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(54) **Chisel, in particular for a drill head and/or cutting head**

(57) The invention relates to a chisel, in particular for a drill head and/or cutting head, having a chisel head (10) and a chisel shank (30) attached directly or indirectly thereto; the chisel shank (30) has a first receptacle region (32), to which a first tensioning element (40) is assigned.

An optimal design of such a chisel with regard to wear can be attained in that the chisel shank forms a second receptacle region (35), which has a reduced cross section relative to the first receptacle region and to which a second tensioning element (50) is assigned, and that the chisel shank (30) is rotatable relative to the first and second tensioning elements (40, 50).

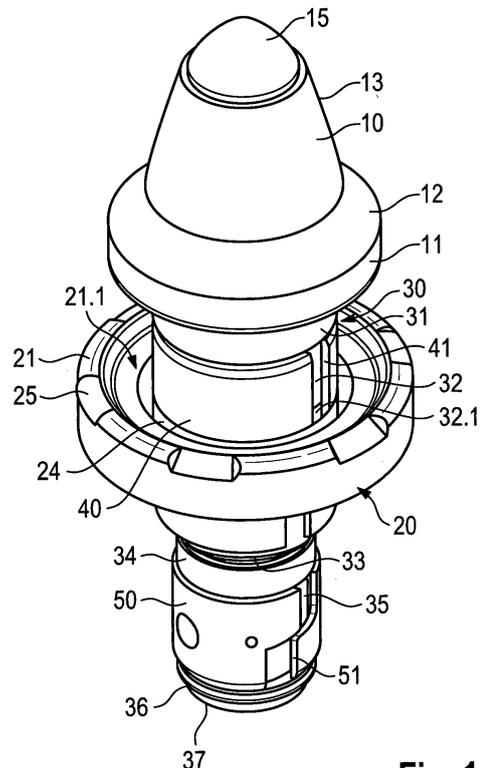


Fig. 1

Description

[0001] The invention relates to a chisel, in particular for a drill head and/or cutting head, having a chisel head and a chisel shank attached directly or indirectly thereto.

[0002] One such chisel is known from German Patent Disclosure DE 3307895 A1. In it the chisel is embodied as a round shank chisel, and adjoining the chisel head it has a first cylindrical portion. A second cylindrical portion, which is reduced in diameter relative to the first cylindrical portion, is integrally formed onto this first cylindrical portion. An encompassing groove is made by lathe in the second cylindrical portion and receives a tension ring. By means of this tension ring, the chisel can be fixed in a receiving bore of a chisel holder in captive fashion axially, but freely rotatably in the circumferential direction. During the use of the tool, the chisel, with a tip of the chisel head, strikes the material to be removed, such as rock material, and breaks it up. In the process, a circumferential force is also introduced into the chisel. The effect of this is that the chisel rotates about its center length. In this way it is ensured that the chisel will not wear unevenly; instead, the chisel head wears uniformly over its entire circumference. As a consequence of the rotation of the chisel, the chisel holder also becomes worn in the vicinity of the chisel receptacle, so that after a certain time in use it must be replaced, to maintain stable support of the tool.

[0003] The chisel described in DE 3307895 A1 is typically used in mining and serves to remove material from coal seams and the like, for example. For a long time, chisels and especially round shank chisels have also been used in offshore mining. In offshore mining, rock removal is done on the ocean bed. There, the conditions of use differ fundamentally from those in traditional mining. The chisels known from DE 3307895 A1 cannot be used in offshore mining, since for one thing, the round shank chisel is not fastened stably enough in the chisel holder. For another, markedly stronger pressure forces are exerted on the chisel. These forces lead to rapid wear of both the chisel and the chisel holder.

[0004] It is the object of the invention to furnish a chisel of the type mentioned at the outset with a service life optimized in particular for the purpose excavating, offshore mining or the like.

[0005] This object is attained in that in addition to the first receptacle region, the chisel shank has a second receptacle region, which has a reduced cross section relative to the first receptacle region and to which a second tensioning element is assigned, and that the chisel shank is rotatable relative to both the first and the second tensioning elements.

[0006] By means of the two tensioning elements, the chisel can be braced stably and over a long supported length in a chisel receptacle of a chisel holder. The reaction forces exerted on the chisel shank during use are reliably transmitted via the adapter sleeves to the chisel holder. In the vicinity of the adapter sleeves, no rotational

wear occurs between the chisel and the chisel holder, so that the service life of the chisel holder is optimized. By means of the graduated embodiment of the chisel holder, the assembly of the chisel with a suitable embodiment of the chisel holder is simplified markedly. Moreover, with the graduated embodiment of the shank in combination with the two tensioning elements, both weight reduction and at the same time a markedly increased retention force are achieved. The chisels according to the invention could be used in connection with any kind of mining machine, e.g. for purposes of offshore mining, and for excavating - or dredging machines.

[0007] In a preferred variant embodiment of the invention, it can be provided that the first and/or the second tensioning element is retained in a prestressed state by means of a tensioning piece. This further simplifies the assembly of the chisel. Because the tensioning element is kept in the prestressed state, the chisel can be introduced into the chisel receptacle of the chisel holder without force, or with reduced force. The result is a preassembled state which can then easily be made into a finally assembled state.

