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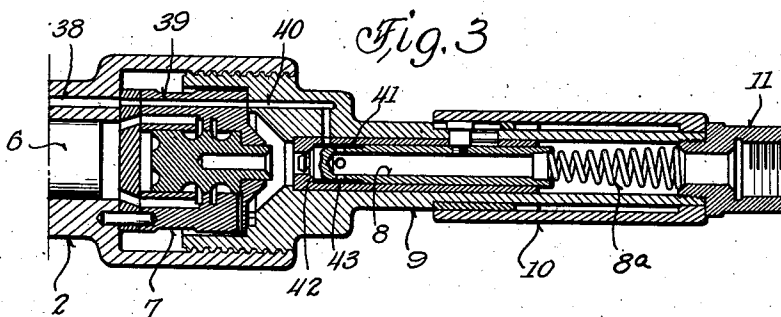
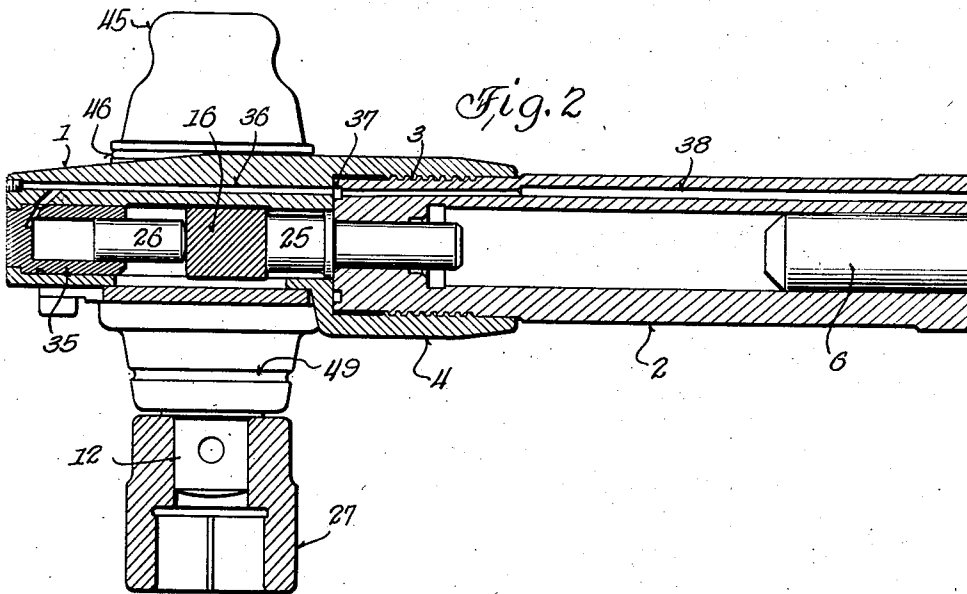
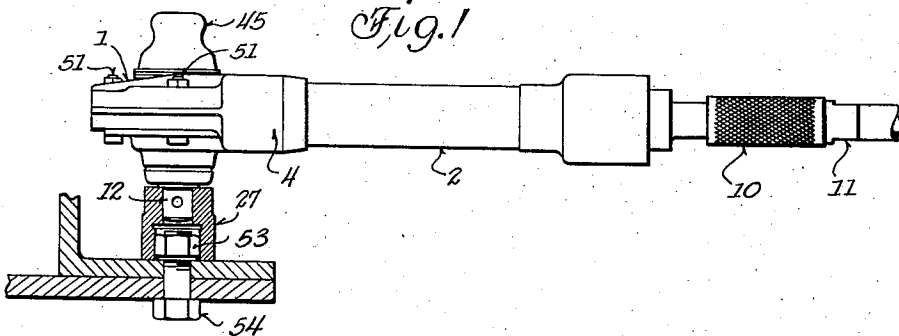
C. N. DOUGLASS

