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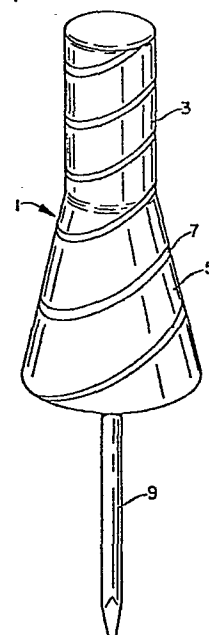
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Screwdriver.

A screwdriver having a driving shaft (3) and a handle (1) ; wherein the handle includes at least a portion (5) in the shape of a frustum of a cone to facilitate application of axially directed and rotating forces on said shaft.

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SCREWDRIVER

FIELD OF THE INVENTION

This invention relates to a screwdriver of improved construction.

5 DESCRIPTION OF THE PRIOR ART

Screwdrivers are tools which are extensively used. Generally, the tool comprises two parts, a screw-driving shaft and a handle. The shaft is intended to fit into a screw head slot while the handle is the means by which the desired torque is applied to the shaft to loosen or tighten a screw. When using the tool to tighten or to loosen a screw, two forces are applied, one axially for keeping the screwdriving shaft engaged in the screw slot and the other rotationally to turn the tool. Should the shaft slip from the slot when applying these two forces, the screw slot may become so damaged that further screwing or unscrewing operations become difficult, if not impossible. In some cases the screw head may even break thus complicating even more the screwing or unscrewing task.

20 A problem with prior screwdrivers is that they provide gripping handles with which it is difficult to develop the two forces referred to unless the shaft of the screwdriver is made extremely long. Space limitations however often make it difficult to use such long screwdrivers.

25 The objective therefore of this invention is to provide a screwdriver capable of developing the required forces to ease removal or tightening of screws and other devices rotatable by means of a screwdriver without stripping or marring the head of the device acted on. This objective
30 is attained by the invention by providing a screwdriver

having a handle which enables joint application of sufficient torque and inward axial force to facilitate screwing and unscrewing operations while minimizing risk of damage to the device being screwed or unscrewed.

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SUMMARY OF THE INVENTION

With the foregoing in mind we provide in accordance with the invention a screwdriver having a handle with a shaft projecting end and a shaft projecting therefrom, characterized by the handle along at least a portion
10 of its length having a cross-section which increases in area in a direction toward the shaft projecting end of the handle.

By virtue of the screwdriver handle in accordance with the invention, the amount of axially applied force;
15 i.e. in the direction of the shaft, as well as the turning torque that can be developed in rotation of a screw or the like by means of the screwdriver shaft is greatly increased. As a result of the invention increased forces along the shaft and turning torque may also be developed for small
20 screwdrivers. Also, one is capable with the present invention of providing greater forces along the shaft and turning torque within confined spaces.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is an isometric elevational view of a
25 screwdriver in accordance with one embodiment of the invention;

Figure 2 is a side view of the screwdriver of Figure 1;

Figure 3 is a cross-sectional view of Figure 2;

30 Figure 4 is a side view of a screwdriver in accordance with a second embodiment of the invention;

Figure 5 is a cross-sectional view of the embodiment of Figure 4; and

35 Figure 6 is a view taken along the line 6-6 of Figure 4.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Figures 1 through 3 show a first embodiment of a screwdriver in accordance with the present invention. The screwdriver includes a handle 1 having a cylindrical shaped end portion 3 and a frustoconically shaped handle portion 5 at the forward or shaft projecting end of the handle. Grooves 7 are helically provided in the handle for improved gripping. A screwdriver shaft 9 is secured within the handle 1 in known manner. The screwdriver in the embodiment of Figures 1 through 3 is operated by grasping the handle 1 in the region 5 so that substantially greater forces axially along the shaft and turning torque are applied than would be the case if the screwdriver were held in its cylindrical region. This is true because, considering the cylindrically shaped handle, the operator has inadequate surface upon which to apply longitudinally directed forces. The frustoconical handle portion of Figures 1 to 3 provides the operator with a surface against which he can bear without hand slippage so that substantial forces may be applied not only axially but also rotationally about the shaft.

