

**EUROPEAN PATENT APPLICATION**

Application number: 84306167.2

Int. Cl.4: B 25 B 15/00

Date of filing: 10.09.84

Priority: 21.09.83 ZA 831927  
30.03.84 ZA 842395

Date of publication of application:  
10.04.85 Bulletin 85/15

Designated Contracting States:  
AT BE CH DE FR GB IT LI LU NL SE

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**Screwdriver with shaped blade tip.**

A screwdriver (by which term screwdriver drill bits and the like are included) which has an operative blade with an arcuate groove in each face adjacent the tip and forming, with the end face thereof, an acute angle, the groove extending across the entire blade width in each case and having a maximum depth chosen to provide, at the position of maximum depth of the grooves, a minimum thickness to the blade of between 75% and 95% of said thickness of the blade tip said position of maximum depth being located at a distance of from 40% to 100% of said blade tip thickness from the edge of the blade tip.

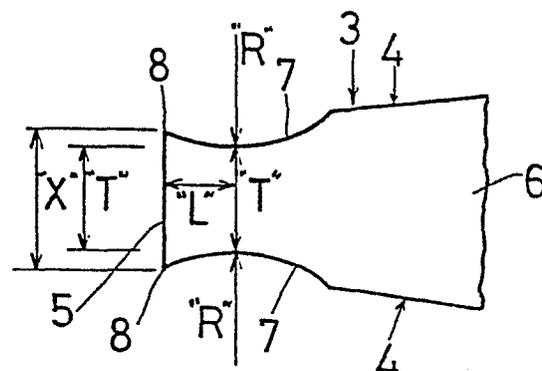


FIG. 3

SPEC86290384b

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FIELD OF INVENTION

THIS INVENTION relates to a screwdriver having a shaped blade tip and, more particularly, a blade tip shaped to diminish slipping of a blade tip relative to a screw slot engaged thereby and, accordingly, to promote a satisfactory grip between the screwdriver blade tip and such screw slot.

BACKGROUND TO THE INVENTION

It is a well known problem with screwdrivers that the screwdriver tip tends to slip out of a screw slot when torque is applied thereto. This is generally in consequence of the tapered faces of the screwdriver blade contacting

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the screw slot at its outer edge and the resultant sliding action of the two surfaces. Clearly the screwdriver surface is generally harder than the screw itself and the edge of the screw slot does, accordingly, not assist in holding the two parts in engagement.

This problem has been recognised in the past and numerous different solutions have been offered to the problem. The most common solution to the problem is to provide a screwdriver blade, and in some cases a specially manufactured screw, with a reverse taper at the end region of the screwdriver blade. This has been achieved by providing a screwdriver blade with a dovetail or other flared shape so that the thickness of the screwdriver blade increases towards the tip of the blade. The problem encountered is to maintain adequate strength of the blade whilst not increasing the widths of the tip to an extent where it will not be accommodated in a slot of a screw. Also, such blades are difficult to manufacture.

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U.S. Patent No. 3,923,088 thus proposed a screwdriver blade wherein the normally convergent major faces of the screwdriver tip were made concave in the longitudinal direction. This provided an end region adjacent the tip in which the faces were divergent and a substantially thinner region at about the middle of the length of the screwdriver blade itself. Substantial weakening of the blade resulted in view of the extremely thin portion which was formed well inwardly of the operative end.

Indeed, such is the weakening effect that the patent itself proposed the introduction of integral ribs extending longitudinally along the blades on each side thereof in an attempt to overcome the weakening effect. This arrangement suffers from two disadvantages, the one being that as the screwdriver tip requires sharpening, the thickness of the blade diminishes until the position of minimum thickness is reached whereafter an effect opposite to that desired would be achieved. Furthermore, sharpening would be made difficult in some cases particularly those where the ribs are

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provided. Finally, the arrangement suffers from the most serious disadvantage in that it is difficult to manufacture a screwdriver of this nature.

