

No. 767,526.

PATENTED AUG. 16, 1904.

J. N. PAULSON.
CYLINDER REDUCER.
APPLICATION FILED FEB. 11, 1904.

NO MODEL.

Fig. 1.

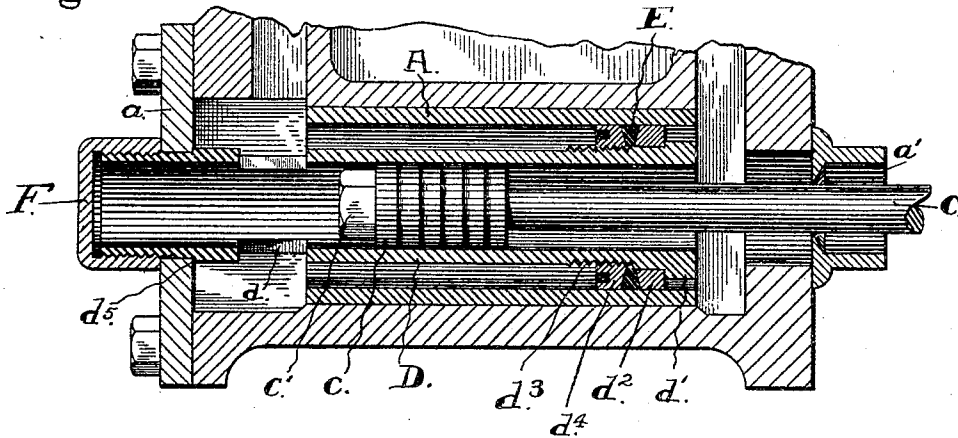
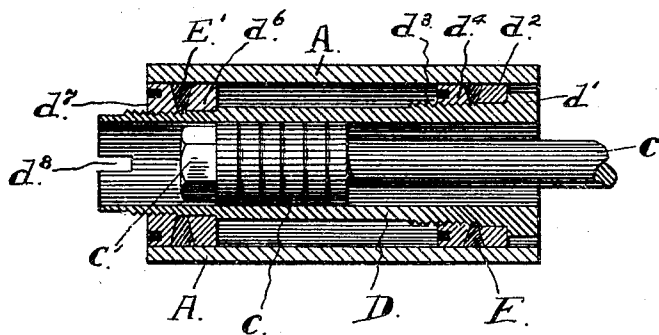


Fig. 2.



WITNESSES.

Arthur L. Allen
Halter D. Lane

INVENTOR.

John N. Paulson
by Wm F. Booth
his Attorney.

UNITED STATES PATENT OFFICE.

JOHN N. PAULSON, OF SEATTLE, WASHINGTON.

CYLINDER-REDUCER.

SPECIFICATION forming part of Letters Patent No. 767,526, dated August 16, 1904.

Application filed February 11, 1904. Serial No. 193,051. (No model.)

To all whom it may concern:

Be it known that I, JOHN N. PAULSON, a citizen of the United States, residing at Seattle, King county, State of Washington, have invented certain new and useful Improvements in Cylinder-Reducers; and I do hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to reducers for cylinders, and while it is applicable to any piston-containing cylinder which for any purpose may require to have its capacity reduced it is especially useful in connection with pumps, whether operated by steam, hand, or any other kind of power.

The object of my invention is to provide a simple and effective means for readily converting the pump from one for low duty to one for high duty, such conversion being particularly useful in the matter of testing steam-boilers for pressure. In many situations, especially on shipboard, the pumps in use for feeding the boilers are of such size that they are not available under their driving power, usually a donkey-boiler, for pumping against the high pressure required by the test, and other pumps, frequently hand-pumps, are brought down to the ship and after being connected require a long time to get up the required pressure; but if the pumps already in place could be made to serve the purpose under the limited power of the donkey-boilers much saving in time and labor would result.

By my invention such pumps can be used for this purpose by fitting their cylinders with reducers, thereby converting them to high-duty pumps, the donkey-boilers or even hand-power being in their reduced condition ample to pump up to the test pressure conveniently and quickly.

My invention consists therefore in an insertible bushing or barrel fitted within the cylinder to reduce its diameter, together with means for holding the bushing in place in the cylinder.

It also consists in the novel reducer which I shall now describe by reference to the accompanying drawings, in which—

Figure 1 is a longitudinal vertical section of a pump-cylinder, showing the application

of my reducer. Fig. 2 is a section showing a modification in the means for securing the reducer in place.

A is a pump-cylinder. At one end the cylinder has a removable head *a* and at the other a stuffing-box *a'*, through which passes the piston-rod C.

Referring to Fig. 1, D is the reducer, consisting of a bushing or barrel having an exterior diameter smaller than the interior diameter of the cylinder A, so that it readily fits therein, and having an interior diameter such as it is desired the reduction shall be. The bushing has openings *d* near one end, whereby it freely communicates with the cylinder spaces and ports. The inner end of the bushing is formed with a flange *d'*, against which bears a loose collar *d''*, freely encircling the bushing. The exterior of the bushing near the inner end is threaded at *d'''*, upon which portion is seated a nut *d'''*, both thread and nut being left-handed. Between the nut *d'''* and the loose collar *d''* is an expansion-ring E, which may consist of a split metallic ring or of elastic material, such as rubber, said ring in any case, whether of metal or rubber, being of a nature to expand its exterior diameter under side compression between the nut and collar. The other end of the bushing projects through the cylinder-head *a* and is threaded to receive a screw-cap F. The bushing just within the head *a* is shouldered at *d''''*, whereby when the cap F is tightened up on the outside against the head *a* the bushing-shoulder *d''''* is tightened up against the inside of said head.