2,086,261

HAMMER WRENCH

Filed June 22, 1936

2 Sheets-Sheet 1



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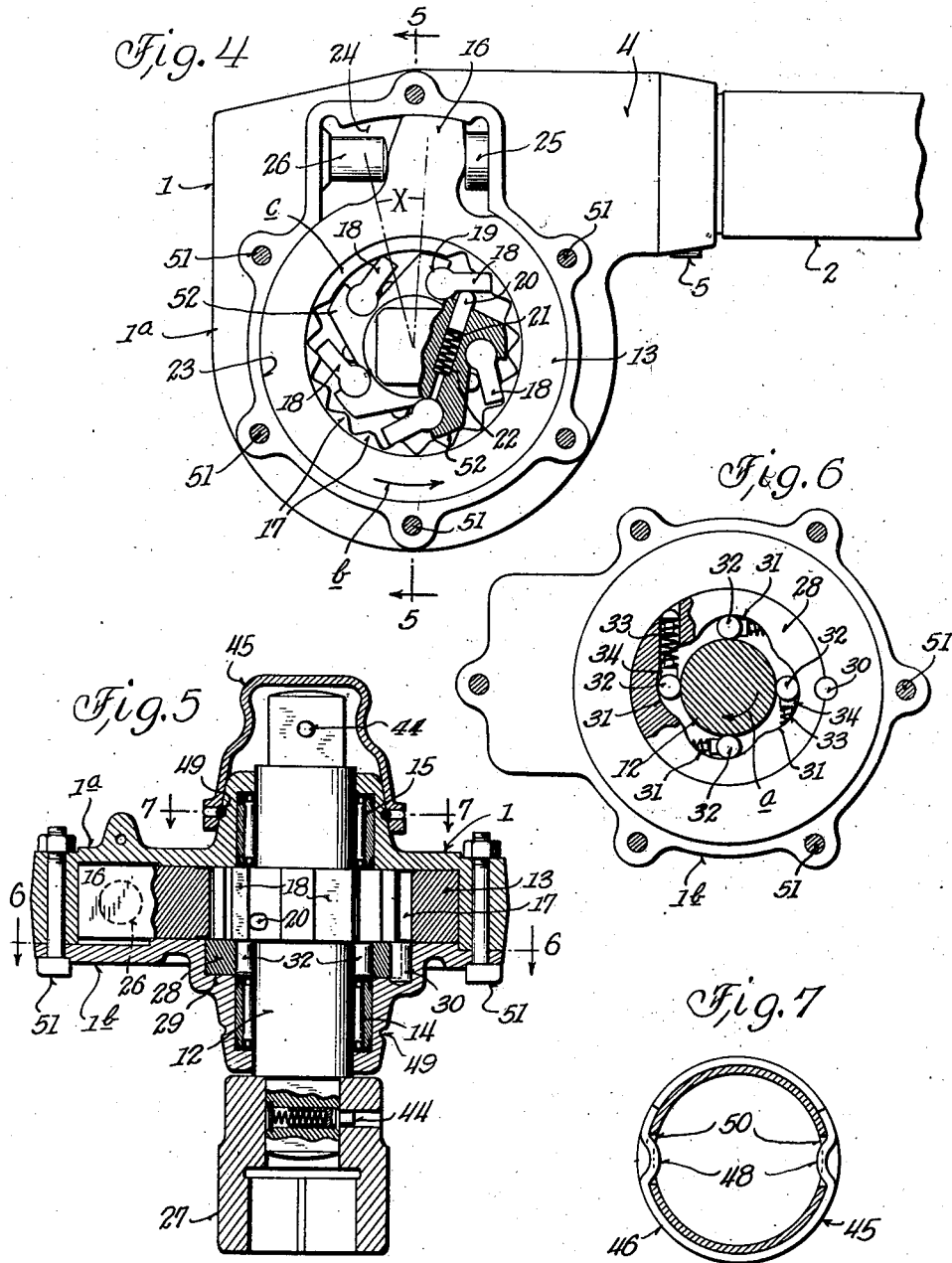
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Filed June 22, 1936

2 Sheets-Sheet 2



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## UNITED STATES PATENT OFFICE

2,086,261

## HAMMER WRENCH

Cecil N. Douglass, Aurora, Ill., assignor to Independent Pneumatic Tool Co., Chicago, Ill., a corporation of Delaware

Application June 22, 1936, Serial No. 86,597

19 Claims. (Cl. 81—54)

This invention relates to a portable power operated hammer wrench for applying or removing nuts of all types from bolts in locomotive work, bridge work, structural steel work, ship yards, automobile plants, boiler shops, and elsewhere.

The general purpose and object of my invention is to provide a strong powerful portable tool of rugged construction, but relatively light in weight, and of such shape that it can be handled and operated with comparative ease.

A further object of my invention is to provide a rotative mounting in the wrench housing for the spindle and the driving means therefor so that no turning effect or torque is transmitted from the spindle or its driving means to the casing of the tool or to the hands of the operator or any part of his body which might be supporting the tool. Thus the wrench may be used with equal safety in the cramped space between a locomotive boiler and its side wall or high in the air on a structural steel or bridge beam without fear of displacing the operator from his position of work, whether tightening large bolts or nuts or removing very tight ones.

In carrying out the objects of my invention the general principle as to the shape of an ordinary wrench has been followed, that is, the main body of the wrench containing the spindle and the driving means therefor and the controlling handle by which the wrench is supported in the hands of the operator are in substantially right angular relation. The advantage of this construction is that nuts can be applied or removed by power with the same ease in close corners and confined spaces as in more open quarters.

Another advantage of my improved construction, especially in structural steel and bridge work is that the operator can hold his body up against the wrench and thus be close to the work with no turning effect or torque transmitted from the spindle or its driving means to the housing of the tool. The operator can rest his body against the tool without either resisting any torque strain or being subject to a possible displacement from his standing position by the torque exerted by the power element of the tool against the spindle in setting or removing a nut or a bolt.

A further object of my invention is to employ a conventional type of pneumatic riveting or chipping hammer as the power element for the wrench and utilize the powerful and rapid blows of such hammer to rotate the nut driving spindle of the wrench.

