Oct. 2, 1956 R. D. PEDERSEN 2,765,013

MULTIPLE TOOL SUPPORTING HEAD

Filed April 30, 1954 2 Sheets-Sheet 1

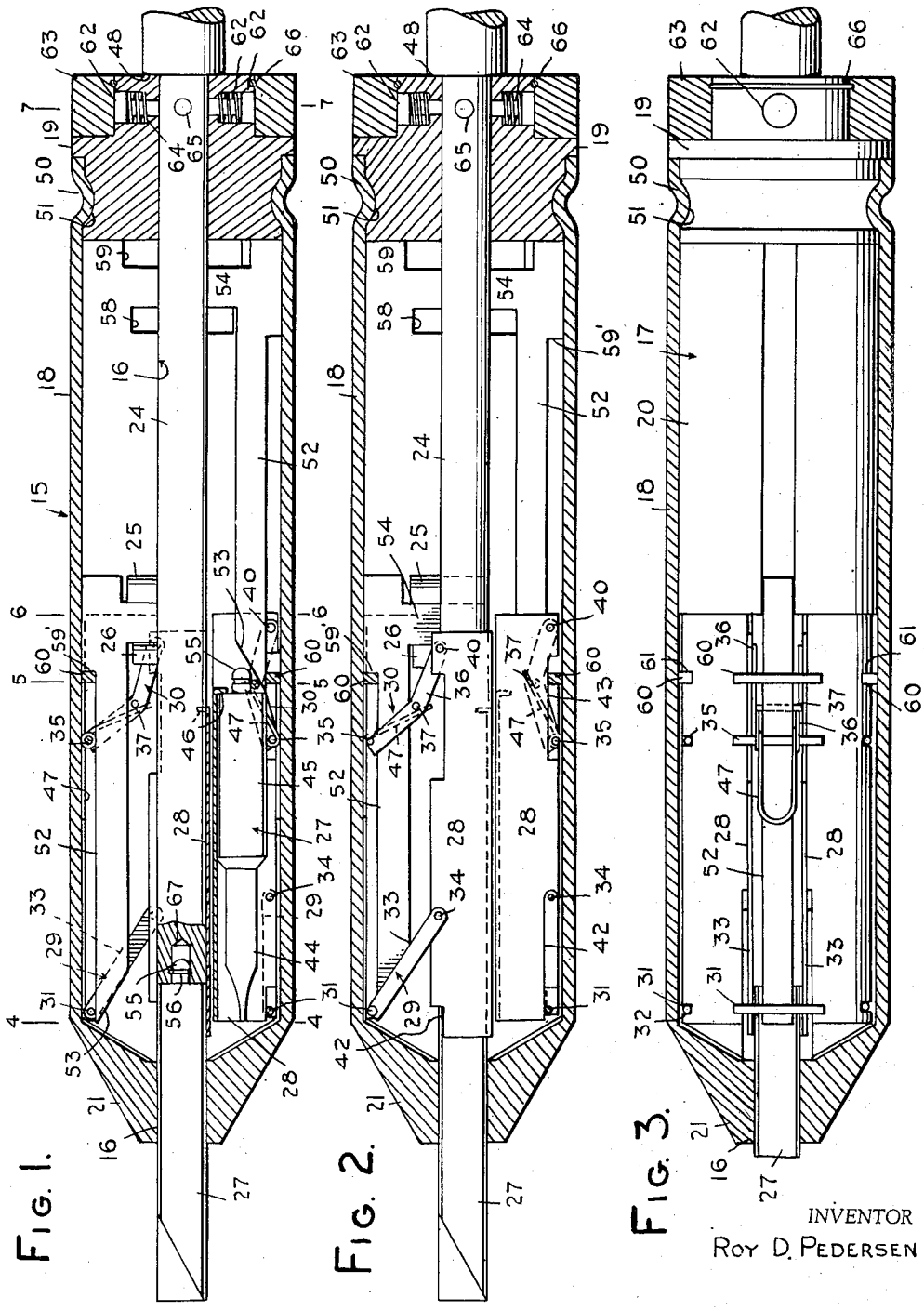

FIG. 1.

FIG. 2.

FIG. 3.

