United States Patent [19]

Butler

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[54] **SELECTIVE CHAMBER SCREWDRIVER**

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[21] Appl. No.: **163,334**

[52] **U.S. Cl.** **145/63,** 279/42

[51] **Int. Cl.** **B25g 1/08,** B23b 5/34

[58] **Field of Search** ..... 7/11 R, 11 A, 15; 81/177 M; 145/50 R, 50 B, 50 C, 61 R, 61 J, 61 EA, 62, 63; 279/41, 42, 48, 78, 80

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Assistant Examiner—Mark S. Bicks
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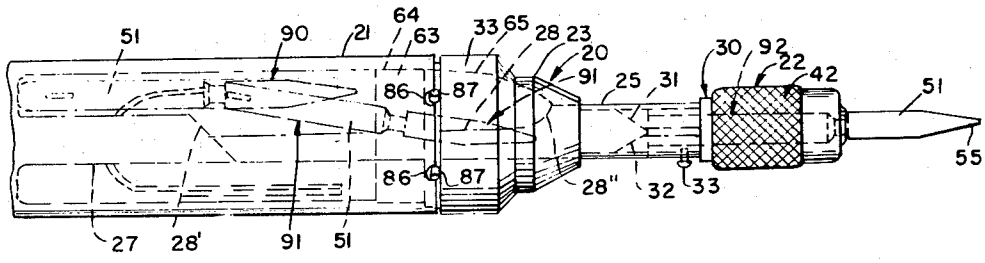
[57] **ABSTRACT**

The invention comprises a selective blade screwdriver. The screwdriver has six screwdriver blades of different sizes housed in the handle of the screwdriver. The screwdriver has a hollow stem structure extending from the forward portion of the handle of the screwdriver, providing a hollow passageway which communicates with the handle. The handle is rotatable to align a selected size screwdriver blade with the hollow passageway, whereupon the screwdriver may be tipped with the handle upward and the stem downward which causes the selected blade to slide under gravity out of the handle into the stem. The screwdriver has radially engaging locking structure at the forward end of the stem to lock the selected blade in the stem once it has slid there under gravity for using the blade with the handle as a screwdriver.

2 Claims, 10 Drawing Figures



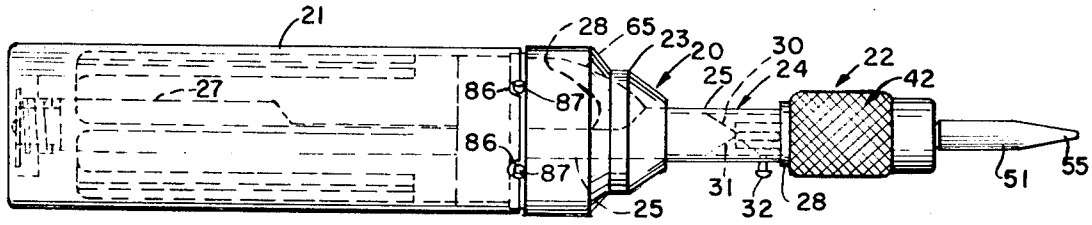


FIG. 1.

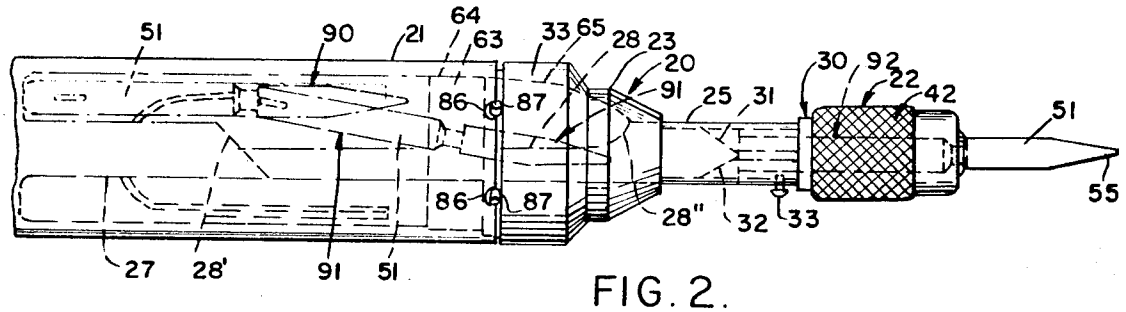


FIG. 2.

