

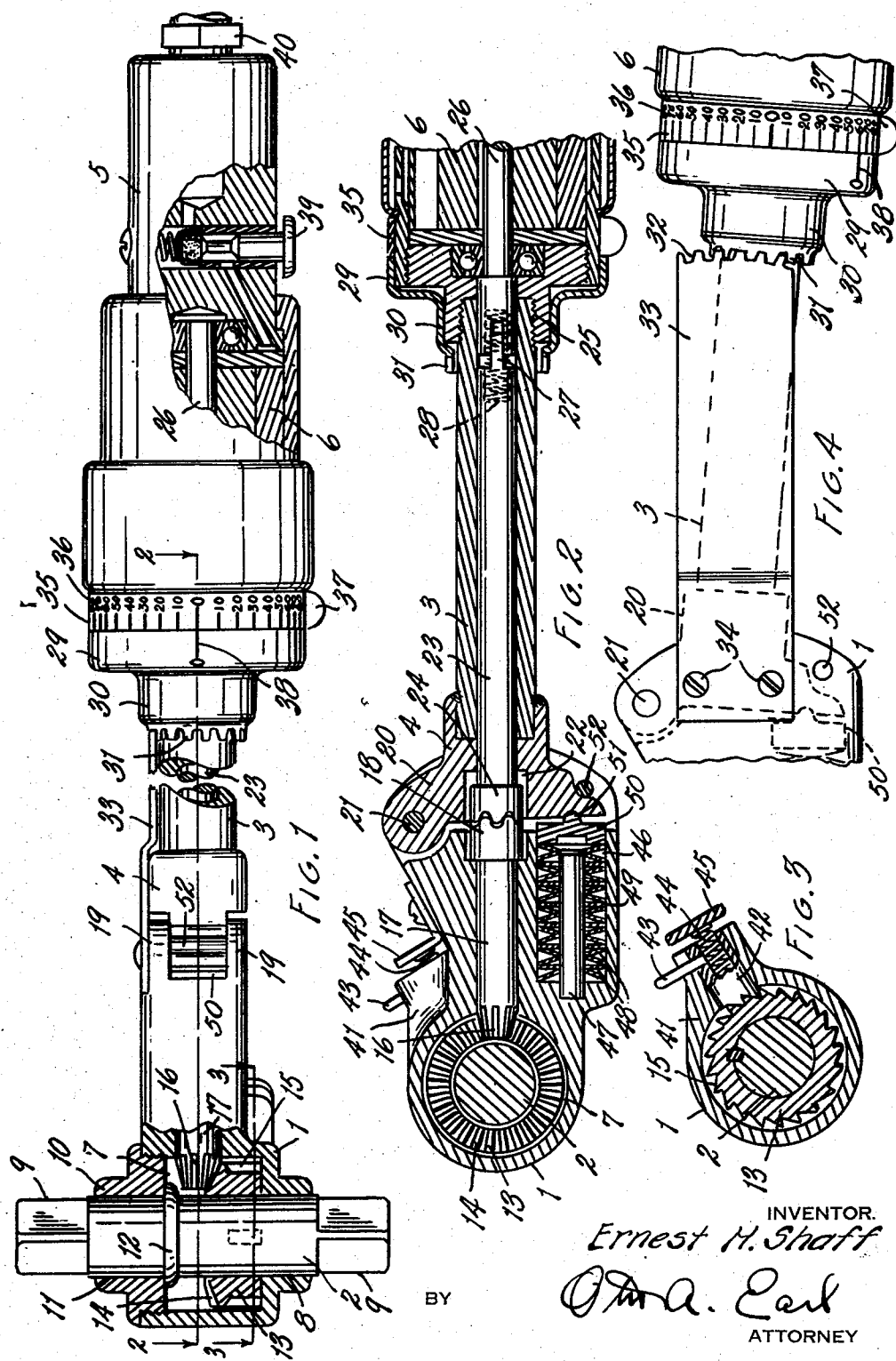
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TORQUE WRENCH

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TORQUE WRENCH

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This invention relates to improvements in a torque wrench.

The principal objects of this invention are:

First, to combine the functions of a torque measuring wrench and a power driven speed wrench in a single tool.

Second, to provide a torque wrench which will initially thread and run up a nut or bolt by means of an air or other motor and then function to give a measurable tightening torque to the bolt by manual operation of the wrench.

Third, to provide a torque wrench having a bolt or nut engaging member which may be driven either by an air motor or by manual operation of the wrench.

Fourth, to provide novel means for drivingly connecting the bolt or nut engaging member of a wrench either to a motor or to the handle of the wrench for high speed power driven or measured manual operation of the work engaging member.

