

SINGER

WellLine

Pump

**INSTALLATION
MANUAL**

SINGER

**WATER RESOURCES
LAYNE PUMP COMPANY
Memphis, Tennessee
U.S.A**

**INSTALLATION AND OPERATING
INSTRUCTIONS FOR SINGER-LAYNE
WELLINE PUMPS
with
SEQUOIL[®] TUBELINE**

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INSTALLATION AND OPERATING INSTRUCTIONS

INTRODUCTION

Proper installation of a vertical turbine pump will have a great effect on improving performance and minimizing future repair costs. Since a Singer-Wellline Pump is a precision piece of machinery, it is important that these instructions be carefully followed. Reasonable care and attention will prolong pump life and save considerably on maintenance expense.

One of the first things to consider is the installation of an adequate foundation. It should be properly designed and deep enough to reduce the possibility of future "settling" which may throw the pump out of line. Great care should be taken to see that the pump hangs in alignment with the well.

PRE-INSTALLATION

A. GENERAL PRECAUTIONS

1. Cleanliness is essential for a good installation. Threads and other mating surfaces will not function as required if they are not clean when assembled.
2. Make certain that no rags, wood scraps or other foreign material is lodged in any exposed openings.
3. Keep the well opening covered whenever possible to prevent dropping small parts, tools or any other foreign material into the well.
4. Lift and handle the unit carefully to prevent damage by excessive strain being imposed on any part.
5. NEVER USE THREAD COMPOUND ON LINE SHAFT THREADS OR SHAFT COUPLINGS. USE A LIGHT OIL.
6. Always use anti-seize compound to prevent galling of the threads on steel column joints.
7. Never use gaskets between flanges, column joints, flange-to-bowl connections or head connections.
8. Special care must be taken to prevent damage to the threads and end faces of shafting, column pipe, and tubing.
9. If during installation the pump is observed to bind or will not rotate freely on the hook swivel, there is an obstruction in the well or the well is crooked. In either case, the well is not acceptable for a proper installation and continuing with the installation will void the warranty.

B. RECEIVING INSPECTION AND HANDLING

Careful handling of the pump during transportation to the well site and during installation is most important. Many people think that because the shaft, tubeline, and outer column are made of steel, that there is little danger of damage when being handled and transported. THE FACT IS THAT IT IS EASY TO PUT A KINK IN A SHAFT OR TUBE AND EVEN THE SLIGHTEST BEND MAY CAUSE THE PUMP TO VIBRATE EXCESSIVELY, AND EVENTUALLY FAIL.

Check all parts for any signs of damage. Be sure that the required parts have been received and are suitable for their intended use.

Do not drop components on the ground. Provide clean boards for supporting the equipment in an area away from the heavy traffic.

C. INSTALLATION EQUIPMENT AND TOOLS

1. Derrick and hoist with sufficient strength, rigidity and control to safely handle the entire weight of the pump. A swivel hook is necessary.
2. Slings, clamps, elevators, etc. for handling all major components.
3. Pipe wrenches and chain tongs.
4. Complete set of wrenches, screw drivers, hammer, files, straight edges, square, etc.
5. Supply of emery cloth, non-hardening thread compound, lubricating oils, and anti-seize compound.

D. PARTS PREPARATION AND CLEANING

1. Prior to making up threaded column joints, remove the thread protectors and thoroughly clean threads with wire brush and solvent. If necessary, repair any damaged threads with a three cornered file and remove any burrs. THE PROTECTIVE COATING ON THE PARTS IS A RUST PREVENTATIVE AND IS NOT SUITABLE AS A THREAD LUBRICANT. THIS COATING MUST BE CLEANED OFF THREADS.
2. Clean all shafting and couplings using a rag soaked with solvent.
3. Remove rust preventative from all flange faces with solvent and if necessary, smooth the flange face with a flat file.
4. Check the shaft ends for nicks, burrs, etc. The shaft ends at each coupling must butt squarely against each other in order for the shaft to be aligned properly.
5. MEASURE AND RECORD THE PUMP LATERAL (shaft end play). This information will be required when making lateral adjustments outlined later.

E. FOUNDATION

The foundation should be of sufficient strength and rigidity to support the weight of the pump assembly plus the weight of the water in the column while main-

taining the proper alignment of the pump head. The opening at the top must be of sufficient diameter and depth to clear the top column flange and fasteners. The pump manufacturer assumes no responsibility for the foundation.

F. WELL CHECK

Prior to installing the pump in the well, check the inside diameter of the well casing and the maximum outside diameter of the pump bowl and column to determine there is adequate clearance to install the pump assembly in the well casing. Also be sure that the well is deep enough to receive the full length of pump. The well casing should be sufficiently straight and without obstructions so that the pump assembly can be installed without binding or being bent so as to cause misalignment. On deeper settings or where there is doubt about the size or straightness of the well, a well log should be run or a dummy sizer be made to the O.D. and length of the bowl and lowered into the well to the appropriate level. If the sizer will not go into the well, the pump cannot be installed properly and all warranties could become void. The pump must be equipped with enough column pipe to assure that the bowls remain submerged during operation. **THE FACTORY DOES NOT RECOMMEND OR GUARANTEE SATISFACTORY OPERATION WITH A SUCTION LIFT.** It is desirable to determine the pumping level of the well prior to installation of the pump so that the pump can be provided with the proper amount of column.

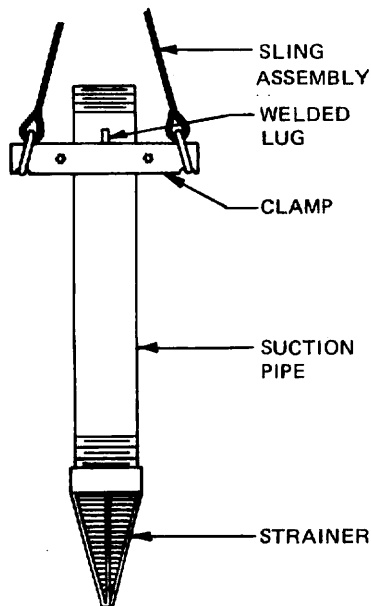


FIG. 1. — SUCTION PIPE AND STRAINER RIGGED FOR LIFTING.

