

Mueller Co.

Operating Instructions for

CL-12 DRILLING MACHINE

Mueller Co.

MAIN OFFICE and PLANT

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! 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. Do not use any power operator in reverse direction with Automatic Feed engaged in an attempt to return machine boring bar to retracted position as this will cause internal damage to machine.
6. 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.

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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CL-12 DRILLING MACHINE

Maintenance Instructions

LUBRICATION

Drain and replace lubricant (gear oil) after the first 10 hours of operation and after each 50 hours of operation thereafter.

Keep the front gear case and rear gear case properly filled with gear oil. This level may be checked by removing oil plugs on gear cases while machine is lying on level surface. Drive spindle and indicators would be on top during this check. Oil level should be even with gear case oil lug threads.

CL-12 Machine requires four pints (4 lbs.) of gear oil in front gear case and four pints in rear gear case.

Mueller Part No. 89347 gear oil is used. This gear oil needs no thinning in cold weather.

PACKING

Boring bar packing on machines is a "V" or chevron type packing, which is automatically adjusted by a spring. There is no take up. When packings leak, they should be replaced with new ones. Packings are good for water, gas, or petroleum products.

To replace Boring bar packing, see Special Instructions on page 20.

Packing leakage may be determined by observing two small drain holes in sides of machine behind front flange. These vents prevent pressure from entering into the gear case.

All oil seals in CL-12 Machines are "o" ring seals, which are non-adjustable. If leakage occurs, new "o" rings are required.

CUTTING EQUIPMENT

Sharpen cutters and point drills by touching them up with an oilstone before each cut. Front edge of cutter tips should be lightly honed.

If cutters are very dull or show excessive wear, return to MUELLER CO. for reconditioning.

CAUTION: Keeping cutters sharp assures maximum efficiency in cutting operations. When cutters are dull they not only make cutting more difficult, but place an additional strain on the tips which can cause tip breakage.

When not in use keep cutters in a wooden container.

NOTE: Be careful not to drop cutter and damage

cutter tips.) If necessary to set cutter on tips, place upon wood rather than brick, concrete or metal.

Cutters used with CL-12 Machines are tungsten carbide tipped for making lateral connections through tapping valves.

Tungsten carbide tipped cutters are designed for cutting cast iron, cement-lined cast iron, asbestos-cement reinforced concrete and steel pipe.

A cutter which has been used on cast iron or steel pipe can be used on cement-lined, asbestos-cement or reinforced concrete pipe without resharpener.

A cutter which has been used on abrasive materials cannot be used on metal pipe without resharpener.

Steel cutter hubs are used with CL-12 Machines.

All pilot drills are threaded into the cutter hub with thread sizes arranged to prevent wrong use of drills and cutters. Drills are provided with wrench flats permitting removal of pilot without removing cutter. All pilot drills have spring loaded detents to retain coupon cut by shell cutter. These detents are removable for cleaning or replacement.

Always check detents before using to be sure they are operating correctly.

AFTER USE

Dirt and excess grease should be cleaned from machine after use. Boring bar should be given a light coat of oil to prevent rust, and this should be done with boring bar slightly extended. Oiled bar will pull lubrication into packings as bar is retracted.

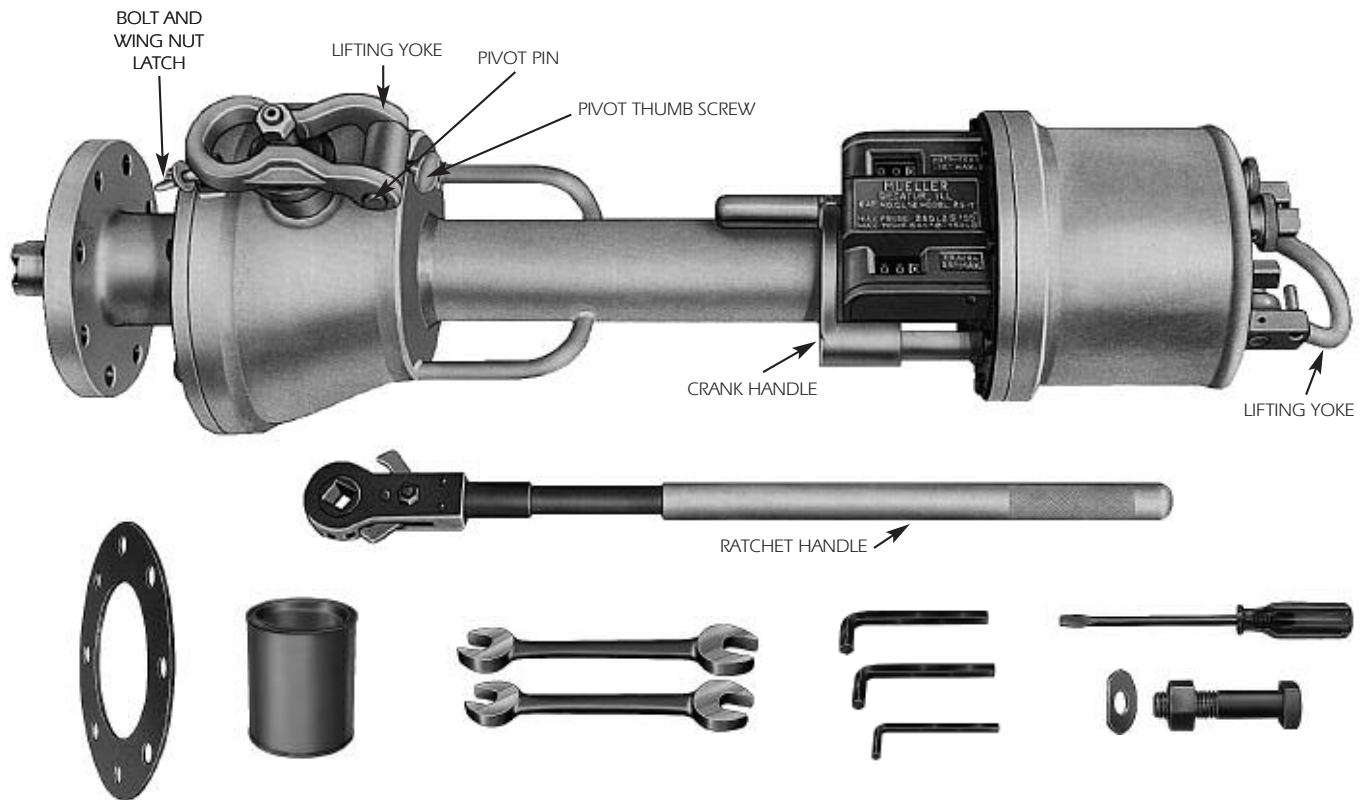
Cutters, drills, hubs, etc. should be lightly oiled after use to prevent rusting.

STORAGE

When not in use the CL-12 Machine should be kept in wooden chest during period of being transported to jobs or stored.

CL-12 DRILLING MACHINE

General Specifications



EQUIPMENT FURNISHED WITH EACH MACHINE

Ratchet Handle
Screw Driver
3 – Double Open End Wrenches
3 – Allen Screw Wrenches
8 – 5/8" x 3" Bolts and Nuts - Machine to Adapter
8 – 11/16" D-Type Washers - Machine to Adapter
Gasket – Machine to Adapter
Cutting Grease

CAPACITY AND USE

The CL-12 Machine may be hand operated by means of a ratchet handle or power operated by either the H614 Air Power Operator or H607 Hydraulic Power Operator.

When used with tapping valves it will make cuts up to 1 1/2" diameter, under pressure, for lateral connections.

The CL-12 Machine is equipped with an Automatic Feed feature. The amount of travel required can be set in inches and tenths of an inch. The Automatic Feed will disengage automatically when the pre-set amount of travel is completed.

CAUTION: Do not use any power operator in reverse direction with Automatic Feed engaged in

an attempt to return machine boring bar to retracted position as this will cause internal damage to machine.

NOTICE: Under certain circumstances some machines may retract the boring bar after the Automatic Feed disengages and the power operator is allowed to continue running in the forward direction. This will not cause damage to the machine or power operator.

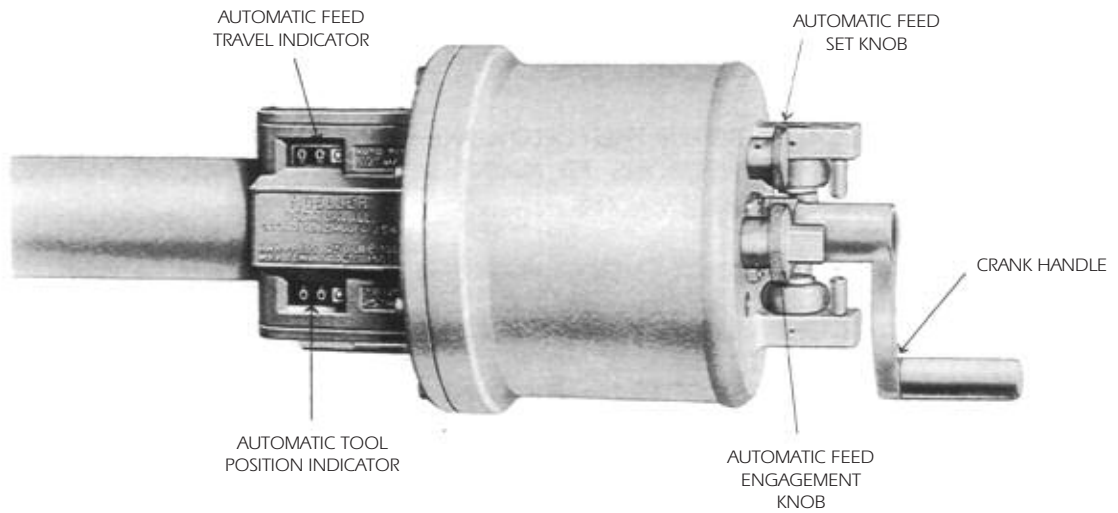
This machine has an automatic over travel protection device which automatically disengages tool feed when maximum 25" travel of machine is reached. Damage to the machine is prevented even if the Automatic Feed is incorrectly set for travel beyond the maximum travel of the machine.

