(No Model.) 2 Sheets—Sheet 1.

E. E. JOHNSON.

PISTON PUMP.

No. 584,592. Patented June 15, 1897.

Fig. 1.

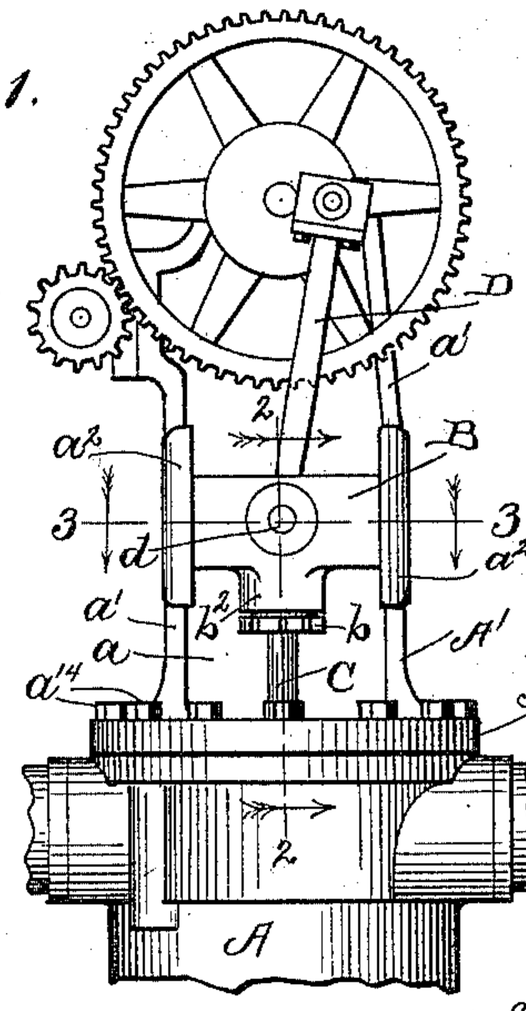


Fig. 14.

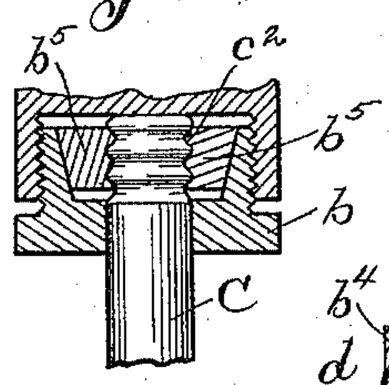


Fig. 2.

Fig. 3.

