

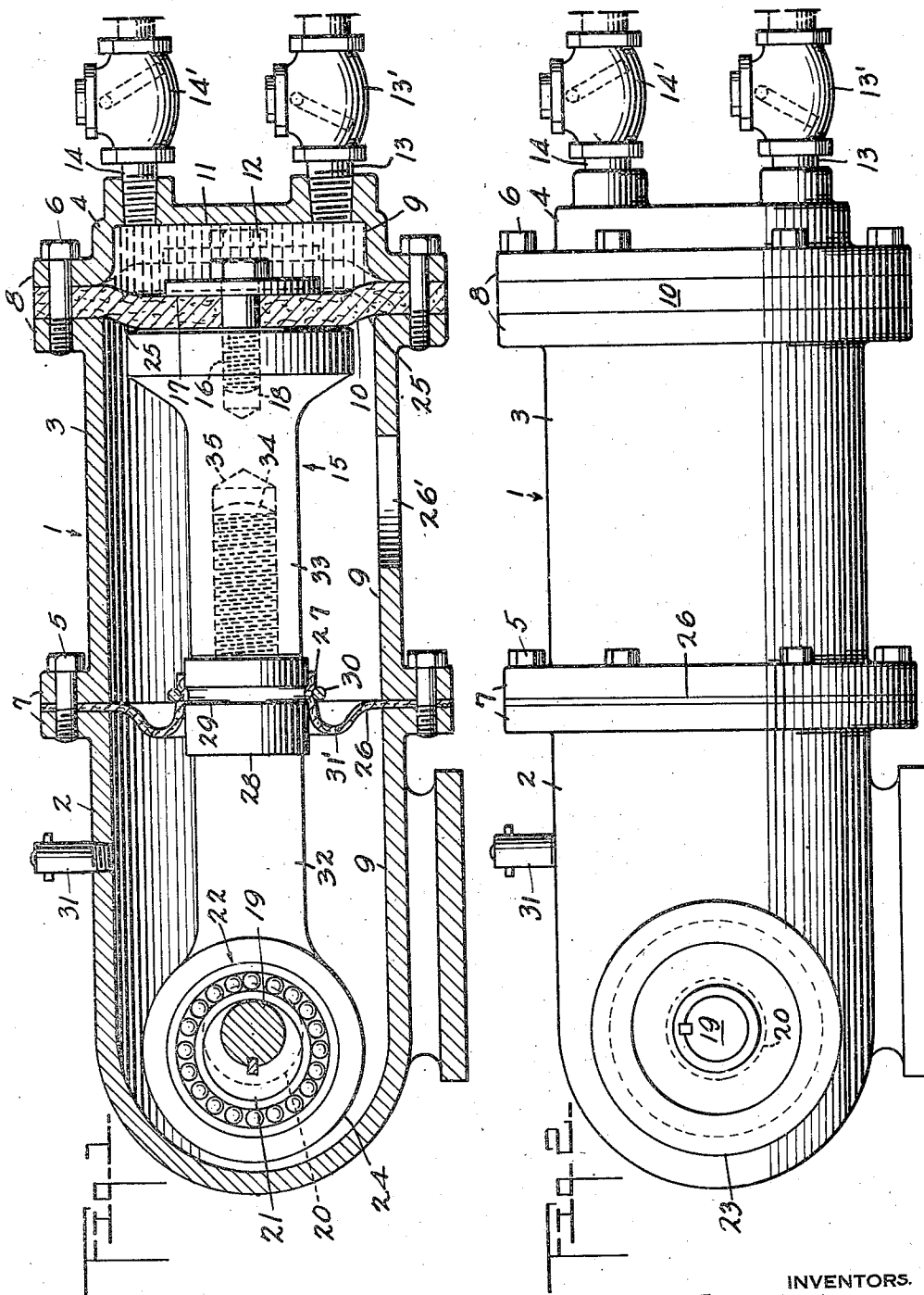
Aug. 10, 1943.

J. F. MALSARY ET AL

2,326,474

DIAPHRAGM PUMP

Filed July 19, 1939



INVENTORS.  
JOB F. MALSARY  
BY WALTER W. TAYLOR  
J. Chappin & Co.  
ATTORNEYS

## UNITED STATES PATENT OFFICE

2,326,474

## DIAPHRAGM PUMP

Job F. Malsbary and Walter W. Taylor,  
Oakland, Calif.

Application July 19, 1939, Serial No. 285,334

2 Claims. (Cl. 286—29)

The present invention relates to improvements in diaphragm pumps, and has among its objects the provision of a pump of the character described in which the useful life of the pump may be extended and the amount of repairs thereon materially reduced.

It is well known that a diaphragm pump is an ideal unit for producing a uniform output of water or other liquid. However, under pressure and long use the diaphragms fail, which results in the seepage of water from the pumping compartment into the bearings of the pump.

Heretofore, whenever the diaphragm failed, the water would reach the bearing compartment and destroy the bearings. Each time a diaphragm failure occurred, a new set of bearings would be required.

It is proposed in the present invention to provide means for preventing water or other liquid from reaching the bearings in the event of a pumping diaphragm failure.

More particularly described, we propose to use a diaphragm for forming a bulkhead between the main pumping diaphragm and the bearing supports for the crankshaft, this bulkhead diaphragm having a liquid-tight seal with the connecting rod and the pump housing.

It is further proposed to arrange the pump housing in such a manner that the bulkhead or secondary diaphragm may be readily inserted thereinto and secured in place.

We propose to fashion the bulkhead diaphragm from suitable material that will resist both water and oil and still be flexible.

