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(54) Title: SHANK CHISEL

(54) Bezeichnung: SCHAFTMEIβEL

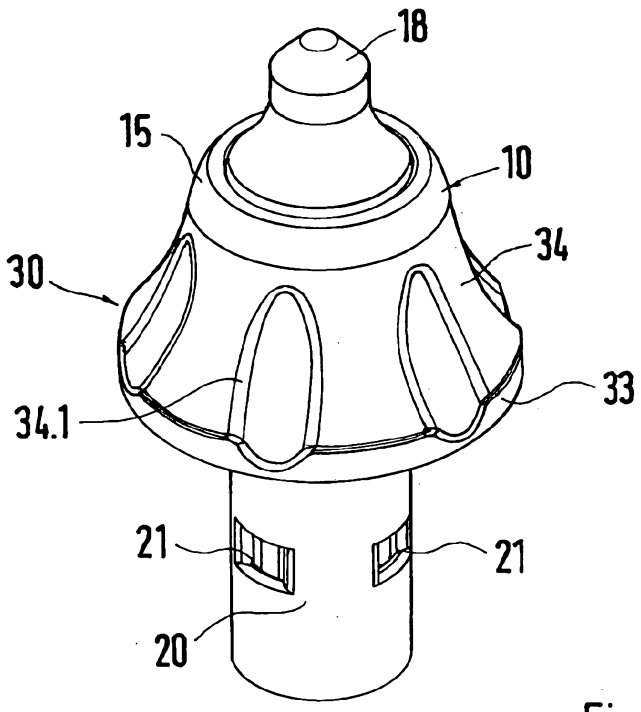

Fig.1

(57) Abstract: The invention relates to a shank chisel, particularly a chisel for milling roads, with a carrier part (10) comprising a shank (11), wherein the shank is provided with a chisel tip (18) made of a hard material. The carrier part comprises a receiving section (14) in the region between the shank and the chisel tip, a head part (30) being held on said receiving section, and the head part comprises a peripheral chip discharge surface (34.1) that is tapered in the direction of the chisel tip. In order to provide an optimized shank chisel of said kind in terms of wear, the invention provides for the head part to be rotatably held with respect to the carrier part.

(57) Zusammenfassung: Die Erfindung betrifft einen Schaftmeißel, insbesondere Straßefräsmeißel mit einem Tragteil (10) der einen Schaft (11) aufweist, wobei der Schaft eine Meißelspitze (18) aus Hartwerkstoff trägt, wobei der Tragteil im Bereich zwischen dem Schaft und der Meißelspitze einen Aufnahmeabschnitt (14) aufweist, an dem ein Kopfteil (30) gehalten ist, und wobei das Kopfteil eine umlaufende sich in Richtung zur Meißelspitze hin verjüngende Spanableitfläche (34.1) aufweist. Um einen solchen Schaftmeißel verschleißoptimiert auslegen zu können, sieht die Erfindung vor, dass das Kopfteil gegenüber dem Tragteil verdrehbar gehalten ist.

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SHANK CHISEL

The invention relates to a shank bit, in particular a road milling bit, having a carrier part that comprises a shank, the shank carrying a bit tip made of hard material, the carrier part comprising, in the region between the shank and the bit tip, a receiving portion on which a head part is held.

A shank bit of this kind is known from DE 38 18 213 A1. A two-part carrier part, which comprises a shank portion made of steel and a cutting holder, is used here. The cutting holder carries the bit tip in a receptacle, and is soldered to the shank portion. A sleeve-shaped ceramic sheath is arranged in the transition region between the shank portion and the cutting holder.

The ceramic sheath is adhesively bonded both to the cutting holder and to the carrier part. The shank bit rotates during operational service. The hard ceramic sheath grinds, in this context, over a seating surface of a bit holder that carries the shank bit. The ceramic sheath works into the seating surface and wears away the bit holder. Because the bit holder is an expensive component as compared with the shank bit, this effect is undesirable.

DE 10 2004 053 666 A1 discloses a shank bit in which a protective sheath, constituting a head part, likewise surrounds the carrier part and is welded to it. A wear protection disk is used to prevent friction between the head part and the bit holder. This additional component increases the part cost of the shank bit.

It would be advantageous if embodiments of the invention create a shank bit of the kind mentioned above that is designed in wear-optimized fashion with little parts outlay.