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2 Sheets-Sheet 2

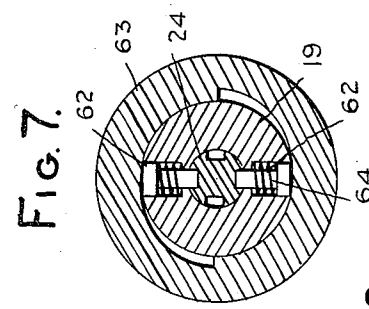

FIG. 7.

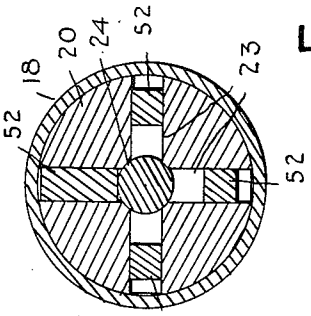

FIG. 6.

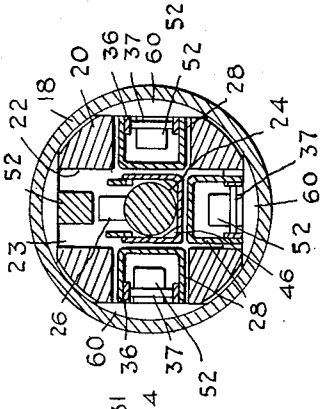

FIG. 5.

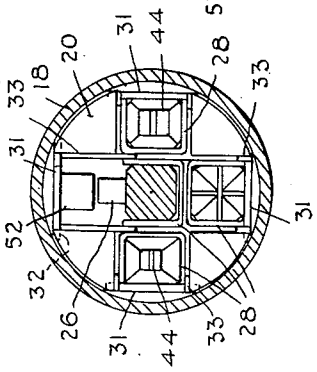

FIG. 4.

FIG. 9.

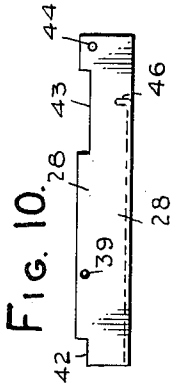

FIG. 10.

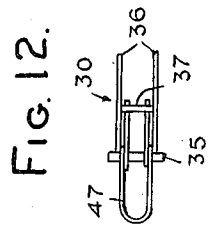

FIG. 12.

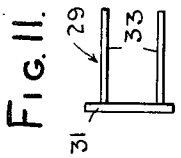

FIG. 11.

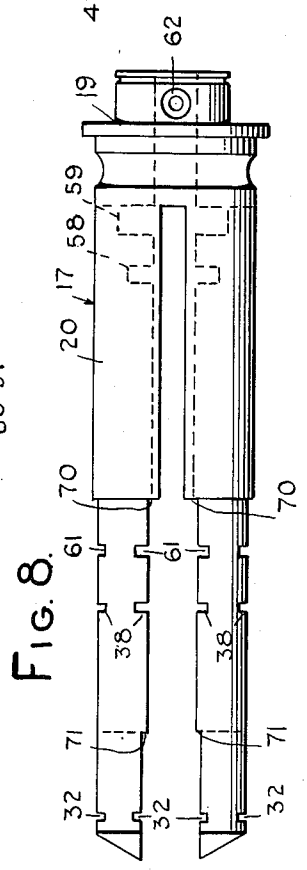

FIG. 8.

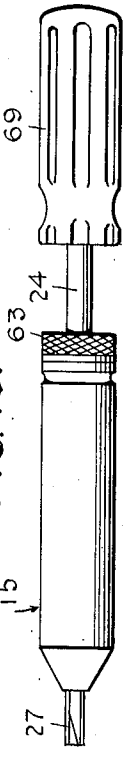

FIG. 13.

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MULTIPLE TOOL SUPPORTING HEAD

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Application April 30, 1954, Serial No. 426,650

3 Claims. (Cl. 145—63)

This invention relates to a multiple tool supporting head and more particularly to a magazine head having a plurality of screw driver elements so mounted therein as to be selectively movable into and out of operating position.

An object of the invention is to provide a single tool equipped with a plurality of alternately usable screw driver elements of different types, saving the expense of having to have a separate tool for each type of element and the inconvenience of keeping more than one tool available while performing a job, particularly if the job is in a precarious or inaccessible place.

