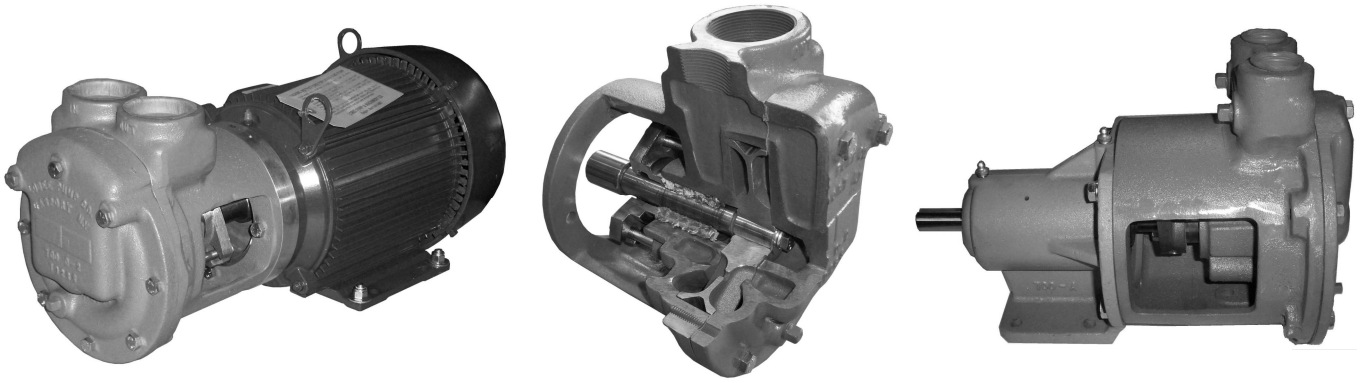
LOBEE LIQUID RING PUMP

Application, Installation, Operation and Maintenance

- ✓ These instructions are important for the performance of all Lobee Liquid Ring Pumps
- ✓ Please read them carefully before installation
- ✓ Quiet and successful operation depends on proper installation and operating procedure
- ✓ Follow carefully the procedure outlined to insure top performance from your Lobee Liquid Ring self priming pump over a long period of time.
- ✓ Keep these instructions on hand at all times



History and Overall Performance

The Lobee Liquid Ring Pump is a descendent from an old time-proven liquid ring type pump, Europe's best seller for over 60 years, and built in the United States by a well-known vacuum pump and compressor manufacturer for handling air. However, the Lobee pump is a liquid ring pump especially for non-lubricating liquids; for instance, water, gasoline, propane, chemicals, etc., but of course, with superior performance on air and vapors. This remarkable combination of a liquid pump makes this pump the answer to many difficult pumping problems.

There seems to be a popular misconception among some that the Lobee Liquid Ring Pump is just another turbine pump and as such should be competitive with other makes in the turbine field. While it is true that this pump can be offered for applications which are in the turbine pump field, it has air and vapor handling ability that cannot be approached by any turbine pump. These superior performance abilities should be exploited to the maximum when comparing it to a turbine pump.

It is ideally suited for handling foamy or volatile liquids, and any mixture of liquid, vapor and air. For applications requiring fast, positive, foolproof self-priming without a foot valve in the suction pipe, the Lobee Liquid Ring Pump exceeds all others. To determine this, three of the popular makes of 1-1/2" turbine pumps equipped with their self-priming chambers, were tested under identical conditions on water and gasoline, and the priming times compared to

that of the Lobee Liquid Ring Pump. The Lobee Liquid Ring Pump primed in 8 seconds, while the nearest competitors pump required three (3) minutes. Another one could only lift the water 4 feet and then stopped pumping.

Published curves show the liquid and air performance of the 8, 12 and 16 model size pumps. The air handling capacity of the best 1-1/2" turbine pumps tested was about 4% that of the model 12 (1-1/2") pump.

With all the superior features of this pump in self- priming and reliability, it is as simple as an open impeller centrifugal pump and can be purchased at a competitive price. It is also well adapted to manufacture in special materials for process service. Here the small size, simple design, and few parts are especially advantageous. There are no valves, no metal to metal contact, no rubbing surfaces, but only one moving part; the one piece impeller on the shaft.
The secret behind the excellent performance is the elimination of the clearance. This clearance is problematic for piston pump troubles, the lack of being a good vacuum pump or a good compressor.

