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PUMP CYLINDER LINER PULLER

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Fig. 1

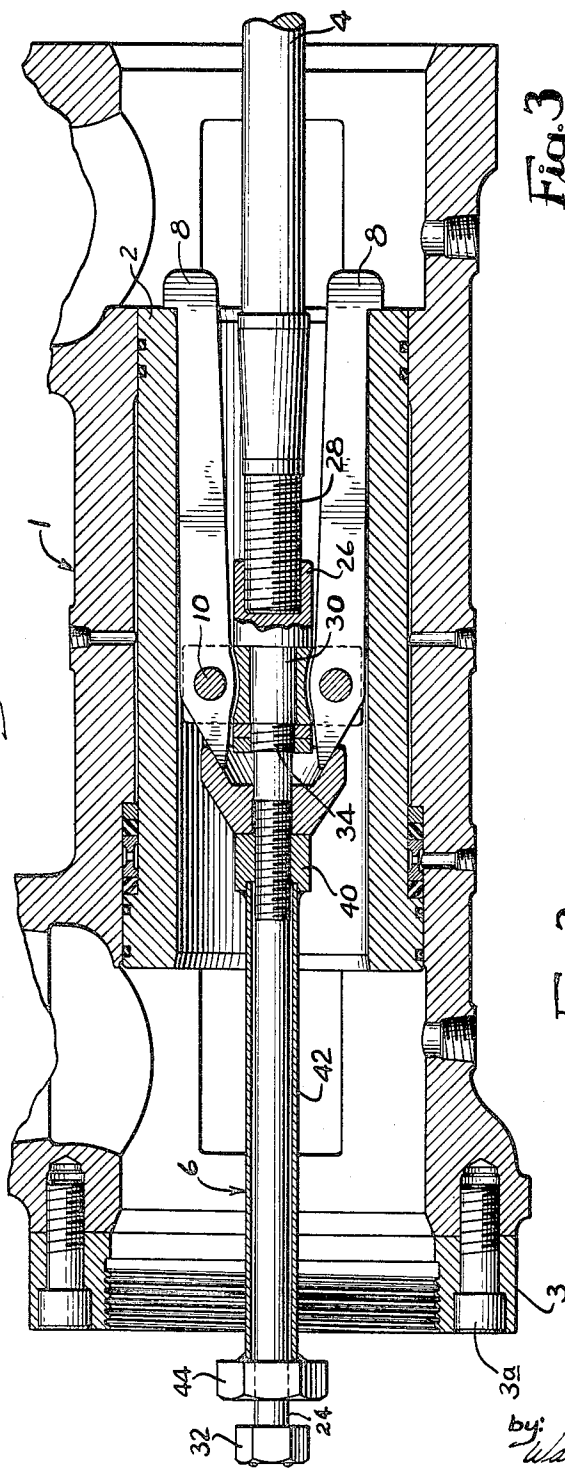


Fig. 3

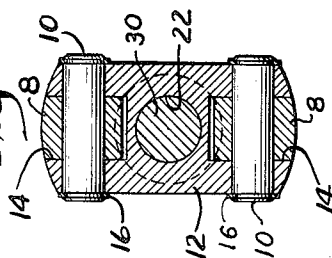
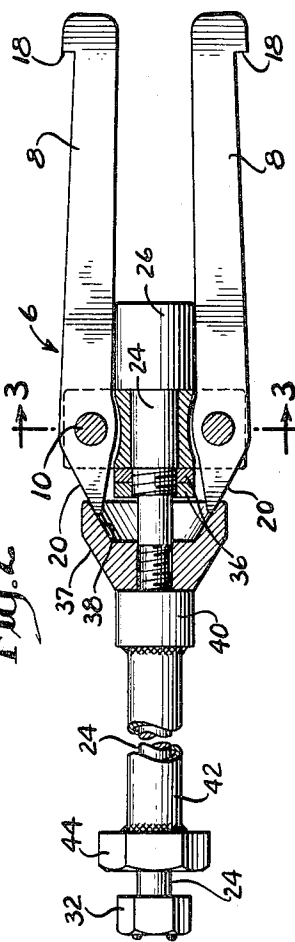


Fig. 2



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PUMP CYLINDER LINER PULLER

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1 Claim. (Cl. 29—283)

This invention relates to improvements in pump liner pullers for reciprocating pumps, and more particularly to pump liner pullers wherein the pump liner is removed by the action of the piston rod of the pump on the pump liner puller.

Various pump liner pullers have been proposed heretofore, but these for the most part, required a screw jack, hydraulic jack, or other auxiliary power means to operate the pump liner puller.

The present device is so constructed that the pump liner may be readily removed from the pump by the action of the piston rod of the pump of the pump liner puller, so as to transmit sufficient power from the piston rod of the pump to the pump liner through the pump liner puller, so as to speedily and positively remove the pump liner from the pump by the power of the power plant connected thereto, without manual effort and in a minimum of time.

