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(71) Applicant: **KENNAMETAL INC.**
One Lloyd Avenue P.O. Box 231
Latrobe Pennsylvania 15650(US)

(72) Inventor: **Stiffler, Stephen P.**
RD no.1, Box 187
New Enterprise Pennsylvania 16664(US)
Inventor: **Beach, Wayne H.**
190 Closson Road
Roaring Spring Pennsylvania 16673(US)

(74) Representative: **Leiser, Gottfried, Dipl.-Ing. et al**
Patentanwälte Prinz, Leiser, Bunke & Partner
Manzingerweg 7
D-8000 München 60(DE)

(54) Conical rotating cutting tool with wear shield bearing surface.

(57) A wear shield (60) for a rouni shaft bit with a bit head (14) and a bit shaft (12), on which a clamping sleeve (50) is positioned and wherein the bit shaft (12) with the clamping sleeve (50) placed under tension can be axially fixed in a bore of a bit holder whereby the bit shaft (12) remains freely rotatable in the clamping sleeve (50). The wear shield (60) significantly simplifies and facilitates insertion of the round shaft bit into the bore of a bit holder and the free rotation of the cutting tool by holding the clamping sleeve (50) during insertion so that the external diameter of the clamping sleeve (50) is equal to or smaller than the diameter of the bore (80) of the bit holder and upon insertion seating itself on an area of the bit shaft lying outside the clamping sleeve (50) so that the clamping sleeve (50) tensions against the interior of the bore holds the round shaft bit in axial position within the bore.

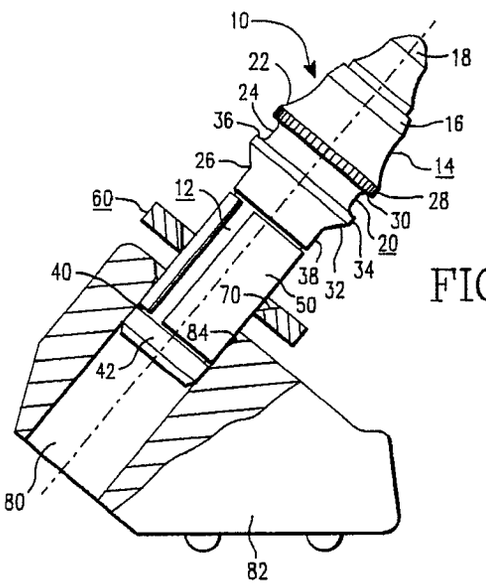

FIG. 1

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CONICAL ROTATING CUTTING TOOL WITH WEAR SHIELD BEARING SURFACE

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates to a wear shield for use in combination with a cutting tool assembly having a round shaft bit with a bit head and a bit shaft, in which the bit shaft has a circumferantial groove with a longitudinally slotted clamping sleeve positioned therein, and in which the bit shaft can be axially fixed in a bore of a bit holder with the clamping sleeve placed under tension while the bit shaft remains freely rotatable in the clamping sleeve. More particularly, the invention provides a wear shield which functions as a holding element during the insertion of the cutting tool assembly into a cutter bit block and which cooperates with the rearward portion of the bit head so as to facilitate the free rotation of the bit shaft within the bit block.

DESCRIPTION OF THE PRIOR ART

A round shaft bit is known from the U. S. Patent No. 1,475,136. In this patent, the clamping sleeve extends over the most significant portion of the axial dimension of the bit shaft, in order to obtain the greatest possible support and clamping surface for the clamping sleeve in the bore of the bit holder. Such types of long clamping sleeves additionally bring the advantage that a sufficiently great holding force is produced between the clamping sleeve and the bore of the bit holder. Since the holding collar is narrow on the free end of the bit shaft, and the clamping sleeve, when inserting the bit shaft with the clamping sleeve into the bore of the bit holder, must be pressed together with great force, considerable difficulties arise when inserting the round shaft bit of this type into a bore of the bit holder. Numerous installation devices which are specific to this problem have been provided.