In the embodiment of Figures 4 through 6, the handle can be made of plastic and molded in the shape shown. The handle includes the frustoconical polygonal portion 11 and the cylindrical portion 13 with a shaft holder 15 secured in the handle for threadedly receiving the shaft 17 or in other known manner. The longitudinal ribs 19 serve the same purpose as the grooves 7 in the embodiments of Figures 1 through 3. It can be seen that the shaft insert 21, by being threadable, is capable of securing a two-ended shaft having a different size or type of end portion at either end of the shaft to supply two sizes or types of screwdriver. This is accomplished by merely unthreading the shaft from the handle and reinserting it after turning it 180°. Alternatively, the portion of the shaft shown near the free end of the cylindrical portion

of the handle can be secured within a small thickness,
longitudinally extending, slot to prevent rotation of the
shaft within the handle. To secure the shaft within the
handle, the shaft insert 21 may be held in place by a
5 spring clip part 23. A molded axially directed pocket 25
is provided to afford storage of the shaft 17. The
annularly arranged pockets 27 are provided to decrease
weight and for conservation of plastic material. The rib
portions 29 best shown in Figure 6 define the pockets 27
10 and provides stiffening for the handle portion of the
increasing cross-sectional area.

It can be seen from the foregoing, the invention
provides great advantages over prior screwdrivers in that
a great deal more force along the shaft as well as torque
15 can be applied to a device to be screwed or unscrewed,

