Oct. 22, 1957 M. JOHNSON 2,810,415

HAND TOOL WITH SELECTIVE HANDLE DRIVE

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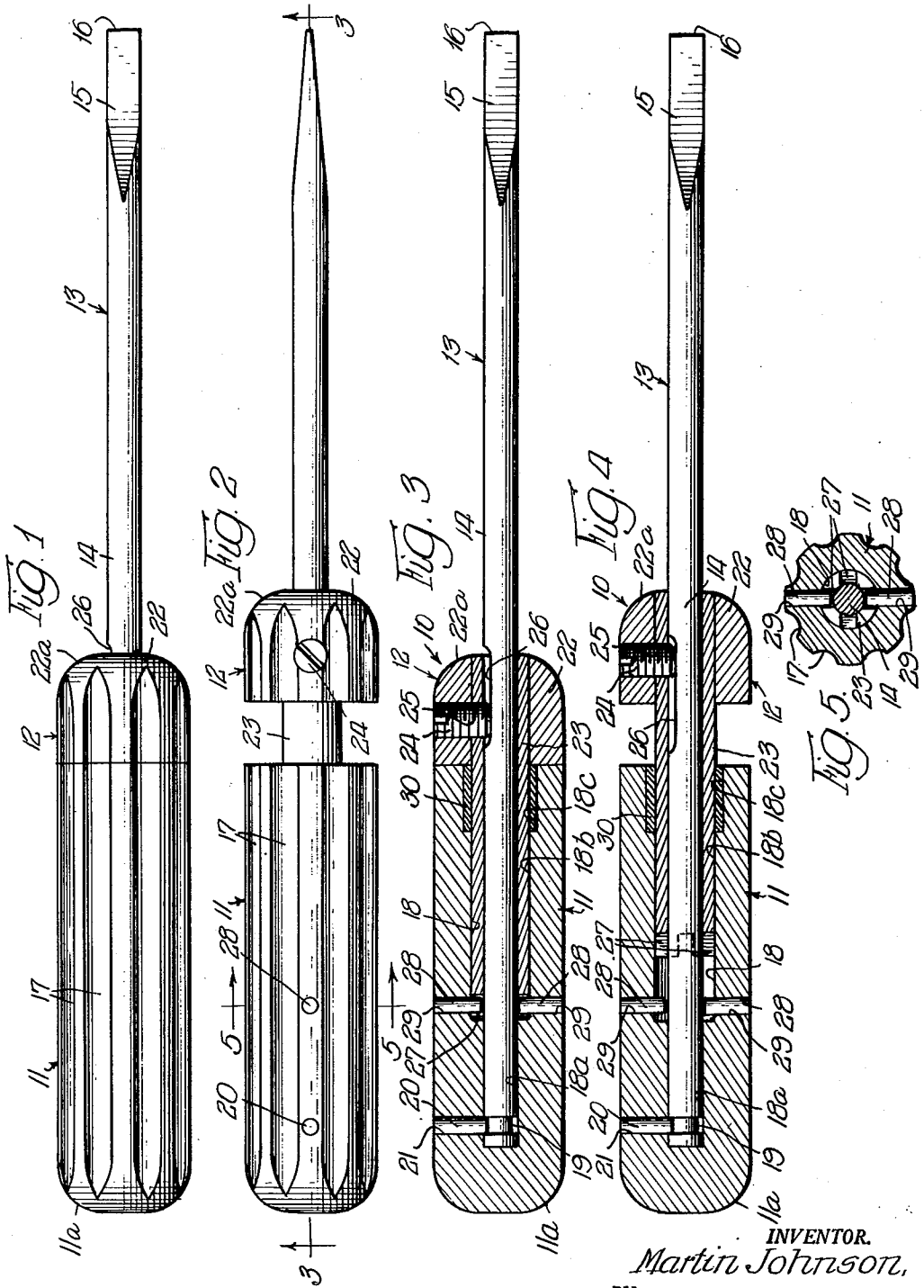


