Sept. 3, 1963 F. W. LIVERMONT 3,102,732

ADAPTOR FOR WRENCH HEADS

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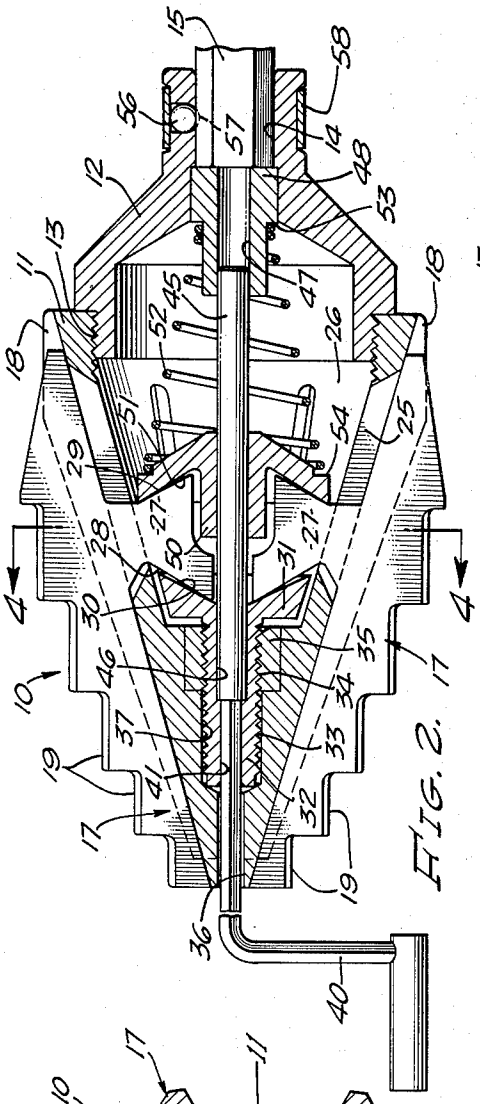


FIG. 2.

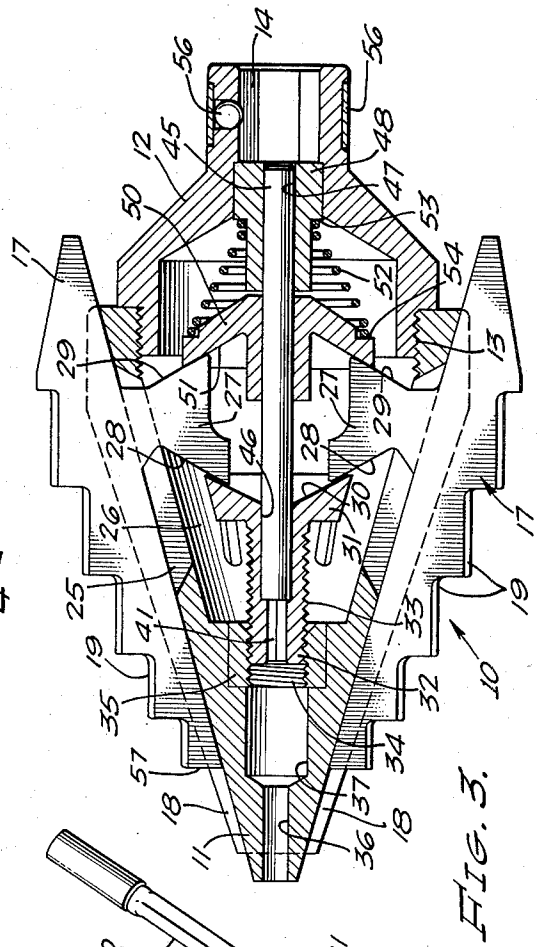


FIG. 3.

