A. B. KLAY.

WHEEL PULLER.

APPLICATION FILED MAY 19, 1920.

1,376,340.

Patented Apr. 26, 1921.

2 SHEETS—SHEET 1.

Fig. 1.

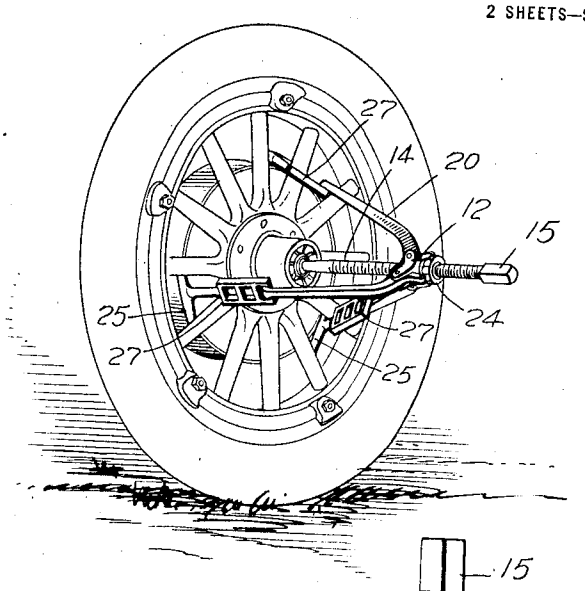


Fig. 2.

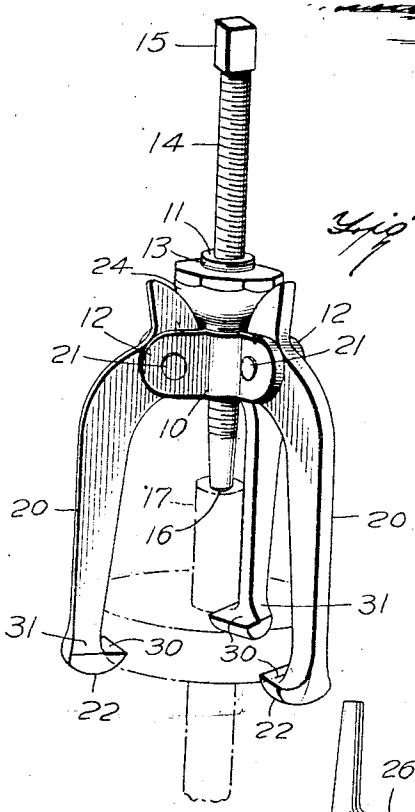


Fig. 3.

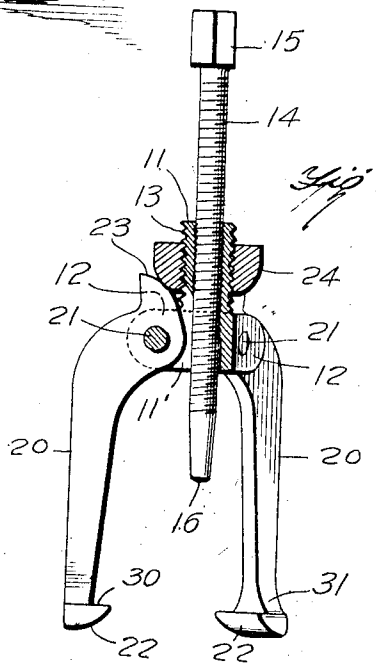
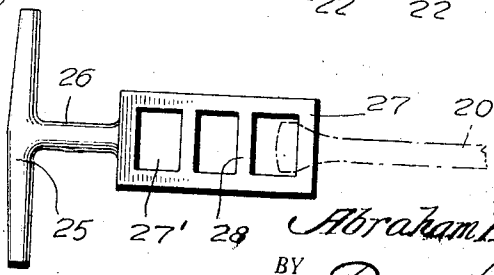


Fig. 4.



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2 SHEETS—SHEET 2.