The CL-12 Machine also has a full-time automatic feed travel indicator. This indicator subtracts as the cut is made and indicates at all times the amount of travel remaining in automatic feed.

The CL-12 Machine is also equipped with a full-time automatic tool position (or boring bar) travel indicator. The position of the shell cutter and pilot drill in relation to its rearmost or fully retracted position is indicated at all times. This indicator adds as the tools advance and subtracts as they are retracted.

CL-12 DRILLING MACHINE

General Specifications



WORKING PRESSURE AND TEMPERATURE

250 psi – Maximum working pressure at 100° F.
500° F – Maximum temperature rating at 150 psi.

LENGTH OF TRAVEL

25" is adequate for all sizes of Mueller Tapping Sleeves and Valves. The CL-12 Machine can be set to automatic feed for any 12" of this travel.

EQUIPMENT TO BE SELECTED

See Mueller Water Products Catalog for equipment required for use with Mueller Tapping Sleeves and Valves to make lateral connections.

MACHINE WEIGHT CHART

	CL-12
Machine & Equipment Shipped in Strong Wooden Chest	400 lbs.
Machine Only	260 lbs.

CL-12 DRILLING MACHINE

Drilling Equipment for Tapping Sleeves and Valves & Power Unit



SHELL CUTTER



PILOT DRILL

NUT, BOLT AND WASHER



DRILL



FLANGE



AQUAGRIP ADAPTER



CUTTER HUB



HUB END ADAPTER GASKET



HUB END ADAPTER



MECHANICAL JOINT "O" RING ADAPTER GASKET



MECHANICAL JOINT ADAPTER

THE FOLLOWING EQUIPMENT IS USED FOR MAKING LATERAL CONNECTIONS TO MAINS BY DRILLING THROUGH TAPPING SLEEVES AND VALVES.

SHELL CUTTER – According to size of valve to be used.

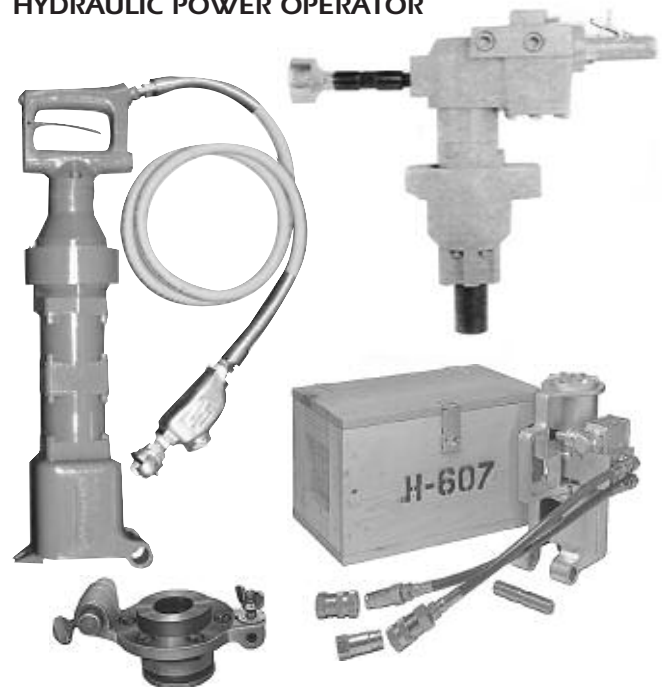
CUTTER HUB – According to size of shell cutter

PILOT DRILL – According to size of shell cutter

DRILL – When used with 2" and 2 1/4" tapping valve it replaces shell cutter, cutter hub and pilot drill.

ADAPTER – According to size and type of tapping valve to be used. (These Adapters are for a working pressure of 200 psi at 100° F.)

H-614 MUELLER AIR MOTOR AND H607 HYDRAULIC POWER OPERATOR



IMPORTANT: For H614, maintain pressure of 90 psi. We recommend the use of a gage at the throttle to determine the actual pressure OF AIR AT THE AIR MOTOR.

CL-12 DRILLING MACHINE

Installation and Operating Instructions

1. Inspect cutter and pilot drill to make sure that they are sharp. If cutter is dull it should be sharpened as described in maintenance instructions. Check pilot drill detents before each operation to make sure they will move completely to the submerged position.

2. Bolt proper size of adapter to front a machine. FIGURE 1. Check to be sure machine to adapter gasket is in good condition and in place. (All gaskets should be periodically replaced)

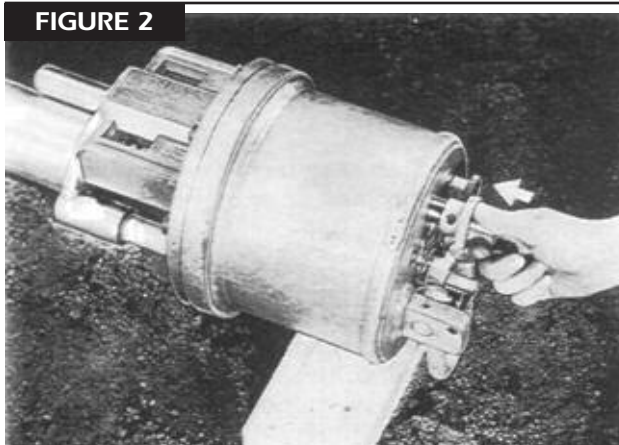
NOTE: On the rear case of the CL-12 Machine you will see two Knurled Knobs. One is marked Automatic Feed Set. This knob is used to set the amount of travel required automatic feed to complete the cut. See instructions 13.

The other Knurled Knob is the Automatic Feed Engagement Knob which is used to place the machine in automatic feed. See instruction 3 in next column.

FIGURE 1



FIGURE 2

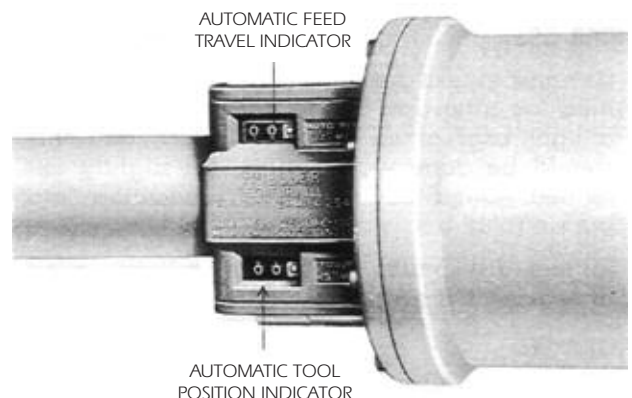


To disengage these knobs—push them in or towards the gear case.

To engage these Knobs —pull them out or away from the gear case.

3. Disengage automatic feed by pushing in on Automatic Feed Engagement Knob on rear of machine, FIGURE 2. this knob has squared end and is indicated by a name or panel on rear of machine.
4. Remove crank handle from its position on the combination shaft and pipe plug located below and alongside Automatic Feed travel and Tool position Indicates. FIGURE 3. Attach crank handle to center squared shaft and rotate **clockwise** to advanced boring bar. FIGURE 4. Boring bar should be advanced enough to expose hub retaining screw hole beyond face of the machine adapter.
5. Attach proper drilling equipment to the boring bar.
 - a. 2" size. Remove retaining screw from boring bar adapter. Insert boring bar adapter into socket in the boring bar. Align holes in boring bar adapter and boring bar. Replace retaining screw by inserting it through in boring bar and in boring bar adapter tapped hole. Tighten securely with screw driver. Screw solid drill into boring bar adapter. Wrench flats on drill may be used to tighten drill into boring bar adapter.
 - b. 2 1/2" size. Remove retaining screw from cutter arbor. Insert cutter arbor into socket in the boring bar. Align the 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 wrench.

FIGURE 3



CL-12 DRILLING MACHINE

Installation and Operating Instructions

- c. 3 1/2" size and larger. Remove hub retaining bolt and lock washer from cutter hub. Slide cutter hub from boring bar. Align the holes in the cutter hub and the boring bar. Replace the hub retaining bolt and lock washer by inserting it through hole and hub, boring bar and into cutter hub tapped hole. Tighten securely with wrench. FIGURE 5.

NOTE: If cutter hub is E-Z Release type (5 1/2" size and larger), tighten allen head cap screws so that the backing ring is rigid with the cutter hub. FIGURE 6. This must be done before shell cutter is attached to hub.

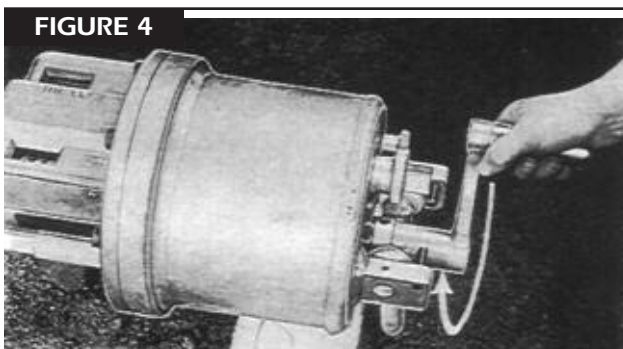
Lubricate cutter hub treads with cup grease and attach shell cutter threading it onto hub hand tight.* FIGURE 7. Lubricate pilot drill threaded shank end and screw it securely into cutter hub. Wrench flats are provided on pilot drill.* FIGURE 8. Check detents on pilot drill to be sure they are operating correctly.