The specific embodiments herein described are
merely exemplary and hence variations and modifications
made by those skilled in the art are intended to be
covered, the scope of the invention being determined by
20 the appended claims.

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Claims

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1. A screwdriver having a handle with a shaft projecting
end and a shaft projecting therefrom, characterized by the
handle (1) along at least a portion of its length (5 or
11) having a cross-section which increases in area in a
10 direction toward the shaft projecting end of the handle.

2. The screwdriver of claim 1, characterized in that the
handle (1) has a length portion (3) thereof of uniform
cross-sectional area from an end thereof opposite its
15 shaft projecting end to its increasing cross-sectional
length portion (5).

3. The screwdriver of claim 1 or 2, characterized in that
the handle (1) has a shape which is symmetrical about its
20 longitudinal axis.

4. The screwdriver of any of the preceding claims,
characterized in that said increasing cross-sectional
length portion (5) uniformly increases in cross-sectional
25 area.

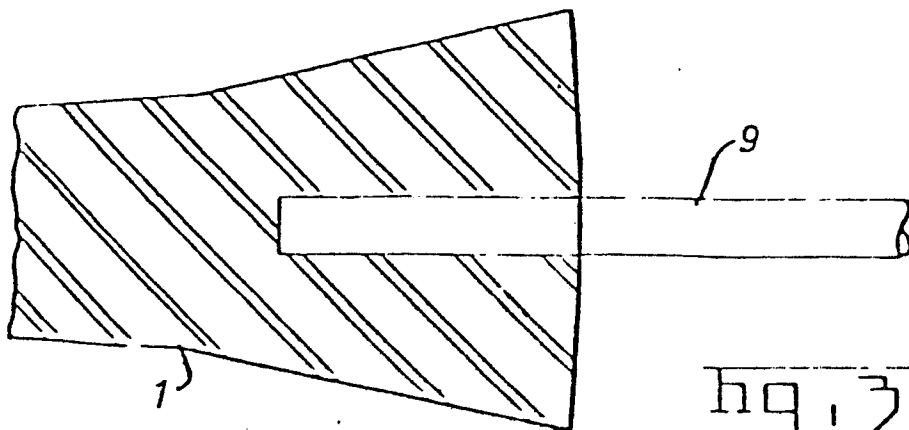
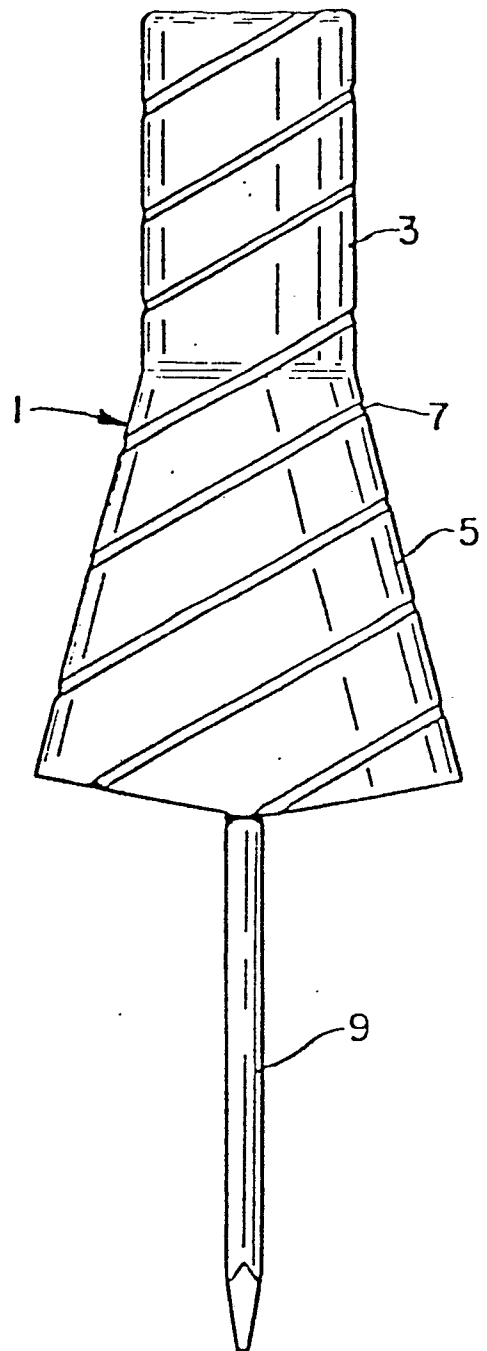
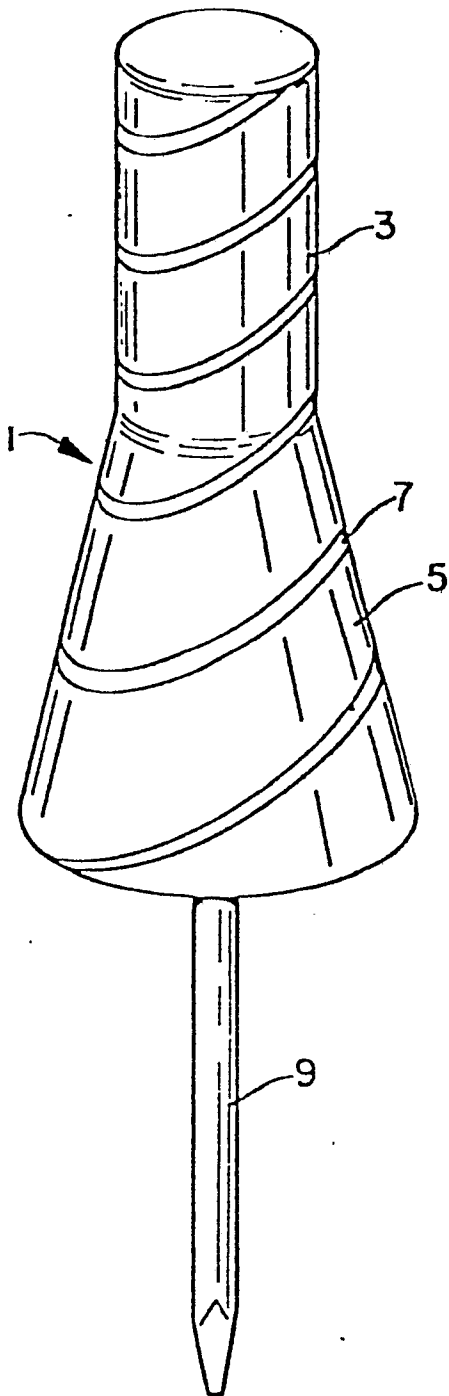
5. The screwdriver of claim 2,3 or 4, characterized in
that said uniform cross-sectional length portion (3) of
the handle (1) has a cylindrical shape and said increasing
30 cross-sectional length portion (5) of the handle has a
generally frustoconical shape of circular or polygonal
cross-section.

