Sept. 22, 1959 R. F. KREITER 2,904,955

LEVER ACTUATED TOGGLE DEVICE FOR DISASSEMBLING MACHINE ELEMENTS

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Fig. 1

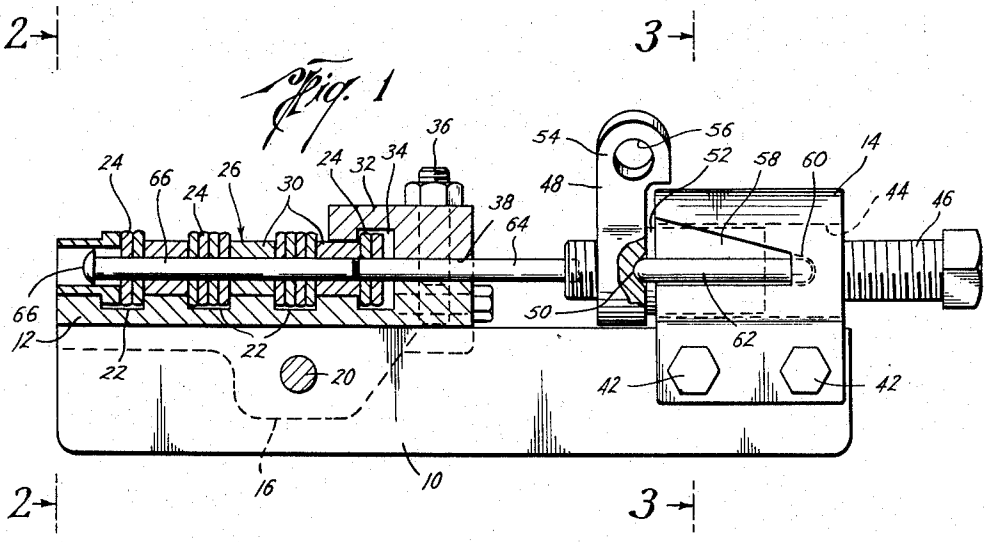


Fig. 2

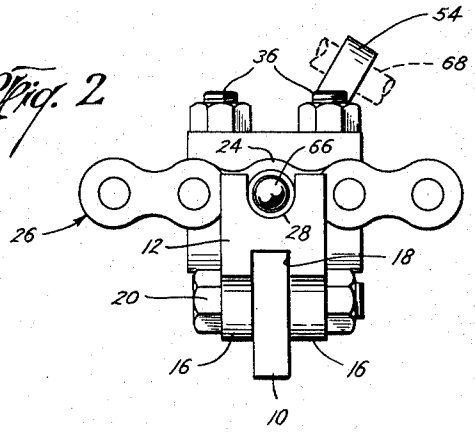
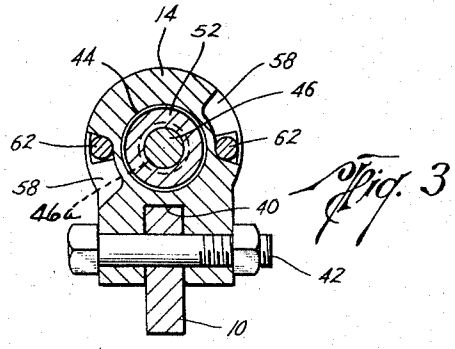


Fig. 3



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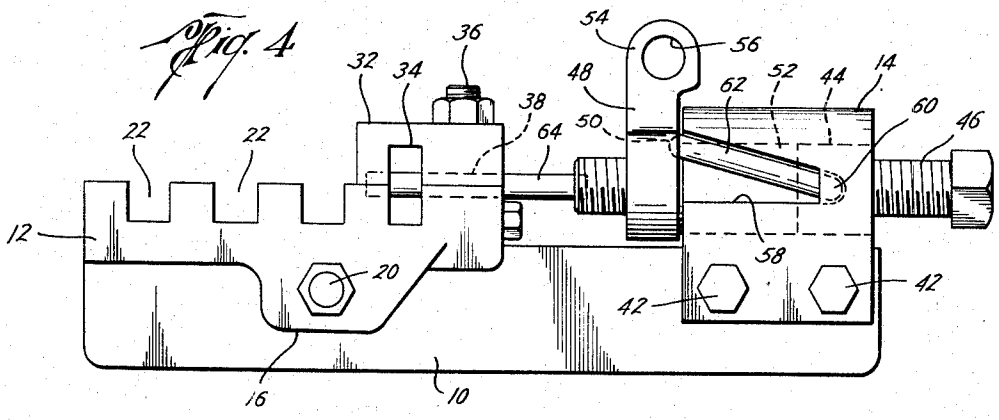
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Fig. 4