U.S. Patent No. 1,055,031, on the other hand, in an effort to retain strength, provided that the central region of the blade tip should remain of standard thickness whilst grooves should be provided only on one or both sides of the centre in respect of each major face of the screwdriver with the groove forming a sharp edge with the end edge of the screwdriver. This arrangement suffers from the disadvantages of difficulty of manufacture and problems in reproducing the grooves when sharpening of the screwdriver is necessary. Also the thickness in any event decreased at the position of maximum shear, ie. at the side edges of the blade. U.S. Patent No. 1,479,506 proposed a similar arrangement to that of U.S. Patent 3,923,088 with substantially the same disadvantages apart from those associated with the ribs which were absent in this case.

Other patents, for example U.S. Patent 2,684,094 proposed the formation of projections

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standing proud of the blade faces at the blade tip. This proposal has the major disadvantage that sharpening is almost impossible to achieve whilst retaining the gripping features.

5 U.S. Patent No. 1,997,422, on the other hand, proposes a combination of what is tantamount to a lipped screw slot (extremely difficult to manufacture) and a co-operating screwdriver.

Other proposals are set out in U.S. Patent  
10 No. 1,056,095 (similar to the invention of 1,055,031) and U.S. Patent No. 4,105,056 which suffers again from the disadvantage of being difficult to sharpen whilst retaining the required features. Also weakening would be a problem in the  
15 latter case.

Other proposals have been made all of which suffer from one or more of the disadvantages outlined above.

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It is the object of this invention to provide an improved screwdriver (by which term is included, in this specification, a screwdriver bit or the like for use in a brace, powerdrill or other means for rotating it) in which manufacture is relatively simple, strength is substantially retained, and sharpening is accommodated adequately.

#### SUMMARY OF THE INVENTION

In accordance with this invention there is provided a screwdriver having a blade defined by two convergent, flat, major faces terminating in a straight transverse, operative blade tip having a predetermined thickness and wherein a groove is provided adjacent the edge of the blade tip in each of the two major faces thereof, the groove extending across the entire blade tip width in each case and having a maximum depth chosen to provide a minimum thickness to the blade of between 75% and 95% of said predetermined thickness at the position of maximum depth of the grooves, said position of maximum depth being located at a distance of from

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40% to 120% of said predetermined thickness from the edge of the blade tip, the grooves being arcuate in cross-section and defining, with the adjacent end face of the blade tip, an acute angle in  
5 cross-section.

Further features of the invention provide for said minimum thickness of the blade to be between 40% and 100%, preferably 80% and 90% of said predetermined thickness of the blade tip; for the  
10 position of maximum depth of the grooves to be located at a distance of between 50% and 80% of said predetermined thickness from the edge of the blade tip; for the groove to be part circular in cross-section; for the radius of curvature of said  
15 part circular grooves to be from 1,5mm to 5mm and, preferably, from 2mm to 4mm; and for the edges of the blade tip to be located in or below the plane of the surface of the flat major face with which it is associated.

20 It has been found that a totally satisfactory non-slip, or gripping screwdriver blade tip is formed when the above constraints are applied thereto.

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As far as Applicant has been able to determine, the best results are obtained when the position of minimum thickness of the blade, ie. maximum depth of the grooves, is located at different positions according to the actual thickness of the tip of the screwdriver. Thus, for screwdrivers having the following thicknesses the preferred location of the position of minimum thickness, or maximum depth of groove is as follows:-

10	<u>Tip Thickness "X"</u>	Preferred Distance of position of Minimum <u>thickness from tip edge</u>
	0,8mm to 1,0mm	70% of "X" to 80% of "X"
	1,0mm to 1,2mm	65% of "X" to 70% of "X"
15	1,2mm to 1,4mm	60% of "X" to 65% of "X"
	1,4mm to 1,6mm	57% of "X" to 60% of "X"
	1,6mm to 1,8mm	53% of "X" to 57% of "X"
	1,8mm to 2,0mm	50% of "X" to 53% of "X"

