K. C. F. MONCKTON

LOCKING ADJUSTABLE HANDLE FOR HAND TOOLS

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FIG. 1

FIG. 2

FIG. 3

FIG. 4

FIG. 6

KENDALL C. F. MONCKTON

INVENTOR

BY CAMERON, KIRKAM, & SUTTON

ATTORNEYS
This invention relates to hand operated tools, such as wrenches and the like, having handles which are adjustable with respect to the work-engaging portions thereof, and is particularly useful in connection with wrenches of the type wherein the handle is adapted to be adjusted to and locked in various positions relative to the wrench head.

A main object of the present invention is to provide improved means for locking the adjustable handle of a wrench or other hand tool to the work-engaging portion thereof which are structurally simple and easy to manufacture, can be readily actuated while the tool is in use, and will effectively prevent the handle from slipping when torque loads are applied thereto.

Another object is to provide a novel form of adjustable tool handle of the character described which may be quickly and easily unlocked, moved from one position to another and positively locked in the new position using only one hand, and which includes yieldable means for facilitating setting of the handle in the desired position.

These and other objects, including the provision of a locking adjustable tool handle which is less bulky and cumbersome, easier to use and more positive in its locking action than similar devices heretofore known, will appear more fully upon consideration of the detailed description of the embodiment of the invention which follows. In this connection, although only one specific form of tool is described and illustrated in the accompanying drawings, it is to be expressly understood that this drawing is exemplary only and is not intended to represent the full scope of the invention which is defined by the appended claims.

Referring now to the drawing, wherein like reference characters indicate like parts throughout the several views:

Fig. 1 is a side elevation view of one form of tool embodying the present invention;

Fig. 2 is an end elevation view of the tool shown in Fig. 1 looking from the left in the latter figure;

Fig. 3 is a fragmentary sectional view taken substantially on the line 3—3 in Fig. 2;

Fig. 4 is a sectional view similar to Fig. 3 showing the handle locking means in released position; and

Figs. 5 and 6 are perspective views of the locking and actuating members, respectively, of the tool shown in Figs. 1—4 as they would appear prior to assembly with the other elements of the device.

In the drawing, the invention has been shown embodied in a wrench of the adjustable open-end type, commonly known as a crescent wrench, having a work-engaging head 11 and an operating handle 12 which is adapted to be adjusted to and locked in various positions relative to head 11.

The wrench head may be of any desired construction, but for illustrative purposes has been shown as comprising a fixed jaw member 13 having a substantially semi-cylindrical body portion and an outwardly projecting jaw portion, and a movable jaw member 14 which is slidably mounted in fixed jaw member 13 and adjustable toward and away from the jaw portion of the latter by a worm 15 in a manner which is well known to the art and therefore need not be described in detail herein. The upper end of handle 12, which is substantially the same thickness as wrench head 11, is bifurcated to form a pair of arms 16, while a sector 17 of the body portion of fixed jaw member 13 below the slot in which movable jaw member 14 is mounted is reduced in thickness sufficiently to fit into the space between arms 16 for rotational mounting in said arms on a pivot pin 18 which is concentric with the periphery of sector 17 and perpendicular to the longitudinal axis of handle 12. With this construction, it is evident that, as indicated in broken lines in Fig. 1, handle 11 may be moved to various angular positions relative to head 11 about the axis of pivot pin 18 through an arc substantially equal to that subtended by the sectorial portion 17 of fixed jaw member 13, i.e., about 125° in the embodiment illustrated, the radially extending shoulders 19 and 20 at the extremities of sector 17 serving as stops which limit the angular movement of the handle with respect to the head.

In order to positively lock handle 12 to wrench head 11 in any selected position, the periphery of sector 17 of head 11 is provided with a plurality of circumferentially spaced, radially inwardly extending locking recesses 21 corresponding in number and location to the various positions in which the handle may be locked to the head, and handle 12 is provided with a cooperating locking member 22 which is slidably mounted in a resilient channel 23 formed in the upper end of the handle and extending from one side thereof to the other, through the lower ends of arms 16 as well as the unifurcated portion of the handle immediately below said arms.