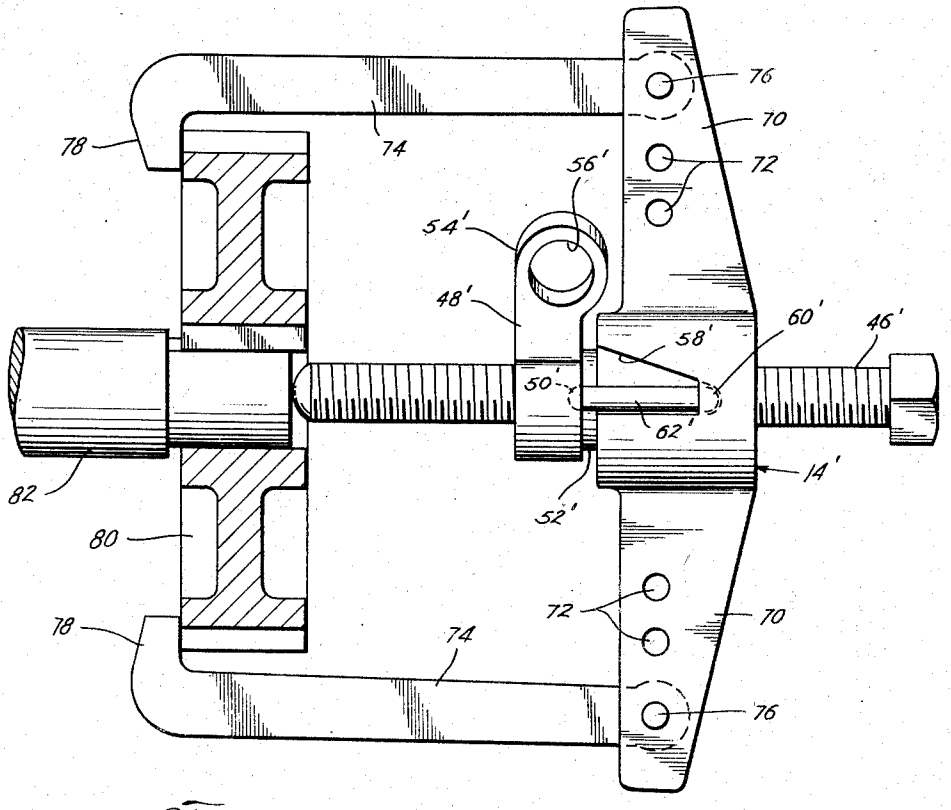


Fig. 5

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LEVER ACTUATED TOGGLE DEVICE FOR DISASSEMBLING MACHINE ELEMENTS

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Application December 1, 1953, Serial No. 395,335

2 Claims. (Cl. 59—7)

This invention relates to a device for disassembling machine elements and more particularly to mechanism by which great pulling or pushing force can be applied for use in the disconnection and removal of parts of machines which are to be disassembled.

While not limited to such use, the invention finds particular application in connection with apparatus for use in the removal of pivot pins from link chains and in the pulling of gears.

An important object of the invention is the provision of means for augmenting the mechanical advantage obtainable in apparatus of the kind referred to, whereby the force which may be applied to start stuck machine elements may be greatly increased.

Another object of the invention is to provide means by which great starting force may be applied to stuck machine elements, and which is operable upon the starting of such elements to enable the force to be rapidly applied in successive stages to effect complete release and the removal of the elements.