Another object of the invention is to provide a multiple screw driver head in which all screw driver elements may be moved to nested, inoperative positions within the head when the tool is not in use.

A further object of the invention is to provide a multiple screw driver head in which one screw driver element may be moved out of operating position and another element moved into and locked in an operative position by simple rotary and sliding movements of a handle of the tool.

Other objects and advantages of the invention will appear from the following description considered in conjunction with the attached drawings, in which:

Figure 1 is a side elevational view in section of a head of the present invention;

Figure 2 is a side elevational view of the head of the present invention showing the tool carriers in full lines;

Figure 3 is a top sectional view of the assembly of Figure 1;

Figure 4 is a view taken along the line 4—4 of Figure 1;

Figure 5 is a view taken along the line 5—5 of Figure 1;

Figure 6 is a view taken along the line 6—6 of Figure 1;

Figure 7 is a view taken along the line 7—7 of Figure 1;

Figure 8 is a side elevational view of the inner element of the magazine structure of the present invention;

Figure 9 is a plan view of one of the tool carriers of the present invention;

Figure 10 is a side elevational view of the element of Figure 9;

Figure 11 is a plan view of one of the link means connecting the tool carrier to the magazine;

Figure 12 is a plan view of the other link means connecting the tool carrier to the magazine and showing the biasing spring attached thereto; and

Figure 13 is an overall view of a screw driver embodying the head of the present invention.

Referring now to the drawings in more detail, the illustrated device comprises a tubular magazine **15** provided with a bore **16** extending from one end to the other thereof. The magazine **15** includes an inner element **17**, shown in detail in Figure 8, and a side wall **18**. The element **17** has a flanged butt portion **19** and a slotted body portion **20**. The side wall **18** is tapered at one end to form

an end wall **21** having a bore **16'**. The magazine receives the body portion **20** of the element **17**, through its other end, and is secured thereto by an annular ridge **50** in its inner surface, adjacent the other end thereof, which fits conformably into an annular groove **51** formed in the body **20** of the element **17**, adjacent the butt portion **19**. A bore **17'** passing through the butt portion **19** is circular in cross section, while the bore **16'** passing through the end wall **21** is of rectangular cross section. Between the butt portion **19** and the end wall **21**, the bore **16** opens into longitudinal slots **22** cut at right angles to each other in the walls of the body portion **20** of the element **17** and projecting radially from the bore **16**, the slots **22** forming chambers **23** when the body portion **20** is enclosed in the magazine. The slots **22** are widened at a point intermediate their ends, forming shoulders **70** in the chambers **23**. The slots **22** are further widened adjacent the end wall **21**, forming shoulders **71** in the chambers **23**.

A handle shaft **24** is supported intermediate its ends in the bore **17'** which extends through the butt portion **19** for projectile and retractile movement and for rotary movement. One end of the shaft **24** extends exteriorly of the butt portion **19** and the other end of the shaft **24** is within the magazine and inwardly of the end wall **21**. Longitudinally spaced, aligned lugs **25** and **26** extend outwardly transversely from the portion of the shaft **24** within the magazine and are so positioned that the lug **25** strikes against the inner face of the butt portion **19** when the shaft **24** is in its retracted position, preventing further retractile movement of the shaft **24**. The body **20** of the element **17** is provided with annular grooves **58** and **59** extending around the side wall **18** adjacent to the butt portion **19** of the element **17**, which grooves accommodate the lugs **25** and **26** and make possible the rotation of the shaft **24** when it is in its retracted position. The external portion of the shaft **24** is enlarged to form an annular shoulder **48** which strikes the outer face of the butt portion **19** when the shaft **24** is in its projected position, as shown in Figures 1 and 2, to limit further movement of the shaft in the projected direction.