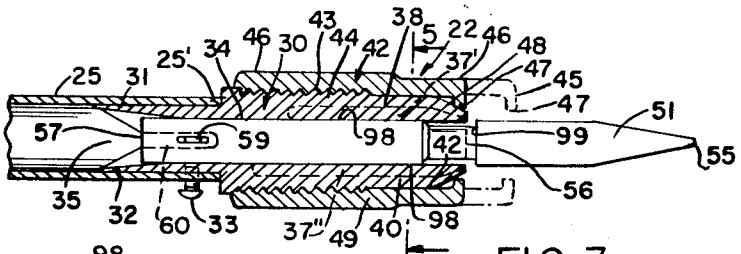


FIG. 3.

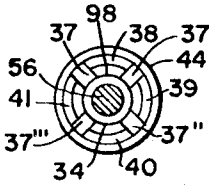


FIG. 5.

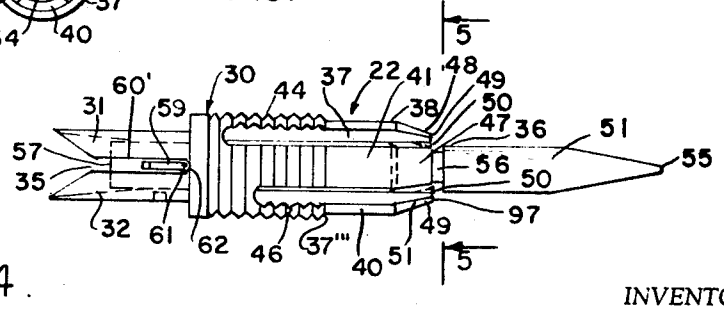


FIG. 4.

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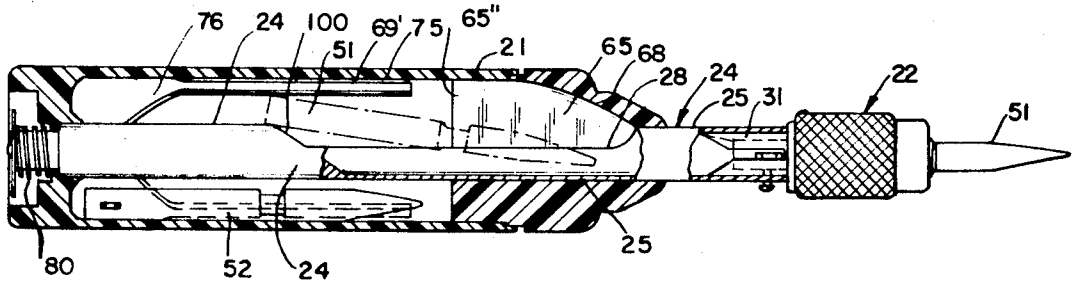

FIG. 6.

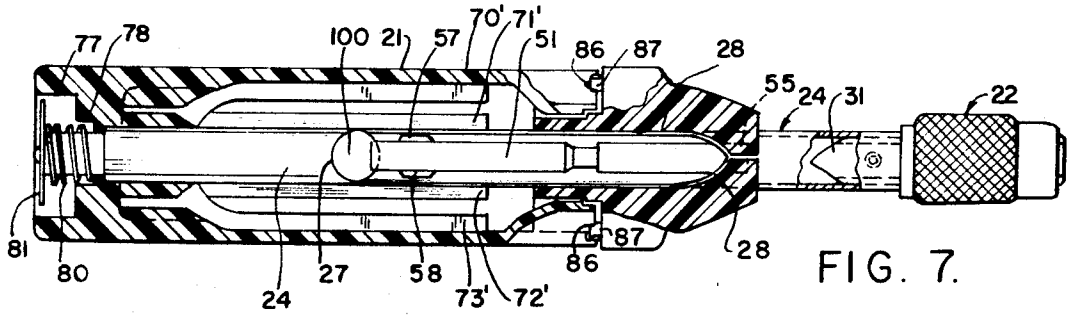

FIG. 7.