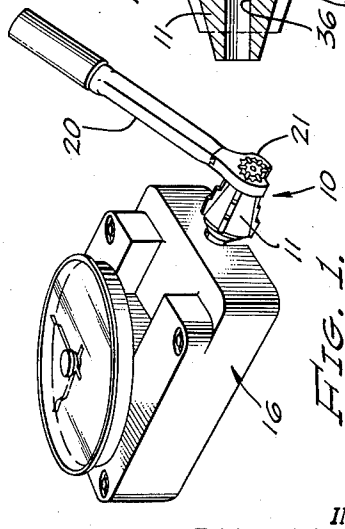


FIG. 1.

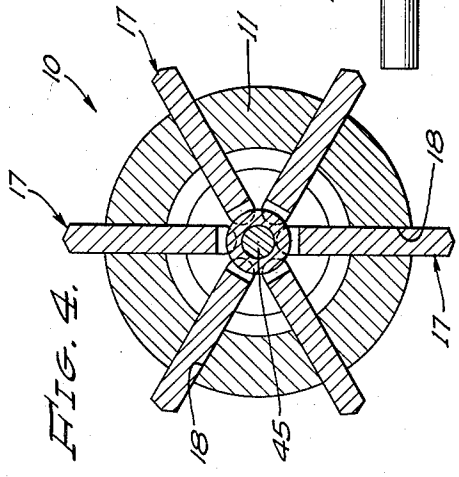


FIG. 4.

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ADAPTOR FOR WRENCH HEADS

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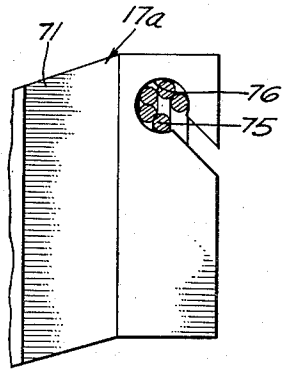


FIG. 9.

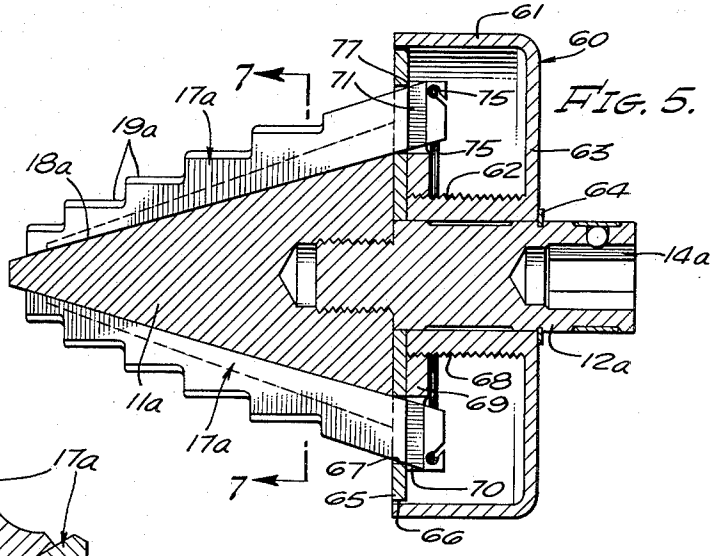


FIG. 5.

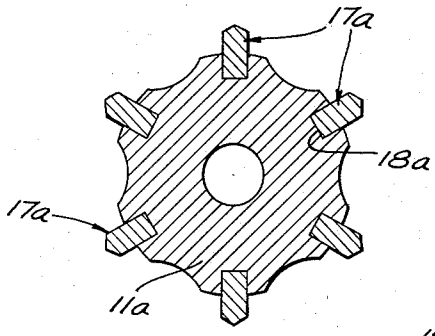


FIG. 7.