A tool **27**, such as a screw driver element, drill, wrench, or the like is nested in each of the chambers **23** and is connected to the magazine **15** for movement from the nested position, as shown of the lower and right and left tools in Figure 4, into position between the end wall **21** and the adjacent end of the shaft **24**. As illustrated, the tool **27** is a screw driver element, which consists of a blade portion **44** and a rectangular shank portion **45**. The free end of the shank portion **45** is provided with a projecting boss **55** which carries a retainer ring **56** seated in a circumferential groove intermediate the ends of the boss **55**. The boss **55** fits conformably within a recess **67** in the adjacent end of the shaft **24**, when inserted therein, to connect the tool **27** to the shaft **24** in end to end relation.

Each tool element **27** rests within a U-shaped carrier **28**, shown in detail in Figures 9 and 10, which carrier **28** is positioned within the chamber **23**, as shown in Figures 1, 2, 4 and 5. The carrier **28** is connected to the adjacent portions of the related element **17** by links **29** and **30**. Each link **29**, shown in detail in Figure 11, has a cross pin **31** which is pivotally supported at its ends in notches **32** in the opposed walls of the related chamber **23**. Each link **29** also has a pair of spaced legs **33**, perpendicular to the cross pin **31**, which legs **33** are pivotally connected, at their free ends, to the adjacent sides of the related carrier **28** by means of rivets **34** which extend through holes **39** formed in the sides of the carrier **28**. Each link **30** has a cross pin **35**, a pair of spaced legs **36**, perpendicular thereto, and a cross piece **37** connecting the legs **36** intermediate their ends.

The pins 35 are pivotally supported, at their ends, in the slots 38 in the adjacent portions of the opposed walls of the chamber 23. The end of each leg 36 is pivotally connected to the adjacent side of the carrier 28 by means of rivets 40 which pass through rivet holes 41 in the side of the carrier 28 and are spaced from the holes 39. Each carrier 28 is thus positioned within the widened portion of its respective chamber 23, intermediate the shoulder 70 and the end wall 21, and is connected to the element 17 for movement from the nested position, as shown of the lower carrier 28 in Figure 2, to a position, as shown of the upper carrier 28 in Figure 2, carrying with it the element 27 resting therein. A U-shaped spring 47 is connected to each link 30 to bias the attached carrier 28 to its nested position. The bight end portion of the spring 47 lies flatly against the inner surface of the side wall 18, the intermediate portion of the legs are looped around the pin 35, and the free end portion of the legs bear against the inwardly facing portion of the pin 37 in such a manner as to urge the clip 30 toward the side wall 18, drawing the carrier to a nested position. The carrier 28 is substantially as wide as the portion of the chamber 23 intermediate the shoulders 70 and 71. The clip 30 is connected to the interior surfaces of the sides of the carrier 28 and consequently needs no clearance exteriorly of the sides of the carrier 28. The clip 29 is connected to the outer surface of the sides of the carrier 28 and therefore requires the clearance provided by the widened end portion of the chamber 23 extending from the shoulders 71 to the end wall 21. The free ends of the sides of the carrier 28 are notched, as shown at 42 and 43, to accommodate the projecting end portions of the pins 31 and 35 when the carrier 28 is in the nested position. A pair of webs 46, positioned in the corners between the base and the opposed sides of the carrier 28, adjacent the end adjoining the shoulders 70, serve as stops for the shank end 45 of the tool 27.

A follower 52 is slidably supported in a portion of each chamber 23, intermediate the shoulder 70 and the butt portion 19 for movement from such position, that occupied by the lower follower in Figure 2, to a position in the wider portion of the chamber 23, that occupied by the upper follower in Figure 2. The end of the follower 52, adjacent the carrier 28, is beveled, as shown at 53. The beveled face 53 is positioned in contact with the pin 37 of the link 30 in such a manner that when the follower 52 is moved toward its extended position, the link 30 will be raised from the surface of the side wall 18, moving the carrier out of its nested position. The side of the follower 52, adjacent the side wall 18, from the beveled end to the point 59 adjacent the other end, is inset to clear the pins 31 and 35 when the follower 52 moves into its extended position, forming a shoulder at the point 59. The other end of the follower 52 is provided with a transversely extending portion 54, adapted to be engaged between the lugs 25 and 26 when the shaft 24 is rotated to bring the lugs into the plane of the portion 54. A block 60, having its end portion seated in notches 61 in opposed walls of the chamber 23 and having its projecting edge curved to conform to the curvature of the sleeve 18, bridges the chamber 23 and engages the shoulder 59 of the follower 52 when the follower is moved into its extended position, preventing further movement of the follower toward the end wall 21.

