Jan. 5, 1926.

P. T. LINDHARD

1,568,751

PUMP

Filed June 6, 1924

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Fig. 1.

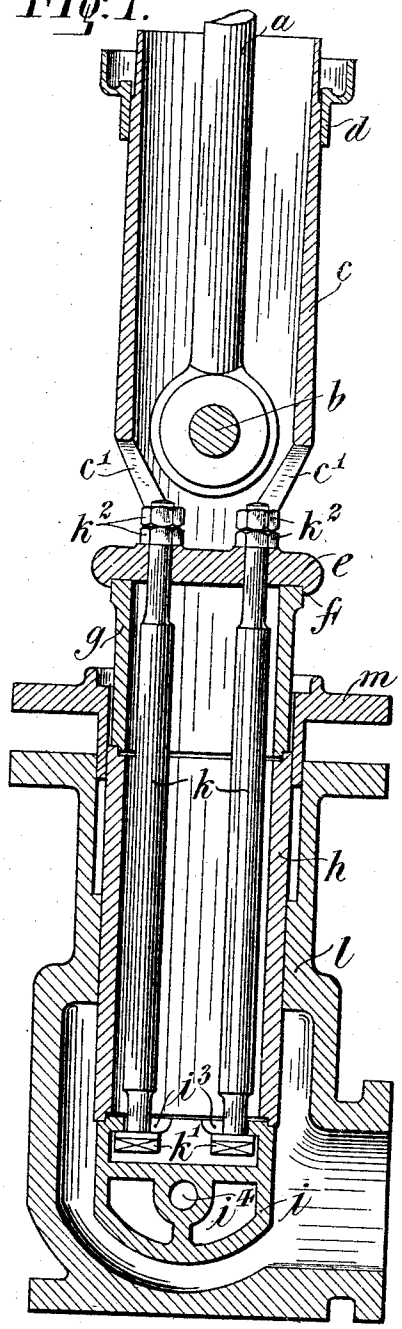


Fig. 3.

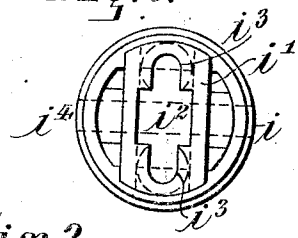
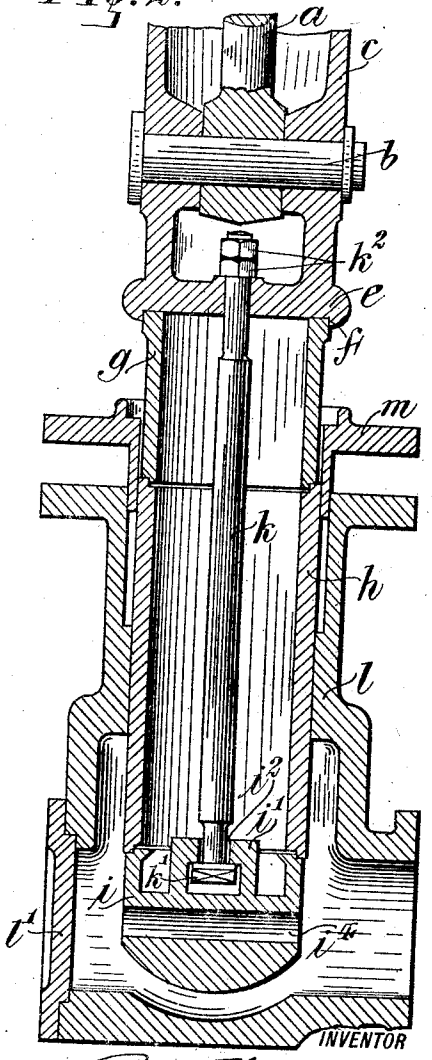


Fig. 2.



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Fig. 4.

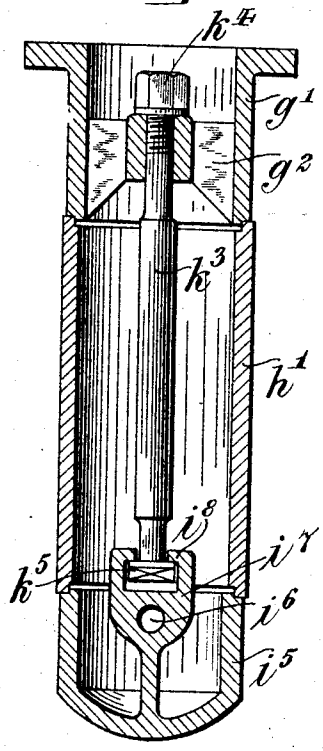


Fig. 5.

