My invention relates to ratcheting devices, particularly of the hand-tool variety often referred to as ratchet wrenches. It is an object of the invention to provide an improved tool of the character indicated. Another object is to provide an improved ratchet wrench having inherent capability of reaching hitherto inaccessible or difficult actuating aspects. A further object is to provide a ratchet wrench with inherent capability to "spin" nuts on and off. It is a specific object to achieve the foregoing objects with a construction that is basically simple and relatively inexpensive, and which lends itself equally well to full-torque application when needed and to low-torque easy-spin application, all with utmost flexibility for access from a range of angular aspects, with respect to the nut or bolt axis to be operated upon.

Other objects and various further features of novelty and invention will be pointed out or will occur to those skilled in the art from a reading of the following specification in conjunction with the accompanying drawings. In said drawings, which show, for illustrative purposes only, preferred forms of the invention:

FIG. 1 is a side-view in elevation of a tool of the invention with the handle in a high-torque position;

FIG. 2 is an enlarged fragmentary plan view of the handle-to-body connection of the parts of the tool of FIG. 1;

FIG. 2A is a sectional view in the plane 2A—2A of FIG. 2;

FIG. 3 is a view similar to FIG. 1, but with the handle elevated to "spin" position;

FIG. 4 is a plan view along the tool-driving axis of FIG. 3;

FIG. 5 is a plan view of another embodiment of the invention, with the handle in a high-torque position.

FIG. 6 is a view similar to FIG. 3, but for the embodiment of FIG. 5;

FIG. 7 is an enlarged fragmentary view, partly broken away and sectioned, in the plane 7—7 of FIG. 6; and

FIG. 8 is a fragmentary view, partly in section, in the plane 8—8 of FIG. 7.

Briefly stated, the invention contemplates an improved ratcheting hand tool, having all the high-torque ruggedness and reliability of prior designs, but additionally incorporating flexibility, both as to elevation angle for torque application and as to one-handed "spin" functions, as when rapidly advancing a nut to an initial bind position, or quickly removing the same once the bind has been released. The flexibility for these ends is achieved by a particular articulation between the actuating handle and the ratchet body, offset from the drive axis of the ratchet.

In accordance with the invention, the actuating handle 17 is articulated to the body 10 at a location radially offset from the rotary axis 13. In the form shown, the body 10 is formed at one angular location with a projecting tongue or stud 18, and the adjacent end of handle 17 is forked at 19—20 to straddle tongue 18 and to define a bearing area support from the adjacent flat sides of tongue 18. A pin 21 may have free-running engagement with holes or bearings in the forked end 19—20 and may be fixedly held, as by a driven force-fit into a slightly smaller hole on tongue 18. The axis of pivot 21 is seen to be substantially perpendicular to a plane which includes rotary axis 13, where that plane is that of the paper in FIG. 1.

Detent engagement between handle 17 and body 10 retains selected pivoted positions of these parts. In the form shown, this is accomplished by a spring-detect ball, captive within a bore in handle 17, and constantly riding a series of angularly spaced teeth on the outer face of tongue 18. For the radially outwardly extending handle position of FIGS. 1, 2 and 2A, detent 22 operates between central teeth 23—23; for the erect-handle position of FIGS. 3 and 4, detent 22 engages the last inter-tooth space 24. Remaining teeth enable selected handle positions between and beyond those specifically identified, i.e. in the range between limits X—Y for shank axis 26 (FIG. 1).

Also in accordance with the invention, the handle 17 is formed at its outer extremity with an elongated hand-grip portion 25 angularly offset from the elongation axis 26 of the shank of the handle 17. Preferably, when viewed in a plane normal to the rotary axis 13 and when handle 17 is in the radially extended position of FIG. 1, this angular offset has a projection designated a, in the range of 15 to 45 degrees, preferably in the order of 20 degrees. Also, when viewed along the rotary axis 13 (as in FIG. 4), the handle offset 25 extends generally across head 10, and with a projected angular extent β up to substantially 45°, preferably in the order of 30 degrees.

In operation, the described tool is seen, in the FIG. 1 position, to provide for application of high-torque to tool element 14, with ratcheting action determined by head 10. During ratcheting drive, handle 17 may be variably elevated or depressed to clear obstructions and permit maximum angular drive for each ratchet stroke. On the other hand, for low-torque situations, as when threading a nut loosely on or off a stud, the handle 17 may be raised to the upwardly extended position of FIGS. 3 and 4, in which position a locating loop of hand grip 25, coupled with nutting gyration of the hand at the wrist, is effective to "spin" the nut through its low-torque displacement.

In FIGS. 5 to 8, I show another form of the invention, in which the axis 30 of handle pivot action is also substantially perpendicular to a plane passing through the rotary axis 43 of ratchet head 41 (that plane being perpendicular to the paper in FIGS. 5 and 6). But the
pivot action is essentially 90° displaced from the orientation of pivot 21 of FIGS. 1 to 4. In FIGS. 5 to 8, a projection 31 integral with body 11 is itself the articulating pivot for connection to handle 17. In the form shown, extensive area of journal support for handle 17 is provided over the bearing surface 32 which pivotally supports a close-fitting bore at the end of handle 17, between spaced shoulders 33-34. A retaining member, such as nut 35 jammed against shoulder 33, secures the assembly. Detent action is provided by a spring-urged ball 36 cooperating with angularly spaced detent pockets 37 on the journal surface 32, thus retaining selected angular orientations of handle 17 about axis 30. These orientations will be understood to range between and beyond those represented by FIGS. 5 and 6.

It will be seen that I have provided an improved hand tool construction which far extends the utility of more conventional ratchet mechanisms by making possible a greater range of accessibility in congested, obstructed regions, and by providing spin-off and spin-on functions. While the invention has been described in detail for the preferred forms shown, it will be understood that modifications may be made within the scope of the invention without departing from its scope as defined in the claims which follow.

I claim:

1. In combination, a ratchet head including a body having a central opening, a rotatable driven element carried within the body opening and having a tool-engaging element projecting therefrom on the axis of rotation, ratchet means selectively engaging said body and driven element for one-way engagement, and an elongated actuating handle pivotally connected at one end to said body at a location radially offset from the rotary axis of said driven element and on a single pivot axis that is substantially normal to a plane through said rotary axis, the freedom for action about said pivot axis including an arc extending from a first position substantially radially extending with respect to said rotary axis to a second position extending substantially parallel to said rotary axis and in the direction opposite to that of the projection of said tool-engaging element, said handle including a shank terminated at its opposite end by an elongated generally cylindrical hand grip which is angularly offset from the axis of said shank; the direction of angular offset of said hand grip, when said handle is erected to said second position and when viewed along said rotary axis, extending generally across said head at an angular offset to the plane which includes said rotary axis and which passes generally through the center of said connection.

2. The combination of claim 1, in which said angular offset is in the range of 15 to 45 degrees when viewed in a plane normal to said rotary axis and when said handle is in said first position.

3. The combination of claim 2, in which said angular offset is in the range of 15 to 45 degrees when viewed along said rotary axis and when said handle is in said second position.

4. The combination of claim 1, in which the connection between said handle and said head includes spring detent means retaining a selected one of a plurality of pivoted position which specifically include both said first and said second position.

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