Fig. 1

Fig. 2

Fig. 3

Fig. 4

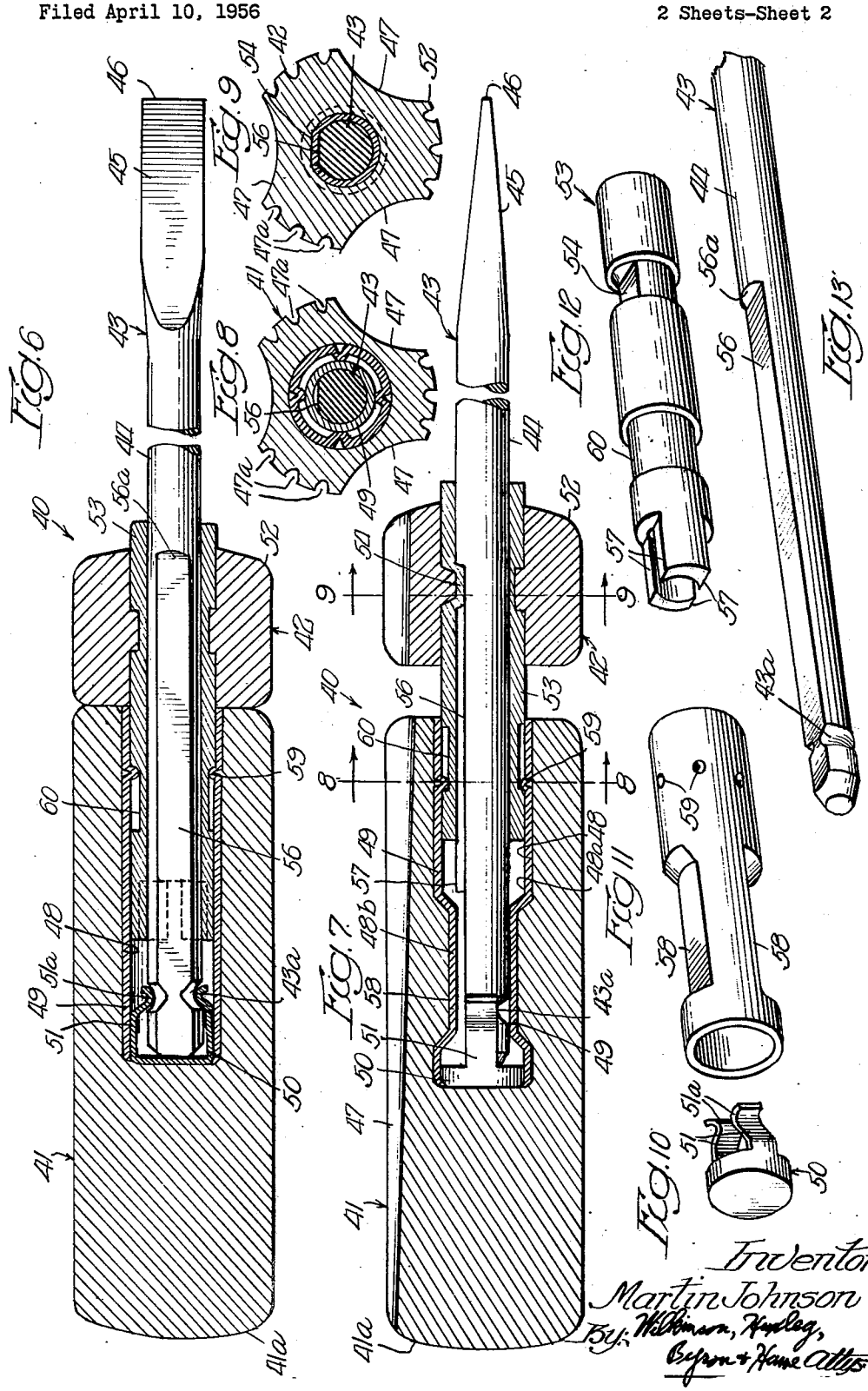
Fig. 5

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HAND TOOL WITH SELECTIVE HANDLE DRIVE

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HAND TOOL WITH SELECTIVE HANDLE DRIVE

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8 Claims. (Cl. 145—76)

This invention relates to an improved construction for a rotatable hand tool, and more particularly to a screw driver or the like adapted for one hand manipulation without removing the screw driver end or bit from the screw slot.

