Sept. 6, 1966 T. NEFF ETAL 3,270,597

MULTI-ANGLE RATCHETING WRENCHES

Filed Sept. 14, 1965 2 Sheets-Sheet 1

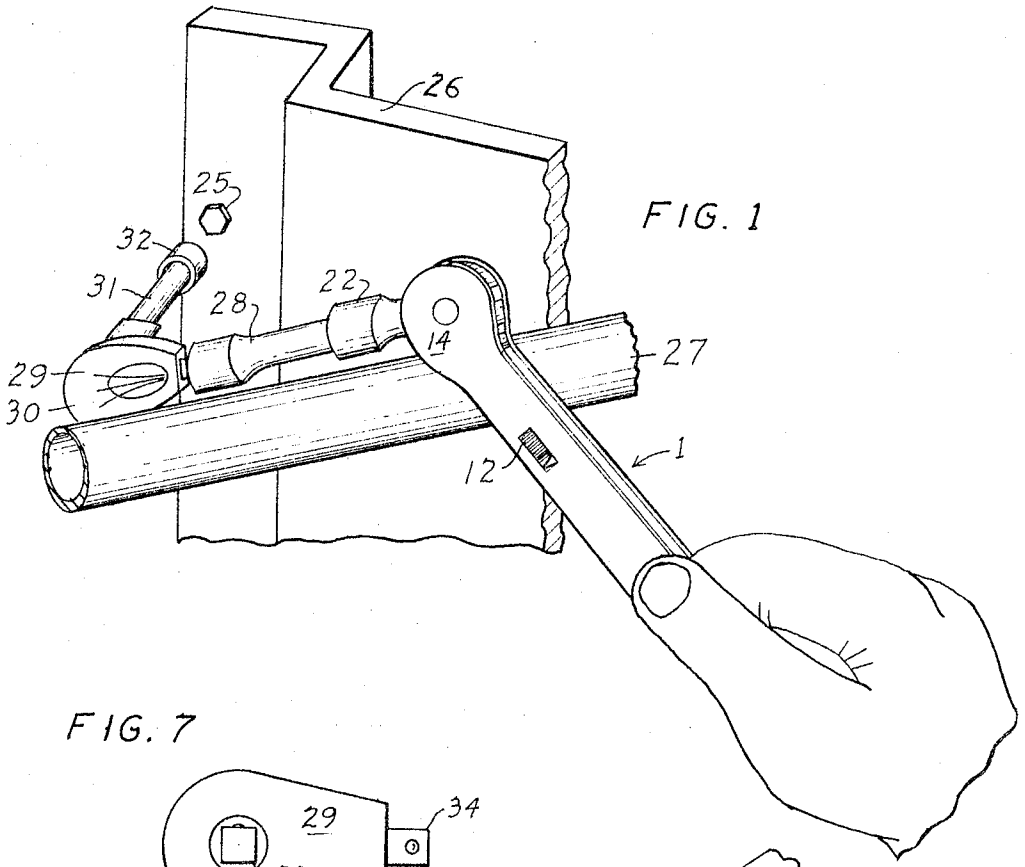



FIG. 1

FIG. 7







FIG. 8

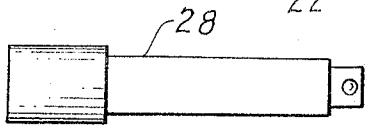



FIG. 9

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MULTI-ANGLE RATCHETING WRENCHES

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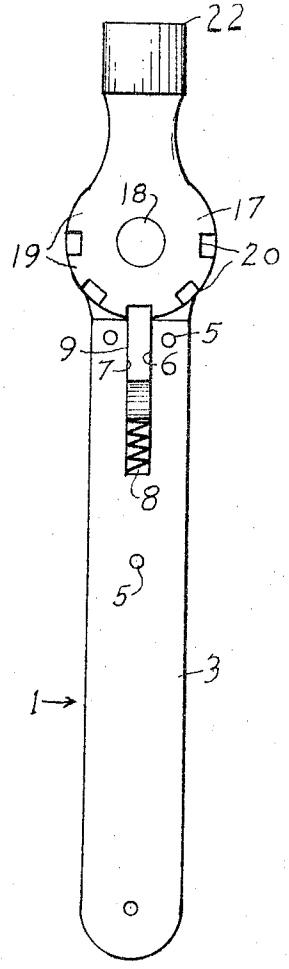



