

[54] **AUTOMATIC RELEASE WRENCH OF THE PRESET TYPE**

[75] Inventor: **Talmage O. Green, Schaumburg, Ill.**

[73] Assignee: **Snap-on Tools Corporation, Kenosha, Wis.**

[22] Filed: **July 18, 1973**

[21] Appl. No.: **380,404**

**Related U.S. Application Data**

[63] Continuation-in-part of Ser. No. 166,003, July 26, 1971, Pat. No. 3,763,724.

[52] U.S. Cl. .... **81/52.4 R**

[51] Int. Cl. .... **B25b**

[58] Field of Search ..... 81/52.4, 52.5; 33/163; 73/139, 1 D

[56] **References Cited**

**UNITED STATES PATENTS**

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| 3,608,403 | 9/1971  | Green .....       | 81/52.5   |
| 3,763,724 | 10/1973 | Green .....       | 81/52.4 R |

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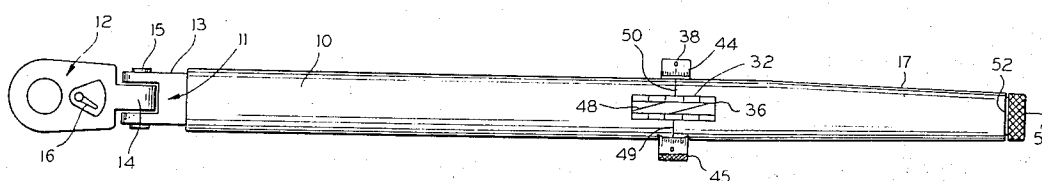
*Primary Examiner*—James L. Jones, Jr.