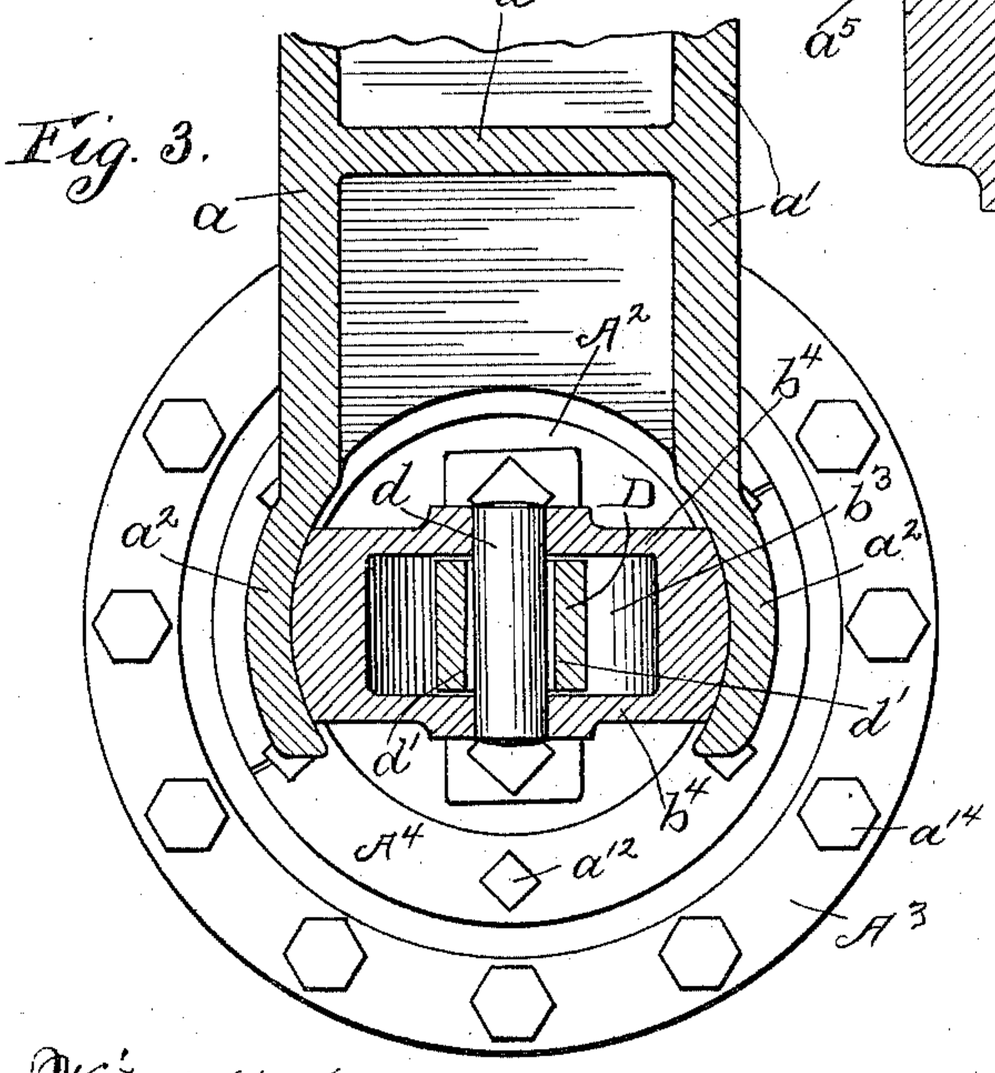
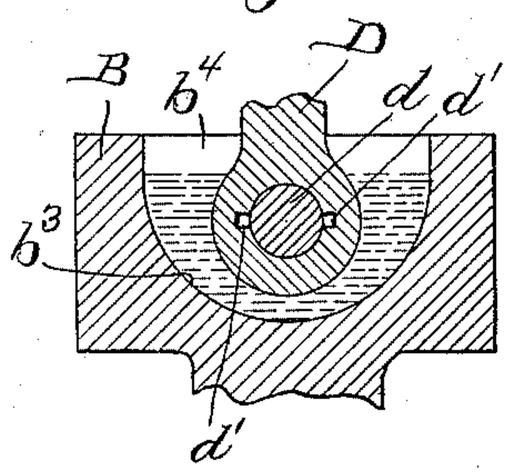


Fig. 4.



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(No Model.) 2 Sheets—Sheet 2.

E. E. JOHNSON.

PISTON PUMP.

No. 584,592. Patented June 15, 1897.

Fig. 5.

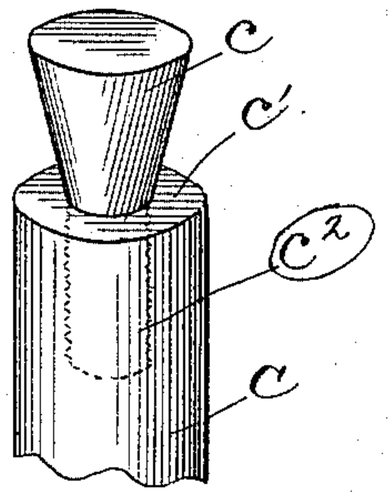


Fig. 6.

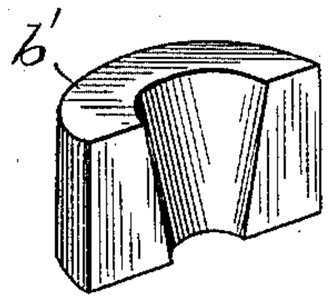


Fig. 7.

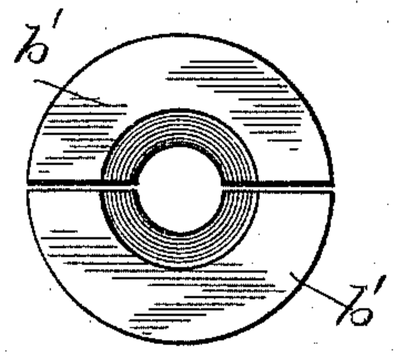


Fig. 8.