In particular, the head part is held rotatably with respect to the carrier part. Because of the rotatability of the head part with respect to the carrier part, the carrier part can rotate

in the tool insert, and the bit tip may wear uniformly. The head part, conversely, may remain unchanged in its position during the load pulse, or may not rotate to the same extent as the carrier part. The possibility thus also exists of placing the head part, if necessary, directly onto a support surface, for example of a bit holder, without exposing the latter to severe rotating wear.

In a first aspect of the present invention, there is provided a shank bit, in particular a road milling bit, having a carrier part that comprises a shank, the shank carrying a bit tip made of hard material, the carrier part comprising, in the region between the shank and the bit tip, a receiving portion on which a head part is held, and the head part comprising a circumferential chip discharge surface tapering in a direction toward the bit tip, the head part being held rotatably with respect to the carrier part, and the chip discharge surface ending in the region of the end of the carrier part receiving the bit tip.

In a second aspect of the present invention, there is provided a shank bit, such as a road milling bit, having a carrier part that comprises a shank, the shank carrying a bit tip made of hard material, the shank bit further comprising a head part the carrier part comprising, in the region between the shank and the bit tip, a receiving portion on which a head part is in use held rotatably with respect to the carrier part, the head part having an exterior surface which comprises a circumferential region that tapers in a direction toward the bit tip, wherein the exterior surface of the head part defines a circumferential chip discharge surface that ends in the region of the end of the carrier part receiving the bit tip.

In a third aspect of the present invention, there is provided a shank bit, in particular a road milling bit, having a carrier part that comprises a shank, the shank carrying a bit tip made of hard material, the carrier part comprising, in the region between the shank and the bit tip, a receiving portion on which a head part is held, and the head part comprising a circumferential chip discharge surface tapering in a direction toward the bit tip, the head part comprising a stop (support portion) and/or a counter surface that

limits the installation movement of the head part on the head part against an abutment surface of the carrier part.

In a fourth aspect of the present invention there is provided a shank bit, such as a road milling bit, having a carrier part that comprises a shank, the shank carrying a bit tip made of hard material, the shank bit further comprising a head part the carrier part comprising, in the region between the shank and the bit tip, a receiving portion on which a head part is in use held rotatably with respect to the carrier part, the head part having an exterior surface which comprises a circumferential region that tapers in a direction toward the bit tip, the head part comprising a stop (support portion) and/or a counter surface that limits the installation movement of the head part on the head part against an abutment surface of the carrier part.

In a fifth aspect of the present invention, there is provided a shank bit, in particular a road milling bit, having a carrier part that comprises a shank, the shank carrying a bit tip made of hard material, the carrier part comprising, in the region between the shank and the bit tip, a receiving portion on which a head part is held, and the head part comprising a circumferential chip discharge surface tapering in a direction toward the bit tip, the carrier part carrying, in the region of the shank, a clamping sleeve, the head part being pulled onto the clamping sleeve, and the head part holding the clamping sleeve in a preloaded resilient state.

In a sixth aspect of the present invention, there is provided a shank bit, such a road milling bit, having a carrier part that comprises a shank, the shank carrying a bit tip made of hard material, the shank bit further comprising a head part the carrier part comprising, in the region between the shank and the bit tip, a receiving portion on which a head part is held, the head part having an exterior surface which comprises a circumferential region tapering in a direction toward the bit tip, the carrier part carrying, in the region of the shank, a clamping sleeve , the head part being pulled onto the

clamping sleeve, and the head part holding the clamping sleeve in a preloaded resilient state.

According to a preferred variant embodiment of the invention, the head part is mounted with respect to the carrier part rotatably about the longitudinal center axis of the carrier part.

If a shank bit is configured so that the head part comprises an annular support surface which concentrically surrounds an aperture, and that the carrier part is received in the aperture, the support surface may then form an abutment region that can be placed directly onto the corresponding countersurface of ordinary bit holders. The compressive forces that occur are then introduced from the shank bit directly into the tool holder.

In one embodiment, the head part comprises, around the aperture, a centering attachment that comprises a centering surface which widens continuously in a direction toward the support surface. The centering attachment then aligns the shank bit on a centering receptacle of the bit holder. The centering receptacle and the centering attachment thus also form a closure system that may make it more difficult for contaminants to penetrate.

For good discharge of the removed stone or bitumen material, the head part in accordance with a specific embodiment comprises a concave or conical chip discharge surface whose diameter tapers in a direction toward the bit tip.

The interface between head part and carrier part may be configured so that the head part comprises a bore that forms, with its cylindrical and/or conical bore wall, a seat against which the receiving portion of the carrier part abuts or can abut.