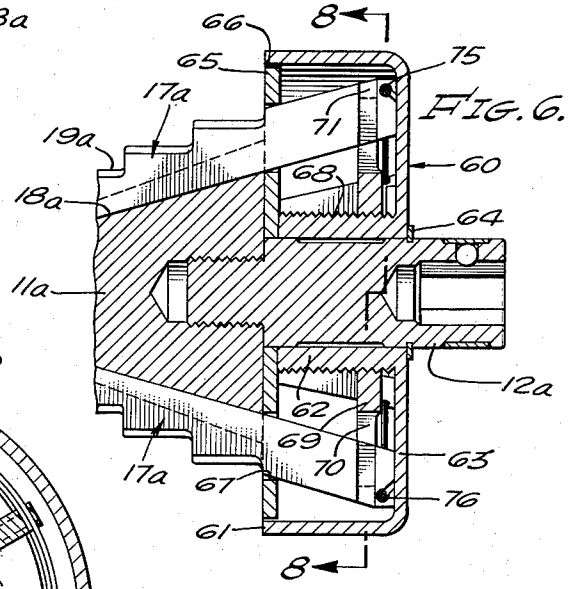


FIG. 6.

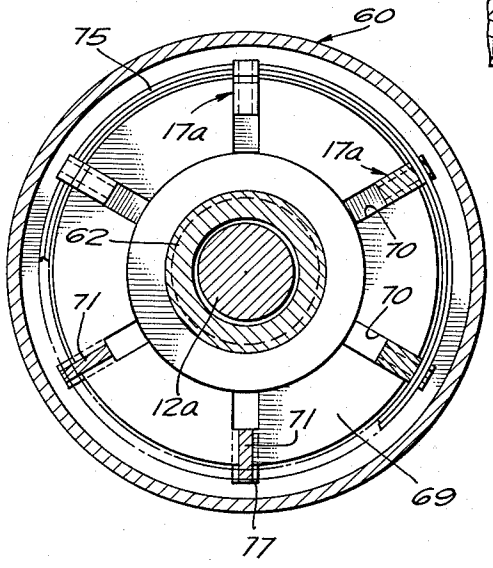


FIG. 8.

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ADAPTOR FOR WRENCH HEADS

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Filed June 30, 1960, Ser. No. 40,058
8 Claims. (Cl. 279—2)

This invention relates to torque tools and is particularly directed to a device for transmitting torque to a measuring instrument from torque wrenches having heads of different sizes.

In my prior patent, No. 2,703,976, granted March 14, 1955, and in my copending application, Serial No. 40,031 filed of even date herewith, and entitled "Torque Measuring Apparatus," I have shown torque measuring and indicating apparatus for use with torque release wrenches. Such measuring instruments provide a means for determining the torque load at which the internal toggle mechanism of the torque wrench "trips" or "breaks," thereby providing a signal to the operator when the torque load setting has been reached. The wrench head may directly engage the torque receiving element of the measuring instrument or suitable adapters may be provided to connect such element, with the wrench head. The present invention relates to an adapter which employs movable parts shiftable to accommodate wrench heads of different sizes. Such an adapter is particularly useful in connection with wrench heads which are not adjustable in size, such as, for example, box wrenches, end wrenches, socket wrenches, etc.

An important object of this invention is to provide an adjustable adapter of the type described which employs a series of inclined blades mounted to slide on a tapered body, the blades having a series of steps furnishing wrench-engaging surfaces.

Another object is to provide a device of this type in which co-operating threaded elements having relative turning movement about the body axis serve to move all of the blades simultaneously. Other and more detailed objects and advantages will appear hereinafter.

In the drawings:

FIGURE 1 is a perspective view showing universal adapter of the type embodying my invention connected to a torque measuring and indicating instrument and being engaged by torque release wrench.

FIGURE 2 is a longitudinal sectional view of an adjustable adapter and showing a preferred embodiment of my invention.

FIGURE 3 is a view similar to FIGURE 2, but showing the parts in a different position.

FIGURE 4 is a transverse sectional view taken substantially on lines 4—4 as shown in FIGURE 2.

FIGURE 5 is a longitudinal sectional view showing a modified form of my invention.

FIGURE 6 is a view similar to FIGURE 5, partly broken away, and showing the parts in a different position.

FIGURE 7 is a transverse sectional view taken substantially on lines 7—7, as shown in FIGURE 5.

FIGURE 8 is a transverse sectional view taken substantially on lines 8—8, as shown in FIGURE 6.

