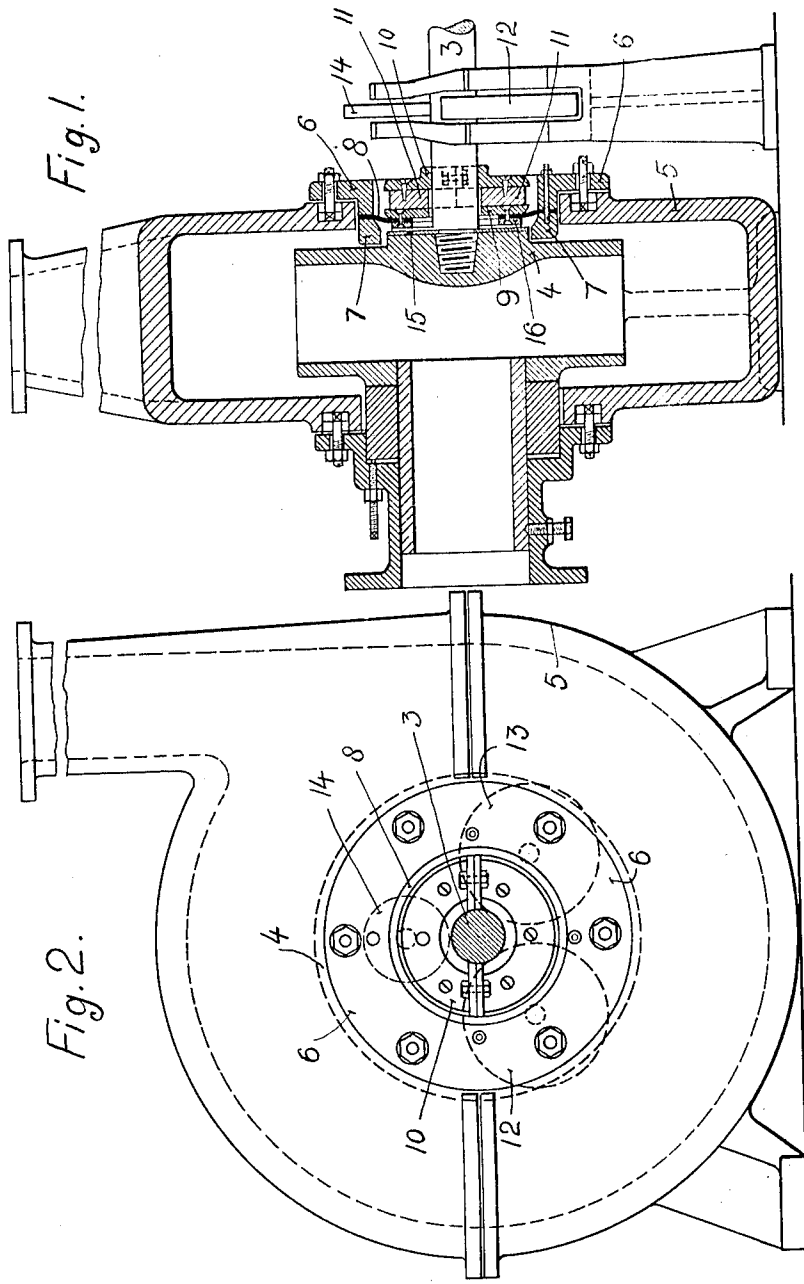


H. A. J. DE BIJLL NACHENIUS.
 PACKING MEANS FOR THE SHAFTS OF CENTRIFUGAL PUMPS.
 APPLICATION FILED JULY 14, 1916.

Patented July 23, 1918.

2 SHEETS--SHEET 1.

1,273,648.



H. A. J. de B. Nachenius
 Inventor

By *J. Gordon Marks*
 Attorney

H. A. J. DE BIJLL NACHENIUS.
 PACKING MEANS FOR THE SHAFTS OF CENTRIFUGAL PUMPS.
 APPLICATION FILED JULY 14, 1916.

1,273,648.

Patented July 23, 1918.
 2 SHEETS—SHEET 2.