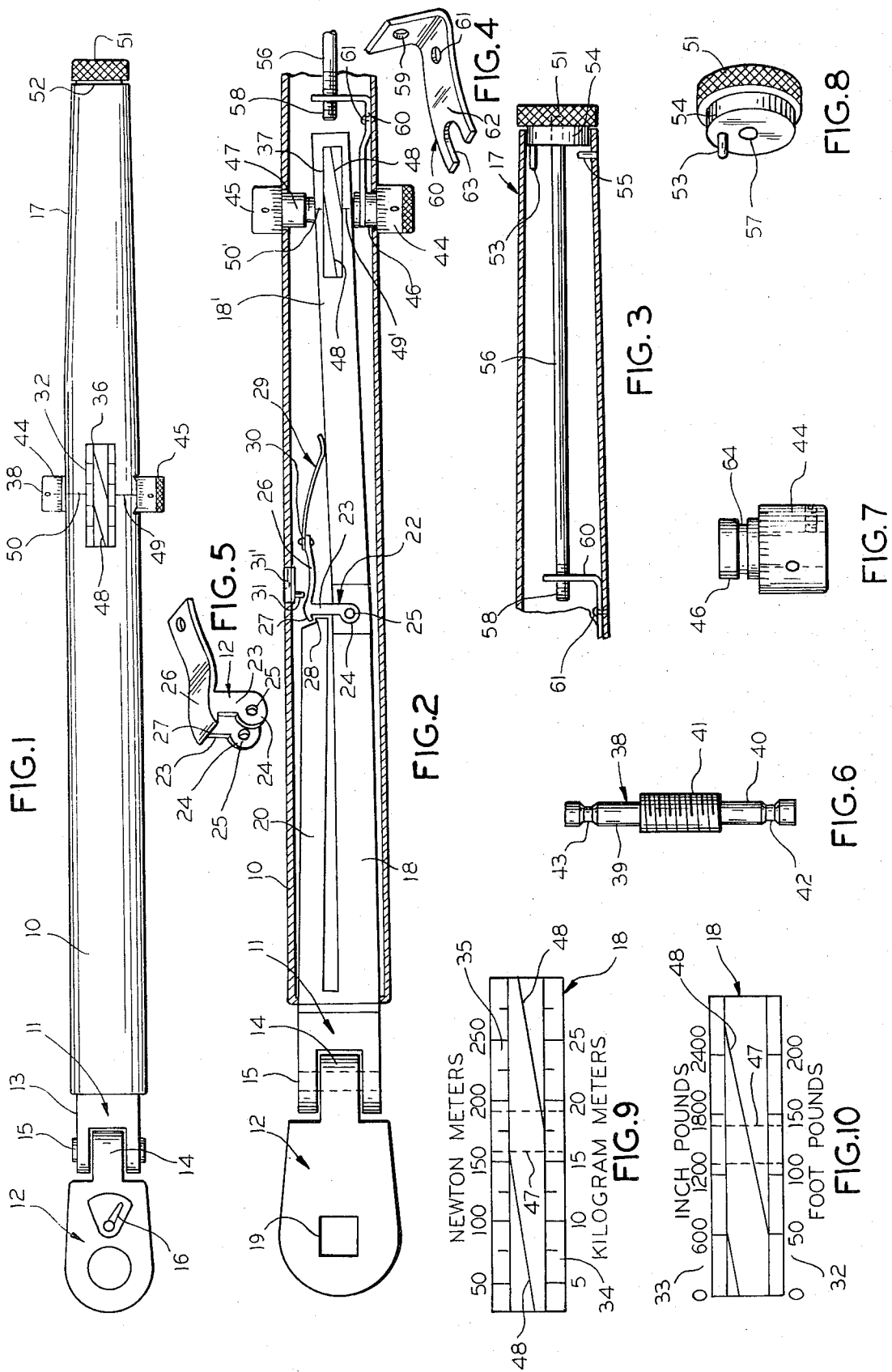
[57] **ABSTRACT**

The structure embodies an elongated tubular handle member with a work engaging member projecting

therefrom at one end thereof to provide a transverse shank to which detachable sockets of various standard sizes are applied to turn fasteners to a predetermined torque load. Confronting primary and secondary flex beams are disposed in the tubular handle member for engagement with each other and the work engaging member. A spring urged trigger release is movably mounted on one flex beam to cooperate with the other flex beam in the region of its maximum flex responsive to resisting the torque load, and this trigger release is in the path of the other flex beam end to normally engage therewith until the trigger moves with the flex of both beams to engage an adjustable obstruction depending from a wall of the tubular handle member, thereby mechanically releasing the connection therebetween to momentarily effect an audible and physically light arm impact disconnect signal. This requires the user to withdraw from the further application of turning force, and move back the handle slightly to reconnect the flex beams to their initial position prior to the repeat application of turning force to another fastener. An adjustable load preset mechanism is provided with micromatic beam positioning instrumentalities to accurately change the predetermined load at which the beams will disconnect automatically to preclude the further application of turning force without manually reestablishing the initial connection between the flex beams by turning back the unloaded turning handle until the instrumentalities reconnect to their initial position in readiness for the next fastener turning requirement.

**10 Claims, 10 Drawing Figures**





## AUTOMATIC RELEASE WRENCH OF THE PRESET TYPE

This application is a continuation-in-part of my application Ser. No. 166,003 filed July 26, 1971, now U.S. Pat. No. 3,763,724.

This invention relates to turning devices and more particularly to preset torque measuring wrenches of the type illustrated and described in U.S. letters Pat. No. 3,608,403 issued Sept. 28, 1971 although certain features thereof may be employed with equal advantage for other purposes.

It contemplates more especially the provision of a simple, dependable, accurate and compact torque measuring wrench that accurately designates and signals the preset force to be applied and upon reaching this torque load will release and momentarily preclude any further nut turning and similar turning movements under all conditions.

Most torque wrenches measure the flex in a beam or the torsional twist in a shank which resists the turning force of a wrench in order to determine the amount of torque or force applied in nut turning and similar operations. Both types of torque wrenches have been adapted to commercial wrench structures of the conventional handle or lever arm type as evidenced by U.S. letters Pat. Nos. 2,312,104 and 2,367,224. However, it is now deemed more effective for some production and repair operations, to preset a wrench of the type so that the desired nut or other fastener tightening load will be indicated and mechanically released during use to momentarily preclude further tightening thereof with simple and possible instant resetting thereof by the user for repeated application to a nut or other fastener for the same predetermined or any adjusted load release as will appear more fully hereinafter.

The desirability of utilizing the degree of twist in the shank or shaft or the flex beam principle as the measuring expedient in nut turning and similar operations, has been resorted to with success from the standpoint of measuring the applied turning load in relations to a calibrated meter that requires constant observations to reduce the human error factor to a minimum as illustrated in the above referred to letters patents; however, it is now known that predetermined tightening loads can be imparted to fasteners by incorporating presetting control instrumentalities to preclude variations in fastener turning applied loads without jarring the sensitive measuring elements thereof and, further, without relying upon the over-reaction or under-reaction of the user whose responses are not always uniform.

The importance of accuracy in torque wrenches cannot be over-emphasized, and the degree of accuracy depending largely upon the elimination of or substantial reduction in friction, lag and free-play between relatively moving parts. This is also important in torque wrenches that embody the principle of flexing a torque resisting beam to provide the desired reading; however, a mechanical release at the point of reaching the applied preset load, lends itself to torque wrenches of the beam flexing type with the teachings of the present invention.