One example of such an installation device in the form of a holding element is shown in U. S. Patent No. 4,818,027, which patent is incorporated herein by reference. The holding element compresses the clamping sleeve during insertion of the bit assembly into the bit block and then remains seated on the bit shaft between the bit block and the bit head during operation of the tool. This holding element also functions as a shield in so far as it deflects work material away from the face of the bit block.

It is also known to provide just a shield like device on a cutting bit and examples of such shields are provided in U. S. Patent Nos 4,660,890 and 4,823,454, both of which patents are incorporated herein by reference. The attachment of such a protective shield as taught in these patents requires the use of an apparatus to mount and deform the shield onto the bit shaft.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a round shaft bit of the previously stated type, in which the insertion into a bore of a bit holder is considerably facilitated, despite the long clamping sleeve with a high tensioning force. More importantly, it is an object of this invention to provide an improved wear shield which not only accomplishs the foregoing objective but also protects the bit block and bit shaft during cutting operations, which simultaneously facilitating the rotation of the bit relative to the block. These objects are acheived in accordance with the invention through the fact that the clamping sleeve is held in a clamping position by menus of a wear shield, in which the external diameter of the clamping sleeve is equal to or less than the diameter of the bore of the bit holder, and that, when inserting the bit shaft with the clamping sleeve into the bore of the bit holder, the wear shield can be adjusted into an area of the bit shaft lying outside the clamping sleeve.

In the round shaft bit provided with the wear shield, the clamping sleeve is held tightly enough that the bit shaft with the clamping sleeve can be pushed into the bore of the bit holder even manually over a great portion of its axial dimension, until, for example, the wear shield abuts on the insertion side or face of the bit holder. By this means, the wear shield is slid from the clamping sleeve, and reaches an area of the bit shaft free from the clamping sleeve, so that the clamping sleeve, with the clamping force particular to it, can be tensed in the bore of the bit holder.

The wear shield is constructed as a holding ring or holding disk, which encloses the clamping sleeve The internal diameter of the holding ring or the holding disk is equal to or smaller than the diameter of the bore of the bit holder. The internal diameter of the wear shield defines at least in part a beveled surface which cooperates with the rearward, beveled portion of the bit head so as to

define a seat into which the rearward, beveled portion of the bit head is seated. The holding element of this invention provides distinct advantages over the prior art and can be produced easily and inexpensively.

The wear shield has an external diameter which preferably is equal to or greater than the maximum external diameter of the bit head so that the portion of the wear shield projecting over the bit head serves to protect at least a portion of the bit holder. In accordance with one preferred embodiment, it is provided that the bit head is formed running into a collar adjacent to the bit shaft; that a hard metal insert is inserted into the bit point turned away from the bit shaft; and that the clamping sleeve extends essentially over a major portion of the axial length of the bit shaft.

BRIEF DESCRIPTION OF THE DRAWING

The above as well as other features and advantages of the present invention can be more readily appreciated through consideration of the several drawings in which:

Figure 1 is a side view of a round shaft bit with a wear shield, in the insertion position, in which the bit shaft with the clamping sleeve is inserted into the bore of a bit holder shown in section;

Figure 2 is a side view of a round shaft bit with a wear shield and clamping sleeve inserted into the bore of a bit holder shown in section; and

Figures 3A and 3B are front and side elevation views of the wear shield of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Turning to Figure 1, a cutting tool, generally indicated by the reference character 10, has the overall appearance of an elongated cylinder with circular transverse cross-sections of various diameters disposed along the axis of the cylinder. The cutting tool 10 includes a bit shaft 12 which projects from bit head 14.

