

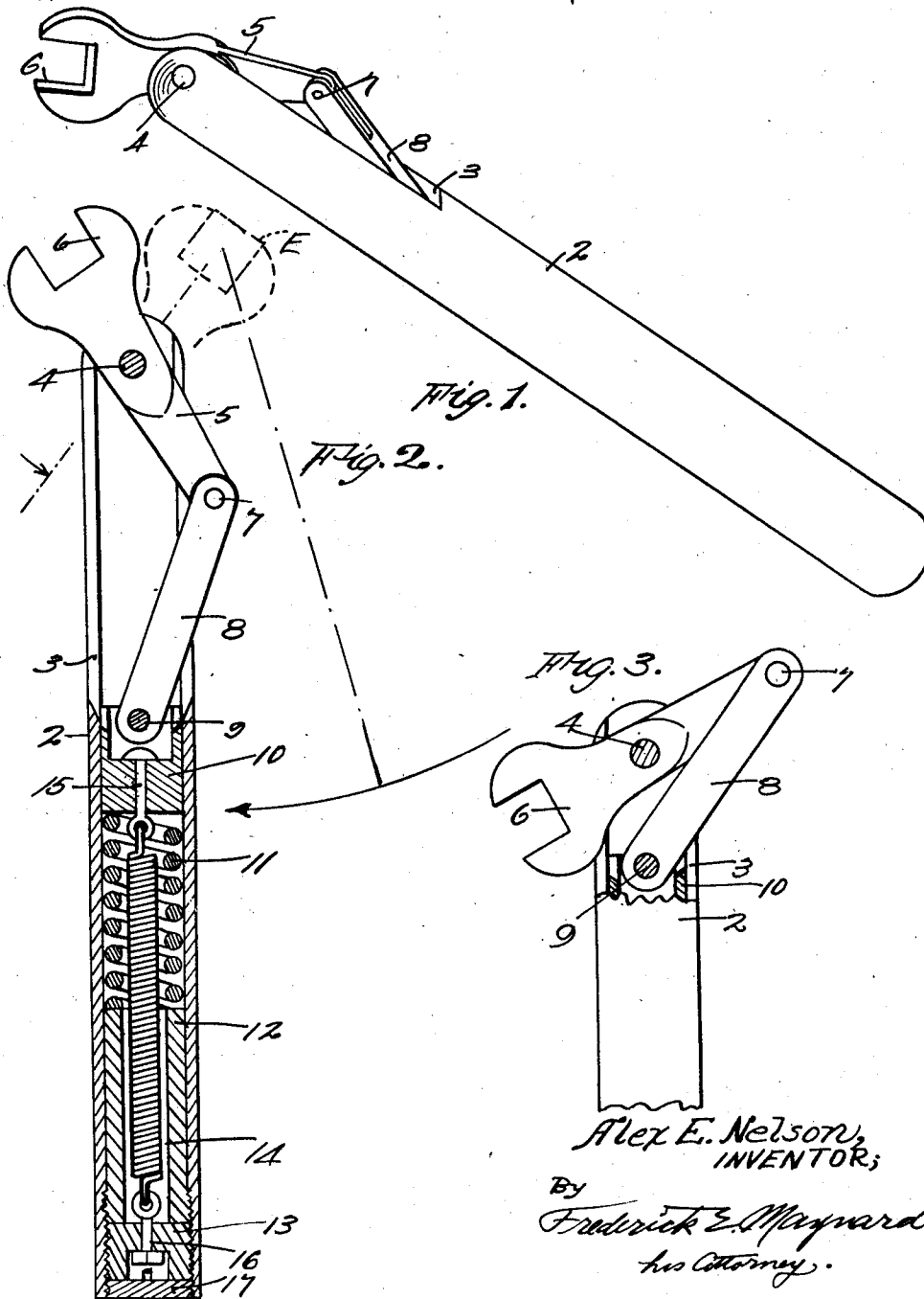
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FIXED MAXIMUM TORQUE TENSION WRENCH

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FIXED MAXIMUM TORQUE TENSION
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This invention is a hand, nut or bolt setting wrench.