A further object of my invention is to impart the blows of the hammer to the spindle through a

driving member which is revolubly mounted with respect to the spindle. The driving member has a releasable clutch connection with the spindle so as to positively interconnect the driving member to the spindle when the driving member is turned in one direction by the hammer blows and to release the driving member from the spindle when the driving member is turned in the opposite direction to reset the clutch connection following the blows of the hammer on the driving member.

A further object of my invention is to have the opposite ends of the spindle accessible for receiving a nut driving socket whereby one end of the spindle may be used for turning on a nut and the other end of the spindle may be used for turning off a nut by merely inverting the wrench.

Other and further objects of my invention will appear from the following specification taken in connection with the accompanying drawings, in which:

Fig. 1 is a side elevational view of my improved hammer wrench showing the nut driving socket at one end of the spindle in section and applied to a nut to be turned;

Fig. 2 is an enlarged longitudinal sectional view, with parts in elevation, of the wrench end of the tool and the adjacent portion of the barrel of the pneumatic hammer which operates the wrench;

Fig. 3 is a similar sectional view of the other end of the pneumatic hammer, showing the distributing and the throttle valves for controlling the supply of compressed air to the barrel of the hammer;

Fig. 4 is a top plan view of the wrench end of the tool, the cover of the wrench housing being removed to show the clutch connection between the spindle and its driving member;

Fig. 5 is a vertical sectional view, with parts in elevation, taken on line 5—5 of Fig. 4;

Fig. 6 is a horizontal sectional view taken on line 6—6 of Fig. 5; and

Fig. 7 is a sectional view taken on line 7—7 of Fig. 5 to show the locking arrangement for the protector cap, the latter being removed from the tool.

In the drawings, 1 indicates the wrench housing and 2 the barrel of a pneumatic hammer secured to the wrench housing for operating the wrench mechanism in said housing. The hammer is secured to the wrench housing by having the forward end of the barrel 2 externally threaded as at 3, and screwed into an internally threaded socket extension 4 at one side of and formed integral with the wrench housing as shown in Fig.

2. A set screw 5 (Fig. 4) locks the barrel in the socket 4 after the parts have been tightly screwed together.

Except for a by-pass arrangement to be hereinafter described, the pneumatic hammer is of the conventional riveting or chipping hammer type. Its hammering piston 6 is reciprocated in the barrel 2 by compressed air admitted alternately to the opposite ends of the barrel by an automatically acting valve mechanism 7 located at the inner end of the barrel, as shown in Fig. 3.

The hammer has a throttle assembly of the customary type secured to the rear end of its barrel 2 to control the supply of compressed air to the barrel. Said valve assembly embodies a throttle valve 8 slidably mounted in the support 9 and normally biased to a closed position by a spring 8a as shown in Fig. 3. The valve 8 is moved to open position by a sleeve 10 rotatably mounted on the support 9 and having a pin and cam slot connection with the valve 8 as usual in assemblies of this character. The sleeve 10 is grasped and turned by the hand of the operator holding the tool to open the valve. The sleeve 10 must be held in valve open position to keep the tool in operation, the valve closing automatically when the sleeve is released. The support 9 is hollow to supply compressed air to the barrel from a supply hose connected with the support 9 through a nipple 11 at the outer end of said support as shown in Figs. 1 and 3.

Supported in the wrench housing 1 is a rotary spindle 12 and a cooperating driving member 13. The spindle 12 is journaled in the wrench housing in roller bearings 14, 15 adjacent the opposite ends of the spindle as shown in Fig. 5. The driving member 13 is in the form of an impact collar revolvably mounted in the wrench housing about the spindle 12 and having an anvil projection 16 on its outer periphery and ratchet teeth 17 on its inner periphery. The spindle 12 carries a number of pawls 18 cooperating with the teeth 17 to provide a releasable clutch connection between the collar and the spindle as will hereinafter more fully appear. The pawls 18 are pivotally mounted at their inner ends in semi-circular grooves or sockets 19 in the spindle and are maintained in engagement with the teeth 17 by spring biased plungers 20, also carried by the spindle. There is a plunger 20 for each pawl, and the spring 21 for the plunger is located in the bore or socket 22 provided in the spindle for the associated plunger, as shown in Fig. 4.

The driving member or collar 13 has rotative support in the wrench housing 1 in annular chamber 23 provided in said housing about the spindle 12. The anvil projection 16 extends in a chamber 24, also provided in the wrench housing in co-planar relation with and intersecting the chamber 23 at one point in its circumference as shown in Fig. 4.

Extending into the chamber 24 on opposite sides of the anvil projection 16 for contact therewith is a tappet 25 and a plunger 26. The tappet 25 extends into the forward end of the barrel 2 to receive the blows of the piston 6 in the operation of the pneumatic hammer and transmits the blows of the hammer to the collar 13 to turn the collar in a direction to rotate the spindle 12. The pawls 18 are arranged to positively interconnect the collar to the spindle when the collar receives the blows of the hammer whereby the blows of the hammer are utilized to turn the spindle to apply or remove a nut depending upon

which end of the spindle is equipped with a nut driving socket 27, as shown in Figs. 1 and 5.