The bit head 14 includes a conically tapered section 16 which is capped at the upper end by a conically shaped carbide cutting tip 18 which is inserted into the bit tip in the known manner. The transition of the bit head is thus constructed as collar 20, which forms the greatest external diameter of bit head 14. The collar 20 comprises a forward flange portion 22, a central portion 24 and a rearward flange portion 26. The forward portion 22 has a rearwardly and outwardly tapered surface which terminates in a uniform diameter as at 28 which extends a relatively short axial distance back from the tapered surface. The lower edge of the uniform diameter section 28 terminates in a transversely disposed first annular wall 30 joined at its lower circumferential base to the bit shaft. The rearward portion 26 is spaced axially and rearwardly from the annular wall 30 of the forward flange portion 22. The rearward flange portion 26 has a shoulder or surface 32 which tappers inwardly and rearwardly from an initial uniform diameter annular wall 34 which originates in a transversely disposed second annular wall 36. The reward flange portion terminates in generally constant diameter portion 38. Disposed between the first and second annular walls is an annular groove. This groove or central portion 24 provides a means for engaging the cutting tool with a known cutting tool removal wrench.

A longitudinally split, cylindrical sleeve spring or clamping sleeve 50 rests in a reduced diameter portion 40 of the bit shaft 12. It is to be appreciated that various combinations of bit shaft length and clamping sleeve length are possible. Depending on the specific cutting tool design, a bit which has a long shaft can be used in combination with a clamping sleeve which is nearly as long as the shaft or a clamping sleeve that is much shorter than the shaft bit length. For illustrative purposes only, the clamping sleeve 50 extends over the greatest portion of the axial dimension of bit shaft 12 in a reduced diameter portion of corresponding length. The clamping sleeve 50 is seated in a reduced diameter portion 40 of the bit shaft as defined between the collar 42 on the free end of bit shaft 12 and the transversely disposed third annular wall 38 of the reward portion 26.

Turning to Figures 3A and 3B, a wear shield 60, according to the teachings of this invention comprises an annular body 62 defining therein a hole 64 concentric with the outer circumference 66 of the annular body 62. The hole 64, as seen in Figure 3B, is chamfered, as at 70, at an angle of approximately 45 degrees relative to the body axis indicated at 68. It is to be appreciated that the application of the cutting tool and the overall dimensions thereof will dictate to some extent the actual dimensions of the wear shield. In a preferred embodiment for a cutting tool which is identified as a C-3-WLR Cutter Bit Assembly and is commercially available from Kennametal Inc. the assignee of the subject invention, the annular body 62 can be fabricated from a hardened Grade 8 washer. This washer has a predetermined thickness of about 0.14 inches and an outside diameter of approximately 1.63 inches.. To achieve the 45 degree chamfer 70, the diameter of the hole 64 proximate the rearwardly facing side of the annular body is

approximately 0.775 inches and the forward facing side of the annular body is approximately;y 1.00 inches. The chamfer 70 provides a seating surface which cooperates with the rearward flange portion 26 surface 32 when the cutting tool is assembled into the bit block as shown in Figure 2. A constant diameter portion 76 is parallel with the wear shield axis 68 and cooperates with the reward flange portion's constant diameter portion 38. This arrangement facilitates the free rotation of the cutting tool mounted in the bit block bore as well as rotation of the wear shield relative to both the bit block and the cutting tool. Moreover, the mated chamfers of the wear shield and the cutting tool serve to minimize the penetration of work materials into the bit block, between the clamping sleeve, the tool shaft and/or the bit block bore.

The wear shield 60 is slid onto clamping sleeve 50 and functions during the assembly process as a clamping sleeve holding element. The wear shield 60 forces the clamping sleeve 50 to such an extent that its external diameter is equal to or smaller than the diameter of bore 80 in bit holder 82. The longitudinal slot of the clamping sleeve 50 is wide enough so that clamping sleeve 50 can be pressed together far enough that its internal wall lies on the base of circumferential groove 40 in bit shaft 12. Since bore 80 of bit block 82 is provided with a bevelled entrance 84 the bit shaft collar 42 of round shaft bit 10 can be easily inserted into bore 21. This insertion process can be carried out manually with for example the increased application of force, for example, by means of a blow from a hammer. Upon assembly, the wear shield ceases to function as a holding element for the clamping sleeve. The wear shield now is disposed on the free area of the bit shaft 12 between clamping sleeve 50 and the bit head 14, so that it releases clamping sleeve 50. Clamping sleeve 50 can now be tensed with the tensing force specific to it, in the bore 80 of bit block 82, since it would accommodate, in the unstressed condition, an external diameter which is greater than the diameter of bore 80 of bit block 82. The difference between both diameter values determines the tensing force of clamping sleeve 50, and thereby the force with which the cutting tool 10 is held in bore 80 of bit block 82.