6. Coat solid drill or shell cutter and pilot drill thoroughly with MUELLER cutting grease (88366). When drilling or cutting A-C or concrete pipe, do not use cutting grease.
7. Open valve completely and measure the exact size of opening and size of cutter to make sure the entire opening is clear and unobstructed and the cutter will pass freely.

NOTE: Diameter of boring bar is 2" which will pass through 2" tapping valves but may not pass through other 2" valves.

8. Retract boring bar to its rearmost position by rotating feed crank handle counter-clock-wise. FIGURE 10. Tool position Indicator, FIGURE 3,

*Place the front lifting yoke over the square drive spindle to prevent rotation of boring bar when attaching tools. FIGURE 9.



will read 000 when tools are fully retracted. Measure the distance the pilot drill extends beyond or behind the face of the machine adapter flange. FIGURE 11. This information will be used later for check purposes in instruction No. 11. Also measure the distance from gate valve outlet flange to gate valve gate to be sure pilot drill or cutter will not interfere with operation of valve.

FIGURE 5



FIGURE 6

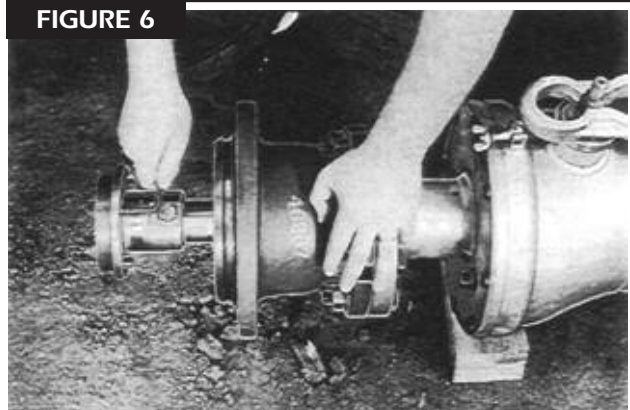
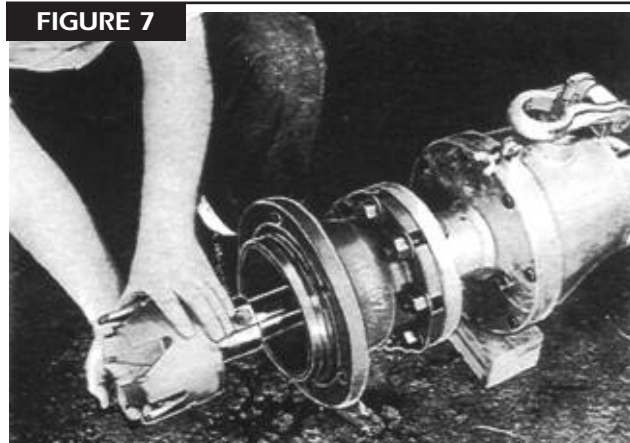


FIGURE 7



CL-12 DRILLING MACHINE

Installation and Operating Instructions

FIGURE 8



FIGURE 9

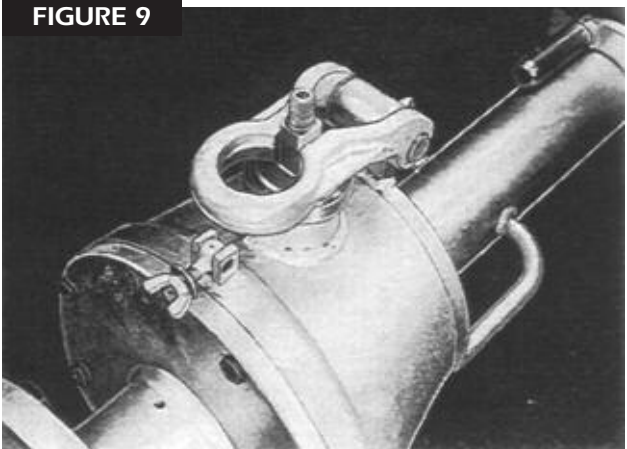
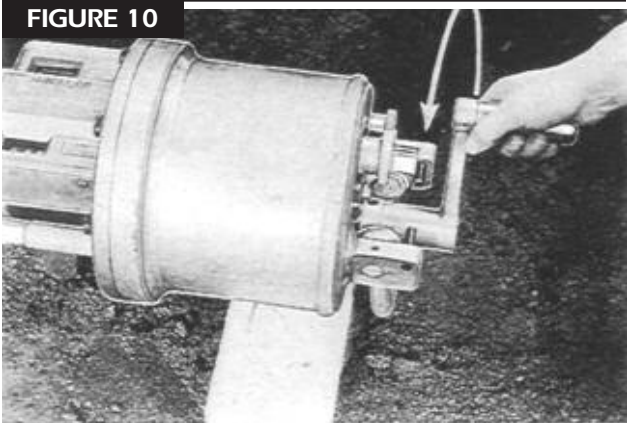


FIGURE 10



9. Place the machine (with adapter and drilling equipment assembled) in drilling position. for horizontal use, support the assembly by blocking up under the machine or valve.

For hand operation the driving spindle should be on the left side of the machine when facing the main. For power operation the driving spindle should be at a right angle to the main.

Check to be sure that adapter gasket is in good condition and in place. FIGURE 12.

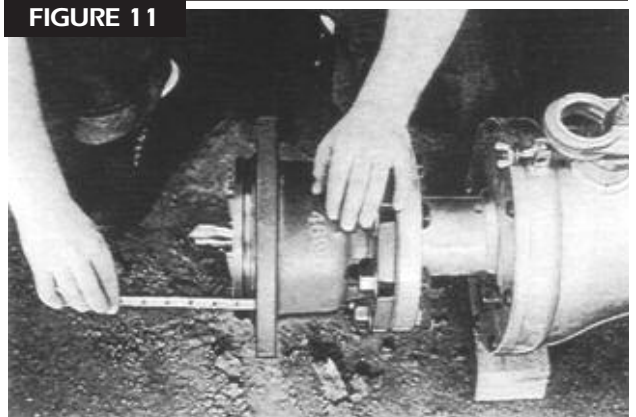
Place machine and adapter against valve, allowing cutter and pilot drill to extend into the end of the valve. FIGURE 12. Install bolt and nuts and tighten evenly to valve.

10. Test set up for pressure tightness with water.
11. Lay a scale or rule alongside the tapping sleeve and valve and measure the machine adapter to pipe distance. FIGURE 13. This distance, plus or minus the amount the pilot drill extends or is behind the face of the machine adapter flange, is the approximate distance the pilot drill should travel to reach the main.
12. Rotate feed crank handle **clockwise** to advance the boring bar until the pilot drill contacts the main.

Tool Position Indicator (see FIGURE 3) should now read the approximate amount that was computed in instruction 11.

CAUTION: If Tool Position Indicator does not read approximately the same as the computed amount, it indicates that the pilot drill has encountered an obstruction and is not contacting the main.
13. Check to be sure Automatic Feed Set Knob is disengaged. (Push in on knob to disengage.) Turn Automatic Feed Set Knob **counter-clockwise** to set the desired amount of Automatic feed on Automatic Feed Travel Indicator. FIGURE 15. Pull out on Automatic Feed Set Knob to engage the automatic Feed Travel Indicator after correct amount has been set. See Travel Charts on page 16, 17, 18 and 19.

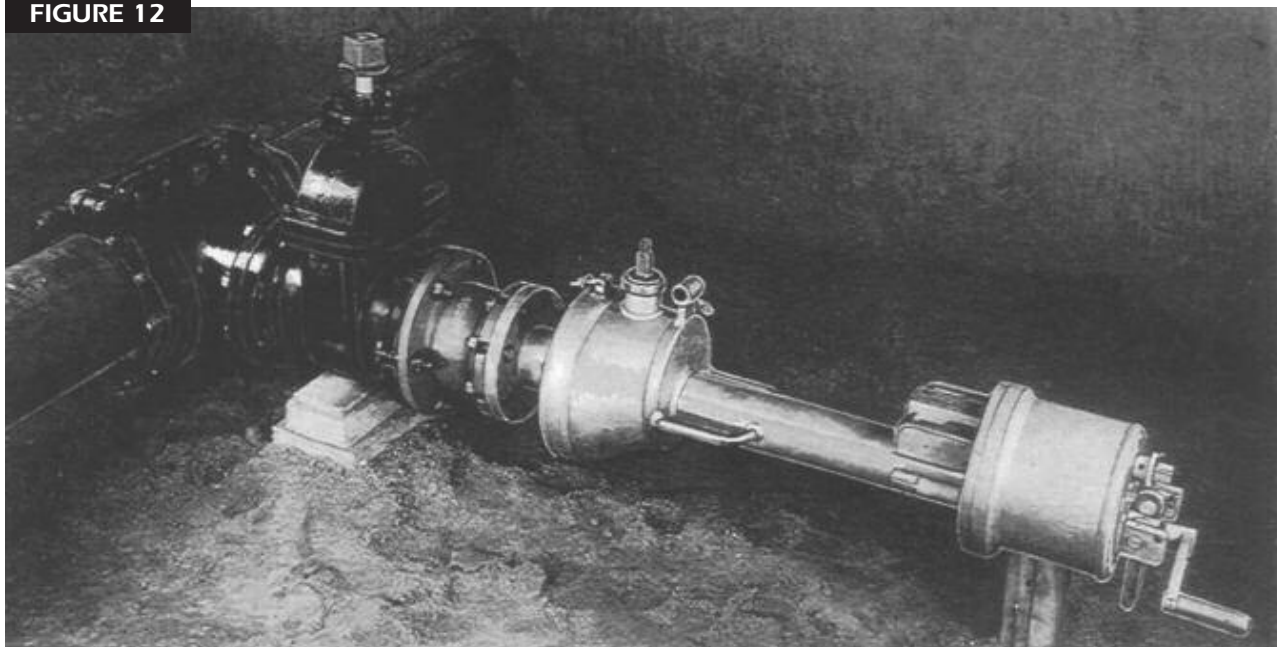
FIGURE 11



CL-12 DRILLING MACHINE

Installation and Operating Instructions

FIGURE 12



While cut is being made, the amount set on the automatic Feed Travel Indicator, see FIGURE 3, will subtract until the completion of the cut. It will then register 000.