An object of the invention is to provide a pump liner puller that may be readily inserted into a pump liner to be removed, in such manner that the piston of the pump will remove the pump liner of a reciprocating pump, upon movement of said piston rod.

Another object of the invention is to provide a pump liner puller which may be readily attached to or detached from a piston of a pump, and which may be so expanded as to engage the inner end of a pump liner in such manner that the piston rod will push the liner out, upon movement of the pump under power.

Still another object of the invention is to provide a pump liner puller which will pull pump liners of a wide variation of sizes.

A yet further object of the invention is to provide a pump liner puller which is easy to insert into and to remove from a pump, which is readily manipulatable from the exterior of the pump, so as to remove the liner upon movement of the piston rod of the pump.

With these objects in mind and others which will become manifest as the description proceeds, reference is to be had to the accompanying drawings in which like reference characters designate like parts in the several views thereof in which:

Fig. 1 is a longitudinal, fragmentary, sectional view through a pump cylinder, and the liner therefor, and the pump liner remover, with certain parts broken away, and with parts shown in section, to illustrate the details of construction;

Fig. 2 is a side elevational view of the device apart from the pump liner, with parts broken away and with parts shortened and with other parts shown in section, to bring out the details of construction; and

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 2, looking in the direction indicated by the arrows.

With more detailed reference to the drawing the numeral 1 designates a pump cylinder assembly in which a pump cylinder liner is fitted. A piston rod 4 of a reciprocating pump is shown as extending into the liner 2, which piston rod has a pump liner puller, designated

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generally by the numeral 6, screw-threaded thereonto, as shown in Fig. 1.

The pump cylinder liner puller 6 has at least one pair of puller bars 8, which are pivotally mounted by means of pins 10, to a body 12, which body 12 is bifurcated on each side thereof, as indicated at 14—14 to form pairs of ears, each of which ears has an aperture formed therethrough, the apertures in each pair of ears being transversely aligned and the axes of which pairs of apertures are parallel. The pins 10 each have a snap ring 16 interfitted within the respective annular grooves formed near each end of each pin, so when the pins 10 are in place on body 12, the snap rings will be so positioned as to prevent longitudinal movement of the pins with respect to the body 12.

Each of the puller bars 8 has an out-turned, shouldered portion 18 thereon, to engage the inner end of cylinder liner 2, substantially in the manner as shown in Fig. 1. The other end of each of the puller bars 8 has a tapered end 20, which tapers inward toward the axis thereof, and outwardly toward the outer end of the liner.

The body 12 has an axial bore 22 therethrough, as will best be seen in Fig. 3. A rod 24 passes through the bore 22. One end of the rod 24 has an enlarged threaded socket 26 thereon to threadably engage the threaded end 28 of the pump piston rod 4. The rod 24 has a portion 30 thereof interfitted within the bore 22 in bearing relation, so as to enable the turning of the rod 24 by fitting a wrench on the hexed head 32 thereof, which hexed head 32 extends to the exterior of the pump cylinder 1, in order to provide accessibility for the operation thereof. The rod 24 has threads 34 thereon, which threads are so positioned as to be on the opposite side of the body 12 from threaded socket 26, and on which rod 24 nuts 36 are threadably secured. The nuts 36 are preferably locked together in such manner as to prevent longitudinal movement of the rod 24 relative to the body 12, yet permit free turning movement thereof within the body 12.

An expanding actuator member 37 is telescoped over rod 24 and the inside conical face 38 thereof engages the tapered portions 20 of the respective puller bars 8, so upon movement of the actuator 37 toward the puller bars 8, the inner end portions 18 of the respective puller bars 8 will pivot on pins 10 and move outward to engage the end of liner 2. A nut 40 threadably engages rod 24, adjacent the conical member 37, so upon turning movement of nut 40, the conical face 38 will move along rod 24.

A tubular extension member 42 is welded or otherwise secured to nut 40 and extends outward, preferably to the exterior of the pump cylinder 1, and has a hexagon shaped head 44 thereon, to enable the ready turning thereof by means of a wrench, so upon turning movement of the hexagon shaped head 44, the tubular member 42 and nut 40 are rotated, which will move the expanding actuator 37 longitudinally along the threaded rod 24.

