

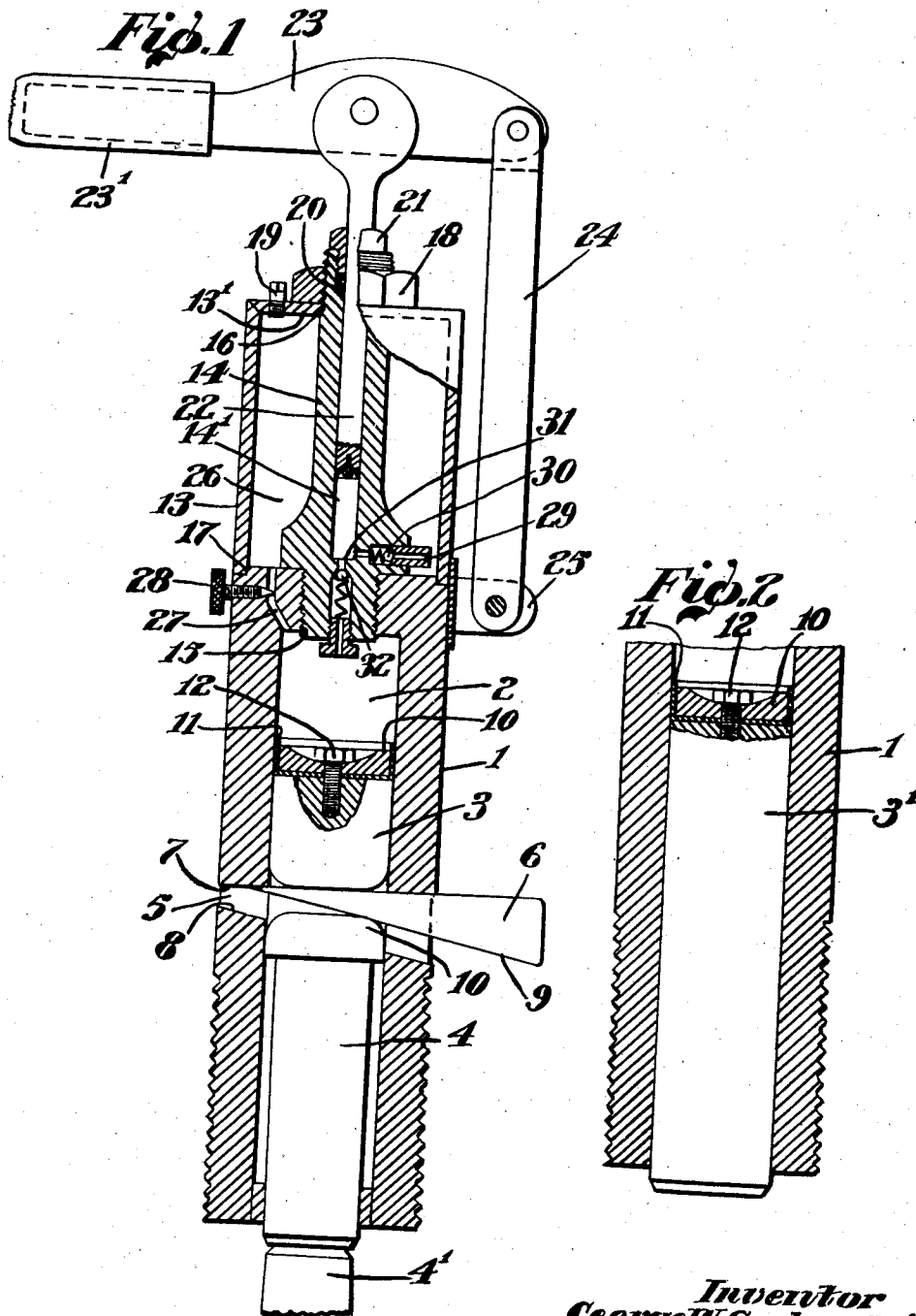
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WHEEL PULLER OF THE COMBINATION IMPACT AND COMPRESSOR TYPE

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UNITED STATES PATENT OFFICE

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WHEEL PULLER OF THE COMBINATION IMPACT AND COMPRESSOR TYPE

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This invention relates generally to a device for removing wheels, gears or the like from an axle or shaft on which the same may be mounted. The invention relates more particularly to a portable type of tool capable of applying a plurality of forces including a gradually variable pressure means and a means capable of delivering an intense initial impact and particularly effective to free the parts and obtain the initial movement of the wheel or other object.