NOTE: It is always necessary to pre-set for some amount of feed to permit machine to automatically advance the boring bar, otherwise it will not feed.

To replace or reset either Indicator, see Special Instructions on page 20.

14. Pull out on Automatic Feed Engagement Knob and rotate feed crank **counter-clockwise** until dive key engages. FIGURE 16. This can be felt when crank handle ceases to freely rotate. This rotation releases the tension between pilot drill and main and does not change the pre-set disengagement point.
- 15A. When hand operating the CL-12 Machine – Loosen the pivot thumb screw. This permits the pivot pin to be removed so that the front lifting yoke may be removed.

Attach ratchet handle to drive spindle and set the **clockwise** rotation. Always operate the machine according to instructions with one man only on ratchet and using automatic feed to assure correct drilling and tapping rate.

FIGURE 13

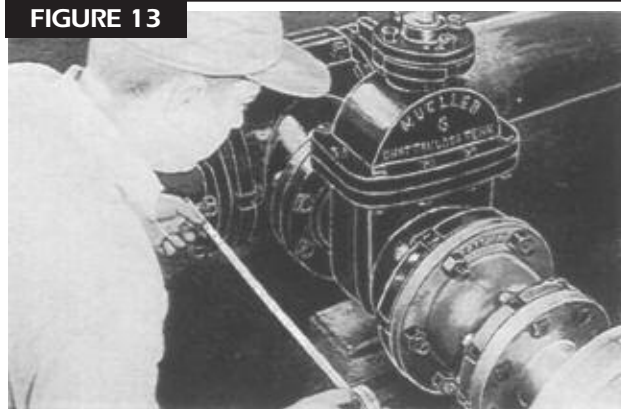
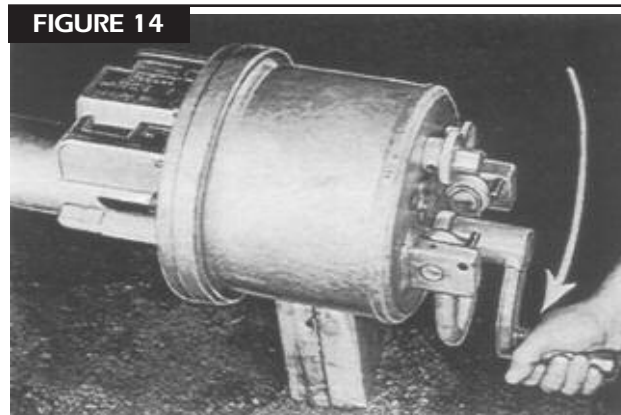


FIGURE 14



CL-12 DRILLING MACHINE

Installation and Operating Instructions

FIGURE 15

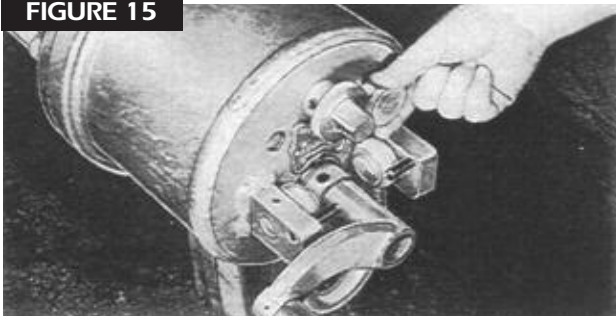
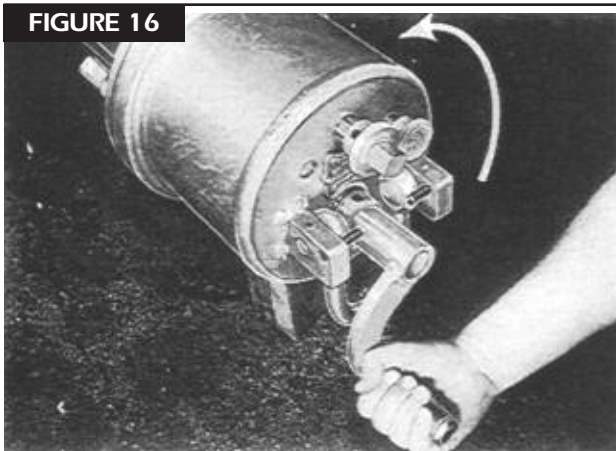


FIGURE 16



If cut becomes too difficult for one man, do not force machine as this may damage cutter or machine. Follow one of the methods listed in instruction 23.

Hand operated CL-12 Machine should have a boring bar advance of about .015" per minute, if operator can maintain 5 RPM on input spindle. This rate would require about 60 minutes to advance one inch. Smaller cuts permit higher input speed and cutting times will be reduced accordingly.

- 15B. When power operating the CL-12 Machine with the Mueller H-614 Air Power Operator or H607 Hydraulic Power Operator

Loosen the pivot thumb screw, this permits the pivot pin to be removed so that the front lifting yoke may be removed and the operator may be attached to the holder pivot on the front gear case of the CL-12 Machine. Position the operator

and replace pivot pin. Tighten the pivot thumb screw and latch the operator in position with the bolt and wing nut latch provided on gear case to prevent movement.

Open operator throttle fully.

Important: Maintain 90 psi air pressure for the H614 Air Power Operator and 1500 psig for the H607 Hydraulic Power Operator. These pressures should be measured at the operator with gauge.

When power operating the CL-12 Machine, the boring bar in automatic feed should advance about .187 per minute or require 5+ minutes to advance an inch.

If cutting becomes difficult and stalling occurs follow on the the methods listed in instruction 23.

16. Continue cutting operation until automatic feed disengages. If for some reason the preset automatic feed was set for more than the travel remaining in machine, feed will be automatically disengaged when boring bar travel limit is reached. When cut is completed, both the Automatic Feed Set Knob and Automatic Feed Engagement Knob will be in the forward or disengaged positions. FIGURE 19.

If the pre-set automatic feed was not disengaged when cutting is completed for some reason, a safety device is built in to prevent damage to this mechanism.

17. Check to see if cut is completed by attempting to advance boring bar by hand advance. Rotate crank **clockwise**. See FIGURE 4. If boring bar advances easily, cut is completed.
18. Rotate crank handle **counter-clockwise** to return boring bar to rearmost position. See FIGURE 10.

CL-12 DRILLING MACHINE

Installation and Operating Instructions

FIGURE 17

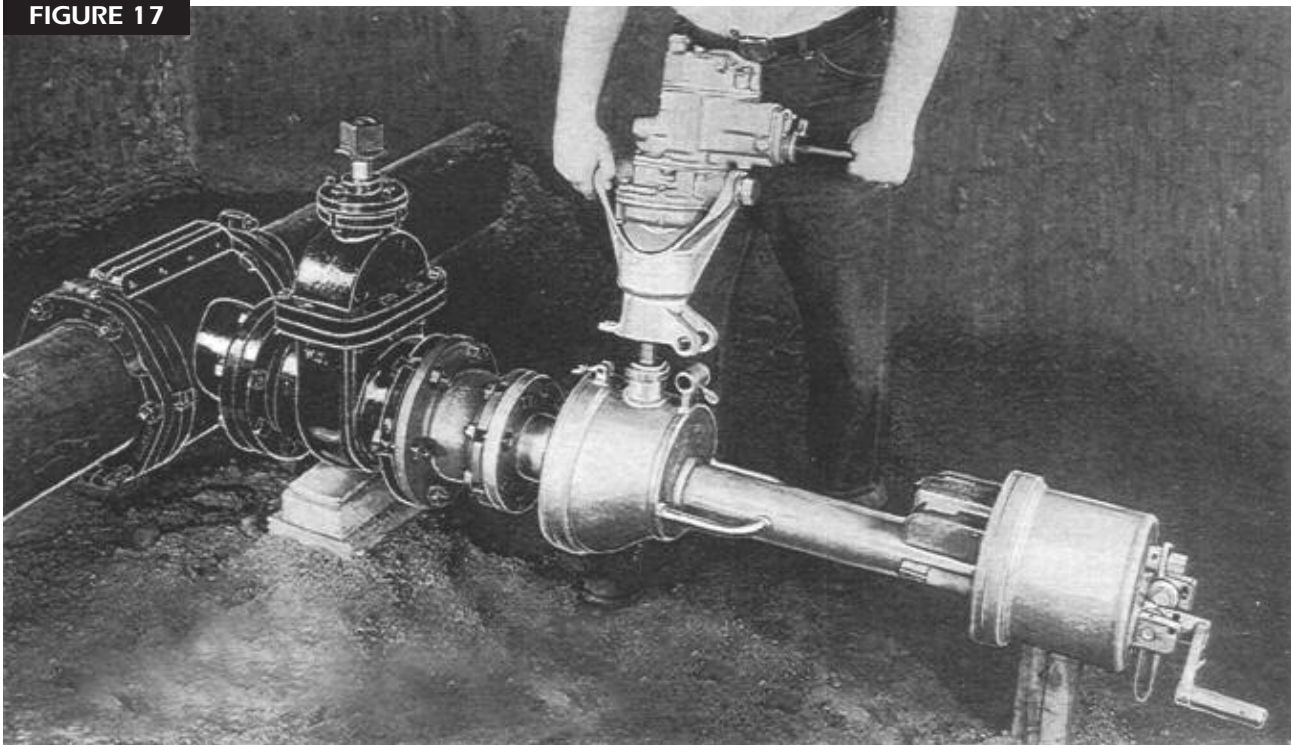
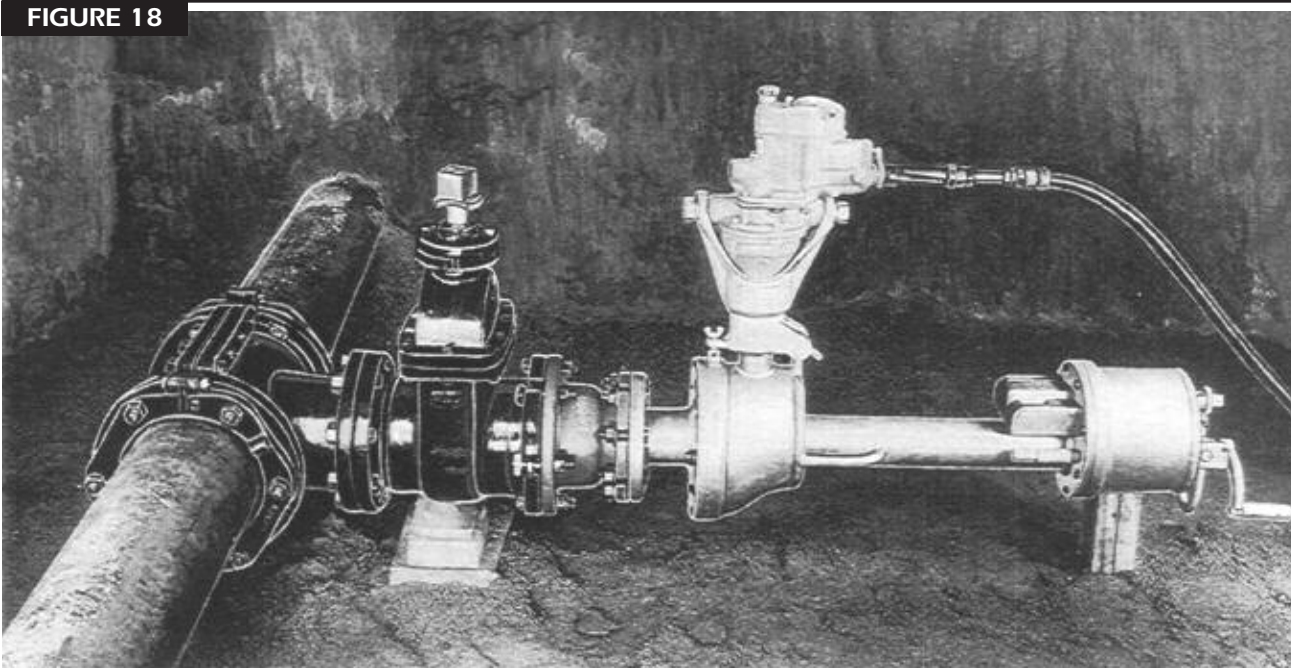