Embodiments having a cylindrical geometry pairing enable a very easily rotating association between the head part and carrier part. When a conical fit connection is selected, on the other hand, free and unimpeded rotatability during operational service may be limited in favor of improved sealing between the head part and the carrier part. The taper angle of the conical connection may be embodied in a manner adapted to the wear requirements and service conditions.

In one embodiment the head part is braced with respect to the carrier part by means of an elastic support element, the load impacts occurring during operational service may then be cushioned by the elastic support element.

A "pumping" effect may also be generated between the head part and carrier part, so that any contaminants that may have entered can be conveyed out.

In order to obtain a defined positional association between the head part and carrier part, the head part in accordance with the third and fourth aspects of the inventor comprises a stop (support portion) and/or a countersurface that limits the installation movement of the head part on the carrier part.

An embodiment of the invention is configured so that the carrier part carries, in the region of the shank, a clamping sleeve; that the head part is pulled onto the clamping sleeve; that the head part holds the clamping sleeve in a preloaded resilient state; and that the head part can be pushed off from the clamping sleeve in such a way that it releases it and the clamping sleeve springs back into its larger-diameter relaxed position. The clamping sleeve may be used, in known fashion, to clamp the shank bit replaceably in a receiving bore of the bit holder.

Because the head part preloads the clamping sleeve, the clamping sleeve may easily be inserted into the receiving bore. The head part may then be pushed off from the clamping sleeve, for example with a hammer blow onto the bit tip. The

clamping sleeve can thereby shift into its installed position and become clamped in the receiving bore.

A wear-optimized configuration of the shank bit results when the carrier part in accordance with an embodiment of the present invention comprises, in the region of the end carrying the bit tip, a circumferential collar whose surface transitions into the chip discharge surface and which radially covers the entry cross-section into the seat of the head part. The collar may also protect the transition between the head part and the carrier part.

According to a particular embodiment of the invention, the head part and the carrier part have a different material hardness and/or material toughness. The material for the head part, may for example, be made of a hard substance, and the material for the carrier part from a tough substance. If the head part is used in such a way that it is placed directly onto the bit holder, the bit holder may have, in the contact region with the head part, a greater hardness than the head part.

The invention will be explained below with reference to an exemplifying embodiment depicted in the drawings, in which:

FIG. 1 is a perspective depiction of a shank bit;

FIG. 2 is a side view and a prepared wraparound view of the shank bit in accordance with FIG. 1;

FIG. 3 is a plan view of what is depicted in FIG. 2; and

FIG. 4 is a side view and longitudinal section of the shank bit in accordance with FIGS. 2 and 3.

FIG. 1 shows a shank bit having a carrier part 10, a head part 30, a clamping sleeve 20, and a bit tip 18 made of carbide metal.

As FIGS. 2 and 4 show, carrier part 10 (manufactured from a steel profile) comprises a cylindrical shank 11. Shank 11 is provided in its central region with a circumferential groove 12.

Clamping sleeve 20, fabricated from a steel sheet and equipped with a longitudinal slot, is pulled onto shank 11. The cylindrical inside cross section of clamping sleeve 20 is dimensioned so that shank 11 can rotate freely in clamping sleeve 20. Clamping sleeve comprises holding elements 21 arranged symmetrically with respect to its transverse central plane. Holding elements 21 engage into groove 12 and hold clamping sleeve 20 on carrier part 10 in lossproof fashion in an axial direction, but freely rotatably. Because of the symmetrical configuration of clamping sleeve 20, the latter can be installed on carrier part 10 in two positions rotated 180°.

Adjacent to shank 11, carrier part 10 comprises a transition portion 13 that leads into a cylindrical receiving portion 14. Receiving portion 14 has an enlarged cross section as compared with shank 11. Adjoining receiving portion 14 is a collar 15 that comprises an abutment surface 16 extending perpendicular to longitudinal center axis 11 of carrier part 10. Adjacent to abutment surface 16, collar 15 is equipped with a convex chip directing surface. Carrier part 10 is equipped in the region of the collar end with a cup-shaped receptacle 17 into which bit tip 18 is soldered.

Head part 30 is fabricated from a metallic material as a pressed part. The rotationally symmetrical head part 30 possesses an annular support surface 31 from which a centering attachment 32 projects. Centering attachment 32 is configured conically, and

tapers away from support surface 31. Head part 30 is penetrated concentrically, in the direction of longitudinal center axis M, by an aperture, centering attachment 32 enclosing the entrance opening into said aperture on one side.