A further object of the invention is the provision of apparatus of the type mentioned, which includes lever operated mechanism by which great force may be exerted on machine elements which are to be separated, and means which is operable to follow up the movement of the elements whereby the application of the force thereto may be continued to complete the separation of the elements.

A still further object of the invention is to provide force applying mechanism of the kind referred to which is of simple design and rugged construction, capable of delivering the force required and withstanding the conditions of rough handling and hard usage to which such equipment is likely to be subjected.

The invention will best be understood from the following detailed description, constituting a specification of the same, when considered in conjunction with the annexed drawings, wherein—

Figure 1 is a side elevational view, partly broken away and partly a cross-section illustrating a preferred embodiment of the invention and the manner in which the same may be used in removing a pivot pin from link chain mechanism;

Figure 2 is an end elevational view of the invention, looking at the left hand end of the same as illustrated in Figure 1;

Figure 3 is a cross-sectional view taken along the line 3—3 of Figure 1, looking in the direction indicated by the arrows;

Figure 4 is a side elevational view of the invention as illustrated in Figure 1, showing the relationship of the parts at a different stage of the operation of the device; and

Figure 5 is a top plan view illustrating a somewhat different form of the invention used as a gear puller.

Referring now to the drawings in greater detail, wherein like numerals of reference are used to designate similar parts throughout the several views, the invention as

illustrated in Figures 1 to 4 includes a tension bar **10**, upon which a clamping head **12** and a power head **14** are mounted in longitudinally spaced relation. The clamping head **12** may be formed with laterally-spaced, downwardly-extending flanges **16**, and may have a downwardly-opening, longitudinal groove **18** extending from end to end thereof and which fits over the upper edge of the tension bar **10**. The flanges **16** are suitably perforated for the reception of a bolt **20**, or other suitable fastening means, which extends through the flanges and through a suitable opening in the tension bar, whereby the clamping head is securely attached to the bar. In its upper surface the clamping head is provided with longitudinally-spaced, laterally-extending notches **22**, for the reception of the links **24** of a link chain **26**, and the clamping head may also have a longitudinal groove **28** in its upper surface, for the reception of rollers **30** of the link chain mechanism, by which the links **24** are retained in properly spaced relation. At one end of the clamping head a clamping element **32** is located, which if formed with a downwardly opening groove **34** into which one of the links **24** of the chain **26** fits, and this clamp element is secured to the clamping head by means of suitable bolts **36**, whereby the chain mechanism is securely clamped to the clamping head. The clamping head and clamp element are provided with complementary grooves forming a longitudinally-extending passageway, indicated at **38**, for a purpose later to be made apparent.

The power head **14** is of generally block-like configuration, having a longitudinally-extending, downwardly-opening groove **40**, which fits over the upper edge of the tension bar **10**, and the power head is provided with suitable perforations for the reception of fastening means, such as the bolts **42**, which pass through suitable opening in the tension bar, and by which the power head is securely anchored to the bar. The power head has a longitudinally disposed bore **44**, extending therethrough, through which an adjusting screw **46** extends, upon which screw an oscillating member **48** is threadably mounted, the threads being indicated by dotted lines at **46a**, Fig. 3. Thus, the hub portion of member **48** is in the nature of a nut threaded on screw **46**.

The oscillating member **48** is preferably formed with diametrically opposed end bearing indentations **50**, and has a cylindrical extension **52**, which is slidably fitted in the bore **44**. A radially extending lug is also provided on the member **48**, which may have a suitable opening **56** therethrough, for the reception of an operating lever, by which the member may be rotated with the screw **46** in the bore **44**.

The power head **14** has longitudinally extending external recesses **58**, which terminate in rounded bearing portions **60**, and in which pivot pins **62** are located, which bear at one end on the bearing portions **60**, and at their other ends in the indentations **50** of the member **48**. These pins **62** are preferably elongated, and the recesses **58** are of such configuration that the pins may perform a rocking movement in the recesses upon rotative movement of the member **48** with the screw **46** relative to the power head.

A push pin **64** is provided, one end of which is engageable with the inner end of the screw **46**, and which extends into the passageway **38** of the clamping head for engagement with the end of a chain pin **66** of the link chain mechanism.

