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LEVER ASSEMBLAGE

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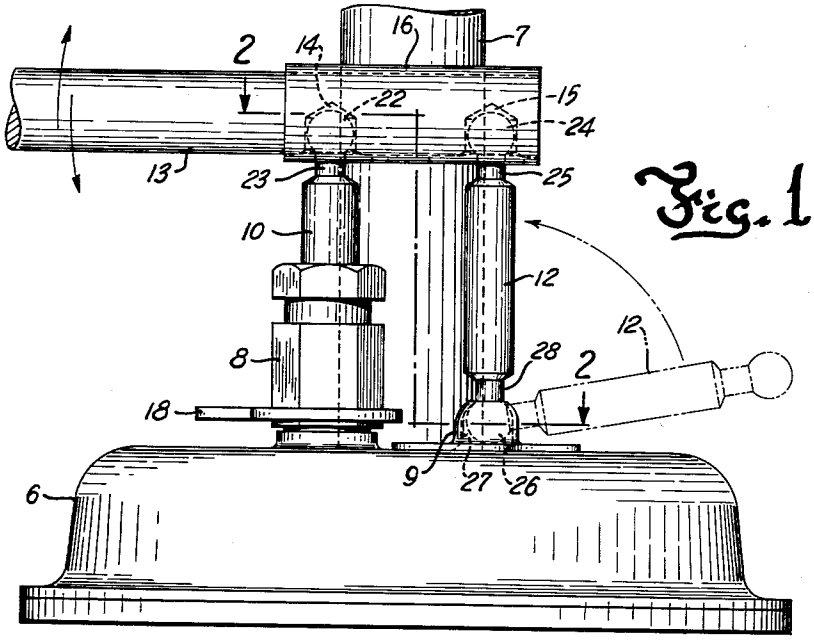


Fig. 1.

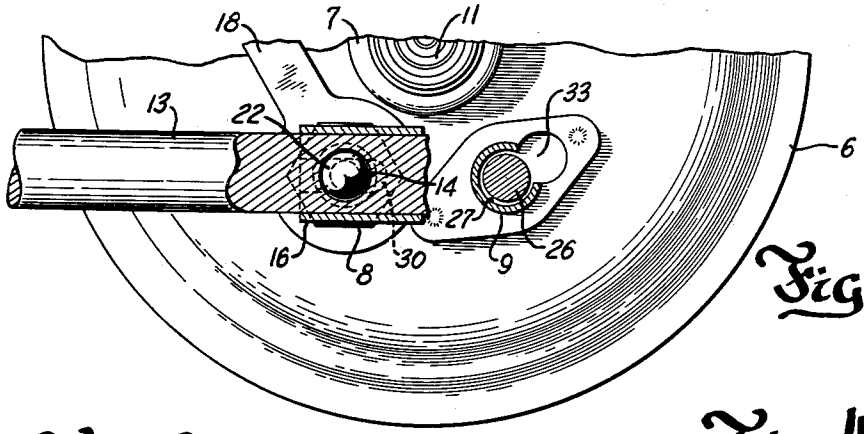


Fig. 2.

Fig. 3.

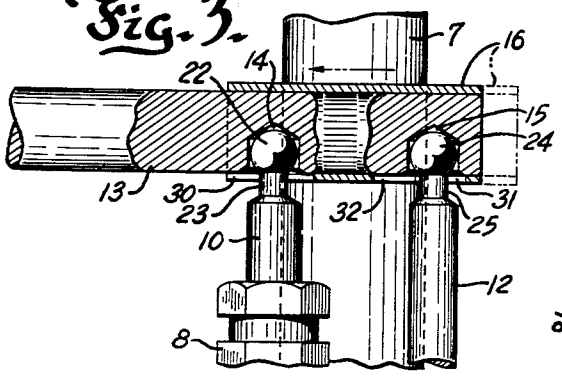
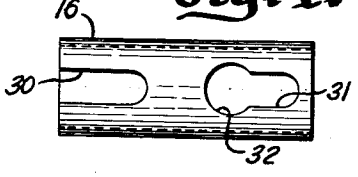


Fig. 4.



INVENTOR.

Neil F. Atherton

BY

Lieber, Lieber & Nilles

Attorneys

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LEVER ASSEMBLAGE

Neil F. Atherton, Bayside, Wis., assignor to Applied Power Industries, Inc., a corporation of Wisconsin

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This invention relates generally to improvements in lever assemblages, and it relates more specifically to improvements in the construction of levers of the type wherein the load is movable along a normally fixed axis but the fulcrum is swingable relative to such fixed axis.

The primary object of the present invention is to provide an improved lever assemblage which is simple but durable in construction, and which is especially advantageously applicable to levers of the type wherein the load actuating or work performing element is normally movable along a fixed axis while the lever fulcrum is movable laterally of said axis.

An important but more specific object of this invention is to provide a lever assemblage wherein the lever fulcrum and the load actuating element are both pivotally confined and effectively maintained within sockets formed in the lever by means of a common assembly sleeve.