One of the objects of this invention is to provide a puller or remover for freeing wheels, gears, or other objects from the shafts on which they may be forcibly mounted or pressed by providing a mechanism by which a powerful force may be gradually applied by a liquid compressor means, or an initial impact of great intensity, or a series of such impacts, either independent of the pressure means, or in addition to such pressure means, may be employed to effect the removal of the object from the shaft upon which it may be mounted.

The further object is to provide a portable wheel puller of simple and rugged construction which may be conveniently handled.

Its further object is to provide a portable wheel puller of the combination mechanical-compressor type having means readily adapting it for use on pullers of various types and sizes.

One illustrative embodiment of the invention is shown in the accompanying drawing for the purposes of illustrating the principles of the invention.

In the drawing:—

Fig. 1 is a sectional view showing the remover as including the liquid compressor means, and the additional mechanical impact means.

Fig. 2 is a sectional view showing a modified form of thrust plunger and casing in which the mechanical impact means for obtaining intense initial impact has been eliminated.

As shown in Fig. 1 of the drawing the puller comprises a cylindrical casing 1 forming a cylinder 2 and having a piston 3 therein. The piston 3 is disposed in one end of the

cylindrical chamber and the piston is provided with the usual seal or packing to maintain the pressure and to prevent the escape of the liquid medium which may be oil, water or other suitable liquid. As shown, a leather cup 11 is held in position by a retaining disc 10 which in turn is secured by a stud 12 threaded in the piston 3.

A thrust plunger 4 is also disposed within the other end of the cylindrical chamber 2, one end of the thrust plunger is guided through an aperture in the head of the casing and is adapted to engage the shaft 4' or other member on which the wheel or gear, which is to be removed, is mounted. The arrangement of the piston 3 and the thrust plunger 4 within the cylinder chamber 2, of course, is such that the movement of the piston 3 may be directly transmitted to the thrust plunger 4.

A transverse aperture 5 is formed in the casing at a point intermediate its ends, and is adapted to receive a wedge or drift 6, the location of the aperture being such that the wedge may be driven between the piston 3 and the plunger 4. As shown, one side 7 of the aperture 5 is normal to the axis of the cylinder and the other or lower side 8 of the aperture is disposed at an angle so that as the wedge 6 is driven in the aperture, movement of the thrust plunger 4 may be effected without effecting movement of the piston 3 and without exerting any thrust or force through the wedge upon the piston 3. By such a disposition of parts, the entire thrust forming impact force upon the wedge 6 is exerted upon the thrust plunger 4. However, the variable force from the pressure unit acting upon the piston 3, may be effective upon the thrust plunger 4, directly (when the wedge 6 is not used), or indirectly through the wedge 6 when the same is used. By such an arrangement and disposition of parts the variable liquid pressure means and the mechanical initial impact means may be used either separately or in combination, to effect the utilization of a force greater than that which either one independently is capable of exerting.

The liquid pressure means for exerting a

variable pressure upon the piston 3 is shown as being mounted at one end of the cylinder casing. This is shown as comprising an open ended housing 13 seated in a shouldered portion designated as 17 of the casing. The housing head 13' at the other end of the housing is provided with an aperture 16 adapted to receive a hollow cylindrical stem 14. A piston rod 22 is reciprocable in the chamber 14' within the stem 14. The piston rod 22 is shown as provided with the usual packing cup to prevent loss of liquid and pressure.

The cylindrical stem 14 is removably fixed in the head of the cylinder casing by any suitable means; as shown, the cylinder stem 14 is threaded in the head of the casing which is indicated at 15.