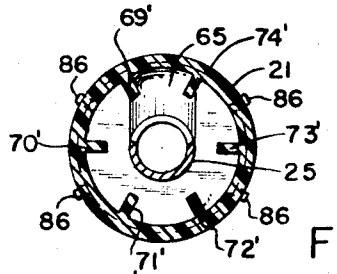

FIG. 9.

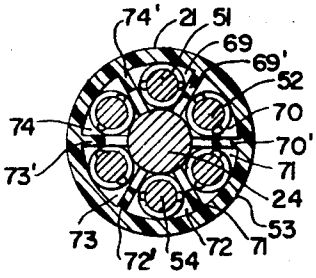

FIG. 10.

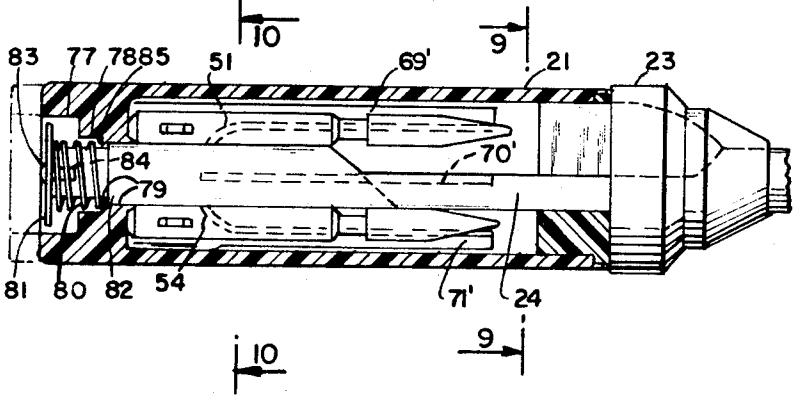

FIG. 8.

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SELECTIVE CHAMBER SCREWDRIVER

This invention relates to tools, more particularily, the invention relates to tools for the rapid exchange of different size working ends of the tool.

It is an object of the invention to provide a novel screwdriver having a hollow handle carrying different size screwdriver blades having a hollow stem for receiving a selected size screwdriver blade and chuck member grasping and locking the selected blade in the stem for use.

It is a further object of the invention to provide a novel screwdriver for feeding various different size screwdriver blades in the stem of the screwdriver under a gravity feed with locking means to lock the blade in the stem.

It is another object of the invention to provide a novel tool for feeding a selected size working end of a tool into the stem of the tool, with means locking the working end of the tool in place for use.

It is another object of the invention to provide a novel tool having a novel revolving handle for selecting a desired size screwdriver blade with means radially engaging the selected blade and locking it in place for use.

Further objects and advantages of the invention will become apparent as the description proceeds and when taken in conjunction with the accompanying drawings wherein:

FIG. 1 is a side elevational view of the selective or multiple screwdriver tool invention.

FIG. 2 is a fragmentary enlarged side elevational view of the screwdriver tool invention shown of the movement of the selected blade in phantom lines as it moves out of the handle in to the stem under gravity, assuming the screwdriver has been tipped so that the stem extends vertically downward.

FIG. 3 is a further enlarged cut away view of the chuck radially engaging locking structure for the selected screwdriver blade.

FIG. 4 is an enlarged view of the locking collar of the chuck structure with the knurled collar removed to reveal the internal construction.

FIG. 5 is a cross-sectional view taken along line 5—5 of FIG. 3.

FIG. 6 is a longitudinal top cut away view of the screwdriver invention.

FIG. 7 is an enlarged longitudinal top cut away view of the screwdriver invention.

FIG. 8 is an enlarged longitudinal side cut away view of the handle of the screwdriver invention disclosing the screwdriver blades positioned in the handle.

FIG. 9 is a cross-sectional view taken along line 9—9 of FIG. 8.

FIG. 10 is a cross-sectional view taken along line 10—10 of FIG. 8.

