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3,039,340

DETACHABLE CONNECTION FOR WRENCH HEADS

Filed Nov. 12, 1959

2 Sheets-Sheet 1

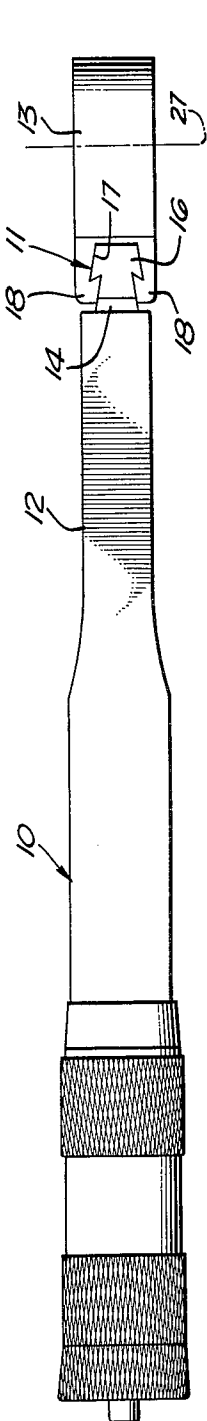


FIG. 1.

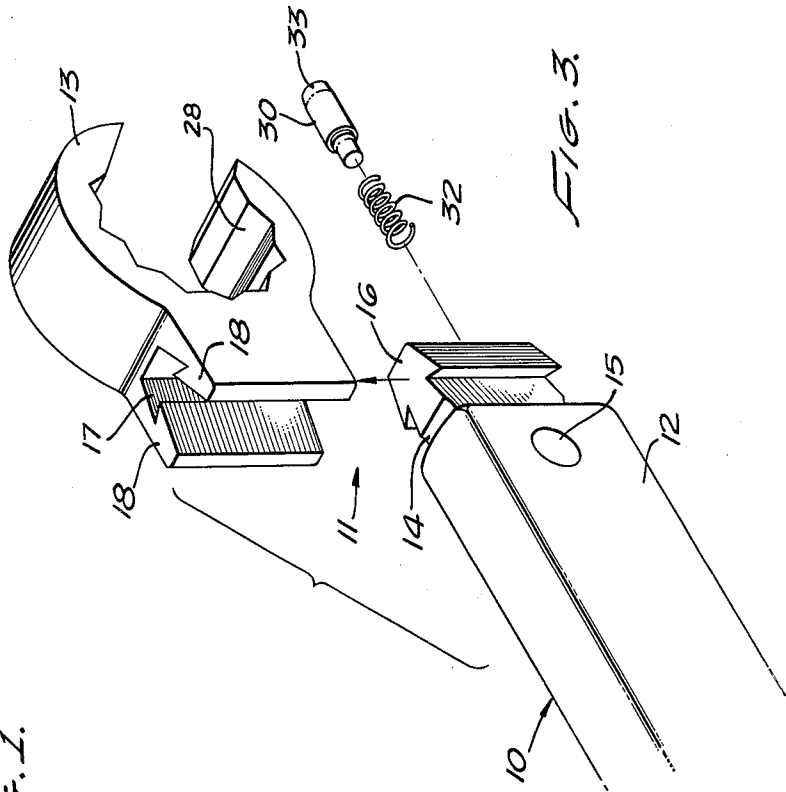


FIG. 3.

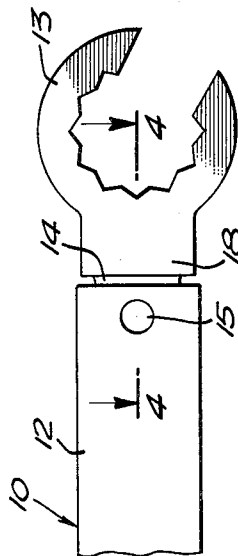


FIG. 2.