The present application is a continuation-in-part of Martin Johnson, Serial No. 351,293, filed April 29, 1953, now abandoned.

It is an object of the present invention to provide an improved rotatable hand tool construction including a handle portion for applying axial force to a bit and an additional separate handle portion for turning the bit.

Another object of the invention is to provide an improved screw driver or the like which has a bit rotatable independent of the main handle portion.

A further object of the invention is to provide a screw driver having a shank normally rotatable in the main handle portion and having auxiliary handle means adapted for selectively rotating the shank or locking the shank to the main handle.

Still another object of the present invention is to provide an improved construction for a rotary hand tool, such as a screw driver, in which one handle portion is rotatably and non-slidably secured to a shank while another handle portion is slidably and non-rotatably secured to the shank so that the shank can be rotated by means of the second handle portion while axial force is being applied to the shank by means of the first handle portion.

A specific object of the invention is to provide an improved rotary hand tool, such as a screw driver, having a cylindrical shank rotatably secured within an axial bore of a main handle portion with a sleeve rotatably disposed about the shank and having a second handle portion secured at one end portion of the sleeve by means of a set screw or a lug which also acts to prevent rotation of the sleeve relative to the shank while allowing axial movement of the sleeve.

Other objects, features and advantages of the present invention will be apparent from the following detailed description taken in conjunction with the drawings in which—

Figure 1 is a side elevational view of a first embodiment of the improved hand tool or screw driver construction of the present invention;

Figure 2 is a side elevational view of the screw driver of Figure 1 showing the second handle portion in extended position for rotation independent of the main handle portion;

Figure 3 is a longitudinal sectional view of the screw driver construction of Figures 1 and 2, taken along the line 3—3 of Figure 2 but showing the second handle portion in closed position;

Figure 4 is a longitudinal sectional view similar to Figure 3, but showing the second handle portion in extended position;

Figure 5 is a sectional view taken along line 5—5 of Figure 2;

Figure 6 is a longitudinal sectional view of a second

embodiment of the improved hand tool construction showing the second handle portion in closed position;

Figure 7 is a longitudinal sectional view of the embodiment of the hand tool shown in Figure 6 but with the hand tool rotated 90° and with the second handle portion in extended position for rotation independent of the main handle portion;

Figure 8 is a sectional view taken along line 8—8 of Figure 7;

Figure 9 is a sectional view taken along line 9—9 of Figure 7;

Figure 10 is a perspective view of the shank holding clip shown in Figures 6 and 7;

Figure 11 is a perspective view of the socket portion of the hand tool shown in Figures 6 and 7;

Figure 12 is a perspective view of the sleeve portion of the hand tool shown in Figures 6 and 7; and,

Figure 13 is a fragmentary perspective view of the shank portion of the hand tool shown in Figures 6 and 7.

The first embodiment of the screw driver construction of the present invention is generally designated by the reference numeral **10** and includes three main portions, a main or first handle **11**, an auxiliary or second handle and locking means **12**, and a shank **13**.

The shank **13** is of elongated cylindrical form having a main body portion **14** and a working end portion **15** which may be provided with a flattened screw driver end **16** for engaging in the screw slot of a metal screw or wood screw (not shown). It will be understood that the working end of the tool may take any form such as an attachment for securing to a wrench socket, a Phillips head screw driver end, a twist drill, or the like.