INSTALLATION

A. SUCTION PIPE AND STRAINER

If the overall length of the assembled strainer, suction pipe and bowl assembly does not exceed the maximum hook height of the derrick or hoist, the suction pipe can be assembled to the bowl while on the ground. The bowls and suction pipe can then be installed as one unit. If the travel of the derrick or hoist being used is not sufficient, it will be necessary to install the suction pipe and bowl assembly separately, as follows:

1. After cleaning the threads, apply a non-hardening thread compound. Screw the suction pipe and strainer together.
2. Attach a pipe clamp to the upper end of the first piece of suction pipe as shown in Fig. 1.
3. Attach a sling to the clamp and hoist the pipe and strainer assembly to the vertical position taking care not to damage the strainer. Push the bottom of the pipe away from the well opening and tap the side of the pipe to remove any loose matter.
4. Center the suction pipe and strainer assembly over the well opening and carefully lower it until the clamp ears are resting squarely on the setting beams. Remove the sling.

B. BOWL ASSEMBLY

1. Inspect the bowl assembly as follows:
 - (a) Make sure no rags, wood or other foreign materials are in the suction or discharge.
 - (b) Rotate the impeller shaft to make sure it does not bind.
 - (c) Check the discharge nozzle bleed ports to be sure that these ports are free of obstructions.
 - (d) Measure and record the available pump lateral (impeller shaft end play) if not already done.
2. If not already installed, place the two settings beams on the foundation.
3. Install a friction clamp to the upper end of the bowl assembly beneath a convenient shoulder. Attach a cable sling to the friction clamp far enough out of the ears to allow removal of the sling after the friction clamp is resting on the setting beams. Also, make sure that the sling is long enough for the load hook to clear the shaft protector when the bowl assembly is uprighted. SEE FIG. 2. Leave the short piece of protective tubing installed until after the bowl assembly has been hoisted to the vertical position.
4. Hoist the bowl assembly to a vertical position being careful not to damage the pump suction or strainer. Use a rope attached to the bowl assembly to prevent it from swinging into the suction pipe, foundation or derrick.

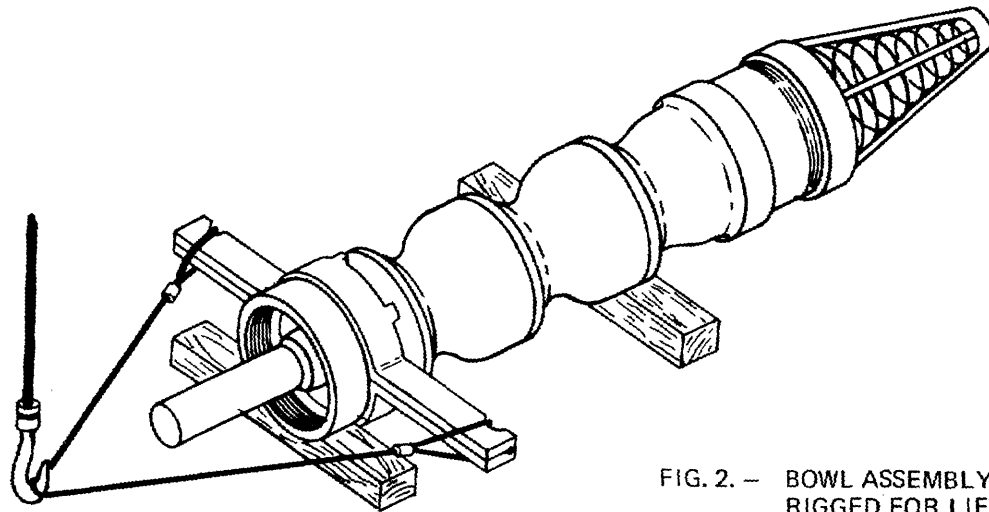


FIG. 2. — BOWL ASSEMBLY RIGGED FOR LIFTING.

5. If the suction pipe was installed separately per Section A, apply thread compound to the threads of the suction pipe, and then carefully lower the bowl assembly so that the suction pipe engages with the suction nozzle. Screw the bowl into the suction pipe by hand, assuring that the connection is properly aligned and is not cross threaded. Use chain tongs to tighten the connection. After the connection is tightened raise the pump slightly, remove the friction clamps from the suction pipe and lower the unit until the friction clamp around the bowl rests on the setting beams. Remove the sling.
6. If the suction pipe and bowl assembly are being installed as one unit, center the unit over the installation opening then carefully lower it until the clamp ears are resting on the setting beams. Remove the sling.
7. Remove the shaft protector, a 24" piece of pipe.
8. Remove the shaft coupling, clean the shaft and coupling threads, the bowl assembly threads and butt face, and the tube adapter coupling threads and face. Lightly oil the shaft threads and screw the shaft coupling on half way. Place a rag over the coupling to prevent entrance of dirt when installing the first section of column.

C. COLUMN

1. Determine the correct sequence of installation of the column sections. The top section of column is approximately two feet long. The top special tubing is tagged for identification by the factory. If this tag is lost, the top special tubing can still be identified since it is only 22" long and chamfered on one end. This end has longer threads inside the tube.
2. Secure a friction clamp or elevator immediately beneath the coupling on the first section of column to be installed.
3. Slide the tubing and shaft assembly into the lower end of the pipe, allowing the tubing to protrude about 15" past the lower end of the column pipe and allowing the shaft to protrude about 9" past the end of the tubing. SEE FIG. 3. Tie a series of half hitches to the pipe tubing and shaft with 3/4" rope so as to prevent the shaft and tubing from sliding out of the pipe when the assembly is hoisted to the vertical position. Attach a sling to the clamp ears.

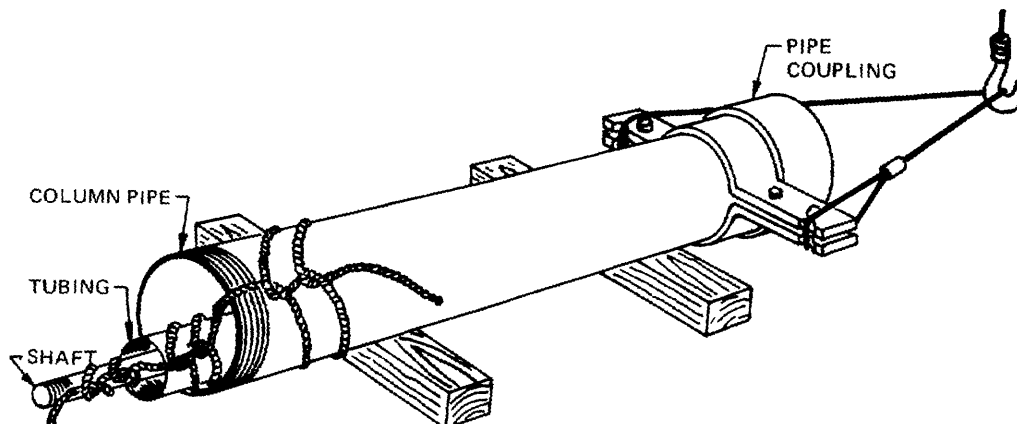


FIG 3. — COLUMN SECTION RIGGED FOR LIFTING.