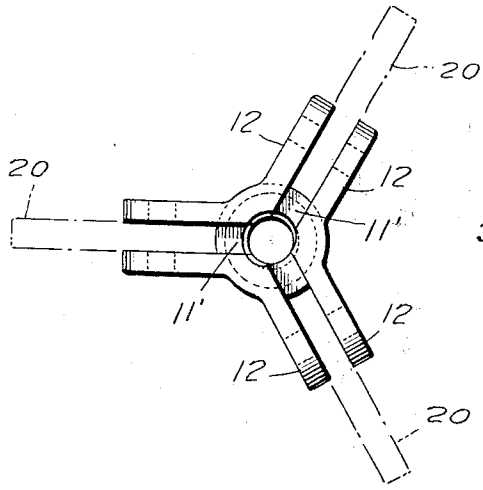


Fig. 5.

Fig. 6.

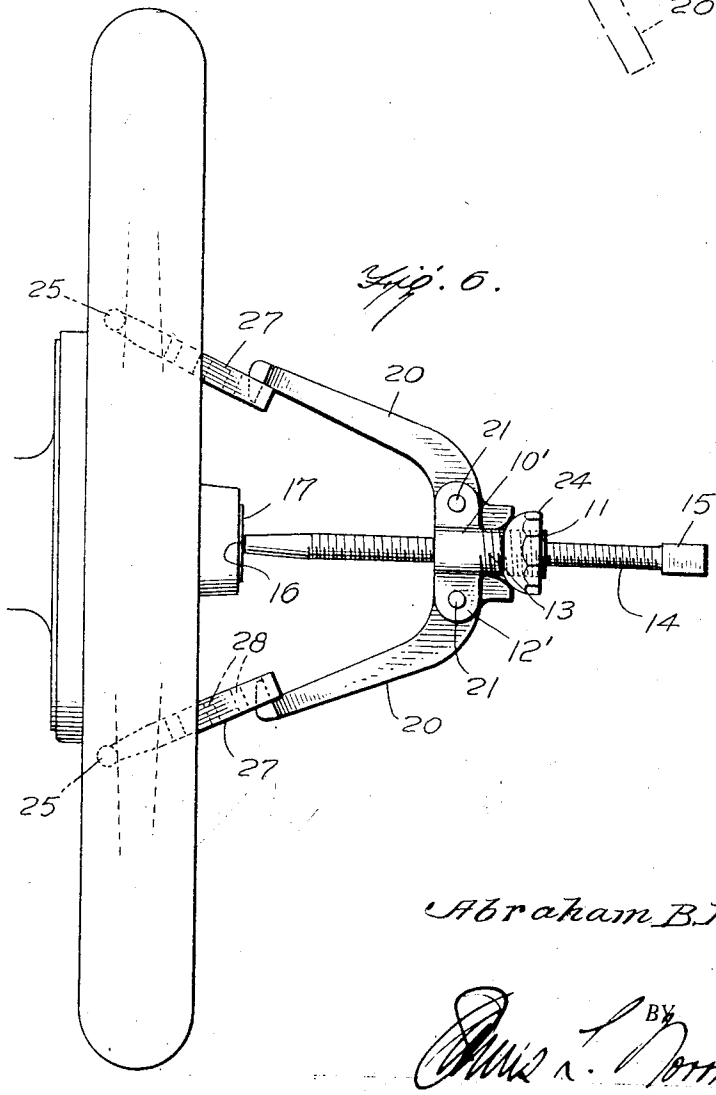
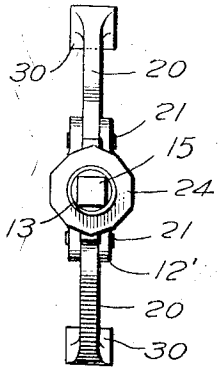


Fig. 7.



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WHEEL-PULLER.

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Application filed May 19, 1920. Serial No. 382,547.

To all whom it may concern:

Be it known that I, ABRAHAM B. KLAY, a citizen of the United States, residing at Beaverdam, in the county of Allen and State of Ohio, have invented new and useful Improvements in Wheel-Pullers, of which the following is a specification.

