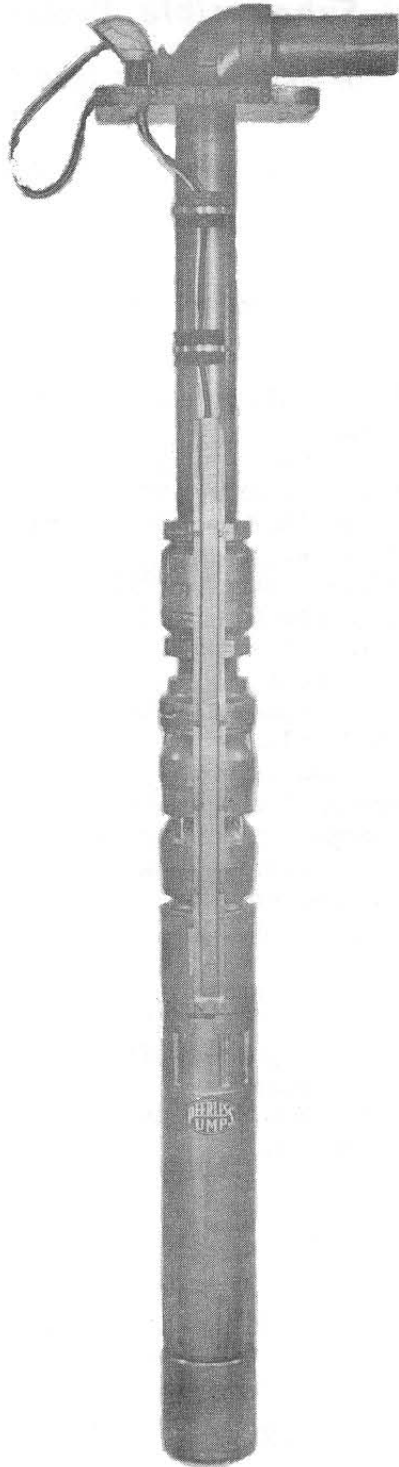


# Peerless Pump Company

## Installation Operation Maintenance Instructions

### Submersible Pumps with 4" and 6" Motors



Pump No. \_\_\_\_\_

Invoice No. \_\_\_\_\_

P.O. No. \_\_\_\_\_

Item No. \_\_\_\_\_

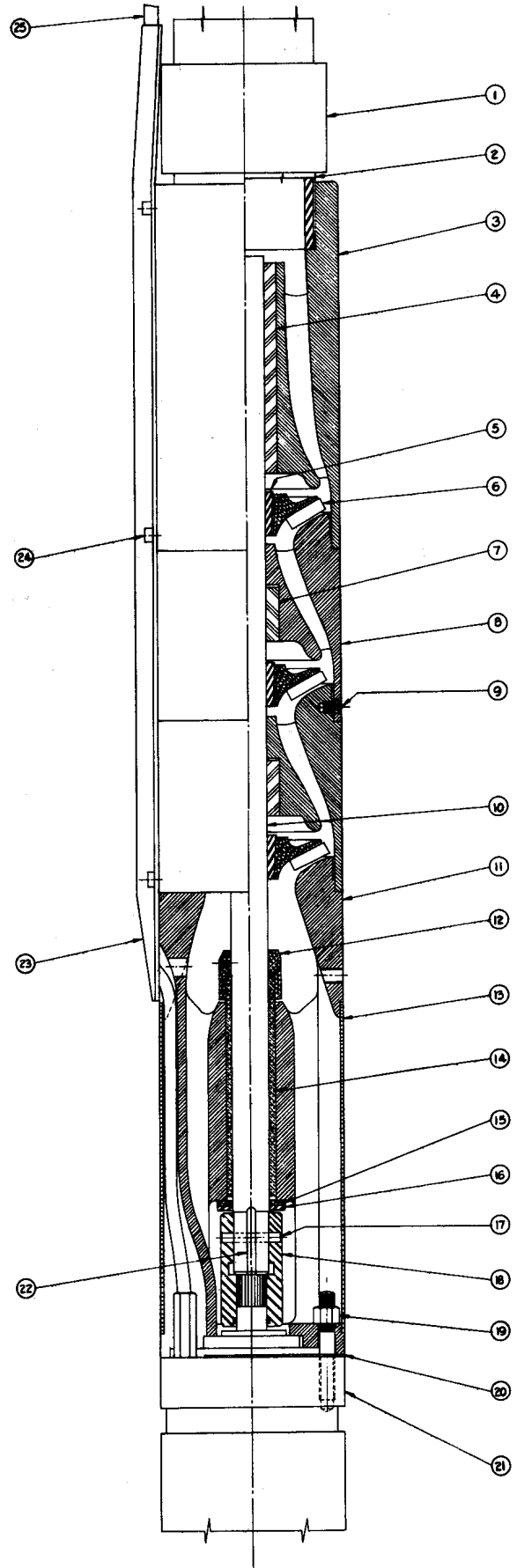


Bulletin B-2622789

# Vertical Submersible Pumps

## 4" MOTOR WITH 4LO BOWL UNIT

Item No.	Description
1	NPT coupling
2	nipple
3	top bowl
4	rubber bushing-top bowl
5	taper lock bushing-impeller
6	impeller
7	rubber bushing-bowl
8	intermediate bowl
9	bowl set screw
10	pump shaft
11	interconnector-suction
12	sand collar
13	suction screen
14	bronze bushing
15	bronze thrust washer
16	S.S. thrust washer
17	pin for coupling
18	shaft coupling
19	nut
20	shim for motor
21	submersible motor
22	key for pump shaft
23	cable guard
24	cap screw for guard
25	power cable



Drawing No. 2827484

## **Installation of Submersible Pumps**

Peerless Pump Company deep well submersible pumps are equipped with either 4" or 6" NEMA standard submersible motors of leading motor manufacturers. Motor sizes and hp ratings must be selected to fit applications. Since number of different bowl sizes are furnished with above motors, purchaser must compare the well inside diameter with the outside diameter (over the cable guard) of the selected unit to make sure that no difficulties arise after the unit is at the well site. For dimensions see Chart #1.

As a pump column a commercially random length pipe with NPT – ¾" taper threads should be used. If butt pipe threads are used the joints must be secured from unscrewing by means of set screws or pins in both ends of each pipe coupling.

The following instructions are intended to insure correct installation procedure and should be completely read before attempting to install or operate the pump. If, after reading the following instructions, any misunderstanding exists, we recommend seeing your dealer, who will offer help or refer questions to the manufacturer.

The Peerless submersible pumps are multi-stage vertical turbine pumps. Each stage consists of a bowl and an impeller.

The pump shaft is directly connected to the motor shaft with a spline coupling. The motor is attached below the pump and takes the thrust of the pump on a tilting shoe thrust bearing. This motor is specifically designed for submerged operation and continued operation of this motor out of water will cause it to burn out.