4. Hoist the column to the vertical position taking care not to strain or damage the shaft. The shaft and tubing should be supported by hand or with two pipe wrenches to prevent slippage. Before centering the column over the bowl, tap the side of the column to remove any matter from the pipe.
5. Swing the column assembly over the bowl, align the shaft, remove the rag from the shaft coupling on the bowl and lower the column assembly until the shaft contacts the coupling, oil the shaft threads then remove the rope. Hold the coupling and turn the shaft by hand (left hand threads) until the shaft ends butt. **DO NOT FORCE THE SHAFT INTO THE COUPLING.** If the shaft will not screw into the coupling by hand, the threads are either damaged or dirty, or the shafts are not properly aligned. This procedure must be corrected before proceeding. Place one pipe wrench on the coupling and one on the top piece shaft and tighten. Both wrenches should be handled by one man so that the push on one wrench will be balanced by the pull on the other wrench. SEE FIG. 4. The shafts should show equal amounts of threads above and below the coupling indicating that the shaft butt is centered in the coupling. Remove any wrench marks from the shaft and the coupling with a flat file and emery cloth. Cover the shaft tube opening with a rag to prevent the metal filings from falling on bearings below.

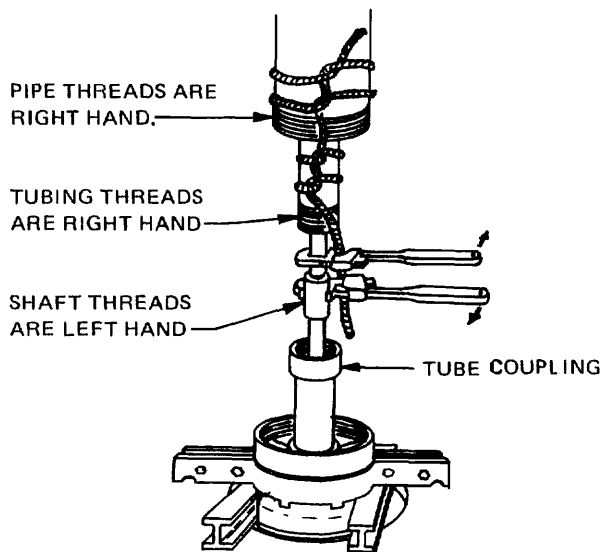


FIG. 4 – ASSEMBLING SHAFTING AND TUBING

6. Lower the assembly until the tubing contacts the tube coupling and then remove the rope. Apply a small amount of thread compound to the threads. Place one pipe wrench on the tube coupling and the second wrench on the tubing and tighten firmly the right hand threads.
7. Apply thread compound to the bowl assembly threads (pipe coupling on subsequent sections) and butt faces and to the pipe threads. Lower the column until the column engages the bowl assembly. Using chain tongs, tighten the pipe (right hand threads) into the bowl while slowly lowering the derrick hoist. Tighten the pipe into the bowl so that it seats securely against the mating shoulder in the bowl assembly. SEE FIG. 5.

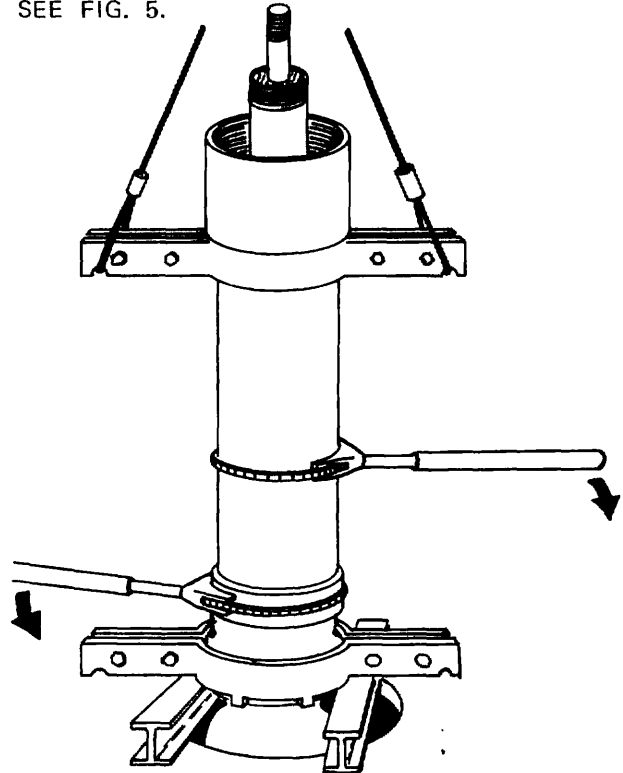


FIG. 5 – INSTALLATION OF COLUMN PIPE TO BOWL ASSEMBLY.

8. Hoist the unit slightly, remove the bowl clamp and slide the setting beams out enough to allow passage of the unit.
9. After each piece of column has been lowered and is resting on the setting beams, pour approximately 4 ounces of oil into the tubing.
10. Clean the tubing O.D., apply soapy water to the spider and slip the spider over the tubing, forcing it approximately 2" into the pipe. The spiders should be located approximately 20' from the bowl and from the head and at 40' intervals along the tubing. The spiders should fit snugly in the column pipe or on the tubing (or at both places).

11. Repeat the procedure outlined above for each additional section of column until all of the column has been assembled.

NOTE—When using a top adjustable flange, install top pipe with long threads up.

SPECIAL PRECAUTIONS WHEN USING STEEL PIPE COUPLINGS

Because of the tendency of the threads to gall when steel pipe is screwed into steel couplings, the following special precautions should be taken when assembling this combination.

- a. Inspect and thoroughly clean the coupling threads (on the section already in the well) and repair any damaged threads as required. Coat the threads with anti-seize compound (NOT thread compound).
- b. Before centering the column assembly over the installation opening, clean inspect and repair any damaged threads.
- c. Recheck pipe threads for cleanliness or damage after pipe is hoisted to vertical position, and then apply a liberal coat of anti-seize compound to the threads.
- d. When lowering the pipe into the coupling do not back thread the pipe.
- e. Carefully screw the pipe into the coupling as far as possible by hand. Do not use a power driven mechanism to spin the connection together. If at any time the threads are suspected of galling, unscrew the pipe. Inspect, clean and repair as necessary the pipe and coupling threads. Apply a fresh coat of anti-seize compound and repeat the above assembly procedure exercising special care in aligning the pipe with the coupling.