In the embodiment in accordance with Figures 1, 2 and 3, the external diameter of the wear shield corresponds to the maximum external diameter of bit head 14 in the area of collar. The wear shield thereby serves as a protective disk for bit block 82, since it cushions the impact forces acting or cutting tool 10.

If the external diameter of the wear shield is expanded over the maximum external diameter of the bit head, then the entire frontal side of the bit block 82 is protected against wear, if the wear shield is made of wear-resistant material.

Claims

1. A round shaft bit for insertion into the bore of bit block, said round shaft bit comprising: a bit head having a rearward flange portion surface and a bit shaft having a circumferential groove, a clamping sleeve supported in said groove, said clamping sleeve having a longitudinal slot and a variable external diameter, a wear shield comprising an annular body defining a hole therein which hole fits over said clamping sleeve holding said clamping sleeve in a clamping position in which position the variable external diameter of said clamping sleeve is not greater than the diameter of a bore of a bit holder into which said bit shaft is inserted, said wear shield being moveable onto an area of bit shaft beyond said clamping sleeve when said bit shaft is fully inserted into said bore placing said clamping sleeve in force relation against said bore axially fitting said bit in said bore of said bit holder, said bit shaft remaining freely rotatable within said clamping sleeve, and wherein said wear shield hole has a chamfered inside diameter in which is seated the rearward flange portion surface of the bit head.

2. The round shaft bit in accordance with claim 1, wherein said wear shield is constructed as a holding element which encloses the clamping sleeve, the internal diameter of said holding ring being not greater than the diameter of said bore.

3. The round shaft bit in accordance with claim 2, wherein said bit shaft has a narrow collar at its terminal end and a narrow bit shaft portion adjacent said bit head defining said circumferential groove therebetween.

4. The round shaft bit in accordance with claim 3 wherein said circumferential groove of said bit shaft is spaced a distance from said bit head which is not less than the thickness of said holding ring.

5. The round shaft bit in accordance with claim 1, wherein said bit head has a collar adjacent said bit shaft; a hard metal insert inserted into the bit point facing away from said bit shaft; and said clamping sleeve extends over a major portion of the axial length of said bit shaft.

6. The round shaft bit in accordance with claim 1, wherein said wear shield is constructed as a holding disk which encloses the clamping sleeve, the internal diameter of said holding disk being not greater than the diameter of said bore.

7. The round shaft bit in accordance with claim 6, wherein said bit shaft has a narrow collar at its terminal end and a narrow bit shaft portion adjacent said bit head defining said circumferential groove therebetween.

8. The round shaft bit in accordance with claim 6, wherein said wear shield is constructed as a holding disk when said bit shaft is inserted into said bore of said bit holder and is positioned over said clamping sleeve between said bit head and the wall at the end of said bore on the insertion side of said bit holder.

9. The round shaft bit in accordance with claim 6, wherein said holding disk is comprised of securely locking material and has an external diameter which is not less than the maximum external diameter of said bit head.

10. The round shaft bit in accordance with claim 6, wherein said bit head has a collar adjacent said bit shaft; a hard metal insert inserted into the bit point facing away from said bit shaft,and said clamping sleeve extends over a major portion of the axial length of said bit shaft.

11. The round shaft bit in accordance with claim 1 wherein the circumferential groove of said bit shaft is spaced a distance from said bit head which is not less than the thickness of said holding ring.

12. The round shaft bit in accordance with claim 1 wherein the open end of said bore has an expansion area on the insertion face of said bit holder for facilitating insertion of said bit shaft into said bore.