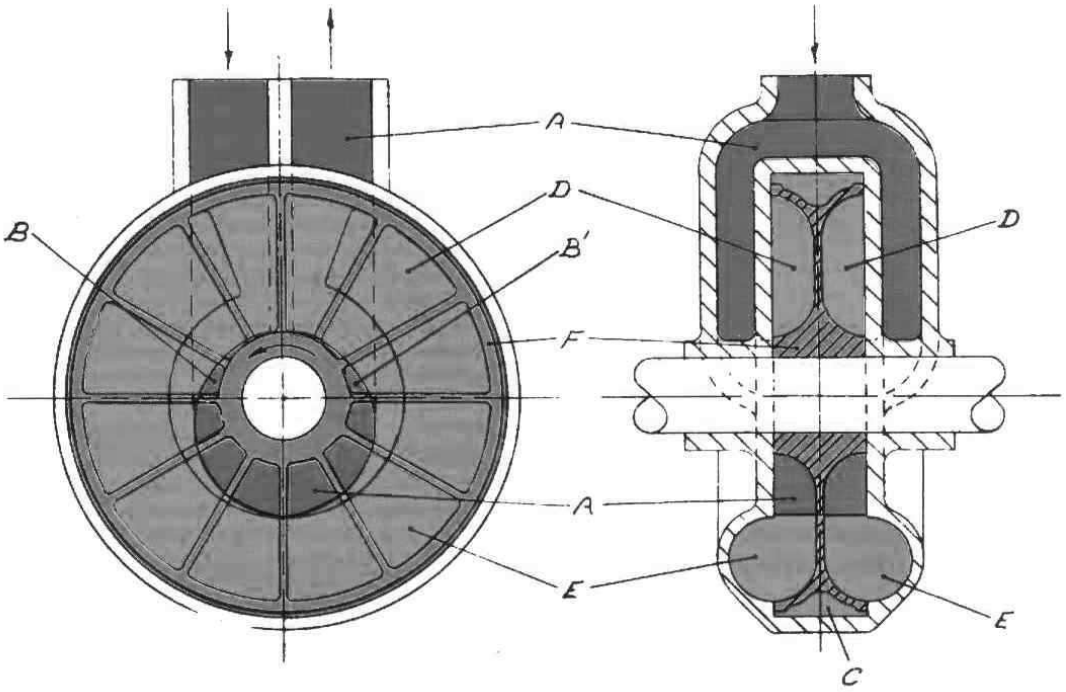
The Lobee Liquid Ring Pump operates as a piston positive displacement pump; however the "piston" is a liquid that reciprocates between the vanes (cylinder) eliminating the clearance. The principal difference between a piston pump and compressor is the different clearance value. Therefore, the same Lobee pump can also be used as a vacuum pump with approximately complete maximum vacuum, minus the vapor pressure, or as a compressor because it handles compressible and incompressible liquids in the same way. The foolproof-ness of a liquid pump depends largely upon how efficiently it can dispose of air and vapors and, in that respect, the Lobee pump is far superior to the jet and re-circulating, self-priming centrifugal pumps.

Some typical applications are:

- ✓ Domestic shallow well pump service
- ✓ General service pump applications requiring fast, positive self-priming without a foot valve in the suction pipe
- ✓ Bilge pumping on small craft at marines or yacht basins
- ✓ The petroleum industry handling gasoline, propane, butane, etc. and in loading and unloading tank trucks or tank cars, which can be accomplished by pumping from the top of the vessel through the siphon loop
- ✓ Unloading of drums from the top by mounting pump on floor or on a small dolly for easy movement from one location to another
- ✓ The chemical field pumping acids and a great variety of liquids. Pumps can be built of special alloys
- ✓ Hydraulic compressor service where pure uncontaminated air is essential
- ✓ Vacuum pumps for evacuating air and condensate from vacuum pans or for pumping mixtures of water, air and vapor in vacuum heating systems and also, for priming a group of centrifugal pumps
- ✓ Dairies and food industries for moving dairy and fruit juice products
- ✓ Condensate and boiler feed pumps that can run without seizing or damage
- ✓ Compressors and vacuum pumps for steady vibration-less flow of non-oil contaminated air for the chemical, food and printing industries