Briefly stated, the invention comprises a selective blade screwdriver having a handle with six screwdriver blades of different sizes housed within the handle. A hollow stem is mounted to the forward end of the handle, and the handle may rotate relative to the stem to place any one of the six screwdriver blades into alignment for passage into the hollow stem under gravity flow. The stem has aligning and stopping structure to stop and align the selected screwdriver blade fed into the stem an axial sleeve surround the blade fed into the stem and the oval sleeve has radially flexible fingers for engaging against the blade in the stem to lock the blade

thereon with a knurled threaded collar threaded onto the sleeve and rotatable to engage the radial fingers for the locking operation.

Referring more particularly to the drawings in FIG. 1, the selective or multiple screwdriver blade invention **20** is illustrated having a hollow handle **21** and a stem member **22.**

The stem member **22** has a plastic collar **23** and a rod **24** which is fixed to the collar and which rod **24** extends into the interior of the handle.

The rod **24** is hollow or tubular in construction along its central **25'** and forward portion **25** and is solid at its rearward portion **27.** The rod **24** has a longitudinal elongated cut away opening **28** extends in the central tubular portion **25** of the rod extending from location **28'** to location **28''.** A blade stopping aligning and locking structure **30** is mounted to the forward end of the stem.

The blade stopping aligning and locking collar structure **30** forming a stopping and aligning and locking collar. The collar **30** has two pointed cylindrical curved fingers **31** and **32** which extending into the forward end **25''** of the hollow tubular portion **25** of the rod **24** and are locked in place by a set screw **33.** The collar **30** has a longitudinal center bore **34** and is open at both ends **35** and **36.** The collar **28** at the end **36** has four radial slots **37, 37', 37'',** and **37'''** cut into the collar which form radial fingers **38, 39, 40,** and **41** in the collar **30.**

An outer collar **42** has internal threading **43** which threads onto the external threading **44** on the inner collar **30.** The outer collar **42** is also knurled. The outer collar may be theaded or turned onto the inner collar from its position shown in phantom lines in FIG. 3 and designated by numeral **45** to its position shown in solid lines in FIG. 3 and designated by numeral **46,** and as the collar **42** reaches its position shown in solid lines. The annular reduced size ridges **47** at the rearward end of the collar **42** will engage the tapered rear surfaces **48** of the fingers **37–41** and compress the rearward ends of the fingers inwardly from their position shown in solid lines in FIG. 4 and designated by numeral **49** to their position shown in phantom lines in FIG. 4 and designated by numeral **50.**

The screwdriver invention has six screwdriver blades of different sizes which are housed circumferentially about the rod **24** in the handle **21.** Only form of the screwdriver blades **51, 52, 53,** and **54** are illustrated although it may be readily comtemplated that the other two blades will have the same construction only it will have a different size or type of nose of tip point **55** so as to accomodate different sizes or types of screws for engaging and turning these different type or sizes of screws.

The screwdriver blades each have an identical annular recess **56** which is spaced the same identical distance from the rearward end **57** of the screwdriver blade. Each has the same identical outside diameter so as to slide into the tubular portion **25** of the rod **24** and into the bore **34** of the collar **31.** The blades each have a pair of diametrically opposed radially projecting lugs **58** and **59** which project outwardly from the opposite side of the outside of the screwdriver and these lugs **58** and **59** will engage the fingers **32** and **32'** when the screwdriver blade is slid into the stem and collar **30** under gravity and the pointed fingers **32** and **32'** will rotate the screwdriver blade, if necessary, and guide the screwdriver blade causing the lugs to slide into the

slots 60 and 60' between the fingers 32 and 32', where the blade will come to a stop, with the forward edge 61 of the lungs abutting the rearward edge 62 of the slots and prevent any further longitudinal sliding movement of the blade toward the forward end 36 of the collar. The lugs 58 and 59 also by sliding into the slots 60 and 60' will be prevented from rotating axially in either direction, appreciatably, as the lugs will engage the sides of the fingers 32 and 32' which form the slots 60 and 60' if the blade is attempted to be rotated axially which thereby stop the axial rotation.

The plastic collar 23 which surrounds and is fixed to the stem 24 has a reduced cylindrical plug portion 63 which slidably fits into the annular ridge 64 at the forward open end 65 of the handle 21 and acts to keep the forward end of the handle in axial alignment with respect to the rod 24. The plastic collar 23 has a radial slot a passageway 65 therein which opens at its one end 65' into the handle and opens into the elongated slot 28 in the hollow tubular part 25 of the stem to provide communication between the handle and the hollow interior of the tubular portion 25 of the rod 24.