In making use of the invention, constructed as described above, the link chain mechanism is positioned as indicated in Figure 1, with the links **24** thereof extending into the grooves **22** of the clamping head, and the clamping element **32** is secured in place to securely hold the chain mechanism in position in the clamping head with the chain pin **66** in axial alignment with the passage-

way 38. The push pin 64 is then positioned in the passageway 38 in endwise engagement with the end of the chain pin 66 and also in endwise engagement with the screw 46. The member 48 is then moved to the position indicated in Figure 4, and the screw 46 is tightened against the push pin 64. By inserting a suitable lever, such as that indicated at 68, in Figure 2, through the opening 56 in the lug 54 of the member 48, the member may then be rotated on the screw in the bore 44 in a direction to move the pins 62 from the position indicated in Figure 4 to that illustrated in Figure 1, whereby the member 48 will be forced away from the power head toward the clamping head, carrying with it the screw 46, and applying an endwise force to the chain pin 66 through the push pin 64 to start the chain pin out of the links, without the screw 46 rotating in the thread of the oscillating member 48, thus eliminating wear on the screw. The member 48 may then be rotated in the opposite direction to return the pins 62 from the position of Figure 1 to that illustrated in Figure 4, whereupon the screw 46 may be rotated to tighten the push pin 64 against the end of the chain pin 66, and by again rotating the member 48 in a direction to move the pins 62 from the position of Figure 4 to that illustrated in Figure 1, pressure may again be applied to the chain pin to further move the chain pin out of the links. By repeating the above described operation, it will be apparent that the chain pin 66 may be moved by successive stages to completely release the pin from the links, whereby the links may be disconnected.

A somewhat different form of the invention is illustrated in Figure 5, wherein the device is adapted for use as a gear puller. In this form of the invention a power head 14' may be employed, which is formed with oppositely extending arms 70, provided with spaced perforations 72. A link 74 is pivotally secured to each of the arms 70, by suitable means such as pins 76, which extends through one of the perforations 72 and through a suitable opening adjacent the end of the link. The links are formed with hook-shaped portions 78 at their outer ends, which may be hooked over a gear 80, which is to be removed from a shaft 82.

In this form of the invention a screw 46' similar to the screw 46, previously described, is employed, and the construction and arrangement of the parts of the power head and oscillating member are substantially the same as those previously described, the tension bar 10 and clamping head of the previously described form of the invention being omitted.

In making use of the form of the invention illustrated in Figure 5 the links 74 are moved into engagement with the gear 80, in the manner illustrated, and the screw 46' is moved into endwise engagement with the shaft 82. The member 48' may then be rotated to a position corresponding to that illustrated in Figure 4, and the screw 46' again tightened in engagement with the shaft 82. By suitably rotating the member 48' to bring the pins 62' into the position indicated in Figure 5, an endwise pressure may be exerted through the screw 46' on the shaft 82, while at the same time a pull is exerted on the gear in the opposite direction through the links 74. By successive rotative movements of the member 48' in opposite directions and tightening of the screw 46' between such movements, it will be apparent that great force may be exerted on the shaft 82 and on the gear 80, whereby the gear may be separated from the shaft.

As the oscillating member moves from the position of Figure 4 to the position of Figure 1, the pins 62 rock from a position at an angle to the axis of the power head to a position parallel position of Figure 1 the force on the oscillating member increases without a corresponding increase in the force applied to the lever.

It will thus be seen that the invention, constructed and operated in the manner described above, provides a device by which great force may be applied to machine elements which are to be separated, whereby such elements may be effectively started when stuck, and may be moved by successive stages to completely release the parts.

While the invention has been disclosed herein in connection with certain specific embodiments of the same it will be understood that this is intended by way of illustration only, and that numerous changes can be made in the construction and arrangement of the various parts, without departing from the spirit of the invention or the scope of the appended claims.