FIGURE 18



CL-12 DRILLING MACHINE

Installation and Operating Instructions

FIGURE 19



19. Close valve securely.
20. Remove the power operator with its holder from the machine pivot.
21. Unbolt adapter from valve and remove adapter, cutting equipment, and drilling machine as a unit.
22. Advance boring bar by rotating feed crank **clockwise** until cutter hub retaining screw is exposed. Remove retaining screw and remove cutter hub, pilot drill, and cut-out section of pipe or coupon.*

If pilot or cutter is to be removed hub, leave hub on boring bar until pilot drill is loosened and cutter is loosened from hub.*

To remove the shell cutter from the E-Z Release Cutter Hub, loosen allen head cap screws in backing ring. Shell Cutter may then be easily taken off.*

Coupon may be slipped over pilot drill detents and out of cutter or pilot may be removed from hub to remove coupon.*

23. If cutting operation becomes difficult, follow one to these methods.
 - a. If cutter has difficulty in cutting, becomes dull or should stall after the cut is started it is probably due to scale on the main or excessive hardness of pipe.
 - b. Mark down the settings on both the Automatic Feed Travel Indicator and the tool Position Indicator, This is for reference when reassembling the set up.
 - c. Push in on both Automatic Feed Set Knob and Automatic Feed Engagement Knob – this will disengage the Automatic Feed Travel Indicator and will also disengage the automatic feed.

*Replace the front lifting yoke and place the front lifting yoke over the square drive spindle to prevent rotation of boring bar when removing tools. See FIGURE 9.

CL-12 DRILLING MACHINE

Travel Chart

TRAVEL CHART CL-12 - PLASTIC PIPE - PVC (CI)							
PIPE SIZE	CUTTER OD	CLASS (DR)					
		100 (25)	125	150 (18)	165	200 (14)	235
4"	3.375	2.01	-	2.15	-	2.30	-
6"	3.375	1.80	-	1.94	-	2.09	-
	5.000	2.55	-	2.75	-	2.98	-
8"	3.375	1.77	-	1.94	-	2.12	-
	5.000	2.25	-	2.45	-	2.66	-
	6.625	3.08	-	3.35	-	3.66	-
10"	3.375	1.79	-	1.99	-	2.20	-
	5.000	2.16	-	2.38	-	2.61	-
	6.625	2.73	-	3.00	-	3.27	-
	8.375	3.72	-	4.09	-	4.50	-
12"	3.375	1.83	-	2.07	-	2.32	-
	5.000	2.14	-	2.39	-	2.65	-
	6.625	2.59	-	2.86	-	3.15	-
	8.375	3.29	-	3.62	-	3.97	-
	10.000	4.27	-	4.70	-	5.21	-
PIPE SIZE	CUTTER OD	CLASS (DR)					
		100 (41)	125 (32.5)	150	165 (25)	200 (21)	235 (18)
14"	3.375	1.62	1.73	-	1.89	-	2.17
	5.000	1.87	1.98	-	2.15	-	2.44
	6.625	2.23	2.34	-	2.52	-	2.83
	8.375	2.76	2.89	-	3.08	-	3.42
	10.000	3.43	3.58	-	3.80	-	4.19
16"	3.375	1.66	1.78	-	1.96	-	2.27
	5.000	1.87	1.99	-	2.18	-	2.50
	6.625	2.18	2.31	-	2.51	-	2.84
	8.375	2.63	2.77	-	2.98	-	3.34
	10.000	3.18	3.33	-	3.56	-	3.95
18"	3.375	1.70	1.83	-	2.04	2.21	2.35
	5.000	1.89	2.02	-	2.23	2.41	2.59
	6.625	2.16	2.30	-	2.52	2.69	2.88
	8.375	2.55	2.70	-	2.92	3.11	3.31
	10.000	3.02	3.17	-	3.42	3.62	3.83
20"	3.375	1.74	1.89	-	2.11	2.30	2.50
	5.000	1.91	2.06	-	2.29	2.48	2.68
	6.625	2.15	2.31	-	2.54	2.74	2.94
	8.375	2.50	2.66	-	2.90	3.11	3.32
	10.000	2.91	3.08	-	3.33	3.55	3.77
24"	3.375	1.83	2.01	-	2.28	2.50	2.73
	5.000	1.98	2.15	-	2.42	2.65	2.88
	6.625	2.17	2.35	-	2.63	2.86	3.10
	8.375	2.46	2.64	-	2.92	3.16	3.41
	10.000	2.79	2.97	-	3.27	3.51	3.77
30"	3.375	1.98	2.20	-	2.53	2.81	-
	5.000	2.10	2.31	-	2.65	2.93	-
	6.625	2.26	2.48	-	2.82	3.10	-
	8.375	2.48	2.70	-	3.05	3.33	-
	10.000	2.74	2.97	-	3.32	3.61	-
36"	3.375	2.14	2.40	-	2.80	3.13	-
	5.000	2.24	2.50	-	2.90	3.23	-
	6.625	2.37	2.63	-	3.03	3.37	-
	8.375	2.56	2.82	-	3.23	3.56	-
	10.000	2.77	3.03	-	3.45	3.79	-

CL-12 DRILLING MACHINE

Travel Chart

TRAVEL CHART SHELL CUTTER FOR CL-12 – PLASTIC PIPE - PVC (IP)						
PIPE SIZE	CUTTER OD	CLASS (DR)				
		100 (41)	125 (32.5)	160 (26)	200 (21)	250 (17)
4"	3.375	1.97	2.01	2.07	2.16	2.27
6"	3.375	1.68	1.73	1.80	1.88	1.98
	5.000	2.43	2.51	2.61	2.72	2.89
8"	3.375	1.60	1.67	1.75	1.85	1.97
	5.000	2.09	2.17	2.27	2.38	2.53
	6.625	2.93	3.04	3.18	3.34	3.57
10"	3.375	1.58	1.66	1.76	1.88	2.02
	5.000	1.95	2.04	2.15	2.27	2.43
	6.625	2.52	2.62	2.75	2.90	3.09
	8.375	3.50	3.64	3.81	4.02	4.31
12"	3.375	1.59	1.68	1.80	1.96	2.10
	5.000	1.89	1.99	2.11	2.26	2.44
	6.625	2.34	2.45	2.58	2.74	2.94
	8.375	3.04	3.17	3.32	3.51	3.76
	10.000	4.01	4.18	4.38	4.65	5.00
14"	3.375	1.61	1.70	1.83	1.98	2.16
	5.000	1.88	1.98	2.11	2.27	2.46
	6.625	2.28	2.39	2.53	2.70	2.90
	8.375	2.88	3.01	3.16	3.35	3.59
	10.000	3.68	3.82	4.01	4.24	4.54
16"	3.375	1.64	1.74	1.89	2.06	2.26
	5.000	1.87	1.98	2.13	2.30	2.52
	6.625	2.21	2.33	2.48	2.67	2.89
	8.375	2.71	2.84	3.01	3.21	3.46
	10.000	3.34	3.48	3.67	3.89	4.18
18"	3.375	1.67	1.79	1.95	2.14	2.37
	5.000	1.88	2.00	2.16	2.36	2.60
	6.625	2.17	2.30	2.47	2.67	2.92
	8.375	2.60	2.74	2.92	3.14	3.40
	10.000	3.13	3.28	3.47	3.70	4.00
20"	3.375	1.71	1.84	2.02	2.23	2.48
	5.000	1.89	2.03	2.21	2.42	2.68
	6.625	2.16	2.30	2.48	2.70	2.97
	8.375	2.54	2.68	2.88	3.11	3.39
	10.000	2.99	3.15	3.35	3.60	3.90
24"	3.375	1.79	1.95	2.16	2.41	2.72
	5.000	1.95	2.11	2.32	2.58	2.89
	6.625	2.16	2.33	2.55	2.80	3.12
	8.375	2.47	2.64	2.87	3.13	3.46
	10.000	2.83	3.01	3.24	3.52	3.86
30"	3.375	1.93	2.14	2.40	2.71	3.09
	5.000	2.06	2.26	2.52	2.83	3.22
	6.625	2.23	2.43	2.70	3.01	3.41
	8.375	2.47	2.68	2.95	3.27	3.67
	10.000	2.75	2.96	3.24	3.57	3.98
36"	3.375	2.08	2.33	2.64	3.01	3.46
	5.000	2.19	2.43	2.74	3.11	3.57
	6.625	2.33	2.57	2.89	3.26	3.73
	8.375	2.52	2.77	3.09	3.47	3.94
	10.000	2.75	3.00	3.33	3.72	4.19

