

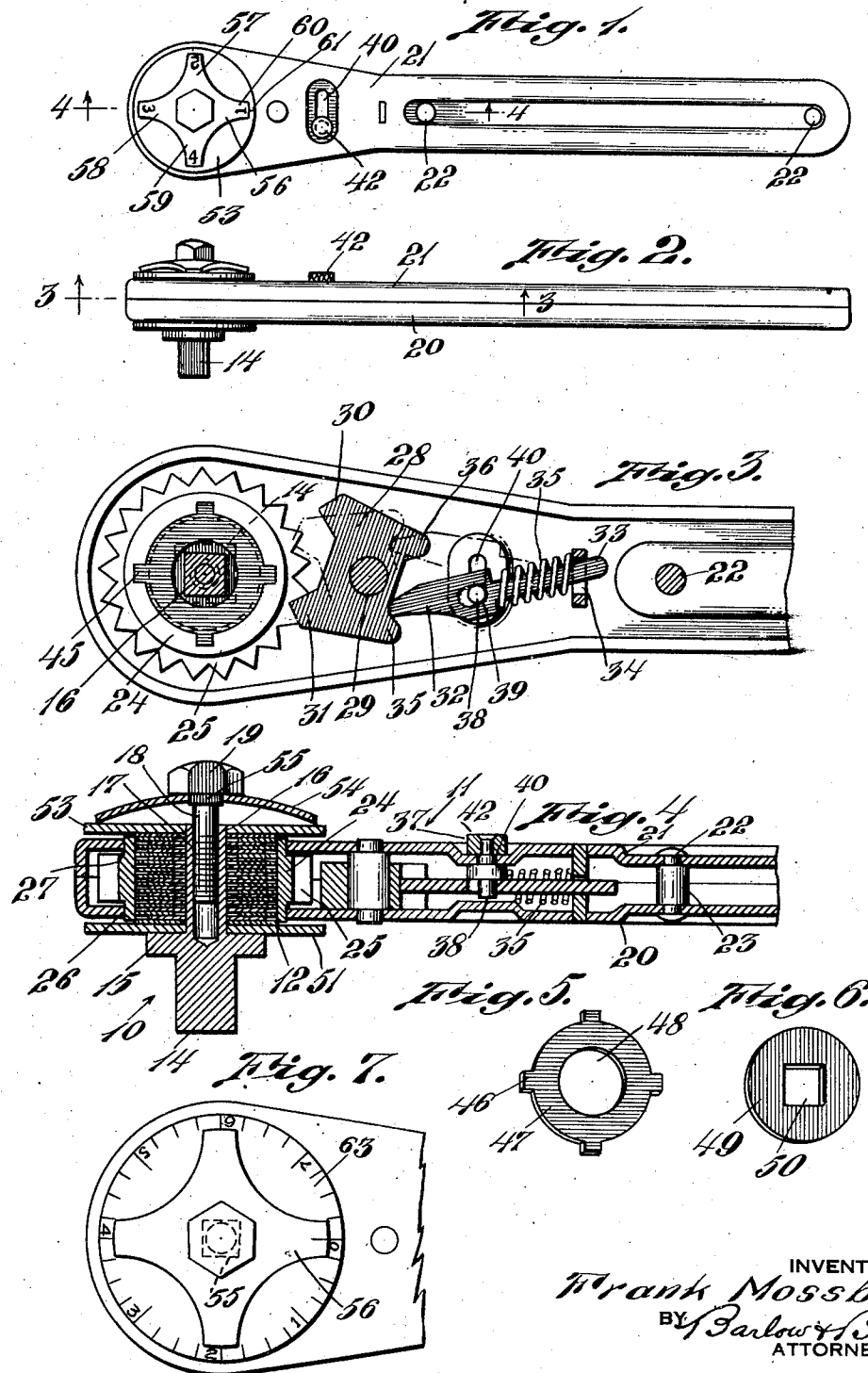
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F. MOSSBERG

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YIELDING RATCHET TORQUE WRENCH

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INVENTOR
Frank Mossberg
BY *Barlow & Barlow*
ATTORNEYS

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YIELDING RATCHET TORQUE WRENCH

Frank Mossberg, Attleboro, Mass.

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This invention relates to an adjustable tension wrench for use where it is desired that too great a strain will not be placed upon the work upon which the wrench is used.