Fifth, to provide a novel spring reaction means for the handle of a torque wrench, capable of transmitting a high torque applied to the wrench.

Sixth, to provide a novel gauge or scale for a torque wrench which will facilitate reading of the scale and speed the operation of the wrench.

Seventh, to provide a torque wrench having the above advantages which is relatively simple and inexpensive to construct.

Other objects and advantages relating to the details and economies of the invention will be apparent from the following description and claims.

The drawing, of which there is one sheet, illustrate a preferred form of my wrench.

Fig. 1 is a fragmentary elevational view partially broken away in vertical cross section of my wrench.

Fig. 2 is a fragmentary transverse cross sectional view along the line 2-2 in Fig. 1.

Fig. 3 is a fragmentary transverse cross sectional view along the line 3-3 in Fig. 1.

Fig. 4 is a fragmentary plan view of the wrench in stressed or operating position.

The principal parts of my wrench are the body member 1 carrying the bolt engaging pin or spindle 2, the shank 3 of a handle having a head 4 pivotally connected to the body and a grip 5 secured to the outer end of the shank and forming a housing for an air motor generally indicated at 6. The body 1 is generally flat and defines a cylindrical recess 7, the lower wall of which is bored to form a journal bear-

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ing 8 for the spindle. The spindle 2 is illustrated as having square ends 9 for engagement with socket head bolts or adapter sockets for various types and sizes of nuts, but socket type ends for direct engagement with bolt heads and nuts could obviously be substituted thereon.

The open end of the recess 7 is threaded and arranged to be closed by the bearing member 10 which forms a bearing for the opposite end of the spindle as at 11. The spindle 2 is provided with a thrust shoulder 12 arranged to bear against the inner side of the bearing 10. Keyed to the spindle 2 and positioned within the recess 7 is a gear 13 having beveled teeth 14 formed around the upper side thereof and having ratchet teeth 15 (see Fig. 3) formed around the lower end thereof. The beveled teeth 14 are constantly in mesh and arranged to be driven by the beveled teeth 16 formed on the end of a drive shaft 17. The drive shaft extends through a radially extending bore in the body member 1 and is provided with a jaw clutch head 18 positioned in a recess at the end of the body member.

The end of the body member adjacent to the clutch 18 is bifurcated to provide spaced flanges 19 between which the tongue 20 of the head 4 is received. A pivot pin 21 extends through the flanges and tongue at a point spaced from the axis of the drive shaft 17 and approximately in the plane of the end of the clutch member 18. The head 4 and shank 3 define an axial bore terminating in a recess 22 opposed to the clutch member 18. The bore in the handle rotatably supports a coupling shaft 23 having a jaw clutch member 24 on the inner end thereof cooperative with the clutch member 18 on the drive shaft 17. It will be noted that the teeth of the clutch members 18 and 24 are cut away or rounded to form an overload releasing clutch.

The outer end of the shank 3 is threadedly received in the end of the grip 5 as at 25 and the shaft 23 of the air motor extends into the bore in the shank opposite the outer end of the coupling shaft 23. The coupling shaft and motor shaft are provided with a sliding tongue and groove connection as at 27 so that the coupling shaft may move outwardly toward the motor shaft when the overload clutch members are forced out of engagement. A coil spring 28 is provided for urging the coupling shaft into engagement with the driving shaft 17.

The inner end of the grip 5 is provided with a cup-shaped indicating member 29 having a portion of reduced diameter 30 rotatably posi-

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tioned around the outer end of the shank 3. The inner end of the reduced portion 39 is provided with axially extending teeth 31 which are engageable with the rack teeth 32 formed on the end of a plate 33 secured to the top of the body member 1 as by the screws 34. A slip ring 35 having a spring engagement around the grip 5 and adjacent to the end of the indicating member 29 is provided with indicia figures and marks as indicated at 36. The slip ring 35 is provided with a finger piece 37 by means of which the ring may be turned to any position relative to a datum point 38 on the indicating member 29.

The air motor 6 is of standard construction and is therefore not described in detail. The grip which houses the rotating parts of the motor is provided with a valve 39 for admitting compressed air to the motor and a connection 40 for attaching an air line to the wrench. While an air motor is illustrated, an electric motor could obviously be substituted therefor.

The body member 1 is provided with a radially extending boss 41 (see Figs. 2 and 3) which defines a radial bore for receiving a pawl 42 having teeth on its inner end engageable with the ratchet teeth 15 on the gear 13. The pawl 42 is provided with a finger piece 43 extending through a slot in the boss and by means of which the pawl may be moved outwardly of the boss out of engagement with the ratchet teeth 15. The pawl is constantly urged inwardly toward engagement with the ratchet teeth by a coil spring 44, the outer end of which bears against an angle-shaped clip 45 secured to the edge of the body member.