The plunger 26 is pressure actuated in a manner to be presently described to constantly hold the anvil projection 16 against the tappet 25 to receive the blows of the hammer and to turn the collar 13 in a direction to reset the pawls 18 with respect to the teeth 17. In this return movement of the collar 13, the pawls 18 ratchet over the teeth 17 and the collar may thus be turned relatively to the spindle.

To insure non-rotation of the spindle 12 in the return movement of the collar 13, I provide a one-way clutch connection between the spindle and the wrench housing 1. This clutch connection comprises a ring 28 supported in the wrench housing about the spindle 12 at one side of the impact collar 13, as shown in Fig. 5. The ring seats in a recess 29 in the housing and is locked against rotation by a pin 30 engaging both the ring and the housing as shown in Figs. 5 and 6. The inner periphery of the ring 28 is provided with a number of semi-circular recesses 31. Located in each recess is a roller 32. The diameter of each roller is slightly less than the radial distance between the spindle 12 and the deepest point of the recess 31. The rollers are actuated upon by coiled springs 33 and plungers 34 which hold the rollers in contact with the spindle and the cam inclines as provided by the recesses 31. This checks the rotation of the spindle in the return movement of the collar 13, but frees the spindle for rotation with the collar under the hammer blows of the piston 6. The rollers 32 are moved by the spindle into the deepest portions of the recesses 31 when the spindle is rotated by the collar 13 and this will be apparent from Fig. 6, wherein the arrow a indicates the direction in which the spindle is rotated by the blows of the hammer. In the assembled tool an arrow appears on the outer side of the housing 1 in association with each end of the spindle to indicate the direction in which the spindle is rotated by the blows of the hammer.

The arrow b in Fig. 4 indicates the direction in which the driving member or collar 13 is turned to rotate the spindle. It will be observed from this figure that the pawls 18 carried by the spindle 12 are set to positively interconnect the spindle to the collar when the latter is turned to rotate the spindle. To accomplish this the pawls face the direction of rotation of the collar by the hammer and have abrupt shoulders at their outer ends to abut against the opposed complementary faces of the teeth 17. As shown in Fig. 4, the five pawls with which the spindle is provided are so spaced about the spindle as to come alternately into abutting or driving engagement with the teeth 17 in the back and forth oscillation of the collar 13. In the embodiment shown, the third pawl from the driving one is at the top of a tooth to drop into driving engagement with said tooth in the turning of the collar to release the holding pawl. This requires a very slight rotation of the collar to set a pawl, with the result that a quick interconnection is established and a rotary motion is insured the spindle from the oscillating motion given to the collar. The pawls 18 are spaced an angular distance of approximately 72° while the teeth 17 are spaced an angular distance of approximately 19°. This ratio can, however, be modified considerably as long as the angular distance between the pawls is not a multiple of the angular distance between the teeth 17.

The chamber 23 provides a full peripheral sup-

port for the collar 13, except for the relatively small portion of its circumference where said chamber is intersected by the chamber 24. The latter is wide enough to take care of the swinging movement of the anvil projection 16 in the full back and forth turning of the collar 13. The full swing of the collar is indicated by the maximum angle "X", in Fig. 4, if there is not sufficient load on the collar to oppose it. This maximum angle occurs when a nut is being spun on or off its bolt. It is arrested, however, by the pressure on the plunger 26 and finally when the plunger strikes the bottom of its cylinder 35 with which the housing 1 is provided as shown in Fig. 2. Although the angular movement of the collar 13 is only 18° in the particular tool shown, the blows transmitted to the spindle 12 through the clutch device 17, 18 causes the spindle to turn as much as 55° when it is spinning a nut on or off a bolt. Thus, the spindle revolves at a free speed of approximately 275 R. P. M., although the blows delivered are only 1800 per minute.

The cylinder 35 is connected to the live air supply for the hammer to constantly urge the plunger 26 against the anvil projection 16 during the operation of the tool. In the particular embodiment shown, the connection is made by the provision of connected passages in the wrench housing 1 and the hammer barrel 2, respectively, as shown in Figs. 2 and 3.

As illustrated in said figures, the wrench housing 1 has a passage 36 connected at one end with the cylinder 35 to the rear of the plunger 26 and at its opposite end with a channel 37 in the forward end of the barrel 2. The barrel has a longitudinally extending passage 38 connecting the channel 37 with a passage 39 in the block of the valve assembly 7. A passage 40 connects the passage 39 with a channel 41 in the throttle valve assembly about the throttle valve 8 in advance of its seat 42. The passage 40 is in the head of the throttle valve assembly screwed into the rear end of the barrel 2 over and against the block of the valve 7. Ports 43 connect the interior of the valve 8 with the channel 41, and thus a small amount of the live air is by-passed to the cylinder 35 about the throttle valve 8 whether it is open or closed. This insures that the tappet 25 will be in striking position for the hammer piston 6 as soon as the wrench is started. The live air enters the barrel 2 and the passages referred to through the valve member 8 which is hollow and is open to the live air supply at the nipple 11.

