches the point marked on the feed indicator shield or until the cutter stops cutting. If power is being used, shut off motor.

4. Check completion of cut by releasing automatic feed and attempting to advance cutter by rotating feed crank **counter-clockwise (clockwise on CH-6)**. If it does not advance easily, the cut has not been completed and automatic feed knob must be pushed in for further cutting. (Pulled out on CH-6.)

CAUTION: STOP ADVANCING THE BORING BAR WHEN THE LIMIT LINE ON THE BORING BAR BECOMES VISIBLE THROUGH THE DRIVE BOX DRAIN HOLE. See Figure 11.

5. When cut is completed, release automatic feed and retract cutter to its rearmost position by rotating feed crank **clockwise (counter-clockwise on CH-6)**.

H—INSERT STOPPER INTO FITTING

1. Open by-pass valve on gate valve, if not already opened. Open gate valve fully.

2. Advance stopper by rotating crank (or double handled ratchet) **counter-clockwise** until lower squared section on operating tube screw is exposed. **See Figure 18.**

ADVANCE CAREFULLY UNTIL STOPPER CONTACTS BOTTOM OF FITTING. DO NOT FORCE STOPPER AGAINST BOTTOM OF FITTING SINCE THIS IS MERELY A POSITIONING OPERATION.

IMPORTANT—ROTATE CRANK (OR DOUBLE HANDLED RATCHET) **CLOCKWISE FOR THREE (3) FULL TURNS TO PROVIDE ADEQUATE CLEARANCE FOR FREE EXPANSION OF STOPPER.**

I—EXPAND STOPPER IN FITTING

1. Loosen wing nut and shift clamp bar from contact with guide post to contact with

INSTRUCTIONS FOR INSTALLING AND STOPPING OFF 4", 6" AND 8" EXTENSION STOPPER FITTINGS

LINE STOPPER UNIT NO. 3SW-500

THESE INSTRUCTIONS APPLY TO FITTINGS H-17252, H-17253 AND H-17262. FIGURES 26, 27 AND 28.

lower squared section of operating tube screw. See **Figure 18**. This places expanding mechanism in operation. Tighten wing nut.

2. If crank has been used to insert stopper, replace it with double handled ratchet.
3. Set ratchet dog for **clockwise** rotation and rotate ratchet to expand stopper. **Figure 33**. (Approximately 6 or 7 revolutions will effect a shut-off, depending upon the line pressure being shut-off and condition of stopper seating surface in fitting.)

J—REMOVE DRILLING EQUIPMENT

1. With the fitting stopped off, remove bolts between the flange and the drilling machine adapter. Remove the drilling machine and drilling machine adapter from the flange as a unit.

K—ATTACH LATERAL PIPING—Figure 34

1. Remove companion flange.

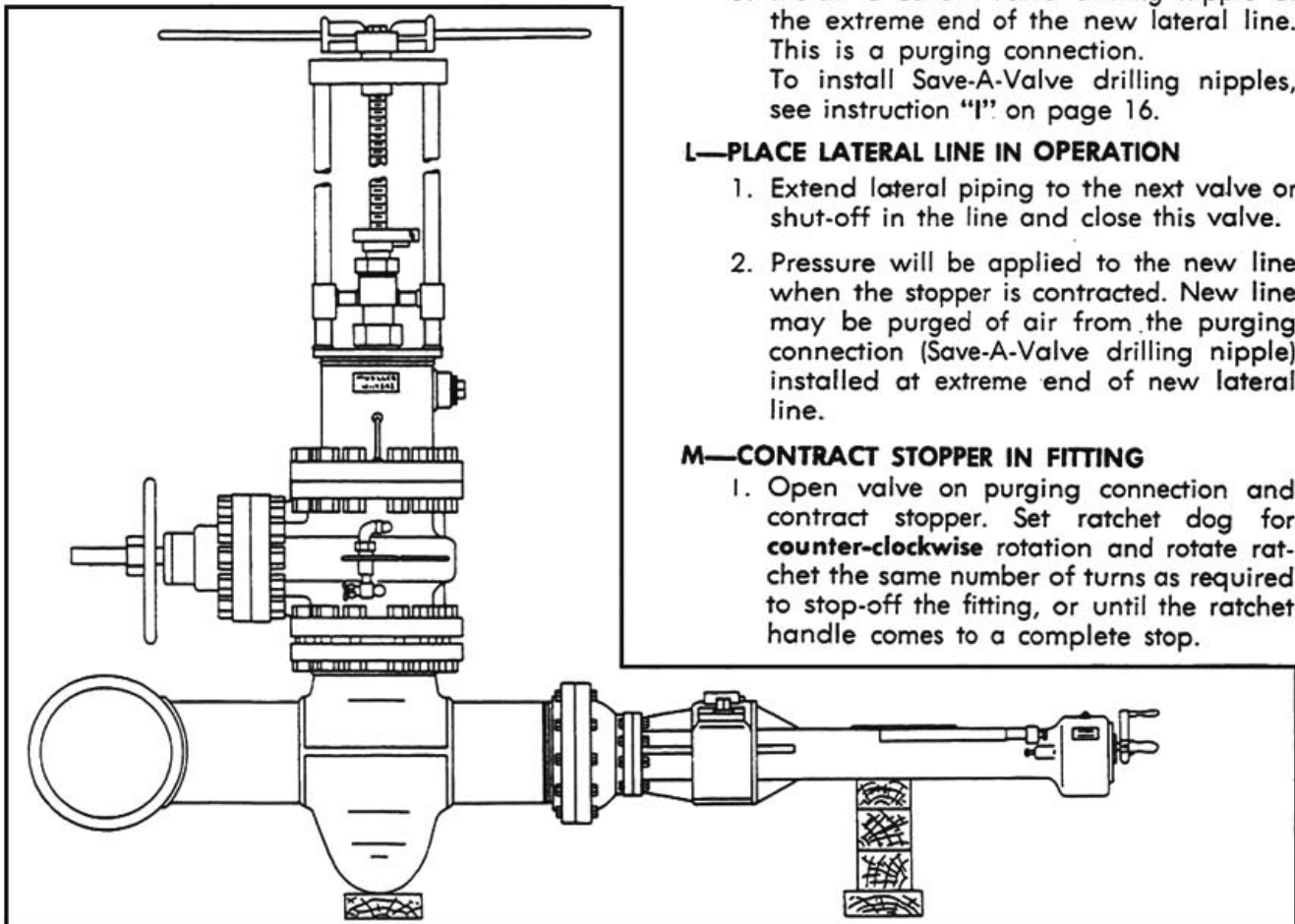


FIGURE 33

2. If using threaded connections, attach pipe fitting to outlet threads.
3. If using welding connections, cut off the threaded end of the fitting and weld pipe to outlet end of the fitting.

NOTE: When cutting or welding near line stopper fittings containing stoppers, maintain the following minimum distance to prevent damage to stopper.

4" fitting — minimum distance 12"

6" fitting — minimum distance 14"

8" fitting — minimum distance 16"

Where this distance cannot be maintained, use wet rags or burlap around the fitting to keep temperature down.

4. If using mechanical joint connections, attach lateral piping to mechanical joint on outlet end of fitting.
5. Install a Save-A-Valve drilling nipple at the extreme end of the new lateral line. This is a purging connection. To install Save-A-Valve drilling nipples, see instruction "I" on page 16.

L—PLACE LATERAL LINE IN OPERATION

1. Extend lateral piping to the next valve or shut-off in the line and close this valve.
2. Pressure will be applied to the new line when the stopper is contracted. New line may be purged of air from the purging connection (Save-A-Valve drilling nipple) installed at extreme end of new lateral line.

M—CONTRACT STOPPER IN FITTING

1. Open valve on purging connection and contract stopper. Set ratchet dog for **counter-clockwise** rotation and rotate ratchet the same number of turns as required to stop-off the fitting, or until the ratchet handle comes to a complete stop.

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INSTRUCTIONS FOR INSTALLING AND STOPPING-OFF 4", 6" AND 8" EXTENSION STOPPER FITTINGS

THESE INSTRUCTIONS APPLY TO FITTINGS H-17252, H-17253 AND H-17262. FIGURES 26, 27 AND 28.

After stopper reaches the limit of **counter-clockwise** rotation, reverse ratchet dog and rotate handle approximately one turn **clockwise**. This releases tension on lower wedge retaining nut (or the stopper coupler screw, if previous design of machine is being used) and permits easy removal later.

2. When all air is purged from new lateral line, close the valve on the purging connection.
3. Test all joints when pressure has build up in the new lateral line.
4. Install completion plug and cap for Save-A-Valve drilling nipple. See instruction "O" for Line Stopper Fittings page 18.

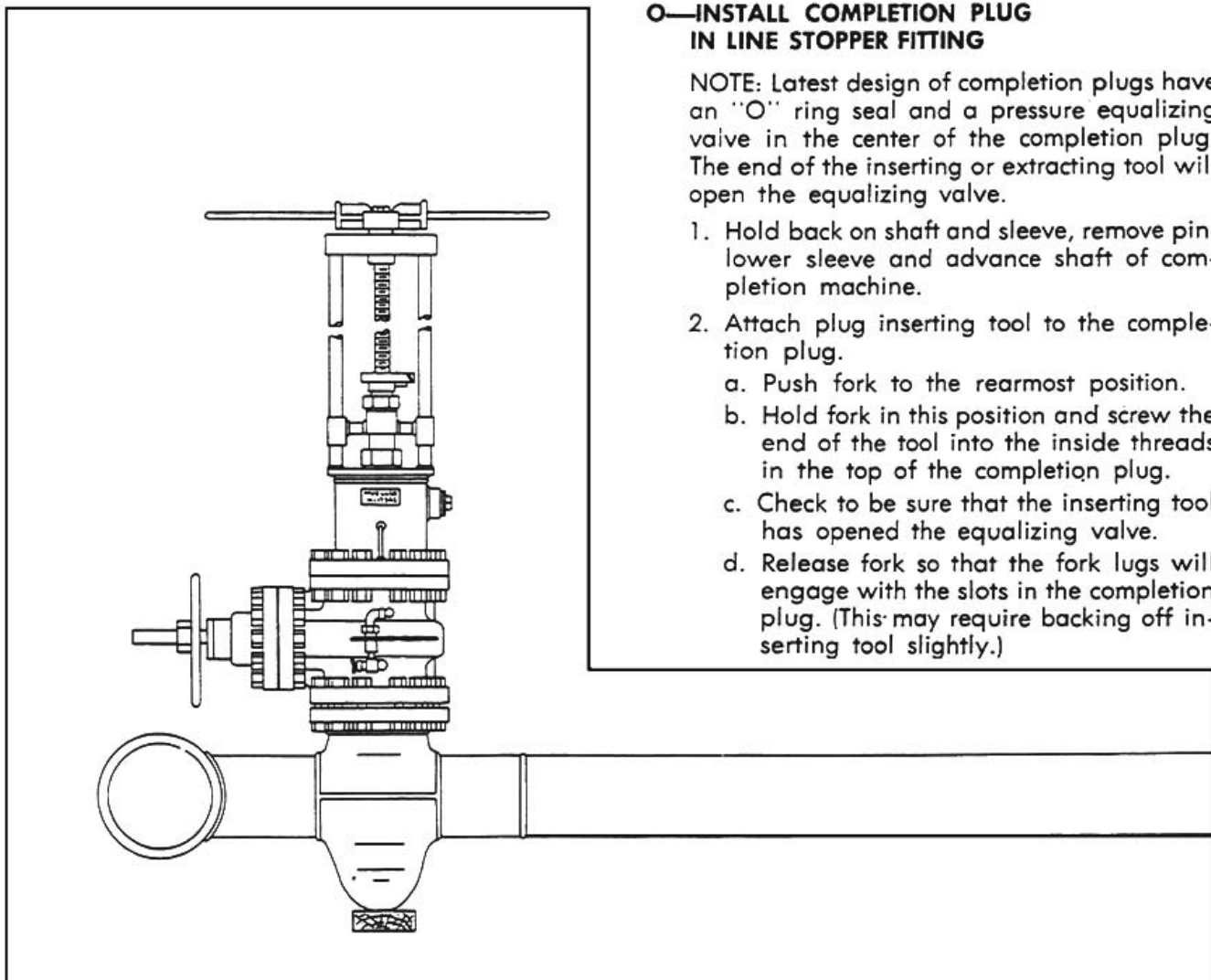


FIGURE 34

N—EXTRACT STOPPER FROM FITTING

1. Loosen wing nut and shift clamp bar from contact with squared section of operating tube screw to contact with guide post. See **Figure 20**. Tighten wing nut.
2. Rotate ratchet handle (or replace with crank) **clockwise** to retract stopper to rearmost position.
3. Close stopping machine gate valve and by-pass valve.
4. Open blow-off valve on gate valve. Flow from blow-off valve will exhaust gas from the stopping machine.
5. Remove stopping machine.