Heretofore tension wrenches have usually been equipped with some sort of an indicator which the operator of the wrench must watch to ascertain the amount of pressure or turning force which is being applied through the wrench to the work. In cases where a slip friction is utilized the friction is applied between surfaces in such amounts that one surface tends to dig into the other surface to abrade the same to such extent that replacement must be effected rather early in the life of the wrench.

One of the objects of this invention is to provide a wrench so arranged that no indicator need be provided for observance of the operator but rather the wrench will slip after a predetermined amount of pressure or turning force has been applied so that any excess force will not be effective upon the work.

Another object of this invention is to provide an arrangement so that the amount of force or turning power applied upon the work may be adjusted for work of various sizes or strengths.

Another object of this invention is to provide a friction slip but to distribute the friction which is applied over surfaces of a large area so that the pressure per unit area will be relatively light and the surfaces will not dig into one another or wear excessively.

With these and other objects in view, the invention consists of certain novel features of construction, as will be more fully described and particularly pointed out in the appended claims.

In the accompanying drawings:

Fig. 1 is a top plan view of the wrench;

Fig. 2 is a side elevation thereof;

Fig. 3 is a fragmental view illustrating the top half of the wrench removed and illustrating the ratchet mechanism thereof;

Fig. 4 is a central sectional view upon substantially line 4—4 of Fig. 1 illustrating the series of friction discs in assembled relation about which this invention is centered;

Fig. 5 is a perspective view of one of these friction discs;

Fig. 6 is a perspective view of a friction disc of the cooperating set;

Fig. 7 is a fragmental view similar to Fig. 1 showing a modified marking arrangement.

In proceeding with this invention I assemble a plurality of friction discs with one set of discs locked to a member through which turning moment is applied to the work and with the other set of discs alternating therewith and locked to the lever for applying turning moment to the member. The amount of friction between the discs is varied by application through a resilient

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arched member which may be adjusted to vary the pressure upon the disc, indicating means being provided to show the amount of pressure which has been applied or the relative value of turning moment for the setting of the wrench.

With reference to the drawings 10 designates the member which either directly engages the work or engages some coupling which engages the work and through which turning moment is applied, while 11 designates generally a handle lever for applying turning moment to the member 10. The turning moment of the member 11 is applied to the member 10 through a set of friction discs 12 shown in Fig. 4 with an arrangement to control the pressure upon these discs so that they will slip when amounts of turning moment in excess of a predetermined amount is applied.

The member 10 consists of a square portion 14 having a flange 15 and an upwardly extending square stud 16 with a threaded hole 17 for the reception of a bolt 18 having a head 19.

The handle member 11 consists of two sheet metal pressed parts 20 and 21 which are assembled with their peripheral edges in contact so as to leave hollow portions within for the housing of actuating mechanism. The two parts are held together by rivets 22 with a spacing collar 23 between the parts. A cylindrical housing 24 is provided with ratchet teeth 25 and is reduced as at 26 at either end to provide shoulders 27, these reduced portions 26 extend into corresponding sized openings in the casing members 20 and 21 to provide a bearing for the mounting of the housing member 24 therein. The housing member is so mounted as to be free to rotate in the handle lever casing but is controlled by the pawl 28 pivoted as at 29 with two teeth 30 and 31. When the tooth 31 is in engagement with the ratchet teeth 25 movement of the lever clockwise, as shown in Figures 1 and 3, will cause the housing member to move with the lever while movement in the opposite direction will cause the pawl tooth 31 to ride over the teeth for a new grip. Conversely when the tooth 30 is in engagement with the ratchet teeth 25 as shown in the dotted line position in Fig. 3 movement in a counter-clockwise direction of the lever will carry with it the housing member 24 while movement in the clockwise direction will cause this tooth to ratchet over the ratchet teeth without exerting any turning movement thereon. The position of the pawl 28 is controlled by a dog 32 which has a tail piece 33 in a slot 34 with a spring 35 urging the dog toward the pawl where it may engage between the arms 35, 36 to urge the pawl in one direction or the other about its pivot 29. The dog is shifted from one position as shown in full lines in Fig. 3 to the dotted line position shown in Fig. 3 by a slide 37 having a finger piece 38 entering an opening 39 in the dog and itself slidable in a

slot 40 in the casing part 21 by means of the handle portion 42 which extends through the slot and is easily engageable by the operator.