The butt portion 19 of the element 17 carries a pair of detents 62 arranged in opposed relation and extending transversely through the butt portion 19 from its outer surface to the bore 16. A spring 64 surrounds each detent 62 and urges it exteriorly of the outer surface of the butt 19. A ring 63 having an inner surface formed into two opposed, eccentric half sections, as shown in Figure 7, is mounted upon the portion of the butt 19 which carries the detent 62 and confines the detents 62 within the butt 19. The ring 63 is held in

place upon the butt portion 19 by means of a retaining ring 66 inserted between facing angular grooves the outer surface of the butt 19 and the inner surface of the ring 63. When the ring 63 is in the position shown in Figure 7, the outer ends of the detents 62 are held flush with the outer surface of the butt 19 and the inner ends of the detents 62 project into the bore 16. When the ring 63 is turned ninety degrees in a clockwise direction, the outer ends of the detents 62 are permitted to extend exteriorly of the outer surface of the butt 19, by virtue of the conformation of the inner surface of the ring 63 and the urging of the spring 64, and the inner ends of the detents 62 are thus withdrawn into the butt 19 from the bore 16. The shaft 24 is provided with outwardly opening recesses 65, arranged at ninety degree intervals about its periphery in the reduced portion of the shaft 24 adjacent the shoulder 48, each pair of opposed recesses 65 being adapted to receive the inner ends of the detents 62 when the detents are in the projected position, as shown in Figure 7, and the shaft 24 is moved to its projectile position and rotated to bring the said recesses into line with the detents 62. When the ends of the detents 62 are thus received in a pair of the recesses 65, the shaft will be releasably locked in its projectile movement position.

Hand actuable means, consisting of a handle 69, is provided on the external end of the shaft 24 for effecting the projectile and retractile movements and the rotary movement of the shaft 24.

A different type of tool, or screw driver element, 27 will normally be carried in each of the chambers 23 of the tool of the present invention and when the tool is not actually in use the shaft 24 will be drawn to its retractile position so that all of the elements 27 will occupy their nested positions within the magazine 15 and the tool will present no projecting, sharp points. When the tool is to be used, the shaft 24 is rotated to bring the lugs 25 and 26 into engagement with the extending portion 54 of the follower 52 occupying the chamber 23 in which the desired screw driver element 27 is located. The shaft is then moved from its retractile position toward its projectile position, carrying the follower 52 with it and moving the carrier 28 supporting the desired element 27 from its nested position to its position within the bore 16. As the element 27 is moved out into the bore 16, the advancing end of the shaft 24 strikes the lug 55 upon the shank end 45 of the element 27 and causes the blade end 44 of the element 27 to project exteriorly of the end wall 21 of the magazine 15 into the operative position. When the shaft 24 reaches its fully projectile position, the shoulder 48 strikes the exterior surface of the butt 19 of the magazine 15, preventing further movement of the shaft 24 in the projectile direction. The shoulder 59 of the follower 52 simultaneously strikes the block 60, arresting the movement of the follower 52. The ring 63 is next turned to cause the inner ends of the detents 62 to move into the aligned recesses 65 in the shaft 24, locking the shaft 24 in its projectile position. The exterior end of the element 27 is then pressed against a hard surface to push the lug 55 into firm engagement in the recess 67 in the end of the shaft 24 to lock the element 27 to the shaft 24. When the element 27 is in the operative position, the rectangular shank 45 is within the conformably fitting rectangular portion of the bore 16 extending through the end wall 21, preventing any turning movement of the element 27 about its longitudinal axis.