[0008] For example, it can be provided that the tensioning piece is a ringlike wear guard element, which is retained displaceably on the tensioning element in the direction of the center longitudinal axis of the chisel, and that the chisel shank has a shank region which directly or indirectly adjoins the tensioning element and onto which the tensioning piece can be slipped, in order to undo the prestressed state of the tensioning element. Thus the chisel can be put in the preassembled position without force or with reduced force. By means of a hammer blow on the chisel head, for example, the tensioning piece can then be pushed off the tensioning element. The tensioning element is now released and can tense as intended in the chisel receptacle of the chisel holder. With this simple provision, the assembly forces can be reduced considerably. In this way, relatively large chisels can be inserted, and thus the driving performance of the rock breakdown machine or the like can be enhanced markedly, producing a high yield. The requisite high tensioning force is made available by the tensioning elements.

[0009] In a preferred variant embodiment of the invention, it can be provided that the second tensioning element is offset, facing away from the chisel head, relative to the first tensioning element, and that the outer circumference of the second tensioning element is less than the outer circumference of the first tensioning element. By way of the spacing of the two tensioning elements, a support spacing is effected which serves to absorb strong bending forces reliably. Because the second tensioning element with the smaller outer circumference is disposed in the vicinity of the free end of the shank, the chisel can easily be threaded into the chisel receptacle for assembly.

[0010] The difference between the outer diameter of the first tensioning element and the outer diameter of the

second tensioning element should preferably be in the range between 2 mm and 60 mm. A greater reduction in cross section would increase the notch stresses at the transition between the two receptacle regions excessively. The result would be an increased risk that the chisel would break. The difference should be at least 3 mm, however, so that simple manual assembly of the chisel can be ensured even in poorly accessible places.

[0011] In a chisel according to the invention, it can be provided that the longitudinal ends, facing one another, of the tensioning elements are spaced apart from one another by a spacing in the range between 2 mm and 30 mm. With this spacing, a settlement chamber on the chisel holder can be achieved. The settlement chamber ensures secure bracing of the chisel, even in the event of axial longitudinal wear of the chisel holder.

[0012] Preferably, the tensioning elements can be embodied as longitudinally slit adapter sleeves. Such adapter sleeves can be made simply and economically from a sheet-metal blank and they have strong tensioning forces.

[0013] It is also conceivable that the tensioning elements are retained in axially captive fashion and freely rotatably in the circumferential direction on the chisel shank by means of at least one detent element or at least one retainer element. The result is a structural unit that is easily manipulated and that in case of wear can be replaced quickly.

[0014] If it is provided that the chisel shank, facing away from the chisel head and adjoining the second tensioning element has a securing element, then additional redundancy for safety's sake is afforded. The securing element prevents loss of the chisel in the event of unforeseen exertions of force.

[0015] An especially simple construction is afforded if it is provided that the securing element is embodied as a securing ring, which is retained in an encompassing groove of the chisel shank.

[0016] A chisel according to the invention can be **characterized in that** that the chisel shank, with a cylindrical coupling piece, directly or indirectly adjoins the chisel head, and that the diameter of the coupling piece is greater than the diameter of the first receptacle region. During use, the transition region between the chisel head and the chisel shank is exposed to severe bending moments and shear stresses. This loading situation is taken into account by the increased-diameter coupling piece.

[0017] For fixation of the tensioning elements to the chisel shank, it can be provided that the first receptacle region and/or the second receptacle region has an encompassing groove which is engaged by the first tensioning element with its retaining elements that protrude in the direction of the chisel shank. Alternatively or in addition, it may be provided that the first and/or second receptacle region forms a groove, into which the tensioning element is inserted.

[0018] The object of the invention is also attained with a combination tool having a chisel holder and a chisel

according to one of claims 1-12, in which the chisel is retained in a chisel receptacle of the chisel holder.

[0019] Preferably, it can be provided that the coupling piece chisel receptacle forms a settlement chamber in the region between the first and second receptacle regions. During use, the chisel can settle back into this settlement chamber if there is longitudinal wear of the chisel holder, and the function and in particular the rotation of the chisel are fully preserved.

[0020] To that end, it can furthermore be provided that the has a smaller diameter than the chisel receptacle. In the event of longitudinal wear of the chisel holder, the coupling piece can thus also insert itself into the vicinity of the chisel holder, without impairment of the free rotatability of the chisel. This provision makes a compact embodiment of the chisel length possible.

[0021] Preferably, the chisel receptacle should be embodied such that a settlement chamber is formed adjoining the free end of the chisel shank.

[0022] According to the invention, the object of the invention is also attained with cutting head having a chisel, in particular for a drill head and/or cutting head, having a chisel head and a chisel shank, in which the chisel shank has a first receptacle region, which directly or indirectly adjoins the cutting head, and the chisel shank has a second receptacle region, which facing away from the chisel head directly or indirectly adjoins the first receptacle region, and the diameter of the second receptacle region deviates from the diameter of the first receptacle region, and the chisel shank has a fastening element, in particular a tensioning element, and the cutting head, facing toward the chisel shank, forms a support face, and/or a wear element disposed in the transition region between the chisel head and the chisel shank forms a support face. According to the invention, it is provided that the spacing of the support face from the region in which the first receptacle region merges with the second receptacle region is in the range between 15 mm and 200 mm, and especially preferably in the range between 30 mm and 190 mm.