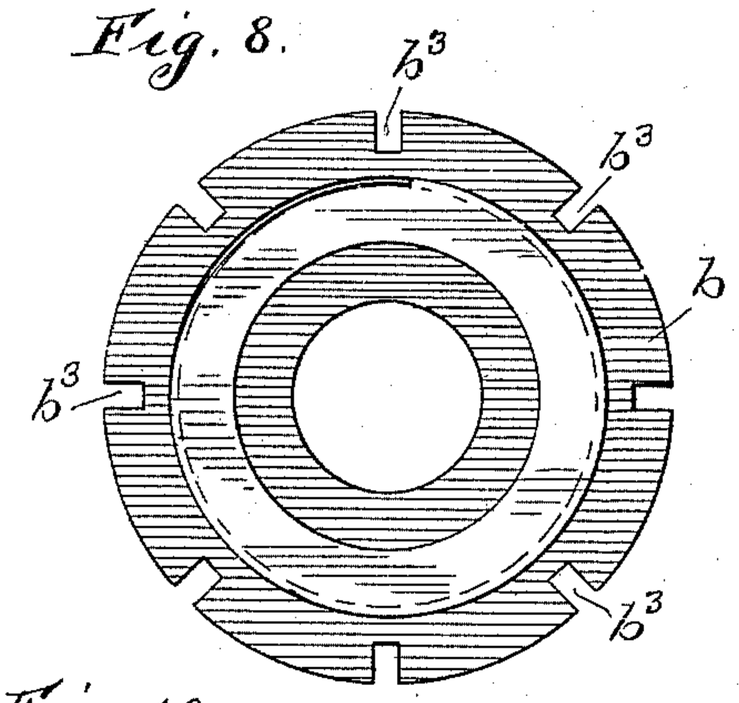


Fig. 9.

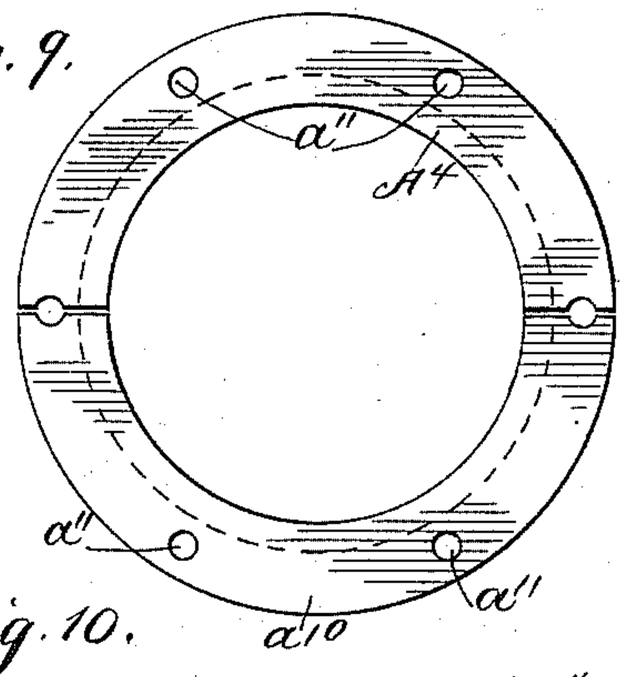


Fig. 10.

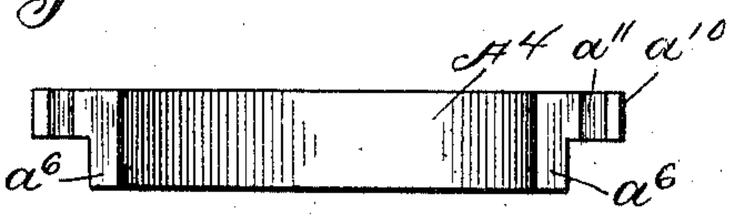


Fig. 11.

