Dec. 16, 1930. A. A. KALO 1,785,125

MULTIPLE WRENCH

Filed July 31, 1929 3 Sheets-Sheet 1

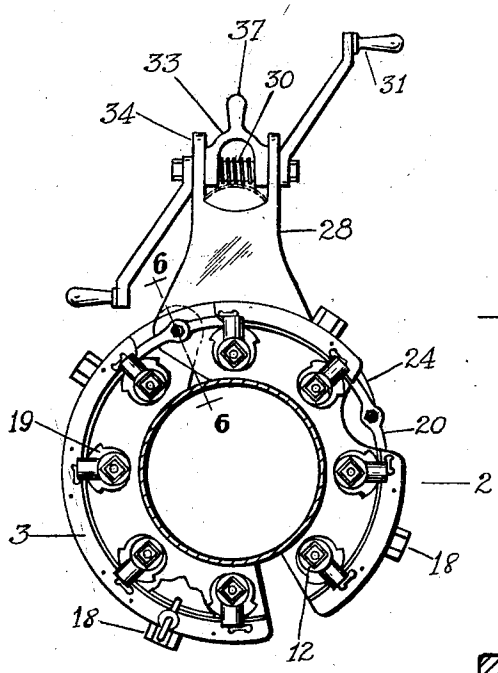


Fig. 2

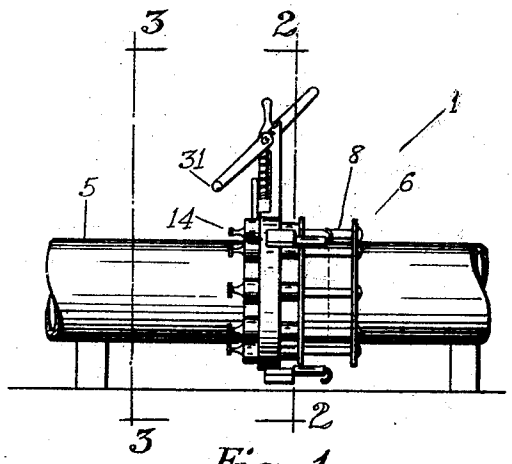


Fig. 1

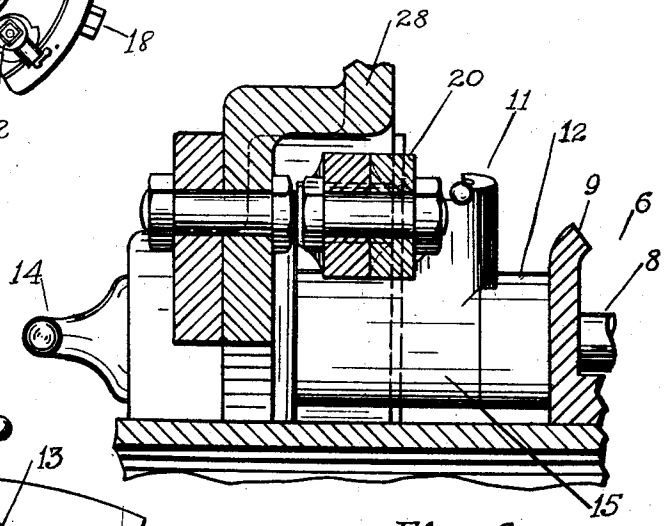


Fig. 6

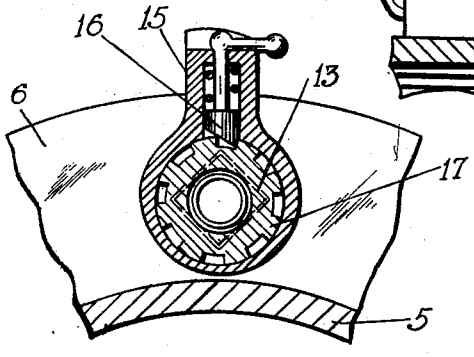


Fig. 7

Inventor

Albert A. Kalo

By W. D. McGowen

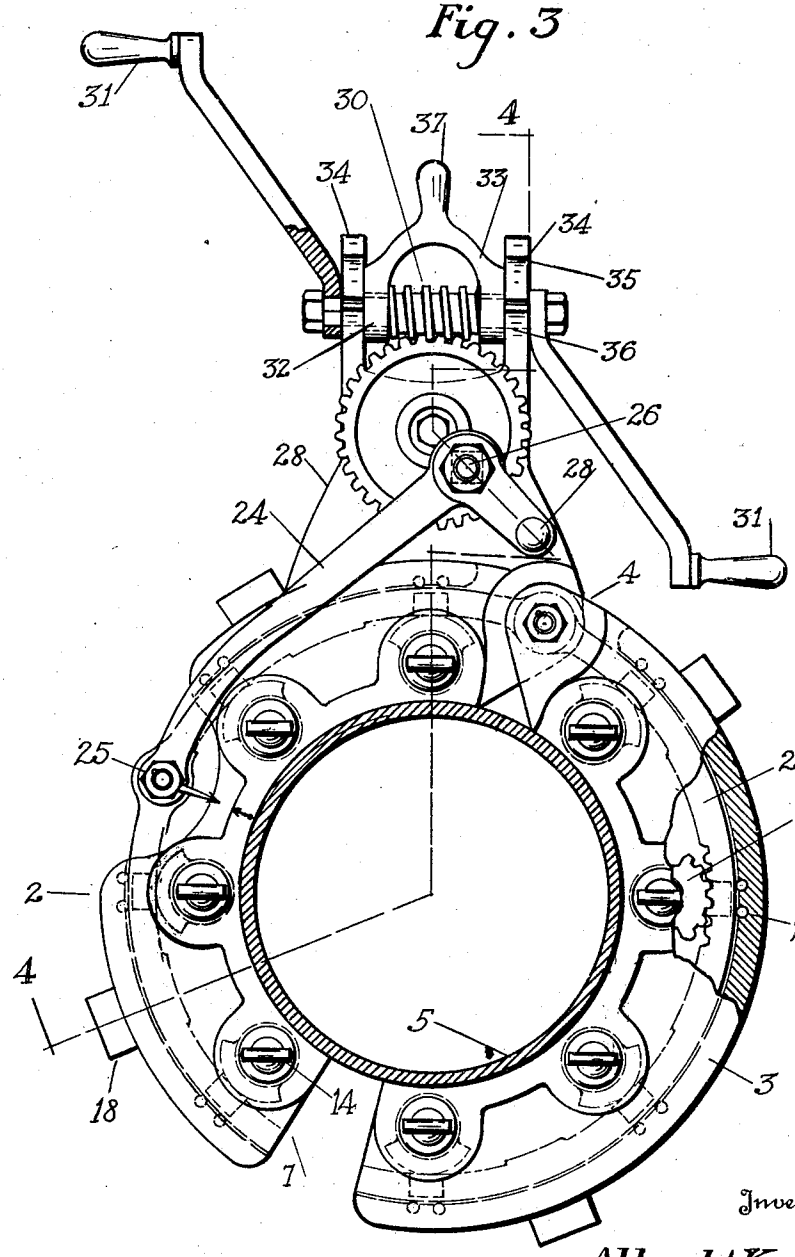
Attorney

Dec. 16, 1930. A. A. KALO 1,785,125

MULTIPLE WRENCH