This invention relates to wheel pullers and has for its object to provide such a device of strong, simple and economical construction which may be readily and rapidly applied and maintained positively in gripping position while the pressure-applying member is operated.

A further object of the invention is to provide a link mechanism whereby a device of standard size may be applied to wheels of varying diameter, the range of adjustment, however, being ordinarily sufficient for gear wheels of the size usually employed in automobile or truck transmissions.

Improvements in the details of construction of wheel pullers and their positive and certain operation are also among objects of my invention and will become apparent on reference to the following specification which describes the invention in connection with the accompanying drawings.

In the drawings:

Figure 1 is a perspective view of the preferred form of my invention applied to the wheel of a motor vehicle.

Fig. 2 is a perspective view showing the application of the preferred form of my invention to a gear wheel.

Fig. 3 is a longitudinal sectional view of the pulling device.

Fig. 4 is a detail view of one of the sectional links.

Fig. 5 is a bottom plan view of the spider.

Fig. 6 is a side elevation of a modified form of my invention applied to the wheel of a motor vehicle.

Fig. 7 is an end view of the modified form illustrated in Fig. 6.

Like numerals represent corresponding parts throughout the several views of the drawing.

The numeral 10 designates a spider having a sleeve extension 11 and pairs of spaced lugs 12. The sleeve 11 is hollow and threaded internally for receiving the threaded pressure-applying member 14 having the square head 15 and the rounded end 16 which is also preferably hardened so as to prevent its deformation. The sleeve 11 is also provided with external threads 13 for a purpose which will hereinafter appear. The end 16 of the pressure-applying member 14 is adapted to engage against the end of the shaft 17 on which the wheel, gear or other member is mounted with sufficient tightness as to require the services of the wheel puller in the removal thereof.

Between the pairs of lugs 12 the spider is slotted as at 11′ to provide sufficient clearance for the operation of gripping levers 20.

Levers 20 are inserted between the pairs of spaced lugs 12 and are pivoted therein by means of pins 21 which pass through registering apertures in the levers and lugs and are riveted over at their ends in order to secure the pins in place. In the preferred form of wheel puller three pairs of lugs and three levers are shown. However, it will be understood that in some cases the limited space may not be sufficient for this number and in that case two pairs of lugs and two levers may be used as illustrated in Fig. 6. The levers 20 are each provided on one side of the pivot pin with a relatively long arm terminating in a hook-shaped end 22, and with a short arm on the other side of the pivot terminating in a cam-shaped surface 23. A nut 24 is threaded on the external threads 13 and is formed with a polygonal head suitable for wrench engagement and also with a curved surface complemental in shape to the cam surfaces 23 of the levers. The nut or collar 24 may be adjusted longitudinally by turning the same on the threads 13 and its cam surface engaging with the cams 23 will move the levers 20 simultaneously about their pivot pins 21 until the long arms 20 grip the wheel or gear or the link devices which are hereinafter described.

When the wheel to be removed is of large diameter, such as the wheel of an automobile, T-shaped members are used equal in number to the levers of the pulling device. Each of these T-shaped members comprises a casting having a cross-arm 25 adapted to extend between and engage the spokes of the wheel and a central projecting portion 26 connecting the cross-arm with the sectional link 27. The link is preferably formed of three sections denoted as 27′, each section being separated by a web 28

which is adapted to engage the hook-shaped end of each lever arm 20. It will be seen that these T-shaped members can be readily applied and detached from the spokes of the wheel and that when in operative position they extend downward so that the spread of the adjustable lever arms may be sufficient both for large and small wheels.

In transmission mechanisms the space is sometimes limited and will not permit the use of three lever arms on the pulling device. Therefore, the form shown in Fig. 6 may be used in which the structure is the same as above described with the exception that the spider 10′ is equipped with two pairs of lugs 12′ and these pairs are arranged at diametrically opposite points.

Fig. 6 shows the application of a two-arm wheel puller to the wheel of a motor vehicle, a T-shaped element and sectional links being shown in connection therewith.