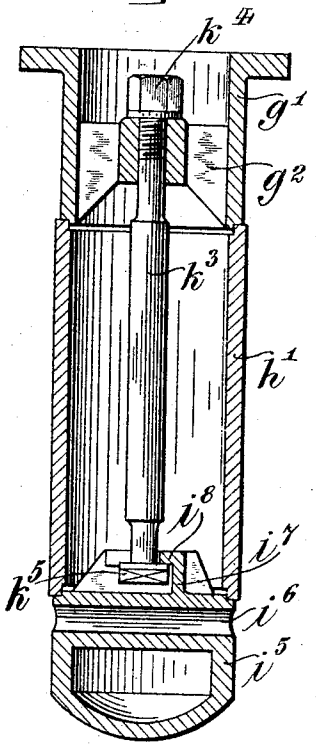
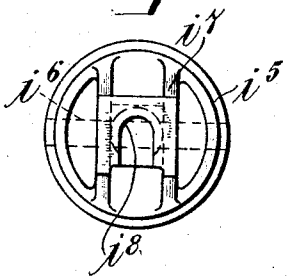


Fig. 6.



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Patented Jan. 5, 1926. 1,568,751

UNITED STATES PATENT OFFICE.

POVL T. LINDHARD, OF BROOKLYN, NEW YORK, ASSIGNOR TO F. L. SMIDTH & CO., OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

PUMP.

Application filed June 6, 1924. Serial No. 718,214.

To all whom it may concern:

Be it known that I, POVL T. LINDHARD, a citizen of the United States, residing in the borough of Brooklyn, of the city of New York, in the State of New York, have invented certain new and useful Improvements in Pumps, of which the following is a specification, reference being had to the accompanying drawings, forming a part hereof.

This invention relates to plunger pumps and has been developed with particular reference to pumps of this character which are designed for the handling of cement slurry and other semi-liquid materials which contain earthy or other solid substances and therefore tend to bring about rapid wear of the plungers of such pumps. Frequent removal and replacement of the plungers of such pumps is necessary and especially so because, to facilitate machining of the plungers, such plungers have hitherto been formed of comparatively soft castings. It is the object of this invention to improve the construction of plungers for pumps of the class referred to so that the portion of the plunger which is mainly subject to wear, by reason of the character of the semi-liquid materials acted upon, can be removed and replaced readily and moreover can be made conveniently of material harder than that commonly employed, whereby, when so much wear has taken place as to reduce materially the efficiency of the pump, it is possible, without taking down the entire mechanism of the pump, to remove and replace the worn portion of the plunger without throwing away the entire plunger as has been done heretofore. The possibility of making the removable part of the plunger of relatively hard and more expensive material, without requiring the entire plunger to be made of similar material, prolongs the period of usefulness of the plunger without great increase in cost.

The invention will be explained more fully hereinafter with reference to the accompanying drawings in which—

Figure 1 is a view in vertical sectional elevation of so much of a pump, including the improved plunger, as is necessary to enable the invention to be understood.

Figure 2 is a similar view but on a plane of section which is at right angles to that of Figure 1.

Figure 3 is a top view of the lower portion of the plunger.

Figures 4, 5 and 6 are views generally similar to Figures 1, 2 and 3 respectively, but showing a modification of the construction.

In the embodiment of the invention shown in Figures 1, 2 and 3, the usual connecting rod a is connected by a wrist pin b with an extension c of the plunger, such extension being guided in a fixed guide d and being provided at its lower end with a foot-piece e, which is recessed on its under side, as at f. Openings are formed in the tubular portion of the extension, as at c', to give access to the threaded ends of the bolts hereinafter mentioned.

The main body of the plunger comprises three cylindrical portions g, h and i, within the embodiment of the invention shown in Figures 1, 2 and 3, two bolts k which hold together the portions g, h and i. The main portion h, which is tubular or sleeve-like is of such length as to engage, in all positions of the plunger, the cylinder l and stuffing box gland m of the pump and is of such diameter as to fit properly within the same. Being the only portion of the plunger which must be machined as to its outer surface, it can be made of relatively hard and expensive material. Moreover, both ends of this portion are alike, being machined for engagement with the upper and lower portions g and i, so that this portion can be reversed when desired for the purpose of distributing wear.