D. DISCHARGE HEAD

1. The top column flange should be installed on the top section of column pipe as follows:
 - (A) Butt type flange
 1. Clean the pipe flange threads and butt surfaces and apply a thin coat of thread compound.
 2. Screw the flange onto the pipe and tighten securely.
 - (B) Adjustable type flange
 1. Clean the threads on the top column pipe, the flange and the packing ring, and apply thread compound.
 2. Screw the packing ring onto the pipe. Make sure that the chamfer is on top.
 3. Screw the flange onto the pipe.
2. Attach slings to the head for lifting as shown in FIG. 6.
4. Lift the head, remove the hex nuts from the studs and clean the mating surfaces on the bottom of the head and on the column pipe. Apply a thin coat of thread compound to all of the head-to-column mating surfaces.
5. Align the head studs with flange holes, lower the head until it is seated squarely on the flange, and

then install and tighten the hex nuts. If a butt type flange is used, orient the head so that its outlet is as close as possible to its final position.

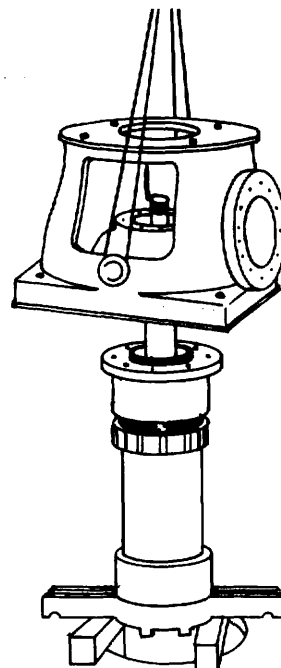


FIG. 6 – METHOD OF RIGGING HEADS FOR LIFTING.

E. DISCHARGE HEAD SHAFT AND TUBING PROJECTIONS—TOP COLUMN FLANGE ADJUSTMENT

Adjustable top column flange, enclosed tubeline and style 60 stuffing box.

1. Rotate the packing ring clockwise as far as possible. The packing ring should now be at the bottom of the threaded area on the top column pipe.
2. Rotate the head until the top tube is positioned in accordance with FIG. 7 & TABLE 1.
3. Check the top shaft projection above the discharge head to be sure that the adjusting nut can be screwed on the shaft and properly positioned on top of the driver. Rotate the head, if necessary, to obtain proper shaft projection, while staying within the limits of dimensions "Y" for the top tube.
4. Install the packing ring and packing as follows:
 - (A) Fill the chamfer on the lower end of the top column flange with the lampwick packing that has been coated with non-hardening thread compound. Use a generous amount of packing. Wind the packing around the column pipe in a clockwise direction so that when the packing ring is tightened, the packing is forced into the chamfer on the flange.
 - (B) Screw the packing ring up against the flange and tighten securely.
5. Using slings attached to the head as shown in FIG. 6. Lift the entire pump assembly slightly, remove the clamps from the long section of column pipe, remove the setting beams, clean the surface of the foundation, and loosen or remove the anchor bolt nuts if they have been installed.

TABLE 1
LIMITS OF DIMENSION "Y"

SHAFT DIAMETER	MAX. "Y"	MIN. "Y"
3/4" & 1"	1-3/4"	0
1-3/16" & LARGER	2-3/4"	0

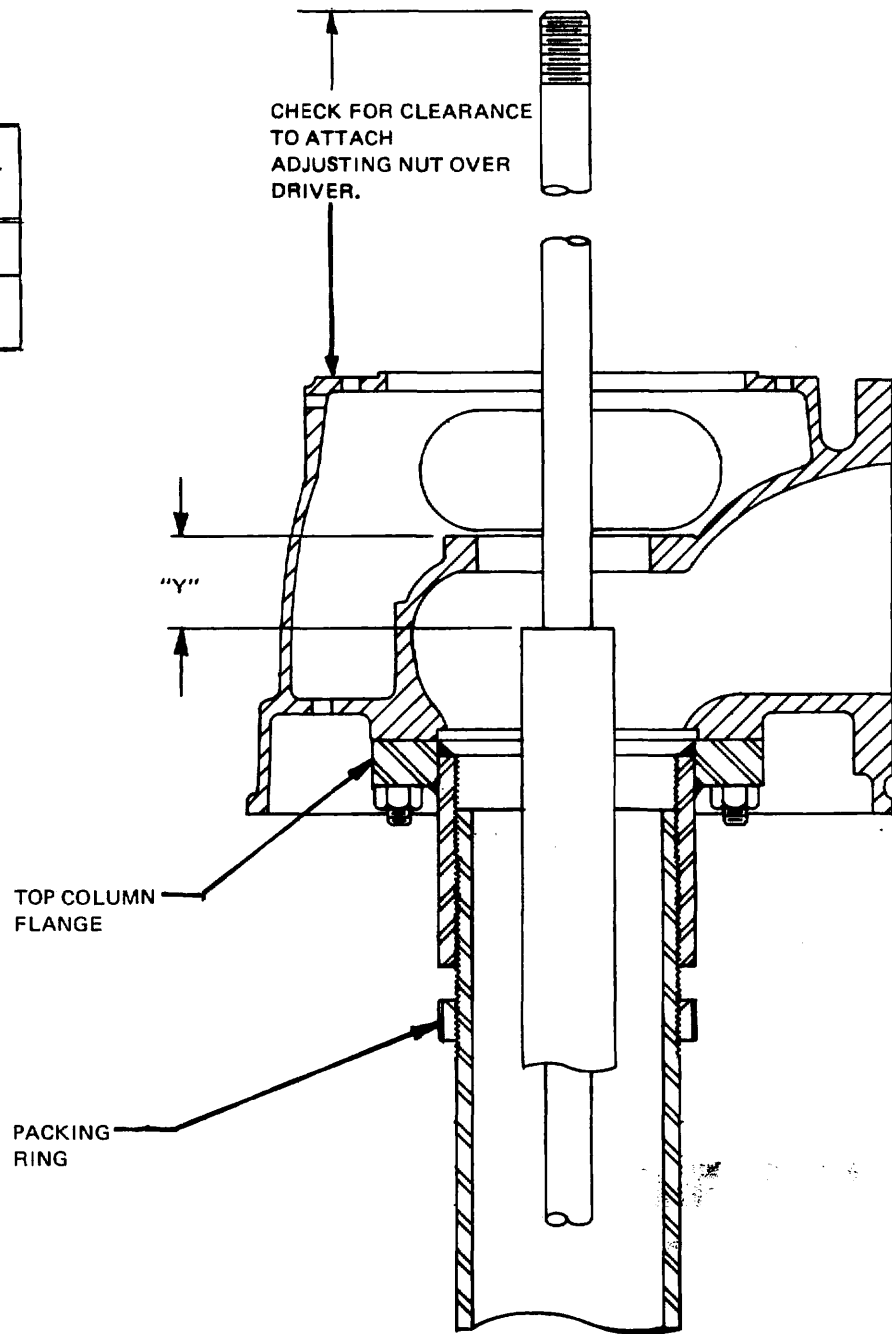


FIG. 7. — ADJUSTMENT OF TOP COLUMN FLANGE.