In many industries and in many kinds of devices, and especially in erection of airplanes large numbers of machine screws and bolts are used. From lack of interest, or carelessness, or poor judgment, and lack of mechanical training, and of too much haste, these machine elements are either under tensioned, and become loose—or are over-tensioned by hand wrench torque, or by the use of conventional types of torque tension wrenches in which no maximum tension control is possible except by reading of gauges, or using signal devices, which is often the cause of the bolts being broken off or given more tension than is safe so that when more tension is set up in the bolt due to applied load the screw or bolt shank, so over-stressed, may break in two.

In airplanes, if the bolts which fix the outer wings to the inner wings are not, in the great majority, properly set tight the wing will likely shear off the gang of bolts when the wing takes on great air resistance. An object is to provide a simple, practical, strong and reasonably low-cost hand wrench, whereby in the intended range of force of the tool, a predetermined amount of tension will be set up in the tightened screw or bolt, as the case may be, and no more. Another object is to provide an automatic action wrench that will self-trip, when the predetermined bolt tension has been reached, over to a position from which further tension cannot be applied to the bolt.

More particularly, it is an object of the invention to provide a hand wrench wherein a handle is provided with a suitable nut or bolt-head receiving jaw operatively mounted on the handle under constant control, and is yieldably supported under work load whereby to enable the application of a fixed degree of torque desired as the maximum to set the desired amount of tension in a nut-or-bolt shank. Further it is an object of the invention to provide a maximum tension hand wrench in which means are incorporated for the regulation of the tension determining device, and, for safety, for the sealing of the tool to prevent tampering with the adjusting means.

The invention consists in certain advancements in the wrench tool art as set forth in the ensuing disclosure and having, with the above, additional objects and advantages as hereinafter developed, and whose construction, combinations and details of means, and the manner of operation will be made manifest in the following description of the

herewith illustrative embodiment; it being understood that modifications, variations and adaptations may be resorted to within the spirit, scope and principle of the invention as it is more directly claimed in the addendum.

Figure 1 is a perspective of the wrench showing the jaw in tripped off position.

Figure 2 is an axial section, with some elements of the tool in face elevation the jaw being shown in normal position by dotted lines.

Figure 3 shows the fully collapsed jaw mechanism, following automatic trip of the wrench at dead-center of the link.

The tool may be of any desired size-capacity and of any desired material, and here includes a substantial, preferably cylindrical, suitable length handle 2; most economically made of metal tubing. What may be considered as the head end of the handle is diametrically bifurcated at 3 and has a transverse pivot pin 4 on which is mounted a strong lever 5 whose inner end plays through the slot 3 from side to side of the handle.

The outer end of the lever 5 is here shown as having an open-side jaw wrench 6, though it is to be understood that any desired jaw or box, or ratchet wrench device may be adopted.

The inner end of the lever 5 is connected by a pivot 7 to the near end of a pitman link 8 having pivot 9 connection with a piston-like block 10 slidably operative in the bore of the tubular handle 2. The inner end of the block 10 constantly rests on a bolster spring 11 of considerable resistance to a compressing force—as from the block 10. It is desired that this resistance may be closely regulated for purpose later set forth and it is therefore supported at its inner end by a device capable of axial movement in the handle and lockable against outward movement, that is, away from the head end of the handle. The spring support here consists of a tubular, inner barrel 12 abutting the spring 11 at one end and at its opposite end bearing on a plug 13 which is screwed into the foot or rear end of the handle 2.

Means are provided to normally hold the piston block 10 snugly to the bolster spring 11 at all times and incidently to hold the wrench jaw 6 in a normal, presented or nut or bolt head receiving position at the head of the handle. This control means includes a tug-spring 14 axially disposed in the handle 2 and in the barrel 12 and hitched by a swivel-pin 15 to the block 10 and by a swivel shank 16 to the screw plug 13. Only a light tension in the tug-spring 14 is required to hold the block 10 on the bolster spring 11.