Operating Principle

A bronze or stainless steel impeller rotates in a cast iron, bronze or stainless steel casing. Suction and discharge openings are located on the top of the pump so that the pump forms a water leg, which is always filled with liquid. This liquid is essential to the pump's operation and is called the "auxiliary liquid". This liquid has the same function as the piston in a reciprocating pump. By rotation of the paddle type impeller the auxiliary liquid is also rotated and, due to the shape of the casing, it has a center of rotation different from that of the impeller. This effect causes the liquid to alternately fill and recede from the space between the blades of the impeller. The auxiliary liquid, therefore, acts as a piston reciprocating in a cylinder which in this case is not cylindrical but is actually the space between the blades of the impeller and the side walls of the casing.



Referring to the figure above, the operation is clearly demonstrated. The crescent shaped space “A” is the displacement of the pump for each revolution. At the tips of the crescent are located the suction and discharge openings B and B1 respectively. The fluid handled enters the crescent shaped area “A” at B and leaves at B1. The fluid handled is moved without agitation, being retained between the blades of the impeller. The auxiliary liquid D activated by centrifugal force acts as a piston on the fluid handled. This activation is due to the channel E which has two dead ends, and which can build up a pressure on the auxiliary liquid (and hence on the fluid handled) nearly ten times as high as the head of a centrifugal pump of the same diameter and rotation speed. When operating as a vacuum pump or compressor, then the auxiliary liquid can be water, oil, mercury or any other suitable liquid. When acting as a liquid pump, the auxiliary liquid is generally the same as the liquid handled.

The liquid plunger has the advantage that it conforms exactly to the shape of the cylinder and therefore, the clearance volume can be reduced to a minimum. The absence of valves eliminates the main source of problems with reciprocating pumps.

The Lobee impeller has (see figure) a groove “C” around its entire periphery which acts as a balance chamber and eliminates all radial thrust. This aids the smooth operation of the pump and ease of maintaining the stuffing boxes. The impeller F is the only moving part of the pump and runs freely between the two sides of the casing with a clearance of about .002”. It was long thought that this clearance would limit the useful life of the pump. In practice, however, it has been demonstrated that the effect of wear which might take place was very much exaggerated. The increasing of this clearance has no more effect on the operation of the pump than the clearance in the wearing rings of a centrifugal pump.

Furthermore, in view of the fact that when the wear has been such that the abrasives in the liquid handled can pass freely between the two surfaces, further wearing ceases. This is due to the fact that the impeller centers itself in the casing and there is no metal-to- metal contact between the impeller and the casing side walls. Due to this feature the loss of capacity, which may be quite noticeable during the first period of operation, does not continue after the initial wear has taken place. If a pump is to be used for handling slightly sandy water, it should be selected for about twice the discharge pressure at the required capacity and the unit will give excellent service for years. The effect of the increased clearance is minimized by the film of the sealing liquid. The Lobee pump should not, however, be used as a sand or gravel pump.

Difficulties experienced in handling liquids by reciprocating as well as centrifugal pumps can frequently be overcome by using the Lobee Liquid Ring Pump. The simplicity of construction, the absence of valves, and parts requiring lubrication, besides the actual suction and discharge characteristics, make this pump well suited to the handling of acidulous and gaseous water, and volatile liquids such as ammonia, alcohol, gasoline, propane etc. On ordinary cold

water, the suction lift can be as high as 25-30 feet and hot water or condensate of say 194° F. can be lifted about 5 feet.

Piping Arrangements of Lobee Liquid Ring Pump

Your Lobee Liquid Ring Pump is factory tested and a proven product with capabilities not found in any other pump and if these instructions are followed, it will give reliable and fool-proof service.