The housing 24 is provided with a series of notches or recesses 45 here shown as four in number which receive the projections 46 of a set of discs 47 having a central hole 48 therein as shown in Fig. 5. Thus these discs are locked to the housing 24 and move with the lever. Another set of discs 49 is provided with one between each of the discs 47. As shown in Fig. 6 each disc 49 has a square hole 50 therein of a size to just receive and fit the stud 16 of the member 10. Thus, this set of discs 49 is locked to the member 10 which acts to apply a turning moment to the work. The discs 49 alternate with the discs 47 and also serve to center the member 10 within the housing 24.

A plate 51 rests upon the flange 15 of member 10 to support the lowermost of the discs of the sandwiched pile while a sheet metal member 53 has a square hole therein to fit the square stud 16 and surmount the pile of discs. Both of these members turn with the member 10, being secured thereto by means of square openings fitting on the square stud 16.

The resilient means for applying pressure upon the discs consists of an arched plate 54 having a square hole therein to receive the squared portion 55 of the bolt 18 so that this plate will turn with the bolt. As the bolt is turned down into its threaded socket 17 more pressure will be applied by the resilient plate by its being distorted from its arched shape shown. The plate instead of being circular is provided with a series of arms 56, 57, 58 and 59, which may have indicating markings such as 60 thereon, which arms may be caused to register with a datum line 61 on plate 53 so that some indication of the amount of pressure which is applied by the plate may be observed. For instance, number 1 may indicate a force applied which would be suitable for tightening a bolt of a quarter inch diameter, number 2 might be the force applied which would be suitable for tightening a bolt for a half inch diameter and number 3 might be the force which could be withstood by a bolt three-quarters inch in diameter, and number 4 might be the force which would be safely withstood by a bolt 1 inch in diameter. This indicating marking might be otherwise arranged for certain pressures by a scale 63 (see Fig. 7) reading about the periphery of the plate 53 with a datum line on one arm of the arched plate.

One set of discs such as 49 will be made of one material whereas the other set of discs will be made of a different material, it being desired that one set of discs will be of softer material than the other so that but one set of discs need be replaced when wear occurs, the softer set of discs taking the wear. For instance, I might provide one set of discs of hard steel and the other set of discs of chrome plated material. Another variation might be that one set of discs be of metal and the other set of discs be of some plastic material such as "Bakelite" or some of the other resinous plastics, different combinations being selected to obtain the coefficient of friction which is to be had.

It will be readily apparent that being of a friction type control no lubrication would be used between the discs as such lubrication would change the values of the pressures and render the marking inaccurate.

From the above it will be readily apparent that I have spread out the surface area over which friction occurs to a large extent by supplying a multiple of discs for the distribution of pressure. Thus no one disc or one unit of surface area has any excessive pressure applied upon it. Thus less wear at any unit area will occur and the device will last a longer time.

I claim:

1. In a wrench, a circular head rotatable relative thereto and provided with radially extending teeth, a handle extending radially from said head, a double action ratchet pawl pivoted on said handle for engaging said teeth for urging movement in one or the other selected direction, a work engaging member located within said head and having an axis concentric with the axis of said head and extending from one side thereof, and a friction clutch within said head concentric with said head and member and acting between said head and member for transmitting movement of the head to said member until a predetermined force is exerted and to then permit a relative movement between the head and member as said head is turned by the handle a spring coaxial with said head and on the other side thereof, for applying friction to said clutch and means for adjusting the spring for applying a predetermined force.

2. In a wrench, a circular head, a handle radial thereof and rotatable relative thereto, said head being provided with radially extending teeth, a double action ratchet pawl pivoted on said handle for engaging said teeth, a work engaging member located within said head and having an axis concentric with the axis of said head and extending on one side thereof, and a friction clutch within said head concentric with said head and member and acting between said head and member for transmitting movement of the head to said member until a predetermined force is exerted and to then permit a relative movement between the head and member as said head is turned by the handle, spring means on said work engaging member and on the other side of the head and means to adjust the pressure of said spring on said friction clutch to determine the torque at which relative movement of the head and member will occur.

FRANK MOSSBERG.

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