The end of the piston-rod C which originally had screwed upon it the piston for the cylinder A has now screwed upon it the substitute piston *c*, secured by a nut *c'* and of a diameter to fit the reducer-bushing, as shown.

To make the change from the larger to the smaller cylinder, the operation is as follows: The ordinary head of the pump-cylinder is first removed and the large piston, with its rod, is passed out through the open end of the cylinder. The reducer-bushing D is now inserted in the cylinder through its open end, the entrance being readily effected by reason of the expansion-ring E being normal, the

nut d' being screwed back away from it. Just as the entrance of the washer is made the nut d' , which is still exposed, is screwed up by hand to the ring E to cause it to expand enough to grip slightly the wall of the cylinder. The bushing is then pushed home in the cylinder, and thereupon with the ring E gripping slightly the bushing is turned to the right on its axis. Now as the nut d' and the loose collar d'' are both pressed up to the ring E and as the ring has a slight grip the bushing can turn on its axis without turning the nut, the ring, or the collar, because the friction between the three latter parts and the cylinder is greater than between them and the bushing. The axial movement of the bushing has the effect of causing the nut d' to screw up tighter to the ring E and to compress the latter with greater pressure between it and the collar, whereby the washer expands and grips the cylinder with pressure sufficient to firmly hold the bushing in place. Then the larger piston having been removed from the rod C and the smaller piston c having been substituted the rod is passed in through the bushing and through the stuffing-box until the smaller piston c is seated in the bushing. Then the apertured head a is fitted over the projecting end of the bushing and is bolted to the cylinder A. Finally the cap F is screwed on the outer end of the bushing up to the head and draws the inner shoulder d'' tight to said head. The change or reduction is thus complete.

If it should be found in practice that a sufficient preliminary grip of the expansion-ring, as above mentioned, cannot be had to hold the nut d' while turning the bushing, provision may be made for this by making threaded sockets, as shown, in the face of the nut, into which suitable long rods or keys may be temporarily seated to hold the nut stationary while turning the bushing, after which the rods will be removed.

The reducer may when the occasion for its use is past be readily removed, and the pump thus restored to its original condition.

In some cases, as in long cylinders, it may be desirable to fit the bushing by means of an expanding grip at each end, thereby making the bushing approximately the length of the cylinder-wall inside and avoiding, by reason of having the entire reducer inside the cylinder, any change in the cylinder-head, such as the specially-prepared substitute head a of Fig. 1. I illustrate this modification in Fig. 2, wherein the bushing is short, having at one end the expanding devices heretofore described, but at the other end being provided with an expanding gripper-ring E' , operated by compression between the loose collar d'' and the nut d' , which is a right-hand one, adapted to be set up by a suitable spanner.

In this case I show a slot d''' in the bushing end to receive a spanner to turn the bushing on its axis for the purpose heretofore described.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A reducer for pump and other piston cylinders, comprising a bushing fitted within the cylinder, and means encircling the exterior of the bushing for frictionally gripping the inner surface of the cylinder-wall.

2. A reducer for pump and other piston cylinders, comprising a bushing fitted within the cylinder, an expansion-ring on the bushing for gripping the cylinder-wall, and means for expanding said ring.

3. A reducer for pump and other piston cylinders, comprising a bushing fitted within the cylinder, an expansion-ring on the bushing, and means operated by the movement of the bushing on its axis, to expand said ring to grip the cylinder-wall.

4. A reducer for pump and other piston cylinders, comprising a bushing fitted within the cylinder, means for detachably connecting said bushing with the cylinder-head, and separate means on the bushing for gripping the inner surface of the cylinder-wall.

5. A reducer for pump and other piston cylinders, comprising a bushing fitted within the cylinder, means for clamping the bushing to the cylinder-head, an expansion-ring on the bushing, and means operated by said clamping means for expanding said ring to grip the cylinder-wall.

6. A reducer for pump and other piston cylinders, comprising a bushing fitted within the cylinder, said bushing having on its inner end the flange, the loose collar, the binding-nut and the intervening expansion-ring constituting a gripping means to detachably secure the reducer to the cylinder-wall.

7. A reducer for pump and other piston cylinders, comprising a bushing fitted within the cylinder, said bushing having at its inner end the flange, the loose collar, the binding-nut and the intervening expansion-ring for gripping the cylinder-wall, and at its outer end the shoulder and tightening-cap for clamping the cylinder-head.

8. A reducer for pump and other piston cylinders, comprising a bushing fitted within the cylinder, an expansion-ring at each end of the bushing, and means for expanding said rings to grip the cylinder-wall.

In witness whereof I have hereunto set my hand.

JOHN N. PAULSON.

Witnesses:

WALTER F. VANE,
D. B. RICHARDS.