March 13, 1962 R. G. STEIN 3,024,524

HYDRAULIC TOOL

Filed March 5, 1958

FIG. 1.

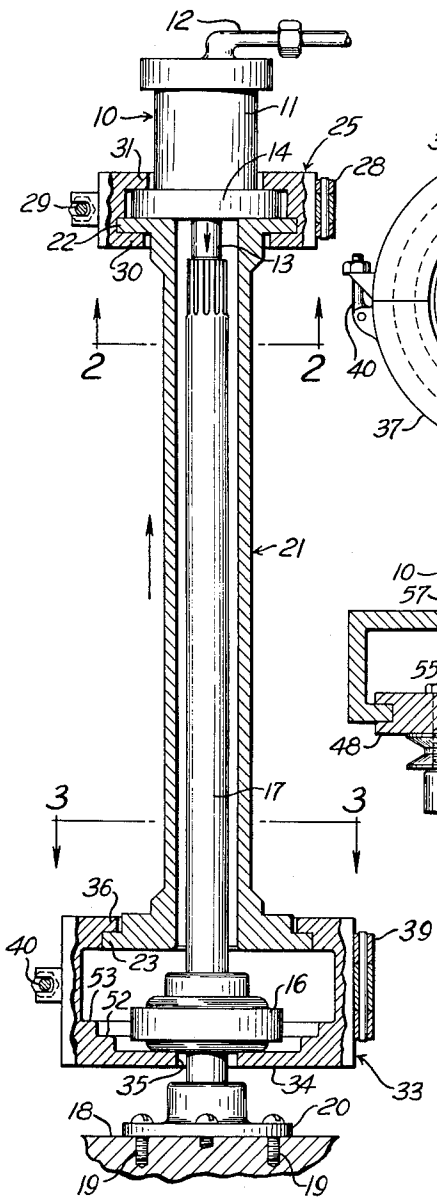
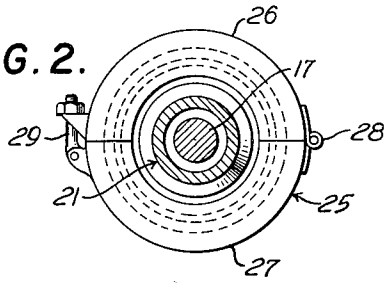


FIG. 2.



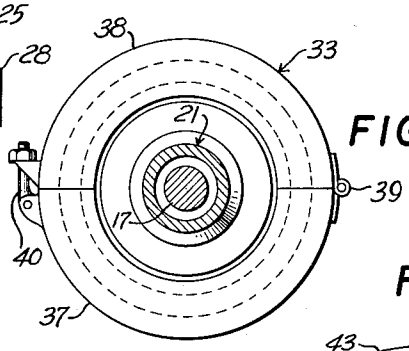
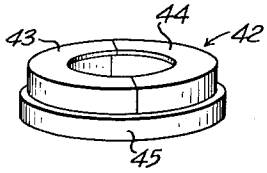


FIG. 3.

FIG. 4.



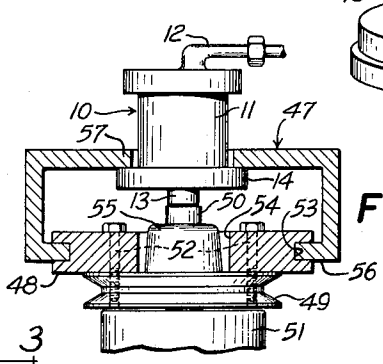


FIG. 5.

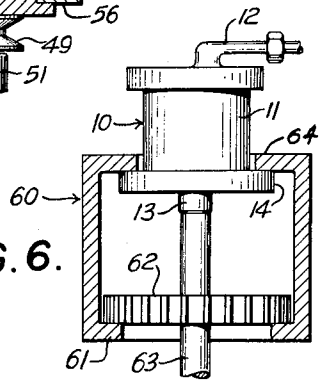


FIG. 6.

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3,024,524

HYDRAULIC TOOL

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1 Claim. (Cl. 29—252)

The present invention relates to tools of the type used for pulling gears, wheels, bearings, pulleys or the like, and which find particular utility in vehicle repair work.

In pulling or removing a part, for example, a bearing assembly from its shaft, it is important to apply pressure evenly around the bearing in order that it will not bind or be distorted. A force of several tons is applied with these pulling tools and the part being removed sometimes will shatter and fly about; or if the tool is not properly aligned, it will "kick out" with considerable force.

Another problem in work of this type is that the part to be removed may be so located so as to be inaccessible to the conventional pulling tool.

In accordance with the present invention a pressure applying tool has been provided which has a quick acting coupling collar that also functions to prevent injury to the operator in the event the part being removed breaks during the removal process.

The tool provided by this invention also insures an evenly distributed force on the part being removed.

The invention furthermore provides a pressure applying tool having attaching parts and coupling collars that result in a highly versatile and efficient tool.

These and other objects and advantages of the invention will appear later as this disclosure progresses, reference being had to the accompanying drawings, in which:

FIGURE 1 is a longitudinal cross sectional view through a pulling tool made in accordance with the present invention and showing its application for removal of a bearing assembly from a vehicle axle;

FIGURES 2 and 3 are sectional views taken on lines 2—2 and 3—3 respectively of FIGURE 1 and showing the quick attaching connection for the coupling collar halves;

FIGURE 4 is a perspective view of a modified form of a quick acting coupling collar;

FIGURE 5 is a longitudinal cross sectional view of another form of pulling tool made in accordance with the invention, and

FIGURE 6 is a longitudinal cross sectional view of still another type of pulling tool.

