June 10, 1930. A. P. RIDENOUR 1,762,796

LINER PULLER

Filed April 22, 1929

Fig. 1.

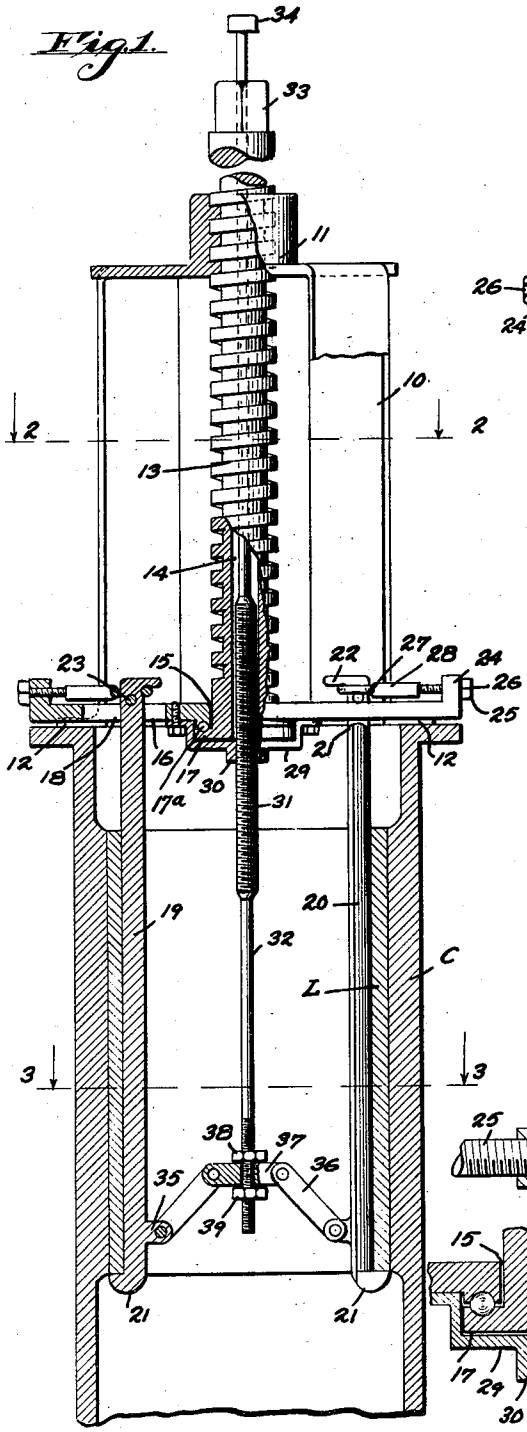


Fig. 2.

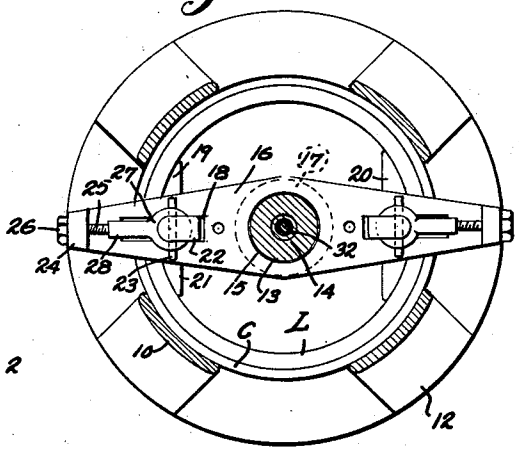


Fig. 3.

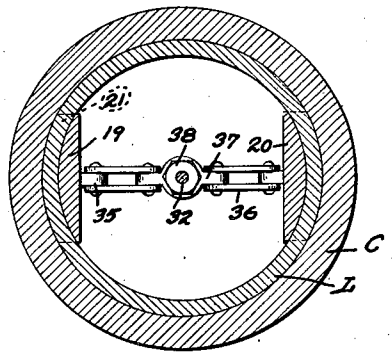


Fig. 4.