O—INSTALL COMPLETION PLUG IN LINE STOPPER FITTING

NOTE: Latest design of completion plugs have an "O" ring seal and a pressure equalizing valve in the center of the completion plug. The end of the inserting or extracting tool will open the equalizing valve.

1. Hold back on shaft and sleeve, remove pin, lower sleeve and advance shaft of completion machine.
2. Attach plug inserting tool to the completion plug.
 - a. Push fork to the rearmost position.
 - b. Hold fork in this position and screw the end of the tool into the inside threads in the top of the completion plug.
 - c. Check to be sure that the inserting tool has opened the equalizing valve.
 - d. Release fork so that the fork lugs will engage with the slots in the completion plug. (This may require backing off inserting tool slightly.)

INSTRUCTIONS FOR INSTALLING AND STOPPING OFF 4", 6" AND 8" EXTENSION STOPPER FITTINGS

LINE STOPPER UNIT NO. 3SW-500

THESE INSTRUCTIONS APPLY TO FITTINGS H-17252, H-17253 AND H-17262. FIGURES 26, 27 AND 28.

3. Attach plug inserting tool, with the completion plug assembled to it, to the shaft of completion machine.
 - a. Remove protector nut from end of shaft.
 - b. Insert lug on shaft into matching recess or slot in plug inserting tool.
 - c. Screw coupler sleeve on plug inserting tool to shaft threads.
4. Coat the threads and "O" ring on the completion plug with a heavy grease.
5. Withdraw shaft to rearmost position, raise sleeve and place pin in sleeve so that the completion plug will not fall while the machine is being placed on the gate valve.
6. Place completion machine on gate valve in same position as marked in paragraph "E-12" on page 29. With gasket in place bolt the completion machine to the gate valve.
7. Open by-pass valve on gate valve. Close blow-off valve.
8. Open gate valve.
9. Hold back on shaft and sleeve, remove pin, lower sleeve, advance shaft and screw completion plug into fitting securely by rotating shaft **clockwise**.
10. Remove plug inserting tool from the completion plug by turning the shaft **counter-clockwise**.
11. Open blow-off valve on gate valve, to determine tightness of plug.
12. Unbolt and remove gate valve and completion machine from fitting as a unit.
13. Completion plugs furnished with an "O" ring will be tightened to their seat by the machine with no further tightening needed.
14. Place gasket in fitting recess and put completion cap in place.
15. Bolt cap solidly to fitting flange. **Figure 35.**
16. Test fitting again with soapsuds.
17. Refill trench.

P—TO RE-USE EXTENSION STOPPER FITTING

1. Follow instruction "Q" on page 19.

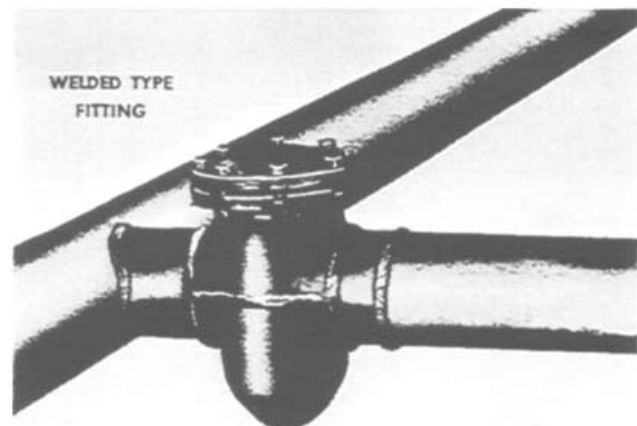


FIGURE 35

LINE STOPPER UNIT NO. 3SW-500

INSTRUCTIONS FOR INSTALLING 4", 6" AND 8" SAVE-A-VALVE DRILLING NIPPLES

FIGURE 36

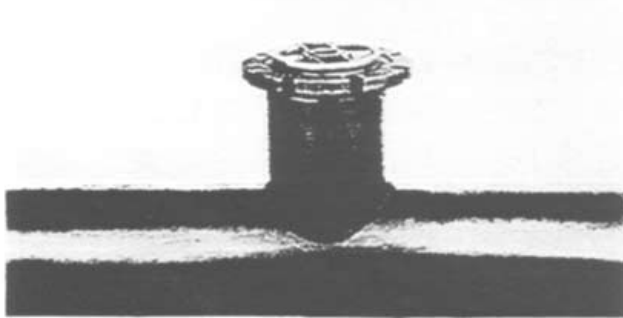


FIGURE 37

500 p.s.i. Maximum Working Pressure at 100° F.
250° F. Max. Temperature Rating at 375 p.s.i.

The line pressure and temperature must not exceed these amounts during the use of the completion machine. The line pressure may be increased to the maximum working pressure of the nipple after it is fully installed with completion plug and cap in place.

CAUTION: The maximum working pressure for the H-17495 Nipple is 230 p.s.i. When using this nipple, the line pressure must not exceed this amount.

NOTE: Latest design of Save-A-Valve Drilling Nipples requires the use of the same shell cutters, Cutter Hubs and Pilot Drills that are regularly used with extension stopper fittings and flanged tees.

Save-A-Valve Drilling Nipples 4" in size and larger as now furnished have a completion plug with an "O"-ring seal at the top of the thread and a pressure equalizing valve located in the center of the plug.

NOTE: A special valve adapter and set of tools (see chart below) are required for 4" size Save-A-Valve drilling nipples. None of these tools are furnished with the completion machine as is the case with 6" and 8" size nipples. All other procedures are the same.

	4" H-17495	6" H-17495	8" H-17495	4" H-17496 H-17497	6" H-17496 H-17497	8" H-17496	4" H-17498	6" H-17498
Drilling Machine	CC-36 or C1-36	CC-36 or C1-36	CC-36 or C1-36	CC-36 or C1-36	CC-36 or C1-36	CC-36 or C1-36	CC-36 or C1-36	CC-36 or C1-36
Gate Valve — 3SW-500	83721	83721	83721	83721	83721	83721	83721	83721
Valve Adapter	501361	63205	63193	500021	63261	—	501982	63244
Drilling Machine Adapter	83730	83730	83730	83730	83730	89341	83730	83730
Shell Cutter	3 1/2" 33519	5 1/2" 36004	7 1/2" 33999	3 1/2" 33519	5 1/2" 36004	7 1/2" 33999	3 1/2" 33519	5 1/2" 36004
Pilot Drill	33976	36005	64244	33976	36005	64244	33976	36005
Cutter Hub	88340	63978	33996	88340	63978	33996	88340	63978
Plug Inserting Tool	83772	83237	83237	83772	83237	83237	83772	83237
Plug Extracting Tool	83773	83238	83238	83773	83238	83238	83773	83238
Plug Alignment Tool	83774	83250	83250	83774	83250	83250	83774	83250
Completion Plug Wrench	36404	36424	36424	36404	36424	36424	36404	36424

INSTRUCTIONS FOR INSTALLING 4", 6" AND 8" SAVE-A-VALVE DRILLING NIPPLES

LINE STOPPER UNIT NO. 3SW-500

A—SELECT THE EQUIPMENT REQUIRED

1. From the chart (page 34), select the equipment required according to the size and catalog number of the nipple to be used.
2. The work may be scheduled so that much of the equipment will be available for other jobs such as the installation of line stopper fittings. The gate valve (part no. 83721) from the H-17342 stopping machine and the valve adapter (if required) will not be available for other work during the time that nipple is in use.

B—WELD THE NIPPLE—Figure 36—TO THE PIPE

1. Clean surface where nipple is to be welded.
2. Remove completion cap.
3. Loosen completion plug slightly but do not remove. Use completion plug wrench. Latest design of completion plug has an "O"-ring seal. Loosen this type of plug so that the "O"-ring is exposed and not in contact with the flange of the nipple.
4. Locate the nipple in the desired position and weld to the pipe. **Figure 37.** NOTE: It may be necessary to shape the inlet end of the nipple to fit the pipe when used on larger size pipe. The nipple may be installed in any position, providing that the center line of the nipple is at a right angle to the axial center line of the pipe. A split reinforcing saddle may be used if desired.

C—TEST THE WELD—Figure 38

1. Remove completion plug.
2. Bolt completion cap to nipple being sure gasket is in good condition and in place. Remove test plug and attach air hose. (The completion cap of previously designed nipples does not have a test plug. Use separate test cap which is tapped.)
3. Apply air pressure and test for leaks with soapsuds (add glycerin in freezing weather) or bubble type leak detection fluid.
4. Remove completion cap or test cap.
5. Replace test plug in completion cap.

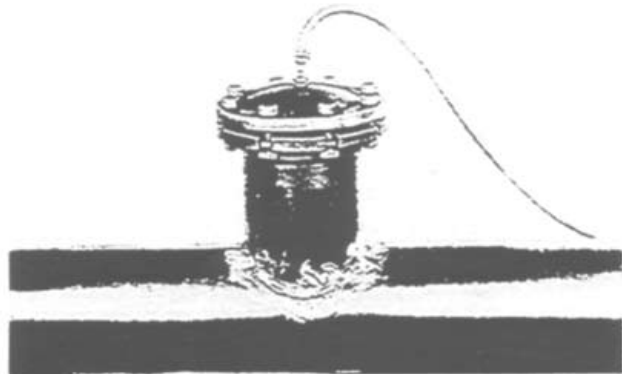


FIGURE 38

D—ATTACH GATE VALVE

1. The gate valve (part no. 83721) is a special 9" MUELLER gate valve which is furnished with the H-17342 stopping machine. It must be installed with the rubber faced disc up since the pressure aids in seating the gate and keeping it tight when closed.
2. Attach gate valve or gate valve and adapter to nipple.
 - a. When using an 8" H-17496 nipple, bolt the gate valve to the nipple. (8" nipples having Class 300 or 400 flanges do not require a valve adapter between the nipple and the valve.) See **Figure 5.** Check to be sure that the gasket is in good condition and in place. The bolt nuts should be loose at this point to permit the gate valve to be shifted slightly if necessary.
 - b. When using 4", 6" and 8" H-17495, 4" and 6" H-17496, 4" and 6" H-17497 or 4" and 6" H-17498 nipple, bolt the proper valve adapter to the nipple and then bolt the gate valve to the adapter. All 4" and 6" nipples require a valve adapter and 8" nipples with Class 150 or 600 flanges. See **Figure 6.** At both of these flanged joints check to be sure that the gasket is in good condition and in place. The bolt nuts for both joints should be loose at this point to permit the gate valve and valve adapter to be shifted slightly if necessary.
3. Open gate valve. Check to be sure it is **fully** open (approximately 30 turns to open).

LINE STOPPER UNIT NO. 3SW-500

INSTRUCTIONS FOR INSTALLING 4", 6" AND 8" SAVE-A-VALVE DRILLING NIPPLES

4. Open by-pass valve on gate valve.
5. Attach plug alignment tool to completion plug.
 - a. Push fork to rearmost position and tighten thumb screw.
 - b. Screw the end of the tool into the inside threads in the top of the completion plug.
 - c. Loosen thumb screws so that the fork lugs will engage with slots in the completion plug. (If necessary, back off the tool slightly to engage lugs in the plug.)
6. Attach plug alignment tool, with the completion plug assembled to it, to shaft of completion machine.
 - a. Remove protector nut from end of shaft.
 - b. Insert lug on shaft into matching recess or slot in plug alignment tool.
 - c. Screw coupler sleeve on plug alignment tool to shaft threads.
7. Withdraw shaft to rearmost position, raise sleeve and place pin in sleeve to prevent shaft and completion plug from falling while being placed on valve.
8. Attach completion machine on gate valve with a few bolts.
9. Hold back on shaft and sleeve, remove pin, lower sleeve and slowly advance shaft until completion plug contacts nipple threads. **IMPORTANT — DO NOT LET THE SHAFT DROP.**
10. At this point it may be necessary to slightly shift the gate valve on the nipple and possibly the completion machine on the gate valve to align the completion plug threads with the nipple threads.
11. Rotate shaft **clockwise** until completion plug threads are engaged with threads in nipple at least $\frac{1}{2}$ ".
12. Securely bolt gate valve to valve adapter and valve adapter to nipple and mark the position of the completion machine flange location in relation to the gate valve flange. This is for reference so that the completion machine may be properly positioned for the final installation of the completion plug when job is finished.
13. Rotate shaft **counter-clockwise** until completion plug is unscrewed from nipple. Withdraw shaft to rearmost position, raise sleeve and place pin in sleeve.
14. Remove completion machine from gate valve.
15. Hold back on shaft and sleeve, remove pin, lower sleeve and advance shaft until completion plug and plug alignment tool are exposed.
16. Remove completion plug and plug alignment tool from shaft and place protector nut on end of shaft.
17. Remove plug alignment tool from completion plug.

E—ATTACH AND OPERATE DRILLING MACHINE

For detailed instructions see OPERATING INSTRUCTIONS for CC-36 or C1-36 DRILLING MACHINES.)