The slot or passageway 65 extends longitudinally along the length of the opening 66 in the tubular portion 25 and continuously communicates along its bottom 67 with the opening 66 and has a curved upper edges 68 which curve downwardly toward the slot 66 to guide the forward end 55 of the screwdriver blade into the opening 66 in the tubular portion 25.

The screwdriver handle 21 is made of plastic and has six bored areas 69, 70, 71, 72, 73, and 74, with radial ribs 69', 70', 71', 72', 73', and 74' which define the bores into compartments to retain the blades in their respective bored areas by preventing rotational movement or shifting of the blades in an arcuate direction about the handle. The ribs are more narrow radially along the central and forward portions 75 and wider radially along their rearward portions 76. The ribs 69'–74' extend parallel to the longitudinal axis of the handle and are spaced equally and circumferentially about the cylindrical inner surface 76 of the handle.

The handle 21 is slidably mounted to the rod 24 and spring biased against the collar 23 on the stem of the screwdriver. The handle has a pair of cylindrical recesses 77 and 78 which are aligned coaxially with one another; with the outer cylindrical recess 77 being larger than the inner cylindrical recess 78

The solid portion of the rod 24 extends through a bore 79 in the rear of the handle 21 into the recesses 77 and 78, and a coil spring 80 surrounds the portion of the rod 24 in the recesses 77 and 78, and a metal annular disc 81 fixed to the rearwardmost end 82 of the rod 24 by means of a screw 83 threaded into a bore 84 in the rod 24, with the disc 81 acting to urge the coil spring 80 against inner wall portion 85 of the handle in the inner recess 78, to urge the handle 21 relative to the stem and rod 24 against the collar.

The handle 21 at its forward open end has four notches 86 which surrounds four pins 87 fixed on the collar 23, to align the handle relative to the stem. The pins on the one side of the collar 23 are located 60° apart from one another and are in diametrically opposed relationship to the pins on the other side of the collar 23.

OPERATION

Rotation of the Handle to Select a Blade.

The operation will pull the handle 21 rearward relative to the stem 24 and collar 23 from its position shown in solid lines in FIG. 8 to its portion shown in dashed lines in FIG. 8 and designated by numeral 88, causing the handle along its rearward portion to slide rearwardly along its annular surfaces 89 defining the bore 79 and causing the notched portion of the forward portion of the handle to slide axially out of its engagement with the pins 87 and causing the coil spring 80 to compress somewhat. The operator then while holding the handle 21 is its rearward post shown in phantom lines and designated by numeral 88 with the notches portion disengaged from the pins, will rotate the handle 21 axially relative to the stem until the one of the bores 69–74, which holds the one desired screwdriver blade, aligns with the slots 65 in the collar 23 such as shown in FIG. 2, for example.

The operator will then release the handle and allow the spring to move the handle 21 axially forward until the molded positions engage the pins to lock the handle in its desired position relative to the stem.

Sliding Movement of the Selected Blade into the Stem and Locking the Blade in the Stem for Use

Assuming for purposes of illustration that the blade selected by the rotation of the handle is the blade 51 shown in FIG. 2 in the bored area 79 in the handle or shown by phantom lines 90, in order to slide this blade into the stem, the operator will tip the screwdriver so that its longitudinal axis extends vertically, with the rearward end 21'' of the handle uppermost and the knurled collar 42 lowermost in relation to one another.

The tipping of the screwdriver to this vertical position will cause the blade 51 to slide downward (left to right when viewed from FIG. 2) sliding downward between the ribs in the handle into the slot 65 in the collar 23, as shown by phantom lines 91. The curved contour 68 along the top of the slot 65 guiding the nose 55 of the blade into the slot 28 in the tubular portion of the stem 24 as shown in phantom line 91, until the blade is completely inside the tubular portion of the stem, whereupon it will continue slide downward in the stem 24 toward the knurled collar 42 until it reaches its position 92 shown in solid lines in FIG. 2.