The main handle **11**, which may be formed of any suitable material such as a plastic, is of generally cylindrical configuration provided with grip means such as the elongated flutes **17** and with a rounded end **11***a* as shown in Figures 1 and 2. The handle **11** is provided with an internal bore **18** which extends for most of its length and is adapted to receive the end portion of the shank **13** opposite from the working end **15**. An inner reduced diameter portion **18***a* of the bore **18** fits fairly closely about the shank **13** but still allows rotation of the shank without resistance. The portion of the shank **13** within the bore portion **18***a* is provided with an annular groove **19** which loosely receives the inner end of a dowel pin **20** or the like, which is secured in a close fitting radial bore **21** formed through the main handle **11**. Thus it will be seen that the shank **13** is rotatably and non-shiftably secured within the main handle **11**. An axial force can be imparted to the shank **13** in the direction of the working end **15** since the other end of the shank abuts the bottom of the handle bore **18**.

The auxiliary handle **12** includes a body portion **22** which may be formed to appear as an extension of the main handle **11** and which may be provided with an annular rounded end **22***a* to match the annular rounded end **11***a* of the main handle portion. The body portion **22** is disposed in close fitting relation about one end portion of a sleeve **23** which is slidably disposed on the main body portion **14** of the shank **13**. A pin connector such as a set screw **24** is threadedly inserted through the body portion **22** and extends inwardly through a close fitting aperture **25** formed through the adjacent portion of the sleeve **23** in order to lock the body portion **22** to the sleeve. The set screw provides a second function by having its inner end extend into a longitudinal groove or cut-out **26** formed in the main portion **14** of the shank **13** so that the auxiliary handle is slidably but non-rotatably secured to the shank **13**. A third function is provided by the set screw **24** in that the screw may be tightened against the shank to lock the auxiliary handle **22** in any axial position desired within the limits of the length of the groove **26**.

The portion of the sleeve 23 not encircled by the body portion 22 is adapted to be slidingly received in a portion 18b of the bore 18. The end of the sleeve 23 opposite to the attached body portion 22 is provided with a plurality of end notches or slots 27 which are adapted to lockingly engage the inner ends of a pair of dowel pins 28 which extend radially oppositely through the main handle 11 axially adjacent the inner end of the enlarged portion 18b of the bore 18. The dowel pins 28 are secured in respective close fitting bores 29 formed with the main handle 11. It will be readily apparent that when the auxiliary handle 12 is in the closed position against the main handle 11 as shown in Figures 1 and 3, the two handles will be locked together which will also lock the main handle to the shank so that the screw driver can be manipulated in the ordinary manner. If the operator wishes, the set screw 24 can be tightened on the shank 13 to lock the auxiliary handle in its closed position.

In order to protect the outer portion of the bore 18 and to provide a bearing for the sleeve 23, a bushing 30, formed of suitable material such as steel, brass or the like, is secured in an enlarged bushing seat portion 18c formed at the open end portion of the bore 18.

In use, the screw driver 10 may be manipulated in the ordinary manner by putting the two handles in the abutting or closed position as shown in Figures 1 and 3 and as previously described. If the operator wishes to turn the shank 13 for turning a screw or the like without turning the main handle 11, the auxiliary handle 12 may be moved away from the main handle to the extended or open position shown in Figures 2 and 4, so that the locking notches 27 are no longer engaged by the locking pins 28. In this position the main handle 11 can be grasped in the operator's palm for applying an axial force on the shank while the thumb and forefinger of the operator can be used to rotate the auxiliary handle 12 and the shank 13 without necessitating rotation of the operator's hand as a whole. This makes it possible to keep the screw driver end 16 within the slot of the screw while the screw is being turned down or up, and there is no danger of inadvertently slipping the screw driver end from the screw slot, due to rotation of the operator's hand, such as when using a conventional screw driver or an ordinary ratchet type of screw driver. Furthermore, the operation can be performed entirely by one hand, leaving the other hand free. Since the operator never releases his hand and never turns his hand, he may keep a steady pressure against the screw to assist in its insertion and to prevent marring of the screw slot. The present screw driver construction provides an additional advantage in that it is very easy to keep the screw driver axially aligned with the screw to insure accurate placing of the screw and to further prevent injury to the screw slot.

