March 28, 1967 W. E. VAN HOOSE 3,311,002

ADJUSTABLE WRENCH

Filed March 15, 1965

FIG. 1.

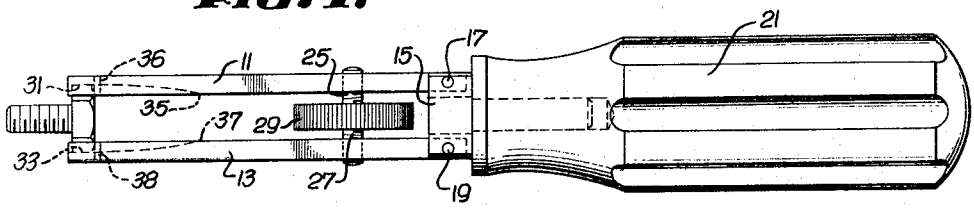


FIG. 2.

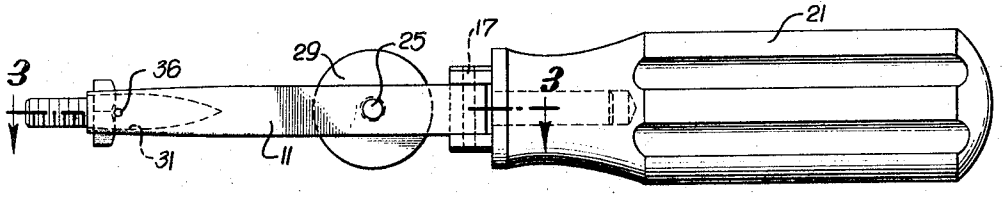


FIG. 3.

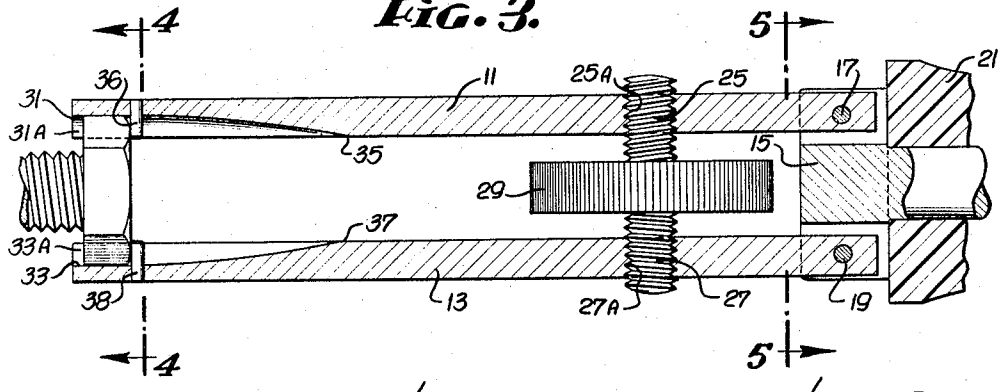


FIG. 4.

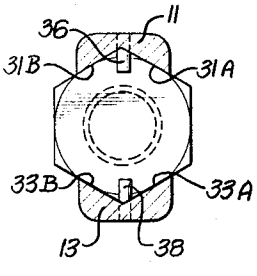


FIG. 5.

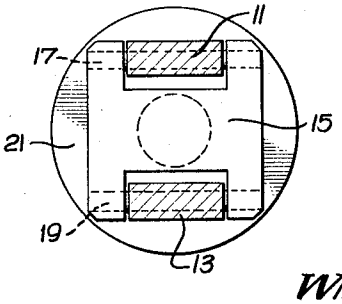
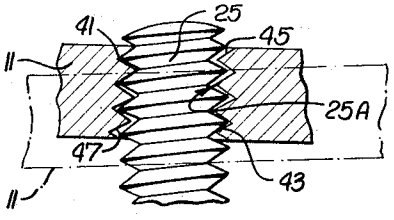


FIG. 6.



INVENTOR.
WILLIAM E. VAN HOOSE
By Huebner & Worrel
ATTORNEYS.

United States Patent Office 3,311,002 Patented Mar. 28, 1967

3,311,002

ADJUSTABLE WRENCH

William E. Van Hoose, 4117 Brompton Ave., Bell, Calif. 90201

Filed Mar. 15, 1965, Ser. No. 439,589
11 Claims. (Cl. 81—118)

This invention relates to an adjustable wrench particularly suitable for insertion into small openings. More particularly, this wrench includes gripping members which axially protrude from a screw-driver type handle and which are automatically limited by suitable means when adjusting the spread of the gripping members.