As the blade 51 approaches its position shown in solid lines in FIG. 2 it will slide into the bore 34 in the collar, and as lugs 58 and 59 reach the fingers 32 and 32' the fingers will guide the lugs 58 and 59 into the slots 60 and 60' as shown in FIG. 2 in dashed lines and as shown in FIGS. 3 and 4. When the forward edges 61 of the lugs 58 and 59 engage the rearward edges 62 of slots 60 and 60' they stop the down ward movement of the blade, stopping the blade in its position shown in solid lines in FIG. 2 and designated by numeral 93.

Prior to tipping the screwdriver into its vertical position, the knurled collar will be rotated from its position shown in solid lines in FIG. 3 and designated by numeral 94 to its position shown in phantom lines in FIG. 3 and designated by numeral 95 so that the fingers of the collar 30 are not radially compressed by the collar 42, and are in their position shown in solid lines in FIG. 4, so that the blade 51 may slide freely into the collar 30 to its position shown in solid lines in FIGS. 2, 3, and 4.

Once the screwdriver blade **51** reaches its position shown in solid lines in FIGS. **2, 3,** and **4** the knurled collaw **42** will be rotated from its position shown in phantom lines **45** in FIG. **3** to its position shown in solid lines **46** in FIG. **3,** which causes the rearward reduced annular ridge **47** to engage the tapered surfaces **48** of the fingers **37–41** compressing and flexing the radial fingers **37–41** radially inward toward one another from their position shown in solid lines in FIG. **4** and designated by numeral **49** to their position shown in phantom lines **50** in FIG. **4** which causes the forward ends **97** of the radial fingers **37–41** to project into the annular notch **56** in the blade **51,** as well as causing the inner surfaces of the fingers **37–41** to compress against the outer surfaces **98** of the screwdriver blade.

The forward ends **97** of the radial fingers **37–41** by compressing or flexing to a smaller inside diameter than the outer surfaces **98** of the screwdriver blade, thereby locking the blade **51** from moving back along the stem toward the handle any appreciable distance, since any movement of the blade back toward the handle while the fingers **37–41** are flexed inward will cause the forward ends **97** of the fingers to immediately engage the annular wall **99** of the screwdriver at the forward end of the annular notch **56** in the screwdriver which engagement prevents any further movement of the blade back toward the handle.

Since the radial slots **60** and **60'** engage the lungs **58** and **59** to prevent axial rotation of the blade **51** relative to the collar **30** and stem **24,** and since the lugs **58** and **59** engaging the forward edges **61** of the slots **60** and **60'** and prevent any movement further of the blade **51** in a direction away from the handle and toward the knurled collar, since the rotation of the knurled collar to compress the fingers **37–41** locks the blade **51** from moving back toward the handle. The blade **51** is now effectively locked in the collar **30** of the stem **24** against movement in any direction relative to the stem **24** of the screwdriver, and the blade **51** may be employed to turn or drive screws in and out of material, by engaging the nose **55** of the screwdriver blade **51** in the slot of the head of the screw and rotating the screwdriver by the handle **21,** the handle being locked to stem **24,** and in relation to the blade **51,** by its engagement of its slotted portions **86** with the pins **87** on the collar **23** of the stem.

When it is desired to replace or exchange the blade **51** with one of the other of the five screwdriver blades in the handle, the operator will simply rotate the knurled collar **42** lock to its position shown in phantom lines in FIG. **3** which releases the screwdriver blade **51** in the collar **30,** and will then invert the screwdriver to a vertical position with the handle lowermost and the knurled collar uppermost, which will cause the blade **51** to slide under the force of gravity back out of collar **30** into the tubular portion **25** out through the slot **28** in the tubular portion, through the slot **65** in the collar and back to its bore in the handle. The tubular portion **24** has a tapered back wall **100** to guide the screwdriver blade back into the handle.