6. Slowly lower the unit until one corner of the head-base flange just touches the foundation. Stop lowering at this point and insert wedges (two per side) underneath the edges of the baseplate that are not touching the foundation. Tap the wedges lightly to tighten them.
7. Lower the hoist until the full weight of the unit is resting on the foundation and the wedges.

BUTT TYPE TOP COLUMN FLANGE

The butt type flange cannot be adjusted. However check on distance "y" and the shaft projection being within the limits given in steps 2 and 3. If not within these limits, the problem is probably due to the tubing, shafting, or column pipe not being butted properly. This problem must be corrected before proceeding. If within

the specified limits, proceed with lowering the pump into the well as described in Steps 5 through 7 above.

F. ALIGNMENT

In order to prevent undue bearing loads and excessive vibration, the pump head and lineshaft must be aligned during operation. The pump head should be placed at the approximate elevation desired by shimming equally under the wedges. The discharge flange should be oriented properly prior to commencement of the head alignment. Once the head has been aligned, any connections made must be fitted so that no strain is placed on the pump head when the connections are tightened. **DO NOT ATTEMPT TO ALIGN THE HEAD WITH THE DISCHARGE PIPING CONNECTED.**

When properly aligned the lineshaft will be in the center of the head and will be perpendicular to the driver mounting flange on the head. The alignment should be performed as described below.

1. Remove the stuffing box if installed. Check to see that the shaft is properly centered. If not, the shaft must be centered by shimming between the foundation and the baseplate.

This is done by driving in the wedge or inserting shims under the side where the shaft is farthest from the bore and withdrawing the wedges or removing shims from where the shaft is closest to the bore.

2. Using a carpenter's square, determine whether or not the shaft is perpendicular to the motor mounting flange. Check four places 90° apart. If the shaft is not perpendicular, adjust the wedges as described above. (A bent carpenter's square will give a false indication. If the direction indicated out of perpendicularity changes as the square is shifted between positions 180° apart, then the square is bent). After adjusting the wedges check that the shaft is still in the center of the stuffing box bore.
3. Rotate the shaft approximately 90° and repeat steps 1 and 2 above.

NOTE: When a wrench is to be used on a shaft that is a permanent part of the installation wrap the shaft for protection.

If the shaft did not remain in the center of the stuffing box or did not remain perpendicular to the motor mounting flange, then it is likely that either the top shaft is bent or the first shaft joint below the head is not installed properly (not butted, dirt or burrs on butt faces, etc.) In order for the alignment to be acceptable the shaft must remain in the center of the stuffing box bore and remain perpendicular to the motor mounting flange for two shaft positions 90° apart. Note that the discharge head may not be exactly level when the alignment is complete. This is normal and **NO ATTEMPT SHOULD BE MADE TO LEVEL THE DISCHARGE HEAD.** The

head is aligned so that the shaft will run true in the stuffing box bearing (i.e. head is aligned perpendicular to the shaft). If the well is drilled at a slight angle then the pump may lay against one side of the casing, resulting in the column pipe and shaft laying at a slight angle away from vertical. When the head is aligned to the shaft it also will sit at this same angle.

G. STUFFING BOX

If an adjustable top column flange is used, adjustments of flange must have been made per Section E above.

1. Remove the lock screw and the o-ring and thoroughly clean the stuffing box including the o-ring groove. Remove any nicks or burrs from the upper and lower mounting faces and male register with a fine flat file. Re-install and lightly oil the exposed surface of the o-ring. SEE FIG. 8.
2. Clean the surface of the head that receives the stuffing box and remove any nicks or burrs with a fine flat file.
3. Carefully install the stuffing box, align the mounting holes with the taps in the head and seat the box to the head. Install and evenly tighten the mounting capscrews.
4. Clean the tension bearing thoroughly and remove any nicks or burrs from the mounting face and register with a fine file. Remove any nicks or burrs from the threads with a three cornered file.
5. Oil the threads and the bore and carefully place the tension bearing over the shaft and thread (right hand) into the tubing. Continue threading until the lower flange face firmly contacts the stuffing box face.
6. The proper amount of tube tension is obtained by continuing to tighten the tension bearing 1/10 of an inch for each 100 feet of setting.

For settings less than 100 feet, tighten to the nearest locking position.

The number of turns required for proper tube tension can be determined by referring to Table 2. Multiply the required tube tension by the number of threads per inch, as shown for each tube size.

TABLE 2

TUBING SIZE	1-1/4"	1-1/2"	2", 2-1/2", 3" & 3-1/2"
NO. OF THREADS PER INCH	16	12	10

For example, if the installation has a 200 foot setting, the required tube tension is 2/10 of an inch. If using, 1-1/2" tubing the number of turns would equal 2/10 times 12, which equals 2.4 turns or slightly less than 2-1/2 turns.