BRIEF DESCRIPTION OF THE DRAWINGS

20 In order that the invention may be more

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fully understood one embodiment thereof will now be described with reference to the accompanying drawings in which:-

5                   Figure 1 is an isometric view of a manually operable screwdriver,  
                  Figure 2 is a very much enlarged isometric view of the tip region of the blade thereof,  
                  Figure 3 is a side elevation of the tip region illustrated in Figure 2, and,  
10                   Figure 4 illustrates, in side elevation, the tip region in engagement with a slotted screwhead.

EXPANDED DESCRIPTION WITH REFERENCE TO THE DRAWINGS

15                   As illustrated in Figure 1, a screwdriver is basically of conventional design and has a plastics handle 1, from which extends a co-axial shank 2, having a screwdriver blade formation 3 at its end remote from the handle.

20                   The screwdriver blade formation is of substantially conventional design having two major faces 4 which converge towards the tip face 5 itself and two sides 6 which also converge in the usual way.

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By means of any suitable process, and conveniently by grinding, there is formed in each of the major faces 4, and along the end face 5 of the blade, a groove 7 of part-circular shape in cross-section. The groove communicates with the edge 8 of the end face 5 of the tip to define therewith an acute angle as shown most clearly in Figure 3.

Each of the grooves is specially shaped and dimensioned as provided by this invention and, to this end, the radius of curvature, which is indicated by "R" in Figure 3, is made to between 1,5mm and 5mm and, in particular, to a radius of 3mm. It has been found that the radius of curvature does not have to extend outside of this range for any normal sized screwdriver.

The position of minimum thickness of the blade, which is shown as being a distance "L" from the end face 5 of the tip, is located at a position as indicated above according to the thickness of the tip of the screwdriver which is indicated by the letter "X" in Figure 3. These constraints then determine the minimum thickness indicated by letter "T" in Figure 3.

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As shown most clearly in Figure 4, a screwdriver tip shaped as above described, co-operates with a slot 9 in the head of a screw 10 so that the edges 8 engage in the inner region of the slot and will, when torque is applied to the screwdriver, tend to bite into the side of the screw slot at or near the base of the slot.

It will be understood that the invention provides an extremely simple, yet adequately strong screwdriver tip, which will not slip in use, and which has advantages over prior art attempts at non-slip screwdrivers in that the strength is not appreciably impaired, and the screwdriver tip can be adequately sharpened, when required. In order to achieve sharpening, the end face can be ground flat and the groove can then be adjusted by grinding or, alternatively, simply by means of a small circular sectioned file where manual sharpening is effected. In view of the fact that no external projections or the like are required, the screwdriver blade can last for a number of sharpenings, in the usual manner whilst operating effectively in use. Manufacture is also simple.

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1. A screwdriver having a blade defined by two convergent, flat, major faces terminating in a straight transverse, operative blade tip having a predetermined thickness and wherein a groove is provided adjacent the edge of the blade tip in each of the two major faces thereof, the groove extending across the entire blade tip width in each case and having a maximum depth chosen to provide a minimum thickness to the blade of between 75% and 95% of said predetermined thickness at the position of maximum depth of the grooves, said position of maximum depth being located, at a distance of from 40% to 120% of said predetermined thickness from the edge of the blade tip, the grooves being arcuate in cross-section and defining, with the adjacent end face of the blade tip, an acute angle in cross-section.

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2. A screwdriver as claimed in Claim 1 in which the said minimum thickness of the blade is between 80% and 90% of the said predetermined thickness of the blade tip.
- 5 3. A screwdriver as claimed in either of claims 1 or 2 in which the position of maximum depth of the grooves is located at a distance of from 40% to 100% of said predetermined thickness from the edge of  
10 the blade tip.
4. A screwdriver as claimed in Claim 3 in which the position of maximum depth of the grooves is located a distance of from 50% to 80% of said predetermined thickness  
15 from the edge of the blade tip.
5. A screwdriver as claimed in any one of the preceding claims in which the grooves are of part circular shape in cross-section.