1. Sharpen shell cutter and pilot drill before each cut by honing the front edge of the cutter teeth. If the shell cutter is very dull, it should be returned to Mueller Co., Decatur, Illinois for reconditioning. Check pilot drill detents to be sure they are operating correctly.
2. Bolt drilling machine adapter to front of the drilling machine, check to be sure that gasket is in good condition and in place.
3. Release automatic feed by pulling out automatic feed knob. (Directions are indicated on panel on rear of torque tube.)
4. Advance boring bar by rotating feed crank **counter-clockwise** until bolt hole in boring bar is exposed beyond face of adapter. (Directions are indicated on panel on rear cover of torque tube.) Remove hub retaining bolt.
5. Assemble drilling equipment.
 - a. When using CC-36 or C1-36 drilling machines, assemble the shell cutter and cutter hub. Insert the shank of pilot drill into the socket in the boring bar. Slide cutter hub and shell cutter over the end of boring bar. Align holes in the cutter hub, boring bar and pilot drill and attach to boring bar with hub retaining bolt.
 - b. Coat shell cutter and pilot drill thoroughly with Mueller cutting grease.

INSTRUCTIONS FOR INSTALLING 4", 6" AND 8" SAVE-A-VALVE DRILLING NIPPLES

LINE STOPPER UNIT NO. 3SW-500

6. Retract boring bar to rearmost position by rotating feed crank **clockwise**.
7. Place the machine (with adapter and drilling equipment assembled) in drilling position on gate valve and bolt adapter solidly to valve flange. Check to be sure that the gasket is in good condition and in place.
8. Be sure that the nipple is cool before cut is started.
9. Rotate feed crank **counter-clockwise** to advance boring bar until pilot drill contacts the pipe.
Turn feed crank **clockwise** $\frac{1}{4}$ turn which retracts the boring bar slightly to release tension between pilot drill and the pipe. (1 revolution of the feed crank moves the boring bar $\frac{1}{6}$ of an inch—6 revolutions equals 1 inch.)
10. Set feed indicator to zero. Mark the point on feed indicator shield that the arrow will reach to complete the cut. For travel chart, see OPERATING INSTRUCTIONS for CC-36, or C1-36 DRILLING MACHINES.
11. Engage automatic feed by pushing in on automatic feed knob.
12. Operate the drilling machine.
 - a. When using the CC-36 Machine:
Place ratchet handle on machine so that it is pushed toward the pipe when the cut is made. Observe note on ratchet casting and arrow on drive box boss. Always operate the machine according to instructions with one man only on ratchet handle and using automatic feed to assure correct drilling rate.
If cut becomes too difficult for one man **DO NOT FORCE MACHINE** as this may cause damage to cutter or machine. See detailed instructions for the CC-36 Machine.
 - b. When using the C1-36 Machine and the MUELLER H-600 Air Motor:
Loosen the pivot set screw. This permits pivot pin to be removed so the air motor holder may be attached to the holder pivot on the drive box of the Drilling Machine.
Position air motor holder and replace pivot pin, tighten the pivot set screw

and latch the small hook on the air motor holder to the pin on the machine drive box to prevent movement of the air motor holder.

Examine air motor on ground with air pressure on. Position throttle lever for forward operation. This will turn drive spindle **clockwise**.

Place air motor in holder, open throttle slightly. Spindle will turn until square in motor spindle aligns with square on drive spindle. Motor will then drop into place. Screw feed screw in top of motor back into countersink in top of holder. Slide hook clamp into position on air motor torque handle and tighten.

Open air motor throttle **fully** so that motor is operating at proper speed (50 to 60 rpm). **IMPORTANT — MAINTAIN PRESSURE OF 90 P.S.I. WE RECOMMEND THE USE OF A GAGE AT THE THROTTLE TO DETERMINE ACTUAL PRESSURE OF AIR AT THE AIR MOTOR.** If cutting becomes difficult and motor stalls, see detailed instructions for the C1-36 Machine.

13. Continue the cutting operation until the hole is drilled and the arrow reaches the point marked on the feed indicator shield or until the cutter stops cutting. If power unit is being used, shut off motor.
14. Check completion of cut by releasing automatic feed and attempting to advance cutter by rotating feed crank **counter-clockwise**. If it does not advance easily, the cut is not completed and automatic feed knob must be pushed in for further cutting.
CAUTION: STOP ADVANCING THE BORING BAR WHEN THE LIMIT LINE ON THE BORING BAR BECOMES VISIBLE THROUGH THE DRIVE BOX DRAIN HOLE. See Figure 11.
15. When cut is completed, release automatic feed and retract cutter to its rearmost position by rotating feed crank **clockwise**.

LINE STOPPER UNIT NO. 3SW-500

INSTRUCTIONS FOR INSTALLING 4", 6" AND 8" SAVE-A-VALVE DRILLING NIPPLES

F—REMOVE DRILLING MACHINE

1. Close gate valve (approximately 30 turns required to completely close the valve) and by-pass valve.
2. Do not force gate valve closed as that may destroy the rubber seat of the valve.
3. Open blow-off valve on gate valve. This exhausts the pressure above the gate and also indicates whether or not the gate is shut tight.
4. Remove bolts from the joint between the gate valve flange and the drilling machine adapter flange. Remove the drilling machine and drilling machine adapter from the gate valve as a unit.

G—ATTACH PIPE TO SAVE-A-VALVE DRILLING NIPPLE

1. Bolt pipe or fitting to the outlet end of the gate valve. Check to be sure gasket is in good condition and in place. The outlet flange of the gate valve is an 8" Class 300 flange.
2. When the piping from the nipple has been completed, open by-pass valve on gate valve.
3. Test all joints for tightness.
4. Allow the pressure to build up in the pipe line and then open the gate valve **fully**.

H—INSTALL COMPLETION PLUG IN SAVE-A-VALVE DRILLING NIPPLE

Latest design of completion plugs have an "O"-ring seal and a pressure equalizing valve in the center of the completion plug. The end of the inserting or extracting tool will open the equalizing valve.

1. When the flow from the Save-A-Valve drilling nipple is no longer required, close the gate valve and the by-pass valve.
2. Open blow-off valve on gate valve. Flow from blow-off valve will blow down the line.

3. Remove pipe or fitting from the gate valve.
4. Attach plug inserting tool to the completion plug.
 - a. Push fork to rearmost position.
 - b. Hold fork in this position and screw the end of the tool into the inside threads in the top of the completion plug.
 - c. Check to be sure that the inserting tool has opened the equalizing valve.
 - d. Release fork so that the fork lugs will engage with the slots in the completion plug. (This may require backing off inserting tool slightly.)
5. Attach plug inserting tool, with the completion plug assembled to it, to the shaft of completion machine.
 - a. Remove protector nut from end of shaft.
 - b. Insert lug on shaft into matching recess or slot in plug inserting tool.
 - c. Screw coupler sleeve on plug inserting tool to shaft threads.
6. Coat the threads and "O"-ring on the completion plug with a heavy grease.
7. Withdraw shaft to rearmost position, raise sleeve and place pin in sleeve so that shaft and completion plug will not fall while the machine is being placed on the gate valve.
8. Place completion machine on gate valve in same position as marked in paragraph "D-12" on page 36. With gasket in place, bolt the completion machine to the gate valve.
9. Open by-pass valve on gate valve.
10. Open gate valve **fully**.
11. Hold back on shaft and sleeve, remove pin, lower sleeve, advance shaft and screw completion plug into nipple securely by rotating shaft **clockwise**.
12. Rotate shaft **counter-clockwise** until inserting tool is free from completion plug.
13. Open blow-off valve on gate valve to determine tightness of plug.

INSTRUCTIONS FOR INSTALLING 4", 6" AND 8" SAVE-A-VALVE DRILLING NIPPLES

LINE STOPPER UNIT NO. 3SW-500

14. Unbolt and remove gate valve and completion machine from nipple as a unit.
15. Completion plugs furnished with an "O"-ring will be tightened to their seat by the machine with no further tightening needed.
16. Place gasket in nipple recess and put completion cap in place.
17. Bolt cap solidly to nipple flange. **Figure 39.**
18. Test nipple again with soapsuds.
19. Refill trench.

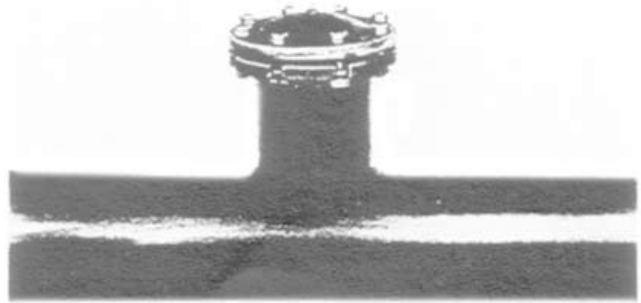


FIGURE 39

—TO RE-USE SAVE-A-VALVE DRILLING NIPPLE

1. Remove completion plug by following instruction "Q" on page 19.
2. Then follow instruction "G" on page 38.

LINE STOPPER UNIT NO. 3SW-500

INSTRUCTIONS FOR INSTALLING 4", 6" AND 8" FLANGED TEES

500 p.s.i. Maximum Working Pressure at 100° F.
250° F. Max. Temperature Rating at 375 p.s.i.



FIGURE 40



FIGURE 41

The line pressure must not exceed these amounts during the use of the completion machine. The line pressure may be increased to the maximum working pressure of the tee after it is fully installed with completion plug and cap in place.

CAUTION: The maximum working pressure for the H-17505 Tee is 230 psi. When using this tee, the line pressure must not exceed this amount.

Flanged Tees 3" in size and larger as now furnished have a completion plug with an "O"-ring seal at the top of the thread and a pressure equalizing valve located in the center of the plug.

Tools furnished with H-17347 Completion Machine are designed for use with tees having an equalizing valve in the completion plug. They are entirely satisfactory for use with tees without an equalizing valve.

NOTE: A special valve adapter and set of tools (see chart below) are required for 4" size flanged tees. None of these tools are furnished with the completion machine as is the case with 6" and 8" size tees. All other procedures are the same.

	4" H-17505	6" H-17505	4" H-17506 H-17507	6" H-17506 H-17507	8" H-17506 H-17507	4" H-17508	6" H-17508
Drilling Machine	CC-36 or C1-36	CC-36 or C1-36	CC-36 or C1-36	CC-36 or C1-36	CC-36 or C1-36	CC-36 or C1-36	CC-36 or C1-36
Gate Valve — 3SW-500	83721	83721	83721	83721	83721	83721	83721
Valve Adapter	501361	63205	500021	63261	—	501982	63244
Drilling Machine Adapter	89341	89341	89341	89341	89341	89341	89341
Shell Cutter	3 1/2" 33519	5 1/2" 36004	3 1/2" 33519	5 1/2" 36004	7 1/2" 33999	3 1/2" 33519	5 1/2" 36004
Pilot Drill	33976	36005	33976	36005	64244	33976	36005
Cutter Hub	88340	63978	88340	63978	33996	88340	63978
Plug Inserting Tool	83772	83237	83772	83237	83237	83772	83237
Plug Extracting Tool	83773	83238	83773	83238	83238	83773	83238
Plug Alignment Tool	83774	83250	83774	83250	83250	83774	83250
Completion Plug Wrench	36404	36424	36404	36424	36424	36404	36424

LINE STOPPER UNIT NO. 3SW-500

INSTRUCTIONS FOR INSTALLING 4", 6" AND 8" FLANGED TEES

A—SELECT THE EQUIPMENT REQUIRED

1. From the chart, page 40, select the equipment required according to the size and catalog number of the tee to be used.

B—WELD THE TEE—Figure 40—TO THE PIPE

1. Clean surface where tee is to be welded.
2. Remove completion cap.
3. Loosen completion plug slightly but do not remove. Use completion plug wrench. Latest design of completion plug has an "O"-ring seal. Loosen this type of plug so that the "O"-ring is exposed and not in contact with the flange of the tee.
4. Locate the tee in the desired position and weld to the pipe. **Figure 41**. Note: It may be necessary to shape the inlet end of the tee to fit the pipe when used on larger size pipe. The tee may be installed in any position, providing that the center line of the tee is at a right angle to the axial center line of the pipe. A vertical position is recommended if conditions will permit. A modified split reinforcing saddle may be used if desired.

C—ATTACH LATERAL PIPING—Figure 42

1. Weld lateral piping to outlet of tee.
2. Extend the lateral piping to the next valve or shut-off point and close this valve.

D—TEST THE WELD—Figure 43

1. Remove completion plug.
2. Bolt completion cap to tee being sure gasket is in good condition and in place. Remove test plug and attach air hose. (The completion cap of previously designed Tees does not have a test plug. Use separate test cap which is tapped.)
3. Apply air pressure and test for leaks with soapsuds (add glycerin in freezing weather) or bubble type leak detection fluid.
4. Remove completion cap or test cap.
5. Replace test plug in completion cap.