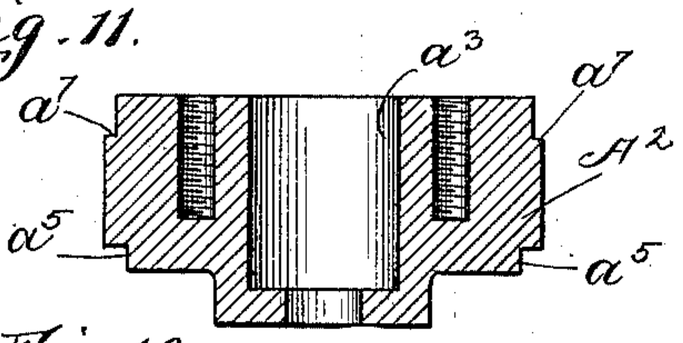


Fig. 12.

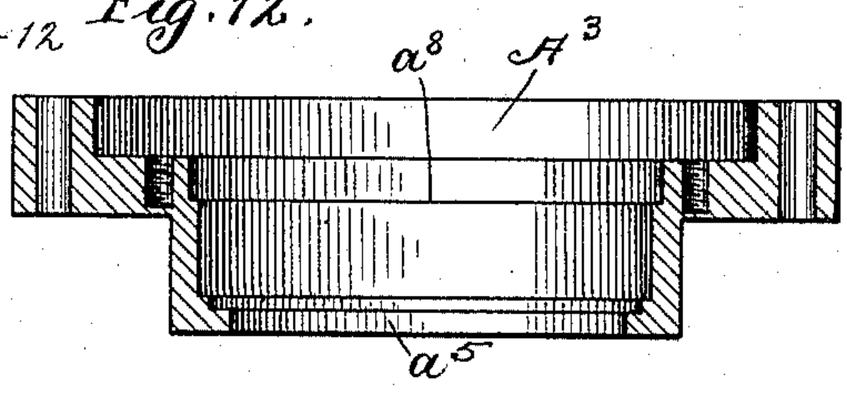
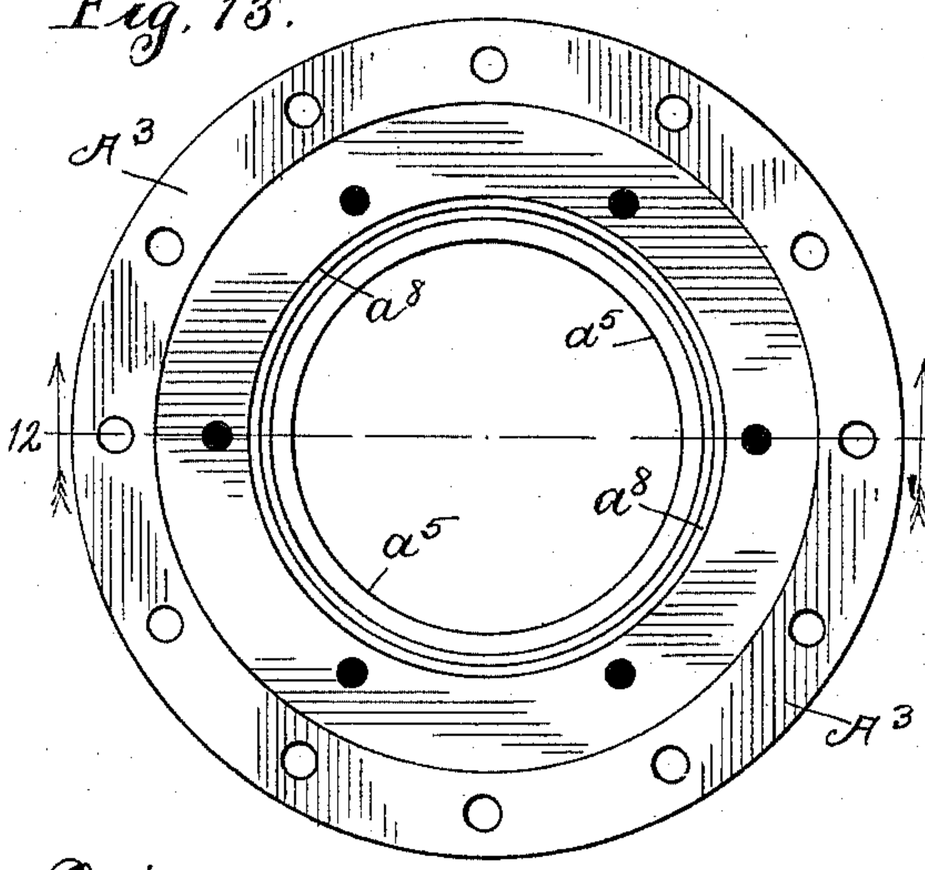


Fig. 13.