The aperture is embodied as a stepped bore, a first diameter being defined by a support portion 36 adjacent to centering attachment 32. Head part 30 is pulled, with this diameter region, onto clamping sleeve 20. The inside diameter is dimensioned to be smaller than the outside diameter of clamping sleeve 20 in its relaxed state.

Clamping sleeve 20 is thereby held with head part 30 in a preloaded state that enables easy installation of the shank bit into a bit holder. The outside diameter of the preloaded clamping sleeve 20 is then dimensioned so that clamping sleeve 20 can easily be pre-fitted into a receiving bore of a bit holder. Adjacent to support portion 36, head part 30 comprises a larger-diameter cylindrical seat 35. The inside diameter of this seat 35 is selected to be the same as or larger than the outside diameter of receiving portion 14. An elastic support element 38 in the form of an O-ring made of rubber is inserted into seat 35, facing toward support portion 36. Head part 30 is equipped on the outer side with a concave chip discharge surface 34 that, in the installed state, transitions in flush fashion into the convex chip directing surface of collar 15. On its side facing away from bit tip 18, chip discharge surface 34 transitions into a cylindrical collar 33, and the latter into support surface 31. Longitudinally directed depressions 34.1 are recessed into chip discharge surface 34 for improved discharge of the removed material.

For installation of the shank bit, the latter is inserted as described above, with its clamping sleeve 20, into the receiving bore of the bit holder until support surface 31 abuts against a corresponding countersurface of the bit holder. By means of a hammer blow onto bit tip 18, head part 30 is displaced with respect to carrier part 10 in the direction of longitudinal center axis M and toward bit tip 18.

In this context, seat 35 moves into the region of receiving portion 14. At the same time, support portion 36 releases clamping sleeve 20, and clamping sleeve 20 springs radially back. It then becomes clamped against the inner wall of the receiving bore of the bit holder.

The displacement motion of head part 30 is limited by abutment surface 16 of collar 15, which comes to a stop against an annularly circumferential countersurface 37 of head part 30.

Collar 15 also holds head part 30 in lossproof fashion, axially in a direction toward bit tip 18, with respect to carrier part 10. At the same time, support portion 36 supports head part 30 with respect to carrier part 10 by way of elastic support element 38. In the opposite direction, the bit holder prevents head part 30 from being pushed away from carrier part 10.

Head part 30 is thus held on carrier part 10 in lossproof fashion axially, but rotatably about the longitudinal center axis.

In the installed state, support element 38 abuts against receiving portion 14 in the region of transition portion 13. In the context of a load on carrier part 10 in an axial direction, support element 38 can be compressed so that it can cushion impact loads.

During tool use, the shank bit strikes with its bit tip 18 against the stone or bitumen material that is to be removed. Carrier part 10 is thereby pressed into seat 35 of head part 30. Carrier part 10 is then braced on countersurface 37 and/or on support portion 36.

In the claims which follow and in the preceding description of the invention, except where the context requires otherwise due to express language or necessary implication, the word "comprise" or variations such as "comprises" or "comprising" is used in an

inclusive sense, i.e. to specify the presence of the stated features but not to preclude the presence or addition of further features in various embodiments of the invention.

It is to be understood that, if any prior art publication is referred to herein, such reference does not constitute an admission that the publication forms a part of the common general knowledge in the art, in Australia or any other country.

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The claims defining the invention are as follows:

1. A shank bit, such as a road milling bit, having a carrier part that comprises a shank, the shank carrying a bit tip made of hard material, the shank bit further comprising a head part, the carrier part comprising, in the region between the shank and the bit tip, a receiving portion on which a head part is in use held rotatably with respect to the carrier part, the head part having an exterior surface which comprises a circumferential region that tapers in a direction toward the bit tip, wherein the exterior surface of the head part defines a circumferential chip discharge surface that ends in the region of the end of the carrier part receiving the bit tip.

2. A shank bit, such as a road milling bit, having a carrier part that comprises a shank, the shank carrying a bit tip made of hard material, the shank bit further comprising a head part the carrier part comprising, in the region between the shank and the bit tip, a receiving portion on which a head part is in use held rotabably with respect to the carrier part, the head part having an exterior surface which comprises a circumferential region that tapers in a direction toward the bit tip, the head part comprising a stop (support portion) and/or a counter surface that limits the installation movement of the head part on the head part against an abutment surface of the carrier part.