FIG. 2

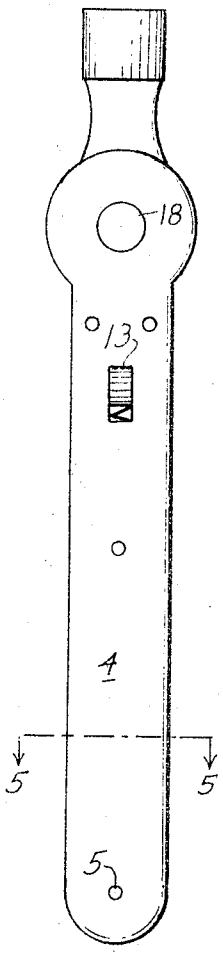



FIG. 4

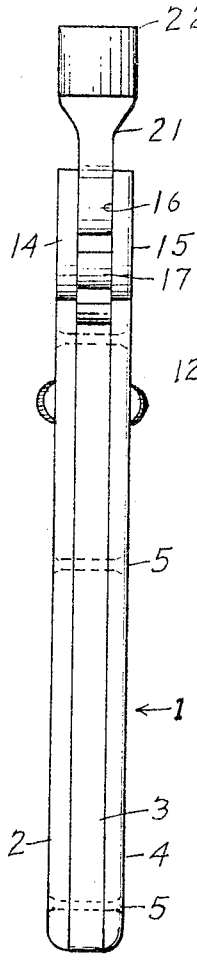



FIG. 3

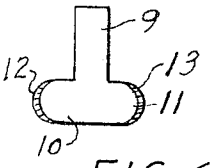



FIG. 6

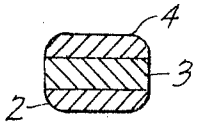



FIG. 5

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United States Patent Office 3,270,597 Patented Sept. 6, 1966



3,270,597

# MULTI-ANGLE RATCHETING WRENCHES

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Filed Sept. 14, 1965, Ser. No. 487,209
1 Claim. (Cl. 81—177.9)

This is a continuation-in-part of application of Cyrus L. Wing, Ser. No. 372,525, filed June 4, 1964, for "Adjustable Articulated Wrench Extension Arm," now abandoned.

This invention relates to improvements in tools and particularly hand wrenches of the type employed by mechanics in general for placing and removing various kinds of fasteners such, for example, like nuts, bolts, screws, etc.

The rapid advancements of the mechanical and electrical arts have produced problems in fastening parts of equipment together because of the habit of crowding all kinds of mechanism in an effort to save space. Many situations of the past also provided special problems for reaching certain fasteners and clamping means that could not generally be worked upon due to the fact that certain fixed equipment were previously installed and could not be readily removed. The tool of this invention makes it easier to turn nuts and bolts in crowded spaces and in awkward work corners.

A primary object of this invention is to present a tool wherein it may be readily adjusted to various angles and lengths for facilitating the use of the tool in restricted, ordinarily inaccessible or otherwise difficult work places.

Another prime important feature and object is to provide in a manner hereinafter set forth, a wrench that will project itself in two or more different angular planes at the same time; one plane being in several selective, or variable positions around an 180° arc, and the second angular plane being at a fixed 90° angle off the first plane.

Still another object is to provide, in combination with the above objects, a means of locking the tool rigidly in the two angular planes chosen, but which tool can be ratcheted in a fast, time-saving manner.

Other objects of the present invention are to provide a wrench of the character set forth which is comparatively simple in construction, easy to operate, and which can be manufactured economically.

Still other objects and advantages and features will become subsequently apparent and reside in the details of construction and operation as more fully hereafter described and claimed.

Reference is now made to the accompanying drawings which form a part of the disclosure and wherein like numerals refer to and designate the same parts.