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UNITED STATES PATENT OFFICE.

EDWARD E. JOHNSON, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE DEMING COMPANY, OF SALEM, OHIO.

PISTON-PUMP.

SPECIFICATION forming part of Letters Patent No. 584,592, dated June 15, 1897.

Application filed May 4, 1896. Serial No. 590,141. (No model.)

To all whom it may concern:

Be it known that I, EDWARD E. JOHNSON, of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Piston-Pumps, of which the following is a specification.

This invention relates to certain details of construction which are particularly applicable to power-pumps of that class in which the cylinder and cross-head guides are cast integral with each other or are otherwise so connected as to render the parts difficult to assemble or remove when constructed in the ordinary manner, of which class the ordinary triplex power-pump is a familiar example.

The invention consists more particularly in an improved form of connection between the cross-head and piston-rod, by which said parts may be more readily disconnected, and in the peculiar construction of the cylinder-head, which facilitates the removal of the piston and the more ready access to and packing of the various adjacent parts.

In the accompanying drawings, Figure 1 is a fragmentary end elevation of a power-pump constructed in accordance with my invention. Fig. 2 is a sectional elevation thereof, taken on line 2 2 of Fig. 1. Fig. 3 is a horizontal section taken on line 3 3 of Fig. 1. Fig. 4 is a sectional detail of the cross-head, showing the oil-reservoir therein. Fig. 5 is a perspective detail of the cross-head end of the piston-rod. Figs. 6 and 7 are details of the split clamping-collar for said piston-rod end. Fig. 8 is an enlarged top plan view of the inclosing sleeve for said collar. Fig. 9 is a similar view of the split ring for the cylinder-head. Fig. 10 is an inner side elevation of one section thereof. Fig. 11 is a transverse section of the inner head. Fig. 12 is a similar view of the outer head, taken on line 12 12 of Fig. 13. Fig. 13 is a top plan view thereof. Fig. 14 is a detail section of a somewhat modified form of cross-head and piston-rod connection.

In said drawings, A designates a cylinder of a pump, and A′ a standard rising from said cylinder to support the driving shaft and gear. Said standard consists of a vertical web *a*, provided with side flanges *a*′, which widen out at a point about midway of the height of the standard to afford guides a^2 for the cross-head B of the pump.

C designates the piston-rod, to the lower end of which any suitable plunger or piston (not herein shown) is secured. A principal feature of the present improvement consists in the mode of connecting said piston-rod with the cross-head B, the object of the improvement being to provide a readily-detachable connection which shall not require a relative rotation of the cross-head and piston-rod in order to separate and attach them. To this end the upper extremity of the piston-rod is made in the form of a truncated cone *c*, which joins the body of the rod at its point of smallest diameter, leaving a surrounding shoulder *c*′ at the point of juncture. The said conical end may be either made integral with the rod itself or may be made in a separate piece, with a threaded end c^2, which is screwed or otherwise secured within a suitable bore in the end of the rod. Being thus formed the extremity of the rod is inserted through an aperture in a rotative sleeve *b* of the cross-head, and its conical portion is clasped between the two sections of a conically-bored split collar *b*′, that is seated within the upper end of said sleeve. The latter is exteriorly screw-threaded and is designed to be seated within a screw-threaded socket b^2 in the lower end of the cross-head B. The length of the conical end *c* of the piston-rod is somewhat greater than the thickness of the split collar *b*′, so that it projects slightly above the upper surface of the latter when the parts are assembled. The screwing of the collar *b* into the cross-head, therefore, serves to carry the upper end surface of the conical terminal *c* into contact with the bottom of the socket b^2, and thereby causes said terminal to be firmly seated and held within the conical seat formed by the split collar *b*′. With this construction the cross-head and piston-rod may be disconnected at any time by simply unscrewing the sleeve *b*, any suitable spanner-slots b^3 or similar devices being provided in the sleeve for this purpose. The piston-rod is then free from the cross-head, and the sleeve and collar may thereupon be removed by simply

slipping the sleeve downwardly away from the collar, which in the meantime will be held up by the shoulder c' of the rod. The collar being thus released its halves may be separated and removed from the conical terminal of the rod, and the sleeve b may then be lifted off over said terminal, the larger extremity of the cone being made not greater than the maximum diameter of the rod to permit the application and removal of the sleeve in this manner. A reversal of this operation will obviously enable the parts to be reassembled and the piston-rod to be again connected with the cross-head.