13. The round shaft bit in accordance with claim 1 wherein said bit head has a collar adjacent said bit shaft; a hard metal insert inserted into the bit point facing away from said bit shaft; and said clamping sleeve extends over a major portion of the axial length of said bit shaft.

14. The round shaft bit in accordance with claim 1, wherein said bit shaft has a narrow collar at its terminal end and a narrow bit shaft portion adjacent said bit head defining said circumferential groove therebetween.

15. A wear shield for use in combination with a round shaft bit which is insertable into the bore of bit block, said round shaft bit comprising a bit head having a rearward flange portion surface and a bit shaft having a circumferential groove, a clamping sleeve supported in said groove, said clamping sleeve having a longitudinal slot and a variable external diameter; said wear shield comprising an annular body defining a hole therein which hole fits over said clamping sleeve holding said clamping sleeve in a clamping position in which position the variable external diameter of said clamping sleeve is not greater than the diameter of a bore of a bit holder into which said bit shaft is inserted, said wear shield being moveable onto an area of bit shaft beyond said clamping sleeve when said bit shaft is fully inserted into said bore placing said clamping sleeve in force relation against said bore axially fitting said bit in said bore of said bit holder, said bit shaft remaining freely rotatable within said clamping sleeve, and wherein said wear shield hole has a beveled inside diameter in which is seated the rearward flange portion surface of the bit head.

16. The wear shield in accordance with claim 15, wherein said wear shield is constructed as a holding ring which encloses the clamping sleeve, the internal diameter of said holding ring being not greater than the diameter of said bore.

17. The wear shield in accordance with claim 16 wherein the circumferential groove of said bit shaft is spaced a distance from said bit head which is not less than the thickness of said holding ring.

18. The wear shield in accordance with claim 17, wherein said wear shield is constructed as a holding disk which encloses the clamping sleeve, the internal diameter of said holding disk being not greater than the diameter of said bore.

19. The wear shield in accordance with claim 15, wherein said wear shield functions as a holding element when said bit shaft is inserted into said bore of said bit holder and is positioned over said clamping sleeve between said bit head and the wall at the end of said bore on the insertion side of said bit holder.

20. The wear shield in accordance with claim 15, wherein said wear shield has an external diameter which is not less than the maximum external diameter of said bit head.

21. The wear shield in accordance with claim 1 wherein the circumferential groove of said bit shaft is spaced a distance from said bit head which is not less than the thickness of said wear shield.