On the opposite side of the drive shaft 17 from the pivot pin 21 the body member defines a cylindrical recess 46 parallel to the drive shaft 17 and opening to the outer end of the body member. A guide pin 47 is positioned in the center of the recess and a series of concavo-convex disk spring members 48 are positioned around the guide pin and within the recess. Flat disk members 49 are interposed between the opposed outer edges of the spring disks. A circular compression button 50 is positioned at the outer end of the recess 46 to bear against the spring disks and is provided with a rounded projection or pressure pin 51 on its outer end engageable with a depression in the inner face of the head 4. A stop pin 52 extends between the spaced plates 19 of the body member and is engageable with the outer surface of the head to limit the motion of the head and handle about the pivot 21 under the influence of the spring disks 48. Attention is called to the fact that the pivot pin 21 and pressure pin 51 are aligned approximately with the faces of the overload clutch 18, 24.

In operating the wrench the spindle 2 may be engaged with a nut or bolt to be tightened and the valve 39 depressed to actuate the air motor. The air motor will rotate the coupling shaft and drive shaft through the overload clutch to rotate the gear 13 and spindle until the bolt or nut is drawn up snugly and the overload clutch 24 disengages automatically. During the operation of the air motor, the finger piece 43 may be held out to disengage the pawl 42 from the ratchet teeth 15 or the pawl may be left in to slide over the ratchet teeth. After the bolt or nut has been drawn up as tight as the overload clutch will permit, the slip ring 35 may be rotated to bring its zero indicia opposite the datum point 38 on the indicating member 29 and torque applied to

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the wrench by pulling on the grip 5. The handle 3 will then tend to pivot around the pin 21, this motion being opposed by the spring disks 48. The torque thus applied to the body member 1 will further tighten the bolt or nut. As the handle pivots relative to the body member, the plate 33 being fixed relative to the body member will operate to rotate the indicating member 29 by reason of engagement of the teeth 32 with the teeth 31 as indicated in Fig. 4 and the indicating member 29 will rotate so that the datum point 38 swings to opposite an indicia figure on the slip ring indicating the torque applied to the bolt or nut. Obviously the indicia on the slip ring may be calibrated with respect to the strength of the spring disks 46 to give a direct reading in terms of foot pounds of torque applied or the scale may be an arbitrary one.

Another mode of operation of my torque wrench which is particularly advantageous when tightening a series of bolts or nuts to the same degree of tightness is to move the slip ring 36 until the desired indicia number is opposite the datum point 38 when the wrench is in unstressed position. The wrench may then be successively applied to a series of bolts or nuts and when the manual pressure is applied to the handle, the operator needs only to watch the datum point 38 and when it coincides with the zero point on the indicia scale he can release the pressure on the handle. In this manner there is less chance for the operator confusing adjacent indicia marks on the slip ring and need not watch the scale so closely.

I have thus described a highly commercial embodiment of my wrench so that others may reproduce the same with such minor modifications as are desired without further description.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a combined torque and speed wrench, a chambered body member provided with a longitudinal bearing, a double ended spindle journaled transversely in said body member, a beveled gear provided with a ratchet disposed within the body member and fixed to said spindle, a manually retractable spring pressed pawl coacting with said ratchet to lock the spindle against rotation in one direction, a driven shaft disposed in said bearing and provided with a pinion coacting with said gear on said spindle, a handle comprising a shank pivotally mounted on said body at one end thereof and a motor housing constituting a handle grip, said shank having a longitudinal bore generally aligned with said driven shaft, a motor in said housing including a driving shaft extending into said longitudinal bore of said handle shank, an intermediate coupling shaft positioned in said longitudinal bore of said handle shank and having a longitudinally slidable driving engagement with said driving shaft, said intermediate and said driven shafts having coacting jaw clutch members provided with teeth conformed to permit slipping under overload, a thrust spring acting on said coupling shaft to yieldingly urge the said clutch members into driving engagement, a biasing spring between said body member and handle acting to urge them apart, means for limiting the outward swinging movement of the handle on its pivot, an indicating member rotatably mounted on said handle and provided with a datum pointer and having axially extending teeth on its inner end, a relatively fixed rack member carried by said

body member and coacting with said indicating member, a slip ring rotatably adjustable about said handle and having scale indicia thereon associated with the datum point of said indicating member, and means for controlling said motor 5 positioned on said handle.