[0023] While the chisel is engaged in machining, forces are exerted obliquely to the center longitudinal axis of the chisel, and the force direction varies during the contact with the material that is to be removed. The chisel head is braced on a counterpart face of the chisel holder. Because of the forces introduced into the chisel head, a tilting moment occurs in the chisel shank. Its effect is that the fastening element, on its longitudinal ends on diametrically opposite sides, is pressed against the chisel receptacle of the chisel holder. In the vicinity of these pressure points, the incident force has to be limited, to prevent widening of the chisel receptacle. With the arrangement according to the invention, ideal force diversion for the purposes of offshore mining is attained with the choice of the support spacing in the range between 15 mm and 200 mm. At extreme water depths, the upper limit range is preferably selected for the supported length. At slight water depths, for instance in harbor construction,

even shorter supported lengths suffice. It has been demonstrated that the intermediate range of between 30 mm and 190 mm recited in claim 16 is sufficient for deep-drilling operations at this time.

[0024] In a preferred variant embodiment, it should be provided that the tensioning element has an axial extent in the range between 20 mm and 190 mm. These dimensions create tensioning lengths that are sufficient for secure fixation of the chisel over the entire machining bandwidth in offshore mining. Moreover, if the length of the tensioning element is chosen in the range of greater than or equal to 20 mm, the occurrence of excessive edge pressures on the longitudinal ends of the tensioning element is averted. Greater lengths of the tensioning element than those given in the aforementioned range do not lead to better tensioning quality; on the contrary, only the weight of the chisel is affected, which however must be kept as low as possible.

[0025] A chisel according to the invention can be characterized in that the spacing of the support face of the chisel head from the longitudinal end, facing toward the chisel head, of the tensioning element is in the range between 3 mm and 30 mm. During machining use, strong bending forces occur in this transition region, so that because of the aforementioned lever length, the bending stress in this component region leads to dimensioning of the chisel with adequate component safety. Particularly when commonly known steel materials are used, there is then no risk of breakage in this region of the chisel.

[0026] A variant embodiment such that the chisel head is attached directly or indirectly to the first receptacle region via a coupling piece, that the coupling piece has a larger cross-sectional area than the first receptacle region, and that the diameter of the coupling piece is preferably greater than or equal to 38 mm, is especially preferred. During tool engagement, depending on the tool position relative to the subsurface area being worked, force components exerted in particular radially to the chisel shank lead to strong shear stresses in the transition region between the chisel head and the chisel shank. These stresses can be adequately absorbed by way of the increased cross-sectional area of the coupling piece. In particular, this also results in a chisel design that is optimized in terms of weight, since the first receptacle region is dimensioned to be smaller than the coupling piece.

[0027] If the diameter is selected to be greater than or equal to 38 mm, then all offshore mining applications can be reliably employed.

[0028] In one possible variant embodiment, it can be provided that the first receptacle region has a diameter in the range between 37 and 150 mm, and the length of the first receptacle region in the direction of the center longitudinal axis of the chisel is selected to be less than or equal to 200 mm. Such dimensioning results in sufficient security against breakage, especially in the case of stresses that occur suddenly. Such stresses can be present if the drilling tool encounters harder rock forma-

tions unexpectedly.

[0029] To make it possible to offer an adequate guide length for the sake of optimal rotational performance of the chisel, it can be provided in an embodiment of the invention that in the direction of the center longitudinal axis of the chisel, the second receptacle region has a length in the range between 10 and 100 mm. To avoid an overly great difference in diameter and attendant high notch stresses, it can be provided that the ratio of the diameter of the first receptacle region to the diameter of the second receptacle region is in the range between 1.05 and 2.

[0030] According to the invention, it can also be provided that the support face of the chisel head has an outer diameter in the range between 60 mm and 250 mm. By dimensioning the chisel head in this way, the pressure per unit of surface area between the chisel head and the chisel holder or wear guard element is optimized. Accordingly, unwanted deflection of the contact faces cannot occur. Especially preferably, the fastening element is embodied as a tensable securing element, in particular as a longitudinally slit adapter sleeve. It can then especially preferably be provided that the securing element in its unstressed state has an outer diameter, and that preferably, the difference between this outer diameter and the outer diameter of the first receptacle region is ≥ 0.05 mm and ≤ 10 mm. The securing element can for instance simply be made from a sheet-steel blank. Over the selected range of difference, it then has a high tensioning force, which ensures captive fixation of the chisel in the receiving bore of the chisel holder even in the presence of considerable internal system pressures.

[0031] The invention will be described in further detail below in terms of exemplary embodiments shown in the drawings. In the drawings:

Fig. 1 shows a chisel in perspective;

Fig. 2 shows the chisel of Fig. 1 in a side view and partly in section;

Fig. 3 shows a chisel holder in a schematic view and in full width; and

Fig. 4 shows a combination tool comprising a chisel and a chisel holder.

[0032] Figs. 1 and 2 show a chisel with a chisel head 10 and a chisel shank 30 formed integrally onto the chisel head. The chisel head 10, in the region adjoining the chisel shank 30, has a collar 11 with a cylindrical outer circumference. The collar 11, via a transition region 12 which is concave and is thus optimized in terms of tension, merges with a frustoconical portion 13. The frustoconical portion 13, on its face end, forms a receptacle 14 for the chisel tip 15. While the chisel head 10 comprises a steel material, the chisel tip 15 is made from a hard material, in particular a hard metal. The chisel tip 15 has a cutting tip 15.1, which is embodied in cuplike fashion. The cutting tip 15.1 is adjoined by a centering portion 15.2. With this centering portion 15.2, the chisel tip 15

can be aligned exactly with an associated inner cone of the chisel head 10. Via an adapter piece 15.3, the centering portion merges with a fixation portion 15.4. The fixation portion 15.4 is joined to the chisel head 10 in material-locking fashion, in particular being soldered to the chisel head 10.