Prior to my invention difficulty was often experienced when attempting to screw or unscrew nuts and bolts in confined spaces. The gripping members of such wrenches were often too large and bulky to extend into confined areas. This same bulkiness prevented such wrenches from being easy to handle. Most of the available wrenches do not have protruding jaws suitable for reaching into confined spaces nor a handy means for adjusting the jaws which includes an integral structural feature which automatically limits the outer extension of the jaws.

Therefore, it is a primary object of this invention to provide a wrench which has protruding jaws especially suitable for insertion into confined spaces and which has means for easily adjusting the jaws.

Another object of this invention is to provide means for adjusting jaws which axially protrude from the screw-driver type handle of a wrench which includes a self-limiting structure that serves as a stop means when the jaws are opened.

Still another object of this invention is to provide a wrench with a screw-driver type handle which has jaws that are easily adjustable by means of a rotatable turning knob that can be reached by the same hand with which the screw-driver type handle is gripped.

A further object of this invention is to provide a wrench wherein the jaws are adapted to move simultaneously with respect to each other.

Other objects and advantages will become apparent from the following description and illustrative drawings of this invention.

Briefly, an adjustable wrench in accordance with this invention has a handle from which hingedly attached elongated jaws protrude. In a preferred embodiment of this invention the jaws are substantially in alignment with the longitudinal axis of the handle. In other forms the jaws are not in alignment with the axis of the handle. A jaw adjusting means comprised of knurled rotatable turning knob from which axially aligned oppositely threaded perpendicular shanks or studs protrude is positioned between the jaws. The jaw adjusting means is near enough to the hinged attachment of the jaws to the handle that the turning knob can be reached and turned by the thumb of a person's hand which is gripping the handle. The threaded shanks of the jaw adjusting means are engaged in correspondingly threaded aligned holes in each of the jaws so that rotation of the knurled turning knob opens and closes the jaws. The axes of these holes are substantially perpendicular to the longitudinal axis of the corresponding jaw. However, the axes of the holes are preferably offset a few degrees toward the handle from a true perpendicular relationship with the jaws so that the amount that the jaws can be opened is limited by immovable, binding, abutting engagement between the threads of the shanks and their corresponding holes. Thus, the necessity for stop means on the ends of the shanks so as to prevent the jaws from becoming unscrewed when they are opened can be eliminated.

In the drawings:

FIGURE 1 is a top plan view of a wrench in accordance with this invention.

FIGURE 2 is an elevational view of the wrench shown in FIGURE 1.

FIGURE 3 is a partially elevational enlarged fragmented longitudinal sectional view of the wrench shown in FIGURE 2 taken along lines 3—3 thereof.

FIGURE 4 is a cross sectional view of the wrench shown in FIGURE 3 taken along lines 4—4 thereof.

FIGURE 5 is a cross sectional view of the wrench shown in FIGURE 3 taken along lines 5—5 thereof.

FIGURE 6 is an enlarged fragmented view of one end of a threaded adjusting shank and associated jaws opened toward its self-limiting position.

With reference to the preferred form of this invention shown in the drawings the jaws **11** and **13** protrude from the base plate **15** of the handle **21** roughly in alignment with the longitudinal axis of the handle **21** and as shown preferably are at least as long as the handle. They are adjustably interconnected by means of oppositely threaded shanks or studs **25** and **27** which project from and are axially aligned with each other on opposite sides of a rotatable turning knob **29**. Turning knob **29** is centrally positioned and perpendicular to the axis of threaded shanks **25** and **27**. The threaded shanks **25** and **27** are engaged in correspondingly threaded holes **25A** and **27A** which are aligned opposite from each other in jaws **11** and **13** respectively.

Recessed gripping portions **31** and **33** are at the end of each of the jaws **11** and **13** remote from where they are hingedly attached to the base plate **15**. Each of these recessed gripping portions preferably has two faces such as faces **31A** and **31B** of gripping portion **31** and faces **33A** and **33B** of gripping portion **33** which can be viewed best in FIGURE 4. The recessed gripping portions **31** and **33** each gradually slope inwardly from the ends of the jaws until they disappear at points **35** and **37** respectively so that they are shallower in portions closer to points **35** and **37**. The faces **31A**, **31B**, **33A** and **33B** are angled toward each adjacent face and the same amount as the angle of the adjacent outside faces of the nut or bolt they are intended to grip. Hence, as shown in FIGURE 4 where a six-sided bolt head is gripped, the angles between each of the adjacent outside surfaces of the bolthead is 120° and so is the angle between adjacent faces **31A** and **31B** and between **33A** and **33B**. Small protruding studs or stops **36** and **38** can be provided inside the gripping portions to limit the depth of insertion of the nut or bolthead gripped.