The housing 13 is removably secured in fixed position at one end of the casing 13 by adjustable means on the cylindrical stem; in the drawing this means is shown as a nut 18 threaded on the portion of the cylindrical stem 14 which extends through the apparatus 16 in the head 13' of the housing. The housing 13 when in position forms a chamber or reservoir 26 about the cylindrical stem 14, and is adapted to contain a liquid such as oil, water or other suitable liquid.

An intake passage 29 is provided in the cylindrical stem 14 to afford communication between the reservoir 26 and the cylinder 14'; a usual type of spring actuated ball check valve 30 is shown for the intake passage, the arrangement being such that upon suction stroke of the piston rod 22, the intake passage will be opened and the liquid will be drawn into the cylinder chamber 14' from the reservoir 26. An outlet passage 31 is provided to afford an outlet passage between the cylinder chamber 14 and the cylinder chamber 2 of the casing; the usual type of spring actuated ball valve 32 is provided for the outlet passage, the arrangement being such that upon the suction stroke of the piston rod 22 the passage 31 will be closed but upon the power stroke of the piston rod 22 the check valve 32 will be opened and the liquid will be forced under pressure to the cylindrical chamber 2 so that the force is transmitted to the piston 3 which in turn transmits the movement to the thrust plunger 4, either directly or through the wedge 6.

An outlet for the cylindrical chamber 2 is provided by a passage 27 in the head of the cylinder casing 1, which passage connects the cylinder chamber 2 with the reservoir 26. A suitable valve 28 is provided for opening or closing the passage 27. The liquid in the cylinder chamber 2 may be returned to the reservoir 26 through the passage 27 when the valve 28 is opened.

A suitable means may be provided for reciprocating the piston rod 22. As shown in the drawing this means includes an actuating detachable handle 23'

and a link connection 24, the link being pivotally connected at one end to the arms, the link being pivotally connected at its other end to a bracket 25 which bracket is mounted upon the cylinder casing.

Fig. 2 is a fragmentary view in section showing the cylinder casing 1 with the piston 3', therein, and with the end of the piston extending through the opening at the end of the casing so that the piston also functions as the thrust plunger 4 as shown in Fig. 1. The modified form shows the relative arrangement of parts, when the tool is used without the impact means, such as the wedge 6. A tool of the character described herein, having a plurality of means of force available and effective in a wheel or gear puller is particularly desirable, because it frequently happens that the gear or the wheel is fixed or frozen in positions so that the application of a high pressure gradually applied is not sufficient for freeing the set or frozen parts; under such conditions, it is desirable to apply, in addition to the constant gradually applied or maintained high pressure, an additional pressure by impact which is equal to or greatly in excess of the constantly maintained pressure. By providing the wedge, which is interposed between the piston 3 and the thrust plunger 4, an intense pressure is applied by impact which is sufficient to free the frozen parts. After the parts have been freed by breaking the initial set, or frozen connection, the wedge may be removed, and the gear or wheel removed by applying sufficient pressure through the piston 3 to the plunger 4.

While one selective embodiment of the invention has been shown for purposes of illustration, it is understood that various changes and modifications may be made without departing from the spirit and scope of the invention as defined in the appended claims.

What I therefore claim and desire to secure by Letters Patent is:

1. A wheel puller comprising a cylinder casing, a piston in said cylinder, a thrust plunger in said cylinder, means at one end of the casing for delivering a variable liquid pressure to the piston in said cylinder, to effect a gradually increasing pressure upon said thrust plunger, means arranged to permit the application of an intense impact force, independent of the pressure means upon the thrust plunger, said means including a wedge adapted to be driven between the piston and said thrust plunger.

2. A wheel puller comprising a cylinder casing, a piston in said cylinder, a thrust plunger in said cylinder, means at one end of the casing for delivering a variable liquid pressure to the piston in said cylinder, to effect a gradually increasing pressure upon said thrust plunger, means arranged to per-

mit an initial force by impact to be delivered
to the thrust plunger, said means including
a transverse aperture extending through the
walls of the cylinder casing at a point be-
tween the piston and the thrust plunger, and
a wedge or drift adapted to be driven
through said transverse aperture so as to ef-
fect movement of the plunger without effect-
ing movement of the piston.

10 In testimony whereof I affix my signature.
GEORGE W. GREBENSTEIN.

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