2. In a combined torque and speed wrench, a chambered body member provided with a longitudinal bearing and a cylindrical recess at one side thereof, a double-ended spindle journaled transversely in said body member, a driven shaft 10 disposed in said body and having a driving connection to said spindle, a handle pivotally mounted on said body on the opposite side thereof from said recess, said handle having a longitudinal bore generally aligned with said driven shaft, a driving shaft extending into said longitudinal bore of said handle, an intermediate coupling shaft positioned in said longitudinal bore of said handle and having a longitudinally slidable driving engagement with said driving shaft, said intermediate and said driven shafts having coacting jaw-clutch members provided with teeth conformed to permit slipping under overload, a thrust spring acting on said coupling shaft to yieldingly urge the said clutch members into driving engagement, a guide pin disposed centrally within said cylindrical recess of said body member, a series of opposed concavo-convex spring disks positioned in said recess around said guide pin, a thrust member disposed in said recess in supported relation to aid disks and provided with a central stud engaging said handle in opposed relation to its pivot, said body member being provided with a stop limiting the outward swinging movement of the handle on its pivot, an indicating element rotatable about said handle and having teeth extending axially toward said body, and a rack fixed to said body and engaging said teeth to rotate said indicating element upon movement of said handle about its pivot, said indicating element and handle having cooperative indicia thereon.

3. A combined torque and speed wrench comprising a body member, a transversely disposed double-ended jaw spindle journaled in said body member with its ends projecting therefrom and provided with a beveled gear having ratchet teeth positioned within the body member, a manually releasable pawl coacting with said ratchet, a longitudinally disposed driven shaft mounted in said body member perpendicularly to said spindle and having a pinion coacting with said gear on said spindle, a handle pivotally connected to said body member, a spring interposed between said handle and body member to bias them on their connecting pivot, there being a stop limiting the separating movement of the handle and body member on said pivot, a motor housing on said handle having a motor therein provided with a driving shaft disposed axially of the handle, a coupling shaft disposed axially of the handle intermediate said driving and driven shaft and having a longitudinal slip spring biased connection to said driving shaft and a spring biased clutch driving connection to said driven shaft, an indicating member 65 rotatably mounted on said handle and having a series of rack engaging teeth, a rack member mounted on said body member to coact with said teeth on said indicator member and a scale indicia member rotatably mounted on said handle to cooperate with a datum point on said indicating member, and means for controlling said motor mounted on said handle.

4. A combined torque and speed wrench comprising a body member, a transversely disposed 75

jaw spindle journaled in said body member, a longitudinally disposed driven shaft mounted in said body member perpendicularly to said spindle and having a driving connection therewith, a handle pivotally connected to said body member and having a motor supported thereon, a spring interposed between said handle and body member to bias them on their connecting pivot, there being a stop limiting the separating movement of the handle and body member on said pivot, a driving shaft from said motor disposed axially of the handle, a coupling shaft disposed axially of the handle intermediate said driving and driven shaft and having a longitudinal slip connection to said driving shaft and a spring biased slip clutch driving connection to said driven shaft, an indicating member rotatably mounted on said handle and having a series of rack engaging teeth, a rack member mounted on said body member to coact with said teeth on said indicator member and a scale indicia member rotatably mounted on said handle to cooperate with a datum point on said indicating member, and means for controlling said motor mounted on said handle.

5. A wrench of the class described comprising pivotally connected body and handle members, spring means opposing relative pivotal motion between said members, a fixed member carried by said body member, a rotatable indicating member carried by said handle member and engageable with said fixed member for rotation thereby, a transversely disposed work engaging member carried by said body, a driven shaft for driving said work engaging member carried by said body, a motor carried by said handle, a drive shaft interconnected between said motor and driven shaft for driving said driven shaft the same being disposed longitudinally of the handle member and having an angularly variable driving connection with said driven shaft, and a pawl for locking said work engaging member to said body.

6. A wrench of the class described comprising pivotally connected body and handle members, spring means opposing relative pivotal motion between said members, a fixed member carried by one of said first two members, a rotatable indicating member carried by the other of said first two members and engageable with said fixed member for rotation thereby, a transversely disposed work engaging member carried by said body, a driven shaft for driving said work engaging member carried by said body, a motor carried by said handle, a drive shaft interconnected between said motor and said driven shaft for driving said driven shaft the same being disposed longitudinally of the handle member, an overload clutch forming angularly variable and automatically releasable driving connection between said driven shaft and said drive shaft, and a pawl for locking said work engaging member to said body.