In the illustrated embodiment of the invention, each of locking recesses 21 is in the form of a U-shaped notch and locking member 22 is a rectangular block of the same thickness as the portion of handle 12 in which it is mounted. As shown best in Figs. 3 and 4, channel 23 extends longitudinally of handle 12 in a radial direction relative to the axis of pivot pin 18 so that the movement of block 22 in the channel is radial with the notched sector 17 of wrench head 11. The upper or inner end of channel 23 in arms 16 is spaced from the axis of pivot pin 18 by substantially the same distance as are the bases of notches 21, while the width of said channel is substantially equal to the distance between the parallel sides of each notch so that, when one of said notches is radially aligned with said channel, the upper end of locking block 22 may engage the notch with the same sliding fit as it has in the channel. The length of channel 23 is somewhat greater than the longitudinal dimension of block 22 plus the depth of a notch 21 so that, when the block is moved downwardly in the channel a sufficient distance to completely disengage the aligned notch 21, there is enough space between the lower end of the block and the base of the channel to accommodate a compression spring 24. If desired, the lower end of block 22 and the base of channel 23 may be provided with spring seating recesses 25 and 26, respectively.

In accordance with the invention, novel means are provided for moving locking block 22 into and out of locking engagement with any selected notch 21 which, when the upper end of the block has been seated in the notch, are effective to lock the block in place and to prevent slippage between handle 12 and wrench head 11 when torque is applied to the handle, as in tightening a nut.

As shown, the block actuating means comprise a manually operable lever member 27, having the shape best illustrated in Fig. 6, which is pivotally connected to locking block 22 and has a second pivotal or fulcrum...
axis supported by and movable relative to handle 12. In the form illustrated, lever member 27 consists of a pair of parallel cheek plates 28 which embrace the sides of that portion of handle 12 wherein channel 23 is formed, and a transversely extending web 29 which connects cheek plates 28 and normally lies in contact with one edge of the handle, as indicated in Figs. 1 and 3. Lever member 27 is pivotally connected to locking block 22 by a pivot pin 30 which passes through a hole 31 extending through the central portion of block 22 with its axis parallel to pivot pin 18 and is fastened at its ends to cheek plates 28 in any suitable manner, as by riveting. Lever member 27 is also provided with a second pivot pin 32, parallel to and offset from pin 30 and similarly interconnected to cheek plates 28, which is both rotatably and slidably mounted in a slot 33 formed in handle 12 which opens into and extends perpendicularly to the longitudinal axis of channel 23. Pins 30 and 32 are spaced and positioned relative to one another so that, when locking block 22 has been moved downwardly in channel 23 out of locking engagement with a notch 21 to the unlocked position illustrated in Fig. 4, pin 30 lies in substantially the same plane as slot 33 and fulcrum pin 32 is positioned at the outer end of said slot.

Block 22 is also provided with a half-round groove 34 in that side of said block which slides against the side of channel 23 into which said slot 33 opens, groove 34 being parallel to the hole 31 through which pin 30 passes and the distance between the axes of said groove and said hole being equal to the distance between the axes of pins 30 and 32. With this construction, when block 22 is moved upwardly in channel 23 so as to become fully seated in one of notches 21, fulcrum pin 32 is seated half in groove 34 and half in slot 33, thereby positively locking block 22 in place and effectively preventing accidental release of the locking engagement between said block and the notch 21 when a torque load is applied to handle 12.

In order to facilitate adjustment of handle 12 relative to wrench head 11, particularly when the jaws are in engagement with a bolt head or a nut, lever member 27 is so formed as to be readily actuated by the same hand of the operator as that in which the handle is gripped. To this end, the thickness of handle 12 is reduced at the region 35 just below the base of channel 23 to appreciably less than that of the upper portion of the handle, and cheek plates 28 and web 29 of lever member 27 are extended downwardly beyond said region. The lower corner of cheek plates 28 are bent inwardly as indicated at 35 to form push points against which the operator may exert direct pressure and thereby move the lever outwardly to the unlocked position indicated in Fig. 4, against the pressure of spring 24. Then, without releasing the handle, the operator can rotate it about pivot pin 18 to a new position where the handle may be relocked to the head by returning lever member 27 to its original position of Fig. 3, either by the application of manual pressure to web 29, or by simply disconnecting the application of force to push pins 36 and permitting the spring 24 to move locking block 22 upwardly into engagement with the then-registering notch 21.