The second embodiment of the invention is generally designated by the reference numeral 40 and is illustrated in Figures 6–13. The screw driver construction 40 is very similar to the construction 10 and includes three main portions, a main or first handle 41, an auxiliary or second handle and locking means 42, and a shank 43.

The shank 43 is of elongated generally cylindrical form having a main body portion 44 and a working end portion 45 which may be provided with a flattened screw driver end 46. As is the case in connection with the first embodiment, the working end of the tool may take any desired form.

The main handle 41 is of generally cylindrical configuration provided with grip means such as the three longitudinally extending tapered flutes 47 which are radially spaced and a plurality of smaller longitudinally extending grooves 47a which are formed on the lands between the flutes. A rounded grasping end 41a is provided at one end of the main handle. An internal bore 48 is provided containing a generally cylindrical metallic liner 49 which is preferably molded within the main handle 41 to provide an opening at the end thereof opposite to the manipulating end 41a. Within the liner 49, the bore 48 is adapted to receive the end portion of the shank 43 opposite from the working end 45.

The end portion of the shank 43 within the bore 48 is provided with an annular groove 43a. A cupped spring 50 is secured in the inner end of the bore, and a pair of spring detent arms 51 are provided having rounded end portions 51a which engage in the annular groove 43a of the shank to releasably retain the shank in rotatable but non-shiftable position within the main handle. An axial force can be imparted to the shank 43 in the direction of the working end 45 since the other end of the shank abuts the bottom of the cupped spring 50 which in turn abuts the bottom of the handle bore 48.

The auxiliary handle and locking means 42 includes a body portion 52 which may be formed to appear as an extension of the main handle 41. The body portion 52 is disposed in close fitting relation about a locking sleeve 53 which is slidably disposed in close fitting relation on the main body portion 44 of the shank 43. A dual purpose connector is formed by means of an inwardly directed lug 54 which is pressed in the wall of the sleeve 53 in the portion encircled by the auxiliary handle body 52. When the body 52 is molded about the sleeve 53, part of the material fills the cavity left by the inwardly pressed lug 54 so that the dual purpose connector performs a first function in locking the body 52 to the sleeve 53. The connector provides a second function in that the lug 54 extends into a longitupdinal groove or cutout 56 formed in the main portion 44 of the shank 43 so that the auxiliary handle 42 is slidably but non-rotatably secured to the shank. A shoulder 56a is formed at the outward end of the groove 56.

It will be seen that this second embodiment of the invention provides for selective removal of the shank 43 in order that various types of working end portions may be selectively utilized. The interchangeability feature is provided by cooperation of the spring detent arms 51 of the cup spring 50 with the annular groove 43a. The longitudinal groove 56 extends inwardly to the end of the shank to allow the shank to be completely removed from the bore 48 and the sleeve 53.

The portion of the sleeve 53 not encircled by the body portion 52 is adapted to be slidingly received in a section 48a of the bore 48, within the adjacent portion of the liner 49. The inner end of the sleeve 53 is notched in two diametrically opposite places to provide a pair of parallel locking faces 57 which are adapted to lockingly engage in a flattened throat or neck portion 48b of the bore 48, within the liner. The throat portion 48b may be formed by squeezing the liner 49 on diametrically opposite sides to form on the outside of the liner a pair of parallel flattened indentations 58.

The throat 48b is positioned so that it snugly engages the locking faces 57 of the sleeve 53 when the auxiliary body handle 52 engages the main handle 41 to prevent relative rotation between the main handle and the auxiliary handle. When the auxiliary handle 42 is separated sufficiently from the main handle 41 so that the locking faces 57 are free of the locking neck 48b, the auxiliary handle may be freely rotated with respect to the main handle. It will be readily apparent that when the auxiliary handle 42 is in the closed position against the main handle 41 as shown in Figure 6, the two handles will be locked together, which will also lock the main handle to the shank so that the screw driver can be manipulated in the ordinary manner.