Filed July 31, 1929 3 Sheets-Sheet 2

Fig. 3



Inventor

Albert A. Kalo

By W. D. McDowell

Attorney

Dec. 16, 1930. A. A. KALO 1,785,125

MULTIPLE WRENCH

Filed July 31, 1929 3 Sheets-Sheet 3

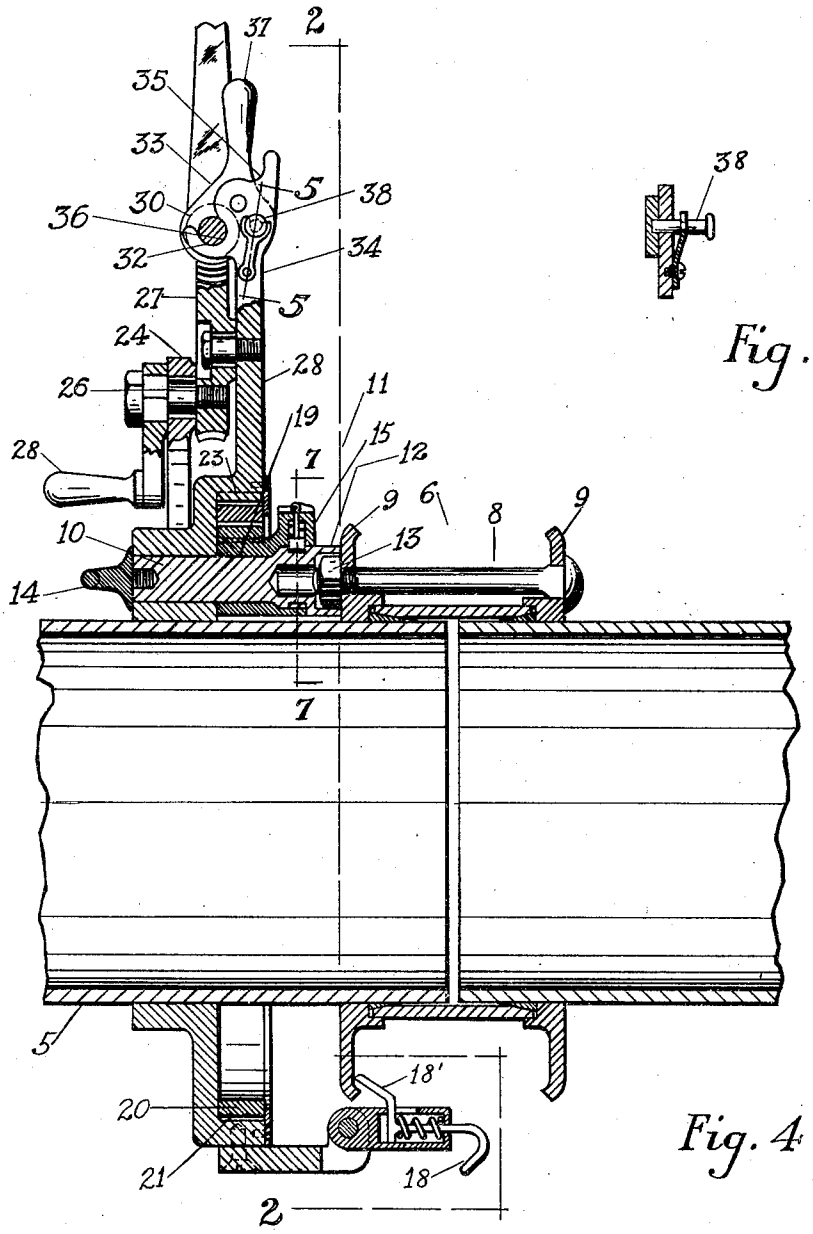


Fig. 4

Fig. 5

Inventor

Albert A. Kalo

By W. S. M. Gowell

Attorney

Patented Dec. 16, 1930 1,785,125

UNITED STATES PATENT OFFICE

ALBERT A. KALO, OF COLUMBUS, OHIO, ASSIGNOR OF ONE-HALF TO C. A. HANNER, OF CANTON, OHIO

MULTIPLE WRENCH

Application filed July 31, 1929. Serial No. 382,403.

This invention relates to an improved multiple wrench particularly applicable for tightening or loosening nuts or bolts which connect the flanges of couplings of adjoining pipe sections, but may also by making a slight alteration therein be employed in other fields as, for instance, upon railways, bridges or machinery wherein series of nuts and bolts may be screwed up or unscrewed simultaneously.