Peerless submersible pumps are well constructed, and if installed and operated with reasonable care should give years of satisfactory service with a minimum of maintenance. Be sure to check the pump and motor for breakage in shipment immediately after its receipt.

### **MOTOR:**

4" and 6" submersible motors may vary in design (such as oil filled, water filled & etc.) between the motor manufacturers but they will be all to NEMA standards. This motor is not a standard electric motor and requires special handling. Refer to the motor instructions enclosed in the shipping crate. Any repair work on the motor must be done by respective motor manufacturer's service department otherwise the motor warranty will be void.

Keep this bulletin for further service and operation reference.

### **MOTOR CONTROL BOX:**

Special control boxes are not furnished with three phase submersible motors. We recommend that the pump installer use standard motor control that has three leg protection and quick-trip heaters. A variable overload or an ambient-compensating overload should be used if a wide range of ambient temperature is expected. If the control housing is not a weather proof container it must be protected from extreme weather conditions. Single phase motors are furnished with control boxes and lighting arrestors.

The following chart shows the main dimensions, in inches, of these submersible pumps:

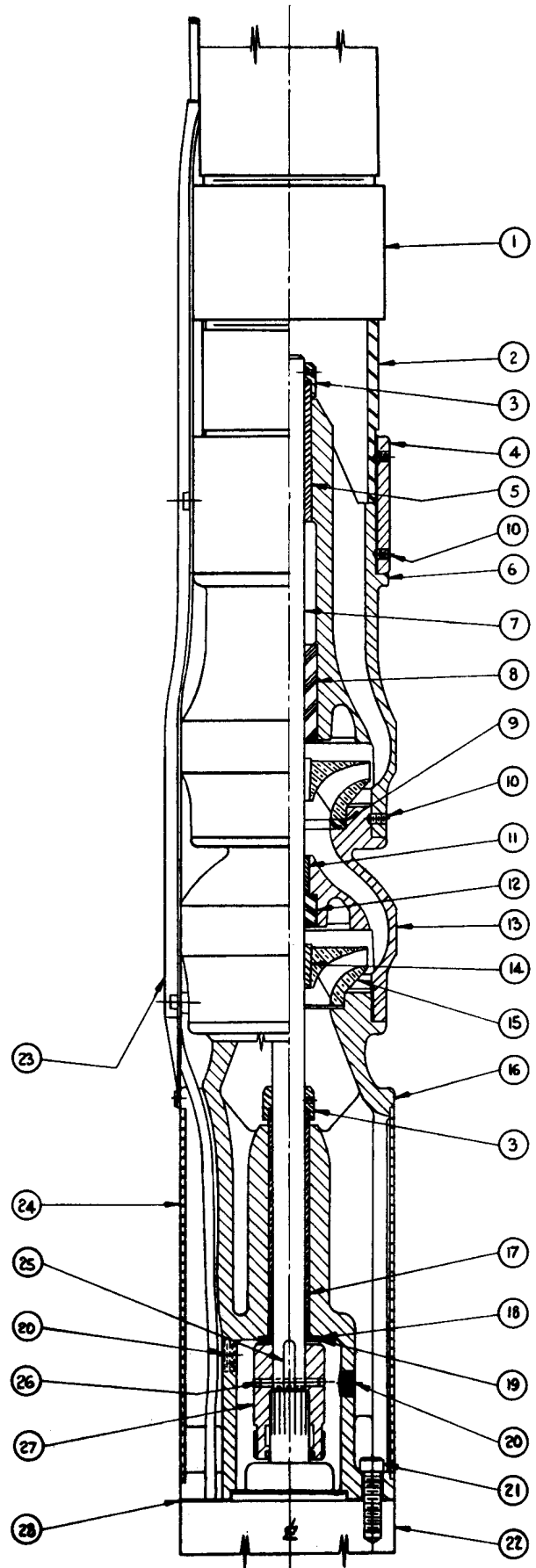
**CHART # 1**

4" MOTORS & PUMPS						
MOTOR			PUMP			
HP	Dia.	Lg.	Type	O. D.	Length per Stage	
					1 <sup>st</sup>	Additional
3	3-3/4	31	4LO	4-1/2	21-3/8	3-1/2
5	3-3/4	31	6LB	6-1/8	24-1/8	4-7/8
-	-	-	6MA	6-1/8	24-3/8	4-7/8

6" MOTORS & PUMPS						
MOTOR			PUMP			
HP	Dia.	Lg.	Type	O. D.	Length per Stage	
					1st	Additional
5	5-3/8	29	-	-	-	-
7½	5-3/8	31	4LO	5-5/8	19-5/8	3-1/2
10	5-3/8	35	6LB	6-1/8	21-3/8	4-7/8
15	5-3/8	39	6MA	6-1/8	21-3/8	4-7/8
20	5-3/8	44	6HXB	6-1/8	20-1/4	4-11/16
25	5-3/8	61	7LA	7	19-7/8	5-5/8
30	5-3/8	61	7HXB	7-1/4	20-1/8	5-9/16
40	5-3/8	69	8LB	8-1/16	22-7/8	6-5/16
-	-	-	8MA	8	23-1/8	5-3/4

**Vertical Submersible Pumps**  
**6" MOTOR WITH 6" BOWL UNIT**

Item No.	Description
1	NPT coupling
2	nipple
3	sand collar
4	butt pipe coupling
5	bronze bearing for top bowl
6	top bowl
7	pump shaft
8	rubber bearing for top bowl
9	impeller seal ring
10	bowl set screw
11	bronze bearing for intermediate bowl
12	rubber bearing for intermediate bowl
13	intermediate bowl
14	impeller taper bushing
15	impeller
16	suction interconnector
17	bronze bearing for suction interconnector
18	bronze thrust washer
19	S.S. thrust washer
20	plug
21	cap screw
22	submersible motor
23	cable guard
24	bronze screen
25	key for coupling
26	pin for coupling
27	shaft coupling
28	shim for coupling



Drawing No. 2825628

**CHECKING THE WELL:**

Before any attempt is made to install the pump, the well should be carefully checked to determine that the casing is of the proper diameter depth and straightness. If there is any doubt about the size or accuracy of the well, consult your pump dealer and, if necessary, have it carefully surveyed and plotted to determine that the pump can be installed properly, and will operate normally. Since the pump drop pipe can be curved, within limits, without being detrimental to find out in what direction and how sharply it curves throughout its length.

Wells for which the exact depth and diameter are not known, should be checked even if they are not crooked, because the lower strings of casing are frequently smaller in diameter than the upper ones.

If a well is crooked, surveying is important especially when the pump outside diameter is close to the well inside diameter.