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6. A screwdriver as claimed in Claim 5 in which the radius of curvature of said part circular shape is from 1,5mm to 5mm.
  
7. A screwdriver as claimed in Claim 6 in which the said radius of curvature is from 2mm to 4mm.
  
8. A screw driver as claimed in Claim 1 and substantially as herein described or exemplified with reference to the relevant accompanying drawings.

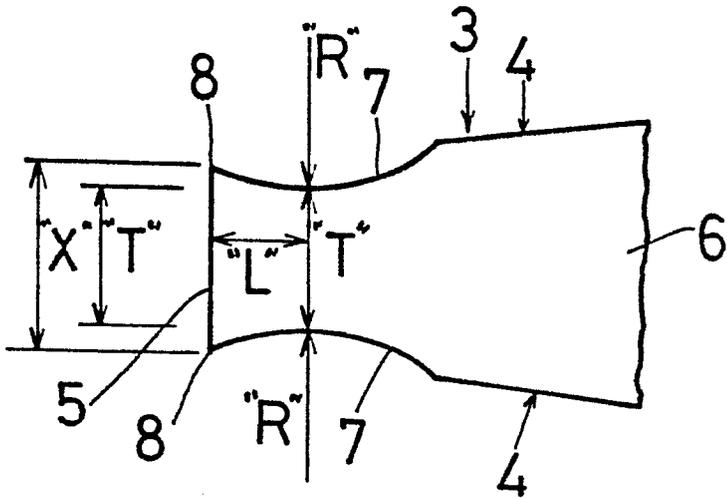
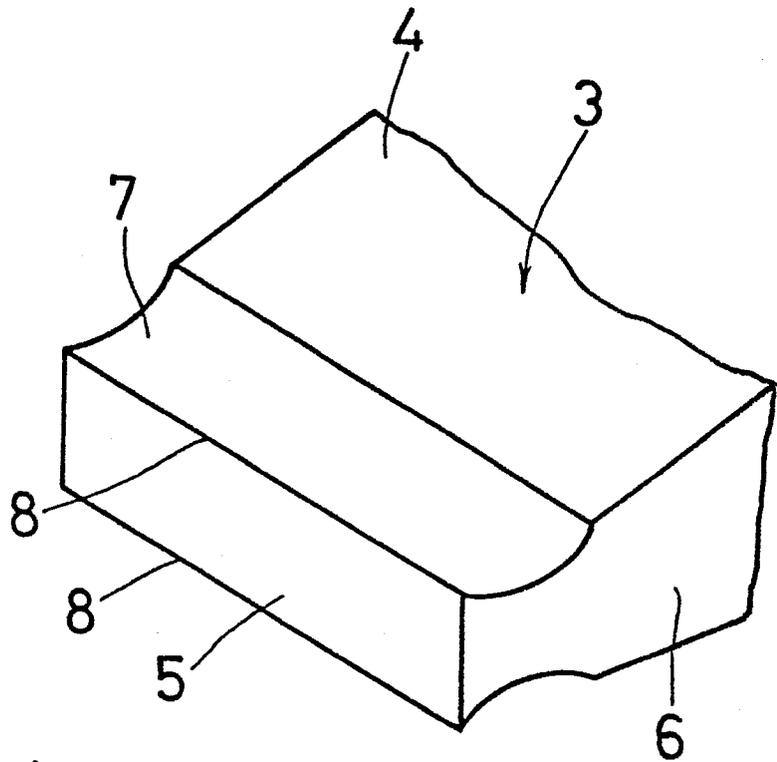
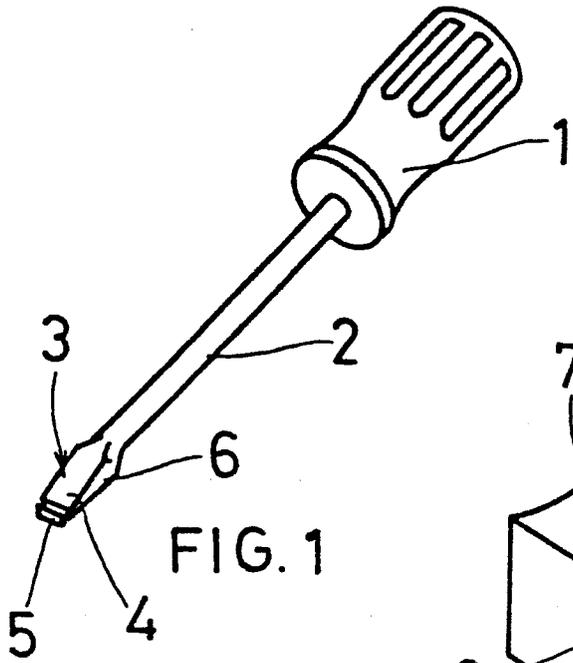