INSTALLATION AS A LIQUID PUMP

The pump should be mounted on a flat, horizontal surface. Connect piping as shown in Figure 1 below avoiding undue pipe strains. While the suction piping should be kept as short as practical with a minimum number of elbows, the pump will still give reliable performance even if there are high spots or air pockets in the pipe. The pipe should be free of leaks and the elevation of the pump above the water surface should not exceed twenty-five (25) feet. No foot valve or check valve are required in the suction pipe but it is desirable to have both check and gate valves in the discharge pipe. While this pump is intended primarily for clear liquids a small amount of fine solids in the liquid is acceptable. Wear will take place to accommodate the particle size and there will be a resulting reduction in performance but after the initial wear takes place, the pumping rate will remain almost unchanged. This is a normal break-in cycle.

OPERATION AS A LIQUID PUMP

Remove priming plug and pour in about one quart of water and replace the plug. This initial filling is all that is required unless the pump has been drained to avoid freezing or for repair. Start pump and check direction of rotation. If backwards, the rotation of a three phase motor can be corrected by interchanging any two of the three leads. If the motor overheats or the current input exceeds the full load value on the name plate by more than the service factor, then the pump is operating at a too high head, and the discharge valve should be opened until the ampere input does not exceed the service factor. The pump will be a little stiff when new but its power requirements will be less after a few hours of operation as part of the normal break-in period.

OPERATION AS A COMPRESSOR OR A VACUUM PUMP

The pump should be piped to a cooling tank as shown in Figure 2 below. This tank should have approximately a twenty (20) gallon capacity and be about half full of water. When working as a compressor or vacuum pump the flow of cooling water should be regulated by valve A. The proper setting of valve A occurs when the pressure or vacuum gauge shows its maximum reading. This arrangement provides enough cooling to dissipate the heat of compression for intermittent service. For continuous service as a compressor or vacuum pump some additional means of cooling such as a cooling coil or air fins are required.

MAINTENANCE

The impeller axial clearance with the casing is from .001” to .002” per side. No adjustment of the clearance is required as the impeller is free to float axially and center itself in the casing. This clearance is set at the factory. To disassemble the pump, remove the cover, slide the impeller off the shaft, and remove the impeller key. When reassembling, the impeller should have the side with the arrow facing out (toward you). If no arrow, the fins on the impeller should slant to the left looking at the top of the impeller. The only lubrication required is for the motor and frame (LR only) bearings. When ordering replacement parts provide the pump model and serial number.

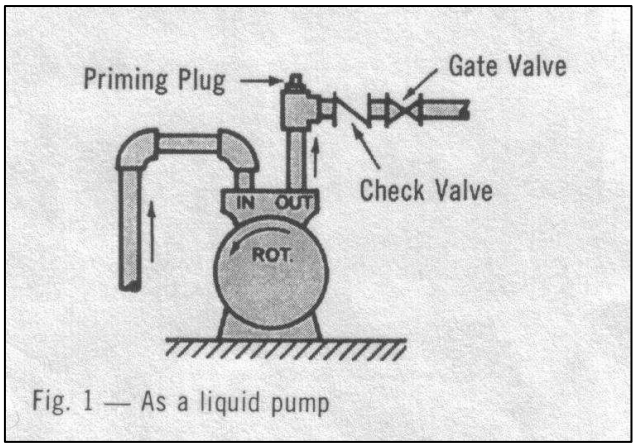


Fig. 1 — As a liquid pump

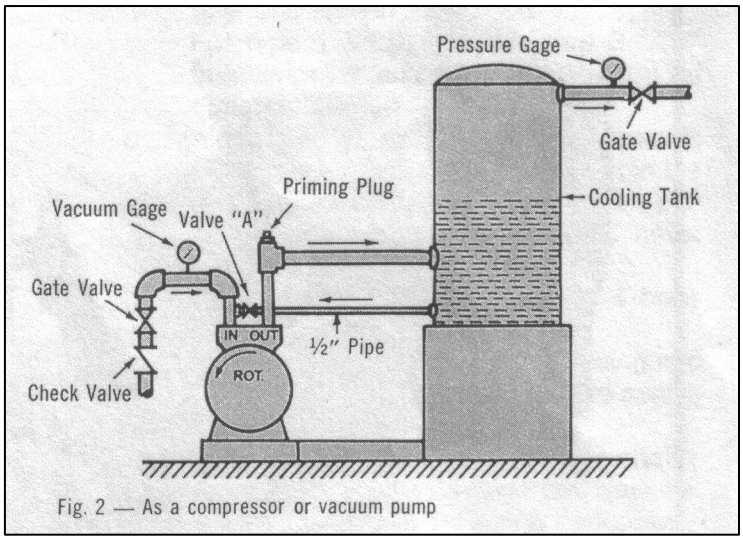


Fig. 2 — As a compressor or vacuum pump

Assembly Instructions for Liquid Ring Pumps

PUMPS WITH PACKING (All Models)