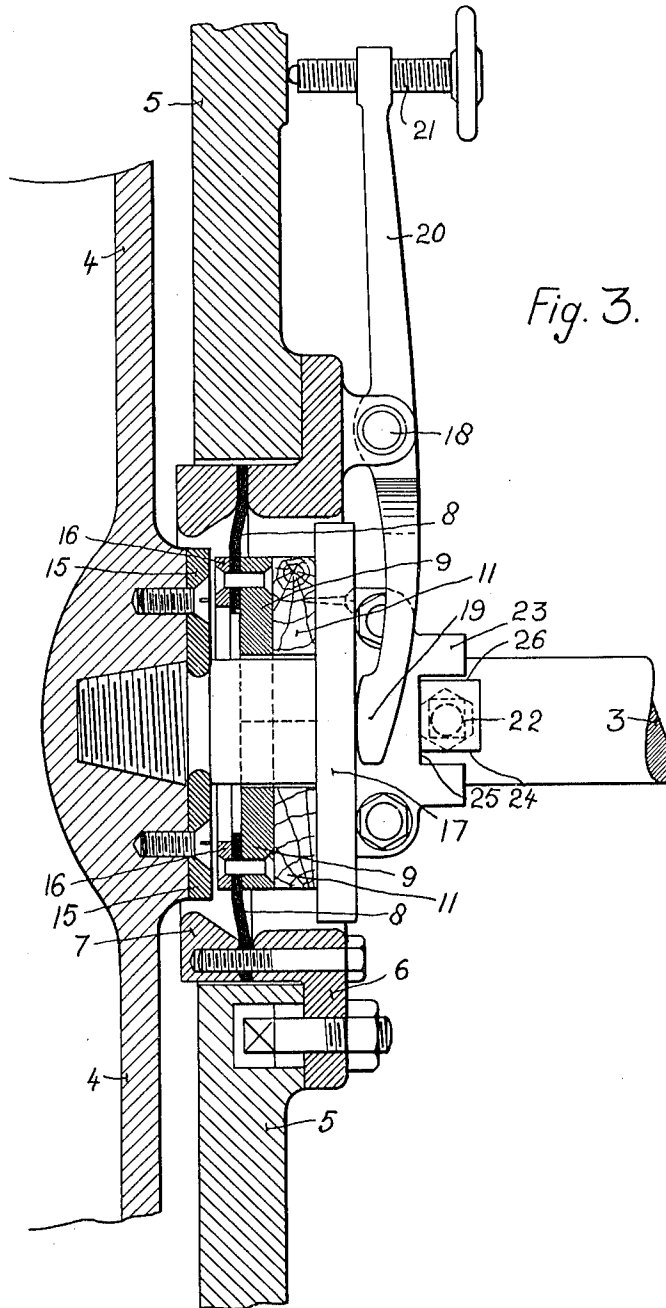


Fig. 3.

H. A. J. de B. Nachenius
 Inventor

By *E. G. Dondmarko*
 Attorney

UNITED STATES PATENT OFFICE.

HENRI ARNOLD JOHANNES DE BIJLL NACHENIUS, OF HAARLEM, NETHERLANDS,
ASSIGNOR TO NAAMLooZE VENNOOTSCHAP "WERF CONRAD," OF HAARLEM,
NETHERLANDS, A COMPANY OF NETHERLANDS.

PACKING MEANS FOR THE SHAFTS OF CENTRIFUGAL PUMPS.

1,273,648.

Specification of Letters Patent.

Patented July 23, 1918.

Application filed July 14, 1916. Serial No. 109,296.

To all whom it may concern:

Be it known that I, HENRI ARNOLD JOHANNES DE BIJLL NACHENIUS, mechanical engineer, residing at Haarlem, the Netherlands, have invented certain new and useful Improvements in Packing Means for the Shafts of Centrifugal Pumps, of which the following is a specification.

This invention relates to packing means for the shafts of centrifugal pumps, more particularly of centrifugal pumps of the kind generally employed for pumping liquids mixed with gravel, sand, mud and the like. Special reference is here made to well known packing means often employed in gravel pumps, consisting of a so-called water chamber closed at the outside by a stuffing box and at the bucket wheel side by a diaphragm having a ring pressed against a shoulder on the shaft. Into this chamber water is forced under a pressure exceeding the pressure within the centrifugal pump, thus causing the diaphragm ring to be continuously pressed against the shoulder on the shaft, the ring and diaphragm being situated at the side of the shoulder away from the bucket wheel. This arrangement with force pump and two packing devices is complicated and in practice causes serious trouble, difficulties being encountered in keeping the bearing inside the pressure chamber lubricated, so that this bearing soon wears out.

