BOX WRENCH HAVING A PIVOTALLY AND SLIDABLY DISPOSABLE TORQUING ELEMENT

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This invention relates to a wrench and, more particularly, to a box wrench having a movable head member.

A box wrench is used effectively in high torque operations to apply torque simultaneously on a plurality of torquing surfaces, its advantage being that the torque-producing head of the wrench completely surrounds the torquing surfaces on a workpiece, such as a nut or a bolt head and, thus, torque may be applied simultaneously on a larger number of torquing surfaces than can be accomplished with another type wrench, such as an open-head wrench. However, box wrenches in common usage have their moving portions integrally formed with or rigidly mounted on shanks, so that such a wrench must be correctly aligned with the torquing surfaces of the workpiece in order to mount the wrench on the workpiece or remove it therefrom, which is often difficult to accomplish, particularly when working in a confined area.

Because the wrench of the present invention has a portion of its head which is separately movable into and out of a position of torquing, it is, therefore, capable of being mounted on and removed from the workpiece much more readily than a normal box wrench, while still providing all of the high torque characteristics of a box wrench.

It is, therefore, an object of the present invention to provide a box wrench having a portion of its head which is pivotally mounted on fixed portions of the head so that the wrench may be adjustably mounted on a workpiece, the movable portion being adapted in cooperation with the fixed portions of the head to quickly and readily assume a torquing position on the workpiece, and the wrench may be quickly removed from the workpiece after torquing has been accomplished.

It is another object of the invention to provide a box wrench which is ruggedly constructed for high torque action, but which may be rapidly mounted on and dismounted from the torquing head of a workpiece.

It is a further object of the invention to provide such a box wrench having a minimal number of parts which may be economically manufactured and easily assembled.

It is yet another object of the invention to provide a box wrench which may be rapidly mounted from one torquing position to another without the necessity of completely disengaging the head of the wrench from the workpiece.

With these and other objects in view, the invention consists of the construction, arrangement and combination of the various elements of the device whereby the objects contemplated are attained, as hereinafter set forth, pointed out in the appended claims, and illustrated in the accompanying drawings, in which:

Fig. 1 is a side elevational view, partially broken away, of the wrench of the present invention;

Fig. 2 is a cross-sectional view taken on the line 2—2 of Fig. 1;

Fig. 3 is a view taken on the line 3—3 of Fig. 2;

Fig. 4 is a view taken on the line 4—4 of Fig. 3; and

Fig. 5 is an exploded perspective view showing various elements of the head portion of the wrench.

A box wrench, designated 10, has a shank 12. Generally cylindrical, aligned head members 14 and 16 have relatively short, aligned shanks 18 and 20 which are mounted on opposite sides of one end of the shank 12, the aligned head members 14 and 16 and the aligned shanks 18 and 20 being spaced apart from each other.

Aligned through-bores 22 and 24 are formed in the head members 14 and 16 respectively, the said bores 22 and 24 being disposed so as to encircle the torquing head of a workpiece. Torquing surfaces 26 and 28, comprised of aligned V-shaped teeth and alternating V-shaped grooves, are formed in the bores 22 and 24 respectively on the internal sides of the bores 22 and 24 adjacent the shanks 18 and 20, the purpose of said torquing surfaces 26 and 28 being to engage a mating part of a torquing surface on the workpiece. It has been found advantageous to provide a series of four aligned teeth and intermediate grooves in said torquing surfaces 26 and 28, although a greater or lesser number of said teeth and grooves may be provided, as desired.

An aligned through-bore 30 is formed at substantially the centers of the shanks 18 and 20, the bore 30 being disposed so as to receive a pin hereinafter mentioned. Slidably disposed between the head members 14 and 16 is a generally cylindrical, moveable head member 32 having a shank 34 which is somewhat shorter than the shanks 18 and 20, with which it is disposed to be aligned when the wrench 10 is in a torquing position. A through-bore 36 is formed in the moveable head member 32, the bore 36 being disposed so as to be aligned with the bores 22 and 24 when the wrench 10 is in a torquing position and, together with the bores 22 and 24, to encircle the torque head of the workpiece. A torquing surface 38, comprised of aligned V-shaped teeth and alternating V-shaped grooves, is formed in the bore 36 on the side of the bore 36 opposite the shank 34, the torquing surface 38 being disposed to engage a mating portion of the torquing surface on the workpiece. As in the case of the torquing surfaces 26 and 28, it has been found advantageous to provide a series of four teeth and intermediate grooves in said torquing surface 38, although, again, a greater or lesser number of said teeth and grooves may be provided, as desired.

A through-bore 40 is formed in the shank 34, said bore 40 being disposed in alignment with the bore 36, and a pin 42 is positioned in the aligned bores 36 and 40 so as to rotateably and slidably mount the moveable head member 32 on and between the head members 14 and 16. An internal slot 44 is formed in the shank 34, slot 44 opening into one side of the bore 40 and curving toward the free end of the shank 34. Disposed in the slot 44 is a spring 46 which is seated on the closed end of the slot 44 and on the pin 42, so as to bias the moveable head member 32 into alignment with the head members 14 and 16.