As stated above, the wrench is particularly adaptable for use in connection with tightening nuts on bolts on flanges of pipe connections of the type employed in pipe lines for conveying gas and oil, or other fluids, and wherein the joints between the coupling sections must be tightened evenly in order that the joints therebetween will be fluid tight. In this instance, by means of this wrench all the nuts on the bolts arranged around the flanges may be simultaneously turned drawing the coupling section towards each other in an even manner thus facilitating the connecting of pipes and also effecting economy of time and labor, inasmuch as one man using the improved wrench will be enabled to do the work of several men with ordinary wrenches now in use.

The invention consists in mounting a series of socket wrenches for rotation within a suitable frame structure, which is detachably connected to a pipe adjacent the coupling carried thereby and which wrenches have attached thereto a series of pawls and ratchets, to which are fixed the operating mechanism, whereby all the number of wrenches may be used simultaneously.

The invention further consists in connecting in the operating mechansim for the wrenches, power means consisting of a worm and worm gear or a train of reduction gears by which adequate leverage of the wrenches is secured.

For a further understanding of the invention reference is to be had to the following description taken in connection with the accompanying drawings, wherein:

Figure 1 is a side elevation of a pair of adjoining pipe sections showing the improved wrench in its applied position thereto,

Figure 2 is a transverse vertical sectional view taken on the line 2—2 of Figure 1,

Figure 3 is a similar view taken on the line 3—3 of Figure 1,

Figure 4 is a vertical longitudinal sectional view taken on the line 4—4 of Figure 3,

Figure 5 is a detail sectional view taken on the line 5—5 of Figure 4,

Figure 6 is a detail sectional view taken on the line 6—6 of Figure 2, and

Figure 7 is a sectional view taken through the ratchet and pawl mechanism of one of the wrenches as indicated by the line 7—7 of Figure 4.

Referring more particularly to the drawings, the numeral 1 designates generally my improved wrench in its entirety. The wrench comprises a pair of substantially semi-circular frame sections 2 and 3 hingedly connected to each other, as at 4, so that the frame sections 2 and 3 may be swung to an open position permitting of the placing of the frame sections around the circular wall of one of the conduit sections 5. The frame structure of the apparatus is arranged adjacent the coupling 6 connecting the ends of the conduit section 5 and is provided with circumferentially spaced bearings 7 disposed in axial registration with the bolts 8 connecting the flanges 9 of the coupling 6.

Journaled for rotation within the bearings 7, are the reduced ends 10 of socket-wrenches 11 which have their outer ends formed with sockets 12 to conform with the nuts 13 of the bolts 8. The sockets 12 are of such depth as to accommodate the ends of the bolts 8 as the bolts are being tightened. Also formed with the reduced ends of the socket-wrenches 11 are hand holds 14 by which the socket-wrenches may be rotated axially for properly aligning the same with the bolts 8 of the coupling. Rotatably mounted on the wrenches 11 are sleeves 15 each of which carries a spring pressed pawl 16 engaging the ratchet teeth 17 formed with the shank portion of the socket-wrenches 11. The pawl and ratchet mechanism is of the reversible type so that the nuts may be unscrewed from the bolt as well as screwed thereon.

To hold the socket-wrenches 11 in place upon the nuts 13 of the bolts 8, the frame sections 2 and 3 have hingedly connected thereto spring pressed latch bolts 18 having fingers 18′ engaging the inner peripheral flange edge of one of the coupling sections. Thus it will be seen that as the nuts on the bolts are tightened they tend to move away from the frame structure and the latter also moves longitudinally of the conduit and maintains the proper connection between the socket-wrenches 11 and the nuts 13 of the bolts 8.

