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Section 29

AUSTRALIA
Patents Act 1990

PATENT REQUEST : STANDARD PATENT

I/We, being the person(s) identified below as the Applicant(s), request the grant of a Standard Patent to the person(s) identified below as the Nominated Person(s), for an invention described in the accompanying complete specification.

Applicant(s) and Nominated Person(s): SANDVIK AB

Address: S-811 81 SANDVIKEN, SWEDEN

Invention Title: TOOLS

Name(s) of Actual Inventor(s): ALEXANDER BRIAN GRAHAM

Address for Service: GRIFFITH HACK & CO
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MELBOURNE VIC 3004

Attorney Code: HA

BASIC CONVENTION APPLICATION DETAILS

Application No	Country	Application Date
9117993.7	GB	20/08/91

Drawing number recommended to accompany the abstract: 1

DATED: 4 August 1992

SANDVIK AB

GRIFFITH HACK & CO.

Patent Attorney for and
on behalf of the Applicant

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Section 29(1)
Regulation 3.1(2)

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NOTICE OF ENTITLEMENT

I/We SANDVIK AB

of S-811 81 SANDVIKEN,
SWEDEN

being the applicant(s) in respect of an application for a patent for an invention entitled TOOLS, state the following:

1. The nominated person(s) has/have, for the following reasons, gained entitlement from the actual inventor(s):

   THE NOMINATED PERSON IS THE ASSIGNEE OF THE BASIC APPLICANT WHO IS THE ASSIGNEE OF THE ACTUAL INVENTOR.

2. The nominated person(s) has/have, for the following reasons, gained entitlement from the basic applicant(s) listed on the patent request:

   THE APPLICANT AND NOMINATED PERSON IS THE ASSIGNEE OF THE BASIC APPLICANT.

3. The basic application(s) listed on the request form is/are the first application(s) made in a Convention country in respect of the invention.

DATE: 4 August 1992

SANDVIK AB

GRIFFITH HACK & CO.

Patent Attorney for and
on behalf of the applicant(s)

AU9220781

(12) PATENT ABRIDGMENT (11) Document No. AU-B-20781/92
(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No. 661005

(54) Title
TOOLS

International Patent Classification(s)
(51)[6] **E21C 035/18**

(21) Application No. : **20781/92** (22) Application Date : **04.08.92**

(30) Priority Data

(31) Number	(32) Date	(33) Country
9117993	**20.08.91**	**GB UNITED KINGDOM**

(43) Publication Date : **25.02.93**

(44) Publication Date of Accepted Application : **13.07.95**

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(56) Prior Art Documents
IS 4682987
DE 2442146
DE 3005684

(57) Claim

1. A tool comprising a working insert having a body portion in an aperture in the forward end of a body of the tool and a tapered tip projecting from said aperture, characterised in that a separately formed ring surrounds the body portion of the insert and covers a flat annular front face formed on the tool body to receive the ring, said insert and ring both being secured in position on the tool body and being formed from a harder material than the tool body.

661005

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COMPLETE SPECIFICATION

STANDARD PATENT

Applicant(s): SANDVIK AB

Invention Title: TOOLS

The following statement is a full description of this invention, including the best method of performing it known to me/us:

TOOLS

This invention relates to tools for breaking or excavating, such as for mineral cutting, which comprise a working insert of a harder material projecting from a hole at the tapered front end of a body of the tool, typically of steel.

Such tools with working inserts of hard metal have been produced in configurations (EP 122893) which have a lower energy consumption for a given operating capability.

Although the front tip of the insert is intended to provide the cutting or breaking action in these low energy tools, any of the softer material of the body exposed to impact or abrasion during operation of the tool can suffer wear and damage, one result of which is to weaken the attachment of the insert. The tool then fails prematurely because the insert has been dislodged.

As regards the forms of tool illustrated in EP 122893, this kind of problem is more likely to be encountered when the insert is a simple cylinder with a conical tip. Other forms shown have inserts with conical portions much larger than the hole into which the insert fits, so that the outer regions of these conical portions provide protection for the forward end of the body. However, these alternative hard metal inserts are more difficult to produce, because their complex shapes are not well adapted to the pressure sintering method that must be

used. They also require substantially more hard metal.