The construction thus described entirely obviates the turning of the piston-rod or the cross-head incident to the ordinary screw-threaded connection in the connecting or disconnecting of the parts and the cutting or marring of the piston-rod by the application of a pipe-wrench in turning it. In deep-well pumps, Artesian engines, &c., where screw-joints are used in connecting several sections of the piston-rod together, the turning of the rod is also objectionable in being liable to disconnect the parts of the rod itself, and in structures of this kind the improved connection described is especially advantageous. It may also be advantageously used in drilling or other machinery where similar requirements prevail, or in connecting together any two parts to which it is applicable, since the joint may be made of any desired strength and is simple and unlikely to work loose or get out of order.

It will of course be obvious that an effective connection embodying the same principles of construction may be made in which the end of the piston-rod is of other than the exact conical shape shown so long as its form is such as to positively interlock with the correspondingly-shaped bore of the split collar. For example, in Fig. 14 I have shown a construction in which the end of the rod is formed with annular grooves and ridges c^2, which are engaged by coacting ridges and grooves on the inner surface or bore of a split collar b^5. The wedging action by which the piston-rod terminal is tightly grasped between the sections of the collar may in this case be accomplished by making the outer surface of said split collar of conical shape and providing a corresponding conically-shaped socket in the rotative sleeve b. The downward pressure of the cross-head upon the end of the piston-rod will obviously tend to force said rod downwardly with relation to the sleeve and to carry with it the split collar, so that the latter will become more firmly wedged within its seat in said sleeve and will consequently grip the end of the piston-rod with a correspondingly-increased pressure. Various other modifications to the same effect will readily suggest themselves to the skilled mechanic, but are all to be understood as included within the spirit of my broad invention.

A further improvement in the cross-head B contemplates a more effective lubrication of the bearing between the connecting-rod D and the pin d, by which it is pivotally secured to said cross-head. To this end the latter is hollowed out in its upper side to provide a cup-shaped recess b^3, into which the lower end of the connecting-rod projects and within which it is secured by the pin d. Said pin extends transversely across the recess b^3, between the side walls b^4 thereof, and is made to have a driving fit with the latter or is tightly secured therein in any other suitable manner. The pitman or connecting-rod D is bored out to oscillate upon the pin d, and the bearing thus provided is kept constantly lubricated by a bath of oil, which is poured into the recess b^3 in sufficient quantities to keep said bearing immersed. The inner surface of the bore which receives the pin d is furthermore grooved longitudinally at its sides or points of least pressure, as shown at d' in Figs. 2, 3, and 4, and the oil is conducted thereby throughout the length of the bearing. Obviously with this construction there will be no possibility of the bearing wearing or binding for lack of lubricant so long as the recess b^3 is filled with oil.

In pumps of the type under consideration the proportions are such that it is usually inconvenient and undesirable to space the cross-head guides as widely apart as the diameter of the flange of the cylinder end, since such a construction would involve both a most ungainly design and a great waste of material. It is nevertheless frequently necessary to remove the cylinder-head in order to give access to the interior of the cylinder, and since the cross-head guides are not far enough apart to permit a cylinder-head of the ordinary construction to pass between the guides and lifted off the piston-rod in the usual manner I have as a further improvement provided a special construction, as follows: A^2 designates a cast-iron head made slightly larger in diameter than the bore of the cylinder A, but of less diameter than the distance between the cross-head guides a^2, so that it may be removed through said guides when the cross-head is disconnected and out of the way. In this instance the cross-head and its guides are made of cylindric shape, as clearly shown in Fig. 3, and are of a diameter slightly greater than the diameter of the head A^2, as above stated. Said head A^2 is provided with a center aperture for the passage of the piston-rod and with the usual stuffing-box a^3 to prevent leakage around the latter. The head A^2 is seated within a counterbore a^4, which extends into the end A^3 of the cylinder the entire depth of the head. Said counterbore is in this instance shown as slightly larger in diameter than the head, except at its lower end, where a ground-joint A^5 is provided. The head is held in place within the counterbore by means of a split ring A^4. This ring is provided with a downwardly-projecting cylindric portion a^6, which is seated with-