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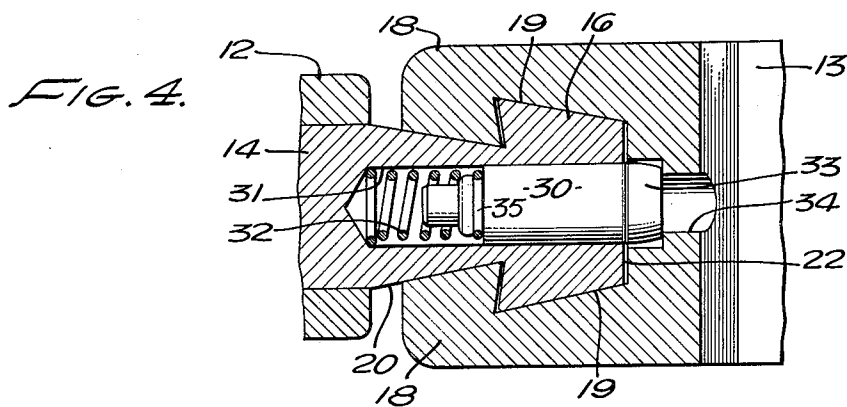
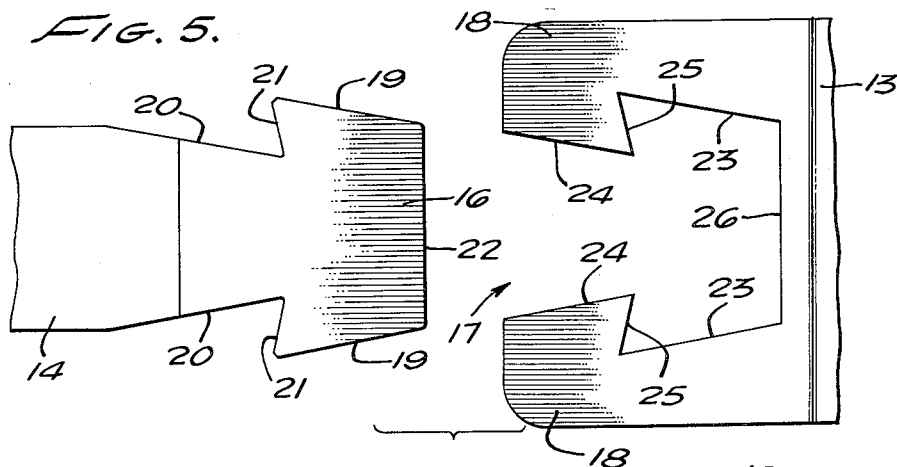
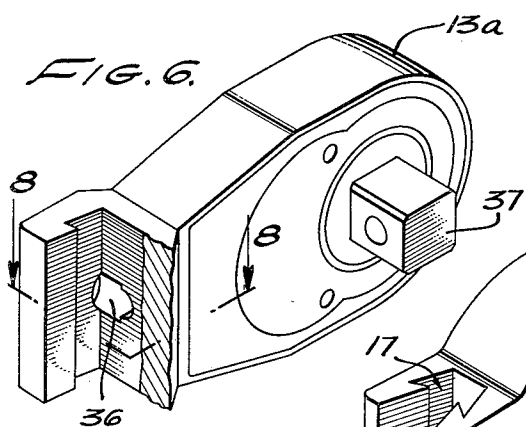
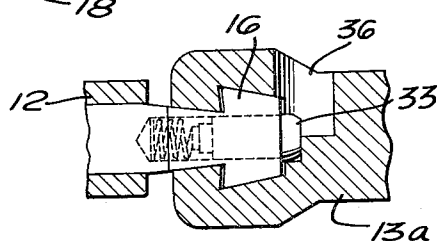
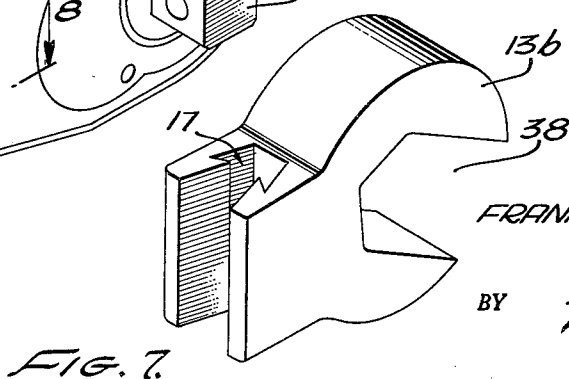
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2 Sheets-Sheet 2



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## DETACHABLE CONNECTION FOR WRENCH HEADS

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4 Claims. (Cl. 81-177)

This invention relates to a tongue and groove connection for detachably connecting a wrench head to a wrench handle, and is particularly directed to improvements over the construction shown in my prior Patent No. 2,832,246. As shown in that patent any one of a series of wrench heads may be detachably connected to a handle, the handle having a built-in torque measuring or torque indicating mechanism. The connecting parts are symmetrical so that the wrench head may be installed either in upright or inverted position.

In accordance with my invention, I provide an improved form of dovetail connection between the handle member and the wrench head member. The advantages of the construction shown in my prior patent are retained and additional strength and rigidity is achieved through the use of inclined wedge-like faces, separated by inclined undercut shoulders. Corresponding tapered surfaces are provided on the companion member, and the result is that a double wedging action takes place on application of torque load from the handle to the wrench head. This double wedging action prevents spreading of the tension-carrying portion of the projecting ends of the dovetail arms, and also prevents relative sliding movement along the interengaging faces and surfaces.

