Aug. 30, 1927. 1,640,489

R. W. DONOWHO ET AL

LINER PULLER

Filed June 14, 1926

Fig. 1.

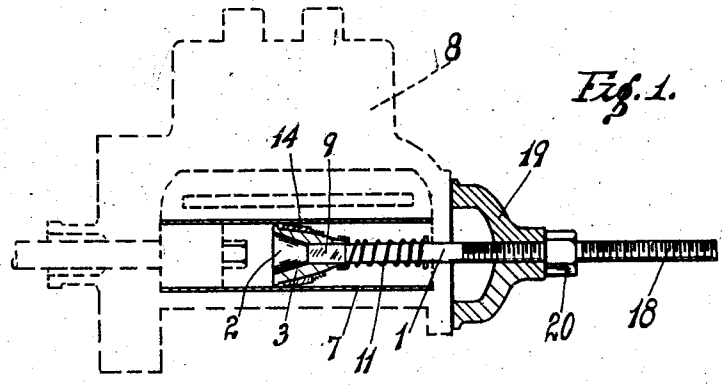


Fig. 2.

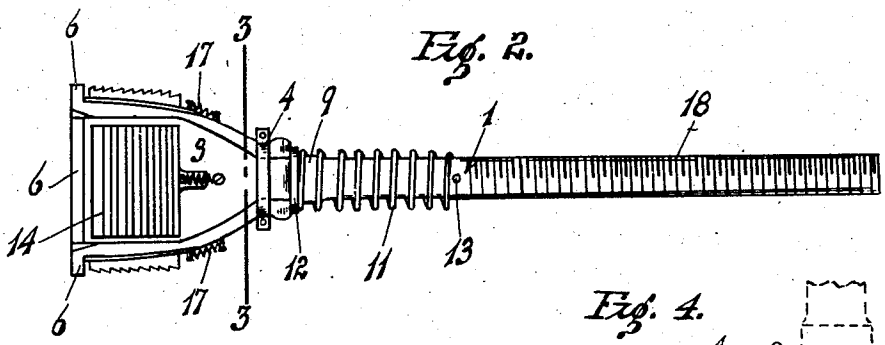


Fig. 3.

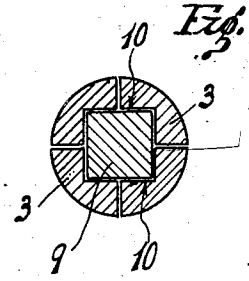


Fig. 4.

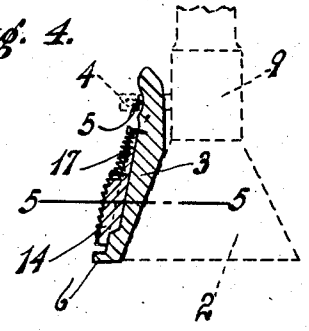
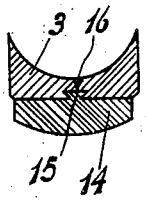


Fig. 5.



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UNITED STATES PATENT OFFICE.

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LINER PULLER.

Application filed June 14, 1926. Serial No. 115,847.

An object of our invention is to provide a liner puller for the cylinders of pumps, engines and the like, which may be applied without removing the piston and associated parts.

Another object is to provide a liner puller which is adapted to engage the inner surface of the liner at any convenient point.

A further object is to provide a liner puller which is easily and quickly adjusted to various sizes of liners.

A still further object is to provide a liner puller which conserves time and effort.

Other objects, advantages and features of invention may appear from the accompanying drawing, the subjoined detailed description and the appended claims.

In the drawing,

Figure 1 is a longitudinal sectional view of our puller in position in a cylinder.

Figure 2 is a side elevation of our puller.

Figure 3 is a sectional view taken on line 3—3 Figure 2.

Figure 4 is a longitudinal sectional view of one of the shoe segments.

Figure 5 is a sectional view taken on line 5—5 of Figure 4.

Referring more particularly to the drawing; our puller comprises a post 1 on the inner end of which a conical cam member 2 is formed. A plurality of shoe segments 3 are positioned about the member 2 and cooperate therewith, as will be further described. The segments 3 are assembled about and entirely surround the member 2, and a strap 4 fits into grooves 5 in said member to hold them together but with a certain amount of relative movement permitted. It will be seen that as the segments 3 are moved longitudinally of the post 1 the cam member 2, with which they engage, will cause them to expand or retract to fit various sizes of liners. A lip 6 on the bottom of each of the segments 3, is adapted to engage the end of the liner 7 in the engine 8, if it is found desirable to so remove the liner.

The post 1 is squared as at 9 above the cam 2 and each of the segments 3 have a groove 10 formed therein which fits about the square 9, to prevent turning of the segments about the post.

A spring 11 surrounds the post 1 and rests against a collar 12, which bears against the top of the segments 3, and a pin 13 in the post holds the outer end of the spring. Thus the action of the spring 11 is to force the segments on the cam 2 and thus expand said segments.

On each of the segments 3 a slip 14 is provided the outer surface of which has teeth formed thereon to grip the inner surface of the liner 7. These slips are slidably mounted on the segments by a tongue 15 which enters a groove 16 in said segment. A spring 17 secured to the slip and the segment normally holds the slip up and away from the lower end of the segment; thus the slip can move downwardly as the puller is operated to better engage the walls of the liner.

The outer end of the post 1 is threaded as at 18 and passes through a spider 19 which bears against the body of the engine 8 over the cylinder containing the liner 7. A nut 20 screws on to the post 1 and bears against the spider 19 to move the post and associated parts outwardly and carrying with it the liner 7 which is engaged by the slips 14.

Having described our invention we claim:

1. A liner puller comprising a post, a plurality of shoe segments slidably mounted on said post, and cam means on said post adapted to be engaged by the segments to expand said segments and a slip slidably mounted on each of said shoe segments, said slips being adapted to engage the liner.

2. A liner puller comprising a post, a plurality of shoe segments slidably mounted on said post, and cam means on said post adapted to be engaged by the segments to expand said segments and a slip slidably mounted on each of said shoe segments, said slips being adapted to engage the liner, spring means engaging said shoe segments whereby said segments are urged outwardly; and springs engaging said slips to urge the same upwardly on the segments.

3. A liner puller comprising a post, a cam member on the end of said post, a plurality of shoe segments arranged around said cam member, a clamp encircling one end of said segments, and a spring encircling said post

and engaging said segments to urge the same against the cam, and slips slidably mounted on each of the shoe segments.

4. A liner puller comprising a post a cam member on the end of said post, a plurality of shoe segments arranged around said cam member, a clamp encircling one end of said segments, and a spring encircling said post and engaging said segments to urge the same against the cam, slips slidably mounted on each of said segments and springs secured to the outer end of said slips and to the segments.

In testimony whereof we affix our signatures.

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