Other objects and advantages of our invention will appear as the specification proceeds and the novel features will be particularly set forth in the appended claims.

In order that our invention may be more fully understood, reference should be had to the accompanying drawing, forming part of this application, in which:

Figure 1 is a longitudinal section taken through a pump embodying our invention, parts being shown in elevation; and

Figure 2, a side elevation of the same pump.

While we have shown only the preferred form of our invention, we wish to have it understood that various changes or modifications may be made within the scope of the claims hereto attached without departing from the spirit of the invention.

In carrying our invention into practice, we provide a pump housing generally indicated at 1 and including sections 2, 3 and 4, these sections

being removably secured together by bolts 5 and 6 passing through companion flanges 7 and 8, respectively. This pump housing provides a chamber 9 extending lengthwise thereof.

Figure 1 discloses a main diaphragm 10 that is mounted across the chamber 9 and which coacts with the housing section 4 to form a pumping compartment 11. The fluid 12 enters the pumping compartment through a valve-controlled passageway 13 during the suction stroke and is discharged through a valve-controlled outlet passageway 14 during the compression stroke.

The diaphragm 10 is secured between the companion flanges 8 and has a connecting rod 15 attached thereto by any suitable means. For this purpose we have shown a stud 16 passing through a large washer 17 and into a threaded bore 18 formed in the adjacent end of the connecting rod.

A crankshaft 19 is journaled in the pump housing in suitable bearing supports 20 and has an offset or eccentric 21 thereon, which engages with the inner race of the connecting rod bearing 22. As the crankshaft is rotated, such as by means of a pulley 23, a connecting rod 15 is reciprocated and the end 24 of the reciprocated rod is moved in a circular path.

The main pumping diaphragm 10 normally fails in the general area indicated at 25 after long use, and the water or other fluid 12 passes through the ruptured diaphragm under great pressure. We provide a drain outlet 26 in the lower part of the housing section 3 to allow the water to drain therefrom.

A bulkhead or secondary diaphragm 26 is mounted across the chamber 9 substantially midway between the main pumping diaphragm 10 and the bearing supports 20. The purpose of this bulkhead diaphragm is to prevent water from gain access to the bearing supports in the event the pumping diaphragm should rupture.

The bulkhead diaphragm 26 has a rim secured between the companion flanges 7 in a transverse plane and has a sleeve 27 surrounding an intermediate portion of the connecting rod, the sleeve being located substantially opposite the rim. The rod has an enlarged portion 28 of circular cross-section, in which an annular groove 29 is formed. A suitable clamping ring 30 anchors the sleeve 27 to the connecting rod so as to form a liquid-tight seal therewith.

The diaphragm 26 projects inwardly toward the connecting rod in the plane of the rim through a short distance and is curved as at 31

to permit free movement of the sleeve and the connecting rod. This diaphragm is made from material that will resist oil or grease and water. The oil or grease may be introduced into the compartment containing the crankshaft 19 through a suitable fitting 31.

In order to facilitate the assembly of the pump, we have made the connecting rod 18 in two sections 32 and 33, the former having a stub shaft 34 threaded in a bore 35 formed in the latter.

Having thus described the various parts of our pump, the operation thereof may be readily understood.

The connecting rod 18 is reciprocated by means of crankshaft 19, which causes the main pumping diaphragm 10 to be flexed. The liquid 12 is drawn in through the one-way valve 13' during the suction stroke and forced out of the pumping compartment and through the one-way outlet valve 14' during the compression stroke.

In the event that the main pumping diaphragm 10 is ruptured, the liquid 12 is prevented from reaching the bearing supports 20 by the bulkhead diaphragm 26. It will be appreciated, of course, that the water or other liquid will pass through the diaphragm 10 at a high rate of speed and the bulkhead diaphragm 26 serves as an effective barrier to protect the bearing supports 20. The water finally drains from the compartment between the two diaphragms through the outlet opening 26'.

We claim:

1. In a pump of the character described, a cylindrical housing having a closed end and an open end and comprising two sections having companion flanges and means for securing the same upon one another, a rigid connecting rod extending through the length of the housing and being reciprocable therein and comprising two portions, an inner portion for accommodation in the closed section of the housing and an outer

portion for accommodation in the open section of the housing, one of said portions having a threaded cavity and the other portion a threaded stud engaging in said cavity for joining the portions substantially opposite the flanges, a sealing diaphragm having an outer rim clamped between the two flanges of the housing, an inner sleeve fitting upon the inner portion of the connecting rod near the joint and a waved body between the rim and the sleeve, and means for clamping said sleeve upon said inner portion of the connecting rod whereby the outer portion of the latter may be unthreaded from the inner portion without disturbing the diaphragm seal.

2. In a pump of the character described, a cylindrical housing of substantially uniform cross-section having a closed end and an open end and comprising two sections substantially equal in length and having companion flanges and means for securing the same upon one another, a rigid connecting rod extending through the length of the housing and being reciprocable therein and comprising two portions of substantially equal length, an inner portion for accommodation in the closed section of the housing and an outer portion for accommodation in the open section of the housing, one of said portions having a threaded cavity and the other portion a threaded stud engaging in said cavity for joining the portions substantially opposite the flanges, a sealing diaphragm having an outer rim clamped between the two flanges of the housing, an inner sleeve fitting upon the inner portion of the connecting rod near the joint and a waved body between the rim and the sleeve, and means for clamping said sleeve upon said inner portion of the connecting rod whereby the outer portion of the latter may be unthreaded from the inner portion without disturbing the diaphragm seal.

JOB F. MALSBARY.

WALTER W. TAYLOR.