E—ATTACH GATE VALVE

1. The gate valve (part no. 83721) is a special 9" MUELLER gate valve which is furnished with the H-17342 stopping machine. It must be installed with the rubber faced disc up since the pressure aids in seating the gate and keeping it tight when closed.
2. Attach gate valve or gate valve and adapter to tee.

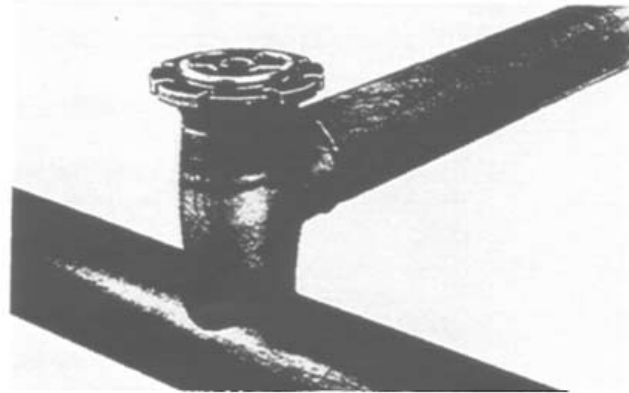


FIGURE 42

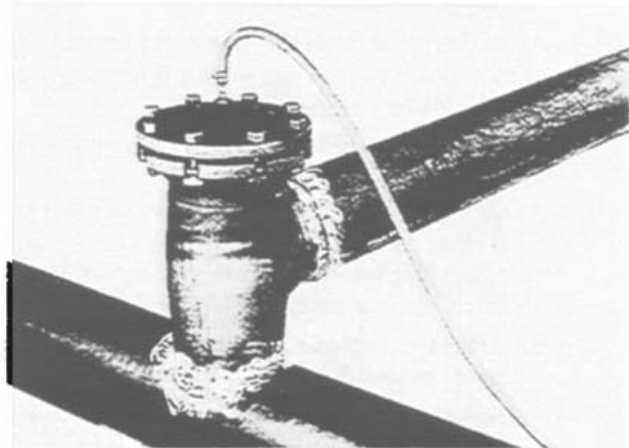


FIGURE 43

- a. When using an 8" H-17506 or 8" H-17507 tee, bolt the gate valve to the tee. (8" tees with Class 300 or 400 flanges do not require a valve adapter between the tee and the valve.) See **Figure 5**. Check to be sure that the gasket is in good condition and in place. The bolt nuts should be loose at this point to permit the gate valve to be shifted slightly if necessary.

- b. With all 4" and 6" Tees, bolt the proper valve adapter to the tee and then bolt the gate valve to the adapter. See **Figure 6**. At both of these flanged joints check to be sure that the gaskets are in good condition and in place. The bolt nuts for both joints should be loose at this point to permit the gate valve and valve adapter to be shifted slightly if necessary.

3. Open gate valve. Check to be sure it is **fully open**. (Approximately 30 turns to open.)

LINE STOPPER UNIT NO. 3SW-500

INSTRUCTIONS FOR INSTALLING 4", 6" AND 8" FLANGED TEES

4. Open by-pass valve on gate valve.
5. Attach plug alignment tool to completion plug.
 - a. Push fork to rearmost position and tighten thumb screw.
 - b. Screw the end of the tool into the inside threads in the top of the completion plug.
 - c. Loosen thumb screw so that the fork lugs will engage with slots in the completion plug. (If necessary, back off the tool slightly to engage lugs in the plug.)
6. Attach plug alignment tool, with the completion plug assembled to it, to shaft of completion machine.
 - a. Remove protector nut from end of shaft.
 - b. Insert lug on shaft into matching recess or slot in plug alignment tool.
 - c. Screw coupler sleeve on plug alignment tool to shaft threads.
7. Withdraw shaft to rearmost position, raise sleeve and place pin in sleeve to prevent plug alignment tool and completion plug from falling while being placed on valve.
8. Attach completion machine on gate valve with a few bolts.
9. Hold back on shaft and sleeve, remove pin, lower sleeve and slowly advance shaft until the completion plug contacts tee threads. **IMPORTANT—DO NOT LET THE SHAFT DROP.**
10. At this point it may be necessary to slightly shift the gate valve on the tee and possibly the completion machine on the gate valve to align the completion plug threads with the tee threads.
11. Rotate shaft **clockwise** until completion plug threads are engaged with tee threads at least $\frac{1}{2}$ ".
12. Securely bolt gate valve to tee (or gate valve to valve adapter and valve adapter to tee) and mark the position of the completion machine flange location in relation to the gate valve flange. This is for reference so that the completion machine may be properly positioned for the final installation of the completion plug when job is finished.
13. Rotate shaft **counter-clockwise** until completion plug is unscrewed from tee. Withdraw shaft to rearmost position, raise sleeve and place pin in sleeve.
14. Remove completion machine from gate valve.
15. Hold back on shaft and sleeve, remove pin, lower sleeve and advance shaft until completion plug and plug alignment tool are exposed.
16. Remove completion plug and plug alignment tool from shaft and place protector nut on end of shaft.
17. Remove plug alignment tool from completion plug.

F—ATTACH AND OPERATE DRILLING MACHINE

(For detailed instructions see OPERATING INSTRUCTIONS for CC-36 or C1-36 DRILLING MACHINES.)

1. Sharpen shell cutter and pilot drill before each cut by honing the front edges of the cutter teeth. If the shell cutter is very dull, it should be returned to Mueller Co., Decatur, Illinois for reconditioning. Check pilot drill detents to be sure they are operating correctly.
2. Bolt drilling machine adapter to front of the drilling machine. Check to be sure that gasket is in good condition and in place.
3. Release automatic feed by pulling out automatic feed knob. (Directions are indicated on panel on rear of torque tube.)
4. Advance boring bar by rotating feed crank **counter-clockwise**, until bolt hole in boring bar is exposed beyond face of adapter. (Directions are indicated on panel on rear cover of torque tube.) Remove hub retaining bolt.
5. Assemble shell-cutter and cutter hub. Insert the shank of pilot-drill into the socket in the boring bar. Slide cutter hub and shell cutter over the end of the boring bar. Align holes in the cutter hub, boring bar and pilot drill and attach to boring bar with hub retaining bolt. **Figure 44.** Coat shell cutter and pilot drill thoroughly with MUELLER cutting grease.
6. Retract boring bar to rearmost position by rotating crank **clockwise**.
7. Place the machine (with adapter and drilling equipment assembled) in drilling position on gate valve and bolt adapter solidly to valve flange. Check to be sure that the gasket is in good condition and in place.
8. Be sure that the tee is cool before cut is started.

INSTRUCTIONS FOR INSTALLING 4", 6" AND 8" FLANGED TEES

LINE STOPPER UNIT NO. 3SW-500

9. Rotate feed crank **counter-clockwise** to advance boring bar until pilot drill contacts the pipe.
Turn feed crank **clockwise** $\frac{1}{4}$ turn which retracts the boring bar slightly to release tension between pilot drill and the pipe. (1 revolution of the feed crank moves the boring bar $\frac{1}{6}$ of an inch—6 revolutions equals 1 inch.)
10. Set feed indicator to zero. Mark the point on feed indicator shield that the arrow will reach to complete the cut. For travel chart, see OPERATING INSTRUCTIONS FOR CC-36 or C1-36 DRILLING MACHINES.
11. Engage automatic feed by pushing in on automatic feed knob.
12. Operate the drilling machine.

a. When using the CC-36 Machine:

Place ratchet handle on machine so that it cuts when ratchet handle is pushed toward pipe. Observe note on ratchet casting and arrow on drive box boss. Always operate the machine according to instructions with one man only on ratchet handle and using automatic feed to assure correct drilling rate.

If cut becomes too difficult for one man **DO NOT FORCE MACHINE** as this may cause damage to cutter or machine. See detailed instructions for the CC-36 Machine.

b. When using the C1-36 Machine and the MUELLER H-600 Air Motor:

Loosen the pivot set screw. This permits pivot pin to be removed so the air motor holder may be attached to the holder pivot on the drive box of the Drilling Machine. Position air motor holder and replace pivot pin, tighten the pivot set screw and latch the small hook on the air motor holder to the pin on the machine drive box to prevent movement of the air motor holder.

Examine air motor on ground with air pressure on. Position throttle lever for forward operation. This will turn drive spindle **clockwise**.

Place air motor in holder, open throttle slightly. Spindle will turn until square in motor spindle aligns with square on

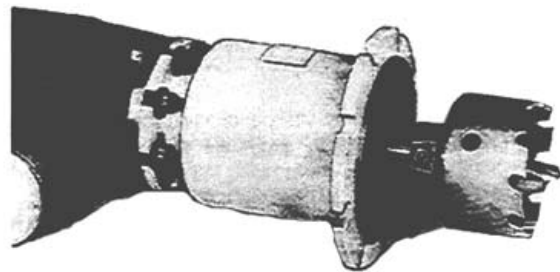


FIGURE 44

drive spindle. Motor will then drop into place. Screw feed screw in top of motor back into countersink in top of holder. Slide hook clamp into position on air motor torque handle and tighten.

Open air motor throttle fully so that motor is operating at proper speed (50 to 60 rpm). **IMPORTANT — MAINTAIN PRESSURE OF 90 P.S.I. WE RECOMMEND THE USE OF A GAGE AT THE THROTTLE TO DETERMINE THE ACTUAL PRESSURE OF AIR AT THE AIR MOTOR.**

If cutting becomes difficult and motor stalls, see detailed instructions for the C1-36 Machine.

13. Continue the cutting operation until the hole is drilled and the arrow reaches the point marked on the feed indicator shield or until the cutter stops cutting. If power unit is being used, shut off motor.
14. Check completion of cut by releasing automatic feed and attempting to advance cutter by rotating feed crank **counter-clockwise**. If it does not advance easily, the cut has not been completed and automatic feed knob must be pushed in for further cutting.
CAUTION: STOP ADVANCING THE BORING BAR WHEN THE LIMIT LINE ON THE BORING BAR BECOMES VISIBLE THROUGH THE DRIVE BOX DRAIN HOLE. See Figure 11.
15. When cut is completed, release automatic feed and retract cutter to its rearmost position by rotating feed crank **clockwise**.

LINE STOPPER UNIT NO. 3SW-500

INSTRUCTIONS FOR INSTALLING 4", 6" AND 8" FLANGED TEES

G—REMOVE DRILLING MACHINE

1. Close gate valve (approximately 30 turns required to completely close the valve) and by-pass valve.
2. Do not force gate valve closed as that may destroy the rubber seat of the valve.
3. Open blow-off valve on gate valve. This exhausts the pressure above the gate and also indicates whether or not the gate is shut tight.
4. Remove bolts from the joint between the gate valve flange and the drilling machine adapter flange. Remove the drilling machine and drilling machine adapter from the gate valve as a unit.

H—INSTALL COMPLETION PLUG IN FLANGED TEE

NOTE: Latest design of completion plugs have an "O"-ring seal and a pressure equalizing valve in the center of the completion plug. The end of the inserting or extracting tool will open the equalizing valve.

1. Hold back on shaft and sleeve, remove pin, lower sleeve and advance shaft of completion machine.
2. Attach plug inserting tool to the completion plug.
 - a. Push fork to rearmost position.
 - b. Hold fork in this position and screw the end of the tool into the inside threads in the top of the completion plug.
 - c. Check to be sure that the inserting tool has opened the equalizing valve.
 - d. Release fork so that the fork lugs will engage with slots in the completion plug.

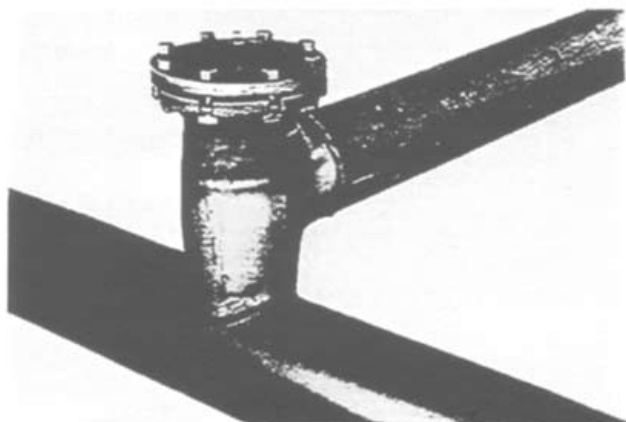


FIGURE 45

3. Attach plug inserting tool with completion plug assembled to it, to the shaft of completion machine.
 - a. Remove protector nut from end of shaft.
 - b. Insert lug on shaft into matching recess or slot in plug inserting tool.
 - c. Screw coupler sleeve on plug inserting tool to shaft threads.
4. Coat the threads and "O"-ring on the completion plug with a heavy grease.
5. Withdraw shaft to rearmost position, raise sleeve, and place pin in sleeve, so that the shaft and the completion plug will not fall while the machine is being placed on the gate valve.
6. Place completion machine on gate valve in same position as marked in paragraph "E-12" on page 42. With gasket in place, bolt the completion machine to the gate valve.
7. Open by-pass valve on gate valve. Be sure blow-off valve is closed.
8. Open gate valve.
9. Hold back on shaft and sleeve, remove pin, lower sleeve, advance shaft and screw completion plug into tee securely by rotating shaft **clockwise**.
10. Remove plug inserting tool from completion plug by turning the shaft **counterclockwise**.
11. Open blow-off valve on gate valve to determine tightness of plug.
12. Unbolt and remove gate valve and completion machine from tee as a unit.
13. Completion plugs furnished with an "O"-ring will be tightened to their seat by the machine with no further tightening needed.
14. Place gasket in tee recess and put completion cap in place.
15. Bolt cap solidly to tee flange. **Figure 45.**
16. Test tee again with soapsuds.
17. Refill trench.

