

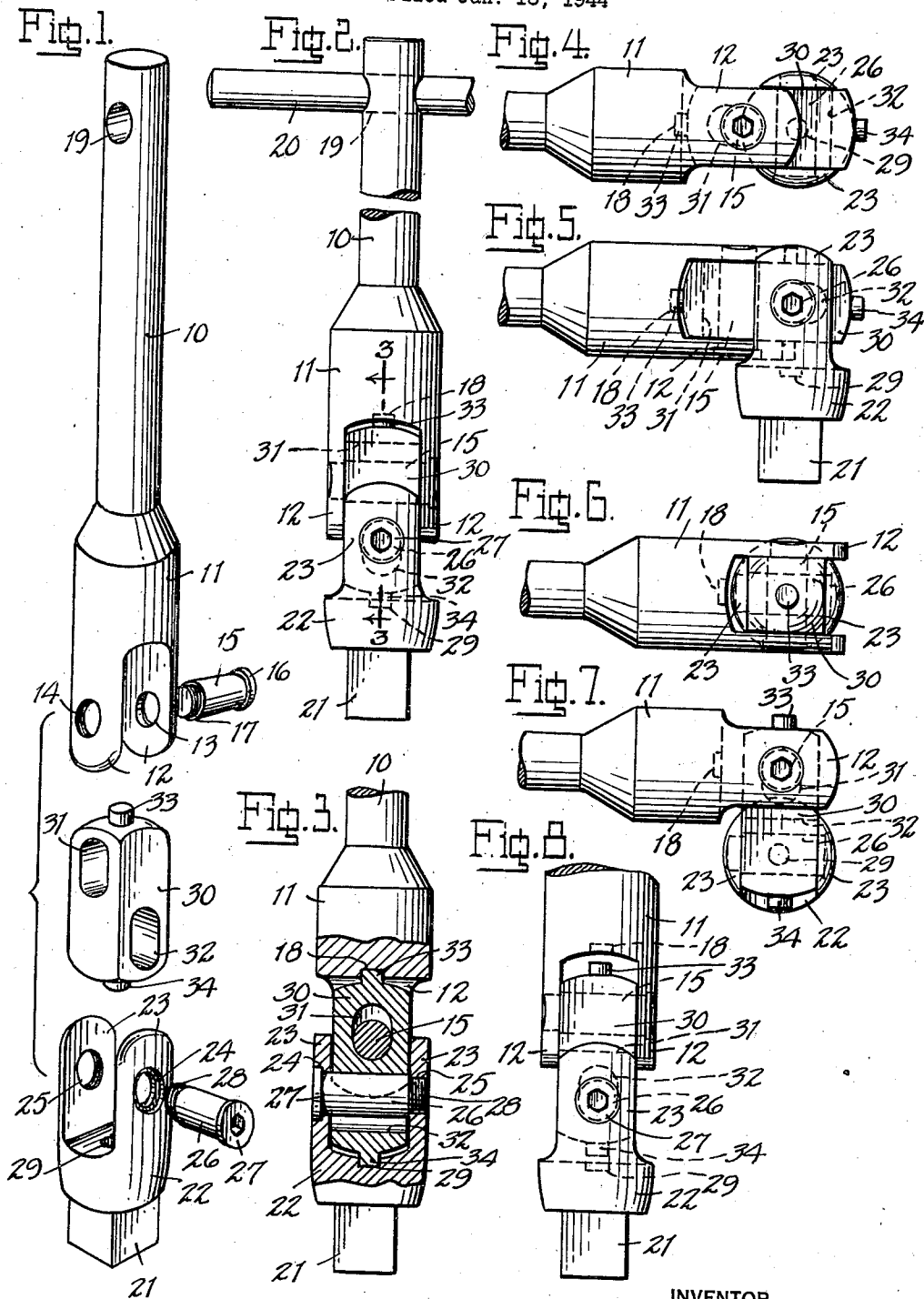
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TOOL

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TOOL

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The present invention relates to a universal socket wrench, and has for an object to provide a wrench structure having a universal joint connection between the handle shaft and the wrench shaft permitting free relative movement between various operative positions, and by means of which a rigid operative connection may be provided between the shafts in various positions of angular adjustment as well as in an axially aligned relation of the shafts.