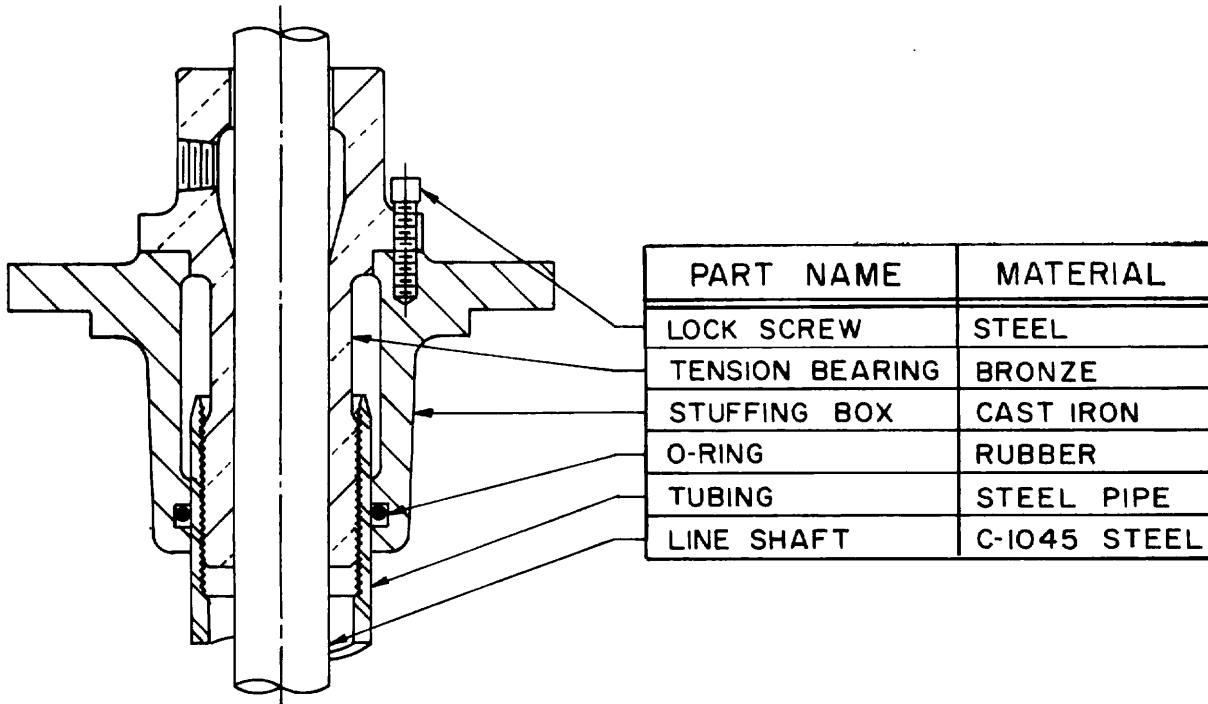


FIG. 8. — STUFFING BOX ASSEMBLY

If after adjusting the tension bearing the proper number of turns, no slot aligns with the lock screw tapped hole in the box, it is recommended that the bearing be backed off to the nearest alignment position if it takes more than an eighth turn forward to achieve alignment.

7. Install and tighten the lock screws.

H. DRIVER AND DRIVE COUPLING

1. Check that the stuffing box installation is complete being sure that the tubing tension adjustment has been made.
2. Inspect, clean and oil lightly, the face and threads on the exposed portion of the shaft.
3. Remove the driver from its shipping skid and place it near the head on a wooden base.
4. For motor and gear drivers follow the manufacturers instruction for lubricating, and preparing prior to assembling to the pump head.
5. Run a fine flat file over the mating surface on the driver base and the driver mounting surface on the head to remove any nicks or burrs. Thoroughly clean these surfaces with solvent and wipe a thin layer of light oil over them to help prevent rust.
6. Swing the driver over the pump centerline and slowly lower the driver until it rests on the pump head. Be extremely careful not to bend or damage the exposed top shaft when lowering the driver over the shaft. Align the mounting holes and install BUT DO NOT TIGHTEN the driver mounting screws. Be sure that the registers are properly engaged between driver and head.
7. Clean the driver plate thoroughly and dress the drive shaft threads and keyway with a 3 cornered file,

if necessary.

8. Temporarily make any necessary connections after removing the clutch, so that the driver can be momentarily started to determine its direction of rotation. The pump shaft should rotate counter-clockwise when viewed from above. If power is not available to make a rotational check, do not make the driver-to-driver-shaft connection until power is available and correct rotation is determined. (Incorrect rotation of the driver, with the pump connected, can unscrew the shaft connections and damage the pump. If the driver is an electric motor and the leads are to be disconnected after the rotation check, mark the leads and the motor terminals so that the motor leads will be reconnected in the same positions as they were for the rotation check. Replace the clutch.
9. Turn driver until the keyway in the driver aligns with the keyway in the shaft. Install and seat the gib key. The key should fit snugly but should not be a drive fit.

I. PUMP ADJUSTMENTS

1. Install the adjusting nut and screw it on the head-shaft, raising the shaft until the entire weight of the line shaft and impellers rests on the adjusting nut. This is the point where the impellers just leave their seat in the bowls and the line shaft begins to turn freely. A slight lowering of the shaft at that point allows the impellers to drag, preventing the shaft from turning. Measure the shaft projection above the adjusting nut per FIG .9. Record the actual measurements.

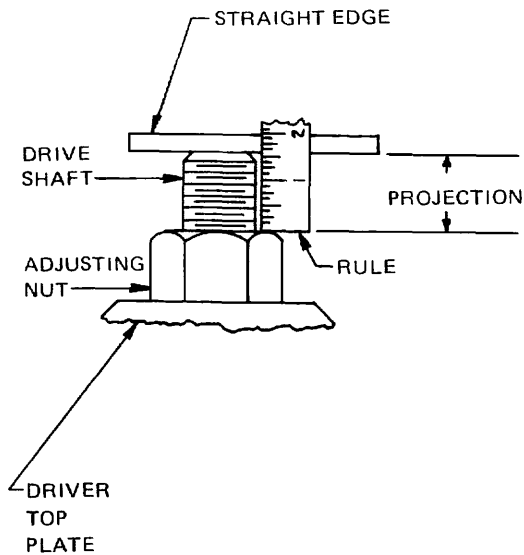


FIG. 9. — MEASURING PROJECTION OF DRIVE SHAFT.

2. TO SET THE LATERAL, the adjusting nut should be torqued until the shaft projection measurement is increased to a new position equal to one-half the available lateral (measurement from Section D5 of Pre-Installation) or 1/10 of an inch for each 100 feet of line shaft, whichever is greater.
3. Make sure that the shaft turns freely. Lock the adjusting nut in place with the lock screw, aligning the hole in the adjusting nut to the nearest hole in the drive coupling. Install lubricator per section J.
4. Connect the driver to the power source and apply a starting torque to the pump. With an electric drive, press the start button and immediately press the stop button. With an engine or other type of driver, apply approximately 50% power for one or two seconds. This will further tighten all the shaft joints.
5. RECHECK AND ADJUSTMENT
Loosen the adjusting nut. Check if the point where the impellers leave their seat in the bowl has changed. If it has, remeasure the new shaft projection.
6. For the permanent pump adjustment, repeat instruction 2 above. If the pump is installed in a new well or where sand or mud is expected at the start, proceed as follows:

Raise the shaft with the adjusting nut until the upper face of the impellers just touch and drag in the bowls, i.e. when the shaft stops turning freely. Back off the adjusting nut 1 turn, which lowers the impellers 1/10 to 1/8 inch. Lock the adjusting nut in place. Make sure the shaft turns freely. Start the pump and let it run until the water is free of mud and sand. Always be sure the water is free of sand before the pump is stopped. When the well is clean, readjust the pump as per instruction 2, above.