As shown in Fig. 4, the teeth 17 do not continue completely about the collar 13, being omitted in the region of the anvil projection 16, as indicated at c, to give additional strength to the collar where the greatest stresses occur under the impacts of the hammer. I do not wish to be limited, however, to this construction as the teeth may be continued completely about the collar.

It will also be observed from the drawings that the barrel 2 extends outwardly from the wrench housing 1 intermediate the ends of the spindle 12, and in substantially right angular relation thereto, thereby allowing the tool to be applied to a nut in the manner of a conventional wrench and also allowing either end of the spindle to be used for nut turning purposes. This simplifies the device as complications of a design for reverse rotation of the spindle are avoided and nuts can be tightened as well as removed by merely changing the socket 27 from one end of the spindle to the other. The opposite ends of the spindle extend exteriorly of the wrench housing 1 for this pur-

pose and are given square or other non-circular shape to receive and drive a nut engaging socket 27. Each spindle end is equipped with a spring pressed detent 44 to releasably connect a socket 27 thereto as shown in Fig. 5.

A hood or cap 45 protects the operator from the end of the spindle not being used. This cap is preferably of metal and is of a size and shape to fit over either end of the spindle and the adjacent portion of the wrench housing. The cap has releasable connection with the wrench housing, being equipped with a split locking ring 46 carried on the outer side of the cap in a groove 47 therein, and provided with diametrically disposed inwardly extending portions 48 to snap into a groove 49 in the wrench housing through openings 50 in the cap, as shown in Fig. 7.

For the purpose of assembly and repair, the wrench housing 1 is made in two parts, a body section 1a and a cover section 1b. The chambers 23 and 24 are in the body section 1a and are closed and completed by the cover section 1b when the latter is secured to the body section as by fastening bolts 51. The cover section 1b contains the ring 28 and its chamber 29, and the bearing 14 for one end of the spindle 12. The other bearing 15 for the spindle is supported in the body section 1a. The socket extension 4 for the barrel 2 constitutes a part of the body section 1a. The cover section 1b holds the collar 13 in its chamber 23 while the portion of the spindle 12 carrying the pawls 18 fits over the ring 28 and holds it in the chamber 29. This section of the spindle is commensurate with the axial dimension of the collar 13, whereby the pawls 18 may have a similar dimension to adequately withstand the powerful blows of the hammer on the collar. The spindle is given spoke shape in the portion referred to so that the pawls which are mounted on the spokes 52 may move inwardly toward the spindle to release the collar 13. The grooves 19 for the pawls are on the inner sides of the spokes and extend completely across the same axially of the spindle whereby the pawls may have the dimension referred to and be inserted into place after the spindle and the collar have been brought together in assembled relation.

The channel 37 in the forward end of the barrel 2 connects the passages 36 and 38 regardless of the final rotative position of the barrel in the socket 4 when the parts are tightly screwed together.

Briefly stated the hammer wrench is used as follows: The tool is held in the hands of the operator and when turning on and tightening a nut the socket 27 is connected with the spindle end which rotates toward the right as shown in Fig. 1. In this figure the nut is marked 53 and the bolt on which the nut is to be turned and tightened is marked 54. When removing or unscrewing a nut, the socket 27 is fitted on the other end of the spindle and the tool is held in a position to engage the nut. The direction arrows marked on the wrench housing facing the opposite ends of the spindle indicate to the operator which end of the spindle to use.

When the socket 27 is applied over the nut, the compressed air to the hammer is turned on at the valve 8 and the piston 6 is reciprocated in the barrel 2 to deliver blows on the collar 13 at its anvil projection 16. The collar 13 will be oscillated back and forth through the action of the tappet 25 and the plunger 26, and the spindle 12 will be rotated to drive the nut. When the nut starts to tighten up, the angular movement of the

collar 13 decreases and the full strength of the blows are delivered to the spindle directly through the pawl 18 in driving engagement therewith. It is not necessary for the collar 13 to be moved far enough by each blow of the hammer to drop the succeeding pawl into driving engagement with a tooth 17. The piston 6 can deliver any number of blows on the same pawl until the spindle is forced to turn sufficiently to drop another pawl into driving position. Due to this action, a very large nut can be tightened or a very tight nut can be removed by simply allowing the hammer to deliver blows long enough on the anvil projection 16. The plunger 26 being under a constant pressure during the operation of the tool holds the anvil projection 16 in position to receive the blows of the hammer and also to automatically reset the pawls.

The wrench shown is of a size to apply and remove nuts from bolts from  $\frac{3}{4}$ " diameter to  $1\frac{1}{2}$ " diameter. For this size of wrench a hammering mechanism is employed delivering approximately 1800 blows or strokes per minute. For a smaller size wrench blows as high as 4000 per minute may be used while for a larger wrench the number of blows may be as low as 1200 per minute. The structural features of the wrench remain the same and the action described imparts powerful impacts to the anvil projection 16.