6. The screwdriver of claim 5, characterized in that the
35 polygonal cross-sectional length portion of the handle
includes annularly arranged pockets (27) defined by rib
portions (29), said shaft (17) projecting from the shaft
projecting end of the handle centrally of said annularly
arranged pockets.

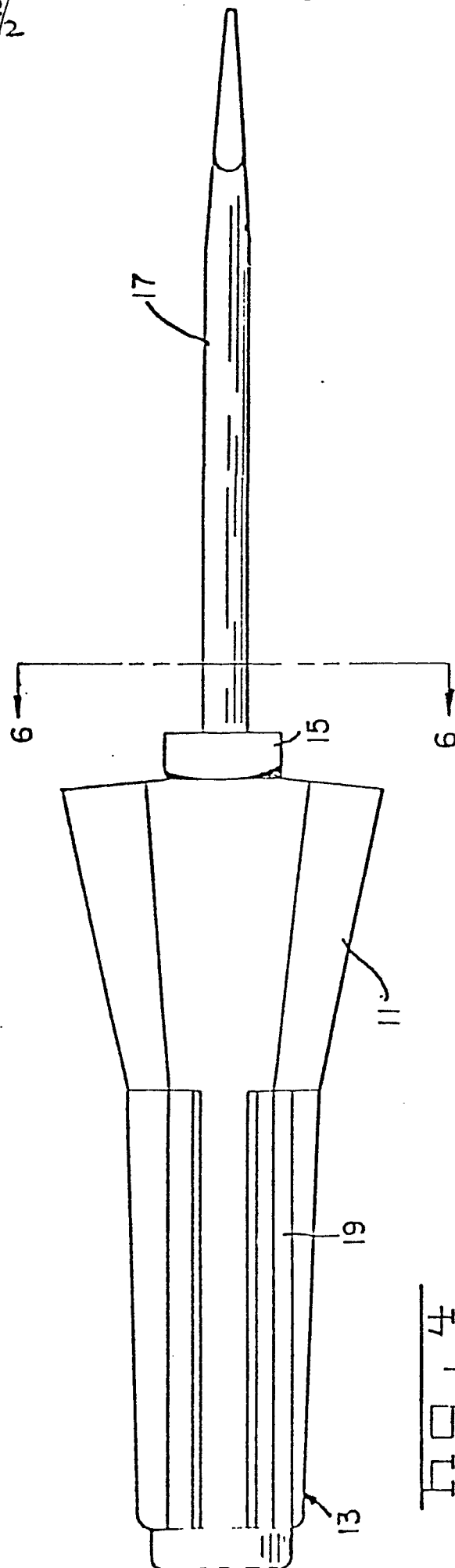
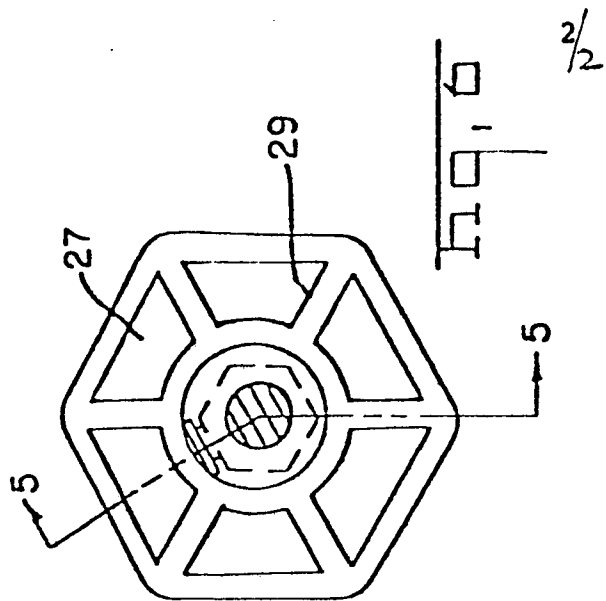
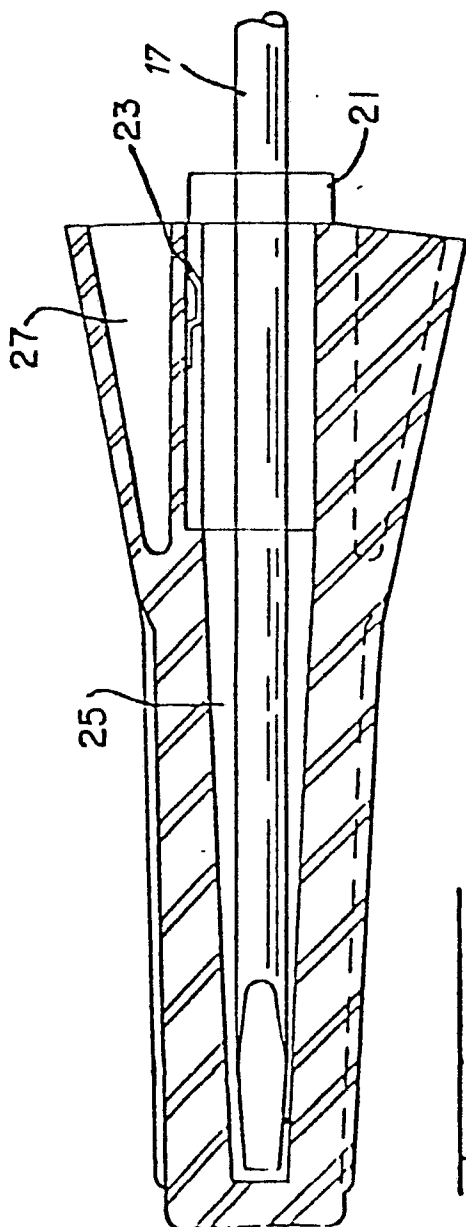
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DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
X	<u>US - A - 3 438 413</u> (J.E. BORAH) * column 1, line 55 to column 2, line 37; fig. 1 to 12 *	1,3-5	B 25 B 23/16 B 25 G 1/10
	<u>DE - U - 7 020 165</u> (E. WIEGAND) * claims 1, 2; fig. *	2	
			TECHNICAL FIELDS SEARCHED (Int. Cl. 3)
			B 25 B 23/16 B 25 B 15/00 B 25 G 1/00
			CATEGORY OF CITED DOCUMENTS
			X: particularly relevant A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons
			& member of the same patent family. corresponding document
The present search report has been drawn up for all claims			
Place of search	Date of completion of the search	Examiner	
Berlin	28-10-1981	HOFFMANN	