If it is desired to change the element 27 in use, the ring 63 is rotated to release the detents 62 from the recesses 65 and the shaft 24 is then withdrawn from the projectile position. As the shaft 24 is withdrawn, it pulls with it the element 27, previously in use, and the corresponding follower 52. The element 27 is thus moved back, into place in its carrier 28, still positioned in the bore 16. When the free end of the shank 45 strikes the

webs 46, the element stops and further retractile movement of the shaft 24 is effective to pull the lug 55 out of engagement in the recess 67, freeing the element 27 from the shaft 24. The carrier 28 is prevented from moving toward the butt end 19 of the magazine 15, as the element 27 is drawn back into it, by reason of the shoulder 70 against which the adjacent end of the carrier 28 strikes. As the shaft 24 reaches its contractile movement position, the beveled end 53 of the follower 52 is withdrawn from contact with the pin 37 of the link 30 and the spring 47 returns the carrier 28, and the element 27 supported therein, to the nested position in the complemental chamber 23. The shaft 24 may now be rotated to the position necessary to select the element next desired and the process of projecting this element and locking it in place is similar to that described with respect to the first element.

When the shaft has been rotated to select the desired element and projected so as to position and fasten the element in operative position, the handle 69 may be removed and the tool connected to a power tool mechanism for use therewith.

What is claimed is:

1. In a multiple tool, a tubular magazine having a side wall and a closed forward and a rear end, said closed end having a polygonal bore therethrough, a body extending longitudinally of and fixed within said magazine, said body having a butt portion closing said rear end, said butt portion having a cylindrical bore therethrough, a handle shaft extending rotatably and slidably through said cylindrical bore and being movable from a rearwardly retracted position to a forwardly projected position, said body having diametrically opposed longitudinal slots opening through sides of the body, said body having a forward end through which slots open, said slots defining chambers, carriers positioned in said chambers for movement longitudinally thereof, link means mounting the carriers in the chambers for longitudinal and lateral movements to and from nested positions within the chambers to centered positions relative to said bores, a tool element positioned in each carrier, means releasably holding the tool elements in place in the carriers, means on said handle shaft engageable with a selected carrier after selective rotation of the handle shaft for moving a selected carrier into alignment with said bores, releasable connection means on the facing ends of the handle shaft and a tool element for operatively connecting the handle shaft and a centered tool bit in a projected position of the handle shaft.

2. In a multiple tool, a tubular magazine having a side wall and a closed forward and a rear end, said closed end having a polygonal bore therethrough, a body extending longitudinally of and fixed within said magazine, said body having a butt portion closing said rear end, said butt portion having a cylindrical bore therethrough, a handle shaft extending rotatably and slidably through said cylindrical bore and being movable from a rearwardly retracted position to a forwardly projected position, said body having diametrically opposed longitudinal slots opening through sides of the body, said body having a forward

end through which slots open, said slots defining chambers, carriers positioned in said chambers for movement longitudinally thereof, link means mounting the carriers in the chambers for longitudinal and lateral movements to and from nested positions within the chambers to centered positions relative to said bores, a tool element positioned in each carrier, means releasably holding the tool elements in place in the carriers, means on said handle shaft engageable with a selected carrier after selective rotation of the handle shaft for moving a selected carrier into alignment with said bores, releasable connection means on the facing ends of the handle shaft and a tool element for operatively connecting the handle shaft and a centered tool bit in a projected position of the handle shaft, spring means acting between the carriers and the side wall of the magazine urging said carriers toward nested positions in the chambers.

3. In a multiple tool, a tubular magazine having a side wall and a closed forward and a rear end, said closed end having a polygonal bore therethrough, a body extending longitudinally of and fixed within said magazine, said body having a butt portion closing said rear end, said butt portion having a cylindrical bore therethrough, a handle shaft extending rotatably and slidably through said cylindrical bore and being movable from a rearwardly retracted position to a forwardly projected position, said body having diametrically opposed longitudinal slots opening through sides of the body, said body having a forward end through which slots open, said slots defining chambers, carriers positioned in said chambers for movement longitudinally thereof, link means mounting the carriers in the chambers for longitudinal and lateral movements to and from nested positions within the chambers to centered positions relative to said bores, a tool element positioned in each carrier, means releasably holding the tool elements in place in the carriers, means on said handle shaft engageable with a selected carrier after selective rotation of the handle shaft for moving a selected carrier into alignment with said bores, releasable connection means on the facing ends of the handle shaft and a tool element for operatively connecting the handle shaft and a centered tool bit in a projected position of the handle shaft, and releasable detent means acting between said butt portion and the handle shaft serving to releasably hold the shaft in selected rotated positions in the projected position of the handle shaft.

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