The operation of the wrench

A nut E is shown in dotted lines in Fig. 2 and when screwing up a right-hand nut (or bolt) the operator simply sets the wrench jaw to the dotted line position on the nut and keeps turning the tool and the nut, clockwise, until, finally, the nut is so hard clinched that a strong effort must be given the tool handle up to such a degree that the lever 5 begins to tilt on the pivot pin 4 and toward the handle as indicated by the arrow at the left of the handle and the link 8 forces back the piston block 10 so far that the lever and the link come to dead-center alinement, relatively at which moment the spring 11 will automatically react to force the lever 5 and the link 8 to the opposite side of the dead-center line and to the full line position shown in Figs. 1 and 2. Once the barrel 12 has been advanced by the adjusting plug 13 to the desired degree toward the fixed-point, pivot 4, it is obvious that it will always require the same amount of compression of the bolster spring before it will and can react to automatically snap the jaw lever 5 past the dead-center line of the piston block 10; to the tripped position seen in Fig. 1. Until the torque on the tool handle is enough to bring the lever and the link to dead-center alinement it is clear that the nut has not been set to the desired tension as gauged by the pre-set bolster spring, and when the designed tension, by torque of the handle, has been reached the spring 11 instantly trips the wrench jaw and no further tension can be given the screw or bolt; the jaw, having, on the handle pivot, a turning arc of about 110°.

This will make it practically impossible for the operator to apply more torque tension even if it were possible to give the handle further turn with the nut of screw.

When the wrench jaw has been tripped to the position shown in full lines in Fig. 1, the tool handle is merely rotated in the hand, on the axis of the handle, to bring the jaw 6 to the ready position (in dotted lines). It will be observed that the full line position shows the jaw ready for use on left-hand screws—of which but very few are in industrial use.

When the barrel 12 has been finally set it can be covered as by a suitable seal 17 fixed in the rear end of the handle to prevent tampering with the adjustment.

What is claimed is:

1. A fixed torque wrench including a tubular handle bar which has a closed end and is bifurcated at its forward end, a gripping jaw having a

pivot in the bifurcation of the handle and having a rigid arm swinging on the axis of said pivot from side to side of the handle through the bifurcation as the handle is swung in either direction on the jaw pivot and the pivot having a fixed longitudinal relation as to the handle, a bolster block in said handle, a bolster spring seated in the handle between said closed end and said block, and tension means in the handle for constantly pulling the arm to a position of arrest on and by the spring and including a link pivotally connected to the arm and block.

2. The wrench of claim 1, provided with a means for adjusting the compression and tension respectively of both the bolster spring and of the pulling means.

3. A wrench of the type set forth and including a tubular handle bar which is longitudinally bifurcated in one end, a pivot in the said end of the handle, an arm on said pivot and having a rigid forwardly projecting jaw part sweeping from side to side around the said end of the handle whilst the inner end of the arm plays across the handle in the bifurcation, a bolster spring mounted in the handle, and extensible means including a hitch device in the handle and operatively connected to the arm and a tension spring for normally pulling the said device to an inner position of arrest by the bolster spring.

4. The wrench of claim 3; said means including a link attached to the inner end of the arm and to the said device and an anchor part in the handle for the tension spring.

5. A fixed torque wrench including a hollow handle bar having an abutment at its rear end, a gripping jaw having a transverse pivot in the forward end of the bar and having a rearwardly extending, rigid arm, a block axially slidable in the handle, a link pivotally connected to the arm and the block, a tug spring in the handle connected at one end to the handle and at the other end to the block and retracting the block in the handle, and a yieldable bolster in the handle between the abutment and the block.

6. The wrench of claim 5, and means for varying the reaction of the bolster.

7. The wrench of claim 5; said spring and bolster being relatively concentrically arranged.

8. The wrench of claim 5, and an axially shiftable anchor in the handle and on which the bolster is seated to which the spring is swivelled and whereby the bolster is regulated in action.

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