FIGURE 9 is a fragmentary view on an enlarged scale showing a portion of the apparatus of FIGURES 5 and 6.

Referring to the drawings, the adapter device 10 includes a hollow tapered body 11 provided with a flanged hub 12. The body 11 and hub 12 are connected by threads 13, and function as a unit. The hub 12 is provided with a socket 14, noncircular in cross section and

adapted to receive a similarly shaped torque receiving part 15 projecting from the interior of a torque measuring and indicating instrument 16. Inclined blades 17 are mounted in axially extending grooves 18 provided on the outer tapered surface of the body 11. These blades 17 have a series of steps 19 on the outer surface thereof for engagement with wrench heads of various sizes.

In FIGURE 1, there is shown a torque release wrench 20, having a box wrench head 21, and this wrench head 21 engages one of the steps 19 on each of the blades 17. In the general scheme of operation the blades 17 are moved along the inclined grooves 18 to a position in which one of the steps 19 on each of the blades may be engaged by the particular wrench head to be employed.

The body grooves 18 are each intersected by a slot 25 which extends into the central cavity 26 within the hollow body 11. Each of the blades 17 has an integral projection or finger 27 extending through its respective slot 25. Each finger 27 has an inclined front surface 28 and an inclined rear surface 29. The inclined front surfaces 28 on the fins 27 are engaged by the concave conical surface 30 formed on the head 31 of the adjusting sleeve 32. This adjusting sleeve 32 is provided with external threads 33 engaged within internal threads 34 provided within the bushing 35 which is pressed into the body 11. A circular bore 36 of relatively small diameter extends axially through the body and into the enlarged bore 37. A crank-shaped tool 40, similar to an Allen wrench, is insertable into the bore 36 and into engagement with a noncircular socket 41 provided in the adjusting sleeve 32. Accordingly, it will be understood that turning of the crank tool 40 relative to the body 11 serves to cause axial movement of the adjusting sleeve 32.

A cylindrical bar or post 45 is fixed within the axial bore 46 of the adjusting sleeve 32, and this post 45 is slidably received within the axial bore 47 of the bushing 48. This bushing 48 is pressed into the flanged hub 12. Slidably mounted on the post 45 is the cone-shaped follower 50, having a concave conical surface 51 engaging inclined faces 29 on each of the fingers 27. A compression spring 52 is mounted within the body 11 and flanged hub 12 and has one end engaging a shoulder 53 on the bushing 48 and another end engaging the shoulder 54 on the follower 50.

In operation, the device 10 is assembled with respect to a measuring instrument 16 by installing the hub 12 in position so that the noncircular socket 14 receives the noncircular projection 15 which extends from the instrument 16. A ball 56 mounted in the hub 12 is engageable with a detent 57 in the member 15 to hold the parts in position against separation. A band spring 58 acts on the ball 56. A torque release wrench 20, having a wrench head 21, is then installed on one of the steps 19 on each of the blades 17. If the wrench faces do not happen to seat properly on one of the steps 19, the crank tool 40 is inserted into position within the socket 41, and the sleeve 32 is rotated to move the blades 17 up or down the inclined grooves 18. The blades 17 are adjusted in position by means of the crank tool 40 until the wrench faces properly seat on one of the steps 19. During the adjusting operations, the spring-urged follower 50 maintains the finger surfaces 28 in contact with the cone surface 30 of the adjusting sleeve 32.

It will be observed that when the torque load is applied by the wrench head to one of the steps on each of the blades 17, that this torque load is transmitted directly through the body and flanged hub 12 to the member 15 projecting from the measuring instrument 16. The torque load is not transmitted through the fingers 27 nor adjusting parts 32 and 50.

As shown in FIGURE 2 of the drawings, the angle of the cone surface 30 is steeper than the angle of the

faces 28 on the fingers 27. Also, the angle of the cone surface 51 is not as steep as the angle of the faces 29 on the fingers 27. By means of this construction, the resulting forces applied by the parts 32 and 50 to the fingers 27 tend to maintain the lower end 57 of each of the blades 17 in position within its respective groove 18.