In the latter connection, it will be obvious that resetting of the handle may be facilitated by releasing lever member 27 as soon as the handle has reached a position wherein the upper end of locking block 22 is opposite any portion of the motion tools adjacent to machined with which it is desired to lock, whereupon spring 24 will automatically move the block into engagement with said notch as soon as continued rotation of the handle brings the block and notch into registration.

There is thus provided by the present invention a new and useful mechanism for securely locking the adjustable handle of a wrench or other hand tool to the work-engaging head thereof in a plurality of different positions which mechanism is quickly and easily released and relocked, even with the same hand of the operator as that by which the handle is grasped, and which, when locked, will not permit slippage between the handle and the head upon the application of torque. The structure provided embodies a minimum of parts, is simple in design and hence easy to manufacture, and is relatively light in weight and compact in arrangement. It is also substantially easier and quicker to adjust than devices hereinafter adapted for similar purposes.

While only one specific embodiment of the invention has been described and illustrated in the accompanying drawing, it will be recognized that the invention is not limited to the exact structure shown, but is capable of incorporation in a variety of mechanical forms. For example, it is evident that the type of tool shown is not a material part of the invention, and that the locking mechanism may be used with advantage in various other kinds of tools wherein it is desired to adjust the handle relative to the work-engaging element. It is also obvious that the elements of the locking means may take specifically different forms from those illustrated in the drawing without affecting the principle of operation of the device or the advantages attained thereby. For instance, it will be recognized that the shapes and relative sizes of the locking recesses, the locking member and the cheek plates and web of the lever member, as well as the manner in which the lever is formed to facilitate actuation by the operator, may be varied as desired and in order to conform to the construction of tools of different types. It will also be understood that the spring which urges the locking member toward its locked position may be omitted, if so desired, although the presence of this spring is advantageous in that it makes it easier to reset the handle in the desired adjusted position, particularly when the tool is being used under conditions wherein the operator cannot easily see just where the handle is with respect to the locking recesses of the work-engaging element.

Various other changes, which will now become apparent to those skilled in the art, may be made in the form, detail of construction and arrangement of the parts without departing from the inventive concept. Reference is therefore to be had to the appended claims for a definition of the limits of the invention.

What is claimed is:

1. A tool of the type having a work-engaging element and a handle pivotally connected to said element for adjustment relative thereto about an axis perpendicular to the longitudinal axis of the handle, means for releasably locking said handle to said work-engaging element in any selected one of a plurality of different positions comprising a plurality of locking recesses formed in said work-engaging element corresponding in number and location to the positions in which said handle may be locked to said element, a locking member slidably mounted in said handle for movement into and out of engagement with said recesses, and a lever member for moving said locking member pivotally connected to the latter on a first axis and having a second pivotal axis movable in said handle in a direction substantially perpendicular to the direction of movement of said locking member, both said first and second axes of said lever member being parallel to the pivotal axis of said handle.

2. A tool of the type having a work-engaging element and a handle pivotally connected to said element for adjustment relative thereto about an axis perpendicular to the longitudinal axis of the handle, means for releasably locking said handle to said work-engaging element in any selected one of a plurality of different positions comprising a sectorial portion of said work-engaging element concentric with the pivotal axis of said handle having a plurality of locking recesses therein corresponding in number and location to the positions in which said handle may be locked to said element, a locking member...
slidably mounted in said handle for movement into and out of engagement with said recesses and normally in engagement with one of said recesses, and a lever member for moving said locking member pivotally connected to the latter on an axis parallel to said axis of said handle and having a free end normally lying close to said handle, said lever member having a movable fulcrum so supported by said handle that the path of movement of said fulcrum is substantially perpendicular to the path of movement of said locking member, whereby the application of force to the free end of said lever having a normal position moves said free end away from said handle and releases said locking member from engagement with said recess.

3. A tool handle locking mechanism as defined in claim 2 wherein said fulcrum is positioned intermediate the free end of said lever member and the pivot connection thereof to said locking member, and is movable in a slot formed in said handle extending substantially perpendicularly to the longitudinal axis of said handle.