[0033] Adjoining the chisel head 10, the chisel shank 30 has a cylindrical coupling piece 31. The coupling piece 31 is formed integrally, via a rounded transition, onto the chisel head 10 in the vicinity of the collar 11. The coupling piece 31 is adjoined in load-optimized fashion, via a rounded transition, by a first receptacle region 32. The first receptacle region 32 is embodied cylindrically and has an encompassing groove 32.1. Facing away from the chisel head 10, the first receptacle region 32 ends with a frustoconical transition 33. The transition 33 leads into a second receptacle region 35. The outer diameter of the second receptacle region is dimensioned to be smaller than the first diameter of the first receptacle region 32. The second receptacle region 36 forms an encompassing groove, which is bounded by a shank portion 34 and an end portion 36. The shank portion 34 adjoins the transition 33. The end portion 36 forms the free end of the chisel. As can be seen from Fig. 2, the end portion 36 is embodied with a cross-sectional taper 37.

[0034] As can be seen from Fig. 1, the chisel shank 30 has a first tensioning element 40 at the first receptacle region 32 and a second tensioning element 50 at the second receptacle region 35. The first tensioning element 40 is embodied as a cylindrical adapter sleeve, which is embodied with a slit 41 that opens the adapter sleeve in the circumferential direction. The second tensioning element 50 is likewise embodied as an adapter sleeve with such a slit 51, and Fig. 2 shows the shape of the slit 51, with a circumferential offset. The first tensioning element 40 is likewise embodied with an offset slit 41 of this kind. The first tensioning element 40 has retaining elements 42, which are cut free from the tensioning element 40 and protrude in the direction of the chisel shank 30. The retaining elements 42 engage the encompassing groove 32.1 of the chisel shank 30 in such a way that the chisel shank 30 is freely rotatable, but is captive in the axial direction, in the first tensioning element 40. The construction of the retaining elements 42 that engage the groove 32.1 will be described in further detail below in conjunction with Fig. 3.

[0035] A wear element 20 in the form of a wear guard disk is slipped onto the first tensioning element 40. The wear element 20 has an indentation 21.1, which is bounded laterally by an encompassing collar 21. The indentation 21.1 has a support face 21.2, which radially on the inside adjoins the collar 21. A recess 24 embodied as a bore is machined centrally into the support face 21.2. In the vicinity of its underside, the wear element 20 is bounded by means of a further support face 22. In the transition region between the support face 22 and the recess 24, a shoulder 23 is formed, which in the present case has a frustoconical geometry.

[0036] The recess 24 is dimensioned such that the wear element 20 prestresses the first tensioning element 40 circumferentially on being slipped onto the outer circumference. Accordingly, the diameter of the recess 24 is smaller than the outer diameter of the first tensioning element in the unstressed, or in other words expanded, state. Accordingly, the wear element 20 in its slipped-on state keeps the first tensioning element 40 in a first prestressed state.

[0037] The second tensioning element 40 is placed entirely inside the groove of the second receptacle region 35 in such a way that with its face ends, it can strike the shank portion 34 on the one hand and the end portion 36 on the other. The second tensioning element 50 is held in the groove between the shank portion 34 and the end portion 36 with slight axial and radial play, to ensure the free rotatability of the second tensioning element 50 relative to the chisel shank 30.

[0038] The diameter of the first tensioning element 40, both in the prestressed state of Fig. 2 and in the assembled state, is greater than the diameter of the second tensioning element 50.

[0039] In Fig. 3, a further variant embodiment of the chisel is shown. This variant chisel differs from the chisel design of Figs. 1 and 2 solely in the embodiment of the transition region 12 of the chisel head 10. Otherwise, the chisel is identical to the embodiment of the chisel in Figs. 1 and 2. The transition region 12 in Fig. 3 is provided with cutouts 12.1. In addition or alternatively, raised areas 12.2 can also be provided on the transition region 12. The cutouts 12.1 and raised areas 12.2 present a resistance to the rock material that has been removed and thus improve the rotational performance of the chisel.

[0040] The dimensioning of the chisel will be addressed below. The dimensioning of the chisel here is optimized for deep-sea applications. However, still other dimensions for the chisel may be used within the scope of the invention.

[0041] As can be seen from Fig. 2, the spacing between the tip of the chisel and the lower support face 22 of the wear element 20 is chosen as I1. This length should be chosen to be less than 90 mm, to avoid excessive bending moments in the coupling piece 31. The spacing between the support face 22 and the longitudinal end of the chisel shank 30 is I2. For reasons of weight reduction, an axial length I2 in the range between 90 mm and 150 mm is sufficient. The total length I3 is composed of the lengths I1 and I2. The axial length I4 of the second tensioning element 50 can be selected within the range between 20 and 30 mm. Adequate tensioning forces and good rotational guidance in this region are then ensured.

[0042] To prevent the tip 15 of the chisel from breaking off under the high loads that occur in offshore operation, the length I5 of the tip 15 of the chisel should be at least 20 mm.

[0043] The wear element 20 should preferably be embodied of a steel material, in particular as a forged part. Adequate pressure stability of this component is

achieved if the spacing between the support face 22 and the indentation 21.1 is selected as greater than 5 mm. Optimally, a spacing in the range between 7 mm and 13 mm can be selected here, to make a sufficient wear length available.