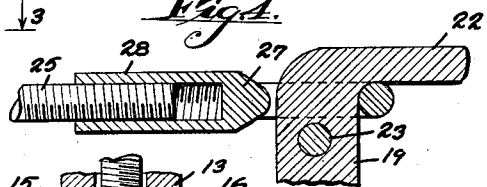
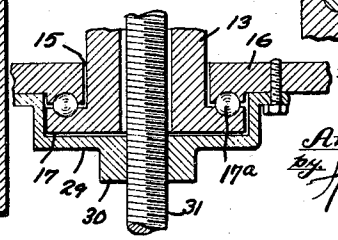


Fig. 5.



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UNITED STATES PATENT OFFICE

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LINER PULLER

Application filed April 22, 1929. Serial No. 357,173.

This invention relates to improvements in liner pullers and the like.

An object of the invention is to provide an improved liner puller which is primarily designed for removing liners from pumps and similar machines, but which may be used for other analogous purposes.

Another object of the invention is to provide a liner puller having a plurality of jaws adapted to be expanded against the interior of a liner in such a manner that the jaws bear against the interior of the liner for substantially their entire length, thus causing the jaws to pull on the liner in a direction perfectly parallel to the longitudinal axis of the liner.

Another object of ithe invention is to provide a liner puller of simple and durable construction which can be easily and quickly applied to a liner in a pump or similar machine and which will quickly and positively remove the liner.

With the foregoing and other objects in view which will be made manifest in the following detailed description and specifically pointed out in the appended claims, reference is had to the accompanying drawings for an illustrative embodiment of the invention.

Fig. 1 is a sectional view through a cylinder of a pump illustrating the improved liner puller in applied position wherein the liner is about to be removed.

Fig. 2 is a horizontal section taken substantially upon the line 2—2 upon Fig. 1.

Fig. 3 is a horizontal section taken substantially upon the ring 3—3 upon Fig. 1.

Fig. 4 is a partial view in vertical section illustrating a detail of construction.

Fig. 5 is a vertical section illustrating a detail of construction.

Referring to the accompanying drawings wherein similar reference characters designate similar parts throughout the improved liner puller is shown as applied to the cylinder C of a pump or similar machine in which there is a liner L. The liner puller comprises a body or frame having a plurality of spaced legs joined at their upper ends by a head 11. The bottoms of the legs are provided with feet 12 which are adapted to rest against the end of the cylinder C or other suitable support on the pump. A jackscrew 13 is threaded through the head 11 and this jackscrew has a vertical central bore 14 formed therein. The lower end of the jackscrew extends through an aperture 15 in a crosshead 16 and beneath the aperture the jackscrew is provided with a shoulder 17 forming a swivelled connection between the crosshead and the jackscrew. A suitable anti-friction bearing such as indicated at 17ª may be positioned between the shoulder 17 and the crosshead to reduce friction. The crosshead 16 extends diametrically across the frame between the legs 10 thereof and it is provided with slots 18 in which the upper ends of the jaws 19 and 20 are movable. The jaws 19 and 20 are straight presenting convex surfaces on their outer sides complementary to the interior surface on the liner L. They have at their lower ends shoulders 21 adapted to engage the end of the liner. The upper ends of the jaws are reduced in width where they extend through the slots 18 and are provided with inwardly extending lips 22 located a short distance above the crosshead. Pins 23 extend through the jaws and rest on top of the crosshead so as to suspend the jaws from the crosshead while enabling them to be moved back and forth in their respective slots 18. The outer ends of the crosshead are provided with upstanding ears 24 through which bolts 25 extend which have heads or handles 26 bearing against the outer sides of the ears. Eye members or eye bolts 27 are provided which are receivable over the inwardly extending lips 22. These eye members or eye bolts have their stems 28 internally threaded to receive the ends of the bolts 25.