It will be noted that the indentations 58 provided by formation of the locking neck 48b serve to receive a portion of the material of the handle 41 when it is molded about the liner so that the liner is fixedly secured within the handle.

For limiting the extent of possible axial movement between the auxiliary handle 42 and the main handle 41 a plurality of small stop lugs 59 are radially inwardly formed in the liner in an axial position near the opening of the bore 48. The lugs 59 engage in an annular groove

60 formed in the sleeve 53. The groove 60 is of such a length and the lugs 59 are so placed that the main and auxiliary handles may abut in closed position and may be separated axially a sufficient amount to an open position permitting relative rotation but preventing removal of the sleeve from the bore 48.

The screw driver construction 40 operates in exactly the same manner as the screw driver construction 10 with the exception that the shank 43 is removable to permit selection of shanks having different types of working ends. This feature of shank removability and replaceability is provided without sacrificing any of the utility of the tool.

The improved hand tool or screw driver construction of the present invention is especially useful for performing fine work such as that of watch makers and instrument repairmen. An additional important use of the screw driver is in connection with assembly line work in which the combined speed and accuracy provided results in lower production cost and fewer rejections. Interchangeability of the tool bits without sacrifice of utility makes the tool even more versatile.

It will be readily seen that the present invention provides an improved hand tool construction in which rotary motion can be imparted to the tool without rotation of the operator's hand while the tool is kept in proper axial alignment and axial force is applied. The improved results are provided with a very much simplified construction which is rugged and which is adapted for mass production.

Variations and modifications may be effected without departing from the scope of the novel concepts of the present invention.

I claim:

1. In a rotatable hand tool, a shank having an end portion adapted to engage a work piece, a first handle rotatably secured to said shank and adapted for transmitting axial force to the shank, a sleeve slidably disposed on said shank, a second handle disposed about a portion of said sleeve, said shank being provided with an axially extending groove, a pin member inserted through said second handle and said sleeve and having an inner end portion extending into said shank groove whereby said pin fixedly secures said second handle to said sleeve and prevents relative rotation between the sleeve and the shank, and interengageable means formed on the sleeve and the first handle for locking the shank to the first handle when the second handle is in a position adjacent the first handle.

2. In a rotatable hand tool, a shank having an end portion adapted to engage a work piece, a first handle rotatably secured to said shank and adapted for transmitting axial force to the shank, a sleeve slidably disposed on said shank, a second handle disposed about a portion of said sleeve, means for fixedly securing said second handle to said sleeve, means for preventing relative rotation between the sleeve and the shank, said sleeve having an end portion provided with a plurality of notches, and a locking pin disposed in said first handle with an end portion of said pin extending into said first handle for engaging one of said sleeve notches.

3. In a rotatable hand tool, a shank having one end portion with an annular groove formed therein and the other end portion adapted to engage a work piece, a handle having an axial bore with said one end portion of said shank rotatably disposed therein, a pin fixedly disposed in said handle with an end portion of the pin extending into said groove for preventing axial movement of said shank in said handle while allowing relative rotation between the shank and the handle, a sleeve slidably disposed on said shank and having an end portion provided with a plurality of notches with said end portion adapted for being received in said handle bore, a locking pin fixedly disposed in said handle with an end portion of the pin extending into said handle bore and adapted for engaging in one of said sleeve notches when said sleeve is in one axial position, a second handle disposed about a portion of said sleeve, said shank being provided with an axially extending groove, a set screw threadedly inserted through said second handle and inserted through said sleeve for fixedly securing said second handle to said sleeve, the inner end portion of said set screw being disposed in said shank groove for preventing rotation of the sleeve and the second handle relative to the shank while allowing axial sliding, whereby when said second handle is moved to one axial position, said first-named handle and said shank are connected for concurrent rotation and whereby when said second handle is manipulated to move said sleeve out of said one axial position, said shank can be rotated independent of said first-named handle by means of said second handle while axial force is applied to the shank by means of the first-named handle.