4. In a tool of the type having a work-engaging element and a handle pivotally connected to said element for adjustment relative thereto about an axis perpendicular to the longitudinal axis of the handle, means for releasably locking said handle to said work-engaging element in any selected one of a plurality of different positions comprising a plurality of locking recesses formed in said work-engaging element corresponding in number and location to the position in which said handle may be locked to said element, a locking member slidably mounted in a channel formed in said handle for movement into and out of engagement with said recesses, a lever member for moving said locking member pivotally connected to the latter on an axis parallel to the pivotal axis of said handle and having a cylindrical fulcrum pin on the axis of which is parallel to and offset from the axis of said pivotal connection to said locking member, and a slot in said handle wherein said fulcrum pin is slidably mounted, said slot opening at one end into said channel and extending substantially perpendicularly thereto.

5. A tool handle locking mechanism as defined in claim 4 including a groove in said locking member partially round in cross-section so positioned as to register with the open end of said slot and to receive part of the periphery of said fulcrum pin when said locking member has been moved into locking engagement with one of said recesses.

6. A tool handle locking mechanism as defined in claim 4 including a groove in said locking member partially round in cross-section so positioned as to register with the open end of said slot when said locking member has been moved into locking engagement with one of said recesses, the axis of the pivotal connection between said locking member and said lever member being equidistant from the axes of said fulcrum pin and said groove, whereby said fulcrum pin becomes partially seated in said groove when said locking member has been moved into locking engagement with one of said recesses and thereby prevents accidental release of said locking engagement.

7. A hand operated tool comprising a work-engaging head, a handle having a bifurcated end forming a pair of arms embracing a portion of said head, a pivotal connection between said arms and said head for permitting relative adjustment of said handle and head about an axis substantially concentric with said axis and a plurality of radially extending recesses formed in said peripheral, a channel in said handle extending from the opening between said arms toward the opposite end of the handle in a direction substantially perpendicular to the direction of movement of said locking member when force is applied to said manually actuable portion, and means cooperating with said fulcrum pin when said locking member has been moved into engagement with one of said recesses for preventing accidental release of said locking engagement.

8. A hand operated tool comprising a work-engaging head, a handle having a bifurcated end forming a pair of arms embracing a portion of said head, a pivotal connection between said arms and said head for permitting relative adjustment of said handle and head about an axis substantially concentric with said axis and a plurality of radially extending recesses formed in said peripheral, a channel in said handle extending from the opening between said arms toward the opposite end of the handle in a direction substantially perpendicular to the direction of movement of said locking member when force is applied to said manually actuable portion, and means cooperating with said fulcrum pin when said locking member has been moved into engagement with one of said recesses for preventing accidental release of said locking engagement.

9. A hand operated tool comprising a work-engaging head, a handle having a bifurcated end forming a pair of arms embracing a portion of said head, a pivotal connection between said arms and said head for permitting relative adjustment of said handle and head about an axis substantially concentric with said axis and a plurality of radially extending recesses formed in said peripheral, a channel in said handle extending from the opening between said arms toward the opposite end of the handle in a direction substantially perpendicular to the direction of movement of said locking member when force is applied to said manually actuable portion, and means cooperating with said fulcrum pin when said locking member has been moved into engagement with one of said recesses for preventing accidental release of said locking engagement.

10. A hand operated tool comprising a work-engaging head, a handle having a bifurcated end forming a pair of arms embracing a portion of said head, a pivotal connection between said arms and said head for permitting relative adjustment of said handle and head about an axis substantially concentric with said axis and a plurality of radially extending recesses formed in said peripheral, a channel in said handle extending from the opening between said arms toward the opposite end of the handle in a direction substantially perpendicular to the direction of movement of said locking member when force is applied to said manually actuable portion, and means cooperating with said fulcrum pin when said locking member has been moved into engagement with one of said recesses for preventing accidental release of said locking engagement.
into said channel, and a groove in said locking member so positioned as to register with the open end of said slot and to receive a portion of the periphery of said fulcrum pin when said locking member has been moved into locking engagement with one of said recesses.

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