Adjustment of the jaws is accomplished by turning rotatable turning knob **29** which in turn moves both jaws **11** and **13** equally due to interconnected threaded engagement of shank **25** with hole **25A** and shank **27** with hole **27A**. The jaws can be closed inwardly until they grip an object or touch each other but their extent of opening is automatically self-limiting due to tight locking abutment engagement of each of the threaded shanks with their corresponding threaded holes. This is due to the fact that since one end of each jaw is hingedly connected to base plate **15** an increasing angular differential from perfect alignment of the axis of the threaded shank and the corresponding threaded holes in each jaw occur as the jaws are opened. This causes the threaded portions of a shank **25** as in FIGURE 6 to engage threaded hole **25A** tightly at portions **41** and **43** of the hole **25A** and become completely separated at portions **45** and **47** of the hole **25A** as the jaw is opened. This tight engagement at portions **41** and **43** of the holes prevents further movement of the shank **25**.

Hence, due to this structural arrangement of the jaws and threaded adjusting means the extent to which the jaws may be opened is automatically self-limiting. That

is, when the jaws are opened to the point at which a portion of the external threads of the shank become tightly wedged against a portion of the internal hole threads of an engaged jaw the jaws are prevented from being opened farther. The point at which this self-limitation will occur depends upon variables such as the thread depth and thread count per inch and also how closely the externally threaded portion of the shank fits the internally threaded portion of the corresponding jaw. Also, the extent to which the axis of the shank is out of alignment with the axis of the corresponding threaded hole in the jaw in which it is engaged depends upon the amount of deviation of the longitudinal axis of the jaw from the position where it is perpendicular to the axis of the threaded shank. For example, if the axis of the threaded hole is roughly perpendicular to the longitudinal axis of the jaw in which it is drilled then, when the axis of the jaw is perpendicular to the axis of the threaded shank the axes of the threaded hole and the bar will be aligned.

The jaws **11** and **13** are spaced apart from each other at the attachment of their respective pivot pins **17** and **19** to the base plate **15** a distance which corresponds to the diameter of the largest nut or bolt head that is intended to be gripped. In this manner, the gripping portions **31** and **33** of the jaws will normally not be farther apart than the corresponding distance between the pivot pins **17** and **19** on the attached hinged ends of the jaws when the wrench is used to grip a nut or bolthead. Therefore, gripping power will always be substantial and normal usage will not entail attempted opening of the jaws beyond the point at which there is the self-limiting stop means previously described.

It has been found desirable in the preferred form of this invention to slightly offset from the perpendicular the angle which the axes of the threaded holes subtend with the longitudinal axes of their respective jaws so as to thereby form acute angles directed toward the handle. Hence, by offsetting the angle of the axis of the threaded hole one to five degrees it will subtend an angle of 89 to 85 degrees with the longitudinal axis of the jaw. By varying the amount of such offsetting the position where the jaws are self-limiting can be correspondingly varied. That is, this offsetting causes the threaded portion of the shank or stud and the engaged threads of the hole in each jaw to become tightly abutting against each other sooner when the jaws are opened than they would otherwise. Thus, by varying this offset angle the self-limiting effect of this structure can be made to occur exactly as the jaws **11** and **13** are opened to the ends of the shanks **25** and **27** respectively, thereby eliminating the need for stop caps on the ends of these shanks or studs.

Though not intended as a limitation upon the scope of this invention the embodiment shown in the drawings is a particularly handy and preferred form of tool having structure in accordance with this invention. By gripping the handle **21** like a screw driver and placing one's thumb on knurled turning knob **29** the protruding jaws **11** and **13** can be inserted into restricted openings and relatively inaccessible areas and adjusted so as to grip the particular nut or bolthead which is desired to be screwed or unscrewed. Then the wrench is turned like a screw driver to effect the tightening or unscrewing of the screw or bolt. It should be noted that the knurled turning knob **29** is relatively close to the handle **21** so that it can be comfortably reached with the thumb of the hand gripping the handle **21** and that the jaws **11** and **13** protrude a distance from the handle **21** sufficient to enable the end gripping portions **31** and **33** to be inserted in confined spaces. In this particular embodiment the axes of the threaded holes **25A** and **27A** are offset two degrees toward the handle **21** from a true perpendicular position that the axes of the holes take with the longitudinal axis of the jaws **11** and **13**.

Although the invention has herein been shown and described in what is conceived to be the most practical and preferred embodiment, 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.