in an annular groove provided by slightly enlarging the upper end of the counterbore a^4 and turning down the opposite margin of the head, so as to form shoulders a^7 and a^8, between which and the lower edge of the ring a suitable packing a^9 is provided. The ring A^4 is also formed with an outwardly-projecting flange a^{10}, having apertures a^{11}, through which bolts a^{12} are passed into the end of the cylinder to secure the ring in place. Said holes a^{11} are in this instance shown as six in number and are so placed about the circumference of the ring that two of the holes are located on the line of division between the two sections of the ring, so that a single bolt at this point will engage and bind both sections.

With the construction thus described the cylinder-head may be removed at any time after the cross-head is disconnected and out of the way by simply unbolting and removing the split ring A^4 and then lifting the head vertically upward between the guides a^2, so that it clears the piston-rod C. The latter, together with the piston, may then be lifted out of the cylinder and either removed laterally beneath the guides a^2 or upwardly between the same, since its diameter is, as before stated, less than the diameter of the cylinder-head, and consequently less than the distance between said guides.

The upper end A^3 of the cylinder is herein shown as made as a separate piece or outer head, which fits within a counterbore a^{13} of the cylinder-body and is secured by bolts a^{14}, placed around its outer edge, a suitable packing a^{15} being inserted between the parts to prevent leakage. Such separable outer head or cylinder-head, however, is simply characteristic of the particular style of pump to which my improvements have in this instance been applied and forms no part of my present invention, since it will be obvious that the inner head and split ring could be applied equally well to an integral cylinder end as to the separable end illustrated.

I claim as my invention—

1. The combination with a piston-rod and cross-head, of a socket in said cross-head, a recessed sleeve fitting over the piston-rod and adapted to be secured within the cross-head socket, and a split collar seated within the recessed sleeve and interlocking with the end of the piston-rod.

2. As a means for connecting a piston-rod and cross-head, a conical terminal on said piston-rod, a correspondingly-bored split collar fitting said terminal, and a recessed sleeve inclosing said collar and secured within a socket in the cross-head.

3. The combination with the piston-rod provided with a tapering terminal secured to the piston-rod at its point of smallest diameter, of a correspondingly-bored split collar fitting said terminal and made of less depth than the length thereof, a sleeve fitting over said piston-rod and collar, and a cross-head having a screw-threaded recess to receive said sleeve, substantially as described.

4. A power-pump provided with one or more cylinders, shaft-supporting standards arising above said cylinders, cross-head guides on said standards more widely separated than the cylinder-bore, a cylinder-head of a diameter less than the distance between the cross-head guides whereby it may be removed through the same and a split clamping-ring bolted to the end of the cylinder and engaging the head to hold the same in place, a conical terminal on the piston-rod, a correspondingly-bored split collar fitting said terminal and a recessed sleeve inclosing the collar and secured within a socket on the cross-head, substantially as described.

5. The combination with the cylinder and cross-head guides, of the inner cylinder-head of less diameter than the distance between the cross-head guides, the outer cylinder-head bolted to the cylinder, and a split clamping-ring bolted to the outer cylinder-head and engaging the inner cylinder-head to hold the latter in place substantially as described.

6. The combination with the cylinder and cross-head guides of the outer cylinder-head fitting within the counterbored end of the cylinder and bolted to the latter, the inner cylinder-head of less diameter than the distance between the cross-head guides fitting within a counterbore in the outer cylinder-head and a split ring bolted to the outer cylinder-head and engaging the inner cylinder-head to hold the latter in place substantially as described.

In testimony that I claim the foregoing as my invention I affix my signature, in the presence of two witnesses, this 30th day of April, A. D. 1896.

EDWARD E. JOHNSON.

Witnesses:
HENRY W. CARTER,
WILLIS D. SHAFER.