Surveying involves lowering into the well to the proper setting a checking tool which is the maximum diameter and length of the pump, together with a piece of drop pipe at least 50 feet long.

In a crooked well a submersible pump will work much better than a line shaft pump because it has no line shaft in the well causing excessive friction and wear.

**DEVELOPING THE WELL:**

Developing the well and freeing it from sand are part of the well driller's job and should be done with a test pump reserved for this purpose. However, if a test pump is not available and a new pump must be used, extreme care should be taken. Throttle the discharge at least until such time that the water clears from excessive sand. Even then, any and all precautions which might have been taken will not insure that the pump will not be badly sand cut during the process. Therefore, if at all possible, use a test pump to develop the well because the customer is solely responsible for any damage to the new pump used in this manner.

**AIR AND GAS IN THE WELL:**

If air or gas is present in the water, the pump will not meet the performance requirements and, if either is present in excessive quantities, pumping may stop altogether. The presence of gas or air may cause vibration and damage. If it is known that gas or air is present, consult your dealer or the pump manufacturer for advice.

**THE PUMP FOUNDATION:**

Whenever possible, a substantial concrete foundation should be built around the well before the pump is installed. The top of the foundation should be a minimum

of 3" above the top of the well casing and large enough so that a generous shoulder will extend all around the base of the surface plate. The foundation should slope outward and downward and sufficiently deep into the ground to provide the required thickness for strength as well as to secure a firm footing.

**CHART # 2**

Permissible Load on Soil	
Nature of Soil	Lbs. Per sq. ft. of area
Packed gravel	16,000
Compacted sand	8,000
Dry-thick clay bed	8,000
Moist thick clay bed	4,000
Dry sand	4,000
Soft, wet clay	2,000
Alluvial top soil	1,000

**CHART # 3**

Approx. Wt. Of Water in 1 Ft. of Col.		
Std. Pipe Size	Wt. Per Ft. of Pipe	Wt. Of Water Per Ft. of Pipe
2 ½	5.79	2.1
3	7.58	3.0
4	10.79	5.0
5	14.62	8.0
6	18.97	12.0

**CHART # 4**

Approx. Weight of Pump & Motor		
Type	Motor & One Stage Pump Weight Lbs.	Additional Stages Weight Lbs.
4LO	200	8
6LB	397	15
6MA	398	13
6HXB	398	13
7LA	411	21
7HXB	419	23
8LB	434	36
8MA	430	31

The thickness and ground area for the foundation will depend upon the firmness of the supporting earth around the well at any and all times (considering rain or flood effects) and the weight of the complete pumping unit when full of water. If the temperature drops below freezing, the foundation has to go under the freezing level. Total load on the foundation equals the dead weight of all parts including the weight of foundation itself plus the weight of water in drop pipe. The following tables may be used for reference when figuring the size of the foundation.

A piece of 2" pipe set near one corner and not over 1" above the top of the foundation, where it will clear the surface plate, will prove very convenient for placing a pipe extension to anchor the chain tongs when making up the drop pipe joints. The anchor pipe should extend a generous distance below the foundation to give rigidity and the top should be threaded and capped when not in use.

#### **FOUNDATIONS OTHER THAN CONCRETE:**

Structural foundations when properly constructed are very satisfactory for many types of installations, as are a combination of structural and concrete. Foundations made up of structural members or wooden timbers resting on unstable soil are definitely not satisfactory.

#### **WATER SUPPLY:**

Any source of suitable water, free of solid material (e.g. sand) will be pump satisfactorily. Seasonal and pumping drawdown should be ascertained to insure against the pump running dry, which may ruin both pump and motor. If this is not certain, the use of a high and low water level control or a water level indicator is highly recommended. For best results the pump should be located at least 10 feet below the lowest pumping level, and if possible above the water bearing strata. Care must be taken not to locate the pump so the motor is buried in mud at the bottom of the well. It is advisable to keep the motor at least 5 feet above the bottom. Do not use oversize drop pipe. A throttling valve should be installed in the discharge line to prevent possible over-pumping of the well.

If the conditions of the well are such that the motor may be buried in sand or mud, the motor skirts must be used to protect the motor and pump from being sand or mud locked. See your dealer for recommendations.

#### **PUMP INSTALLATION:**

#### **SPECIAL TOOLS & EQUIPMENT REQUIRED FOR SUBMERSIBLE PUMP INSTALLATION**

Volt-ammeter for checking current

Sta-kon pliers or crimping tool for securing cable connectors to the cable.

Banding tool for securing cable to the column.

Band "Band it" stainless steel band

"Band it" buckle for use with band.

Rubber pads to protect cable under "Band it" band.

Cable: 3 parallel conductors #1 or #1/0 AWG approximately 20 feet, for checking of rotation of the unit before installation in the well.

After the splicing of the drop cable to the motor is completed and checked for insulation, splice temporarily to the drop cable end, which sticks out of the hub of the reel, 3 parallel conductors. Connect the other end of the 3 parallel conductors to the power supply. Check the rotation of the unit, mark drop cable leads for identification on final hook up. Disconnect the 3 conductors from the power supply and drop cable. Proceed with installation.

Installation of a submersible pump is simple, but care in installation is important. Before the pump leaves the factory it is tested. The performance may be limited or lowered by poor installation practice. It will therefore be advisable to closely observe the following installation procedure:

#### 1. Exercise caution in handling the pumps:

The entire down thrust of the pump is carried on a special thrust bearing. This bearing can be broken if the pump is dropped or jarred, resulting in the pump becoming inoperative. The motor is enclosed in a metal tube. If this tube is damaged the motor may be affected and the performance of the pump substantially curtailed.

#### 2. Prepare the motor for operation:

Follow the motor instruction sheet. Suggestions may seem trivial, but omission of them will shorten the motor life, and may void the warranty.

#### 3. Splice the cable to the motor leads with Peerless Pump waterproof cable connectors:

#### **PEERLESS WATERPROOF CABLE CONNECTOR**

For making a waterproof cable splice, we recommend to use:

A. Scotch cast splicing kit No. 82-A1, one for each lead. In about one hour, the three connections could be made. After having checked the insulation the pump can be lowered immediately into the well. Each kit includes instructions for using it. (Peerless Pump Part Number 2615720)

B. Taped Type Splice (Peerless Pump Part Number 2615721) Among the many effective methods of making

Waterproof splices, the one given below has been found to be as satisfactory as any.

The following tapes are used:

(1) "Bi-Seal" tape

Supplier: Mitchell-Rand Insulation Co.  
51 Murray Street  
New York 7, New York

Or: "Scotchfil" Electrical Putty  
Supplier: Minnesota Mining & Mfg. Co.

(2) "Scotch #33" electrical tape and "Scotchkote"  
Supplier: Minnesota Mining & Mfg. Co.

"Bi-Seal" tape is a self-bonding polyethelene tape which has excellent electrical properties and extremely low water vapor transmission.