The automatic predetermined torque release wrenches of the type illustrated and described in U.S. letters Pat. Nos. 3,608,403 and 3,763,724 have proved very successful and practical, but these were found rather expensive to produce because of the number of

parts involved so that with the teachings of the instant invention, simplicity and dependability have been accomplished to minimize production costs and simplify the adjustment to any predetermined load release within the capacity range of the device.

In accordance with the teachings of the present invention, the applied preset torque measuring principle has been embodied in the conventional type lever arm flex-beam wrench with minimum friction, lag, free play, and maximum translation. This has been accomplished to conjunction with presetting torque load indicator instrumentalities with minimal release impact to both the user and the instrumentalities. This is conducive to the avoidance of user discomfort and precluding errors and variations in reading and interpreting the usual indicators in all conditions of use. Torque measurements are possible, therefore, with a negligible error factor and nut turning operations are accurately applied under all conditions and capacities irrespective of human error and the position of applied force along the lever arm for effecting the turning operation.

It has been found in actual use of dial indicating torque wrenches, especially in repetitive production line operations, and in engine repair work that the attendant may not be distracted from an indicator dial or he may be working under tiring or difficult conditions to be sufficiently observant thereof or the dial positioned in such an obscure or inconvenient position for the purpose of nut turning with difficulty in normally inaccessible places so that accurate observations are difficult or impossible. Thus, there is little opportunity to read the dial and, therefore, the user of a torque wrench may not be in the position to determine with any great deal of accuracy the torque load that is being applied. Furthermore, human error may render otherwise accurate torque measuring instrumentalities ineffectual so that the present invention contemplates the elimination of human error and the other noted difficulties by providing simple automatic mechanical disconnect and connect control features that will convey to the user the knowledge that the applied torque has reached the predetermined value at which the measuring instrumentalities have been preset prior to the application of the device. To this end, it has been found desirable to provide simple disconnect and connect instrumentalities that render it mechanically impossible for the user to apply more torque load to a fastener than is initially intended without any overt act.

The physical indicator preferably takes the form of a trigger release mechanism operating responsive to a flex beam which will provide an automatic disconnect at the preset load so that the handle 10 will be momentarily ineffectual to apply more force for the further application thereof in nut turning operations. This construction provides partial releasing, since the two beams 18-20 bend together after initial fractional loading of the primary beam 18 to share the torque load. Thus, the wrench handle 10 travels a certain arc (degrees) to sustain the preset load when the secondary beam 20 releases by reason of the trigger 24 being displaced therewith to engage the obstruction which, in this instance, is a handle depending fixed interior pin 31 that causes a trigger 22 disconnect. Then the primary beam 18 must take over the full load and these occurrences cumulatively create a momentary interruption, a mild vibratory shock and some audible click due to the trigger disconnect serving as a signal to the

user who becomes conscious of the desirability not to over-pull by continuing the application of force.

The effect of this is to cause a sudden relaxation of part of the applied torque at the drive end 12 as the user knows he must then stop as advised by the aforesaid cumulative release signals. Normal relation of all the instrumentalities then takes place due to the straight natural at rest attitude of the secondary beam 20 when the latter passes to its no stress point upon release of the trigger 24 which is then spring-urged to return to its initial position of engagement with the secondary beam 20. The free end of the secondary beam 20 always maintains contact at some point with the unlatched trigger 22 even when the secondary beam 20 is released so that as it assumes its straight attitude re-latching of the spring urged trigger 22 is readily attained. This is aided by the fact that the primary beam 18 also assumes a straight attitude upon release and user relaxation to slightly displace the trigger 22 backwardly to assist in the re-latching trigger operation.

This would be true irrespective of the care exercised by the user or the position in which he was using the torque wrench or the inaccessibility of use which may preclude the direct vision to any calibrated indicator or measuring meter that has heretofore been used in devices of this character. These human failures have been entirely eliminated by utilizing mechanical disconnect instrumentalities that are responsive to the presetting instrumentalities when the torque load reaches the measurement for which the wrench is preset and the user receives the mechanical signal to relax his grip and stop applying further torque. It should be observed that when the full turning torque load is released, the impact thereof is substantially reduced because only a relatively small load is carried by the secondary beam 20 that is responsive to the preset load factor; therefore, the user is not jarred by the release operation but is significantly notified thereof so that he will unconsciously re-cock the handle 10 and apply the work engaging member 12 to another fastener for tightening to the same load.

One object of the present invention is to simplify the construction by substantially reducing the number of parts and simultaneously improve the operation of devices of the character mentioned.

Another object is to provide a more simple and compact preset torque measuring device that is accurate, dependable in operation, and embodies utmost simplicity in the presetting adjustment instrumentalities.

Still another object is to provide torque measuring turning tool having a simple micromatic presetting instrumentality with trigger release means which are self-restoring upon manual release thereof after the disconnect occurs.

A further object is to provide a self-contained torque measuring turning tool with simple and effective multiple calibrated screw adjusting instrumentalities for positive connection and disconnection of the load turning elements at any predetermined torque load with multiple capacity calibrations in a plurality of different measuring systems.

A still further object is to provide a torque wrench with a turning shank having trigger release and restoring mechanical controls serving as a mechanical release at a present load with a simple micromatic screw flexbeam preset mechanism in different measuring systems to insure accurate and rapid tightening of fasten-

ers without human intervention except for applying the load until a disconnect occurs.

Still a further object is to provide an improved presetting and releasing torque wrench consisting of a multiple calibrated micromatic screw preset control to mechanically interrupt the applied torque load without the user's involvement therein.

Other objects and advantages will appear from the following description of an illustrative embodiment of the present invention.

In the drawing:

FIG. 1 is a top plan view of the device embodying features of the present invention.

FIG. 2 is an enlarged sectional bottom view of the device shown in FIG. 1 taken substantially along the longitudinal interior bottom surface casing line of FIG. 1.

FIG. 3 is an enlarged fragmentary side view in elevation of the slide retainer rod within the rearward portion of the handle member, the rearward part of the handle member being shown in section to clarify the illustration.

FIG. 4 is an enlarged perspective view of the micromatic screw friction lock retainer shown in FIG. 2 to maintain the calibrated flex-beam and its screw member in adjusted preset position against accidental displacement.

FIG. 5 is an enlarged perspective view of the release trigger latch shown in assembled position in FIG. 2 between the primary and secondary beams.

FIG. 6 is an enlarged plan view of the micromatic screw which threadedly engages and displaces the calibrated flex-beam shown in assembled position in FIGS. 1 and 2.

FIG. 7 is an enlarged plan view of the calibrated knob which is attached to the ends of the micromatic screw shown in FIG. 6 that indexes the setting of the calibrated flex-beam.

FIG. 8 is an enlarged perspective view of the friction lock adjusting knob shown in FIG. 1 at the rearward handle end.

FIG. 9 is an enlarged bottom view of the calibrated flex-beam shown on FIG. 2.

FIG. 10 is an enlarged top plan view of the calibrated flex-beam region shown in FIG. 1, this being a different measurement system on the opposite calibrated surface of the flex-beam shown in FIG. 9.

The structure selected for illustration is not intended to serve as a limitation upon the scope or teachings of the invention, but is merely illustrative thereof. There may be considerable variations and adaptations of all or part of the teachings depending upon the dictates of commercial practice. The present embodiment comprises an elongated tubular handle member 10, in this instance of rectangular cross-section, to also serve as a housing for instrumentalities to be hereinafter described. The forward end 11 may have any suitable work engaging member extending therefrom, in this instance, has a projecting work engaging member 12 complementarily sized for frictionally grasping and closing the handle end 11 with reasonable tightness to preclude interaction therebetween. The work engaging member 12 may consist of a projecting furcated member 13 to which a complementary work engaging ratcheted head shank 14 is pivotally connected as at 15. The ratchet and/or pivotal head 12 may be of standard construction to provide tightening and loosening direc-

tional selection with the aid of the ratchet pawl control lever 16 or the latter may be utilized to tighten and loosen left-hand threaded fasteners which require handle oscillation opposite to right-hand threaded fasteners. For that matter, a plain work projecting head member may be substituted for the ratchet type 12 as illustrated in my prior letters patent cited supra.

The work engaging head 12 is preferably retained in the elongated handle 10 by means of a tight frictional telescopic fit therebetween or mechanically connected as commercial practice may dictate to apply turning force thereto by means of the handle 10 which is manually grasped at the other and reduced end region 17 thereof. As shown, the work engaging head 12 has, in this instance, a flex-beam 18 extending integrally therefrom and inwardly of the elongated handle member 10 for substantially the entire length thereof. This beam 18 serves as the primary bending or flexing beam which resists the turning movement applied to the handle member 10 when the work engaging head 12 has a standard wrench socket (not shown) on its polygonal shank 19 (FIG. 2) in registry with a nut or other standard fastener.

A secondary and shorter bending beam 20 is integrally or otherwise fitted, fabricated, or attached to each other and to the work engaging head 12-13 by any suitable means so that both beams 18-20 ultimately resist the turning movement applied through the handle member 10 as the preset load is approached and both beams 18-20 flex to apply the torque load as will appear more fully hereinafter. The secondary beam 20 is, in this instance, somewhat less than one-half the length of the primary beam 18 which flexes first to carry a trigger release mechanism 22 (FIGS. 2 and 5) in connecting operative relation to the secondary beam 20.

The trigger connecting and releasing latch mechanism 22 involves a substantially U-shaped inverted furcated member having vertical confronting lever arms 23 that terminate in enlarged ears 24 with axially aligned aperture 25 for pivotally connection with the primary beam 20 disposed therebetween proximate to its midpoint through a lever arm bridging pin 25 serving as a mount therefor. The upstanding trigger vertical lever arms 23-24 comprise an integral part of a lever arm curved bridging plate latch to present a horizontally and forwardly which has a projecting curved tongue 27 (FIG. 5) thereon for engagement and disengagement with the secondary beam 20. To this end, the trigger release latch tongue 27 confronts and is engageable with a stepped shoulder 28 provided on the rearwardly projecting end of the superposed secondary beam 20 for tiltable connection and release relative thereto as will appear more fully hereinafter.

The trigger release latch 22 is normally urged in a counterclockwise direction (FIG. 2) by a convexly curved flat spring 29 that is riveted as at 30 to the trigger latch bracket plate 26 opposite to its engaging tongue 27 thereon. The convexly curved flat spring 29 has its other end in contact with the upper edge of the primary beam 18 to normally tilt the trigger latch 26 in a counterclockwise direction (viewed from FIG. 2). This spring action normally provides detachable connection of the trigger release latch 22 with the stepped shoulder 28 at the free end of the secondary beam 20. This is effected through the trigger release latch tongue 27 to insure engagement between the primary and sec-

ondary beams 18-20 under and responsive to the torque turning load flex thereof. The trigger release latch engaging edge 27 has its upper curved surface 26 confronting any suitable obstruction to effect its release of the secondary beam 20, in this instance, a pin 31 depends downwardly from an adjustable mount 31' threadedly disposed through the housing wall to terminate in an exposed angulated head in the wall of the housing handle 10-17 to provide inwardly projecting adjustment of the pin 31. It should be noted that the pin mount 31' is a circular wafer-type disc threaded at its periphery or circumference to afford rotary adjustment to position the depending pin 31 that is eccentrically mounted thereon, relatively forward or backward to effectively vary the preset position of the trigger release latch 22 actuation. This changes the preset value at which the secondary beam 20 will be released from the primary beam 18, and also affords an effective initial adjustment to correct any value variations of release should such occur either upon completion of the torque wrench at the factory or during the use thereof in turning fasteners and the like. This required correction for a precise measuring instrument can be detected by utilizing periodically a torque wrench testing device of known types. By adjusting the pin mount 31' its distance from the convexly curved latch surface 26 is changed. This affects the predetermined load release point because the pin 31 serves as a stop to release the trigger latch 22 and stops further beam flexing.

This action releases the secondary beam 20 from connection with the primary beam 18 by pivoting the trigger release latch 22 in a clockwise direction (viewed from FIG. 2). At this moment, the load on both the secondary and primary beams 20-18 sequentially release respectively. The secondary beam 20 is unflexed by reason of the release actuation of the trigger release latch 22 and the flex of the primary beam 18 is released by the user's physical response to momentarily turn back the handle 10-17 in order to reset the mechanism. This allows the trigger release latch 22 to be restored to its initial position responsive to the urge of the convexly curved flat spring 29. The reconnection of the primary and secondary beams 18-20 is fully restored just as the preset torque load (manually applied by the user) has been reached. Thereupon, the work engaging head 12 may be either removed from the fastener and applied to another fastener for like tightening or held in readiness therefor. It should be observed that the curved flat restoring spring 29 extends from the trigger release latch 22 to engage the top edge of the primary beam 18 to normally maintain its engagement with the secondary beam 20 at zero or at intermediate torque turning loads until the preset load is reached.

At a point of flexing beams 18-20 to the predetermined load which occurs when the trigger release latch 22 is displaced against the urge of the spring 29 by the user's continued application of an increasing torque load until the beams 18-20 flex sufficiently and allows the trigger release latch 22 to contact the obstruction which is the pin 31. This causes the spring 29 to yield while the latch 22 pivots clockwise (viewed from FIG. 2) for effecting the trigger release and the latch disconnect between the beams 18-20, thereby momentarily allowing the manual release of the handle member 10-17 from further torque load application. This momentary disconnect audibly clicks and physically jars

the user lightly to signal the manual handle release of the applied turning torque load because the predetermined load has been reached and the handle member 10-17 should be slightly reversed in movement to reset the trigger release latch 22. This momentary disconnect allows for manual handle load release and tends to re-latch the trigger jaw 27 for engagement toward and onto the complementally stepped secondary beam stepped end-shoulder 28.

Thus, the described preset mechanism 22-28 and 29 and the position of the primary and secondary beams 18-20 are again operative to carry the torque turning load to the preset value or to readjusted preset load value depending upon the user's work requirements. With the work engaging member 12 in registry with a fastener (assuming the preset control is at a desired load setting, the gradual increase in the turning load will cause bending of both beams 18-20 and elevate the trigger release latch 22 until its uppermost arcuate surface 26 is disposed in the path of the stationary pin 31 and engages therewith to repeat the described cycle of operation. The initial flexing of the primary beam 18 say to one-half of the predetermined and preset load, and coincident thereto the secondary beam 20 becomes loaded for flexing therewith as the compounds beams 18-20 sustain the load together and continue to elevate the trigger release latch 22 until the latter is again obstructed by the housing mounted depending pin 31 to depress the trigger release latch 22 in a clockwise direction (viewed from FIGS. 2 and 5) until the connection at 27-28 is broken at the moment the turning torque load reaches the preset value to again repeat the cycle of movements described supra.

The user is immediately alerted by the mechanical disconnect constituting a definite audible and arm impact release signal that the preset load has been attained. This is accomplished by a preset control of extremely simple, accurate and effective calibrations etched, stamped or otherwise impressed in the opposite surfaces of the primary beam free end region 18' to define rectangular scale areas (FIGS. 9 and 10) represented by linear scales 32-33, in this instance, in foot pounds and inch pounds, respectively, on one side (FIG. 10) and, in this instance, in Kilogram Meter and Newton Meter scales 34-35, respectively, on the other side (FIG. 9) of the primary beam end region 18'. These calibrated rectangular areas are delineated by aligned viewing openings 36-37 of rectangular configuration on opposite parallel walls of the housing handle member 10-17 for registry with the calibrations 32-33 and 34-35 impressed respectively on the opposite surfaces of the primary beam 18-18'. When this interruption occurs at the time the preset load has been reached and the release latch 22 has been effected at the preset load, the primary beam 18 still retains a marked reserve of elasticity which reduces the amount of over-torque to fasteners even though the user inadvertently pulls through a greater arc than the preset load calls for upon release.

In order to provide for accurate preset loads adjustments, a finger manipulating and rotary micrometer related stud shaft 38 (FIG. 6) is provided. The stud shaft 38 has similarly reduced shaft ends 39-40 with an intermediate and enlarged threaded portion 41 comprising part of an adjustable micromatic preset release mechanism. The end regions 39-40 of the stud 38 are provided with annular grooves 42-43 to which finger

turning micrometer knobs 44-45 are attached by any suitable means such as Allen set screws or the like. To this end, the knobs 44-45 have reduced tubular shanks 46 (FIG. 7) for enabling their attachment to the reduced ends of the micrometer stud 38. To this end, suitable set screws (not shown) are provided through the knobs 38-44 to engage the annular grooves 42-43 of the micrometer screw 38. The enlarged threaded stud shoulder 41 of the micrometer screw 38 is in threaded engagement with interior bores 47 provided through the primary beam end region 18' intermediate the ends of the calibrated surfaces 33-34 thereof so that the latter may be manually pre-flexed and displaced by either calibrated knob 38 or 44 depending upon the measurement system involved in the setting.

The knobs 38 and 44 are cylindrically impressed with calibrations 44 and 45 which cooperate and are tied-in with the linear calibrations 32-33 and 34-35, respectively, on opposite surfaces of the beam end region 18' (FIGS. 1 and 2). These calibrations are interconnected by inclined lines 48 coordinated therebetween for pre-setting with extreme accuracy in relation to indexing lines 49-50 on the exterior surface of the housing 10 midpoint of the viewing openings 36-37 therein. As the calibrations 32-33 or 34-35 come in view and the inclined lines 48 meet with the indexing lines 49 or 50, the predetermined torque load is pin-pointed thereon or therebetween with the aid of the micrometer calibrations on the knobs 44-45 which coordinate the calibrations 32-33 or 34-35 therewith in relation to the indexing lines 49-50.

The inclined calibration connecting lines 48 have an angle rate that is coordinated with the pitch of the threads 41 and the calibrations on the knobs 44-45. These calibrations are a function of the pitch of the threads 41 or the number of threads per inch. Assuming the width of the window 36 to be 1 inch, the inclined lines 48 will progress across the full opening width responsive to a full turn of the knob 44 or 45 from zero (0) to full scale or the line traverse will be one full inch across the viewing openings 36-37. The consequent linear traverse progresses the equivalent of one linear inch of threads 41 which is the correlation therebetween to calibrate for 1 foot-pound on scale 32 and 12 inch-pounds on scale 33 (FIGS. 6, 9, and 10). The other measurement scales 34-35 on the bottom or reverse side of the housing or handle 10 are commensurately calibrated with equal ease. This enables the corresponding calibration for the full capacity of the compound beams 18-20. The scale viewing openings 36-37 are sufficiently long to enable the visual reading of the full scale of calibrations 32-33 and 34-35 so that the knobs 44-45 will be preset at any given value over the full extent of the selected measurement scale commensurate with the full functional capacity of the torque load for which the selected plural beams 18-20 are designed.

It should be noted that the depending stud 31 constituting the confronting stop for the trigger latch 22, is mounted in and through the wall of the handle 10-17 by its exteriorly threaded mount 31'. It may be desirable to provide a special top and indentation in the mount 31' which is an accessible through the wall of the handle 10 for registry with a complementary screw-driver head (not shown) for registry therewith to enable ready adjustment for initial zero adjustment or

compensation for normal minor variations over extended periods of use. The mount 31' provides for the required beam flex or the extent of beam flex by adjusting the depending position of the stud 31 which accurately obstructs the trigger release latch 22 upon reaching the desired preset load. The depending stud mount 31' threadedly extends through the handle 10-17 so that its stud 31 is accurately distanced from the trigger latch surface 26 at the proper beam flex for the predetermined knob setting commensurate with the applied torque load for fastener turning. Contact between the depending stud 31 and the trigger release latch surface 26 occurs sooner or later depending upon whether or not the stud 31 is properly distanced relative to the trigger latch surface 26 carried by the beams 18-20. Thus, the reading for which the release trigger latch 22 is preset will be effected to conform with the results indicated, this can be accurately determined in advance of use while under test with a special torque load tester such as but not limited to the type illustrated in U.S. letters Pat. No. 3,255,624 issued May 31, 1966.

Torque loading by turning fasteners tight to a preset degree of tightness, is not always accomplished manually in a plane normal to the axis of the work engaging head shank 19, but mechanics inadvertently apply turning force to the handle end 19 at abnormal angles and this may cause or tend to cause the beams 18-20 with the trigger latch 22 to contact and rub against the side walls of the handle 10 serving as a housing therefor. This friction would reflect upon the accuracy of the preset release and it is desirable to minimize such friction by keeping the beams 18-20 in longitudinal alignment in the housing handle 10 to avoid contact therewith even under such abnormal turning conditions. It should be noted that the preset position of the calibrated knobs 44-45 should be locked against accidental turning during the turning movement of the handle 10-17 while applying the torque load or during the non-use thereof. This may be accomplished by providing a knurled knob 51 complementary to and sized to correspond with the open circular end 52 of the handle end region 17 for journaled association therewith. A short stud 53 extends longitudinally inwardly from the knob hub collar 54 to project into the patch of another short stud 55 projecting radially relative to the hub collar 54 and parallel thereto for limiting the rotation of the knob 51 to approximately one revolution in both directions (FIGS. 3 and 8).

An elongated rod 56 extends axially within the end region of the cylindrical handle end region 17 for press-fitted connection within the axial recess 57 (FIG. 8) in the inner knob collar 54 to rotate therewith. The inner end 58 of the knob rod 56, is threaded to engage a correspondingly threaded aperture 59 in an angular flat spring lock strap 60 (FIG. 4) that rocks for a very limited degree on its rivet mount 61 loosely anchored to the inner wall of the handle 10 in the end region 17 thereof. The spring lock strap 60 has a slightly curved arm 62 terminating in an open curved bifurcation 63 which frictionally fits into an annular groove 64 provided in the collar 46 formed integral with the calibrated knob 44 (FIG. 7). Any rocking displacement of the spring plate 60 occasioned by the slight rotation of the knob 51 will vary the friction holding engagement between the spring lock strap bifurcation 63 and the knob groove 64, thereby holding the knob 44 with its threaded stub shaft 38 in its preset adjusted position.

By minimizing the friction of the strap bifurcation 60 through rotation of the lock knob 51, the preset position of the beams 18-20 may be changed to suit the requirements of the work at hand. After presetting, the lock knob 51 is again turned for the friction retention thereof. The lock knob 51 may be properly marked on its end surface to designate the off-on lock positions thereof. It will be appreciated, therefore, that the reduced number of parts involved in this preset type of torque wrench so that minimum production expense is involved and simplicity of operation promotes utmost dependability as well as accuracy.

Various changes may be made in the embodiment of the invention herein specifically described without departing from or sacrificing any of the advantages of the invention or any features thereof, and nothing herein shall be construed as limitations upon the invention, its concept or structural embodiment as to the whole or any part thereof except as defined in the appended claims.

I claim:

1. A preset torque wrench comprising a rigid elongated tubular handle member, a pair of superposed flex beams disposed along and within said elongated tubular handle member, a work engaging head member anchored to both of said flex beams and projecting within said tubular handle member, a trigger release latch mechanism on one of said flex beams to engage the other flex beam after a partial load is impressed upon said first named flex beam to displace said trigger release latch therewith for detachable engagement with the second named flex beam so that both beams flex to carry the preset load beyond the initial load sustained alone by said first named flex beam, whereby the further application of a turning load continues until said trigger latch is deflected by an obstruction in the path thereof to release the last named flex beam from the first named flex beam in order to preclude further effective turning of the fastener by said work engaging member, and calibrated micromatic preset torque release setting means on said handle member in operative engagement with one of said flex beams to cooperate with inter-related calibrated scales on said last named flex beam to initially preset the position of said trigger release latch means relative to the obstruction in the path thereof to control the torque load release of said trigger release latch mechanism.

2. A preset torque wrench defined in claim 1 wherein said preset means include a calibrated micromatic screw member in threaded connection with one of said flex beams to accurately position the latter with said trigger release latch mechanism thereon.

3. A preset torque wrench defined in claim 1 wherein an adjustable obstruction is disposed in the path of said trigger release latch mechanism to disconnect said flex beams upon applying a preset torque turning load through said work engaging member, and the preset means include a micromatic screw to vary the initial position of the flex beams relative to inter-related scales thereon to control the release responsive to said adjustable obstruction.

4. A preset torque wrench defined in claim 2 wherein said calibrated micromatic preset means are in threaded connection with one of said flex beams to cooperate with inter-calibrated scales thereon to accurately preset the load at which the trigger release latch

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means effect a disconnect between said superposed flex beams.

5. A preset torque wrench defined in claim 2 wherein said calibrated micromatic screw preset means cooperate with calibrations on one of said flex beams to accurately preset the torque turning load at which the trigger latch will release the connection between said flex beams, there being a visual opening in said handle member to expose the flex beam calibrations which are inter-related to said micromatic preset means, and means for changing the torque load at which the release of said latch means is effected.

6. A preset torque wrench defined in claim 1 wherein said calibrated micromatic preset load release means include a stub shaft journaled in said handle member to threadedly engage one of said flex beams having inter-related calibrations to index the position thereof through a visual opening in said handle member relative to said trigger release latch obstruction, and means other than said last named means to initially position said trigger release latch means to correct the preset torque load at which said secondary beam is released from connection with said other beam.

7. A preset torque wrench defined in claim 6 wherein said stub shaft has two micromatically calibrated knobs thereon to cooperate with calibrations on both sides of the flex beam, therebeing visual openings in said handle member confronting said last named calibrations to

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provide accurate initial positioning of said last named flex beams with said calibrated knobs inter-related therewith.

8. A preset torque wrench defined in claim 7 wherein said handle member has two viewings openings on opposite sides thereof to confront and expose the inter-related calibrations on said calibrated flex beam.

9. A preset torque wrench defined in claim 8 wherein said superposed flex beams are initially connected by said trigger latch release and said micromatic preset means initially move the trigger connected flex beams to a calibrated predetermined initial position.

10. A preset torque wrench defined in claim 1 wherein one of said superposed flex beams is shorter than the other to provide a long primary beam and a short secondary beam with said trigger release latch pivotally mounted on said primary beam in the path of the free end of said secondary beam for connection and release relative thereto, and micromatic screw means threaded through said primary beam to preset the initial position of both flex beams relative to the obstruction in the path thereof as said beams were flexed by the applied torque load, there being visual openings in said handle member to confront said primary beam, and inter-related calibrations on said micromatic screw means and primary beam aligned with said visual openings in said handle member.

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