[0044] The length l7 of the first tensioning element 40 in the present case is selected in the range between 40 and 60 mm, to maintain sufficiently tilt-resistant guidance of the chisel and in association with it an ideal rotational performance of the chisel. Moreover, at these axial lengths, excessively high pressures per unit of surface area do not occur in the vicinity of the receiving bore of the chisel holder 60. In agreement with the invention, the spacing of the support face 22 of the wear element 20 from the transition 33, in which the first receptacle region 32 merges with the second receptacle region 35, is selected to be in the range between 55 and 65 mm (length l8). The spacing of this transition 33 from the support face 16 of the chisel head 10 increases in proportion to the aforementioned dimensions indicated (length l6 + length l8).

[0045] The spacing of the two tensioning elements 40 and 50 in the direction of the center longitudinal axis M of the chisel is l9, and it is selected to be in the range between 2 mm and 30 mm.

[0046] In Fig. 3, a chisel holder is shown in full width by means of a chisel receptacle 62. The chisel of Figs. 1 and 2 can be mounted in the chisel receptacle 62, as will be described in detail below. On the introduction end, the chisel receptacle 62 has a conical recess 61. Adjoining the conical recess, the chisel receptacle 62 forms a chisel receptacle region 63. This merges with an end portion 65, via a settlement chamber 64. The settlement chamber 64 is embodied as a frustoconical taper and thus reduces the cross section of the chisel receptacle 62. In the vicinity of the end facing away from the conical recess 61, the chisel receptacle 62 forms a settlement chamber 66.

[0047] The chisel receptacle region 63 has a diameter D1, which is dimensioned suitably for realizing the tensed state of the first tensioning element 40. The end portion 65 likewise forms a diameter D2, which is adapted to the tensed state of the second tensioning element 50. The axial length L1 of the chisel receptacle 62 is adapted to the spacing between the support face 22 of the wear element 20 and the end of the first receptacle region 32. Likewise, the axial length L3 of the end portion 65 is dimensioned such that the second receptacle region 35 of the chisel shank 30 can be received, while a settlement chamber 66 is preserved, as will be explained in detail below. The settlement chamber 64 is dimensioned with an axial length L2 and receives the transition 33 of the chisel shank 30.

[0048] Fig. 4 shows the assembled state of the chisel on a chisel holder 60. To convert the chisel from the pre-assembled state shown in Fig. 1 to the assembled state of Fig. 4, the chisel is inserted by its free shank end into the chisel receptacle 60. The reduced-diameter second

receptacle region 35 here serves to simplify threading the chisel into a chisel receptacle 62. This insertion motion is limited by the wear element 20. Accordingly, the wear element 20, with its lower support face 22, strikes a counterpart face of the chisel holder 60. The counterpart face annularly surrounds the bore entrance of the chisel receptacle 60. A driving-in force can now be exerted on the chisel head 10. This driving-in force can be effected for example by a hammer blow on the tip 15 of the chisel. As a consequence of the hammer blow, the wear element 20 shifts relative to the first tensioning element 40. As a result, the wear element 20, with its recess 24, enters into the vicinity of the coupling piece 31. This assembly position is shown in dashed lines in Fig. 2. With the wear element 20 slipped off, the first tensioning element 40 can expand radially and presses itself, under tension, against the inner wall of the chisel receptacle 62. As can be seen from Fig. 4, in this assembly state the retaining elements 42 engage the encompassing groove 32.1 of the chisel shank 30, so that the chisel is held freely rotatably in the transition region, yet is held captive axially.

[0049] In the insertion motion of the chisel that is effected by the hammer blows, the second receptacle region 35 also slides into the end portion 65 of the chisel receptacle 62. In the process, the chisel shank 30, with the conical end portion 37, is centered at an inner cone of a settlement chamber 64 and is thus threaded into the vicinity of the end portion 65. In this insertion motion, the second tensioning element 50 is also compressed radially inward at the wall that limits the end portion 65. As a result, the second tensioning element 50 is put into a tensed state. In the fully assembled state of the chisel, the second tensioning element 50 thus tenses itself against the inner wall of the end portion 65 and keeps the chisel, along with the first tensioning element 40, axially captive.

[0050] During operational use, forces act on the chisel tip 15 and the chisel head 10 in such a way that the chisel is set into rotary motion. The chisel head 10 is braced with the underside of the collar 11 (support face 16) on the support face 21.2 of the indentation 21.1 of the wear element 20. As a consequence of the chisel rotation, a relative motion ensues between the collar 11 and the support face 21.2. As can also be seen from Fig. 4, the wear element 20 is braced by its bottom support face 22 on the annular counterpart face of the chisel holder 60. Once again, rotational wear can occur during operational use. For limiting the lateral play between the coupling piece 31 and the wear element 20, the wear element 20 is centered by its shoulder 23 in a conical recess 61 of the chisel receptacle 60. Because of the dimensional associations, the chisel can rotate relative to the wear element 20 and to the two tensioning elements 40 and 50.

[0051] On account of the frictional wear between the chisel head 10 and both the wear element 20 and the chisel holder 60, the chisel continuously settles into the chisel receptacle 60. For that purpose, the diameter of the coupling piece 31 is made smaller than the inner di-

iameter of the chisel receptacle 62. In order not to hinder the ability to settle in, a settlement chamber 64 is formed in the transition region between an end portion 65 of the chisel receptacle 62 and the region 63 of the chisel receptacle 62 that receives the first tensioning element 40. The chisel shank 30 can settle continuously into this settlement chamber 64 with its first receptacle region 32 and the first tensioning element 40, without hindering the free rotatability of the chisel. Moreover, the end portion 65 of the chisel receptacle 62 forms a settlement chamber 66, into which the free end of the chisel shank can continuously settle. This embodiment of the settling geometries makes it possible to drive many chisels on one chisel holder 60, so that a wear-optimized design is ensured.