"Scotchfil" electrical insulation putty has good dielectric and excellent aging properties.

"Scotch #33 tape, although also a good insulating material, is used for mechanical protection due to its superior abrasion resistance.

**In splicing, proceed as follows:**

A. If cable furnished is of three conductor in single round jacket construction, snip outer jacket in two or three places and remove with Sta-kon or similar by peeling jacket back approximately one foot. Remove cotton or any other tape from individual conductors in order to expose the insulation of each wire.

Utmost care must be exercised to remove all traces of tape from insulation of individual conductors: otherwise, thru capillary action, the water will enter the splice, thus shorting out the motor.

Strip the insulation of each conductor back far enough to allow conductor to extend half way thru the connector.

Crimp the connectors to the conductors.

B. Apply "Bi-Seal" tape – first stretch tape 2-3 times its normal length. Start taping with a view of making a smooth contour across the length of the splice. Use normal tension in taping. Continue taping until the thickest part of the splice is about 1 ½ times the conductor diameter. Use about a ½ lap in taping. With each layer proceed beyond the start of the previous layer. Last layer should be at least 1 ½" beyond the end of the wire insulation.

When "Scotchfil" is used make a smooth contour over the connection by filling the voids and padding sharp edges of cable connectors. Extend the filling

at least 1" beyond the end of the wire insulation.

C. Apply four ½ lapped layers of "Scotch #33" tape going beyond the ends of the "Bi-Seal" tape.

D. Apply one coat of "Scotchkote" over the tape going beyond the end of the tape over the cable jacket.

**CHART # 5**

4" SUBMERSIBLE MOTORS					
HP	Voltage			F. L. Current Amps	Fuse Amps
	Nom	Min	Max		
3*	230	210	250	16.8	50
5*	230	210	250	24.8	80
3	220	198	242	9.5	30
3	240	396	484	4.75	15
5	220	198	242	15	45
5	440	198	484	7.5	25

6" SUBMERSIBLE MOTORS					
HP	Voltage			F. L. Current Amps	Fuse Amps
	Nom	Min	Max		
5*	230	210	250	26	80
7½*	230	210	250	37.3	125
5	220	198	242	16.5	50
5	440	396	484	8.25	25
7½	220	198	242	21	70
7½	440	396	484	10.5	35
10	220	198	242	32	90
10	440	396	484	16	45
15	220	198	242	42	125
15	440	396	484	21	60
20	220	198	242	56.6	175
20	440	396	484	26	90
25	220	198	242	71.0	210
25	440	396	484	35.5	110
30	440	396	484	41.5	150
40	440	396	484	55.5	200

\* Single phase motors.

**4. Test motor and connector as follows:**

Check the winding resistances of the three-phase motors by touching the prongs of the meter to the cable leads of any two wires. The reading so obtained must be equal in all three legs, if otherwise, check with your dealer or motor manufacturer.

Also check resistance of each lead to the water or water-container to determine a possible short to the water. The reading so obtained should be about 50,000,000 ohms (50 meg ohms) or more.

Above chart shows nominal, minimum and maximum voltages acceptable for safe operation of pump. Full load current shown are typical values. See motor name plate for rated current. Fuse amperes are approximate values – not necessarily in agreement with all motor manufacturer’s recommendations. Refer to motor manual for each motor manufacturer’s recommendations.

A three-phase motor may run in the wrong direction; this can be seen, if after starting, it tends to rotate in a reverse to correct impeller rotation. In this case, change any two of the supply wires on the starting switch. If power is available check rotation before lowering the unit into the well.

**5. Lowering the pump into the well:**

At no time clamp or hold the motor casing with Stillson type wrench or chain tongs. The pump may be clamped but watch for motor leads going outside on the pump which are protected by a sheet-metal guard. Don’t squeeze it.

Place timbers or equivalent support upon the foundation around the well casing for use as resting blocks for the elevator clamp.

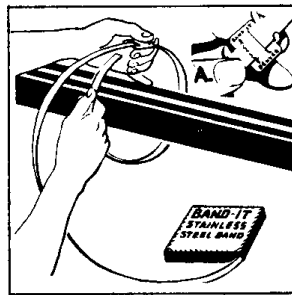
Everything should now be in readiness for the final, careful check of material and equipment before the actual installation of the pump is attempted. Securely fasten one elevator clamp between check-valve and top bowl. Attach the sling to the elevator clamps and pass the looped end over the hoist hook. While the helpers support the lower end of the pump, the unit is hoisted clear and into position over the well. It is then carefully lowered into the well until the elevator clamp rests upon the support timbers. The sling is removed for use in hoisting the following column pipes.

Extra care must be used when handling long pump units (6 foot or longer) because they can be easily damaged. It is suggested that such units remain fastened to the skids as they are received from the factory and lifted into a vertical position over the well before the skids are removed.

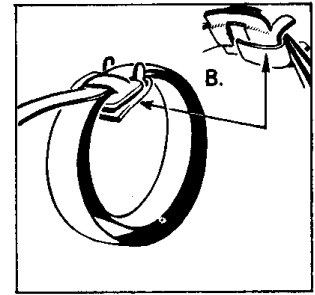
When making up any threaded joint be sure that the threads engage freely and square. Do not allow cross-threading, or assembly troubles will result. If cross-threading has accidentally started, be sure to break the joint, file and clean-up the threads before again making up the joint. If cross-threading damage is too extensive the offending part should be removed and replaced with a new piece. All threaded joints will make up easily if the

threads are started properly. Use a good quality thread rope and make all joints TIGHT.

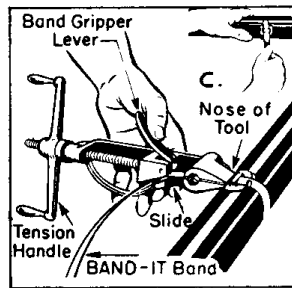
The following pictures show the bending procedure:



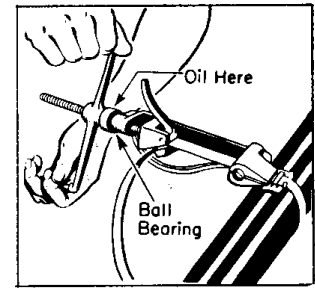
**1** Band may be used from bulk roll as shown, or, for ease of application, cut off about 8' to 10' of Band; hook one end on Buckle (A) then bring the other around object to be banded and through Buckle.



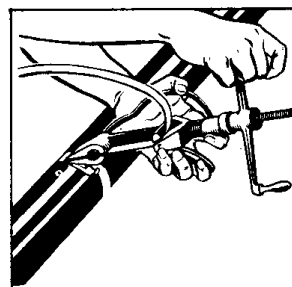
**2** Bring end around object—preferably twice around and through Buckle. Bend end of Band under Buckle (B). For best results, apply Band twice around. Double banding develops almost four times the grip of single banding.