CL-12 DRILLING MACHINE

Travel Chart

TRAVEL CHART							
CL-12 MACHINE - METALLIC OR PLASTIC PIPE - PVC (CI)							
PIPE SIZE	CUTTER OD	CLASS (DR)					
		100 (25)	125	150 (18)	165	200 (14)	235
4"	2.50	2.17	-	2.27	-	2.38	-
	3.50	2.65	-	2.80	-	2.96	-
6"	2.50	2.13	-	2.26	-	2.40	-
	3.50	2.40	-	2.55	-	2.70	-
	5.50	3.81	-	4.07	-	4.41	-
8"	2.50	2.16	-	2.33	-	2.50	-
	3.50	2.36	-	2.53	-	2.71	-
	5.50	3.33	-	3.55	-	3.78	-
	7.50	4.88	-	5.31	-	5.97	-
10"	2.50	2.22	-	2.42	-	2.62	-
	3.50	2.37	-	2.58	-	2.79	-
	5.50	3.19	-	3.42	-	3.66	-
	7.50	4.23	-	4.52	-	4.84	-
	9.50	6.01	-	6.71	-	-	-
12"	2.50	2.28	-	2.52	-	2.76	-
	3.50	2.41	-	2.65	-	2.90	-
	5.50	3.13	-	3.39	-	3.66	-
	7.50	3.97	-	4.27	-	4.58	-
	9.50	5.11	-	5.50	-	5.93	-
	11.50	6.85	-	8.02	-	-	-
PIPE SIZE	CUTTER OD	CLASS (DR)					
		100 (41)	125 (32.5)	150	165 (25)	200 (21)	235 (18)
16"	2.50	2.14	2.26	-	2.44	-	2.75
	3.50	2.23	2.35	-	2.54	-	2.85
	5.50	2.83	2.96	-	3.15	-	3.47
	7.50	3.45	3.58	-	3.79	-	4.13
	9.50	4.18	4.33	-	4.55	-	4.93
	11.50	4.83	4.99	-	5.25	-	5.70
18"	2.50	2.19	2.32	-	2.52	2.69	2.87
	3.50	2.27	2.40	-	2.61	2.78	2.96
	5.50	2.84	2.97	-	3.19	3.36	3.54
	7.50	3.40	3.55	-	3.77	3.95	4.14
	9.50	4.05	4.20	-	4.44	4.64	4.84
	11.50	4.56	4.73	-	4.99	5.21	5.44
20"	2.50	2.24	2.39	-	2.61	2.80	2.99
	3.50	2.31	2.46	-	2.69	2.87	3.07
	5.50	2.85	3.00	-	3.24	3.43	3.63
	7.50	3.38	3.53	-	3.77	3.97	4.18
	9.50	3.96	4.13	-	4.38	4.59	4.81
	11.50	4.38	4.55	-	4.82	5.05	5.29
24"	2.50	2.34	2.52	-	2.78	3.01	3.24
	3.50	2.41	2.58	-	2.85	3.07	3.30
	5.50	2.91	3.08	-	3.36	3.58	3.82
	7.50	3.37	3.55	-	3.83	4.06	4.31
	9.50	3.86	4.05	-	4.34	4.58	4.83
	11.50	4.15	4.35	-	4.65	4.91	5.17
30"	2.50	2.50	2.72	-	3.05	3.32	-
	3.50	2.55	2.77	-	3.10	3.38	-
	5.50	3.02	3.23	-	3.57	3.85	-
	7.50	3.42	3.65	-	3.99	4.27	-
	9.50	3.84	4.07	-	4.42	4.71	-
	11.50	4.03	4.26	-	4.62	4.91	-
36"	2.50	2.67	2.93	-	3.32	3.65	-
	3.50	2.71	2.97	-	3.37	3.70	-
	5.50	3.15	3.41	-	3.81	4.14	-
	7.50	3.52	3.78	-	4.19	4.52	-
	9.50	3.89	4.15	-	4.56	4.90	-
	11.50	4.00	4.27	-	4.69	5.04	-

CL-12 DRILLING MACHINE

Travel Chart

TRAVEL CHART CL-12 MACHINE - METALLIC OR PLASTIC PIPE - PVC (IP)						
PIPE SIZE	CUTTER OD	CLASS (DR)				
		100 (41)	125 (32.5)	160 (26)	200 (21)	250 (17)
4"	2.50	2.10	2.14	2.18	2.24	2.31
	3.50	2.62	2.67	2.73	2.82	2.95
6"	2.50	2.00	2.06	2.12	2.19	2.29
	3.50	2.28	2.33	2.41	2.48	2.59
	5.50	3.69	3.79	3.92	4.09	4.35
8"	2.50	1.99	2.06	2.14	2.23	2.35
	3.50	2.19	2.26	2.34	2.44	2.57
	5.50	3.18	3.26	3.37	3.49	3.65
	7.50	4.77	4.94	5.16	5.49	-
10"	2.50	2.01	2.09	2.19	2.30	2.44
	3.50	2.17	2.25	2.35	2.46	2.61
	5.50	2.98	3.07	3.18	3.31	3.48
	7.50	4.01	4.12	4.26	4.44	4.66
	9.50	5.76	5.99	6.31	6.85	-
12"	2.50	2.04	2.13	2.25	2.38	2.55
	3.50	2.17	2.27	2.38	2.52	2.69
	5.50	2.89	2.99	3.11	3.26	3.45
	7.50	3.72	3.84	3.98	4.15	4.37
	9.50	4.85	5.00	5.19	5.42	5.72
	11.50	6.57	6.90	7.44	-	-
14"	2.50	2.07	2.17	2.29	2.43	2.61
	3.50	2.19	2.28	2.41	2.56	2.74
	5.50	2.86	2.97	3.10	3.26	3.45
	7.50	3.62	3.73	3.88	4.06	4.28
	9.50	4.59	4.72	4.90	5.12	5.40
	11.50	5.74	5.93	6.19	6.54	7.03
16"	2.50	2.11	2.22	2.36	2.53	2.73
	3.50	2.21	2.32	2.46	2.63	2.84
	5.50	2.84	2.95	3.10	3.28	3.50
	7.50	3.50	3.63	3.79	3.98	4.22
	9.50	4.31	4.45	4.63	4.85	5.12
	11.50	5.10	5.26	5.48	5.76	6.10
18"	2.50	2.15	2.28	2.43	2.62	2.85
	3.50	2.24	2.37	2.53	2.72	2.95
	5.50	2.83	2.96	3.12	3.32	3.56
	7.50	3.43	3.57	3.74	3.95	4.21
	9.50	4.14	4.28	4.47	4.70	4.98
	11.50	4.74	4.90	5.12	5.38	5.71
20"	2.50	2.20	2.34	2.51	2.72	2.97
	3.50	2.28	2.42	2.59	2.80	3.06
	5.50	2.84	2.98	3.16	3.37	3.64
	7.50	3.39	3.54	3.73	3.95	4.23
	9.50	4.02	4.18	4.38	4.62	4.92
	11.50	4.51	4.68	4.90	5.16	5.49
24"	2.50	2.30	2.46	2.67	2.92	3.22
	3.50	2.37	2.53	2.74	2.99	3.29
	5.50	2.88	3.04	3.26	3.51	3.83
	7.50	3.37	3.54	3.76	4.02	4.34
	9.50	3.90	4.07	4.30	4.58	4.91
	11.50	4.23	4.42	4.66	4.95	5.31
30"	2.50	2.45	2.65	2.91	3.22	3.60
	3.50	2.51	2.71	2.97	3.28	3.66
	5.50	2.98	3.18	3.45	3.76	4.15
	7.50	3.40	3.61	3.88	4.20	4.59
	9.50	3.84	4.05	4.33	4.66	5.06
	11.50	4.05	4.27	4.56	4.90	5.32
36"	2.50	2.61	2.85	3.16	3.53	3.98
	3.50	2.65	2.90	3.21	3.58	4.03
	5.50	3.10	3.34	3.66	4.03	4.49
	7.50	3.48	3.73	4.05	4.42	4.89
	9.50	3.87	4.12	4.44	4.82	5.30
	11.50	4.00	4.26	4.59	4.98	5.47