Another important object of the invention is to provide an improved structure for imparting oscillatory movement of a lever to a load carrying element which is normally confined to movement along a fixed axis, without subjecting the loaded element to undesirable lateral pressure.

Still another important object of the present invention is to provide an improved lever fulcrum link which is swingable to permit slight longitudinal displacement and lateral oscillation of a lever which coacts with a load confined to rectilinear reciprocation.

An additional important object of this invention is to provide an improved lever assemblage which is flexible in its adaptations, and which comprises few sturdy parts adapted to be readily constructed and assembled.

These and other more specific objects and advantages of the invention will be apparent from the following detailed description.

A clear conception of the features constituting the present improvement, and of the construction and functioning of a lever assemblage embodying the invention, may be had by referring to the drawing accompanying and forming a part of this application wherein like reference characters designate the same or similar parts in the various views.

FIG. 1 is a side elevation of one of the improved lever assemblages showing the same applied to a pump adapted to actuate a hydraulic jack, a portion of the lever handle and of the jack having been broken away;

FIG. 2 is a sectional view of the assemblage shown in FIG. 1, taken along the irregular line 2—2;

FIG. 3 is a fragmentary part sectional side elevation of the same lever assemblage, with a central longitudinal vertical section taken through the fulcrum and load engaging end of the lever and through the improved assembly sleeve; and

FIG. 4 is a bottom view of the assembly sleeve alone.

While the invention has been shown and described herein as having been embodied in a lever assemblage of the second class and which is advantageously applicable to a hydraulic jack as illustrated, it is not intended to confine the improvement to a lever of the second class or to usage in such a jack; and it is also contemplated that specific descriptive terms employed herein be given the broadest possible interpretation consistent with the disclosure.

Referring to the drawing, the hydraulic jack and actuating lever assembly shown therein, comprises in general

a base 6 having a ram cylinder 7 and a pump cylinder 8 and a socket fitting 9 mounted thereon; a piston having a rod 10 reciprocable along a normally fixed axis within the cylinder 8 to actuate a load lifting plunger 11 reciprocable within the ram cylinder 7; a fulcrum link 12 having its lower end pivotally associated with the socket fitting 9; a lever 13 having therein a pair of spaced sockets 14, 15 pivotally associated respectively with the upper ends of the piston rod 10 and fulcrum link 12; and an assembly sleeve 16 coacting with the lever 13 to hold the upper rod and link ends within the sockets 14, 15.

The base 6 is provided with an internal reservoir containing liquid such as oil from which the pump piston actuated by the rod 10 is adapted to deliver liquid under pressure into the ram cylinder 7 to lift a load coacting with the plunger 11 and the pump cylinder 8 is provided with a control member 18 which is swingable about the pump axis to either connect the pump and ram displacement chambers in order to effect such load lifting, or to place the ram displacement chamber in open communication with the liquid supply reservoir so as to lower the load. This hydraulic jack mechanism including the passageways, porting and valving, is shown and described in my copending application Serial No. 676,220, now Patent No. 2,935,851, and constitutes no part of the present invention. It is important, however, that the work performing rod 10 be movable along a fixed axis and that the fulcrum link 12 be swingable toward and away from this axis whenever the lever 13 is oscillated to actuate the pump in order to protect the pump piston packing against lateral pressure and resultant excessive wear, and the present invention is concerned with improved linkage for actuating the pump plunger or a similar work performing element.

The rod 10 may therefore be any type of work performing element which is necessarily confined to movement along a fixed axis, and the upper end of this rod 10 is provided with a pivot ball 22 adapted to be rather snugly confined within the lever socket 14 and which is firmly united with the rod body by a reduced neck 23. The upper end of the fulcrum link 12 is likewise provided with a pivot ball 24 adapted to be rather snugly confined within the other lever socket 15 and which is firmly united with the body of the link by a similar neck 25. The lower end of the fulcrum link 12 is also provided with a pivot ball 26 adapted to be likewise confined within a socket 27 in the fitting 9, and which is firmly united with the link body by a reduced neck 28. While the balls 22, 24, 26 have been shown as substantially complete spheres, this is not essential since the sockets 14, 15 may be formed by drilling with a tapered drill point and it is only desirable to provide spherical zone surfaces at the rod and link ends of sufficient area so they will engage these sockets along annular contact lines, as illustrated in FIG. 3.

The pump actuating lever 13 has a manipulating handle at its swinging end, and has circular transverse cross-section adjacent to the sockets 14, 15 formed therein. The sheet metal assembly sleeve 16 is adapted to snugly engage the socketed end portion of the lever 13, and is provided with one slot 30 which is open toward the adjacent sleeve end and has a width slightly greater than that of the rod neck 23 but less than the diameter of the ball 22, and is also provided with a keyhole slot 31 having closed ends but one end portion of which is of the same width as that of the slot 30 while its opposite end portion 32 is enlarged to permit the ball 24 to pass therethrough, see FIG. 4. The socket fitting 9 which may be firmly attached to the base 6 as by welding and may also be formed of sheet metal, has a cut-out 33 therein of sufficient size to permit the lower ball 26 of the fulcrum link 12 to be inserted therethrough into the

socket 27, thus completing the construction of the various parts of the device.