What is claimed as this invention is:

1. An adjustable wrench comprised of a handle, a pair of protruding jaws each hingedly attached to one end of said handle and extending from said handle substantially in alignment with the longitudinal axis of said handle, said jaws each having matching recessed double-faceted, gripping faces which are opposite from each other on the ends of the jaws remote from the ends where the jaws are hingedly attached to the handle, said jaws each having an aligned oppositely threaded hole which has an axis that extends from the interior surface of the jaw to the exterior surface thereof in the direction of the handle so as to be slightly tilted from a substantially perpendicular position said axis makes with the longitudinal axis of each jaw, and jaw adjusting means positioned between each of said jaws comprising a pair of axially aligned oppositely threaded shanks protruding from opposite sides of a rotary turning knob, one of each of said shanks being threadably engaged in the threaded holes of each of said jaws so that rotation of said turning knob will cause the gripping portions of the jaws to move.

2. An adjustable wrench as defined in claim **1** wherein the axis of the aligned oppositely threaded holes is tilted from one to five degrees from a perpendicular position relative to the longitudinal axis of the corersponding jaw.

3. An adjustable wrench having a screw-driver type handle, a pair of protruding jaws hingedly attached to one end of said handle, said jaws protruding in alignment with the longitudinal axis of said handle, said jaws having opposing gripping portions near their ends remote from their hinged attachment, each of said jaws having oppositely threaded holes in alignment with each other near their hinged attachment wherein the axes of said holes extend from the interior surface of said jaws to the exterior surfaces thereof in the direction of the handle so as to be slightly tilted one to five degrees toward said handle from their substantially perpendicular position relative to the longitudinal axis of each corresponding jaw, and jaw adjustment means comprising axially aligned oppositely threaded shanks projecting perpendicularly from opposite sides of the center of a knurled rotatable turning knob, said shanks each threadably engaging one of said threaded holes in said jaws.

4. An adjustable wrench as defined in claim **3** wherein the opposing gripping portions of each of the jaws includes two adjacent faces which subtend a predetermined angle between them.

5. An adjustable wrench as defined in claim **3** wherein the jaws protrude from the handle a distance which is at least the length of the handle.

6. An adjustable wrench as defined in claim **3** wherein the opposing gripping portions of each of the jaws include stop means to limit the depth of insertion of the object gripped.

7. An adjustable wrench comprising a screw-driver type handle, a pair of elongated jaws protruding from one end of said handle, said jaws being hingedly attached to said handle and spaced apart at said attachment and having unobstructed facing gripping portions on the ends remote from their attachment with the handle, and rotatable jaw adjusting means positioned between and oppositely threadably engaged with each of said jaws equally through complementary guide means axially diverging outwardly and slightly toward said handle from a line bisecting the longitudinal axis between said jaws sufficiently to limit the outward movement of said jaws and so that said jaws alone grip objects with an equal amount of converging lateral pressure relative to a line bisecting the longitudinal axis between said jaws.

8. An adjustable wrench as defined by claim 7, wherein the jaws each have, as a guide means, an aligned oppositely threaded hole which has an axis slightly tilted toward the handle but substantially perpendicular to the longitudinal axis of the jaw, and the rotatable jaw adjusting means is comprised of axially aligned threaded shanks extending perpendicularly from opposite sides of a rotary turning knob, each of said shanks being threadably engaged in the threaded holes of the jaws so that rotation of the turning knob will cause the jaws to simultaneously move an equal amount relative to each other.

9. An adjustable wrench comprising a screw-driver type handle, a pair of jaws protruding from one end of said handle, said jaws being hingedly attached to said handle and having facing gripping portions on the ends remote from their attachment with said handle, said jaws having aligned oppositely threaded holes which have axes which extend from the interior surfaces of said jaws to the exterior surfaces thereof in the direction of the handle so as to be slightly tilted from a true perpendicular position the axes of the holes take relative to the longitudinal axis of the respective jaw, and rotatable jaw adjusting means positioned between and oppositely threadably engaged with said threaded holes in each of said jaws.

10. An adjustable wrench as defined by claim 9, wherein the rotatable jaw adjusting means is comprised of axially aligned threaded shanks extending perpendicularly from opposite sides of a rotary turning knob, each of said shanks being threadably engaged in the threaded holes of the jaws so that rotation of the turning knob will cause the jaws to simultaneously move relative to each other.

11. An adjustable wrench as defined by claim 10, wherein the distance between the remote ends of the threaded shanks that are on opposite sides of the rotary turning knob is less than the diameter of the handle and the axes of the threaded holes are tilted from a perpendicular position relative to the longitudinal axis of the respective jaw at a sufficient angle to cause the threads of the correspondingly engaged shank to become rigidly wedged against the threads of the engaged hole before it is unscrewed from the shank thereby forming a self-limiting structural feature which limits the extent that the jaws can be opened.

References Cited by the Examiner

UNITED STATES PATENTS

156,124	10/1874	Birch	81—43
222,781	12/1879	Guthrie	145—52
1,033,531	7/1912	Brown.	

WILLIAM FELDMAN, *Primary Examiner.*

R. V. PARKER, JR., *Assistant Examiner.*