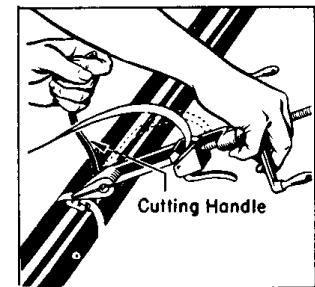
**3** Draw Band snug (C). With thumb on Band Gripper Lever, apply tension with Tool.



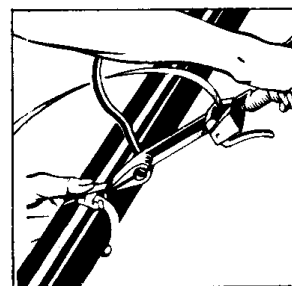
**4** Apply proper amount of tension. (Ball Bearing locks itself under tension.)



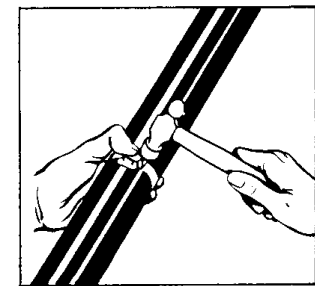
**5** Rotate Tool over Buckle, backing off with Tension Handle throughout entire course of bend. Failure to back off with Tension Handle throughout entire course of bend may result in breaking of Band. There is no loss of tension, as Band released is used up in the bend.



**6** Pull cutting handle to cut the Band.



**7** Remove Tool, holding stub of Band down with thumb.



**8** Clinch stub by hammering down Buckle ears, completing BAND-IT CLAMP.



To lower the pump, just add successive lengths of random length pipe, playing out the cables and strapping them to the column every 20 feet. Untwist the cable, place a rubber shield as shown in Fig. 1, and fix them to the column. If airline is used, fix it to the column at same time. Use "Band-it" clamps.

For using "Band-it" clamp we need the following:

- "Band-it" stainless steel band, 3/8" wide  
(One roll contains 100 feet of band)
- "Band-it" buckles, 3/8" wide
- Wire protector stripe

When all the column is assembled, the surface plate raised, pass the cables through the entrance fitting which is threaded in the surface plate, (Fig. 2). Connect the airline tube (when furnished) to the plate by means of a compression fitting. The surface plate (Fig. 1) is a strong C.I. casting covering the well and supporting the column and pump unit. It has a connecting opening to the lateral discharge line and a drip proof entrance fitting for the motor cables. It can be equipped with a high-low water control instrument or Peerless direct-reading water level gage. On both sides of the discharge elbow it had husky lifting lugs to raise the casting with column, pump and water in the column. Surface plates are made for 2 1/2", 3" and 4" column sizes.

#### **AIRLINE AND GAUGE INSTALLATION AND OPERATION INSTRUCTIONS.**

If the pump is equipped with a water level testing device, the airline, which is 1/4" O.D. copper tubing, should be tied at regular intervals as each component is lowered into the well. The airline is a copper tube, it usually goes in one or more pieces down to two feet from the screen upper edge.

On the top of the surface plate are assembled the water level gage, air valve and tee.

Accurate water level readings can be obtained by installing the gauge center at about the same height as the centerline of the discharge at the pump head, and any additional readings on the surface discharge head, in feet, can be added to the pumping level to give the total "water-to-water" pumping head.

Determine the exact vertical distance from the gauge center to the lower end of the airline and mark this length in feet and inches in the square provided on the gauge dial.

Adjust the movable gauge dial to correspond to the above determined length. Loosen the three screws on the face of the gauge and turn the dial until the graduation corresponding to the vertical height is opposite the hand pointer when the gauge is in an upright position. Check the dial after locking the screws.

Make sure that all joints of the air line, gauge fittings and air valve are air tight under pressure, and that the bottom end of the air line is not plugged.

"Standing" or "Static" water level readings are taken before starting the pump, or after a shutdown period long enough to allow the well water level conditions to reach normal. "Drawdown" and "Pumping Level" readings are taken after the pump has been operating against normal head for a period sufficient to pull down to the maximum point.

To obtain the above readings, pump air into the air line with a hand pump until the gauge cases to rise, and note the gauge reading which is the distance from the gauge center to water level.



**Fig. 1**

Keep a record of all readings and the date taken for a complete story on the well's performance due to seasonal changes.

An ordinary pressure gauge could be used instead of a water level gauge. In this case the pressure indicated by the gauge shall be multiplied by 2.31 to get the water height above the bottom end of airline pipe. The water depth in the well is airline length minus water height. See Bulletin B-127, page 102.

Turn the pump as it hangs from the hoist until the discharge connection points in the desired direction. Slowly lower the pump and locate the column pipe approximately concentric with the well casing. If anchor bolts are used, they should be directly below and in line with the holes in the surface plate. Continue to lower the pump until the bolts just enter the holes. Locate the leveling wedges, one on each side of the surface plate where greatest support and rigidity is apparent. Lower the pump until the surface plate rests firmly upon the wedges while at the same time maintaining the concentric position of the column within the well casing. Remove the hoist sling and then align the surface plate.

#### 6. Wire the pump systems:

See wire data under motor test page. Outdoor lines over 50' length shall be protected by lightning arrestors.

Check the current at motor starter switch. Use snap-on voltammeter. Measure current in each line without throttling of the flow after the pump is started. Readings obtained should be within 15% of name plate rated full load current. Using same instrument check the voltage in each line. The readings should be within 10% of name plate rated voltage.

A cable selection is an important factor. If improper cable is used the voltage drop may exceed the limits and serious damage may occur in motor. See your dealer for cable recommendations.

#### 7. Throttle valve setting:

Some wells may be over pumped so a discharge valve correctly set to limit capacity should be used.

When first starting the pump in a well it is advisable to pay attention to the quantity of water the well can deliver to the pump and the amount of water the pump is capable of delivering to the system. The danger point is if the pump will carry off water faster than it flows into the

well. If this occurs the supply of water in the well will be depleted before a pumping cycle is completed, causing the pump to run dry. In order to prevent this from occurring the following procedure should be followed:

When the pump is first put into operation the system has no water pressure, and therefore, then pump will deliver its maximum capacity until such pressure is developed. This sudden rush of water in the well may loosen sand, carry it into the water lubricated bearings of the motor and the pump and thereby wreck the pump, or at least limit its life. It is therefore recommended that a throttling valve be installed in the pump discharge. This valve should be opened just enough to permit a minimum flow of water when the pump is first started. Determine the water level in the well with the pump not running, start the pump and when the system is up to capacity, again determine the water level in the well. This change in water level is called the drawdown. If there is no appreciable change in the water level in the well, the valve may be opened more. The maximum permissible flow will be reached when the water level is drawn down to a certain level and that level is maintained until the pump again stops. With that valve setting the amount of water taken out of the well equals the amount of water flowing into the well. Seasonal change in well capacities should also be taken into account, or water level controls be installed.