FIG. 3

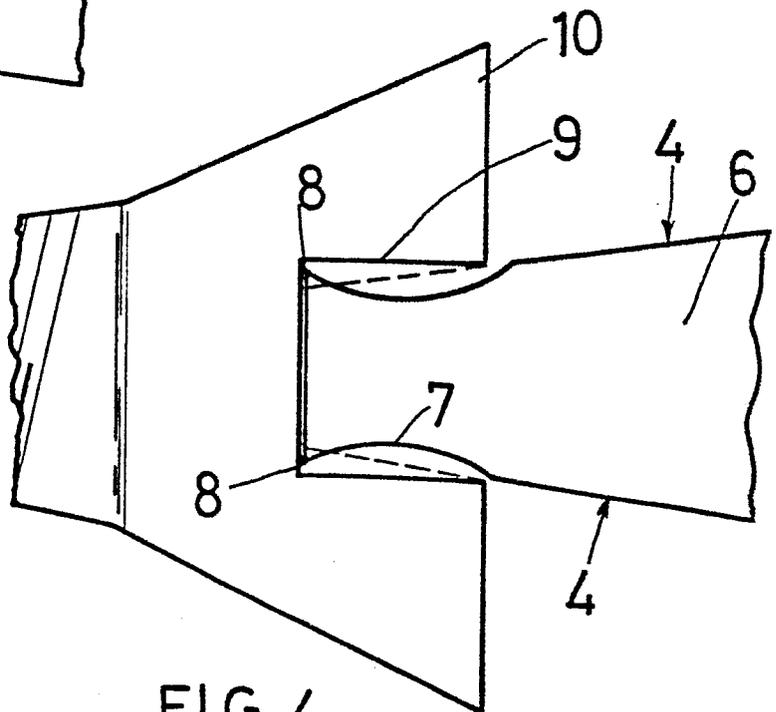


FIG. 4



EP 84306167.2

DOCUMENTS CONSIDERED TO BE RELEVANT			EP 84306167.2
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 4)
X	<u>DE - A1 - 2 637 131</u> (KOLLER) * Page 5; fig. 1 *	1,3,5	B 25 B 15/00
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A	<u>GB - A - 2 037 925</u> (DUNLOP) * Fig. 4 *	1	
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D,A	<u>US - A - 3 923 088</u> (ARNN) * Totality *	1	
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D,A	<u>US - A - 4 105 056</u> (ARNN) * Totality *	1	
	--		
D,A	<u>US - A - 1 479 506</u> (KELLE MEN) * Totality *	1	TECHNICAL FIELDS SEARCHED (Int. Cl. 4)
	----		B 25 B 15/00 B 25 B 23/00
The present search report has been drawn up for all claims			
Place of search VIENNA		Date of completion of the search 26-11-1984	Examiner KREHAN
<b>CATEGORY OF CITED DOCUMENTS</b> X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			