CL-12 DRILLING MACHINE

Travel Chart

TRAVEL CHART CL-12 MACHINE - PLASTIC PIPE - HD PE (DI)							
PIPE SIZE	CUTTER OD	DR					
		21	17	15.5	13.5	11	9
4"	3.375	2.03	2.12	2.17	2.25	2.40	2.60
6"	3.375	1.82	1.92	1.96	2.04	2.19	2.39
	5.000	2.58	2.71	2.78	2.90	3.14	3.53
8"	3.375	1.79	1.91	1.96	2.06	2.23	2.44
	5.000	2.28	2.41	2.48	2.59	2.79	3.05
	6.625	3.12	3.30	3.39	3.55	3.87	4.34
10"	3.375	1.82	1.95	2.02	2.13	2.33	2.58
	5.000	2.20	2.34	2.41	2.54	2.76	3.03
	6.625	2.78	2.94	3.03	3.18	3.44	3.78
	8.375	3.78	4.01	4.13	4.35	4.79	5.50
12"	3.375	1.87	2.03	2.11	2.24	2.47	2.75
	5.000	2.18	2.34	2.42	2.56	2.81	3.12
	6.625	2.63	2.81	2.90	3.06	3.34	3.68
	8.375	3.34	3.55	3.66	3.85	4.19	4.63
	10.000	4.34	4.61	4.76	5.03	5.56	6.44
14"	3.375	1.94	2.10	2.20	2.36	2.62	2.94
	5.000	2.20	2.38	2.47	2.64	2.91	3.25
	6.625	2.57	2.77	2.87	3.04	3.34	3.71
	8.375	3.14	3.36	3.47	3.66	4.00	4.42
	10.000	3.86	4.12	4.25	4.48	4.89	5.42
16"	3.375	2.01	2.21	2.89	2.48	2.78	3.15
	5.000	2.24	2.44	2.55	2.71	3.04	3.41
	6.625	2.56	2.78	2.89	3.07	3.40	3.80
	8.375	3.04	3.27	3.39	3.59	3.94	4.38
	10.000	3.62	3.88	4.01	4.23	4.63	5.14
18"	3.375	2.09	2.31	2.43	2.62	2.95	3.36
	5.000	2.29	2.52	2.63	2.83	3.17	3.59
	6.625	2.57	2.81	2.93	3.13	3.49	3.93
	8.375	2.99	3.23	3.36	3.58	3.96	4.43
	10.000	3.48	3.75	3.89	4.12	4.53	5.05
20"	3.375	2.18	2.42	2.55	2.76	3.13	3.57
	5.000	2.35	2.60	2.73	2.95	3.33	3.78
	6.625	2.61	2.87	3.00	3.22	3.61	4.08
	8.375	2.97	3.24	3.38	3.61	4.02	4.52
	10.000	3.41	3.69	3.83	4.08	4.51	5.05
24"	3.375	2.35	2.64	2.79	3.04	3.48	4.01
	5.000	2.50	2.79	2.95	3.20	3.64	4.18
	6.625	2.71	3.01	3.16	3.42	3.88	4.43
	8.375	3.00	3.31	3.47	3.74	4.21	4.78
	10.000	3.35	3.67	3.83	4.11	4.60	5.19
30"	3.375	2.62	2.98	3.17	3.47	4.02	4.67
	5.000	2.74	3.11	3.29	3.60	4.15	4.81
	6.625	2.91	3.28	3.46	3.78	4.34	5.00
	8.375	3.14	3.52	3.71	4.03	4.60	5.28
	10.000	3.41	3.80	3.99	4.32	4.90	5.60
36"	3.375	2.91	3.34	3.56	3.92	4.57	5.35
	5.000	3.01	3.44	3.66	4.03	4.68	5.47
	6.625	3.14	3.58	3.80	4.18	4.84	5.63
	8.375	3.34	3.78	4.01	4.38	5.05	5.86
	10.000	3.56	4.01	4.24	4.62	5.30	6.12

CL-12 DRILLING MACHINE

Travel Chart

TRAVEL CHART CL-12 MACHINE - PLASTIC PIPE - HD PE (IP)							
PIPE SIZE	CUTTER OD	DR					
		21	17	15.5	13.5	11	9
4"	3.375	2.11	2.20	2.25	2.34	2.51	2.79
6"	3.375	1.84	1.93	1.97	2.05	2.19	2.37
	5.000	2.66	2.80	2.87	3.00	3.27	3.69
8"	3.375	1.79	1.90	1.90	2.05	2.21	2.41
	5.000	2.32	2.44	2.51	2.62	2.82	3.08
	6.625	3.25	3.44	3.54	3.72	4.10	4.78
10"	3.375	1.81	1.94	2.01	2.12	2.31	2.55
	5.000	2.20	2.34	2.42	2.54	2.76	3.02
	6.625	2.81	2.98	3.07	3.21	3.48	3.82
	8.375	3.90	4.15	4.28	4.52	5.03	-
12"	3.375	1.86	2.01	2.09	2.21	2.44	2.71
	5.000	2.18	2.34	2.42	2.55	2.80	3.09
	6.625	2.65	2.83	2.92	3.07	3.35	3.69
	8.375	3.41	3.62	3.73	3.92	4.27	4.72
	10.000	4.50	4.80	4.96	5.25	5.89	-
14"	3.375	1.90	2.60	2.14	2.28	2.53	2.92
	5.000	2.18	2.35	2.44	2.59	2.85	3.16
	6.625	2.60	2.79	2.88	3.04	3.33	3.68
	8.375	3.25	3.46	3.57	3.75	4.09	4.52
	10.000	4.11	4.37	4.51	4.75	5.21	5.05
16"	3.375	1.46	2.15	2.24	2.40	2.63	3.01
	5.000	2.21	2.40	2.50	2.66	2.93	3.30
	6.625	2.56	2.77	2.87	3.04	3.36	3.83
	8.375	3.02	3.25	3.37	3.58	3.93	4.39
	10.000	3.57	3.83	3.96	4.19	4.59	5.10
18"	3.375	2.03	2.24	2.34	2.52	2.83	3.21
	5.000	2.25	2.46	2.57	2.75	3.07	3.46
	6.625	2.56	2.78	2.90	3.09	3.42	3.83
	8.375	3.02	3.25	3.37	3.58	3.94	4.39
	10.000	3.57	3.83	3.96	4.19	4.59	5.10
20"	3.375	2.11	2.34	2.46	2.65	2.99	3.41
	5.000	2.30	2.54	2.66	2.86	3.21	3.63
	6.625	2.58	2.82	2.94	3.15	3.52	3.96
	8.375	2.98	3.23	3.36	3.58	3.97	4.45
	10.000	3.46	3.73	3.87	4.10	4.52	5.04
24"	3.375	2.27	2.55	2.69	2.92	3.33	3.82
	5.000	2.43	2.71	2.85	3.09	3.51	4.01
	6.625	2.66	2.94	3.09	3.33	3.76	4.27
	8.375	2.98	3.28	3.42	3.68	4.12	4.66
	10.000	3.36	3.67	3.82	4.08	4.55	5.12
30"	3.375	2.53	2.87	3.04	3.33	3.94	4.46
	5.000	2.66	3.00	3.18	3.47	3.98	4.60
	6.625	2.84	3.19	3.36	3.66	4.18	4.81
	8.375	3.09	3.44	3.62	3.93	4.46	5.11
	10.000	3.38	3.75	3.93	4.24	4.79	5.46
36"	3.375	2.80	3.21	3.41	3.76	4.37	5.10
	5.000	2.91	3.32	3.52	3.87	4.49	5.23
	6.625	3.05	3.47	3.69	4.03	4.65	5.40
	8.375	3.26	3.68	3.89	4.25	4.88	5.64
	10.000	3.50	3.93	4.14	4.51	5.15	5.92