Referring more specifically to the drawings, the hydraulic ram **10** comprises a cylinder **11** having a pressure fluid supply conduit **12**, a rod **13** extendable from the cylinder, and an annular shoulder or projection **14**.

As illustrated in FIGURE 1 the invention has been shown as used for removing a bearing assembly **16** from a vehicle drive axle **17** which would be secured to the vehicle housing **18** by bolt means **19** extending through its flange **20**. The removal of these bearings from trucks or automobiles is ordinarily a particularly difficult job, often requiring on the order of one hour to accomplish. For this particular task, the present invention provides a pulling tube **21** having radially outward extending flanges **22** and **23** at its ends.

A split-type coupling collar **25** is used to connect the one end of tube **21** to the ram **10** and includes the complementary halves **26, 27** which are hinged together at **28** and have a quick acting latch **29** at their other side to hold them together. The collar has axially spaced radially extending flanges **30, 31** which embrace the tube flange **22** and ram shoulder **14**, respectively.

Another quick attachable coupling collar **33** secures

the tube in pulling relationship to the bearing assembly **16** or other part to be removed. In addition, this collar **33** acts to completely enclose the bearing so that if the latter shatters or breaks while pressure is applied thereto, the parts will not fly about to cause injury and other damage. The collar **33** has an inner flange **34** containing an aperture **35** through which the axle **17** extends. This flange is adapted to abut against the inner side of bearing **16** while flange **36** engages the tube flange **23**. This collar **33** is also formed of complementary halves **37, 38** hinged together at **39** and having a quick acting latch **40**. The inner portion of the collar **33** is provided with a series of different sizes of steps or annular shoulders **52, 53** which accommodate the various sizes of retaining rings of certain types of vehicles. By providing a firm bearing surface that extends completely around the ring, distortion or bending of the parts is prevented.

The above arrangement is such that as pressure fluid is admitted to the ram, the rod is forced to extend relative thereto and applies a force to the axle. An oppositely directed force is applied to the bearing by the ram cylinder acting through collar **25**, tube **21** and collar **33**. By use of collars **25** and **33** and tube **21**, an evenly distributed force is applied around the bearing. In other words, rather than using circumferentially spaced grasping fingers which create a circumferentially unbalanced force that results in binding or tipping between the parts, the present arrangement provides an evenly and circumferentially distributed load. In fact, the arrangement shown is balanced to such an extent that it is possible to remove a bearing from a completely broken axle, by piecing the axle together in the tube **21** for transmitting the force of the ram.

The modified form of collar **42**, shown in FIGURE 4, is comprised of complementary halves **43, 44** which are held together by a ring **45** slipped axially over the halves, when the latter are together, and serves to tightly embrace them to prevent their disassembly. The collar **43** otherwise performs as do collars **25** or **33**.

The arrangement shown in FIGURE 5 shows the ram **10** employing another coupling collar **47** and an adapter plate **48** as used when removing a vibration damper pulley **49** from a truck crankshaft **50**. The pulley **49** is mounted closely adjacent the crankshaft housing **51** and there is insufficient clearance therebetween for the insertion of a coupling collar. The pulling plate **48** is secured to the pulley by bolts **52** which are threaded into tapped holes in the pulley. The plate **48** has a groove **53** extending around its periphery and a central opening **54** for receiving the pulley hub **55**. The inner flange **56** of the collar **47** extends into groove **53** while the outer flange **57** abuts against ram shoulder **14**. The collar **47** is also of the split type and its halves are slipped over the pulley and ram and securely locked together. By means of this collar **47** and plate **48** and effective coupling means is provided for this particular job.

FIGURE 6 shows another coupling collar **60** having a radially short flange **61** which engages a gear **62** to be pulled from shaft **63**. Flange **64** of the collar bears against shoulder **14** of the ram and the rod **13** pushes against the end of the shaft **63** when pressure fluid is admitted to the ram. Collar **60** is also of the split halves type by means of which it is readily clamped in position or removed.

Various modes of carrying out the invention are contemplated as being within the scope of the following claim particularly pointing out and distinctly claiming the subject matter which is regarded as the invention.

I claim:

A tool for pulling a part from a shaft comprising in combination, a hydraulic ram having an annular pro-

ection extending around its exterior periphery, said ram ncluding a force applying element disposed coaxially with and extending in a direction normal to said annular projection, a pulling tube adapted to be slipped over said shaft and element and having a radial outwardly extending flange at each of its ends, a coupling collar having a pair of radially inwardly extending flanges embracing one of said tube flanges and said ram projection therebetween, a second coupling collar having a pair of radially inwardly extending flanges embracing the other of said tube flanges and adapted to embrace said part therebetween, said second coupling collar adapted to enclose said part and apply pressure from said ram through said tube and equally around said shaft.

References Cited in the file of this patent

UNITED STATES PATENTS

1,357,698	Fessenden	Nov. 2, 1920
1,599,332	Kerr	Sept. 7, 1926
1,761,412	Schwerin	June 3, 1930
1,857,211	Odlum	May 10, 1932
2,149,142	Jorgenson	Feb. 28, 1939
2,496,005	Grant	Jan. 31, 1950
2,504,393	Cook	Apr. 18, 1950

FOREIGN PATENTS

689,849	France	June 3, 1930