With certain universal wrenches heretofore in use a hinge or link connection has been provided between the wrench shaft and handle shaft, usually consisting of a block connected to the two shafts by pivot pins arranged at right angles to each other, so that the handle shaft can be turned to any angle with respect to the wrench shaft. However, these structures have the disadvantage that a rigid connection can not be effectually established between the wrench and handle shafts in the various positions of adjustment, and the turning strain is applied entirely to the connecting pins. It is proposed, according to the present invention, to provide a universal joint connection including a block member arranged between the yoke ends of the wrench and handle shafts and connected by pins engaged in elongated slots in the block member, and whereby the pins are adapted to have longitudinal movement in the slots to bring the yoke ends of the handle and wrench shafts into rigid interlocking relation with each other, and wherein the main turning strain is imposed through the rigidly interlocked yoke portions.

The arrangement has the advantage of creating a stabilized effect between the wrench and handle shafts which aids in causing the axis of the wrench shaft to align with the axis of the stud or nut which is being turned.

It is further proposed to provide an interlocking pin and socket connection means between the block member and the yoke portions of the wrench and handle shafts, whereby upon relative longitudinal movement such pin and socket means may be engaged to rigidly connect the block member in axial alignment with the wrench and handle shafts.

Another object is to provide a wrench structure having a universal connection between the wrench and handle shafts permitting the handle shaft to be interlocked with the wrench shaft in any one of four 90° angular positions, thus making it possible to turn the wrench shaft while still maintaining the handle within a single 90° angle.

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It is a further object to provide a universal wrench which will effectually take the place of various other types of known wrenches, each designed for a particular purpose, such for instance as the universal wrench, the T-wrench, the hinge wrench, and the ratchet wrench. In the case of operations which usually require the workmen to be equipped with these various types of wrenches, the same work can be accomplished with the single wrench of the invention.

With the above and other objects in view, an embodiment of the invention is shown in the accompanying drawings, and this embodiment will be hereinafter more fully described with reference thereto, and the invention will be finally pointed out in the claims.

In the drawings:

Fig. 1 is a perspective view showing the several parts of the universal wrench in axially separated relation.

Fig. 2 is a side elevation showing the wrench with the several parts interlocked in axially aligned relation for use as a T-wrench, a horizontal turning rod being shown engaged in the end of the handle shaft.

Fig. 3 is a vertical sectional view, taken along the line 3—3 of Fig. 2.

Fig. 4 is a top plan view of the wrench showing the handle shaft in a one horizontally turned rigidly connected operative position.

Fig. 5 is a side elevation thereof.

Fig. 6 is a top plan view of the wrench showing the handle shaft in another horizontally turned rigidly connected operative position.

Fig. 7 is a top plan view showing the wrench with the handle shaft swung to an offset horizontally arranged operative position.

Fig. 8 is a side elevation showing the parts in axially extended relation, and wherein a freely turning universal joint connection is provided between the handle and wrench shafts.

Similar reference characters indicate corresponding parts throughout the several figures of the drawings.

Referring to the drawings, the universal socket wrench, according to the illustrated exemplary embodiment of the invention shown therein, comprises a handle shaft 10 provided at its lower end with an enlargement 11 having a lower yoke section consisting of a pair of spaced and opposed leg portions 12—12. Transversely aligned holes 13 and 14 are provided in the respective leg portions, the hole 13 being shouldered, while the hole 14 is threaded to removably receive a cross pin 15, having a head 16 at one end to en-

gage the shouldered hole 13, and a reduced threaded portion 17 at its other end to engage the threaded hole 14. In the transverse top of the yoke section there is provided a pocket 18 in axial alignment with the axis of the handle shaft 10. The upper end of the handle shaft is provided with a transverse hole 19 to receive a turning rod 20, as shown in Fig. 2, this rod being usually inserted when the wrench is adapted for operation as a T-wrench, as will presently more fully appear.