All torsion developed by the impacts or blows of the hammer are absorbed in the tool thus relieving the operator of these strains and permitting him to actually "lay right on the nut" and have complete control of the tool. When a nut is unusually tight and slow to start running, the tool being in wrench form provides the operator with the necessary leverage to start the nut. With all torque strains eliminated it is unnecessary for the operator to frequently stop the tool for relief when using the wrench over a long period of operation. The hammer can continue to deliver its maximum blows on the collar indefinitely without harmful effects as the tool construction is steel throughout and the operating parts are of uniform strength and free of any weakness that will fail under the stress of constant and strenuous use.

With all torque strains eliminated due to the free rotative mounting provided in the housing 1 for the driving collar 13 and the spindle 12, the operator is not fatigued in the running of the tool and moreover the possibility of serious accidents are entirely avoided. Thus the operator may safely use the tool and hold his body against it, if need be, in cramped quarters or when standing high in the air on a structural steel or bridge beam without fear of the tool displacing him from his working position.

The rapidity of the hammer blows provides considerable power for tightening a nut when applying it or loosening a nut when removing it. Moreover, the speed of these blows rapidly spins a loose nut on or off a bolt as the case may be thus enabling the work to be performed rapidly and at a considerable saving in cost.

The cap 45 covering the end of the spindle not in use provides a hand rest for one hand of the operator to hold the wrench engaged with the work without contact with the rotating spindle.

The hammering element employed for the wrench may be of the impact type desired, it being understood that I do not wish to limit the application of my invention to the use of a chipping or a riveting hammer as herein referred to. Moreover, the details of construction shown and described may be variously changed and modified

without departing from the spirit and scope of my invention, except as pointed out in the annexed claims.

I claim as my invention:

1. A power wrench comprising a housing, a rotary spindle journaled in said housing and adapted to have a nut driving socket connected therewith, an impact collar revolubly mounted in the housing about said spindle and having ratchet teeth on its inner periphery and an anvil projection on its outer periphery, spring biased pawls carried by the spindle and cooperating with said teeth for rotating the spindle when the collar is turned in one direction and for releasing the spindle from the collar when the collar is turned in the opposite direction, a pneumatic hammer connected with the housing and having a piston for imparting blows on the anvil projection for turning the collar in a direction to rotate the spindle, and pressure responsive means operating on the anvil projection and connected with and actuated by the live air pressure supplied to the hammer for turning the collar in the opposite direction to reset the pawls with respect to said teeth following the blows of the hammer on the collar.

2. A power wrench comprising a housing, a rotary spindle journaled in said housing and adapted to have a nut driving socket connected therewith, an impact collar revolubly mounted in the housing about said spindle and having ratchet teeth on its inner periphery and an anvil projection on its outer periphery, spring biased pawls carried by the spindle and cooperating with said teeth for rotating the spindle when the collar is turned in one direction and for releasing the spindle from the collar when the collar is turned in the opposite direction, a pneumatic hammer connected with the housing and having a piston for imparting blows on the anvil projection for turning the collar in a direction to rotate the spindle, and means also operating on the anvil projection for turning the collar in the opposite direction to reset the pawls with respect to said teeth following the blows of the hammer on the collar, said collar being devoid of teeth adjacent the anvil projection to give added strength to the collar at the anvil projection.

3. A power wrench comprising a housing, a rotary spindle journaled in said housing and adapted to have a nut driving socket connected therewith, an impact collar revolubly mounted in the housing about said spindle and having ratchet teeth on its inner periphery and an anvil projection on its outer periphery, spring biased pawls carried by the spindle and cooperating with said teeth for rotating the spindle when the collar is turned in one direction and for releasing the spindle from the collar when the collar is turned in the opposite direction, a pneumatic hammer connected with the housing and having a piston for imparting blows on the anvil projection for turning the collar in a direction to rotate the spindle, and pressure responsive means operating on the anvil projection and connected with and actuated by the live air pressure supplied to the hammer for turning the collar in the opposite direction to reset the pawls with respect to said teeth following the blows of the hammer on the collar, said pawls being spaced about the spindle for alternate driving engagement with said teeth in the back and forth turning of the collar.

4. A power wrench comprising a housing, a rotary spindle journaled in said housing and adapted to have a nut driving socket connected

therewith, an impact collar revolubly mounted in the housing about said spindle and having an anvil projection, clutch means providing a releasable connection between the collar and the spindle for rotating the spindle when the collar is turned in one direction, a plunger and a tappet reciprocally mounted in the housing on opposite sides of the anvil projection for contact therewith, a pneumatic hammer connected with the housing and having a piston for delivering blows on the tappet for turning the collar in a direction to rotate the spindle, and means for subjecting the plunger to the live air pressure of the hammer for forcing the plunger against the anvil projection to turn the collar in a direction to reset the clutch connection between the collar and the spindle following the blows of the hammer on the collar.