Whereupon the screwdriver will be tipped to a horizontal position and the hande will be rotated as already described to aligned a new blade with the slot **65** and then the screwdriver will be typed vertically again with the knurled collar **42** lowermost and the newly selected blade will slide into the collar **30** where it will be locked in places for use by turning the knurled collar **42.**

The screwdriver blade which has been aligned with the radial slot **65,** by rotation of the handle, may slide freely back and forth from its position in the bore of the handle to its position in the collar **30** in the stem, by simply tipping the screwdriver downward and then upward and so along as the knurled collar **42** is left in its position shown in phantom lines in FIG. **3.**

Thus, it will be seen that a novel selective or multiple screwdriver device has been provided which enables any one of six different screwdriver blades in the handle of the screwdriver to be selected for use by rotating the handle, and position in the stem by typing the screwdriver with the stem downward and the blade may be locked in the stem by rotating of the knurled collar.

Thus, it will be seen that a novel screwdriver has been provided carrying various different size screwdriver blades in the handle and rapidly exchanging the different size blades for use with the screwdriver.

It will be obvious that various changes and departures may be made to the invention without departing from the spirit thereof and accordingly, it is not intended that the invention be limited to that specifically described in the specification or as illustrated in the drawing but only as set forth in the appended claims wherein:

What is claimed is:

1. A multi chambered screwdriver comprising a handle, a stem mounted in front of said handle, said handle being elongated and has a plurality of elongated bores located circumferentially about the handle with a plurality of different size screwdriver blades, one in each bore, said stem being hollow and located centrally to the circumferential bores in the handle, said stem having a rearward enlargement with a single lateral diagonal passageway extending at an angle in relation to the longitudinal axis of the handle with its forward end communicating with the hollow center stem and its rearward end communicating with the forward end of one of the circumferentially located bores in the handle, said rearward enlargement acting to close the forward end of the remainder of said elongated bores in said handle, said handle being rotatable relative to the stem to align the forward end of any one of its circumferential bores with the rearward end of the diagonal passageway of the stem, radially engaging locking structure mounted at the front end of the stem for locking any one of said blades in said stem, whereby when said handle is rotated to align the front end of one of the circumferential bores with the rearward end of the diagonal passageway, the screwdriver may be tipped forward and downward causing the screwdriver blade in the aligned circumferential bore to slid freely under gravity out of its circumferential bore down along the diagonal passageway into the hollow stem until the forward end of the blade projects out the forward end of the stem whereupon the radial locking structure may be rotated to lock the blade in the stem for use, and whereupon by rotating the locking structure in the opposite direction and tipping the screwdriver rearward and downward the blade will slide freely under gravity back into the aligned circumferential bore of the handle, said blades each having projecting lugs along their rearward ends, said radially engaging locking structure also having tapered pointed flanges at rearward end communicating with slots in the locking structure for guiding for guiding the projecting lugs into the slots in the radial locking structure, said blades having rear-

wardly directed end surfaces perpendicular to the length of the blade, said radial engaging locking structure having lug surfaces movable to abut the rear end surfaces of the blade to provide a positive lock to prevent the blade from sliding rearward in the stem while in use.

2. A multi chambered screwdriver comprising a handle, a stem mounted in front of said handle, said handle being elongated with a plurality of elongated bores located circumferentially about the handle and with a plurality of different size screwdriver blades, one in each bore, said stem being hollow and located centrally in relation to the circumferential bores in said handle, said stem having a single lateral diagonal passageway extending at an angle forward and downward toward the longitudinal axis of the stem and handle with its forward end communicating with the hollow center of the stem and with its rearward end communicating with the forward end of one of the circumferentially located bores of the handle, said handle being rotatable relative to the stem to align any one of its circumferential bores with the single diagonal passageway of the stem, radially engaging screwdriver blade locking means mounted at the front of said stem, whereby when said handle is rotated to align the front end of one of the circumferential bores with the rearward end of the diagonal passageway, the screwdriver may be tipped foward and downward causing the screwdriver blade in the aligned circumferential bore to slide freely under gravity out of the circumferential bore down along the diagonal passageway into the hollow stem until the forward end of the blade projects out the forward end of the stem, said screwdriver blades each having rearward directed surfaces, said radial engaging locking means having lug surfaces movable upon actuation of said locking means to abut said rearward directed surfaces to lock the blade in the stem for use, and whereupon by deactuating the locking means and tipping the screwdriver rearward and downward the blade will slide freely under gravity back into the aligned circumferential bore of the handle.

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