Replacement of any part subject to wear requires the dismounting of a great number of parts. Further clean water for the pressure chamber is seldom obtainable at those places where pumps of this kind are employed with the result that the wear on the bearing and the parts of the packing device is considerable, such wear being aggravated by reason that the auxiliary pump maintains the pressure even if the conditions under which the centrifugal pump is working do not require this. Indeed the provision of an auxiliary pump itself renders the whole installation very complicated.

Pumps of this construction are known in which water is led from the delivery pipe into the water chamber. The pressure of this water must thereby be reduced to avoid lifting of the diaphragm ring from the collar on the shaft. The wear of the bear-

ing in this chamber is very severe in the case of gravel or mud pumps.

The present invention provides for employment of the pressure within the centrifugal pump for pressing a ring suspended from a diaphragm against a shoulder on the shaft of the centrifugal pump, such ring being arranged at the bucket wheel side of the shoulder. This shoulder is preferably provided with a lining of wood, fiber, cast iron or other suitable material and is desirably composed of two parts to permit of easy renewal, renewal being effected without necessity for dismounting the diaphragm. When the pump is to be started, the diaphragm is retracted by the suction in the pump and is drawn against an annular surface or the like on the bucket wheel, the arrangement being thus kept watertight.

Alternatively, the shouldered member may be slidable on the shaft, and the shoulder and ring may be pressed firmly against each other during the suction period. The use of a slidable or adjustable shouldered member offers the advantage that the wood or other lining can be used to the last, while on the other hand the diaphragm still allows the ring to make only comparatively small movements.

Practice has shown that owing to the centrifugal action of the rotating parts little sand enters between the parts of the packing device rubbing against each other. On the other hand, the use of wood or similar lining on the rotating shoulder tends to diminish the wear of the parts in question.

In a pump with a closed bucket wheel the delivery pressure can evidently easily be transmitted to the center.

During the operation of the pump the packing device must leak through a little if it is to remain cold. In the case of those gravel pumps to which the packing device according to the invention will mainly be applied this leakage is quite harmless. The shaft may be carried by anti-friction rollers the operation of which will not be prejudicially affected by water splash; a splash guard with a draw off pipe may, however, be provided, if desired.

These anti-friction rollers are substituted for the bearing which in the well known

construction with water chamber is arranged inside the latter. The whole device is better accessible than the existing devices, while the wood, fiber or similar lining can be easily replaced. The pressure between the sliding ring and the shoulder being proportional to the pressure in the pump and not, as is the case in the well known water chamber, continuously kept at a maximum, the wear on these parts is limited to a minimum. A further important advantage is that the auxiliary pump can be dispensed with.

In the accompanying drawings Figure 1 is a sectional view of the pump across a plane through the center of the shaft; Fig. 2 a side view; Fig. 3 is a detail view to a larger scale showing a modification.

Referring to Figs. 1 and 2, the shaft 3 is fixed to the bucket wheel 4 by means of a conical screw thread and a two-part check plate 15. To the casing 5 is secured a double ring 6, 7, between the members of which is pressed the diaphragm 8 of leather, rubber or like material. Fastened to the diaphragm by means of a locking ring 16 and rivets is a ring 9. On the shaft is fixed a disk or shoulder 10 divided into halves, (Fig. 1). This disk carries a wood disk 11 also split into two parts. The ring 9 fits exactly against the wood disk 11, being pressed against it by the liquid in the centrifugal pump with a pressure equal to the delivery pressure of the bucket wheel.

The shaft 3 is carried on anti-friction wheels 12 and 13 (Figs. 1 and 2), a top roller 14 being also provided. The packing device is readily accessible at any point adjacent to the rollers, while the rollers themselves, as aforesaid, are not liable to be affected by water splash. Both devices therefore contribute to the required effect. The supporting point of the shaft is in the device according to the invention situated as near to the bucket wheel as in the well known arrangement having a bearing located in the water chamber.

When the pump is filled by creation of a vacuum therein the ring 9 moves away from the wood disk 11 to such an extent that the locking ring 16 rests against the flat check plate 15, the fit being sufficiently close to allow a sufficient vacuum to be obtained.