5. A power wrench comprising a housing, a rotary spindle journaled in said housing and adapted to have a nut driving socket connected therewith, an impact collar revolubly mounted in the housing about said spindle and having an anvil projection, clutch means providing a releasable connection between the collar and the spindle for rotating the spindle when the collar is turned in one direction, a plunger and a tappet reciprocally mounted in the housing on opposite sides of the anvil projection for contact therewith, a pneumatic hammer having a barrel detachably connected to the housing and containing a piston for imparting blows on the anvil projection for turning the collar in a direction to rotate the spindle, said housing and said barrel having passages communicating at the connection between the housing and the barrel for connecting the rear of the plunger with the live air pressure supply for the hammer for forcing the plunger against the anvil projection to turn the collar in a direction to reset the clutch connection between the collar and the spindle following the blows of the hammer on the collar.

6. A power wrench comprising a housing, a rotary spindle journaled in said housing and adapted to have a nut driving socket connected therewith, an impact collar revolubly mounted in the housing about said spindle and having an anvil projection, clutch means providing a releasable connection between the collar and the spindle for rotating the spindle when the collar is turned in one direction, a pneumatic hammer having a barrel connected with the housing and containing a piston for imparting blows on the anvil projection for turning the collar in a direction to rotate the spindle, a plunger also acting on the anvil projection for turning the collar in the opposite direction to reset the clutch connection between the collar and the spindle following the blows of the hammer on the collar, said hammer having a throttle valve for controlling the supply of live air to the barrel for actuating the piston, and means by-passing a portion of the live air to the plunger about the throttle valve for constantly forcing the plunger against the anvil projection in the operation of the wrench.

7. A power wrench comprising a housing, a rotary spindle journaled in said housing and adapted to have a nut driving socket connected therewith, a driving member revolubly mounted in the housing with respect to said spindle and having an anvil projection, clutch means providing a releasable connection between the driving member and the spindle for rotating the spindle when the driving member is turned in one direction, a pneumatic hammer having a barrel

connected with the housing and containing a piston for imparting blows on the anvil projection for turning the driving member in a direction to rotate the spindle, and a plunger connected with and actuated by the live air pressure supplied to the hammer for turning the driving member in the opposite direction to reset the clutch connection between the driving member and the spindle following the blows of the hammer on the driving member, said barrel extending outwardly from the housing in fixed transverse relation to the axis of the spindle and providing a permanent handle member for the wrench.

8. A power wrench comprising a housing, a rotary spindle journaled in said housing, an impact collar revolubly mounted in the housing about said spindle and having an anvil projection, clutch means providing a releasable connection between the collar and the spindle for rotating the spindle when the collar is turned in one direction, a pneumatic hammer connected with said housing and having a piston for imparting blows on the anvil projection for turning the collar in a direction to rotate the spindle, and means operable by the pressure fluid furnished to the hammer for turning the collar in the opposite direction to reset the clutch connection between the collar and the spindle following the blows of the hammer on the collar, said spindle having its opposite ends accessible from the exterior of the housing whereby a nut driving socket may be connected with one end of the spindle for applying a nut or be connected with the opposite end of the spindle for removing a nut.

9. A power wrench comprising a housing, a rotary spindle journaled in said housing, an impact collar revolubly mounted in the housing about said spindle and having an anvil projection, clutch means providing a releasable connection between the collar and the spindle for rotating the spindle when the collar is turned in one direction, a pneumatic hammer connected with the housing and having a piston for imparting blows on the anvil projection for turning the collar in a direction to rotate the spindle, means operable by the pressure fluid furnished to the hammer for turning the collar in the opposite direction to reset the clutch connection between the collar and the spindle following the blows of the hammer on the collar, said spindle having its opposite ends accessible exteriorly of the housing whereby either end of the spindle may be equipped with a nut driving socket, and a protective cap fittable over either end of the spindle and having releasable connection with the housing.

10. A power wrench comprising a housing, a rotary spindle journaled in said housing and adapted to have a nut driving socket connected therewith, an impact collar revolubly mounted in the housing about said spindle and having an anvil projection, clutch means providing a releasable connection between the collar and the spindle for rotating the spindle when the collar is turned in one direction, a pneumatic hammer connected with the housing and having a piston for imparting blows on the anvil projection for turning the collar in a direction to rotate the spindle, means operable by the pressure fluid furnished to the hammer for turning the collar in the opposite direction for resetting the clutch connection between the collar and the spindle following the blows of the hammer on the collar, and means for checking the rotation of the

spindle with the collar in the movement of the collar to reset the clutch means.

11. A power wrench comprising a housing, a rotary spindle journaled in said housing and adapted to have a nut driving socket connected therewith, an impact collar revolubly mounted in the housing about the spindle and having an anvil projection, pawl and ratchet means providing a releasable clutch connection between the collar and the spindle for rotating the spindle when the collar is turned in one direction, a pneumatic hammer connected with the housing and having a piston for imparting blows on the anvil projection for turning the collar in a direction to rotate the spindle, means operable by the pressure fluid furnished to the hammer for turning the collar in the opposite direction to reset the pawl and ratchet connection between the collar and the spindle following the blows of the hammer on the collar, and a one-way clutch device carried by the housing about the spindle and cooperating therewith to check the rotation of the spindle with the collar in the movement of the collar to reset the pawl and ratchet clutch.