3. A shank bit, such a road milling bit, having a carrier part that comprises a shank, the shank carrying a bit tip made of hard material, the shank bit further comprising a head part the carrier part comprising, in the region between the shank and the bit tip, a receiving portion on which a head part is held, the head part having an exterior surface which comprises a circumferential region tapering in a direction toward the bit tip , the carrier part carrying, in the region of the shank, a clamping sleeve , the head part being pulled onto the clamping sleeve, and the head part holding the clamping sleeve in a preloaded resilient state.

4. The shank bit according to any one of Claims 1 to 3, wherein the head part is mounted with respect to the carrier part rotatably about a longitudinal center axis of the carrier part.

5. The shank bit according to any one of Claims 1 to 4, wherein the head part comprises an annular support surface which concentrically surrounds an aperture, and

the carrier part is received in the aperture.

6. The shank bit according to Claim 5, wherein the head part comprises, around the aperture, a centering attachment that comprises a centering surface which widens continuously in a direction toward the support surface.

7. The shank bit according to any one of Claims 1 to 6, wherein the head part comprises a concave or conical chip discharge surface whose diameter tapers in a direction toward the bit tip.

8. The shank bit according to any one of Claims 1 to 7, wherein the head part comprises a bore that forms, with its cylindrical and/or conical bore wall, a seat against which the receiving portion of the carrier part abuts or can abut.

9. The shank bit according to any one of Claims 1 to 8, wherein the head part is braced with respect to the carrier part by means of an elastic support element.

10. The shank bit according to any one of Claims 1 to 9, wherein the head part (30) can be pushed off from the clamping sleeve in such a way that the head part is released and the clamping sleeve springs back into its larger-diameter relaxed position.

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11. The shank bit according to any one of Claims 1 to 10, wherein the carrier part comprises, in the region of the end carrying the bit tip, a circumferential collar whose surface transitions into the chip discharge surface and which radially covers the entry cross-section into the seat of the head part.

12. The shank bit according to any one of Claims 1 to 11, wherein the head part and the carrier part (10) have a different material hardness and/or a material toughness.