Another object is to provide an improved form of releasable latching device for securing the wrench head in position with respect to the handle member. Other and more detailed objects and advantages will appear hereinafter.

In the drawings:

FIGURE 1 is a plan view showing a preferred embodiment of my invention.

FIGURE 2 is a side elevation, partly broken away.

FIGURE 3 is an exploded perspective view, showing the manner of assembly and the various parts.

FIGURE 4 is a sectional plan view taken substantially on the lines 4-4 as shown in FIGURE 2.

FIGURE 5 is a plan view showing the connecting parts of the tongue and groove in disassembled position.

FIGURES 6 and 7 are perspective views showing typical wrench heads which may be installed in place of the wrench head shown in FIGURES 1-3.

FIGURE 8 is a sectional detail taken substantially on lines 8-8 as shown on FIGURE 6.

Referring to the drawings, the torque wrench assembly generally designated 10 may be similar in internal construction to that shown in my prior Patent 2,732,747, except for the dove-tailed connection 11 which joins the handle member 12 to the wrench head 13. A tang 14 projects within the wrench handle 12 and is connected thereto by means of a pivot 15. The tang 14 is provided with a transverse elongated block 16 at its extreme forward end. This block is adapted to be received within the elongated slot 17 formed between the projecting arms 18 on the wrench head 13. The block 16 and the slot 17 extend in a direction transverse of the wrench handle and perpendicular to but laterally offset from the torque axis 27 of wrench head 13. This torque axis 27 coincides with the axis of the bolt or nut engaged by the wrenching surfaces 28.

As best shown in FIGURES 4 and 5, the block 16 is provided with a first pair of symmetrically placed diverg-

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ing external faces 19, and a second pair of symmetrically placed diverging external faces 20 inwardly off-set from the faces 19 and parallel thereto. The minimum transverse distance between the offset faces 20 is substantially less than that between the external faces 19. Inclined undercut shoulders 21 having negative rake are interposed between faces 19 and 20 on the block 16. The extreme forward end face of the block 16 is numbered 22. The arms 18 are provided with tapered faces 23 adapted to have surface contact with the block faces 19, and the arms 18 also have tapered faces 24 adapted to have surface contact with the block faces 20. Inclined undercut abutments 25 are provided on the arms between the faces 23 and 24, respectively, and these abutments are adapted to have surface contact with the inclined shoulders 21 on the block 16. The surface 26 defining the end of the slot 17 normally has clearance with the surface 22 on the block 16. Since the block 16 and arms 18 are each symmetrical the parts may be assembled in either upright or inverted position.

Means are provided for maintaining the wrench head 13 in assembled position with respect to the handle 12 and as shown in the drawings this means includes a locking pin 30 mounted to slide within a bore 31 extending longitudinally of the tang 14. A coil spring 32 within the bore 31 acts to move the pin toward the right as viewed in FIGURE 4. This brings the projecting part 33 of the pin 30 into registry with aperture 34 provided in the wrench head 13. One end of the spring 30 engages a groove 35 in the pin 30 and the other end of the spring is expanded to a friction fit within the bore 31. Consequently the spring 32 and the pin 30 do not fall out of the bore when the wrench head 13 is separated from the handle 12.

The pin 30 and aperture 34 serve to prevent separation of the wrench head 13 and handle 12 when not in use, but the pin 30 carries very little shear load when torque is applied from the handle 12 to the wrench head 13 to tighten a nut or a bolt. The pin 30 is mounted on the center line of the handle tang 14 and this centerline intersects the turning axis of the bolt or nut. Torque loads applied by the handle to the wrench head are carried through contacting shoulders 21 and abutments 25 above the center line of the pin 30, while the faces 20, 24 and the faces 19, 23 engage below the center line. The negative rake of the shoulders 21 and abutments 25 produce a wedging action to prevent spreading of the tension-carrying portions of the arms 18 under application of the load from the handle 12. A second wedging action develops between the faces 19 and 23 and faces 20 and 24 resulting in frictional forces which resist sliding movement of the block 16 within the slot 17. Substantially no shear load is placed on the pin 30. The latching pin 30 may be retracted to an inoperative position by thrusting a tool (not shown) into the aperture 34 into contact with the projecting part 33 of the pin 30. In this way the pin 30 may be pushed back into the bore 31 compressing the spring 30, and the block 16 may then be moved out of the slot 17.