In SU 899916 it has been proposed to form the hard metal insert with a large disc-like skirt intermediate its length so that when the cylindrical rear end of the insert is placed in a fitting bore in the front of the tool body the skirt covers the front face around the bore. This requires less material than the large conical portions of the inserts shown in EP 122893, but the shape cannot be formed satisfactorily by sintering, because the very high sintering pressures demanded cannot be applied evenly and the insert will have weaknesses that will give premature failure.

DE 2442146 and 3005685 show examples of tool in which the front portion of the tool body is composed of a matrix containing hard metal. This does not overcome the problem of wear because the softer mass of steel in which the hard metal is held is exposed and although the hard metal particles may not wear they will be dislodged as the steel wears. A greater concentration of hard metal in the matrix to avoid this disadvantage would lead to increased material costs without simplifying the manufacture of the tool.

The tool disclosed in GB 2004315 has, on the outer circumference of the leading end of its body, a cylindrical ring of hard metal as reinforcement of the body, but the metal body between the ring and the insert is still exposed to wear. Furthermore, to the extent that the outer ring functions to protect the tool against

abrasion in use it is not possible to use this solution to manufacture a so-called low-energy tool because the ring will only have this effect if the entire front end of the tool participates in the cutting or breaking action.

Finally, there may be mentioned examples of tools which can be considered analogous to that in GB 2004315 in that, instead of the outer ring of hard metal, there is a layer of hard metal extending as a complete sheath over at least the forward portion of the shank. One example is to be found in US 4682987 in which the hard metal is applied as a fused coating to the shank, clearly a rather complicated and expensive solution. US 3627387 shows another example in which a considerably thicker sheath of hard metal is provided, adding to the cost of the tool.

According to the present invention, there is provided a tool comprising a working insert having a body portion held in an aperture in the forward end of a body of the tool and a tapered forward tip projecting from said aperture, a separately formed ring surrounding said body portion of the insert and covering a front face of the tool body, said insert and ring both being secured in position on the tool body and being formed from a harder material than the tool body.

Preferably there is some radial clearance between the ring and the insert. One function of such a clearance would be to simplify not only the assembly but also the securing of the ring and insert in place. Thus

if they are secured by brazing, it is possible to place the brazing alloy in the tool body aperture the clearance allowing passage of the brazing material from the aperture holding the insert to flow into contact with the ring and simultaneously secure both parts in place.

The ring may take a variety of forms. A flat annular shape has particular advantages in simplicity of production; prior to sintering the individual rings can be formed simply by cutting them from an extruded tube of the material. It is not necessary that it is a closed ring, however and it may be preferred to make it up from a number of segments, particularly if a form other than the flat annular form is required.

The insert may also be given a variety of forms, both as regards the exposed cutting tip and the body portion within the main body of the tool. Generally, the cutting tip will have a rotationally symmetrical form but this may be conical or spherical for example. A generally cylindrical form may be most convenient for the body portion but not necessarily of circular cross-section.

One example of a tool according to the invention is illustrated in the accompanying drawing which shows it in a partly sectioned side view.

The main body 2 of the tool is entirely conventional, being made of steel with a central cylindrical shank 4 which locates the tool rotatably in a bore of a holder (not shown), a shoulder 6 at the forward end of the portion providing an abutment face 8 limiting

the insertion of the tool into the bore, and a reduced diameter rear portion 10 on which a locking ring (not shown) can be attached to retain the tool in the bore.

At its forward end the tool body 2 has a tapered front portion 12 in which a central circular bore 14 receives a hard metal cutting insert 20 comprising a main cylindrical portion 22 projecting from the bore and a generally conical tip 24. The tool body has a flat annular face 16 surrounding the bore 14 and that face is covered by a separate hard metal ring 30 of flat rectangular cross-section. The ring outer diameter is chosen such that a line T tangential to the tapered tip and the periphery of the ring lies at a greater angle to the longitudinal axis L of the tool than does the tapered face of the tool body immediately behind the ring so that the body is within the conical envelope defined by the tangential line T. To avoid premature wear of the ring, however, that tangent line T to the tip and ring preferably lies at an angle not substantially greater than about 40° to the tool axis. There is a small radial clearance, eg. not substantially more than 0.5mm, and preferably not substantially more than 0.2mm, between insert 20 and ring 30.

The insert and ring are secured to the tool body by brazing. Brazing material (not shown) placed in the bore 14 before the insert 20 is melted and is able to flow up the sides of the bore and into the interfaces between the insert 20 and ring 30 and the ring 30 and body 2. In

this way, both parts 20,30 are brazed simultaneously to the tool body.