LINE STOPPER UNIT NO. 3SW-500

H-17619 INSPECTION FLANGE

I—USING H-17619 INSPECTION FLANGE—Figure 46

The H-17619 Inspection Flange is for visually determining the condition of the inside of the Line Stopper Fitting and the inside of the pipe after the drilling operation is completed. This may be done under pressure.

1. Bolt drilling machine adapter to gate valve. Check to be sure gasket is in good condition and in place.
2. Bolt H-17619 Inspection Flange to drilling machine adapter. Check to be sure gasket is in good condition and in place.
3. Open by-pass valve on gate valve. Be sure blow-off valve is closed.
4. Open gate valve **fully**.
5. Visually examine the inside of the fitting by viewing through the plastic window. Use a flashlight or spot light.
6. Use the retrieving rod to locate, raise and hold above the gate valve any object which might interfere with the operation of the stopper such as a section of the pipe. The retrieving rod has a ball-joint type of pressure seal permitting it to be raised, lowered, rotated or moved from side to side.
7. Tighten sleeve screw to hold retrieving rod in raised position.
8. Close gate valve and by-pass valve and test for tightness by opening blow-off valve.
9. Remove drilling machine adapter and inspection flange.

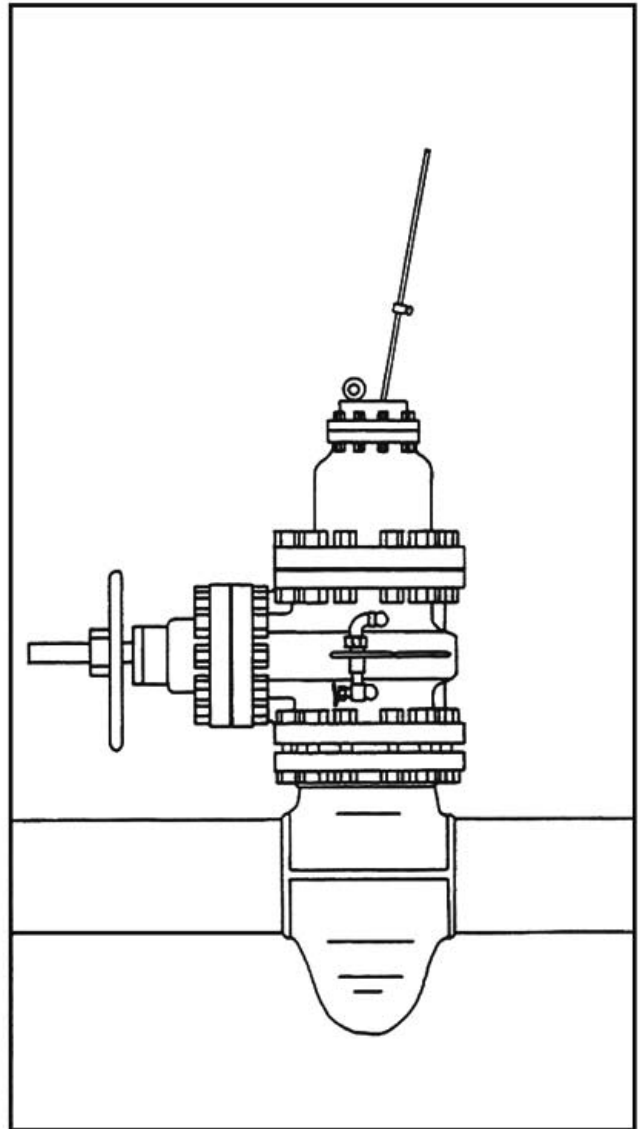


FIGURE 46

LINE STOPPER UNIT NO. 3SW-500

INSTRUCTIONS FOR RECOVERING MUELLER STEEL WEDGE STOPPERS (Neoprene and Positive Control Line Stopper Covers)

IMPORTANT: One or more stop-offs can be made with the same stopper cover. Examine the stopper cover after each stop-off to determine whether replacement is necessary. If the cover is badly cut or damaged, it should be replaced before the

stopper is used again. Due to varying conditions encountered and the care exercised in the operation of the stopping machine, some covers can be used several times, while others should be replaced after each stop-off operation.

REPLACEMENT COVER KITS FOR MUELLER STEEL WEDGE STOPPERS

Description of Stoppers	STOPPER SIZE AND PART NUMBERS					
	4"	6"	THIN WALL 6"	8"	THIN WALL 8"	10" & 12"
Non-Mechanical Retracting Type ** (Originally Furnished with Neoprene Cover)	83511	80669	83714	80670	83717	83339
Mechanical Retracting Type (Originally Furnished with Neoprene Cover)	580634	580612	89183	580613	89184	580614
Mechanical Retracting Type (Originally Furnished with Positive Control Cover)	89694	89696	89700	89698	89702	89704
TO RECOVER WITH OR TO CONVERT TO NEOPRENE COVER, USE: REPLACEMENT COVER KIT WITH NEOPRENE COVER FOR USE WITH PETROLEUM PRODUCTS ONLY.	89687	89688	89689	89690	89691	89692
Kit Includes: Neoprene Cover Adhesive* Instruction Form	53775 504888 9879	79990 504888 9879	63387 504888 9879	79991 504888 9879	63391 504888 9879	46431 504889 9879
TO RECOVER WITH OR TO CONVERT TO POSITIVE CONTROL COVER, USE: REPLACEMENT COVER KIT WITH POSITIVE CONTROL COVER FOR USE WITH GAS ONLY.	89618	89619	89621	89620	89622	89623
Kit Includes: Positive Control Cover Adhesive* Primer Instruction Form	504961 504888 581265 9879	504962 504888 581265 9879	504964 504888 581265 9879	504963 504888 581265 9879	504965 504888 581265 9879	504966 504889 581265 9879

*NOTE: Adhesive can be ordered separately under Part Number 89758 or 89759 which includes Adhesive 504888 or 504889 and Instruction Form 9879. See ordering instructions below.

**This type no longer furnished. Replaced by Mechanical Retracting type.

ORDERING INSTRUCTIONS FOR ADHESIVE ONLY:

To order Adhesive only for 4", 6" and 8" Stoppers, order Part Number 89758

To order Adhesive only for 10" and 12" Stoppers, order Part Number 89759.

ORDERING INSTRUCTIONS FOR COMPLETE REPLACEMENT COVER KIT:

Specify: Quantity and Kit Number.

A—REMOVE OLD COVER FROM STOPPER CYLINDER

1. Place stopper in a vise-like fixture and pull cover off with a pair of pliers or vise-grips. NOTE: Covers attached with green colored adhesive will be difficult to remove and may come off in pieces.

B—REMOVE OLD ADHESIVE FROM STOPPER CYLINDER

1. If old adhesive on stopper cylinder is brown in color, use M.E.K., Acetone or Naptha to remove.
2. If old adhesive is green in color, soak with commercial paint remover to remove. NOTE: After old adhesive has been removed, inspect the surface of the stopper cylinder. If surface is shiny or smooth, it

should be roughened by sand-blasting.

C—THOROUGHLY CLEAN THE STOPPER CYLINDER

1. After old adhesive has been removed, (and cylinder sandblasted if necessary), thoroughly clean the stopper cylinder with 1,1,1, Trichloroethane, Inhibited, solvent (marketed under the trade names Inhibisol and Chorothene NU, non-toxic and non-flammable substitutes for Carbon-Tetrachloride). NOTE: We do not recommend the use of Carbon-Tetrachloride.
2. It is very important that the surface of the cylinder be absolutely clean! The following procedure for cleaning is recommended.
 - a. Suspend stopper cylinder over a drain pan. Apply solvent to surface of stop-

**INSTRUCTIONS FOR RECOVERING
MUELLER STEEL WEDGE STOPPERS
(Neoprene and Positive Control
Line Stopper Covers)**

LINE STOPPER UNIT NO. 3SW-500

per cylinder and wash down. Do not set stopper cylinder in drain pan or re-use solvent which has drained into the pan.

- b. After surface of stopper cylinder has been washed down, it is ready for final cleaning. Pour CLEAN UN-USED solvent onto the surface of the stopper cylinder and brush off with a CLEAN brush.

D—THOROUGHLY CLEAN NEW COVER MATERIAL

1. Lay the new stopper cover on a smooth flat surface with side lettered "This Side Out," face down. Thoroughly clean the roughened side of the new cover (side without lettering) with 1,1,1, Trichloroethane, Inhibited. Pour CLEAN, UN-USED solvent onto cover and brush toward cover ends to remove.

NOTE: USE A CLEAN BRUSH.

ON STEEL WEDGE POSITIVE CONTROL LINE STOPPER COVERS ONLY, brush primer, Part Number 581265, onto the cover. This primer is furnished with Positive Control Cover Kits only (see chart). DO NOT USE THE PRIMER ON NEOPRENE COVERS. Let dry completely for approximately 30 minutes.

E—MIX ADHESIVE (Part Number 504888 for 4", 6" and 8" size stoppers or 504889 for 10" and 12" size stoppers)

CAUTION: Adhesive contains ingredients which can be irritating to the skin. Avoid contact with skin and eyes. If contact occurs, remove from skin with soap and water. Wash hands thoroughly before eating or smoking.

1. Pull the plunger rod up towards the neck of the cartridge.
2. Remove the band of tape from the cartridge. Squeeze the cartridge in the area the tape was removed from to deform the aluminum foil barrier within the cartridge.
3. Begin mixing the adhesive by pushing and pulling the plunger rod back and forth in the cartridge. Rotate the plunger rod **clockwise** with each back and forth movement. At least 40 complete cycles back and forth with **clockwise** rotation of the plunger rod will be necessary to thoroughly mix the adhesive.

F—APPLY ADHESIVE

1. After the adhesive is mixed, remove the red cap from the bottom of the cartridge and pull the plunger rod up towards the neck of the cartridge. Squeeze the cartridge to hold the plunger and remove the plunger rod by twisting it approximately

THREE turns **counter-clockwise**.

2. Force the plunger into the bottom of the cartridge. Continue forcing the plunger to discharge adhesive through the plunger rod hole.
3. Apply adhesive to the "roughened" side of the new cover (apply over large area). Use a putty knife, tile trowel, etc., to spread the adhesive over the surface of the cover with a COMPLETE AND EVEN coating.

NOTE:

½ oz. adhesive required to recover 4" size stopper. ⅓ of 1½ oz. cartridge (Part Number 504888).

1 oz. adhesive required to recover 6" size stopper. ⅔ of 1½ oz. cartridge (Part Number 504888).

1½ oz. adhesive required to recover 8" size stopper. Entire 1½ oz. cartridge (Part Number 504888).

3½ oz. adhesive required to recover 10" and 12" size stopper. Entire 3½ oz. cartridge (Part Number 504889).

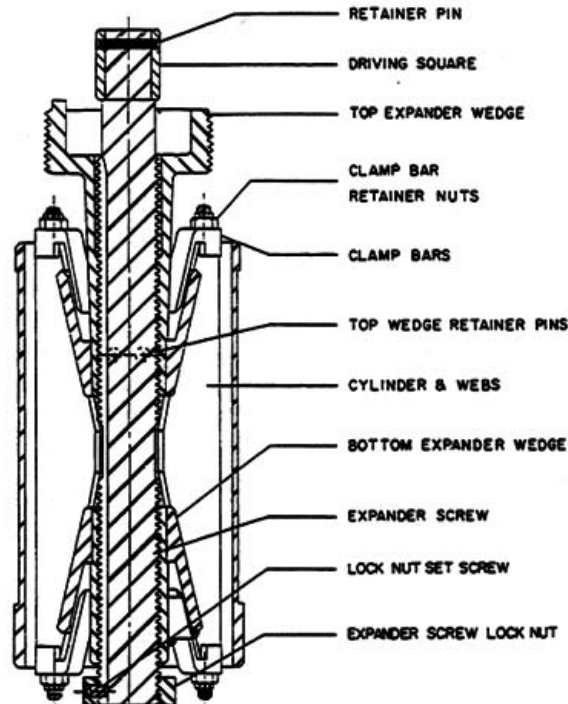
G—PLACE COVER ON STOPPER

1. Place coated cover on stopper cylinder so that one end aligns with edge of the cylinder by-pass slot. Wrap the cover around the cylinder and work out any air bubbles which may be trapped under the cover. Place tape (masking tape, electrical tape, etc.) across the by-pass slot to hold the cover ends together. NOTE: In some cases, the cover may be too long to perfectly align with the other edge of the by-pass slot after it has been wrapped around the cylinder. If so, excess cover can be trimmed off after the adhesive has cured.
2. Wrap the stopper in brown wrapping paper or newspaper and place it in the stopper sleeve. Expand the stopper within the sleeve as tight as possible. The paper will prevent the stopper from sticking to the sleeve. NOTE: For best results, use the stopping machine to expand the steel wedge stopper in the sleeve.
3. Cure at room temperature (above 75° F.) for 24 hours or cure one hour at 300° F. Experience generally shows that the 300° F. cure produces a slightly stronger bond.
4. After curing, remove the stopper from the sleeve and inspect. Remove tape from the cover ends. Trim excess cover from by-pass slot if necessary.
5. Re-lubricate stopper threads.
6. Return stopper to the sleeve until ready to use.