FIG. 1 is a perspective view, showing a wrench embodying features of this invention and its use in combination with some optional extension parts;

FIG. 2 is a vertical view of a major portion of the combination wrench or tool with a handle part removed to show the internal structure of the handle;

FIG. 3 is an elevational view of the handle portion of the tool at one side thereof, the opposite side thereof being substantially the same;

FIG. 4 is an elevational view taken at right angles to that shown in FIG. 3, and the opposite side thereof is substantially the same view;

FIG. 5 is a cross sectional view taken substantially along the line 5—5 of FIG. 4;

FIG. 6 is an elevational view of one side of a minor detailed part;

FIG. 7 is an elevational view of a second major portion of the combination wrench or tool;

FIG. 8 is an elevational view, with a part thereof broken away, which shows a plurality of angular positions for the socket portion of the tool with the ratchet head attached in one of several possible positions;

FIG. 9 is an elevational view of an auxiliary extension part.

Now, referring specifically to the drawings for a more detailed explanation of the preferred form of the invention, it will be seen that the reference character **1** designates in general an elongated handle means consisting of three laminated parts indicated at **2**, **3** and **4** and which parts are firmly held together by a plurality of fastening items or means or rivets **5**.

The central core or lamina **3** is shown to be somewhat thicker than the other two laminae and this central core is provided with a slot **6** which provides an elongated chamber **7** adapted to accommodate coiled spring means **8**, and which also accommodates an elongated pin, plunger, catch or dog means **9**, as shown. Integral with the slide pin or plunger means **9** there are the two laterally extending tabs or projections **10** and **11**, the end faces **12** and **13** of which, respectively, are knurled to provide friction for an operator's fingers so that the operator can easily shift the tab on either side of the handle to release the slide pin from a toothed wheel.

The upper ends of the laminae **2** and **4** are each provided with their respective integral circular portions or trunnions **14** and **15** and which are obviously spaced to provide an open end chamber **16**. In this chamber is positioned a turret or ratchet type wheel **17** having a center bore that is journalled on an axle **18**. This axle projects on either side of the wheel and this axle is firmly fixed within bores provided through the circular portions or trunnions **14** and **15**. The ratchet wheel is provided with spaced teeth **19** which provide the plurality of valleys **20** into which one end of the sliding pin **9** snugly fits for the purpose of locking the wheel and thus prevent its rotation. An extension **21** is integral with the wheel **17** and the distal end of **21** is provided with a connector means **22**. This connector means may be a male connector, or coupling, but in this particular case it is a female connector or socket.

A ratchet means of conventional internal construction is designated by the numeral **29** in FIGURES 1, 7 and 8 of the drawings. However, this ratchet means differs from conventional ratchets in that it has two connecting means, **33** and **34** as shown in FIG. 7, instead of the usual one. The second connector means **34** is located where the handle normally would be and takes the place of the usual handle. The second connector means **34** is shaped to mate with the female connector **22** as shown. The choice of which connector is to be female and which male is immaterial and may be reversed if desirable from a manufacturing standpoint.

It will now be apparent that the connector **22** and attached ratchet means **29** can be swung to various angular positions with respect to the handle means **1** by shifting the knurled projection **12** and **13** backward to withdraw the slide pin or latch means **9** from one of the valleys **20** of the turret member until the proper angle is selected, and then the knurled projection can be released to re-latch the turret member in the chosen position. It should also be apparent that the handle is a composite structure that can be made at low cost by stamping operations, completely eliminating the necessity for costly boring, milling, and slotting operations.

FIGURE 1 shows, as a means of illustration only, one of many possible difficult situations where a nut or bolt would be hard, if not impossible, to reach with conventional tools. In this case, with off-set structural member **26** and pipe line **27** posing the problem, the tool is provided with two auxiliary extensions **28** and **31** (illus-

trated in FIG. 9) and one of many available socket tools **32** to fit the particular bolt or nut, both the extensions and the socket tool being very well known and readily available in the current state of the art. The ratchet head is interconnected between the two extensions at the desired 90° angle, the proper working angle is chosen to fit the situation by adjusting the turret member **17**, the proper direction of ratchet is chosen by lever means **30**, and the handle is pumped up and down to ratchet the bolt or nut either in or out.

In some cases, other auxiliary parts may be needed and used; but in any event, the major parts described are sufficient to meet all requirements likely to be frequently encountered.