To insure that pump is not running in continuous upthrust, the flow of water must not exceed approximately 120% of the capacity pump is selected for. If the capacity is greater, throttle down the flow until above the limit is met. In seasonal changes when water level is high, same flow limit exists.

If there are not flow-measuring devices available, the following procedure will give satisfactory results:

1. Install pressure gauge in discharge head or in discharge pipe between the discharge head and the throttle valve.
2. Determine the distance to water level with pump running and with throttle valve partially closed.
3. Multiply pressure gauge reading by 2.31, thus converting in feet of water. Add to this distance to water which then will give head developed by pump.
4. Adjust the throttle valve so that result obtained in paragraph 3 corresponds to the head (in feet) for which the pump is selected.

## DISASSEMBLY OF PEERLESS SUBMERSIBLE BOWL UNIT

The bowl units used in submersible pumps are designed so that emergency repairs can be made in field.

The following special tools are necessary to disassemble and reassemble submersible bowl unit:

### SPECIAL TOOLS

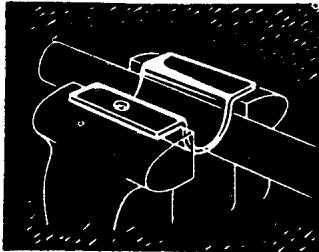


Figure 1  
SHAFT HOLDER. To protect shaft from scratches in vise.

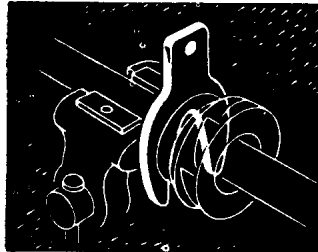


Figure 2  
FROG. For locating impeller on shaft.

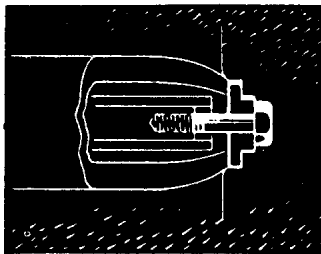


Figure 3  
TIE DOWN BOLT. To draw impellers down onto bowl seat.

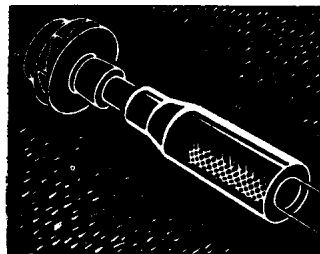
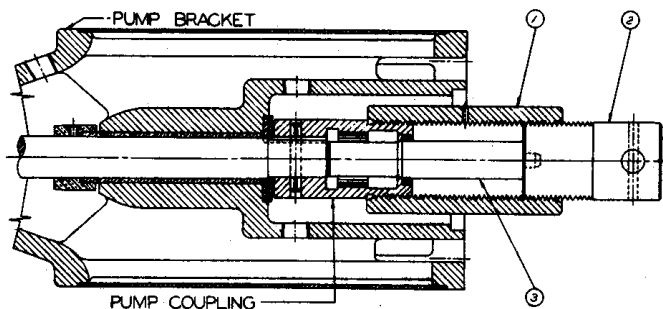


Figure 4  
BEATER. For driving split-tapered impeller lock into impeller.



Drawing 2815605

Fig. 5

1. The unit must be placed horizontally. Use two

supports for motor and as many supports as necessary under bowl unit.

2. Remove cable guard and suction screen.
3. Remove cap screws or nuts between motor and suction interconnector. Slide the motor back until it is separated from bowl unit.
4. Remove coupling as follows:
  - a. Remove 2 plugs opposite in coupling area of the interconnector.
  - b. Drive out the pin from the coupling
  - c. Screw on the sleeve part #1. (This is a standard shaft-coupling for 1-11/16" diameter line shaft. Left hand thread.) Put in the ram, (part 3) so it will enter the hole in the center of the pulling screw (part 2). Grease the top of the ram.
  - d. Screw in part #2, (pulling screw) into part #1 (left hand thread) until pump coupling has been pulled off. Hold part #1 with a pipe wrench against turning.

5. Remove locking set screws or pins from each threaded bowl joint. By use of chain tongs remove interconnector. Note: Flanged type bowls disassemble by removing nuts from bowl studs.
6. Loosen socket head screw in sand collar (3, Figure 1) and slip off collar.
7. Tap out split-tapered impeller lock with beater. Remove impeller from bottom of shaft. Caution: Mark impellers in the sequence of their disassembly. Each impeller must be reassembled on the shaft in the same location as in the original factory assembly. Also, match each impeller and its impeller lock.
8. Spread split-tapered impeller lock with screw driver and slide it off bottom of shaft. Note: The above procedure is repeated for each bowl in the assembly.

The assembly is now ready for inspection of parts. See section titled "What to Look For" on preceding page and Trouble Chart on second page following.

### FIELD ASSEMBLY PROCEDURE 4LO BOWL UNIT

1. Assemble impeller shaft and motor coupling by inserting the turned down end of the shaft with key into the coupling. (Fit is .001 loose to size.) Secure the shaft and coupling assembly by means of roll pin.
2. Slip the thrust washers over the top end of the shaft; the stainless steel washer first and then the bronze. Insert the shaft into the suction interconnector

with the coupling on the end of the interconnector. Insert .050" to .070" of shims between top end of the coupling and the stainless steel thrust washer. Use 1/2" NPT hole in the suction interconnector for 6" motor. 4" motor interconnector is open design.

3. Slip the first impeller over the shaft and lock it into place by means of the taper lock. Do not beat the impeller top hard (2 to 3 average strikes on the taper lock is sufficient). Excessive beating can develop a spring action in the impeller shroud plate thus causing a loss of lateral. This lateral will be the .050" to .070" that is pre-set by the shims. Assemble the remaining stage still being careful not to beat the impellers too hard. Do not assemble the top bowl for the time being.

**CAUTION: DO NOT INSTALL SET SCREWS IN THE BOWLS AT THIS TIME**

4. Remove the shims. Measure the total lateral movement of the impeller shaft and compare it with lateral originally set by shims. There should not be less than .050" movement in the impeller shaft.

5. Push the impeller shaft all the way down butting against the impeller vanes and measure the distance from the motor mounting flange of suction interconnector to the end of the shaft. Measure the motor shaft extension. Subtract from the motor shaft extension the distance measured in the suction interconnector. This is the shaft interference. This interference is necessary for raising the impellers off the bottom (lateral setting). Care should be taken in measuring the motor shaft extension because there can be some movement in the shaft due to the spring action of the mechanical seals in some of the motors. So when measuring the shaft extension of the motor, push the shaft all the way in until it butts against the thrust bearing, and then measure the length of the extension while holding the shaft down.