Assuming that it is desired to remove the wheel illustrated in Fig. 1, the T-shaped elements are first placed between the spokes of the wheel at the proper angular displacements to correspond with the angular positions of the arms 20. The nut 24 is then turned so that it will move longitudinally toward the wheel and engage the cam surfaces 23, thereby moving the gripping levers inward until they contact with the web 28 of a sectional link. The nut 24 is then screwed tightly in position, thus locking the gripping levers in engagement with the T-elements. The member 14 is then turned so that its threaded connection with the spider will make it approach the exposed end of the shaft on which the wheel is mounted. After the hardened end 16 contacts with the shaft a wrench is applied to the squared end 15 of the pressure member and the reactive force will tend to move the spider 10 longitudinally away from the wheel, thus exerting a tension stress on the spokes of the wheel through the lever arms 20 and T-elements 26. The turning of the member 14 is continued until the wheel is loosened and moved sufficiently on the shaft so that the wheel can be readily removed by hand. During the operation, there is no danger of the gripping levers becoming loose because the nut 24 firmly holds them in locked position.

When a device is used in connection with a gear wheel, as illustrated in Fig. 2, the T-shaped elements may be eliminated and the hook-shaped ends 22 of the lever arms 20 applied directly to the gear. The action in this case is the same as above described in connection with the vehicle wheel with the exception that the hooks 22 apply the pressure directly to the surface of the gear wheel. The terminal hooks are wider than the bodies of the levers 20 and present a large bearing surface 30 to the gear or link. These hooks are connected by curved surfaces 31 to the main bodies of the levers and afford greater sectional area at the point of maximum stress and less unit pressure on the contacting surfaces.

It will be seen that my invention provides a simple, certain and economical means whereby wheels or the like may be readily removed from shafts and it is apparent that certain changes may be made in the detail construction of the illustrated form of my invention but all such modifications are considered within the purview of my invention if within the spirit and scope of the appended claims.

I claim:—

1. A device for removing wheels comprising T-shaped elements for engaging the spokes of the wheel, each of said elements having a plurality of link sections, pivoted levers each having a hook-shaped end adapted to engage one of said hook sections, means for locking said hook-shaped ends in engagement with said links and mechanism for exerting a tensile force on said levers.

2. A device for removing wheels or the like from a shaft comprising a member for exerting pressure against the shaft, a spider threaded on said member, levers pivoted on said spider, each of said levers having a long gripping arm and a short arm having a cam-shaped surface, a nut threaded on said spider provided with a cam surface adapted to coact with the cam surfaces of said short arms for simultaneously moving said pivoted levers and clamping said long arms in gripping engagement.

3. A device for removing wheels comprising T-shaped elements detachably engaging the spokes of the wheel, a spider, a plurality of gripping levers supported by said spider, means associated with said spider for causing said gripping levers to approach each other and engage said T-shaped elements and means for forcing said spider longitudinally.

4. A device for removing wheels or the like from a shaft comprising a member for exerting reactive pressure against the shaft, a spider threaded on said member, a plurality of gripping levers pivotally supported on said spider, and a nut adjustably mounted on said spider for simultaneously adjusting the angular position of said levers and locking the same when in engaged position.

5. A device for removing wheels or the like from a shaft comprising a spider having a sleeve extension provided with interior and exterior threads, a threaded member engaging said interior threads and a nut engaging said exterior threads, gripping levers pivotally supported on said spider, said levers and nut being provided with com-

plementally-shaped surfaces for adjusting the angular position of said levers and locking the same when in engaged position.

6. A device for removing wheels or the like from a shaft comprising means for engaging the shaft, a supporting element longitudinally adjustable on said means, gripping members carried by said element and means longitudinally adjustable on said element adapted to coact with said members for varying the angular position of said members and locking the same in operative position.

In testimony whereof I have hereunto set my hand in presence of a subscribing witness.

ABRAHAM B. KLAY.

Witness:
CHAS. S. HYER.