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

1. In an apparatus for removing parts from a machine assembly, the combination of a head member; machine assembly engaging means spaced from said head member; rigid means connecting said machine assembly engaging means to said head member, said head member having a bore therethrough extending toward said machine assembly engaging means; a screw extending freely through said bore; lever means including a portion threadably mounted on said screw and disposed closely adjacent to said head member on the side thereof facing said machine assembly engaging means; said head member being provided with a pair of elongated recesses spaced on opposite sides of said bore, extending generally parallel to said bore and opening toward said lever means, said recesses each terminating in a bearing socket at the end thereof opposite said lever means; said lever means being provided with a pair of bearing sockets spaced on opposite sides of said screw and facing toward said head member, said last-mentioned bearing sockets being so disposed on said lever means as to be capable of being brought simultaneously into substantial alignment with the respective ones of the bearing sockets of said recesses; and a pair of rigid, force-transmitting pins each having one end disposed in one of the bearing sockets on said lever means and the other end disposed in the bearing socket of the corresponding one of said elongated recesses, the predominant portion of the length of each of said pins being disposed in the corresponding one of said elongated recesses, relative rotary movement between said lever means and head member about the axis of said screw being effective to shift said pins between an angular position relative to said axis and a position approximately parallel to said axis, such movement in a direction to shift said pins from said angular position to said approximately parallel position effecting linear movement of said lever means and screw in the direction of said axis toward said machine assembly engaging means, the apparatus including means for applying such movement to a part of the machine assembly engaged by said machine assembly engaging means; said elongated recesses each being provided with divergent wall portions, one such wall portion of each recess extending at an angle to said axis and being disposed to stop the corresponding one of said pins in said angular position, the other wall portion of each recess extending approximately parallel to the axis of said screw and being effective to stop the corresponding one of said pins in said position approximately parallel to said axis, rotation of said screw and lever means relative to said head member in one direction being effective to bring said pins respectively into engagement with the angularly extending ones of said recess wall portions whereby said lever means is held stationary as said screw is further rotated in said one direction, such rotation of the screw being effective to travel the screw toward said machine assembly engaging means when said lever means is held stationary.

2. In an apparatus for removing link pins from a roller chain, the combination of a base; a head member mounted on said base and having a bore therethrough; work holding means mounted on said base and constructed to hold the roller chain to be operated on with

the link pins thereof extending toward said head member, said head member being provided with a bore extending toward said work holding means; a screw extending freely through said bore; lever means including a portion threadably mounted on said screw and disposed closely adjacent to said head member on the side thereof facing said work holding means; said head member being provided with a pair of elongated recesses spaced on opposite sides of said bore, extending generally parallel to said bore and opening toward said lever means, said recesses each terminating in a bearing socket at the end thereof opposite said lever means; said lever means being provided with a pair of bearing sockets spaced on opposite sides of said screw and facing toward said head member, said last-mentioned bearing sockets being so disposed on said lever means as to be capable of being brought simultaneously into substantial alignment with the respective ones of the bearing sockets of said elongated recesses; a pair of rigid, force-transmitting pins each having one end disposed in one of the bearing sockets on said lever means and the other end disposed in the bearing socket of the corresponding one of said elongated recesses, the predominant proportion of the length of each of said pins being disposed in the corresponding one of said elongated recesses, relative rotary movement between said lever means and said head member about the axis of said screw being effective to shift said pins between an angular position relative to said axis and a position approximately parallel to said axis, such movement in a direction to shift said pins from said angular position to said approximately parallel position effecting linear movement of said lever means and screw in the direction of said axis toward said

work holding means; and rigid means engaging said screw and extending toward said work holding means for transmitting such linear movement to a link pin to be removed; said elongated recesses each being provided with divergent wall portions, one such wall portion of each recess extending at an angle to said axis and being disposed to stop the corresponding one of said pins in said angular position, the other wall portion of each recess extending approximately parallel to the axis of said screw and being effective to stop the corresponding one of said pins in said position approximately parallel to said axis, rotation of said screw and lever means relative to said head member in one direction being effective to bring said pins respectively into engagement with the angularly extending ones of said recess wall portions whereby said lever means is held stationary as said screw is further rotated in said one direction, such rotation of the screw being effective to travel the screw toward said work holding means when said lever means is held stationary.

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