In the construction shown in Fig. 3 the press fit of the ring 16 against the plate 15 or the pressure with which the disk 11 is kept against the ring 9 may be obtained by positive means, by reason that the shoulder or disk 17 (in principle corresponding with the shoulder 10 in Fig. 1) is slidable on the shaft 3. Adjustment in the direction of the bucket wheel is effected by means of a lever pivoted on a stationary fulcrum 18, the extremities 19 of the bifurcated lower arm of the lever being pressed against the disk 17,

while the upper lever arm 20 is engaged by a screw 21 fitted with a hand wheel. It will be seen that the disk 17 can be moved during the starting period of the pump by rotation of the screw 21.

The disk 17 is caused to follow the shaft in its rotation by means of the bolt 22 located in a square hole in the shaft, which bolt is partly inclosed by the projecting bush 23 on the disk 17. This bolt is provided at one end with a square head and at the other end with a square washer plate. The bolt-head and washer are so arranged that the four edges are at different distances from the center line of the bolt. If the bolt 22 be inserted into the hole with the side 24 of the head and the washer against the surface 25 of the disk 17, the latter will during the operation of the pump attain a position more to the left than shown on the drawing. The bolt will, therefore, be set in a position to suit the thickness of the wood disk 11. Should the latter be worn away to a great extent the edge 26 is arranged opposite the disk. With the aid of this arrangement a thick wood disk 11 can be used. The lever 19, 20 is put into operation during the adjustment of the bolt 22.

Until now it has been the practice to provide a separable lining for gravel pumps of the kind herein indicated. When the packing devices described above are used, the casting forming the casing of the pump requires no machining, so that the casing may be more easily replaced when worn out than can the lining inside the casing of an existing pump.

It is to be understood that the parts may be modified without departure from the principle of the invention. For instance, the bifurcated lever may be of a slightly different form and may act upon the ring 9 during the starting period, pressing the ring against the disk 15. In this case a tight fit is also obtained by positive means during the starting period. The plate or ring 9 may then be provided with projections reaching up to the ring 6.

Having now described my invention, what I claim and desire to secure by Letters Patent is:—

1. Packing means for the shafts of centrifugal pumps, consisting of a shoulder-forming member rotating with but lengthwise slidable on the shaft, a lining on said shoulder-forming member at the bucket wheel side thereof, a ring suspended from the casing of the pump by means of a diaphragm said ring being located opposite said lining and exposed to the delivery pressure of the pump or bucket wheel.

2. Packing means for the shafts of centrifugal pumps, consisting of a shoulder-forming member rotating with but lengthwise slidable on the shaft, a ring suspended

from the casing of the pump by means of
 a diaphragm said ring being located op-
 posite said shoulder-forming member at the
 bucket wheel side thereof and exposed to
 5 the delivery pressure of the pump or bucket
 wheel, and positive means for pressing said
 shoulder-forming member against said ring
 during the period of filling the pump in
 vacuum.

10 3. Packing means for the shafts of cen-
 trifugal pumps, consisting of a shoulder-
 forming member rotating but lengthwise
 slidable on the shaft, a lining on said
 shoulder-forming member at the bucket
 15 wheel side thereof, a ring suspended from
 the casing of the pump by means of a
 diaphragm said ring being located opposite
 said lining and exposed to the delivery
 pressure of the pump or bucket wheel,
 20 and adjustable means for arresting said
 shoulder-forming member in its movement
 away from the bucket wheel through the
 delivery pressure of the pump, said means
 consisting of a bolt, with an eccentric, rec-

tangular head and washer plate, passing 25
 through the shaft and holding, by means
 of said head and washer plate, said shoulder-
 forming member at different positions ac-
 cording to the position of said eccentric
 head. 30

4. In a centrifugal pump, the combina-
 tion of packing means for the shaft, consist-
 ing of a shoulder-forming member rotating
 with the shaft and a ring suspended from
 the casing of the pump by means of a 35
 diaphragm said ring being located op-
 posite said shoulder-forming member at
 the bucket wheel side thereof and exposed
 to the delivery pressure of the pump or
 bucket wheel, with roller bearings arranged 40
 adjacent said shoulder-forming member at
 the outside of the casing.

In testimony whereof I affix my signature
 in presence of two witnesses.

HENRI ARNOLD JOHANNES DE BIJLL NACHENIUS.

Witnesses:

H. Y. KOOR,

J. KNOOPRATHUS.