The wrench shaft comprises a work-engaging lower square part 21 extending axially downwardly from an enlargement 22 provided with an upper yoke section comprising a pair of spaced and opposed leg portions 23—23, the spacing of these leg portions substantially corresponding to the width of the leg portions of the handle shaft to permit interlocking engagement of one yoke section with the other. This yoke section of the wrench shaft is substantially identical with the yoke section of the handle shaft, being provided in the respective leg portions with a shouldered hole 24 and a threaded hole 25 for receiving a cross pin 26 having a shouldered head end 27 and a reduced threaded end 28. In the transverse base of the yoke section there is provided a socket 29 in axial alignment with the square part 21. The work-engaging square part 21 is adapted for engagement with the socket end of a bolt or the like for the purpose of turning the latter and it will be obvious that it may be of hexagonal or other suitable shape, and also that in its place the end of the wrench shaft may have a socket formation of suitable shape to receive the head of a bolt or the like. As the wrench shaft is detachable with respect to the other parts of the wrench a number of wrench shafts for engaging different types and sizes of bolts may be provided to be interchangeably connected to the wrench.

The joint member for connecting the handle and the wrench shafts comprises an elongated block member 30 of square cross section provided in its upper half with an elongated transversely extending slot 31 through which the cross pin 15 of the handle shaft is engaged, and in its lower half with an elongated transversely extending slot 32, extending at right angles to the slot 31, and through which the cross pin 26 of the wrench shaft is engaged. These slots correspond in width to the diameters of the cross pins, and are of such length as to permit limited movement of the block member with respect to the cross pins. At its upper and lower ends the block member is provided with pin formations 33 and 34 adapted to respectively engage within the sockets 18 and 29 of the handle and wrench shafts, as shown in Figs. 2 and 3, the length of the block member being such that in the engaged relation of the pin formations in the two sockets the cross pins 15 and 26 are engaged in the adjacent ends of the slots 31 and 32. In this relation the handle shaft is rigidly connected to the wrench shaft in axial alignment therewith and consequently may be operated in a similar manner to a T-wrench.

By disengaging the pin formation 34 from the socket 29 of the wrench shaft, through longitudinal movement of the block member, the handle shaft may be hingedly moved with respect to the wrench shaft, the block member moving with the handle shaft. By disengaging the upper pin formation 33 from the socket 18 of the handle shaft, the handle shaft may be hingedly moved

with respect to the rigidly connected block member and wrench shaft. By disengaging the pin formations of the block member from the sockets of both the handle and wrench shafts, and in which relation the cross pins 15 and 26 engage the outer ends of the slots 31 and 32, a universal link connection is provided between the handle and wrench shafts, permitting the operation of the wrench in the manner of a link type universal wrench, this arrangement being shown in Fig. 8.

The sliding connection of the block member with the handle and wrench shafts permits the rigid interlocking of the handle and wrench shafts in an angular position of the handle shaft, the yoke section of one shaft being engaged within the yoke section of the other. Consequently turning strain is imposed mainly upon the yoke sections with a minimum of direct strain upon the connecting cross pins. The arrangement also permits the handle shaft to be swung back to a given angular position following each quarter turn of the wrench shaft in either direction, so that the wrench may be operated within a confined space in the manner of a ratchet wrench.

Figs. 4 and 5 illustrate the positions of the handle and wrench shafts with the block member rigidly connected to the handle shaft and with the yoke portion of the handle shaft engaged within the yoke portion of the wrench shaft. Fig. 6 shows the wrench shaft turned 90° from the position as shown in Fig. 4, and with the handle shaft in the same relative angular position, the block member being rigidly connected in axially aligned relation with the wrench shaft and the yoke end of the wrench shaft being engaged within the yoke end of the handle shaft.