In FIG. 8, the tool is shown assembled in its two major components without the auxiliary parts and with the ratchet head mounted cross-wise and facing downward in relation to the turret member, instead of in the same plane and facing outward as shown in FIG. 1. This position effectively provides a flex-head ratchet handle that can be locked in the angular position chosen, which cannot be done with conventional flex-head ratchet handles. It is also obvious that the ratchet head may be removed and reinserted in any one of the four different facing directions, for example, up and/or down, or to either side, at the choice of the operator to fit the requirements of the particular job at hand.

Considering all of the more than 100 possible combinations of extensions and angles available, a most versatile tool is contained in the present invention.

Certain novel features and details of this new and novel tool are disclosed herein, and in some cases in considerable detail, in order to make the invention clear in at least one or more forms thereof. However, it is to be clearly understood that the invention, as disclosed, is not necessarily limited to the exact form or forms and details disclosed since it is apparent that various modifications and changes may be made without departing from the spirit and scope of the invention.

Having thus described our invention, what is claimed as new and desired to be secured by Letters Patent is:

A tool comprising in combination, an elongated handle, a revolving turret member on the handle, means for latching the turret member in a fixed position, a square female connector means integral with said turret member, and a ratchet attachment having two square male connector means; said handle having one end in the form of a bifurcated head and formed by three laminated sections held together by four rivets, a pair of the outer laminae being longer than the central lamina to form the bifurcation, said turret member being multiple-slotted around a section of its outer periphery and journalled in a cavity formed by said bifurcation, a rectangular slot in the central lamina opening into said cavity, a cross slot in each outer lamina that opens into the rectangular slot of the central lamina, said latch means comprising a shiftable rectangular pin in the slot of the central lamina having one end to engage any one of the multiple slots in the turret member for the purpose of holding the turret member in a selected position, said pin engaging a spring which constantly urges the pin into engagement with one of the turret slots, said pin having laterally extending arms which extend through said cross slots on both sides of the handle and wherein their outer ends protrude to form finger tabs for shifting said pin out of engagement with said turret member against the urging of said spring, said female connector means comprising a square-shaped recessed cavity at the outer end of a short arm extending integrally from one side of the turret member, the longitudinal axis of which is in alignment with the longitudinal axis of said handle when the turret member is latched in the central slot, said female connector means being for the purpose of cooperating with and receiving one of the two male connector means on the ratchet attachment in any one of four facing directions, said female connector means also being for the purpose of receiving a similar male connector means on an extension bar as an alternate choice, in which case the first male connector means on the ratchet head may be attached to the opposite end of said extension bar instead of directly to the female connector on the turret member and in any one of four different facing directions in the same manner as it may be connected directly to the turret member, the second square male connector means on the ratchet attachment extending outwardly from one side of said ratchet attachment at a 90° angle in relation to the first male connector means, said second male connector being for the purpose of receiving directly a socket tool, or for receiving an extension bar having a female connector means of complementary cross section, in which case the socket tool may be attached to the opposite end of the extension bar instead of directly to the ratchet attachment, thereby providing in the combination tool a facility for reaching and turning a work piece or fastener from many selectable single or double-angles of variable lengths that otherwise would be inaccessible to ordinary tools.


**References Cited by the Examiner**

UNITED STATES PATENTS

| | | | |
|---|---|---|---|
| 107,539 | 9/1870 | Rand | 81—177.9 |
| 648,572 | 5/1900 | Patterson | 81—61 |
| 1,182,652 | 5/1916 | Davis | 81—177.9 |
| 1,416,461 | 5/1922 | Hance. | |
| 1,568,442 | 1/1926 | Carver | 81—177.8 |
| 1,578,065 | 3/1926 | Bemus et al. | 81—61 |
| 1,942,640 | 1/1934 | Fromme | 81—177.9 |
| 2,294,510 | 9/1942 | Nakano. | |
| 3,039,339 | 6/1962 | Hanson | 81—177 |

FOREIGN PATENTS

| | | |
|---|---|---|
| 387,366 | 5/1908 | France. |
| 289,714 | 5/1928 | Great Britain. |


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