In the modified form of my invention shown in FIGURES 5 to 9, the blades 17*a* are similar to the blades 17 previously described, except that they do not have the inward-projecting fingers 27. Each blade 17*a* is mounted in an inclined groove 18*a* provided on the outer surface of a tapered body 11*a*. This body member 11*a* is not hollow and is provided with an axially extending hub 12*a*. The housing 60 is mounted to rotate on a portion of the hub 12*a*, and this housing 60 includes an outer cylindrical wall 61, an inner sleeve 62, and an end flange 63. A split retainer ring 64 holds the housing 60 in position on the hub 12*a*. An apertured ring 65 has a circular periphery 66 that is provided with a plurality of slots 67, one for each of the blades 17*a*. The apertured ring 65 is fixed relative to the body 11*a* and hub 12*a* and functions as an integral part therewith. External threads 68 are provided on the sleeve 62, and these are engaged by the internal threads on the nut member 69. This nut member 69 takes the form of an annular ring having a plurality of radial slots 70 extending inward from its periphery. These slots are narrower than the width of the grooves 18*a*, and each of the blades 17*a* is provided with a section 71 of reduced thickness for reception into these radial slots 70. From this description, it will be understood that turning movement of the housing 60 and sleeve 62 relative to the body 11*a* causes the sleeve 62 to turn within the nut 69 to move the nut axially within the housing 60. Such axial movement of the nut 69 from the position shown in FIGURE 5 to the position shown in FIGURE 6 causes the blade 17*a* to be moved upward along the inclined grooves 18*a*.

Means are provided for applying an outward directed force to each of the blades 17*a* near their upper outer ends. As shown in the drawings, this means includes a multiple strand spring or cable 75, engaging within an opening 76 provided on each of the blades 17*a*. The action of this spring wire cable 75 is to expand and thus to apply a force in a radial and outward direction to the outer end of each blade 17*a*. Substantially no sliding action of the cable 75 occurs relative to the blade openings 76. Each blade is prevented from moving bodily outward under the expanding action of the spring wire 75 by the shoulder 77 defining the outer end of each of the radial slots 70. Accordingly, the blades 17*a* are maintained in the grooves 18*a*.

In operation, the hub 12*a* is positioned so that the projection 15 from the measuring instrument 16 extends into the noncircular socket 14*a*, and a wrench head 21 is placed in position on one of the steps 19*a* of the blade 17*a*. If the faces of the wrench head do not fit snugly on one of the steps 19*a*, the housing 60 is turned manually to move the nut 69 axially for adjusting the position of the blades 17*a*. It will be observed that a torque load applied by the wrench head 21 to the blades 17*a* do not pass through the blade-adjusting parts 69 and 62, but instead pass directly to the body 11*a* and hub 12*a*.

Having fully described my invention, it is to be understood that I am not to be limited to the details herein set forth, but that my invention is of the full scope of the appended claims.

I claim:

1. A torque transmitting device for engagement by wrench heads of various sizes, comprising in combination: a tapered body having a central axis, the body having a plurality of inclined grooves on the outer surface thereof, each groove tapering from a shallow depth near the small end of the body to a substantially greater depth near the large end of the body, a plurality of axially extending inclined blades mounted to slide in the grooves, the blades projecting radially from the grooves and having a series of graduated steps on the outer surfaces thereof for wrench engagement, means on the body whereby it may turn a driven part, means for moving the blades simultaneously and for retaining the blades in said grooves, said blade moving and retaining means including a threaded member mounted coaxially of the body for turning movement therewith, and a co-operating threaded member mounted coaxially of the body and turnable with respect thereto, and means on one of said members contacting each of said blades.