In Fig. 7 the wrench is illustrated in another position of adjustment wherein the block member is turned at a right angle to the axis of the wrench shaft and the handle shaft is turned into angular relation with respect to the block member, so that the turning axis of the handle shaft is offset from the turning axis of the wrench shaft. Upon applying turning pressure to the handle shaft the side of the yoke section of the handle shaft is brought against the side of the yoke section of the wrench shaft and turning movement is applied to the wrench shaft through the horizontal link connection provided by the block member.

The form of the invention illustrated in the drawings and described herein is typical and illustrative only, and it is evident that the invention is capable of embodiments in other forms, all falling within the scope of the appended claims.

What is claimed is:

1. A universal wrench comprising a handle shaft having a yoke end, a wrench shaft having a yoke end, a connecting block member engaged in said yoke ends, a pivot pin pivotally connecting one of said yoke ends to said block member, a pivot pin disposed at a right angle to said first pivot pin and connecting said other yoke end to said block member in longitudinally spaced relation to said first pivot pin, said block member having a pair of longitudinally spaced longitudinally extending slots disposed at right angles to each other respectively engaged by said pivot pins and permitting relative rectilinear movement of said block member with respect to the pivotal axes of said pivot pins, said yoke ends being adapted to be interchangeably engaged

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with each other, the sides of the handle yoke within the wrench yoke or the sides of the wrench yoke within the handle yoke, through relative rectilinear movement of said pins in said slots and relative angular movement of one of said shaft members with respect to the other.

2. A universal wrench comprising a handle shaft, a wrench shaft, means for rigidly connecting said handle shaft and wrench shaft in any one of a plurality of relative angular positions comprising a yoke associated with each of said shafts, a pivot associated with each yoke, and a connecting block including a pair of elongated slot-like pivot apertures disposed at right angles to each other adapted to receive the pivots of said yokes respectively, the sides of each of said yokes being adapted to be embraced by the other yoke in a plurality of interchangeable motion transmitting connections.

3. A universal wrench comprising a handle shaft, a wrench shaft, means for rigidly connecting said handle shaft and wrench shaft in any one of a plurality of relative angular positions comprising a yoke associated with each of said shafts, a pivot associated with each yoke, and a connecting block including a pair of elongated slot-like pivot apertures disposed at right angles to each other adapted to receive the pivots of said yokes respectively, the parts being movable on said pivots to one position in which the handle yoke embraces the sides of the wrench yoke in a motion transmitting connection, and to a second position in which the sides of the handle yoke are embraced in the wrench yoke in a motion transmitting connection.

4. A universal wrench comprising a handle shaft, a wrench shaft, means for rigidly connecting said handle shaft and wrench shaft in any one of a plurality of relative angular positions comprising a yoke associated with each of said shafts, a pivot associated with each yoke, and a connecting block including a pair of elongated slot-like pivot apertures disposed at right angles to each other adapted to receive the pivots of said yokes respectively, the parts being movable on said pivots to one position in which the

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handle yoke embraces the sides of the wrench yoke in a motion transmitting connection, and to a second position in which the sides of the handle yoke are embraced in the wrench yoke in a motion transmitting connection, and to a third position in which aligned margins of the sides of the handle yoke engage the margin of one side of the wrench yoke.

5. A universal wrench comprising a wrench shaft terminating in a yoke, a handle shaft terminating in a yoke, a pivot associated with each of said yokes, and a connecting block embraced by said yokes and including a pair of elongated slot-like apertures disposed at right angles to each other receiving said pivots with capacity for relative pivotal and rectilinear movement thereof, the arms of each yoke being of such width in a direction normal to the pivot associated therewith as to be capable of being embraced by the arms of the other yoke and the length of the arms of each yoke extending beyond the pivot and the length of the slots giving capacity for rectilinear movement of the pivots sufficient to permit the embrace of the arms of each yoke to extend over a substantial length of the arms of the other yoke to establish a positive motion transmitting connection.

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