6 Check the motor shaft for burrs. If there are any, remove them, especially off the end. Then slide the motor shaft into the coupling and tighten the motor to the suction interconnector with the cap screws or nuts.

7. Turn impeller shaft to check whether the unit rotates freely. At this stage it is recommended to set the unit in a vertical position. Push down on the impeller shaft until the thrust bearing in the motor is solidly on bottom. Measure the gap with a feeler gage between the impeller vanes and the impeller seat in the top bowl. Add or remove motor interconnector shims as necessary to provide a gap of from .010" to .015" with shaft pushed in. This then is the impeller setting off bottom. The total lateral movement should still be .050" to .070".

8. When the Franklin motor is furnished the lateral setting of impellers is accomplished by means of adjusting screw on the lower end of the motor. Total travel of the shaft from initial position, as received from motor manufacturers, is .025" up and .025" down. Set

the pump and motor in a vertical position with the top bowl removed.

Measure the lateral setting under the vanes of top impeller. Adjust as necessary by means of the adjusting screw. For upward movement of the shaft, turn the adjusting screw counter clockwise; for downward movement turn the adjusting screw clockwise.

**CAUTION: IMPELLER SETTING OF MORE THAN 0.015" OFF BOTTOM CAN GREATLY REDUCE THE PUMP PERFORMANCE SO DO NOT EXCEED THIS .015"!**

9 Turn the impeller shaft to check whether or not the unit rotates freely. If not, locate and correct the cause before proceeding. Screw the top bowl onto the pump, secure all threaded joints from unscrewing by means of set screws. For set screw installation refer to "Installation and Maintenance Instructions". Assemble the cable guard. The pump assembly is now completed.

**CAUTION: EXTREME CARE MUST BE TAKEN IN HANDLING THE MOTOR LEADS. DO NOT STEP ON THE LEADS OR DO ANY KIND OF DAMAGE TO THE LEADS BECAUSE THIS CAN LEAD TO AN ELECTRICAL FAILURE.**

#### **FIELD ASSEMBLY PROCEDURE FOR THREADED BOWL UNITS (OTHER THAN 4LO).**

1. Assemble impeller shaft and motor coupling by inserting the turned down end of the shaft with key into the coupling. (Fit .001 loose to size). Secure shaft and coupling assembly by means of roll pin.
2. Slip the thrust washers over the top end of the shaft; stainless steel first and then the bronze. Insert the shaft into the suction interconnector. Insert 3/16" to 7/32" of shims between coupling end and stainless steel thrust washer. Use the 1/2" NPT hole in the suction interconnector for 6" motor. 4" motor interconnector is open design.
3. Set the impeller over the shaft and lock in place by means of the taper lock. Assemble the rest of the bowl unit except for the top bowl which should be left off temporarily.

**CAUTION: DO NOT INSTALL SET SCREWS IN THE BOWLS AT THIS TIME.**

4. Remove the shims. Measure the total lateral and compare with lateral originally set by shims. There should not be less than 3/16" movement in the impellers.
5. Push the impeller shaft all the way down, butting against the impeller skirt and measure the distance

from mounting flange of suction interconnector to the end of the shaft. Measure the motor shaft extension. Subtract from the motor shaft extension the distance measured in the suction interconnector. This is shaft interference. Add enough shims between the motor and the suction interconnector to leave 5/32" to 1/8" shaft interference. This interference is necessary for raising the impellers off bottom (lateral setting). Care should be taken in measuring the motor shaft extension because there can be some movement in the shaft due to mechanical seals in some of the motors. So when measuring the shaft extension of the motor, push the shaft all the way in until it butts against the thrust bearing and then measure the length of the extension.

6. Check the motor shaft for burrs. If there are any remove them, especially off the end. Then slide the motor shaft into the coupling and tighten the motor to the suction interconnector with the cap screws or nuts. Check again, in the top bowl, the total lateral movement and impeller setting off bottom. Total movement should be 3/16" to 7/32" and the impeller setting should be 5/32" to 1/8" off bottom.

7 Turn the impeller shaft to check whether or not the unit rotates freely. If not, correct the cause before proceeding. Screw the top bowl onto the pump. Secure all threaded joints from unscrewing by means of setscrews. For setscrews installation refer to "Installation and Maintenance Instructions". Assemble cable guard. Extreme care should be taken in handling the motor leads. Do not step on the leads or do any kind of damage to the leads because this will lead to an electrical failure. The pump assembly is now completed.

#### **FIELD ASSEMBLY PROCEDURE FOR 8LB & 8MA BOWL UNIT**

1. Assemble impeller shaft and motor coupling by inserting the turned down end of the shaft with key into the coupling. (Fit .001 loosen to size). Secure the shaft and coupling assembly by means of roll pin.

2. Slip the thrust washers over the top end of the shaft; the stainless steel washer first and then the bronze. Insert the shaft into the suction interconnector. Insert 3/16" to 7/32" of shims between coupling end and stainless steel thrust washer by going thru 1/2" NPT

hole in the suction interconnector.

3. Set the impeller over the shaft and lock in place by means of the taper lock. Assemble the rest of the bowl unit except for the top bowl, which should be left off temporarily.

4. Remove the shims. Measure the total lateral and compare with lateral originally set by shims. There should not be less than 3/16" movement in the impellers.

5. Push the impeller shaft all the way down, butting against the impeller skirt and measure the distance from mounting flange of suction interconnector to the end of the shaft. Measure the motor shaft extension. Subtract from the motor shaft extension the distance measured in the suction interconnector. This is shaft interference. Add enough shims between the motor and the suction interconnector to leave 1/8" to 5/32" shaft interference. This shaft interference is necessary for raising the impellers off bottom (lateral setting). Care should be taken in measuring the motor shaft extension because there can be some movement in the shaft due to mechanical seals in some of the motors. So when measuring the shaft extension of the motor, push the shaft all the way in until it butts against the thrust bearing and then measure the length of the extension.

6. Check the motor shaft for burrs. If there are any remove them, especially off the end. Then slide the motor shaft into the coupling and tighten the motor to the suction interconnector with the cap screws or nuts. Check again, in the top bowl, the total lateral movement and impeller setting off bottom. Total movement should be 3/16" to 7/32" and the impeller setting should be 1/8" to 5/32" off bottom.