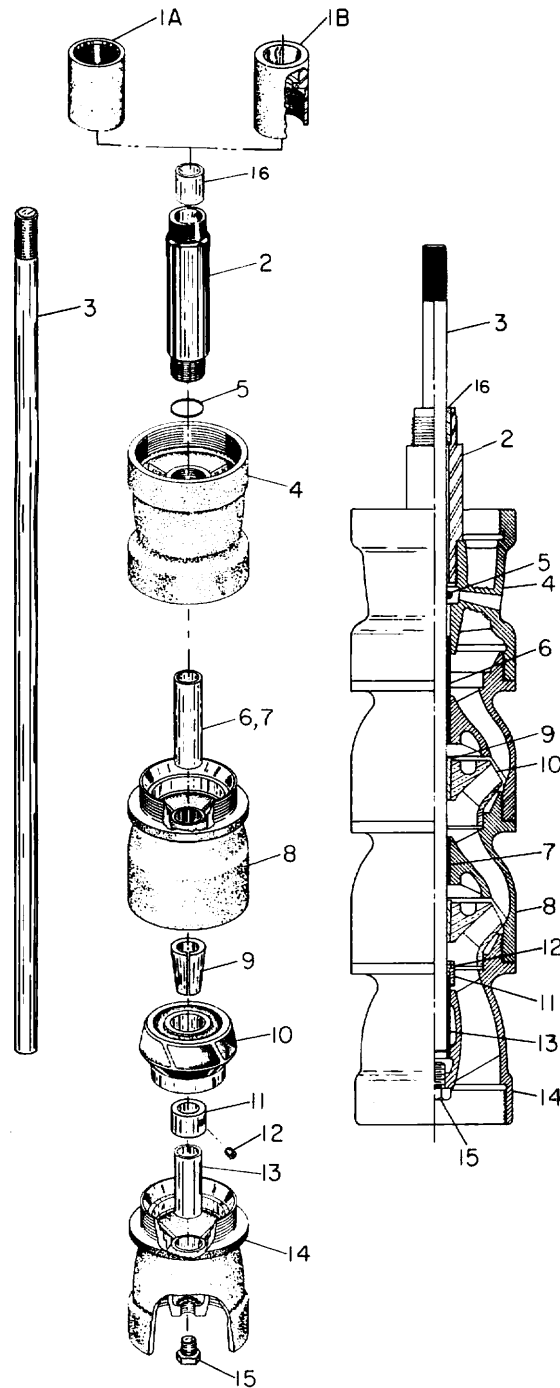
J. MISCELLANEOUS EQUIPMENT

1. LUBRICATING DEVICE

- (a) Install the lubricator and bracket to the discharge head. Refer to the lubricator assembly drawing. Connect the 1/4" line from the lubricator to the stuffing box inlet port.
- (b) For lubrication of the electric motor or gear drive, use lubricant prescribed by the manufacturer.
- (c) For pulley drives, use heavy duty turbine oil equivalent to SAE 30.
- (d) For the pump shaft, clean and fill the lubricator tank with a high grade, non-detergent oil having a viscosity of 150 to 200 SSU at the water temperature. The oil shall contain oxidation and corrosion inhibitors. Automotive engine oils should not be used. Adjust oilers to feed 6 to 10 drops per minute for the first 100 ft. of column. Allow an extra 2 or 3 drops for each additional 100 ft. It is recommended to feed more oil than this for the first hour or two of operation.

2. DISCHARGE PIPING

- (a) Flange faces should be clean and free of nicks and burrs. Make certain that the groove is clean and free of obstructions.
- (b) Do not attempt to use a flat gasket on the discharge head outlet flanges which are not machined. These flanges are grooved to accept the packing furnished with the head. Since these flange faces are not flat, tightening the bolts in an attempt to seal a flat gasket will usually result in a broken discharge flange.
- (c) The discharge piping should be installed and supported in such a manner as to eliminate the possibility of the head (discharge ell) being placed in a strain. The pump head can easily be thrown out of alignment by "drawing up" the bolts in a discharge flange connection that is not "fitted up" properly.