CL-12 DRILLING MACHINE

Travel Chart

CL-12 MACHINE - CEMENT LINED DUCTILE IRON								
PIPE SIZE	CUTTER O.D.	CLASS						
		50	51	52	53	54	55	56
4"	2.5	-	2.30	2.34	2.38	2.42	2.46	2.50
	3.5	-	2.84	2.90	2.96	3.02	3.09	3.06
6"	2.5	2.14	2.17	2.20	2.23	2.27	2.30	2.33
	3.5	2.41	2.45	2.48	2.52	2.55	2.59	2.63
	5.5	3.82	3.88	3.94	4.01	4.08	4.16	4.24
8"	2.5	2.09	2.12	2.15	2.18	2.21	2.24	2.28
	3.5	2.28	2.31	2.34	2.38	2.41	2.44	2.48
	5.5	3.24	3.28	3.32	3.36	3.40	3.44	3.48
	7.5	4.71	4.78	4.85	4.93	5.00	5.08	5.16
10"	2.5	2.07	2.10	2.13	2.16	2.19	2.22	2.25
	3.5	2.22	2.25	2.28	2.31	2.35	2.38	2.41
	5.5	3.02	3.05	3.09	3.12	3.16	3.19	3.23
	7.5	4.01	4.06	4.10	4.15	4.19	4.23	4.28
	9.5	5.63	5.70	5.78	5.86	5.94	6.03	6.12
12"	2.5	2.06	2.09	2.12	2.15	2.18	2.22	2.25
	3.5	2.19	2.22	2.25	2.28	2.31	2.34	2.37
	5.5	2.89	2.92	2.96	2.99	3.02	3.06	3.09
	7.5	3.69	3.73	3.77	3.80	3.84	3.88	3.92
	9.5	4.76	4.81	4.85	4.90	4.95	5.00	5.05
	11.5	6.21	6.29	6.37	6.46	6.54	6.63	6.73
14"	2.5	2.10	2.13	2.16	2.19	2.22	2.50	2.28
	3.5	2.20	2.23	2.26	2.29	2.33	2.36	2.39
	5.5	2.84	2.88	2.91	2.94	2.97	3.01	3.04
	7.5	3.54	3.57	3.61	3.64	3.68	3.71	3.75
	9.5	4.39	4.43	4.47	4.51	4.55	4.59	4.63
	11.5	5.27	5.32	5.37	5.42	5.47	5.53	5.58
16"	2.5	2.09	2.12	2.15	2.18	2.21	2.24	2.27
	3.5	2.18	2.21	2.25	2.28	2.31	2.34	2.37
	5.5	2.78	2.81	2.84	2.88	2.91	2.94	2.97
	7.5	3.40	3.43	3.46	3.50	3.53	3.56	3.60
	9.5	4.12	4.16	4.20	4.23	4.27	4.31	4.34
	11.5	4.76	4.80	4.85	4.89	4.93	4.97	5.01
18"	2.5	2.09	2.12	2.15	2.18	2.21	2.24	2.27
	3.5	2.17	2.20	2.23	2.26	2.29	2.33	2.36
	5.5	2.73	2.77	2.80	2.83	2.86	2.89	2.92
	7.5	3.30	3.33	3.36	3.39	3.43	3.46	3.49
	9.5	3.94	3.97	4.00	4.04	4.07	4.11	4.15
	11.5	4.43	4.47	4.51	4.55	4.59	4.62	4.66
20"	2.5	2.09	2.12	2.15	2.18	2.21	2.24	2.27
	3.5	2.17	2.20	2.23	2.26	2.29	2.32	2.35
	5.5	2.70	2.73	2.76	2.79	2.83	2.86	2.89
	7.5	3.22	3.25	3.28	3.32	3.35	3.38	3.41
	9.5	3.80	3.83	3.86	3.90	3.93	3.97	4.00
	11.5	4.20	4.24	4.27	4.31	4.34	4.38	4.42
24"	2.5	2.10	2.13	2.16	2.19	2.22	2.25	2.28
	3.5	2.16	2.19	2.22	2.25	2.28	2.31	2.34
	5.5	2.66	2.69	2.72	2.75	2.78	2.81	2.84
	7.5	3.11	3.14	3.18	3.21	3.24	3.27	3.30
	9.5	3.60	3.63	3.67	3.70	3.73	3.76	3.80
	11.5	3.88	3.91	3.95	3.98	4.01	4.05	4.08
30"	2.5	2.13	2.17	2.21	2.25	2.29	2.33	2.37
	3.5	2.18	2.22	2.26	2.30	2.34	2.38	2.42
	5.5	2.64	2.68	2.72	2.76	2.80	2.84	2.88
	7.5	3.04	3.08	3.12	3.16	3.20	3.24	3.29
	9.5	3.45	3.49	3.53	3.58	3.62	3.66	3.70
	11.5	3.62	3.67	3.71	3.75	3.79	3.84	3.88
36"	2.5	2.16	2.21	2.26	2.31	2.36	2.41	2.46
	3.5	2.20	2.25	2.30	2.35	2.40	2.45	2.50
	5.5	2.63	2.69	2.74	2.79	2.84	2.89	2.94
	7.5	3.00	3.05	3.10	3.15	3.20	3.25	3.31
	9.5	3.36	3.41	3.46	3.51	3.57	3.62	3.67
	11.5	3.47	3.52	3.57	3.62	3.68	3.73	3.78

CL-12 DRILLING MACHINE

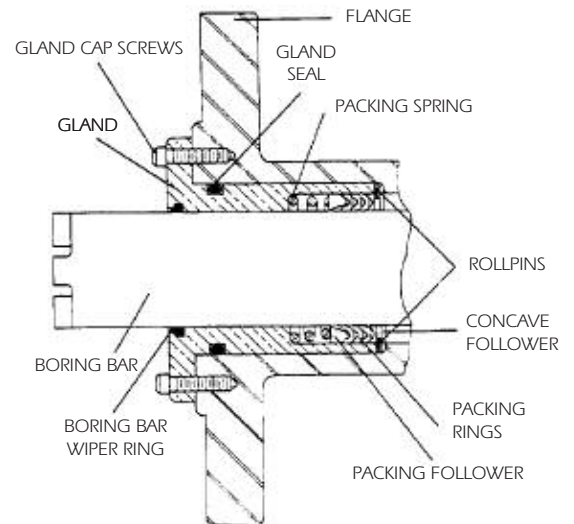
Special Instructions

TO REPLACE BORING BAR PACKING

1. Remove the Four Gland Cap Screws from the Brass Gland.
2. Inset the Gland Cap Screws into the alternate tapped holes in the Brass Gland and screw them in all the way. This should be done evenly, tightening each cap screw a little at a time. This will cause the Gland to move forward evenly out of the flange recess until the Gland Seal is exposed.
3. Rotate Crank Handle **clockwise** and advance the Boring Bar approximately 6 or 8 inches. This will usually cause the Gland, Packing Spring Packing Follower, 3 Packing Rings and Concave Follower to move forward into an exposed position.
4. Remove the Gland from the Boring Bar.
5. Punch out the two Rollpins which retain the entire packing assembly,

CAUTION: Place the gland assembly in a vise to retain the Concave Packing Follower before punching out the Rollpins. Since the packing is spring loaded, these parts will fly out when the pins are removed if they are not properly retained.

6. Remove Concave Follower, 3 Packing Rings, Convex Follower, and Packing Spring from the gland and clean the packing cavity.
7. Remove the Boring Bar Wiper Ring and the Gland Seal and replace, if necessary.
8. Replace Packing Spring, Convex Packing Follower, 3 Packing Rings, and Concave Packing Follower into Gland. Make sure the Rollpin holes in the Concave Packing Follower align with the holes in the Gland during his assembly.
NOTE: Make sure the new packing rings are installed with facing the pressure or front end of the machine.
9. Retain the assembled gland in a vise while inserting the two Rollpins in the gland to retain Concave Packing Follower.



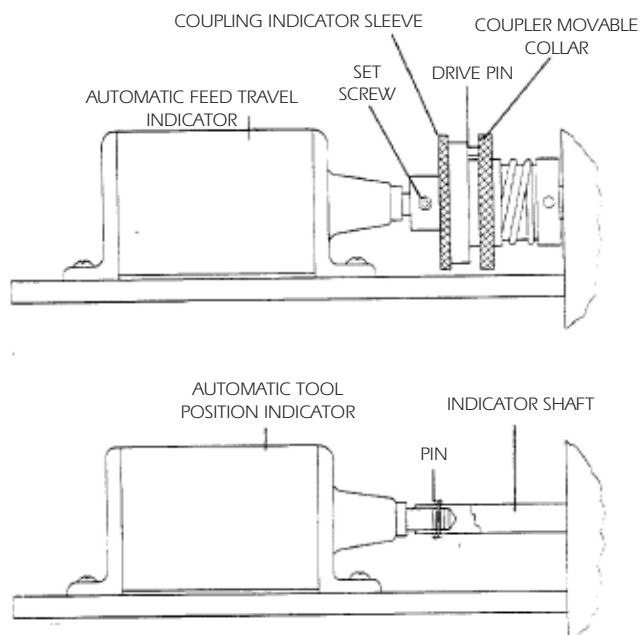
10. Remove any "burrs" or "nicks" from the Boring Bar Drive Lugs. Lubricate the boring bar and the inside of the packing rings with a light film of oil.
11. Remove the Four Gland Cap Screws from the tapped holes in the gland.
12. Carefully slide the Gland Assembly onto the lubricated Boring Bar and slide into place. Insert the Gland Cap Screws through the drilled holes and tighten Gland Cap Screws securely.

CL-12 DRILLING MACHINE

Special Instructions

TO REPLACE OR RESET AUTOMATIC FEED TRAVEL INDICATOR (Gray Finish)

1. Rotate crank handle **counter-clockwise** to retract boring bar to its rearmost position.
2. Remove Brass Indicator Cover.
3. Loosen set screw in Coupling Indicator Sleeve.
4. Remove screws which hold Automatic Feed Travel indicator to body of the machine.
5. Remove Automatic Feed Travel Indicator.
6. With the Automatic Feed Travel Indicator set at 000, place the shaft of the indicator into the Coupling Indicator Sleeve, and replace screws which hold the Automatic Feed Travel Indicator to the body of the machine.
7. Rotate the Automatic Feed Set Knob **counter-clockwise** and pull out on it to place the machine in Automatic Feed. If the shaft fails to stay out, rotate the knob some more and pull out again.
8. Rotate the Crank Handle **clockwise** until the Automatic Feed Shaft moves forward. This will be the zero point of the Automatic Feed.
9. Tighten the Set Screw in Coupling Indicator Sleeve against the shaft of the Automatic Feed Travel Indicator.
10. Set Automatic Feed Travel Indicator for some amount above 005 (five tenths advance in Automatic Feed is usually the minimum setting and rotate crank handle **clockwise** until automatic feed disengages.)
11. If Automatic Feed Travel Indicator does not read exactly 000 after disengaging, reset it to 000 as follows:
 - a. Pull the Knurled Coupler Movable Collar toward the rear of machine (This collar will move approximately $\frac{1}{8}$ ")
 - b. Hold it in this position until the Knurled Coupling Indicator Sleeve is turned the required amount to obtain the 000 setting on the Automatic Feed Travel Indicator.
 - c. Then release the Knurled Coupler Movable Collar so that the drive pin in it engages the nearest hole in the Coupling Indicator Sleeve.
12. Replace Brass Indicator Cover.



TO REPLACE AND RESET AUTOMATIC TOOL POSITION INDICATOR (Black Finish)

1. Rotate crank handle **counter-clockwise** to retract boring bar to its rearmost position.
2. Remove Brass Indicator Cover.
3. Remove screws which hold Automatic Tool Position Indicator to body of machine.
4. Remove Automatic Tool Position Indicator.
5. With the Automatic Tool position Indicator set at 000, place the shaft of the Automatic Tool Position Indicator into the end of the Indicator Shaft.
6. Make sure the notch in the Automatic Tool Position Indicator Shaft engages the pin in the Indicator Shaft.
7. Replace screws which hold Automatic Tool Position Indicator to body of the machine.
8. Replace Brass Indicator Cover.