When the wrench head takes the form shown at 13a in FIGURE 6 and includes a conventional ratchet drive to a square projection 37, there is provided an aperture into which the projecting part 33 of the pin 30 may engage, and there is also provided a lateral opening 36 through which a pin retracting tool may be inserted. On other conventional forms of wrench head designs as illustrated by the typical design shown at 13b in FIGURE 7, the aperture 34 extends from the slot 17 to the wrench opening 38.

Having fully described my invention, it is to be understood that I do not wish to be limited to the details

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herein set forth but my invention is of the full scope of the appended claims.

I claim:

1. In a wrench assembly having a wrench head detachably connected to a handle, the combination of: an elongated block on the handle, a pair of arms on the wrench head defining an elongated slot therebetween for reception of said block, said block and said slot extending in a direction transverse of the wrench handle and perpendicular to but laterally offset from the torque axis of the wrench head, the block having a first pair of symmetrically placed diverging external faces, the arms having cooperating faces in sliding surface contact with said block faces, the block having a second pair of symmetrically placed diverging external faces inwardly offset from said first pair of faces and parallel thereto, respectively, the arms having cooperating faces in sliding surface contact with the latter said block faces, inclined undercut shoulders connecting said block faces, inclined undercut abutments on the arms connecting said arm faces and having sliding surface contact with said inclined undercut shoulders, respectively, whereby upon application of bolt-tightening torque load from the handle to the wrench head sliding movement of the block between the arms along said faces is resisted by wedging of the first said faces at one end of the block and whereby said inclined shoulders and abutments cooperate to prevent spreading of the projecting ends of the arms at the other end of the block.

2. In a wrench assembly having a wrench head detachably connected to a handle having a longitudinal axis, the combination of: an elongated block extending transversely on the end of the handle, a pair of arms on the wrench head defining an elongated slot therebetween for reception of said block, said block and said slot extending in a direction transverse of the wrench handle and perpendicular to but laterally offset from the torque axis of the wrench head, the block having a bore coaxial with the said longitudinal axis of the handle, a pin slidably mounted in said bore, the wrench head having an aperture intersecting said elongated slot and adapted to receive a portion of said pin to prevent initial disassembly of the block from said slot, the block having a first pair of symmetrically placed diverging external faces, the arms having cooperating faces in sliding surface contact with said block faces, the block having a second pair of symmetrically placed diverging external faces inwardly offset from said first pair of faces and parallel thereto, respectively, the arms having cooperating faces in sliding surface contact with the latter said block faces, inclined undercut abutments on the arms connecting said arm faces and having sliding surface contact with said inclined undercut shoulders, respectively, whereby upon application of bolt-tightening torque load from the handle to the wrench head sliding movement of the block between the arms along said faces is resisted by wedging of the first said faces at one end of the block and whereby said inclined shoulders and abutments cooperate to prevent spreading of the projecting ends of the arms at the other end of the block.

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3. For use with a wrench handle having an elongated transverse block at one end thereof, the block having first and second pairs of diverging external faces symmetrically placed and the pairs of faces being connected by inclined undercut shoulders: a detachable wrench head having, in combination, a pair of arms on the wrench head defining an elongated slot therebetween for reception of said block, said slot extending in a direction transverse of the wrench handle and perpendicular to but laterally offset from the torque axis of the wrench head, the arms having pairs of cooperating faces for sliding surface contact with said block faces, inclined undercut abutments on the arms connecting said arm faces adapted for sliding surface contact with the inclined undercut shoulders on the block, respectively, whereby upon application of bolt-tightening torque load from the handle to the wrench head sliding movement of the block between the arms along said faces is resisted by wedging of said faces at one end of the block and whereby the inclined shoulders and abutments cooperate to prevent spreading of the projecting ends of the arms at the other end of the block.

4. For use with a detachable wrench head having a pair of arms defining an elongated slot therebetween extending in a direction transverse of the wrench handle and perpendicular to but laterally offset from the torque axis of the wrench head, the arms having first and second pairs of diverging internal faces symmetrically placed, and the pairs of faces being connected by inclined undercut abutments: a wrench having in combination: an elongated transverse block at one end thereof extending in a direction perpendicular to but laterally offset from the torque axis of the wrench head, the block having first and second pairs of symmetrically placed diverging external faces for sliding surface contact with the arm faces, the second pair of faces on said block being inwardly offset from the first pair of faces thereon and parallel thereto, respectively, inclined undercut shoulders connecting said block faces and adapted to engage the undercut abutments on the arms, whereby upon application of bolt-tightening torque load from the handle to the wrench head sliding movement of the block between the arms along said faces is resisted by wedging of the first said faces at one end of the block and whereby said inclined shoulders and abutments cooperate to prevent spreading of the projecting ends of the arms at the other end of the block.

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