On the under side of the crosshead there is secured a bracket 29 which provides a nut 30 in which the enlarged threaded portion 31 of an expander rod 32 is threaded. This expander rod extends upwardly through the bore 14 in a jackscrew 13 and projects a short distance above the top of the jackscrew. Both the jackscrew and

the expander rod are provided with squared heads indicated at 33 and 34 to facilitate their being rotated. Each jaw 19 and 20 is provided with an ear 35 on its inner surface to which links 36 are pivotally connected. These links are in turn pivotally connected to a collar 37 through which the lower end of the expander rod extends. Nuts 38 and 39 are screwed onto the expander rod and bear against the top and bottom of the collar respectively, thus forming a swivelled connection between the expander rod and the collar.

The manner of application and operation of the improved liner puller is as follows: Assuming the liner puller to be in a contracted or collapsed position the liner puller is applied to the pump by inserting the jaws through the liner L and causing the feet 12 of the frame to engage the end of the cylinder C. The expander rod 32 then has a wrench or equivalent tool applied to its squared head 34 and it is rotated, causing it to be screwed downwardly through the nut 30. The downward movement of the expander rod forces the collar 37 downwardly and causes the lower ends of the jaws to be expanded outwardly against the interior surface of the liner with the shoulders 21 engaging the ends of the liner. When the lower ends of the jaws have been thus expanded by the expander rod the eye members or eye bolts 27 are slipped over the upper ends of the jaws. The bolts 25 are then screwed into their stems 28 and continued rotation of the bolts 25 causes the eye bolts to pull the upper ends of the jaws outwardly so that the upper ends of the jaws as well as the lower ends of the jaws are expanded against the interior of the liner. In such position it will be noted that the jaws bear against the interior of the liner for substantially their entire length and that pulling forces applied to the jaws will be transmitted thereby to the liner in a direction which is perfectly parallel to the longitudinal axis of the liner. When the jaws have been thus expanded against the inside of the liner the jackscrew 13 is rotated by applying a wrench to its squared head 33 and rotation of the jackscrew causes it to pull the crosshead upwardly within the frame between the legs 10. The crosshead in turn pulls on the jaws removing the liner L from the cylinder C. The distances between the inside surfaces of the legs 10 is such that the liner L can be pulled upwardly within them and when the liner is removed from the cylinder the liner and liner puller can be removed and the puller detached from the liner by reversely rotating the bolts 35 and the expander rod 32.

From the above described construction it will be appreciated that an improved liner puller is provided which is of simple and durable construction and which will effectively remove a liner from a pump cylinder. Not only are the jaws positioned parallel to the longitudinal axis of the liner when in pulling position so that there is little danger of the shoulders 21 becoming rounded but there is also a considerable frictional engagement between the outside surfaces of the jaws and the liner, assisting the shoulders 21 in removing the liner from the cylinder.

The length of the slots 18 is such that the jaws may be expanded or contracted therein through such distances as will enable the improved liner puller to be used on different sized liners in accommodating the liner puller to differently sized liners. Substitutions may be made for the links 36 and for the bolts 24 if such is found necessary.

Various changes may be made in the details of construction without departing from the spirit or scope of the invention as defined by the appended claims.

I claim:

1. A liner puller comprising a plurality of jaws, means for causing one end of each of the jaws to be expanded against the interior of a liner, independently operable means for causing the other end of each of the jaws to be expanded against the interior of the liner, and means for causing the jaws to move the liner longitudinally.

2. A liner puller comprising a frame, a jackscrew threadedly mounted upon the frame, a crosshead swivelled to the jackscrew, jaws carried by the crosshead, means operable through the jackscrew for expanding the lower ends of the jaws against the interior of a liner, and means associated with the crosshead for expanding the upper ends of the jaws against the interior of the liner.

3. A liner puller comprising a frame, a jackscrew threaded to the frame, a crosshead swivelled to the jackscrew, jaws movable in slots in the crosshead, an expander rod threadedly connected to the crosshead, means connecting the jaws to the expander rod to enable the jaws to be expanded by the expander rod, and means mounted on the crosshead for causing the crosshead ends of the jaws to be expanded.

In testimony whereof I have signed my name to this specification.

ARCH P. RIDENOUR.