Claims

1. A chisel, in particular for a drill head and/or cutting head, having a chisel head (10) and a chisel shank (30) attached directly or indirectly thereto, in which the chisel shank (30) has a first receptacle region (32), to which a first tensioning element (40) is assigned,

characterized in that

 the chisel shank forms a second receptacle region (35), which has a reduced cross section relative to the first receptacle region (32) and to which a second tensioning element (50) is assigned; and that the chisel shank (30) is rotatable relative to the first and second tensioning elements (40 and 50).
2. The chisel according to claim 1,

characterized in that

 the first and/or the second tensioning element (40, 50) is retained in a prestressed state by means of a tensioning piece (wear guard element (20)) and/or

in that

 the tensioning piece is a ringlike wear guard element (20), which is retained displaceably on the tensioning element (40, 50) in the direction of the center longitudinal axis (M) of the chisel; and that the chisel shank (30) has a shank region (coupling piece (31)), which directly or indirectly adjoins the tensioning element (40, 50) and onto which the tensioning piece can be slipped, in order to undo the prestressed state of the tensioning element (40, 50).
3. The chisel according to claim 1 or 2,

characterized in that

 the second tensioning element (50) is offset, facing away from the chisel head (10), relative to the first tensioning element (40); and that the outer circumference of the second tensioning element (50) is less than the outer circumference of the first tensioning element (40), and/or

in that

 the difference between the outer diameter (d6) of the first tensioning element (40) and the outer diameter (d5) of the second tensioning element (50) is in the range between 2 mm and 60 mm.
4. The chisel according to one of claims 1-3,

characterized in that

 the longitudinal ends, facing one another, of the tensioning elements (40, 50) are spaced apart from one another by a spacing in the range between 2 mm and 30 mm (spacing I9).
5. The chisel according to one of claims 1-4,

characterized in that

 the first and/or the second tensioning element (40, 50) is embodied as longitudinally slit adapter sleeves; and/or that the first and/or second tensioning element (40, 50) is retained in axially captive fashion and freely rotatably in the circumferential direction on the chisel shank (30) by means of at least one detent element or retainer element (41), and/or in that the chisel shank (30), facing away from the chisel head (10) and adjoining the second tensioning element (50), has a securing element.
6. The chisel according to claim 5,

characterized in that

 the securing element is embodied as a securing ring, which is retained in an encompassing groove of the chisel shank (30).
7. The chisel according to one of claims 1-6,

characterized in that

 the chisel shank (30), with a cylindrical coupling piece (31), directly or indirectly adjoins the chisel head (10); and that the diameter of the coupling piece (31) is greater than the diameter of the first receptacle region (32), and/or

in that

 the first receptacle region (32) and/or the second receptacle region (36) has an encompassing groove (32.1), which the first tensioning element (40) engages with one or more retaining elements (41) that protrude in the direction of the chisel shank (30).
8. The chisel according to claim 7,

characterized in that

 the first and/or second receptacle region (32, 35) forms a groove, into which the tensioning element (40, 50) is inserted.
9. A combination tool having a chisel holder (60) and a chisel according to one of claims 1-8, which is retained in a chisel receptacle (62) of the chisel holder (60).

10. The combination tool according to claim 9,
characterized in that
 the chisel receptacle (62) forms a settlement chamber (64) in the region between the first and second receptacle regions (32 and 35), and/or
in that
 the coupling piece (31) has a smaller diameter than the chisel receptacle (62); and/or that the chisel receptacle (62) forms a settlement chamber (66) adjoining the free end of the chisel shank (30). 5
11. A chisel, in particular for a drill head and/or cutting head, having a chisel head (10) and a chisel shank (30), in which the chisel shank (30) has a first receptacle region (32), which directly or indirectly adjoins the cutting head (10), and the chisel shank (30) has a second receptacle region (36), which facing away from the chisel head (10) directly or indirectly adjoins the first receptacle region (32), and the diameter of the second receptacle region (35) deviates from the diameter of the first receptacle region (32), and the chisel shank (30) has a fastening element, in particular a tensioning element (40, 50), and the cutting head (10), facing toward the chisel shank (30), forms a support face (16), and/or a wear element (20) disposed in the transition region between the chisel head (10) and the chisel shank (30) forms a support face (22),
characterized in that
 the spacing (length l8) of the support face (16 or 22) from the region in which the first receptacle region (32) merges with the second receptacle region (35) is in the range between 15 mm and 200 mm, and especially preferably in the range between 30 mm and 190 mm. 10 15 20 25 30 35
12. The chisel according to claim 11,
characterized in that
 the first tensioning element (40) has an axial extent (length l7) in the range between 20 mm and 190 mm, and/orin that
 the spacing of the support face (16) of the chisel head (10) from the longitudinal end, facing toward the chisel head (10), of the tensioning element (40) is in the range between 3 mm and 30 mm. 40 45
13. The chisel according to one of claims 11-12,
characterized in that
 the chisel head (10) is attached directly or indirectly to the first receptacle region (32) via a coupling piece (31);
 that the coupling piece (31) has a larger cross-sectional area than the first receptacle region (32);
 and that the diameter of the coupling piece (31) is preferably greater than or equal to 38 mm. 50 55
14. The chisel according to one of claims 11-13,
characterized in that
 the first receptacle region (32) has a diameter in the range between 37 and 150 mm, and the length of the first receptacle region in the direction of the center longitudinal axis (M) of the chisel is selected to be less than or equal to 200 mm. 5
15. The chisel according to one of claims 11-14,
characterized in that
 in the direction of the center longitudinal axis (M) of the chisel, the second receptacle region (35) has a length in the range between 10 and 100 mm, and/orin that the ratio of the diameter of the first receptacle region (32) to the diameter of the second receptacle region is in the range between 1.05 and 2, and/orin that the support face (16) of the chisel head (10) has an outer diameter (d3) in the range between 60 mm and 250 mm. 10 15 20 25 30 35
16. The chisel according to one of claims 1-15,
characterized in that
 the fastening element (40) is embodied as a tensable securing element, in particular as a longitudinally slit adapter sleeve, and/orin that
 the securing element, in its unstressed state, has an outer diameter (d6);
 and that preferably, the difference between this outer diameter (d6) and the outer diameter of the first receptacle region is ≥ 0.05 mm and ≤ 10 mm. 20 25 30 35
17. A cutting head having two or more chisel receptacles (62) in which chisels according to claim 1 to 8 or 11 to 16 can be retained especially in chisel holders (60) 30 35