Operation

When it is desired to remove the pump liner from a reciprocating pump, the pump cylinder head is first removed from the pump cylinder, which is designated generally at 1, so as to enable ready access thereinto. The pump cylinder head is not shown in the present instance, but it is screw threaded into a threaded cap member 3, which cap member is held in place by cap screws 3a. After the head is removed, the piston of the pump is then removed from the piston rod 4, with the rod 4 remaining in the pump and being connected to the usual pump driving mechanism (not shown). With the pump cylinder head removed, and with the pump piston removed,

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and with the piston rod 4 in the extreme inward position, as shown in Fig. 1, and with the nut 40 in position on rod 24, as shown in Fig. 2, the puller bars will be moved toward each other. The pump liner puller, designated generally at 6, is then inserted into the cylinder 1, as shown in Fig. 1, and the enlarged threaded socket 26 is threadably engaged with the threaded end 28 of piston rod 4 by turning the hexed head 32 on the outer end of elongated rod 24, until the threaded socket 26 is in solid engagement with the end of the piston rod 4.

Whereupon, the puller bars 8 are pivotally mounted on the respective pins 10 in bifurcations 14 on the body 12, and with the inner conical face 38 of expanding actuator member 37 in contact relation with the angle portion 20 of the puller bars 8, and with the puller bars 8 in retracted position, as shown in Fig. 2, the hexed head portion 44 on the outer end of tubular member 42 is turned, which in turn will turn nut 40 to urge expanding actuator member 37 inward into engagement with the tapered ends of the puller bars 8. Further turning of the hexed head portion 44 will move the puller bars 8 from the position as shown in Fig. 2 to that shown in Fig. 1, and with the shouldered portion 18 engaged behind the inner end of pump cylinder liner 2, the liner is ready to be removed from the pump cylinder 1.

The pump cylinder 1, of the construction as shown in Fig. 1, has an enlarged bore in the intermediate portion, which is larger than the bore at the inner end of said cylinder and the outer end portion of the bore is larger than the intermediate portion thereof, and while the ends of the pump cylinder liner 2 seat in circumferential, fluid tight relation near each end thereof, the liner 2, when moved a short distance outward, will readily become loosened with respect to the cylinder 1.

With the pump piston liner puller positioned as described above, and shown in Fig. 1, the power drive which drives the pump is engaged and the piston rod 4 is reciprocated, and as the pump liner 2, which is engaged by the shouldered portions 18 of puller bars 8, is moved outward substantially the length of the stroke of the pump, thereby becoming loosened so that it may be readily removed by hand.

It is to be pointed out that this device may be readily applied, either to a threaded piston rod, or in abutting relation with a threaded or unthreaded piston rod, as it is the outward movement of the piston rod 4 that removes the liner 2 from the body of the pump cylinder 1. While the device is particularly adaptable for removing liners from pump cylinders, such as the cylinders from gear driven mud pumps, by means of the power exerted by the pump on the piston rod, the device may also be used with any type of reciprocating pump where the piston can be removed without having to remove the piston rod, and wherein controlled power can be applied to the piston rod in a manner to push the liner 2 out, under the influence of the power which is normally used to operate the pump.

While the invention has been illustrated and described in one embodiment thereof, it is to be understood that changes may be made in the minor details of construc-

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tion, and adaptations made to different installations without departing from the spirit of the invention or the scope of the appended claim.

Having thus clearly shown and described the invention, what is claimed as new and desired to secure by Letters Patent is:

A cylinder liner puller for removing a cylinder liner from a reciprocating pump having a threaded piston rod; which cylinder liner puller comprises a threaded rod having an enlarged, shouldered, threaded socket on an end thereof, which socket threadably engages said threaded piston rod, a longitudinally apertured body, said body being telescoped over said rod in abutting engagement with said shouldered, threaded socket, said body being bifurcated on opposite sides to form pairs of ears, which ears extend outward on opposite sides of said body, each of which ears has a hole formed therein, the holes of each pair of ears being transversely aligned, means retaining said body against relative longitudinal movement on said rod yet permitting free relative turning movement of said rod in said body, an apertured puller bar positioned between each pair of said ears so the aperture in the respective puller bars will be in aligned relation with the holes of the respective pairs of ears, a pivot pin passing through the holes of the respective pairs of ears and the respective puller bar to mount said bars for pivotal movement on the respective pins, each of said bars having a shoulder formed on one end thereof, the opposite end of each puller bar from the shoulder thereof, being inwardly tapered toward threaded rod, a hollow, conical member, having an axial opening therethrough, telescoped over said threaded rod and being adapted to complementarily engage said inwardly tapered ends of said puller bars and being longitudinally movable on said threaded rod, said threaded rod having a threaded portion thereon adjacent said hollow conical member when said conical member is in abutting relation with said tapered ends of said puller bars, a threaded nut threadably engaging said last mentioned threaded portion of said threaded rod, which nut is in abutting relation with an end of said conical member, a tubular extension member secured to said threaded nut and extending outward beyond the confines of said cylinder liner, wrench engaging means secured to said tubular extension member near the outer end thereof, said threaded rod extending outward through said tubular extension member beyond said wrench engaging means on said tubular extension member, and further wrench engaging means near the outer end of said threaded rod.

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