12. A power wrench comprising a housing, a rotary spindle journaled in said housing and adapted to have a nut driving socket connected therewith, an impact collar revolubly mounted in the housing about the spindle and having an anvil projection, clutch means providing a releasable connection between the collar and the spindle for rotating the spindle when the collar is turned in one direction, a pneumatic hammer connected with the housing and having a piston for imparting blows on the anvil projection for turning the collar in a direction to rotate the spindle, means also operating on the anvil projection for turning the collar in the opposite direction for resetting the clutch connection between the collar and the spindle following the blows of the hammer on the collar, a non-rotative ring carried by the housing about the spindle and having cam-shaped recesses facing the spindle, and spring biased rollers located in said recesses to check the rotation of the spindle with the collar in the movement of the collar to reset the clutch means.

13. A power wrench comprising a housing, a rotary spindle journaled in said housing and adapted to have a nut driving socket connected therewith, an impact collar located in the housing about the spindle and having ratchet teeth on its inner periphery and an anvil projection on its outer periphery, said housing having a pair of intersecting chambers, one chamber surrounding the spindle and providing a rotative mounting for the collar and the other chamber being offset from the spindle to accommodate the anvil projection, a tappet and a plunger extending into the last named chamber on opposite sides of the anvil projection for contact therewith, spring biased pawls carried by the spindle and cooperating with said teeth to provide a releasable connection between the collar and the spindle for rotating the spindle when the collar is turned in one direction, a pneumatic hammer connected with the housing about the tappet and having a piston for delivering blows on the tappet for turning the collar in a direction to rotate the spindle, and means connecting the rear of the plunger to the live air pressure of the hammer for forcing the plunger against the anvil projection to turn the collar in a direction to reset the pawls with respect to the teeth following the blows of the hammer on the collar.

14. A portable power wrench comprising a housing, a rotary spindle and an intermittent grip device for driving the spindle, both journaled in the housing, a pneumatic hammer having a barrel connected to the housing and containing a piston for imparting blows on the grip device for turning the latter in a direction to rotate the spindle, and pressure responsive means carried by the housing and co-operating with the grip device for turning the same in the opposite direction following the blows of the piston, said pressure responsive means being connected with and operated by the live air pressure supplied to the hammer.

15. A portable power wrench comprising a housing, a rotary spindle and an intermittent grip device for driving the spindle, a pneumatic hammer having a barrel connected to the housing and containing a piston for imparting blows on the grip device for turning the latter in a direction to rotate the spindle, pressure responsive means carried by the housing and co-operating with the grip device for turning the same in the opposite direction following the blows of the piston, said pressure responsive means being connected with and operated by the live air pressure supplied to the hammer, and means providing a rotatable mounting in the housing for the spindle and the grip device, whereby to relieve the housing and the hammer barrel of torque strains of the spindle.

16. A portable power wrench comprising a housing, a rotary spindle and an intermittent grip device for driving the spindle, both journaled in the housing, a pneumatic hammer having a barrel connected to the housing and containing a piston for imparting blows on the grip device for turning the latter in a direction to rotate the spindle, and pressure responsive means carried by the housing and co-operating with the grip device for turning the same in the opposite direction following the blows of the piston, said pressure responsive means being connected with and operable by the live air pressure supplied to the hammer, the latter being fixedly secured to the housing and having its barrel extending outwardly therefrom whereby the hammer provides a permanent handle member for the wrench.

17. A portable power wrench comprising a housing, a rotary spindle and an intermittent grip device for driving the spindle, both journaled in the housing, and a pneumatic hammer and a pressure responsive device connected with the housing and operable on the grip device for turning the same in opposite directions, said pressure responsive means being connected with and operated by the live air pressure supplied to the hammer, said grip device having a connection with the spindle for converting the reciprocatory action of the hammer into a rotary action for the spindle.

18. A portable power wrench comprising a housing, a rotatable spindle and an intermittent grip device for driving the spindle, both journaled in the housing, and a pneumatic hammer and a pressure actuated means carried by the housing and operable on the grip device for turning the same in opposite directions, said pressure actuated means being connected with and operated by the live air pressure supplied to the hammer, said grip device having a connection with the spindle for converting the reciprocatory action of the hammer into a rotary action for the spindle, and said spindle having its opposite

ends accessible whereby a nut driving socket may be connected to either end of the spindle.

5 19. A portable power wrench comprising a housing, a rotary spindle and an intermittent grip device for driving the spindle, both jour-  
naled in the housing, said grip device having an impact collar revolubly mounted in the housing about the spindle and having a radially disposed  
10 anvil projection located within the housing, a pneumatic hammer having a barrel connected to the housing and containing a piston for imparting blows on the anvil projection for turning the

collar in a direction to rotate the spindle, and means carried by the housing and operable on the collar in opposition to the piston for turning the collar in a direction to reset the grip device following the blows of the hammer, said  
5 hammer being fixedly secured to the housing and extending outwardly therefrom to serve as a permanent handle member for the wrench and disposed in substantially co-planar relation with the collar.

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