2. A torque transmitting device for engagement by wrench heads of various sizes, comprising in combination: a tapered hollow body having a central axis, the body having a plurality of inclined grooves on the outer surface thereof, a plurality of axially extending inclined blades mounted to slide in the grooves, the blades projecting radially from the grooves and having a series of graduated steps on the outer surfaces thereof for wrench engagement, means on the body whereby it may turn a driven part, means within the hollow body for moving the blades simultaneously and for retaining the blades in said grooves, said blade moving and retaining means including an internally threaded member mounted coaxially of the body for turning movement therewith, and an externally threaded sleeve member mounted to turn about the body axis, means on one of said members engaging each of said blades, and means whereby said sleeve member may be turned relative to said body.

3. A torque transmitting device for engagement by wrench heads of various sizes, comprising in combination: a tapered body having a central axis, the body having a hub fixed relative thereto and provided with a noncircular socket for turning a driven part, the body having a plurality of inclined grooves on the outer surface thereof, each groove tapering from a shallow depth near the small end of the body to a substantially greater depth near the large end of the body, a plurality of axially extending inclined blades mounted to slide in the grooves, the blades projecting radially from the grooves and having a series of graduated steps on the outer surfaces thereof for wrench engagement, and means including a pair of co-operating threaded members mounted for relative turning movement about the axis of the body for moving the blades simultaneously.

4. A torque transmitting device for engagement by wrench heads of various sizes, comprising in combination: a hollow tapered body having a central axis, the body having a plurality of inclined grooves on the outer surface thereof and a slot intersecting each groove, a plurality of axially extending inclined blades mounted to slide in the grooves, the blades having a series of graduated steps on the outer surfaces thereof for wrench engagement, each blade having a finger extending through a body slot into the interior of the hollow body, means including a pair of co-operating members within the body engaging the fingers to retain the blades against radial movement out of said slots, thread means for moving one of said members axially, and means on the body whereby it may turn a driven part.

5. A torque transmitting device for engagement by wrench heads of various sizes, comprising in combination: a hollow tapered body having a central axis, the body having a plurality of inclined grooves on the outer surface thereof and a slot intersecting each groove, the body having a hub fixed relative thereto and provided with a noncircular socket for turning a driven part, a plurality of axially extending inclined blades mounted to slide in the grooves, the blades having a series of graduated steps on the outer surfaces thereof for wrench engagement, each blade having a finger extending through

a body slot into the interior of the hollow body, a threaded member mounted within the body to turn about the body axis and having a surface engaging one side of each of said fingers, and a spring-urged follower movable axially within the body and engaging the other side of each of said fingers for moving the blades simultaneously.

6. A torque transmitting device for engagement by wrench heads of various sizes, comprising in combination: a tapered body having a central axis, the body having a hub fixed relative thereto and provided with a noncircular socket for turning a driven part, the body having a plurality of inclined grooves on the outer surface thereof, each groove tapering from a shallow depth near the small end of the body to a substantially greater depth near the large end of the body, a plurality of axially extending inclined blades mounted to slide in the grooves, the blades projecting radially from the grooves and having a series of graduated steps on the outer surfaces thereof for wrench engagement, an externally threaded sleeve mounted to turn on said hub, a nut threadedly engaged with said sleeve, and means on the nut engaging each of the blades for moving the blades simultaneously upon turning of said sleeve.

7. A torque transmitting device for engagement by wrench heads of various sizes, comprising in combination: a tapered body having a central axis, the body having a hub fixed relative thereto and provided with a noncircular socket for turning a driven part, the body having a plurality of inclined grooves on the outer surface thereof, each groove tapering from a shallow depth near the small end of the body to a substantially greater depth near the large end of the body, a plurality of axially extending inclined blades mouted to slide in the grooves, the blades projecting radially from the grooves and having a series of graduated steps on the outer surfaces thereof for wrench engagement, each blade having a section of reduced thickness, an externally threaded sleeve mounted to turn on said hub, a nut threadedly engaged with said sleeve, the nut having peripheral radial slots engaging each of said blade sections for moving the blades simultaneously upon turning movement of the sleeve.

8. The combination set forth in claim 5 in which the blade fingers have diverging surfaces and wherein the threaded member and spring urged follower each have a conical surface engaging said finger surfaces.

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