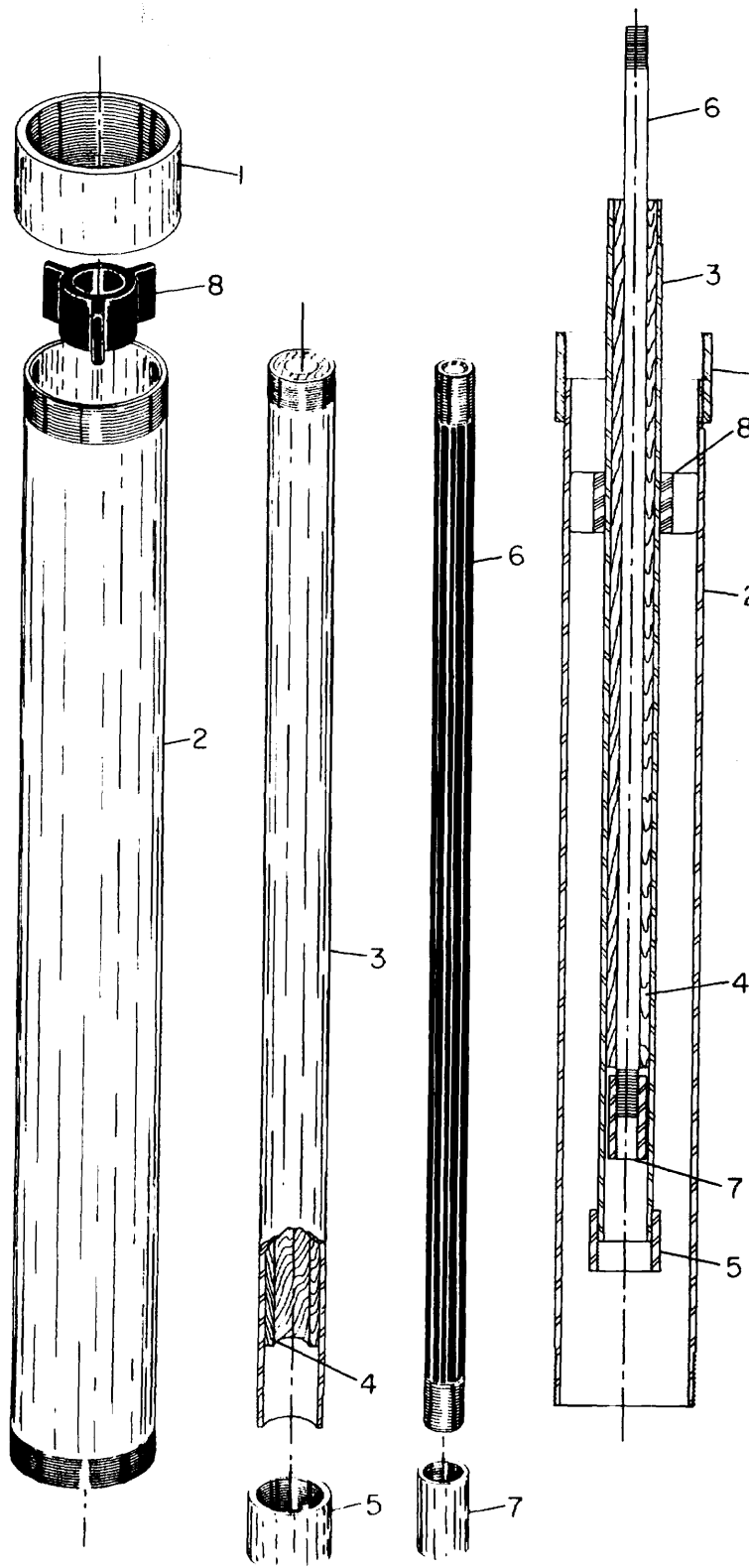


BOWL ASSEMBLY
TYPICAL FOR 8K, 8T, 10K, 12T

ITEM NO.	DESCRIPTION	MAT'L.
1A	TUBE COUPLING	STEEL
1B	REDUCING TUBE COUPLING	STEEL
2	TUBE ADAPTER	STEEL
3	PUMP SHAFT	STN. STL
4	DISCHARGE CASE	C.I.
5*	SLINGER SEAL-O'RING	RUBBER
6	TOP BOWL BEARING	BRONZE
7	INTERMEDIATE BOWL BEARING	BRONZE
8	INTERMEDIATE BOWL	C.I.
9	IMPELLER LOCK COLLET	STEEL
10	IMPELLER	BRONZE
11**	SAND COLLAR	BRONZE
12**	SAND COLLAR LOCK SCREW	STN. STL.
13	SUCTION CASE BEARING	BRONZE
14	SUCTION CASE	C.I.
15	SUCTION CASE PLUG	STEEL
16	TUBE ADAPTER BEARING	BRONZE

* SPECIAL FITTED PUMPS ONLY

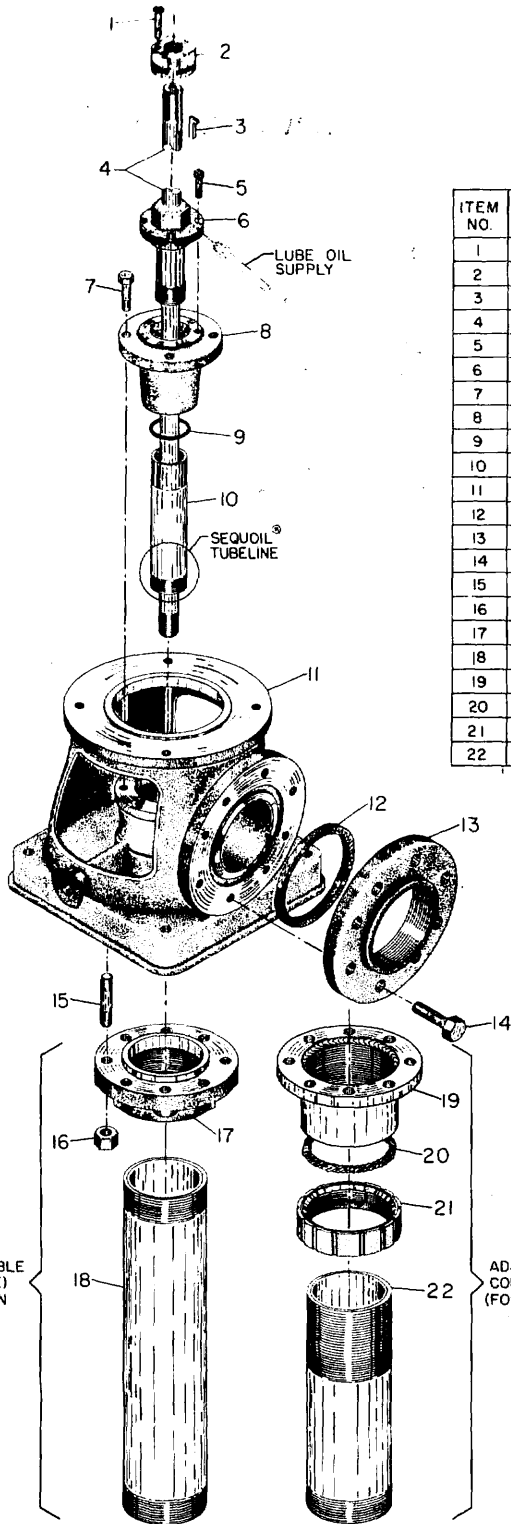
** 8" PUMPS USE RUBBER W/O SET SCREW



**COLUMN ASSEMBLY
SEQUILOIL® TUBELINE**

ITEM NO	DESCRIPTION	MAT'L.
1	COLUMN PIPE COUPLING	STEEL
2	COLUMN PIPE	STEEL
3	SHAFT ENCLOSING TUBE	STEEL
4	SEQUILOIL® BEARING	REDWOOD
5	TUBELINE COUPLING	STEEL
6	LINE SHAFT	STEEL
7	LINE SHAFT COUPLING	STEEL
8	CENTERING SPIDER	RUBBER

DISCHARGE HEAD ASSEMBLY



ITEM NO.	DESCRIPTION	MAT'L
1	ADJUSTING NUT LOCK SCREW	STEEL
2	ADJUSTING NUT	BRONZE
3	GIB KEY	STEEL
4	TOP SHAFT	STEEL
5	TENSION NUT LOCK SCREW	STEEL
6	TUBE TENSION NUT	BRONZE
7	CAPSCREW	STEEL
8	STUFFING BOX	C.I.
9	O-RING	RUBBER
10	TOP TUBE	STEEL
11	DISCHARGE HEAD	C.I.
12	PACKING	
13	COMPANION FLANGE *	C.I.
14	CAPSCREW	STEEL
15	STUD	STEEL
16	NUT	STEEL
17	TOP COLUMN FLANGE (BUTT TYPE)	C.I.
18	HEAD NIPPLE (BUTT TYPE)	STEEL
19	TOP COLUMN FLANGE (ADJUSTABLE)	STEEL
20	PACKING (LAMPWICK)	
21	PACKING RING	C.I.
22	HEAD NIPPLE (ADJUSTABLE TYPE)	STEEL

* OPTIONAL

MANUAL LUBRICATOR ASSEMBLY