13. A shank bit substantially as hereinbefore described with reference to one or more of the accompanying drawings.

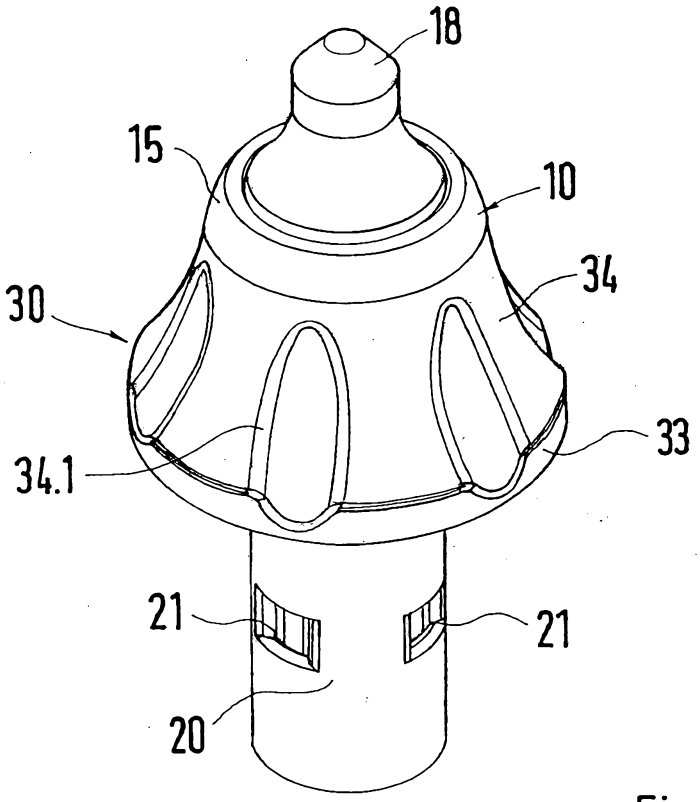

Fig.1

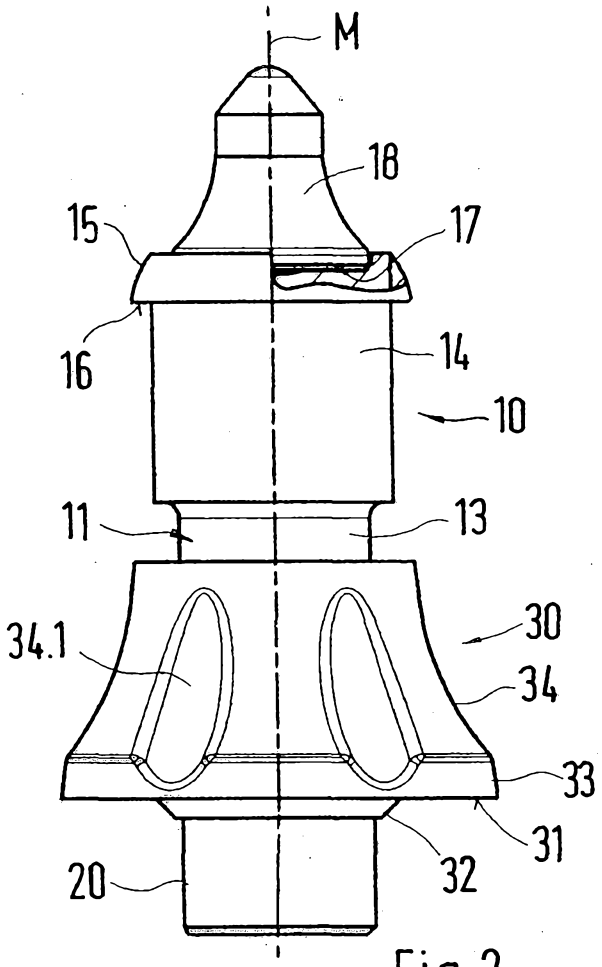

Fig.2

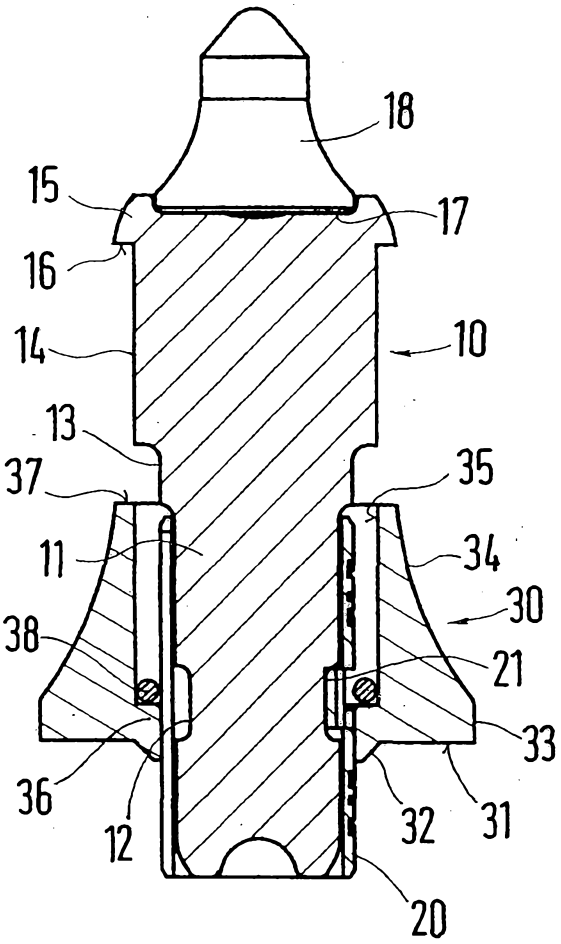

Fig.4

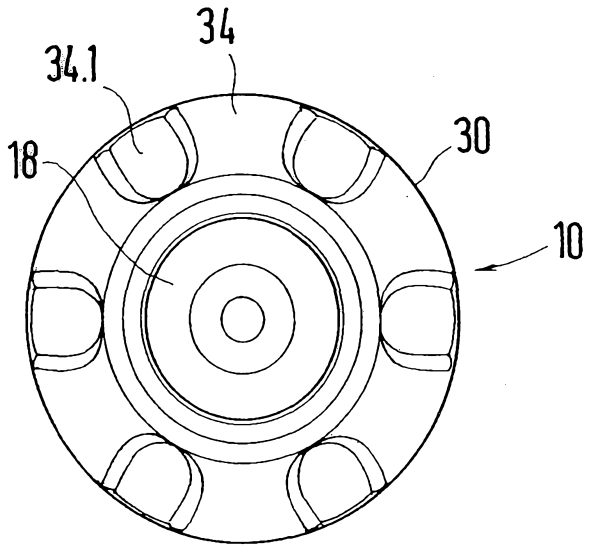

Fig.3