Formed with the sleeves 15 are gear segments 19 which intermesh with the teeth of the circular rack bar 20 mounted for reciprocatory action within a groove 21 formed in the frame sections 2 and 3 of the apparatus. The rack bar 20 is formed in two sections hinged together at a point in alignment with the pivotal axis of the frame sections 2 and 3 and when so aligned, the rack bar and the frame sections may thus be turned unitarily on their pivots for their removal from the associated conduits. Positioned within the grooves 21 and located opposite the wrenches 11 are roller elements 23 which engage with the outer periphery of the rack bar 20 and which serve to prevent undue friction between the rack bar 20 and the frame structure.

In order to effect a reciprocatory action of the gear rack 20, there is provided a link or pitman 24 having one end pivotally connected to the rack bar, as at 25, and the other end journaled on a crank pin 26 carried by a worm gear 27 mounted for rotation upon the bracket extension 28 formed integral with the section 2 of the frame structure. Connected with the crank pin 26 is a handle 28 by which the gear wheel 27 may be quickly rotated while the nuts are loose and free to rotate upon the bolts. However, when more power is needed to draw the nuts taut, the worm 30 may be brought into operative relation with the worm gear 27 and by its rotation through the medium of operating handles 31, the operator may thus without much effort effect the rotation of the socket-wrenches with the result of drawing the coupling sections together to close the joints between the meeting conduit sections.

The ends of the shaft 32 and the worm 30 have their bearings within a swinging yoke 33 pivoted to a pair of upstanding ears 34 integrally formed with the bracket extension 28. Formed with each of the ears 34 is a pair of upper and lower seats 35 and 36 for the reception of the ends of the worm shaft 32. The upper portion of the yoke 33 is formed with a hande 37 for effecting the rocking action of the yoke 33 for the positioning of the ends of the shaft 32 within either of the seats 35 or 36. To hold the worm in its lowermost position in engagement with the worm gear 27 there is provided a locking element which consists of a spring pressed plunger 38 which is received within registering openings formed in the ears 34 and the yoke 33.

The operation of the apparatus is briefly set forth as follows: After the nuts have been started by hand and put on the bolts connecting the coupling sections of the conduits, the apparatus is positioned on the conduit by swinging the frame sections 2 and 3 to an open position. The apparatus which is most convenienty handled by two men, one on each side thereof, is then slid longitudinally of the conduit toward the pipe coupling and positioned so that the socket wrenches will align with the bolts of the coupling. The latch bolts carried by the frame sections are then swung on their pivots so that the fingers thereof will engage with the rear of the coupling flanges thus holding the frame structure in a rigid position for its operation. The ratchet may now be rotated to draw the nuts up while still loose on the bolts by rotating the gear 27 which results in a reciprocatory action of the gear rack 20. Before this operation the worm will, of course, be out of engagement with the worm wheel and positioned in the upper pair of the seats 35. After the nuts have been somewhat tightened, the worm is then swung to its lowermost position into engagement with the worm wheel and rotated to draw the nuts into firm engagement with the coupling flanges. After all the bolts or nuts are screwed tight, the worm may again be raised from out of engagement with the worm gear by swinging the yoke frame on its pivot so that the worm is positioned in the upper pair of the seats 35. After the worm gear has thus been disengaged from its engagement with the worm 30 the same may be turned to a position aligning the pivots of the frame sections 2 and 3 and the pivot of the rack bar 20. The frame sections may now be slid from out of engagement with the nuts of the coupling bolts and swung to an open position disconnecting the same from the conduit sections, when it is ready for its next operation.

From the foregoing description taken in connection with the accompanying drawings it will be noted that by the provision of the apparatus shown and described a simple and efficient means is afforded whereby a plurality of nuts may be tightened or loosened upon a pipe coupling by a simple manipulation of the rotating movement of the crank lever.

It will be understood that while I have particularly described the use of this wrench on the bolts uniting the flanges of a pipe coupling, its use is not limited thereto, but may with some alterations therein be used in

other fields of employment. The details of construction and the proportion of the parts may all be changed without departing from the spirit of the invention as set forth in the following claims.