LINE STOPPER UNIT NO. 3SW-500

ASSEMBLY INSTRUCTIONS FOR 4", 6" AND 8" MECHANICAL RETRACTING STEEL WEDGE STOPPERS

IF STOPPERS ARE DISASSEMBLED FOR CLEANING, COVER REMOVAL, REPAIR OR RELUBRICATION, FOLLOW INSTRUCTIONS BELOW TO REASSEMBLE.



1. Insert Top Wedge Retainer Pins into Top Expander Wedge.
2. Thread Top Expander Wedge, with Pins, onto Expander Screw until the Expander Screw threads are flush with recess in Top Expander Wedge.
3. Insert Top Expander Wedge and Expander Screw into top of Cylinder until Expander Wedge rests on Webs in the Cylinder. Retainer Pins in the Top Expander Wedge should straddle Web in Cylinder. Make sure Lug on Top Expander Wedge is in line with By-Pass Opening.
4. Thread Bottom Expander Wedge onto Expander Screw until Bottom Wedge takes up on Webs in the Cylinder.

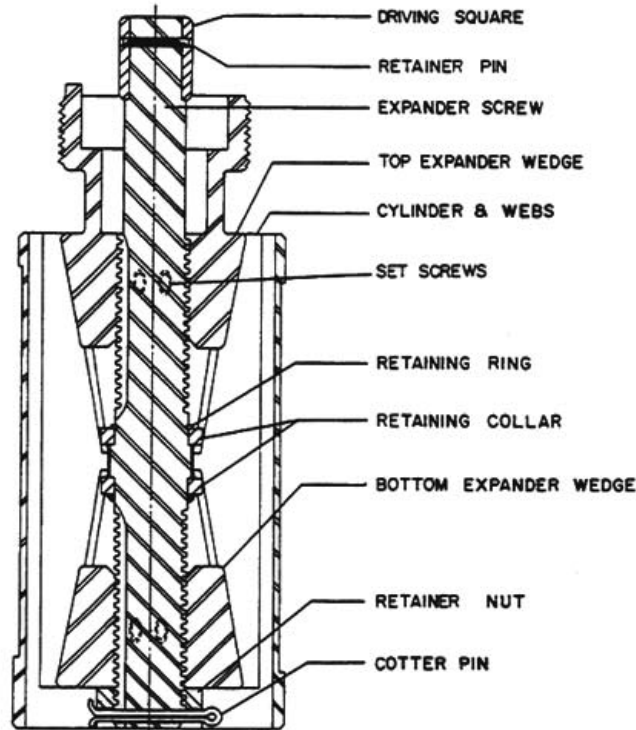
NOTE: Do not turn the expander screw while threading on Bottom Expander Wedge.

5. Assemble the Clamp Bars to the Cylinder with the Clamp Bar Retainer Nuts. The bottom Clamp Bars must have the locking wedge between them.
6. On 4" size Stoppers only, assemble the Driving Square onto the Expander Screw and insert Retainer Pin.
7. Retract Stopper until Cylinder gap measures $\frac{1}{4}$ ". Thread the Expander Screw Lock Nut onto Expander Screw until it bottoms on Bottom Expander Wedge, then unthread to the first position to align Set Screw hole with Expander Screw slot. Insert Lock Nut Set Screw into Expander Screw Lock Nut and tighten.

**ASSEMBLY INSTRUCTIONS FOR
4", 6" AND 8" NON-MECHANICAL
RETRACTING STEEL WEDGE STOPPERS***

LINE STOPPER UNIT NO. 3SW-500

IF STOPPERS ARE DISASSEMBLED FOR CLEANING, COVER REMOVAL, REPAIR OR RELUBRICATION, FOLLOW INSTRUCTIONS BELOW TO REASSEMBLE.



1. Thread Bottom Expander Wedge onto Expander Screw.
2. Thread Retainer Nut onto the Expander Screw until it is flush with bottom of Expander Screw. Insert Cotter Pin into Retainer Nut and Expander Screw.
3. Turn Bottom Expander Wedge back until it rests on the Retainer Nut, then tighten Set Screws.
4. Insert this assembly into bottom of Cylinder and assemble Retaining Collar and Retaining Ring to Expander Screw.
5. Thread the Top Expander Wedge onto the Expander Screw until the top of the threads on the Expander Screw are flush with the recess in the top of the Expander Wedge. Insert and tighten Set Screws. The Lower and Top Expander Wedges will be loose in the assembly. Make sure Lug on Top Expander Wedge is in line with By-Pass Opening.
6. Turn Expander Screw until tension is applied on the Expander Wedges to center the Web Lug between the Retaining Collars.
7. On 4" size Stoppers only, assemble the Driving Square onto the Expander Screw and insert Retainer Pin.

*The non-mechanical retracting type Steel Wedge Stoppers are no longer furnished and have been replaced by mechanical retracting type

LINE STOPPER UNIT NO. 3SW-500

FLOW DATA

PRESSURE DROP THROUGH MUELLER LINE STOPPER FITTINGS WITH BY-PASS LINE

To obtain downstream pressure, determine the pressure drop through the upstream stopper, by-pass, and downstream stopper. It will be necessary to interpolate to find values for by-pass and downstream stopper pressure drop, as all losses are given for the stated value of line pressure without regard to the upstream stopper pressure loss or the by-pass loss. By-pass loss is given for 100 ft of pipe. To find actual loss, divide actual length by 100 and multiply by the factor found by interpolation.

Example - A 4" line is to be stopped using 4" steel wedge stoppers and a 70' - 2" by-pass pipe. Upstream pressure is 100 psig and maximum flow during the operation will be 100,000 cu ft/hr. From the 4" steel wedge stopper chart, at 100 psig (Col. A) and 100,000 cfh (Col. B), the upstream stopper pressure loss is 5.1 psi (Col. C). By-pass inlet pressure is 100 psig - 5.1 psig =

94.9 psig. To find pressure loss for 100 ft of 2" pipe with an inlet pressure of 94.9 and flow of 100,000 cfh (Col. B) find the losses for 2" pipe at 100,000 cfh (Col B), and pressure of 75 psig and 100 psig (Col A), which are 18.71 psi and 13.96 psi (Col. D), respectively. Interpolating between these values to 94.9 psig gives an approximate loss in 100 ft of 2" pipe of 14.9 psi at 100,000 cfh. For 70 ft of by-pass, $70/100 \times 14.9 \text{ psi} = 10.4 \text{ psi}$. Pressure entering the downstream stopper is 100 psig - 5.1 psi - 10.4 = 84.5 psig. At 100,000 cfh flow (Col. B) and pressures of 75 psig and 100 psig (Col. A), downstream stopper pressure drops are 8.3 psi and 6.5 psi (Col. E), respectively. Interpolating between these values to 84.5 psig gives a downstream stopper drop of 7.6 psi. Line pressure downstream of the stoppers is 100 psig - 5.1 psi - 10.4 psi - 7.6 psi = 76.9 psig.

LINE STOPPER UNIT NO. 3SW-500

FLOW DATA

PRESSURE DROP THROUGH MUELLER LINE STOPPER FITTINGS WITH INTEGRAL BY-PASS LINE (Continued)

4" STEEL WEDGE STOPPER

A	B	C	D			E
			Pressure Drop Through 100 Ft. of Pipe — PSI*			
			By-Pass Pipe Size			
Upstream Pressure PSIG	Flow Rate Cu. Ft. Per Hour Of .60 Sp. Gr. Gas At Standard Conditions	Press.-Drop Through Up-Stream Stoppers PSI	1 1/2"	2"	3"	Press. Drop Through Down-Stream Stoppers PSI*
500	80,000	0.76	7.5	1.88	0.23	0.96
	150,000	2.66	25.58	6.62	0.80	3.37
	250,000	7.4	74.71	18.59	2.23	9.4
	500,000	29.1	—	79.11	8.97	37.4
	750,000	66.4	—	205.23	20.42	84.3
	1,000,000	118.1	—	—	36.91	149.8
	1,250,000	184.5	—	—	58.98	234.1
400	80,000	0.90	8.90	2.33	0.28	1.18
	150,000	3.15	32.21	8.24	0.99	4.15
	250,000	8.7	97.44	23.32	2.77	11.5
	500,000	35.0	—	103.57	11.19	46.1
	750,000	78.7	—	361.48	25.63	103.7
	1,000,000	139.8	—	—	46.81	184.4
300	60,000	0.66	6.59	1.72	0.21	0.86
	100,000	1.84	18.68	4.81	0.58	2.40
	250,000	11.5	148.22	31.43	3.66	15.0
	500,000	46.0	—	160.23	14.90	59.9
	750,000	103.6	—	—	34.64	134.9
	850,000	133.0	—	—	45.31	173.3
250	50,000	0.55	5.44	1.42	0.18	0.71
	100,000	2.20	22.52	5.74	0.69	2.85
	200,000	8.8	108.43	23.79	2.78	11.4
	300,000	19.8	—	57.33	6.30	25.7
	500,000	55.0	—	—	17.90	71.3
	600,000	79.2	—	—	26.21	102.7
	650,000	92.9	—	—	31.06	120.5
200	50,000	0.67	6.75	1.76	0.22	0.87
	100,000	2.69	28.46	7.12	0.86	3.5
	200,000	10.8	—	30.13	3.44	14.0
	300,000	24.2	—	76.78	7.82	31.5
	400,000	43.1	—	—	14.11	55.9
	450,000	54.5	—	—	18.03	70.8
	500,000	67.3	—	—	22.50	87.4
150	40,000	0.57	5.64	1.47	0.18	0.73
	80,000	2.26	23.91	5.95	0.71	2.93
	100,000	3.54	39.34	9.40	1.11	4.6
	200,000	14.1	—	41.82	4.51	18.3
	300,000	31.8	—	—	10.33	41.3
	350,000	43.3	—	—	14.24	56.2
	400,000	56.6	—	—	18.88	73.3

4" STEEL WEDGE STOPPER

A	B	C	D			E
			Pressure Drop Through 100 Ft. of Pipe — PSI*			
			By-Pass Pipe Size			
Upstream Pressure PSIG	Flow Rate Cu. Ft. Per Hour Of .60 Sp. Gr. Gas At Standard Conditions	Press.-Drop Through Up-Stream Stoppers PSI	1 1/2"	2"	3"	Press. Drop Through Down-Stream Stoppers PSI*
125	40,000	0.67	6.69	1.74	0.21	0.86
	80,000	2.69	29.19	7.07	0.85	3.44
	100,000	4.2	49.67	11.21	1.32	5.4
	200,000	16.8	—	53.17	5.35	21.5
	250,000	26.3	—	—	8.45	33.6
	300,000	37.9	—	—	12.35	48.4
	350,000	51.5	—	—	17.11	65.8
100	40,000	0.82	8.26	2.12	0.26	1.04
	80,000	3.26	38.20	8.72	1.03	4.15
	100,000	5.1	72.93	13.96	1.61	6.5
	150,000	11.5	—	34.76	3.65	14.6
	200,000	20.4	—	—	6.57	25.9
	250,000	31.9	—	—	10.46	40.5
75	35,000	0.79	8.16	2.08	0.25	1.02
	75,000	3.64	49.36	9.98	1.16	4.68
	100,000	6.5	—	18.71	2.07	8.3
	125,000	10.1	—	31.84	3.25	13.0
	150,000	14.6	—	—	4.72	18.7
	175,000	19.8	—	—	6.49	25.5
50	30,000	0.81	8.49	2.13	0.26	1.04
	60,000	3.25	—	8.99	1.03	4.16
	100,000	9.0	—	31.25	2.90	11.6
	125,000	14.1	—	—	4.59	18.1
	145,000	19.0	—	—	6.25	24.3
	155,000	21.7	—	—	7.20	27.8
25	25,000	0.91	10.33	2.44	0.29	1.19
	35,000	1.79	—	4.95	0.57	2.32
	45,000	2.95	—	8.60	0.95	3.85
	55,000	4.41	—	13.88	1.42	5.7
	65,000	6.2	—	—	2.00	8.0
	75,000	8.2	—	—	2.69	10.7
15	20,000	0.79	9.07	2.10	0.25	1.02
	30,000	1.76	—	4.97	0.56	2.29
	35,000	2.40	—	7.03	0.77	3.12
	40,000	3.14	—	—	1.00	4.07
	45,000	3.97	—	—	1.28	5.2
	50,000	4.91	—	—	1.58	6.4
10	18,000	0.77	—	2.06	0.24	1.00
	20,000	0.96	—	2.57	0.30	1.23
	25,000	1.49	—	4.15	0.47	1.92
	30,000	2.15	—	6.28	0.68	2.77
	35,000	2.93	—	—	0.93	3.76
	40,000	3.83	—	—	1.22	4.9
5	15,000	0.66	—	1.80	0.21	0.87
	20,000	1.17	—	3.33	0.38	1.55
	24,000	1.70	—	—	0.54	2.23
	25,000	1.84	—	—	0.59	2.42
	26,000	1.99	—	—	0.64	2.62

*These losses depend on previous pressure drops in the upstream stopper and/or by-pass line. See example, Page 50.