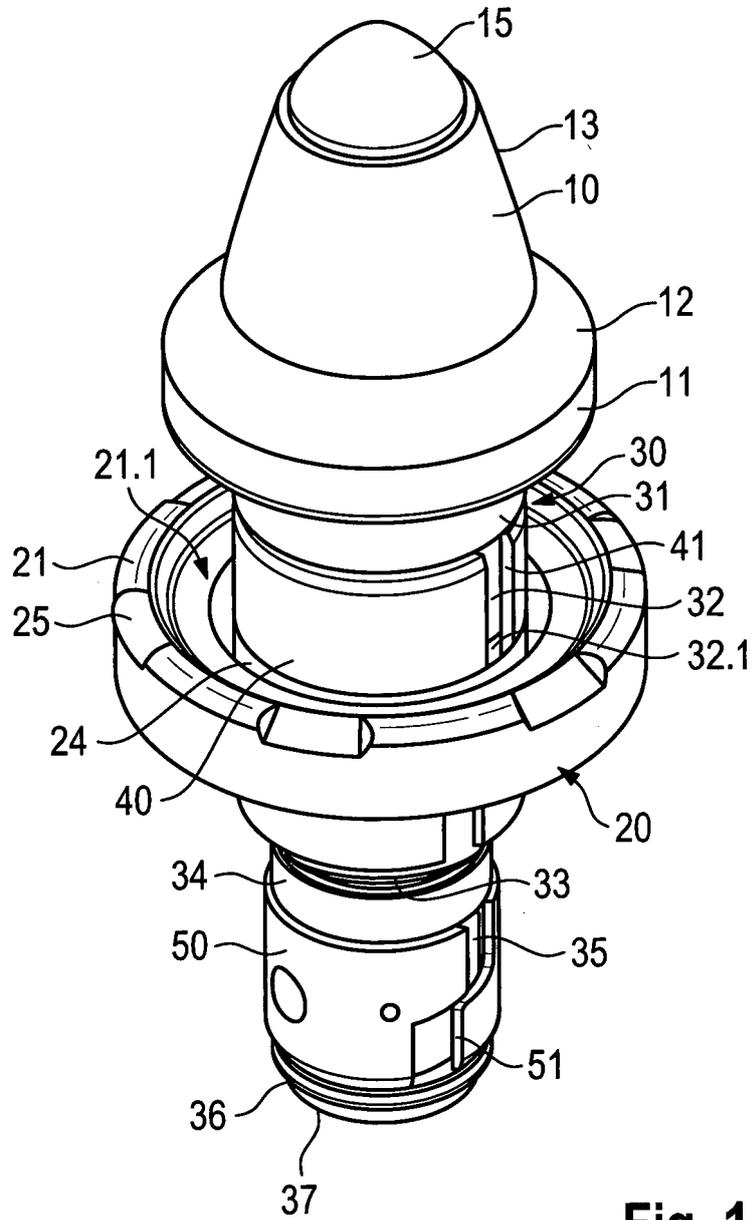


Fig. 1

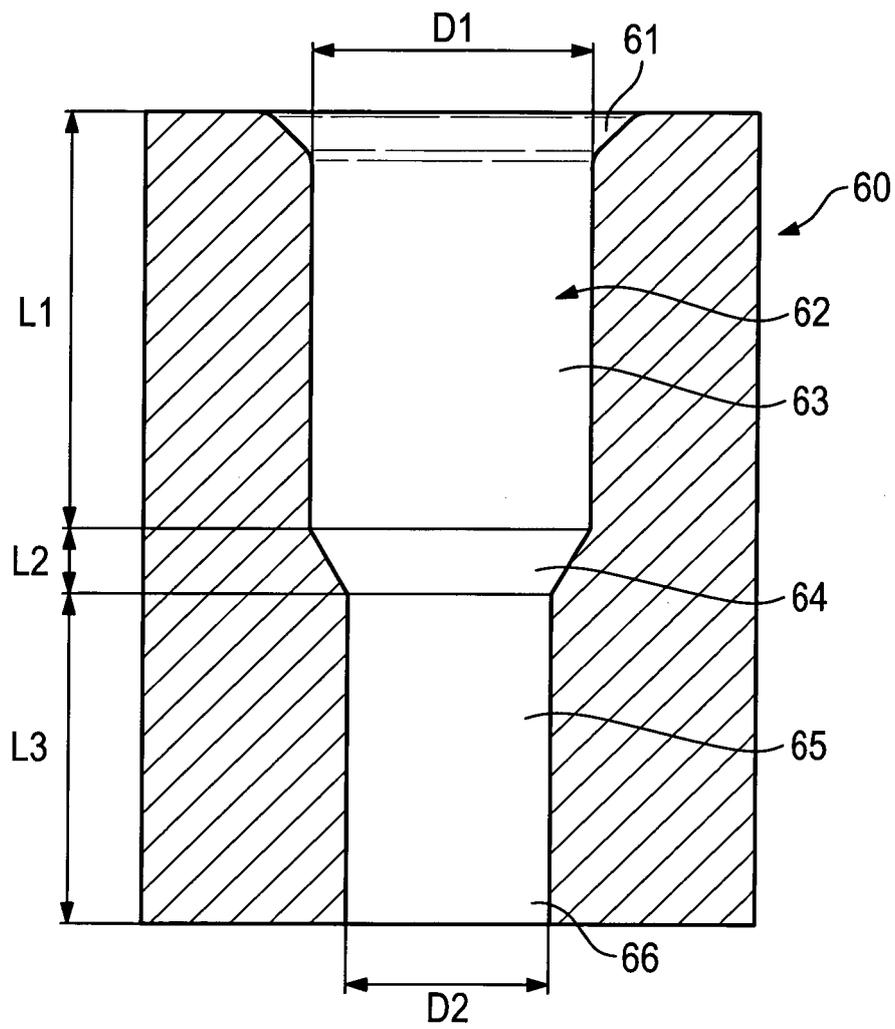


Fig. 3

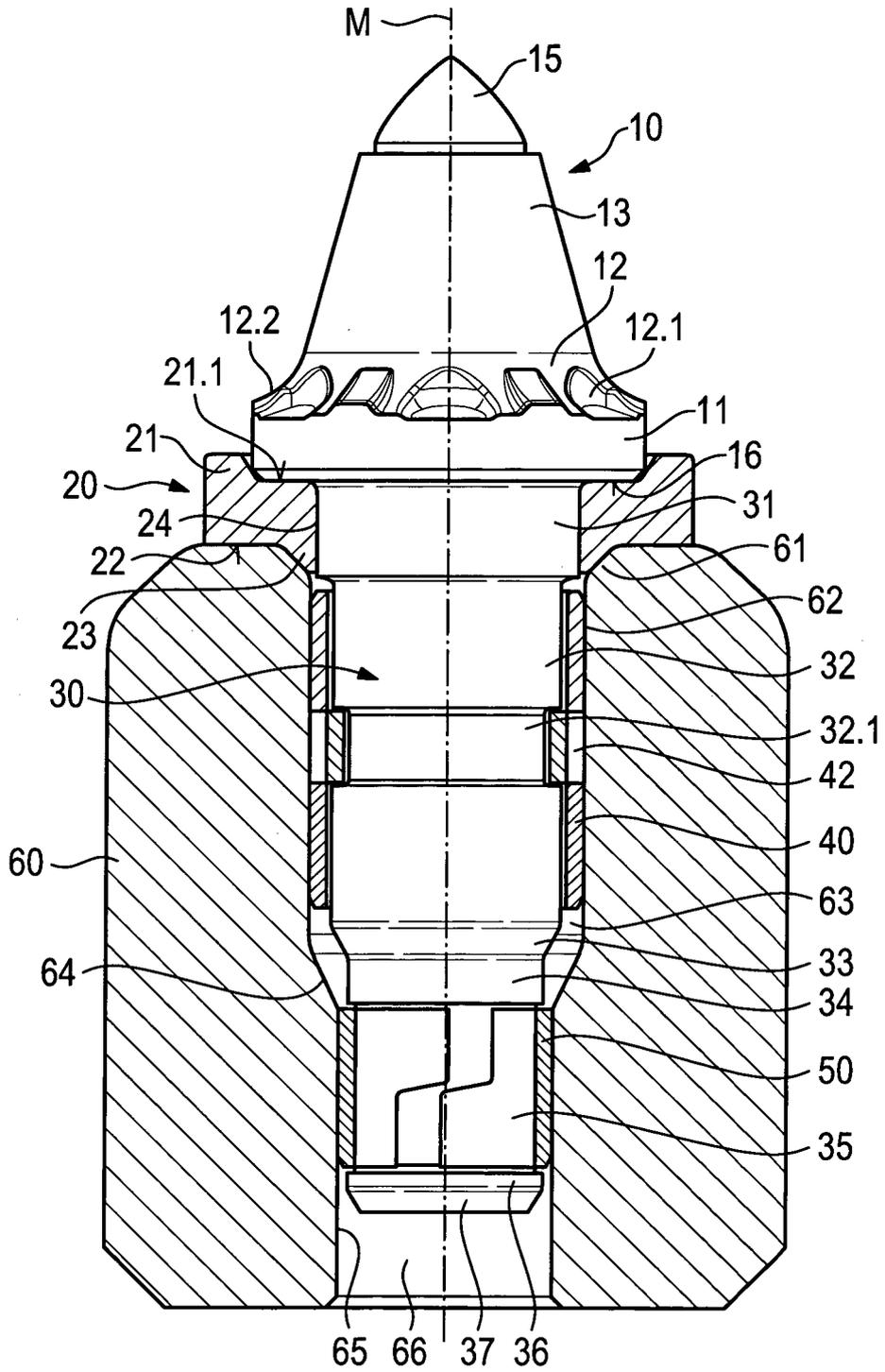


Fig. 4



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Place of search The Hague		Date of completion of the search 26 August 2013	Examiner Garrido Garcia, M
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