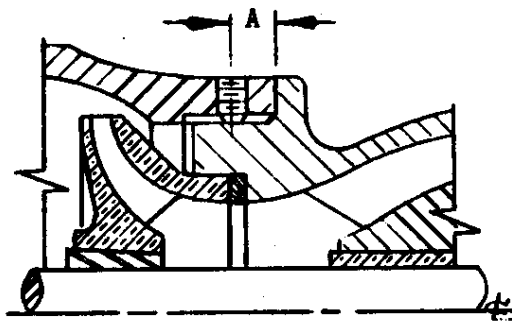
7. Turn the impeller shaft to check whether or not the unit rotates freely. If not, correct the cause before proceeding. Assemble the top bowl onto the pump. Secure threaded joints by means of setscrews. For setscrew installation refer to "Installation and Maintenance Instructions". Assemble the cable guard. Extreme care should be taken in handling the motor leads. Do not step on the leads or do any kind of damage to the leads because this will lead to an electrical failure. The pump assembly is now completed.

**“What to look for”**

TROUBLE SOURCES	PROBABLE CAUSE	REMEDY
Crooked shaft.	Bent in installation.	Replace shaft. Check the bearings.
Uneven wear on bearings.	Misalignment or bend in shaft.	Replace bearings and straighten or replace shaft.
Wear on bearings.	Abrasive action.	Replace bearings.
Lateral seal ring wear.	Abrasive action.	Replace seal rings.
Wear on side seal and impeller skirt.	Abrasive action.	Apply wear rings to skirt and side seal if damage to bowl and impeller not too great.
Wear on bowl vanes and outside wall.	Abrasive action.	Replace bowls if wear is excessive.
Wear on impeller vanes and shroud.	Abrasive action.	Replace impellers if wear is excessive.

**SET SCREW INSTALLATION**

If threaded bowls are used install set screws as shown below.



**TYPE I**

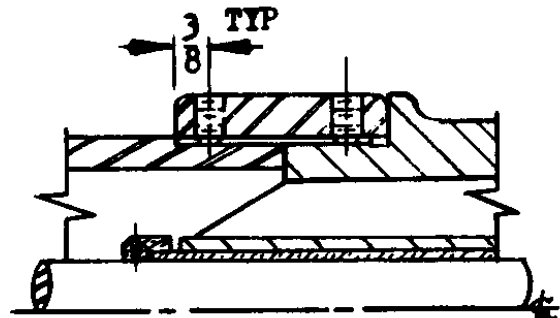
Installation on threaded bowl units.

“A” Dim. for 4” bowls – 5/16

“A” Dim. for 6” & 7” bowls = 1/2

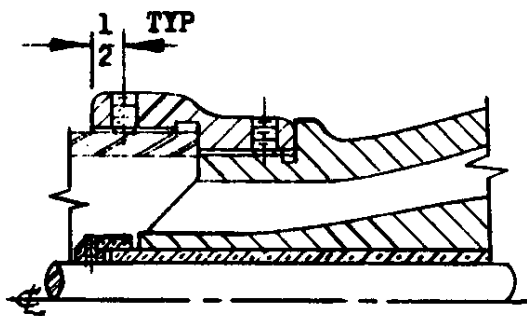
Drill and tap after assembly.

If butt pipe column (3/16 taper threads) is used the column joints must be secured from unscrewing by means of set screws as shown below.



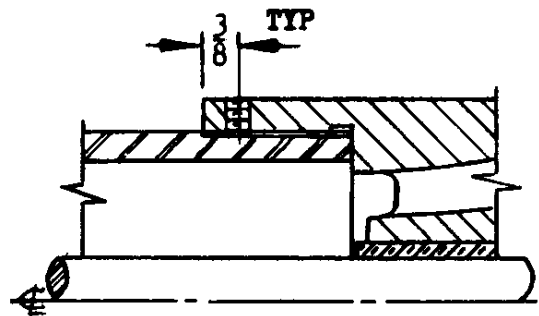
**TYPE II**

Installation of column adapter: Butt pipe coupling only. Drill and tap before assembling on top bowl or column pipe.



**TYPE III**

Installation of column adapter for butt pipe. Drill and tap before assembling on top bowl or column pipe.



**TYPE IV**

Installation on 4LO and 4LE top bowls for 2½” column and 6LB discharge manifold for 3” column. Drill and tap before assembling with column pipe.

**Drilling Note:** #7 (.201) drill 1/2 deep, 1/4 –20UNC x 3/8 deep for **Type I** only.

For **Types II, III and IV** drill and tap through.

Use: Set screw, headless, hexagonal socket, 1/4-20UNC x 3/8 LG. Peerless Pump Part Number 2610680 079

# PUMPING TROUBLES

## NOT ENOUGH WATER AND PRESSURE

<b>Cause:</b>	<b>Remedy:</b>
Low voltage	Increase size of power cable (see cable selection chart), check with power company.
Low water level in well	Lower pump into well if well depth permits. Throttle down pump discharge to compensate well drawdown. If well drawdown is inconsistent, installation of low level controls may be required.
Clogged suction screen	Valve in pump does not permit back-flushing. Clean screen.
Pump setting too deep	Check performance chart and compare to pump setting.

## NO WATER (PUMP RUNNING)

Check-Valve stuck	Check if check valve is correctly installed (arrow must point in direction of flow). Free check valve and clean seat.
Clogged suction screen	Valve in pump does not permit back-flushing. Clean screen
Pump air locked	Free valve in pump discharge. Check if check valve is correctly installed and free. If well is gaseous remove valve at pump and install one riser pipe length above pump.
Pump setting too deep	Check performance chart and compare to pump setting.

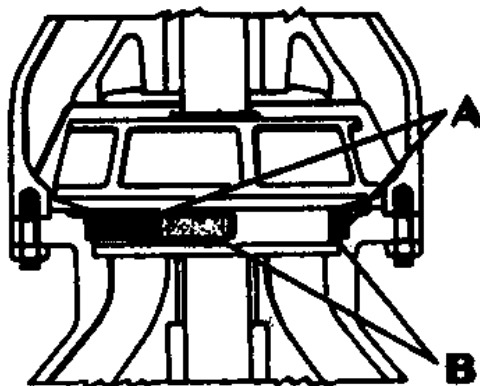
## PUMP NOT RUNNING

Fuses burned out	Check current specification of motor. Low voltage – check Power Company. Replace fuses.
Switch point dirty	Clean or replace points in switch. Check if switch is rated for service.
Broken circuit	Make continuity check with Ohmmeter. If break is in cable or connector, repair splice or splice cable with Peerless waterproof connectors.

## UNEVEN WEAR ON BEARINGS

Misalignment or bend in shaft	Replace bearings and straighten or replace shaft.
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**WHEN ORDERING REPAIR PARTS** give the complete data listed on the nameplate, plus the item number listed in the parts list on the price book and a description of the part. If in doubt, see your dealer for the proper part description and number.



**A- Wear ring pressed into bowl seat.**

**B- Wear ring pressed onto impeller skirt.**

**WEAR RING APPLICATION** Wear rings should be made of bronze although cast iron or steel can be used if this material is not available.



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