LINE STOPPER UNIT NO. 3SW-500

FLOW DATA

PRESSURE DROP THROUGH MUELLER LINE STOPPER FITTINGS WITH INTEGRAL BY-PASS LINE (Continued)

6" STEEL WEDGE STOPPER

A Upstream Pressure PSIG	B Flow Rate Cu. Ft. Per Hour Of .60 Sp. Gr. Gas At Standard Conditions	C Press.-Drop Through Up-Stream Stoppers PSI	D Pressure Drop Through 100 Ft. of Pipe — PSI*			E Press. Drop Through Down- Stream Stoppers PSI*
			By-Pass Pipe Size			
			2"	3"	4"	
500	200,000	1.08	11.82	1.43	0.33	1.09
	400,000	4.31	49.08	5.73	1.34	4.34
	600,000	9.7	118.89	12.97	3.02	9.8
	1,000,000	26.9	—	36.91	8.43	27.1
	1,500,000	60.5	—	87.50	19.17	61.1
	2,000,000	107.7	—	170.61	34.62	108.6
	2,500,000	168.2	—	325.01	55.23	169.7
	400	150,000	0.75	8.24	0.99	0.23
200,000		1.32	14.76	1.77	0.42	1.39
400,000		5.3	62.76	7.13	1.66	5.6
600,000		11.9	62.27	16.22	3.76	12.5
1,000,000		33.1	—	46.81	10.51	34.7
1,500,000		74.5	—	115.44	24.05	78.1
2,000,000		132.5	—	255.61	43.83	138.9
300		150,000	0.99	10.96	1.31	0.31
	300,000	3.96	46.42	5.28	1.23	4.23
	350,000	5.4	65.30	7.21	1.68	5.8
	600,000	15.8	—	21.70	4.96	16.9
	1,000,000	44.0	—	64.89	13.99	47.0
	1,500,000	98.9	—	185.78	32.45	105.7
	1,750,000	134.7	—	—	45.12	143.9
	250	125,000	0.82	9.03	1.08	0.26
300,000		4.70	57.33	6.30	1.47	5.1
500,000		13.1	—	17.90	4.10	14.2
750,000		29.4	—	42.30	9.31	32.0
1,000,000		52.2	—	81.84	16.79	57.0
1,250,000		81.6	—	151.42	26.76	89.0
1,500,000		117.6	—	—	39.54	128.2
200		100,000	0.65	7.12	0.86	0.20
	250,000	4.06	49.47	5.40	1.26	4.52
	400,000	10.4	—	14.11	3.23	11.6
	600,000	23.4	—	33.29	7.34	26.0
	800,000	41.6	—	64.19	13.24	46.2
	1,000,000	65.0	—	117.40	21.09	72.3
	1,100,000	78.6	—	—	25.81	87.4
	150	100,000	0.84	9.40	1.10	0.26
200,000		3.35	41.82	4.51	1.04	3.87
400,000		13.4	—	18.88	4.24	15.5
500,000		21.0	—	30.65	6.67	24.2
600,000		30.2	—	46.64	9.70	34.9
700,000		41.1	—	68.90	13.35	47.4
800,000		53.6	—	104.01	17.68	62.0

6" STEEL WEDGE STOPPER

A Upstream Pressure PSIG	B Flow Rate Cu. Ft. Per Hour Of .60 Sp. Gr. Gas At Standard Conditions	C Press.-Drop Through Up-Stream Stoppers PSI	D Pressure Drop Through 100 Ft. of Pipe — PSI*			E Press. Drop Through Down- Stream Stoppers PSI*	
			By-Pass Pipe Size				
			2"	3"	4"		
125	100,000	1.00	11.21	1.32	0.30	1.16	
	200,000	4.00	53.17	5.35	1.24	4.65	
	400,000	16.0	—	22.85	5.02	18.6	
	500,000	25.0	—	37.92	7.93	29.1	
	600,000	36.0	—	60.14	11.57	41.9	
	700,000	49.0	—	—	16.02	57.0	
	100	80,000	0.79	8.72	1.03	0.24	0.93
		100,000	1.23	13.96	1.61	0.38	1.45
200,000		4.91	81.11	6.57	1.51	5.8	
300,000		11.1	—	15.41	3.43	13.0	
400,000		19.7	—	29.29	6.17	23.2	
500,000		30.7	—	51.46	9.80	36.2	
600,000		44.2	—	—	14.42	52.1	
75		80,000	1.00	11.46	1.32	0.31	1.23
	100,000	1.57	18.71	2.07	0.48	1.92	
	200,000	6.3	—	8.58	1.94	7.7	
	300,000	14.2	—	20.78	4.43	17.3	
	350,000	19.3	—	30.04	6.08	23.5	
	450,000	31.8	—	—	10.31	38.8	
	50	60,000	0.79	8.99	1.03	0.24	0.97
		100,000	2.19	31.25	2.90	0.67	2.70
150,000		4.92	—	6.72	1.51	6.1	
200,000		8.7	—	12.54	2.72	10.8	
275,000		16.5	—	27.07	5.24	20.4	
300,000		19.7	—	—	6.29	24.3	
25		50,000	0.90	10.99	1.17	0.27	1.19
		90,000	2.91	—	3.93	0.89	3.83
	110,000	4.35	—	6.04	1.33	5.7	
	130,000	6.1	—	8.76	1.88	8.0	
	140,000	7.0	—	10.41	2.19	9.3	
	150,000	8.1	—	12.28	2.52	10.7	
	15	40,000	0.79	9.68	1.00	0.23	1.05
		60,000	1.76	—	2.31	0.53	2.35
80,000		3.14	—	4.25	0.94	4.19	
90,000		3.97	—	5.51	1.20	5.3	
100,000		4.91	—	6.99	1.49	6.5	
110,000		5.9	—	8.75	1.81	7.9	
10		35,000	0.73	—	0.93	0.21	0.98
		45,000	1.21	—	1.55	0.36	1.62
	60,000	2.15	—	2.83	0.64	2.88	
	70,000	2.93	—	3.95	0.87	3.93	
	75,000	3.36	—	4.60	1.00	4.5	
	5	30,000	0.68	—	0.86	0.20	0.94
		35,000	0.93	—	1.17	0.27	1.28
		40,000	1.21	—	1.55	0.35	1.67
45,000		1.54	—	1.98	0.45	2.11	
50,000		1.90	—	2.48	0.55	2.61	

*These losses depend on previous pressure drops in the upstream stopper and/or by-pass line. See example, Page 50.

LINE STOPPER UNIT NO. 3SW-500

FLOW DATA

PRESSURE DROP THROUGH MUELLER LINE STOPPER FITTINGS WITH INTEGRAL BY-PASS LINE (Continued)

8" STEEL WEDGE STOPPER

A Upstream Pressure PSIG	B Flow Rate Cu. Ft. Per Hour Of .60 Sp. Gr. Gas At Standard Conditions	C Press.-Drop Through Up-Stream Stoppers PSI	D Pressure Drop Through 100 Ft. of Pipe — PSI*			E Press. Drop Through Down- Stream Stoppers PSI*
			By-Pass Pipe Size			
			3"	4"	6"	
500	200,000	0.59	1.43	0.33	0.04	1.00
	400,000	2.50	5.73	1.34	0.15	4.01
	600,000	5.3	12.97	3.02	0.34	9.0
	1,000,000	14.8	36.91	8.43	0.94	25.1
	1,500,000	33.2	87.50	19.17	2.12	56.3
	2,000,000	59.1	170.61	34.62	3.77	100.2
	2,500,000	92.3	325.01	55.23	5.90	156.4
	3,000,000	133.0	—	81.76	8.52	225.3
400	200,000	0.75	1.71	0.42	0.05	1.23
	400,000	3.02	7.13	1.66	0.19	4.94
	600,000	6.8	16.22	3.76	0.42	11.1
	1,000,000	18.9	46.81	10.51	1.17	30.9
	1,500,000	42.5	115.44	24.05	2.63	69.5
	2,000,000	75.5	255.15	43.83	4.69	123.4
	2,500,000	118.1	—	70.94	7.35	192.8
300	150,000	0.59	1.31	0.31	0.03	0.93
	400,000	4.18	9.46	2.19	0.25	6.6
	700,000	12.8	29.94	6.77	0.75	20.2
	1,000,000	26.1	64.89	13.99	1.54	41.2
	1,500,000	58.8	185.78	32.45	3.48	92.8
	2,000,000	104.5	—	60.53	6.21	164.9
250	150,000	0.69	1.56	0.37	0.04	1.11
	400,000	4.92	11.31	2.61	0.29	7.9
	750,000	15.1	36.41	8.10	0.90	24.2
	1,000,000	30.8	81.84	16.79	1.83	49.5
	1,300,000	52.0	174.36	29.08	3.11	83.6
	1,600,000	78.8	—	45.55	4.72	126.6
200	100,000	0.40	0.86	0.20	0.03	0.61
	250,000	2.53	5.40	1.26	0.14	3.79
	400,000	6.4	14.11	3.23	0.36	9.7
	700,000	19.8	46.93	10.06	1.11	29.7
	1,000,000	40.4	117.40	21.09	2.26	60.7
	1,200,000	58.2	—	31.12	3.27	87.4
	1,300,000	68.4	—	37.09	3.84	102.6
150	100,000	0.55	1.11	0.26	0.03	0.79
	200,000	2.19	4.51	1.04	0.12	3.18
	300,000	4.9	10.33	2.37	0.27	7.2
	500,000	13.7	30.65	6.67	0.73	19.9
	700,000	26.9	68.90	13.35	1.44	39.0
	800,000	35.1	104.01	17.68	1.89	50.9
	900,000	44.4	—	22.74	2.40	64.5