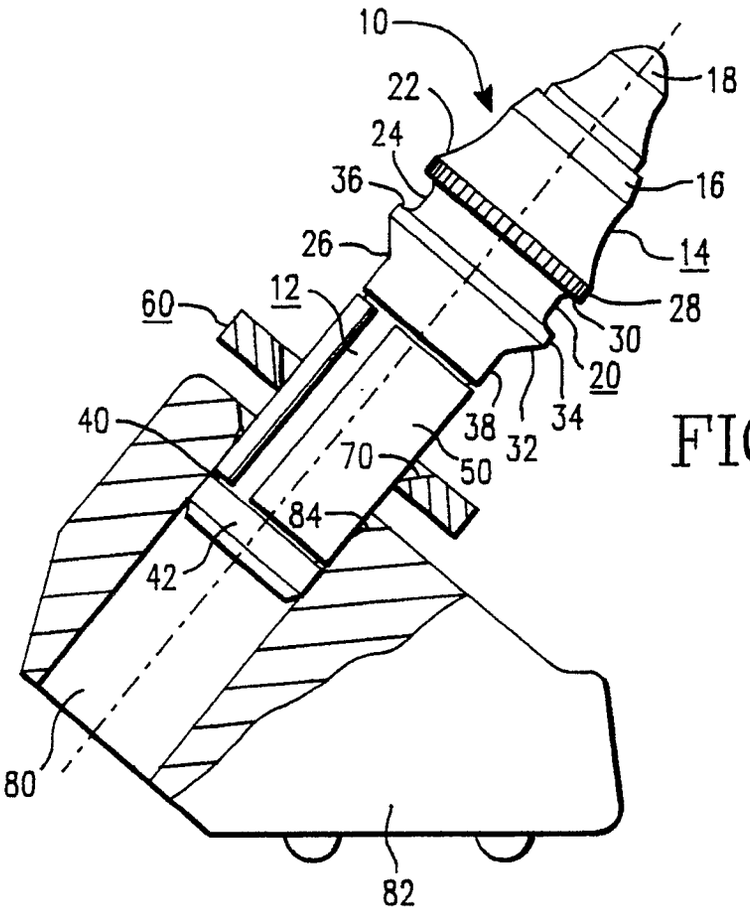

FIG. 1

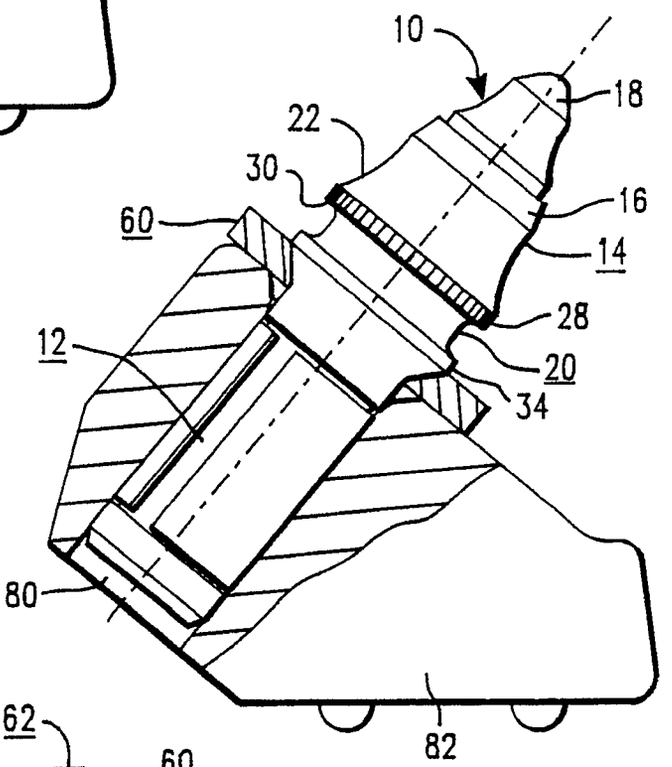

FIG. 2

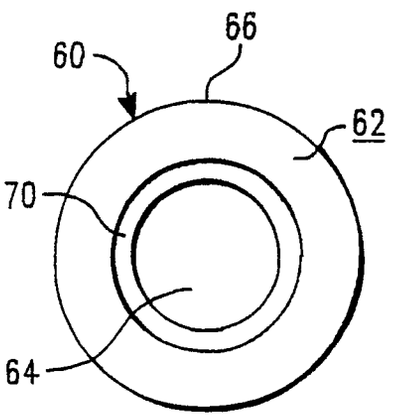

FIG. 3A

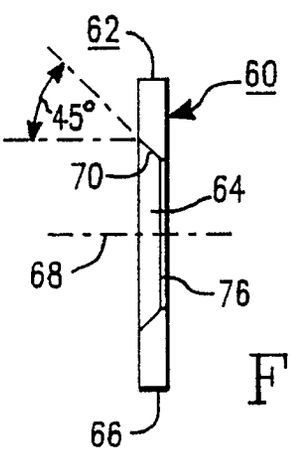

FIG. 3B

Europäisches Patentamt

EUROPÄISCHER RECHERCHENBERICHT

Nummer der Anmeldung

EP 90111759.8

EINSCHLÄGIGE DOKUMENTE

Kategorie	Kennzeichnung des Dokuments mit Angabe, soweit erforderlich, der maßgeblichen Teile	Betrifft Anspruch	KLASSIFIKATION DER ANMELDUNG (Int Cl 5)
X	US - A - 4 561 698 (BEEBE) * Fig. 3,4,6; claims 1,8 * --	1,15	E 21 C 27/00
D,X	US - A - 4 818 027 (SIMON) * