

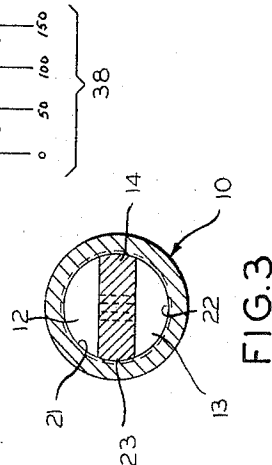
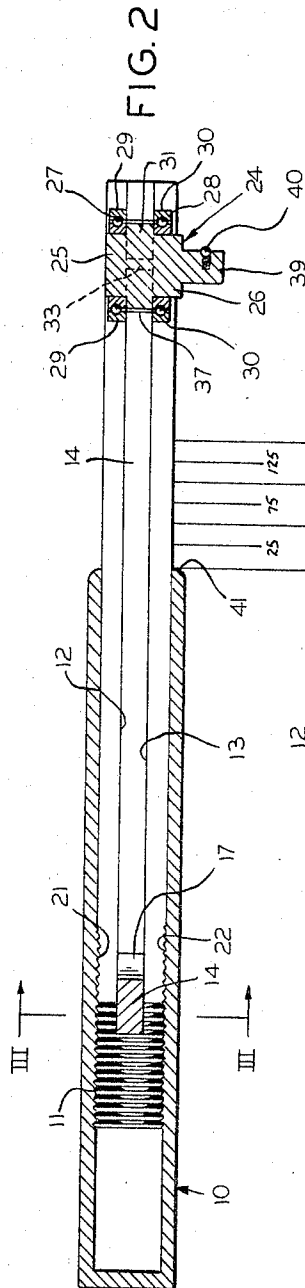
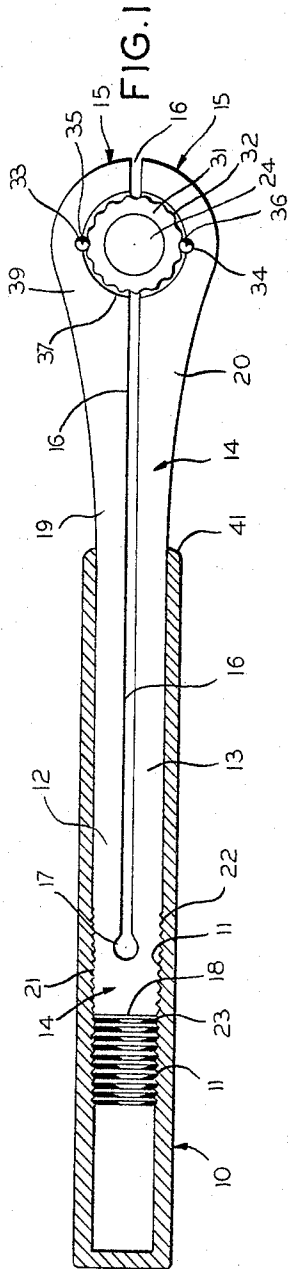
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PRE-SET TORQUE MEASURING DEVICE

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PRE-SET TORQUE MEASURING DEVICE

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This invention relates to torque wrenches and more particularly to pre-set torque wrenches having special application to industrial uses on production line operations, although it may be employed with equal advantage by mechanics and others servicing individual devices such as but not limited to automobiles and the like.

It contemplates more especially the simplification of pre-set torque wrenches of the type described and claimed in my Letters Patent No. 2,852,972, dated September 23, 1958 providing a wide range of prescribed loads which may be applied for fastener tightening and loosening so that any excess turning force applied will mechanically release the turning connection between the handle and work engaging member to preclude load turning beyond the pre-set amount.

With the teachings of the present invention, the torque resisting flexure is measured between a work engaging member and a handle member that are operatively connected together by clutching and de-clutching elements of exceedingly simple construction and which may be accomplished with a variety of mechanical expedients to effectuate a release therebetween when the applied turning load exceeds the pre-set resisting flexure forces. This is accomplished in the preferred embodiment for illustrative purposes by utilizing a ratchet type revoluble member cooperating with opposed detents which retain the engagement between the work engaging member and the handle member until the latter spreads to permit the detents to ride over the ratchet-type circumferential member responsive to applying a load in excess of the resistance offered by the partially bifurcated handle member. This eliminates human errors in reading meters or visual indicators as well as enables the fastener accomplishment of uniform applications of torque loads in repeated tightening operations on a production line as well as in other applications.

One object of the present invention is to simplify the construction and operation of devices of the character mentioned.

Another object is to provide a simplified mechanical release for torque wrenches and the like when the turning load exceeds the pre-set limit.

Still another object is to provide a simple and inexpensive torque turning mechanism which will release the turning connection when the applied load exceeds the pre-set amount.

A further object is to provide a torque wrench which will release the mechanical connection between the work engaging and handle members responsive to attaining a pre-set load turning applied force.

A still further object is to provide improved and less expensive presetting and release means to preclude any applied force in excess of the predetermined setting thereof.

Still a further object is to provide a work engaging and handle members with simple and inexpensive releasable connectors of the clutching and de-clutching type which utilizes a partially furcated handle member that which provides a torque resisting flexure cooperating with the work engaging member.

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

In the drawing:

FIGURE 1 is a sectional view in elevation taken

through the handle member sleeve to clarify the illustration of the other parts.

FIGURE 2 is another sectional view in elevation taken through the handle member sleeve and work engaging member taken at a forty-five degree angle relative to the viewed position in FIGURE 1.

FIGURE 3 is a sectional view taken substantially along line III—III of FIGURE 2.

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 invention comprises an elongated tubular handle member 10 which, in this instance, is interiorly threaded as at 11 for a substantial distance to receive correspondingly threaded and complementary sized telescopic shank members 12–13 comprising part of the furcated handle shank 14. The handle shank 14 is, in this instance of elongated flat configuration so that the furcated end 15 may be arcuately curved at its outer end to conform with the circular configuration of the revoluble member confined therein as will appear more fully hereinafter.

The handle shank 14 is furcated for the substantial portion of its length, in this instance by the elongated slot 16 extending along the longitudinal median line thereof to terminate in an enlarged lower fillet 17 to present confronting torque resisting flexure by creating a spreading urge thereon between the handle shank furcations 19–20 to render the handle shank 14 resilient between the slitted furcations 19–20 thereof and extending therefrom. Beryllium copper or other alloys or metals having a long-life resiliency factor without any appreciable variations therein, may be utilized to advantage in fabricating the torque flexure resisting furcations 19–20 of the torque responsive member 14. The specified beryllium copper remains accurately responsive to the spreading urge imparted to the confronting sprung shank members 19–20 which are separated for most of their length by the slot 12 that extends downwardly to the end fillet 17 in the member 14 proximate to its lower end 18. An infinite number of flexings brought about by applying a torque load to the work engaging member as will appear more fully hereinafter, are imparted to the shank members 19–20 to release their connection with the work engaging member to be hereinafter described.

It should be noted that the confronting plates 12–13 that extend into the divergently flared shank members 19–20 formed integral therewith, are shaped to correspond with the shape of the interior of the tubular handle member 10 serving as a casing therefor. The lower end 18 of the torque responsive member 14, are exteriorly threaded as at 21–22–23 to engage the internal complementary threads 11 of the tubular handle member 10 to displace the plate and shank members 12–13 and 19–20, respectively, along the longitudinal axis thereof relative to the elongated tubular handle member 10 in order to regulate the flexing reaction of the divergently flared shank members 19–20 to render such commensurate to the moment arm or torque load applied to the handle member 10.

The flexing of the outwardly sprung shank members 19–20 is accomplished through a work engaging member 24; however, the relative rotation of the tubular handle member 10 in relation to the shank members 19–20 so that the latter are brought closer together and thus require relatively larger torque loads to accomplish the outward flexing thereof, may be pre-set by a series of calibrations or calibrated lines 38 which are provided on the shank members 19 or 20 or both for setting relative to the outer circumferential edge 41 of the tubular

handle member 10. The work engaging member 24 has confronting hubs 25-26 for journalled mounting in ball bearing raceways 27-28 confined in circular recesses 29-30 provided proximate to the outer ends of the confronting casing plate members 12-13. An enlarged circular collar 31 having a serrated ratchet-type peripheral toothed circumference 32 comprising, in this instance curved nodes and valleys simulating a ratchet wheel, is formed integral between the work engaging hubs 25-26 to carry diametrically opposed rollers 33-34 rotatively carried in substantially semi-cylindrical recesses 35-36 provided in the bearing bore 37 which is defined between the slitted and sprung shank members 19-20 to conform with the radius and curvature of the shank heads 15 for axial alignment with the shank member recesses 29-30.

The work engaging member 24 has a polygonal stub 39 provided with a suitable wrench socket retainer such as but not limited to the standard spring impelled ball detent 40. With this arrangement, variously sized wrench sockets (not shown) may be detachably fitted to the stub 39 for registry with threaded fasteners such as standard nuts or other fasteners for turning to any predetermined torque load as controlled by the threaded relationship between the tubular handle member 10 and the confronting plates and shank members 12-13-19-20 with reference to the calibrated indicia 38. When and if the torque applied load impressed by the manual turning of the handle member 10 exceeds the pre-set amount registered by the indicia 38 relative to the tubular handle open peripheral edge 41, then the shank members 19-20 will be flexed apart sufficiently to spread their head portions 15 sufficiently to permit the rollers 33-34 to be carried therewith so that they will ride over the nodes of the serrated peripheral shoulder 32. This will disconnect the handle members 10-12-13-19-20 relative to the work engaging member 24 so that further or continued turning movement will not be imparted thereto, and the fastener is no longer tightened but remains stationary owing to the fact that the rollers 33-34 will ride over the serrated periphery 32 of the work engaging member 24.

The structure described is very simple, inexpensive, and effective to allow the fasteners to be effectively tightened without requiring the operator to observe the calibrated indicia once the desired torque has been pre-set and successive fasteners can be tightened to the same degree without any further adjustment or the exercise of any care in that the handle member 10 with its confronting sprung plates and shank members 12-13-19-20 are ready to engage the work engaging member 24 for immediate re-application of the torque load to another fastener. The release of the torque load by the mechanical disconnection between the rollers 33-34 and the serrated peripheral shoulder 32, promptly informs the attendant that the pre-set torque load has been attained without any possible error or mistake of judgment or responsive act on the part of the attendant or user.

While I have illustrated and described a preferred embodiment of this invention, it must be understood that the invention is capable of considerable variation and modification without departing from the spirit of the invention and its concepts. I, therefore, do not wish to be limited to the precise details of construction set forth, but desire to avail myself of such variations and modifications as come within the scope of the appended claims.

I claim:

1. In a torque measuring wrench, the combination with a handle member, of a torque responsive sprung member adapted to yield commensurately with torque loads transmitted therethrough in conjunction with said handle member, a work engaging member journalled in said torque responsive sprung member, and complementary clutching and declutching means interposed between said torque re-

sponsive sprung member and said work engaging member to transmit the applied torque load to said sprung member when the torque load is below a pre-set value and for declutching said handle and torque responsive member from said work engaging member when the applied force is beyond the pre-set value of said sprung member.

2. In a torque wrench of the type defined in claim 1 wherein said sprung member comprises an elongated furcated shank member adjustably connected to said handle member to pre-set the limit at which said declutching means become operative.

3. In a torque wrench of the type defined in claim 2 wherein said clutching and declutching means include a serrated roller reaction element to impart torque flexure to said sprung member when the torque load applied exceeds the pre-set value controlled by said handle member.

4. In a torque wrench of the type defined in claim 3 wherein the handle member is tubular and the torque responsive sprung member is partially therein confined with an adjustable threaded connection therebetween.

5. In a torque wrench of the type defined in claim 4 wherein the torque responsive sprung member comprises a flat elongated resilient member of confronting furcated symmetrical parts having complementary openings in an outwardly flared head portion thereof to define a bore for said work engaging member.

6. In a torque wrench of the type defined in claim 2 wherein the elongated furcated shank member is longitudinally grooved along the median line thereof and for substantially the entire length to present split head portions that are resilient relative to each other.

7. In a torque wrench of the type defined in claim 6 wherein the furcated shank split head portions have complementary confronting openings forming a circular bore, a ball bearing raceway in said bore, and a work engaging member journalled in said ball bearing raceway.

8. In a torque wrench of the type defined in claim 7 wherein one or more rollers are rotatively mounted in the split head portion bore to protrude partially therefrom, and a serrated peripheral shoulder on said work engaging member to cooperate with said roller or rollers to connect and disconnect the work engaging member relative to said handle member for declutching when the torque applied turning load exceeds the pre-set load limit.

9. A torque wrench of the type defined in claim 8 wherein the handle member is threadedly connected to said torque responsive sprung member to adjustably pre-set the load limit at which the sprung member permits the roller or rollers to declutch relative to said serrated peripheral shoulder on said work engaging member.

10. A torque wrench of the type defined in claim 4 wherein the torque responsive sprung member is calibrated relative to said handle member to impart greater or lesser resilience to said sprung member directly proportional to the applied torque load for controlling the limit of declutching between said handle member and work engaging member.

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