With the parts formed as above described, and assuming the ram and pump cylinders 7, 8 and the socket fitting 9 to be properly secured to the base 6, the pump actuating lever mechanism may be assembled as follows: The sleeve 16 should be slipped over the fulcrum end of the lever 13 until the enlarged portion 32 of the keyhole slot 31 is in vertical alinement with the lever socket 15 whereupon the opposite end of this sleeve will leave the rod socket 14 downwardly open and unobstructed. With the fulcrum link 12 positioned as shown in dot-and-dash lines in FIG. 1, the lower ball 26 thereof may be freely inserted within the socket 27 of the fitting 9, whereupon this link may be swung into upright position substantially parallel to the fixed axis of the rod 10. The lever 13 with the sleeve 16 initially positioned as above described, may then be lowered to cause the fulcrum ball 24 to enter the socket 15 and to simultaneously cause the rod ball 22 to enter the socket 14, whereupon the sleeve 16 may be pushed inwardly along the fulcrum end of the lever 13 until the extreme adjacent ends of the sleeve and lever substantially coincide. The sleeve 16 thus positioned may then be spot-welded or otherwise permanently attached to the lever 13 to positively but pivotally retain the balls 22, 24, 26 in their respective sockets 14, 15, 27, and to thereby maintain the link 12 in assembled condition.

After the various parts have been thus assembled, the lever 13 may be oscillated in the common plane of its axis and that of the rod 10 about the ball 22 as a pivot, and the fulcrum end of the lever 13 will react against the ball 24 of the fulcrum link 12 while this link may rock back and forth about the lower ball 26 so as to relieve the pump rod 10 of lateral pressure. Although the lever 13 would normally be oscillated only in the common plane containing the lever axis, the rod axis, and the fulcrum link axis, it might be desirable when applying the lever assemblage to other uses, to also swing the lever laterally of this common plane which the improved assemblage permits, but the primary object of the present invention is to relieve the rod 10 of lateral pressure.

From the foregoing detailed description of the construction, mode of assembling, and operation of the device, it should be apparent that the invention in fact provides an improved lever assemblage which is simple and durable in structure and wherein the parts are positively maintained in effective assembled operating condition. The narrow portion of the slots 30, 31 in the sleeve 16 cooperate with the necks 23, 25 of the rod 10 and link 12 respectively to hold the balls 22, 24 confined within their sockets 14, 15, while the narrowed upper part of the fitting 9 cooperates with the lower neck 28 of the fulcrum link 12 and with the narrow slot portion 31 and link neck 25 to maintain the link 12 in approximately upright assembled condition. The various parts of the assemblage may be readily constructed at moderate cost, and the invention has proven highly satisfactory and successful especially as applied to hydraulic jacks.

Obviously, the improvements may also be utilized in a lever assemblage of the first class with equal effect as when the jack is reversed to an upside-down position for use in a press and it is desired to maintain the handle actuating effort in the same direction. In such instances, the lever actuating mechanism is assembled by first reversing the lever 13 and positioning the sleeve 16 with

the enlarged portion 32 of slot 31 in alinement with the socket 14 thus leaving the socket 15 open. The ball 22 is then placed in the socket 15 and the ball 24 in the socket 14, and the balls 22, 24 will then be captured and retained in place within the respective sockets upon movement of the sleeve axially of the lever rod or handle 13 until the extreme ends of the sleeve and lever coincide with the sleeve being secured in place in a suitable manner.

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

I claim:

1. A lever assemblage for use with a pump of the reciprocating piston type comprising, a lever having a manipulating handle and a fulcrum socket remote from the handle and also having a second socket located between the handle and the fulcrum socket, a load actuating rod having a spherical end pivotally cooperable with said second socket and being reciprocable by said lever to actuate the pump piston along a fixed axis, a link having a spherical end pivotally cooperable with said fulcrum socket and being universally swingable relative to said fixed axis, and a sleeve slidably embracing said lever and having therein an open ended slot coacting with said rod and a keyhole slot coacting with said link to maintain said spherical ends pivotally confined within said sockets when the sleeve is shifted along the lever.

2. A lever assemblage for use with a pump of the reciprocating piston type comprising, a lever having a manipulating handle and a pair of spaced sockets remote from the handle, a load actuating rod having a spherical end pivotally cooperable with one of said sockets and being reciprocable by said lever to actuate the pump piston along a fixed axis, a link having one spherical end pivotally cooperable with the other of said sockets and also having a spherical opposite end, a fitting detachably cooperable with said opposite spherical link end to permit universal swinging of the link, and a sleeve slidably embracing said lever and having therein an open ended slot coacting with said rod and a keyhole slot coacting with said link to maintain said spherical ends pivotally confined within said sockets and to retain said link secured to said fitting when said sleeve is shifted along said lever.

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