The upper portion g of the plunger, also tubular or sleeve-like and preferably of somewhat smaller diameter than the portion h, is formed at its upper end to fit in the machined recess in the under side of the foot e of the extension c, and is formed at its lower end, as shown, to engage the portion h so as to maintain the two portions in alignment. The lower portion i is formed at its upper end so as to engage the lower end of the portion h and is also formed with a bridge piece i' which is open at its center, as at i^2 and is formed, at each side of the open center, with a slotted retainer i^3. It may also be formed with a transverse hole i^4 in order that it may be engaged by a suitable rod when the hand hole cover l' is removed, and be held thereby from rotation. The por-

tion i is also preferably of slightly smaller diameter than the main portion h, and need not be machined.

The three portions g, h and i of the plunger are held together, in the embodiment of the invention shown in Figures 1, 2 and 3, by two bolts k, the heads k' of which are successively introduced through the central opening i^2 in the bridge piece i' and are severally engaged with the respective retainers i^3. The other ends of the bolts are passed through suitable apertures in the foot-piece e and receive above the same suitable nuts k^2 so that the several parts of the plunger are held in proper relation.

When the plunger is to be removed the crank shaft (not shown) is turned so that the plunger is in its lowest position and, the hand hole cover l' being removed, a rod is introduced into the hole i^4 of the lower portion i of the plunger so as to hold the same from rotation. The nuts k^2 are then removed from the upper ends of the bolts k through the openings c' provided for that purpose in the extension c, the bolts k being severally held from rotation through the engagement of their squared heads k' with the sides of the bridge piece i. The nuts k^2 having been withdrawn, the crank is turned to its upper position, leaving the plunger at the bottom of the cylinder. The extension c having been raised with the connecting rod, sufficient space is left for the withdrawal of the bolts k and the lifting out of the upper portion g of the plunger and the gland m. The main portion h of the plunger can then be removed and reversed or replaced and the reassembling of all of the parts accomplished in reverse order.

The employment of two rods k to hold together the several portions of the plunger is preferable in new pumps, but in some cases, particularly when an old pump is to be fitted with the improved plunger, the modified construction shown in Figures 4, 5 and 6 may be desirable. In this embodiment of the invention the upper portion g' of the plunger, suitably flanged at its upper end for engagement with the existing extension (not shown), may be provided internally with a bridge piece g^2 to receive the upper end of a single bolt k^5 with a nut k^4 at its extremity, the bolt being in this instance operatively engaged directly with the upper portion g' of the plunger instead of being operatively engaged indirectly therewith through the medium of the foot of the extension, as shown in Figures 1 and 2. The main portion h' of the plunger may be formed as previously described with respect to Figures 1 and 2, while the lower portion i^5, also formed with a transverse hole i^6, as before, is formed with a bridge piece i^7 which has a single slotted retainer i^8 for engagement with the squared head k^5 of the single bolt k^3. When the upper portion g' has been disengaged from the extension (not shown), the operation of removing and replacing the main portion of the plunger can be effected in the same manner as already described with respect to Figures 1 and 2, but with the disengagement of a single bolt.

I claim as my invention:

1. A plunger for a plunger pump comprising a central, removable wear portion, an upper portion, a lower portion having a bridge piece with a slotted retainer, said upper portion and said lower portion being fitted to the central portion, and a bolt engaged at one end with the slotted retainer of the lower portion and in operative engagement with the upper portion at its other end to hold the three portions together.

2. A plunger for a plunger pump comprising a central, removable wear portion, an upper portion, a lower portion, said upper portion and said lower portion being fitted to the central portion, an extension above the upper portion and provided with a flanged foot, and bolts in operative engagement with the lower portion and with the upper portion through the medium of the flanged foot of the extension.

3. A plunger for a plunger pump comprising a central, removable wear portion, an upper portion, a lower portion, said upper portion and said lower portion being fitted to the central portion, an extension above the upper portion and provided with a flanged foot, and bolts in operative engagement with the lower portion and with the upper portion through the medium of the flanged foot of the extension, said lower portion having a bridge piece with slotted retainers for engagement with the heads of the bolts.

This specification signed this 3d day of June, A. D. 1924.

POVL T. LINDHARD.