7. A wrench of the class described comprising pivotally connected body and handle members, spring means opposing relative pivotal motion between said members, a fixed member carried by one of said first two members, a rotatable indicating member carried by the other of said first two members and engageable with said fixed member for rotation thereby, a transversely disposed work engaging member carried by said body, a driven shaft for driving said work engaging member carried by said body, a motor carried by said handle, a drive shaft interconnected between said motor and said driven shaft for

driving said driven shaft the same being disposed longitudinally of the handle member and having an angularly variable driving connection with said driven shaft, and a pawl for locking said work engaging member to said body.

8. A combined torque and speed wrench comprising a body member having a work engaging spindle rotatably mounted therein, a handle member pivotally secured to said body member and eccentrically with respect to the axis of the handle, a spring member carried by one of said members opposing rotation of said handle relative to said body member, an indicating member rotatably mounted on said handle, a fixed member secured to said body member and arranged to rotate said indicating member upon relative movement between said body member and handle, a driven shaft for driving said spindle carried by said body, a motor carried on said handle, a driving shaft extending from said motor along the axis of said handle, an angularly variable connection between said shafts for rotating said driven shaft and spindle, a pawl carried by said body member for locking said spindle against rotation in one direction relative to said body member, and a manually adjustable indicating member on said handle adjacent said first indicating member, said indicating members having cooperative torque measuring indicia thereon.

9. A wrench of the class described comprising pivotally connected body and handle members, yieldable means for maintaining said body and handle in normal relative positions, the free end of said handle being angularly displaceable relative to said body against the action of said yieldable means upon application of a torque force to said body by way of said handle, a fixed member carried by said body member, a rotatable indicating member carried by said handle member and engageable with said fixed member for rotation thereby upon displacement of said handle member, a transversely disposed work engaging member carried by said body member, a driven shaft for driving said work engaging member carried by said body member, a motor carried by said handle, a drive shaft interconnected between said motor and said driven shaft for driving said driven shaft from said motor the same being disposed longitudinally of said handle member and having an angularly variable driving connection to said driven shaft, and a pawl for locking said work engaging member to said body member.

10. In a combined torque and speed wrench, a chambered body member provided with a longitudinal bearing, a double-ended spindle journaled in said body transversely of said bearing, a driven shaft disposed in said bearing and having a driving connection to said spindle, a handle pivotally secured to said body and having a longitudinal bore generally aligned with said driven shaft, yieldable means for maintaining said body and handle in normal relative positions, a motor housing on said handle and having a motor therein, said motor housing and the outer end of said handle being angularly displaceable relative to said body and spindle against the action of said yieldable means upon application of a torque force to said body by way of said handle, a driving shaft positioned in said bore and connected between said motor and said driven shaft, an overload jaw clutch interposed between said driving and driven shafts and forming an angularly variable driving connection there between,

a rack member secured to said body and extending to adjacent said housing, an indicating member rotatably mounted on said housing and having teeth engageable with said rack member, and a spring pressed manually disengageable lock member carried by said body for locking said spindle to said body.

11. In a combined torque and speed wrench, a chambered body member provided with a longitudinal bearing, a double-ended spindle journaled in said body transversely of said bearing, a driven shaft disposed in said bearing and having a driving connection to said spindle, a handle pivotally secured to said body and having a longitudinal bore generally aligned with said driven shaft, yieldable means for maintaining said body and said handle in normal relative positions, a motor housing on said handle and having a motor therein, said motor housing and the outer end of said handle being angularly displaceable relative to said body and spindle against the action of said yieldable means upon application of a torque force to said body by way of said handle, a driving shaft positioned in said bore and connected between said motor and said driven shaft, said driving shaft and driven shaft having an angularly variable driving connection, a rack member secured to said body and extending to adjacent said housing, an indicating member rotatably mounted on the outer end of said handle and having teeth engageable with said rack member, and a spring pressed manually disengageable lock member carried by said body for locking said spindle to said body.

12. In a combined torque and speed wrench, a chambered body member provided with a longitudinal bearing, a spindle journaled in said body transversely of said bearing, a driven shaft disposed in said bearing and having a driving connection to said spindle, a handle having a yieldable connection to said body and having a longitudinal recess generally aligned with said driven shaft, a motor housing on said handle and having a motor therein, said motor housing and the outer end of said handle being angularly displaceable relative to said body and spindle upon application of a torque force to said body by way of said handle, a driving shaft positioned in said recess and connected between said motor and said driven shaft, said shafts having an angularly variable driving connection to accommodate angular displacement between said body and handle, a lock member carried by said body for locking said spindle to said body, and means responsive to the angular displacement between said body and handle for indicating the amount of torque force applied, said means including relatively movable elements respectively carried by said body and said handle.

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