In use, the ring serves as a simple and economical shield over the most exposed part of the tool body to reduce the wear around the insert and so prolong the life of the tool. By shielding the metal of the body from direct impact with the surface being worked, eg. in rock cutting, the tool can also reduce the possibility of sparks being generated.

Depending upon the intended use, the ring may be given different forms but it is always made as a separate part to be assembled with the insert on the shank. For particular uses the insert and ring may be made of other materials, such as cubic boron nitride or polycrystalline diamond, including composites of two or more materials, and the two parts can be made of different materials from each other to reflect their different functions.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A tool comprising a working insert having a body portion in an aperture in the forward end of a body of the tool and a tapered tip projecting from said aperture, characterised in that a separately formed ring surrounds the body portion of the insert and covers a flat annular front face formed on the tool body to receive the ring, said insert and ring both being secured in position on the tool body and being formed from a harder material than the tool body.

2. A tool according to claim 1 wherein there is radial clearance between the ring and the insert.

3. A tool according to claim 1 or claim 2 wherein the ring has a flat annular shape.

4. A tool according to any one of the preceding claims wherein a tangent to the tapered tip of the insert and to the ring lies at a greater inclination to a longitudinal axis of the tool than does the tool body periphery immediately rearwards said ring.

5. A tool substantially as herein described with reference to, and as illustrated by, the accompanying drawings.

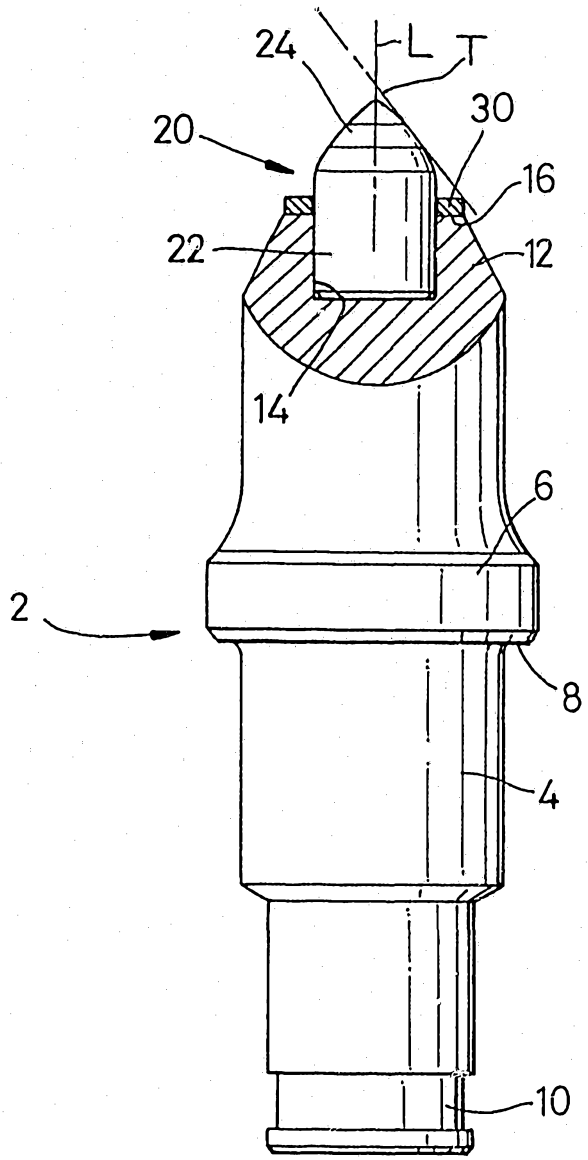
DATED THIS 15TH DAY OF MAY 1995.
SANDVIK AKTIEBOLAG
By its Patent Attorneys:
GRIFFITH HACK & CO
Fellows Institute of Patent
Attorneys of Australia

AUSTRALIAN PATENT OFFICE LS

TOOLS

ABSTRACT

A breaking or excavating tool has a smaller cutting insert (20) at the forward end of a tool body (2) made of a softer material than the insert. A separately formed ring (30), also of harder material than the body lies over a front face (16) of the body surrounding the insert to protect the tool body against wear. The arrangement is relatively easy to produce and can offer effective protection in an economical manner.


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