4. In a rotatable hand tool, a shank having an end portion adapted to engage a work piece, a first handle rotatably secured to said shank and adapted for transmitting axial force to the shank, a sleeve slidably disposed on said shank, a second handle disposed about a portion of said sleeve, said shank being provided with an axially extending groove, a connecting member having an inner portion extending into said shank groove and an outer portion engaging said handle fixedly securing said second handle to said sleeve and preventing relative rotation between the sleeve and the shank, and interengageable means formed on the sleeve and the first handle for locking the shank to the first handle when the second handle is in a position adjacent the first handle.

5. In a rotatable hand tool, a shank having one end portion with an annular groove formed therein and the other end portion adapted to engage a work piece, a handle having an axial bore with said one end portion of said shank rotatably disposed therein, a detent disposed in said handle having a portion extending into said annular groove for checking axial movement of said shank in said handle while allowing relative rotation between the shank and the handle, a sleeve slidably disposed on said shank and having an end portion provided with a plurality of indentation means with said sleeve end portion adapted for being received in said handle bore, locking projection means disposed in said handle and extending into said bore adapted for engaging in said sleeve indentation means when said sleeve is in one axial position, a second handle disposed about a portion of said sleeve, said shank being provided with an axially extending groove, and a connector having one portion engaging said second handle and another portion disposed in said shank groove for preventing rotation of the sleeve and the second handle relative to the shank while allowing axial sliding, whereby when said second handle is disposed in one axial position, said first named handle and said shank are connected for concurrent rotation and whereby when said second handle is disposed in another axial position, said shank is rotatable independent of said first named handle.

6. In a rotatable hand tool, a shank having one end portion with an annular groove formed therein and the other end portion adapted to engage a work piece, a handle having an axial bore with one end portion of said shank rotatably disposed therein, a cup-spring disposed in said bore and having a pair of spring detent arms extending into said annular groove for resiliently checking axial movement of said shank out of said handle while allowing relative rotation between the shank and the handle, a sleeve slidably disposed on said shank and having an end portion provided with a pair of parallel locking faces with said end portion adapted for being received in said handle bore, said bore having a reduced size locking neck portion adapted to receive the locking faces of said sleeve end portion in close fitting relation thereto, a second handle disposed about a portion of said sleeve, said shank being provided with an axially extending groove, an inwardly pressed connecting portion formed on said sleeve providing an inward projection disposed in said

shank groove for preventing rotation of the sleeve relative to the shank while allowing axial sliding, said connecting portion including an indentation receiving a portion of said second handle to lock the second handle to the sleeve, and means associated with said sleeve and said first handle to provide limited axial movement of said sleeve in said first handle to allow disengagement of said locking faces from said locking neck but preventing removal of the sleeve from the first handle.

7. In a rotatable hand tool, a shank having an end portion adapted to engage a work piece, a first handle rotatably secured to said shank and adapted for transmitting axial force to the shank, a sleeve slidably disposed on said shank, a second handle disposed about a portion of said sleeve, said shank being provided with an axially extending groove, an inwardly directed lug formed on said sleeve and providing a corresponding indentation in the sleeve, said lug extending into said shank groove to prevent relative rotation between the sleeve and the shank, said second handle having a portion disposed in said indentation in said sleeve to fixedly secure the second handle to the sleeve, and interengageable means formed on the sleeve and the first handle for locking the shank to the first handle when the second handle is in a position adjacent the first handle.

8. In a rotatable hand tool, a shank having an end portion adapted to engage a work piece, a first handle rotatably secured to said shank and adapted for transmitting axial force to the shank, a sleeve slidably disposed on said shank, a second handle disposed about a portion of said sleeve, means for fixedly securing said second handle to said sleeve, means for preventing relative rotation between the sleeve and the shank, said sleeve having an end portion provided with axially extending locking faces, said first handle having flattened indentations for engaging said locking faces when the second handle is in a predetermined position relative to the first handle.

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