In operation, the head member 16, the moveable head member 32, and the head member 14, in that order, are positioned on the torquing surface of the workpiece, with the torquing surfaces 26 and 28 of the head members 14 and 16 in position on a mating part of the torquing surface of the workpiece, and the torquing surface 38 of the moveable head member 32 in position on another mating part of the torquing surface of the workpiece, positioning being readily accomplished by reason of the resilient movability of the moveable head member 32. As force is then applied to the shank 12 in the direction of the arrow in Fig. 1, all torquing surfaces of the head members 14, 16 and 32 will be firmly seated on mating torquing surfaces on the workpiece, and torque will be applied to the workpiece.

When a torque stroke has been completed and it is desired to apply further torque to the workpiece, movement of the shank 12 in the opposite direction will remove the torquing surfaces of the head members 14, 16 and 32 from the torquing surface of the workpiece and the head members 14, 16 and 32 will turn on the workpiece in the direction of the movement of the shank 12, the moveable head member 32 swinging out of torquing position by...
sliding on the pin 42, with the pin 42 being disposed in the slot 44 against the biasing action of the spring 46, until another suitable torquing position of the wrench 10 is reached, whereupon application of force to the shank 12 in the original direction will return the movable head member 32 to its original position, with the pin 42 again disposed in the bore 40, whereupon the torquing action is repeated in the manner hereinabove described.

When, after completion of application of torque to the workpiece, it is desired to remove the wrench from the workpiece, slight movement of the shank 12 in the direction opposite to the torque-producing direction will cause the movable head member 32 to move against the biasing action of the spring 46, thus freeing the torquing surface 38 of the movable head member 32 from its mating torquing surface of the workpiece and permitting ready removal of the wrench 10.

It will be readily understood that the wrench 10 may be utilized to release a workpiece by reverse torquing by turning the wrench, applying the head member 14, the movable head member 32, and the head member 16, in that order, to the workpiece, and reversing the direction of the application of force to the shank 12.

Although the invention has been herein shown and described in what is conceived to be the most practical and preferred embodiment thereof, it is recognized that departures may be made therefrom within the scope of the invention, which is not to be limited to the details disclosed herein, but is to be accorded the full scope of the claims so as to embrace any and all equivalent structures and devices.

I claim:

1. A box wrench which comprises:
   (a) a shank;
   (b) a pair of cylindrical head members mounted on the shank and spaced apart from each other, said head members having centrally disposed aligned bores therethrough, and said bores being adapted for circumferential mounting on a torquing surface on a workpiece;
   (c) aligned torqueing surfaces on a portion of said bores, said torqueing surfaces being adapted to mate with a portion of the torquing surface of the workpiece;
   (d) a third cylindrical head member pivotally and slidably disposed between said pair of head members, said third head member having a centrally disposed bore therethrough adapted for alignment with the bores in said pair of head members; and
   (e) a torqueing surface on a portion of said bore in said third head member, said torqueing surface being disposed substantially opposite the torqueing surfaces on said pair of head members, and said torqueing surface being adapted to mate with another portion of the torqueing surface of the workpiece.

2. A box wrench as defined in claim 1, including means for resiliently biasing the third head member into alignment with the pair of head members.

3. A box wrench which comprises:
   (a) a shank;
   (b) a pair of cylindrical head members mounted on the shank and spaced apart from each other, said head members having centrally disposed aligned bores therethrough, and said bores being adapted for circumferential mounting on a torquing surface on a workpiece;
   (c) V-shaped teeth and alternating V-shaped grooves formed on portions of said bores, the teeth and grooves on one head member being aligned with the teeth and grooves on the other head member and disposed so as to mate with a portion of the torquing surface of the workpiece;
   (d) a third cylindrical head member pivotally and slidably disposed between said pair of head members, said third head member having a centrally disposed bore therethrough adapted for alignment with the bores in said pair of head members; and
   (e) V-shaped teeth and alternating V-shaped grooves formed on a portion of the bore in said third member, said teeth and grooves being disposed substantially opposite the teeth and grooves on said pair of head members, and said teeth and grooves being adapted to mate with another portion of the torqueing surface of the workpiece.

4. A box wrench as defined in claim 3, including means for resiliently biasing the third head member into alignment with the pair of head members.

5. A box wrench which comprises:
   (a) a shank;
   (b) a pair of cylindrical head members mounted on the shank and spaced apart from each other, said head members having centrally disposed aligned bores therethrough, and said bores being adapted for alignment with the bores in said pair of head members;
   (c) V-shaped teeth and alternating V-shaped grooves formed on portions of said bores, the teeth and grooves on the other head member and disposed so as to mate with a portion of the torquing surface of the workpiece;
   (d) a third cylindrical head member disposed between said pair of head members, said third head member having a centrally disposed bore therethrough adapted for alignment with the bores in said pair of head members;
   (e) V-shaped teeth and alternating V-shaped grooves formed on portions of said bores adjacent said shank, the teeth and grooves on one head member being aligned with the teeth and grooves on the other head member and disposed so as to mate with a portion of the torqueing surface of the workpiece;
   (f) a pin disposed in a bore through the pair of head members and the third head member, said pin being adapted to pivotally and slidably mount the third head member between said pair of head members;
   (g) a slot in said third head member, said slot opening into one side of the bore in which said pin is disposed; and
   (h) a spring in said slot and abutting on said pin, said spring being disposed so as to bias said third head member into alignment with said pair of head members.

6. A box wrench as defined in claim 5, including shoulders on one side of the movable head member; and opposed shoulders on corresponding sides of the head members, the shoulders on the movable head members being disposed so as to abut on the shoulders of the head members.

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