What is claimed is:

1. A multiple wrench comprising a pair of relatively movable supporting sections formed to be positioned around a pipe adjacent to a pipe coupling, a plurality of axially rotatable socket devices mounted for turning movement in said supporting sections, the ends of said devices being formed with open nut receiving sockets for the reception of the nuts of said coupling, primary means carried in connection with said supporting sections for effecting relatively rapid rotation of said socket devices during the initial tightening of the coupling nuts, and secondary operating means for relatively slow turning movement of said socket devices to produce a powerful tightening rotation of the coupling nuts.

2. In a multiple wrench, a pair of relatively movable supporting sections arcuately shaped to conform with the circular wall of a pipe, said supporting sections being adapted to be positioned around a pipe adjacent to a pipe coupling, a plurality of axially rotatable socket devices mounted for turning movement in said supporting sections, the ends of said devices being formed with open nut receiving sockets for the reception of the nuts of said coupling, means for connecting all of said socket devices for simultaneous movement, and means for effecting the movement of the first named means carried by one of said supporting sections.

3. In a multiple wrench, a pair of arcuately shaped frame sections hingedly connected to each other and adapted to be positioned around a pipe adjacent to a pipe coupling, a plurality of axially rotatable socket devices mounted for turning movement in said frame sections, the ends of said devices being formed with open nut receiving sockets for the reception of the nuts of said coupling, gear and rack means connecting all of said devices for simultaneous movement thereof, pawl and ratchet means between said socket devices and said gear and rack means, and additional means carried by one of said frame sections for effecting a reciprocatory motion of said rack and gear means.

4. In a multiple wrench, a pair of arcuately shaped frame sections hingedly connected to each other and adapted to be positioned around a pipe adjacent to a pipe coupling, means for connecting said frame sections to said pipe coupling, a plurality of axially rotatable pawl and ratchet devices mounted for turning movement in said frame section, the ends of said devices being formed with open nut receiving sockets for the reception of the nuts of said coupling, means connecting all of said devices for effecting a reciprocatory action of said pawl and ratchet means simultaneously, and additional means connecting said last named means for effecting a relatively slow turning movement of said devices to produce a powerful tightening rotation of the coupling nuts.

5. A multiple wrench comprising a pair of relatively movable supporting sections formed to be positioned around a pipe adjacent to a pipe coupling, a plurality of axially rotatable socket devices mounted for turning movement in said supporting sections, the ends of said devices being formed with open nut receiving sockets for the reception of the nuts of said coupling, a rotatable sleeve on each of said devices, pawl and ratchet means between said sleeves and said socket devices, gear segments formed with said sleeves, a gear rack mounted for reciprocatory action within said supporting sections, and serving to connect all of said devices, a gear wheel mounted for rotation upon one of said frame sections and having a crank connection attached to said gear rack, and means for rotating said gear wheel.

6. A multiple wrench comprising a pair of relatively movable supporting sections formed to be positioned around a pipe adjacent to a pipe coupling, means for holding said supporting sections in place upon said pipe, a plurality of axially rotatable socket devices mounted for turning movement in said supporting sections, said socket devices being formed with open nut receiving sockets for the reception of the nuts of said coupling, pawl and ratchet means on said devices, and means connecting the pawl and ratchet means of said devices for simultaneous reciprocatory action thereof.

7. A multiple wrench comprising a pair of arcuate supporting sections hinged together and adapted to be positioned around a pipe adjacent to a pipe coupling, a plurality of axially rotatable socket devices mounted for turning movement in said supporting sections, the ends of said devices being formed with open nut receiving sockets for the reception of the nuts of said coupling, pawl and ratchet means on said devices, gear segments on said devices, a circularly shaped gear rack having teeth engaging the teeth of said gear segments, said gear rack being mounted for reciprocatory action within said supporting sections, a worm gear mounted for rotation in connection with one of said supporting sections, a crank arm connection between said worm gear and said gear rack, a worm for turning said worm gear, and a pivotal bearing in connection with said worm by which the latter may be brought in and out of engagement with said worm gear.

In testimony whereof I affix my signature.

ALBERT A. KALO.