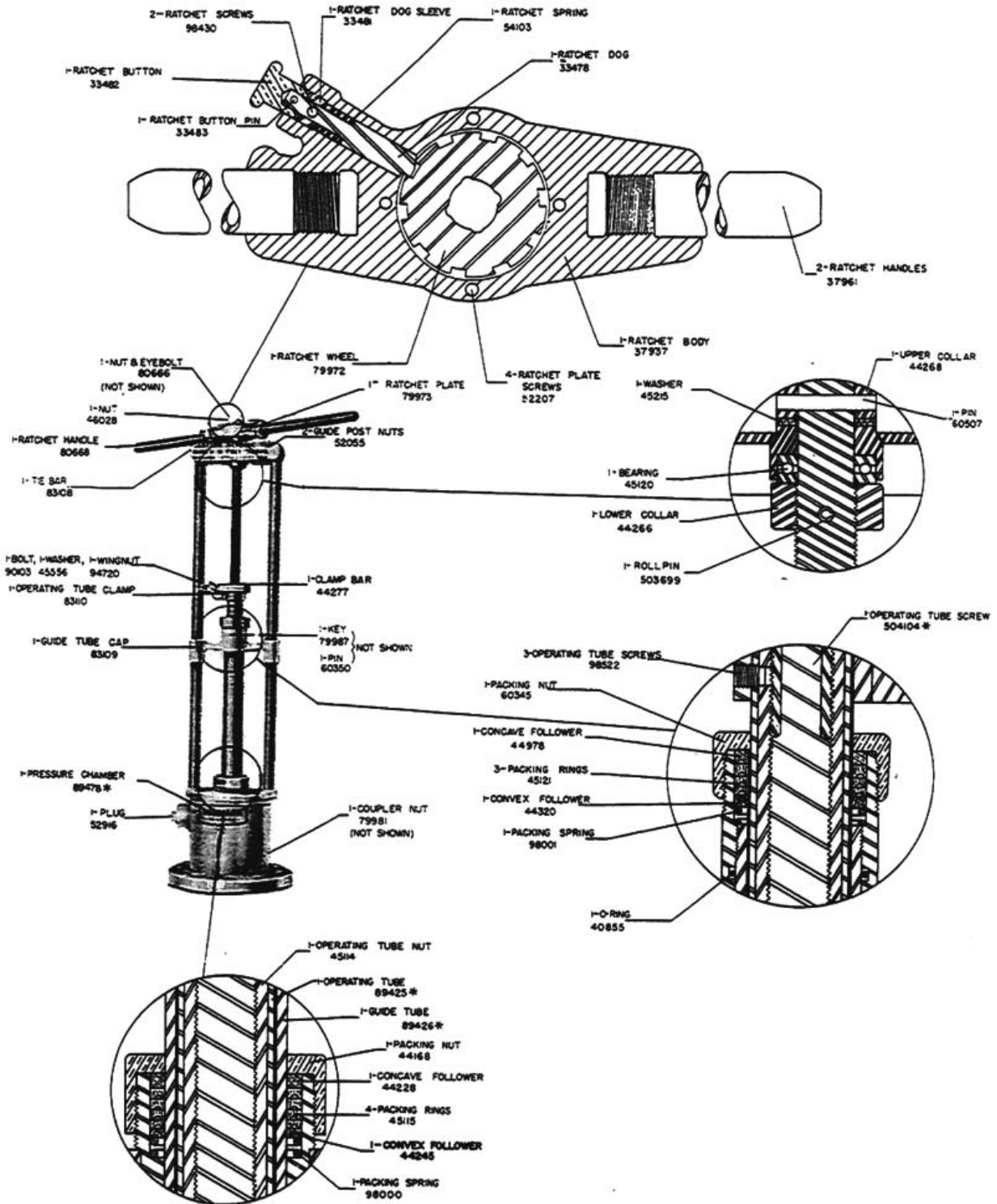
8" STEEL WEDGE STOPPER

A Upstream Pressure PSIG	B Flow Rate Cu. Ft. Per Hour Of .60 Sp. Gr. Gas At Standard Conditions	C Press.-Drop Through Up-Stream Stoppers PSI	D Pressure Drop Through 100 Ft. of Pipe — PSI*			E Press. Drop Through Down- Stream Stoppers PSI*
			By-Pass Pipe Size			
			3"	4"	6"	
125	100,000	0.66	.132	0.30	0.03	0.95
	300,000	6.0	12.35	2.80	0.31	8.5
	500,000	16.6	37.92	7.93	0.87	23.6
	600,000	24.0	60.14	11.57	1.25	34.1
	700,000	32.7	100.11	16.02	1.71	46.4
	800,000	42.7	—	21.35	2.24	60.6
	100	100,000	0.84	1.61	0.38	0.04
200,000		3.34	6.57	1.51	0.17	4.6
300,000		7.5	15.41	3.43	0.38	10.5
400,000		13.3	29.29	6.17	0.68	18.6
500,000		20.8	51.46	9.80	1.06	29.1
600,000		30.1	—	14.42	1.52	41.8
75	80,000	0.70	1.32	0.31	0.03	0.98
	200,000	4.43	8.58	1.94	0.22	6.1
	300,000	9.9	20.78	4.43	0.49	13.7
	400,000	17.6	42.95	8.04	0.87	24.4
	450,000	22.2	—	10.31	1.10	30.9
	500,000	27.5	—	12.93	1.36	38.2
50	60,000	0.58	1.03	0.24	0.03	0.77
	150,000	3.64	6.72	1.51	0.17	4.8
	200,000	6.5	12.54	2.72	0.30	8.6
	250,000	10.1	21.15	4.30	0.47	13.4
	300,000	14.5	34.88	6.29	0.68	19.4
	350,000	19.9	—	8.74	0.92	26.4
25	50,000	0.70	1.17	0.27	0.03	0.89
	75,000	1.59	2.69	0.61	0.07	1.99
	125,000	4.41	8.01	1.73	0.19	5.5
	150,000	6.4	12.28	2.52	0.27	8.0
	160,000	7.2	14.43	2.88	0.31	9.1
	170,000	8.2	—	3.27	0.35	10.3
	15	40,000	0.64	1.00	0.23	0.03
80,000		2.53	4.25	0.94	0.10	3.08
100,000		3.99	6.99	1.49	0.16	4.85
110,000		4.82	8.75	1.81	0.20	5.9
120,000		5.7	—	2.17	0.24	7.0
10		40,000	0.79	1.22	0.28	0.03
	60,000	1.77	2.83	0.64	0.07	2.11
	70,000	2.41	3.95	0.87	0.10	2.87
	80,000	3.15	5.32	1.14	0.13	3.75
	90,000	3.98	7.0	1.45	0.16	4.74
5	30,000	0.58	0.86	0.20	0.02	0.67
	40,000	1.04	1.55	0.35	0.04	1.19
	45,000	1.32	1.98	0.45	0.05	1.51
	50,000	1.62	2.48	0.55	0.06	1.87
	55,000	1.96	3.05	0.67	0.07	2.25

*These losses depend on previous pressure drops in the upstream stopper and/or by-pass line. See example, Page 50.

LINE STOPPER UNIT NO. 3SW-500

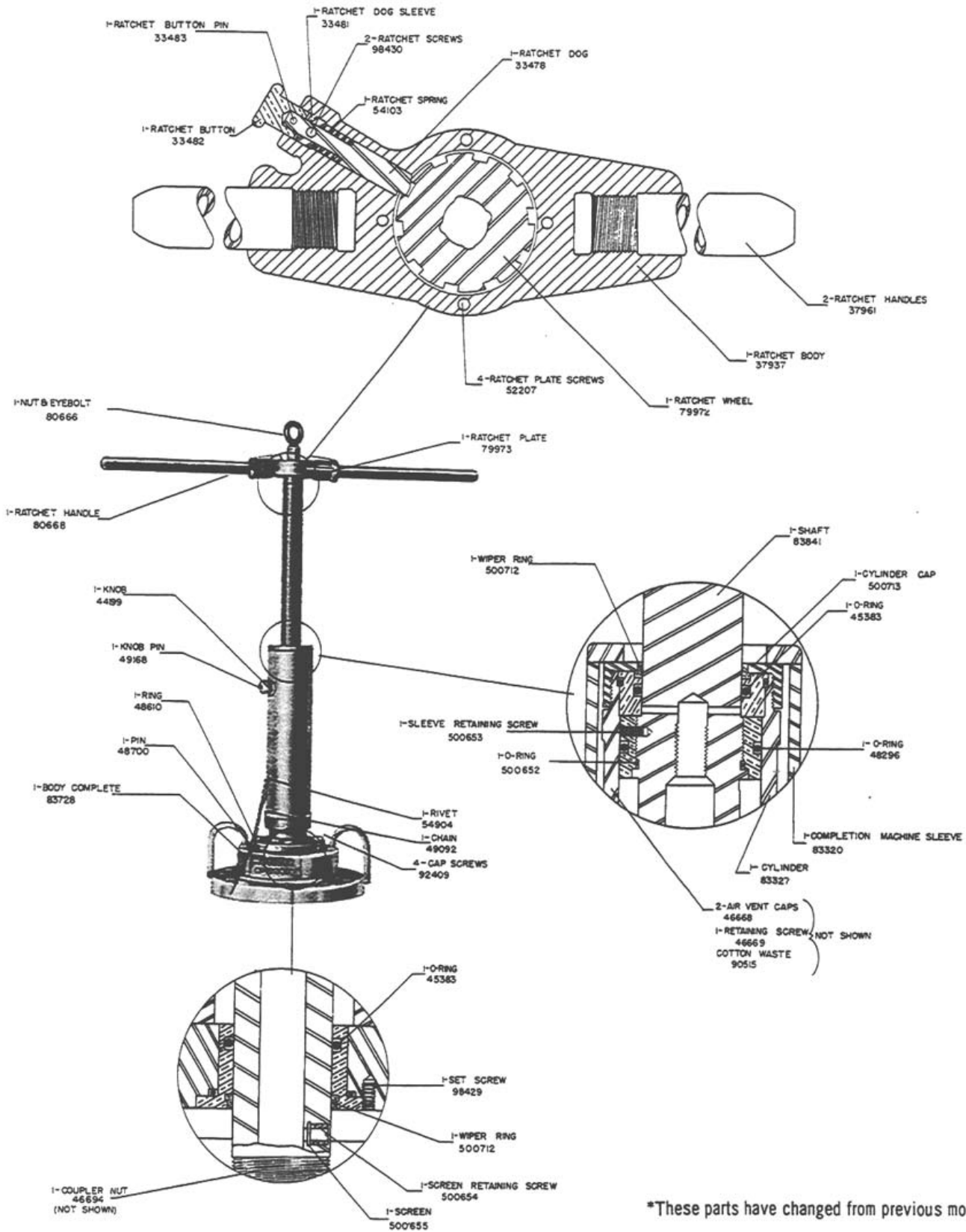
PARTS FOR H-17342.
STOPPING MACHINE



* These parts have changed from previous models.

**PARTS FOR H-17347
COMPLETION MACHINE**

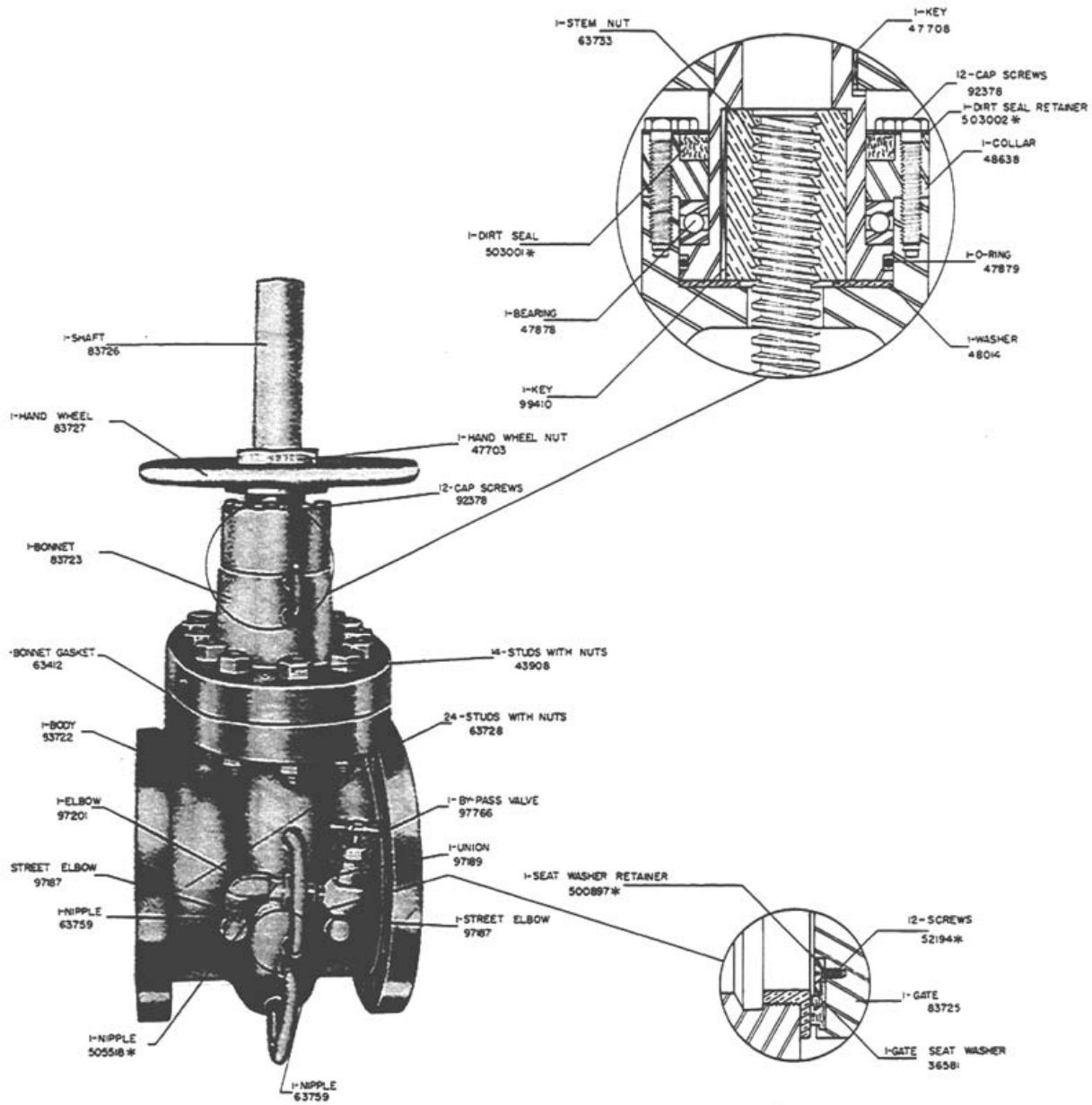
LINE STOPPER UNIT NO. 3SW-500



*These parts have changed from previous models.

LINE STOPPER UNIT NO. 3SW-500

PARTS FOR
3SW-500 GATE VALVE



* These parts have changed from previous models.



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