1) Install packing ring washer into pump casing.
2) Install 5 packing rings into casing, with split end staggered.
3) Place packing gland on shaft with 2 studs and nuts.
4) Push casing with packing onto shaft and bolt casing to bearing frame using 4 bolts (3/8" x ¾" long)

PUMPS WITH MECHANICAL SEAL (Model CLR, LR as noted)

1) Press ceramic ring into seal cap.
2) Install seal cap and seal cap gasket on pump shaft.
3) Push seal onto shaft. (Thick oil will ease installation).
   a) For type 9 Teflon seal measure 1-7/8" (3-3/16" for LR) from impeller end of shaft to **back of seal** and tighten set screws.
   b) For type 1 Viton seal measure 1-7/8" (3-1/32" for LR) from impeller end of shaft to **front of collar** and tighten set screws.
   c) A good test for distance, when seal cap is pushed against the seal, the spring in the seal should compress about 3/16". For type 9 seals the distance should never exceed this figure.
4) Install casing to bearing frame using 4 bolts and bolt seal cap to casing.
5) Line up two punch marks on pump casing and seal cap for easy installation and bolt to casing using 4 each 3/8" x 1-1/4" bolts.
6) Install key into key way and impeller on shaft.
7) Bolt cover to casing with 3 each .006 gaskets. An additional gasket may be added if necessary.
8) Bolt adapter to motor with bolts through countersunk holes. (CLR only)
9) Install casing bolts to adapter into tapped holes. (CLR only)
10) Pumps are tested and lapped in at factory. So pump should turn freely. However, if pump has been in storage for a period of time it may freeze up. If so, loosen cover bolts slightly. When pump is running freely, retighten bolts until all leaks have stopped.
11) To disassemble, reverse the procedure.

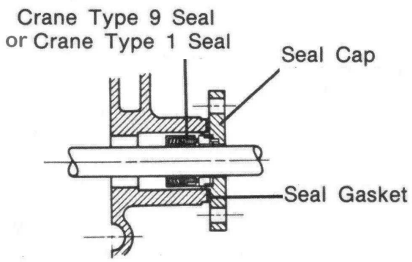
BEARING FRAME ASSEMBLY (LR "stand alone" Model only)

1) Press inboard and outboard bearings on shaft. Then pack bearings with grease.
2) Push shaft into bearing frame. If tight fit, knock in with piece of brass or wood block. Do not pound on bearing directly with hammer.
3) Install bearing cap, snap ring and deflector.

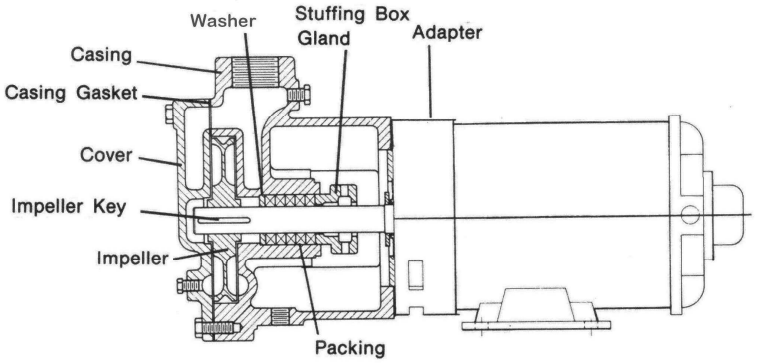
Lubrication

1) On LR Pump grease fittings on bearing frame only. No lubrication of pump end is necessary.
2) On CLR Pump only lube with factory recommendations for motor. Again, lubrication of pump end is not necessary.

Mechanical Seal Options



Model CLR



Model LR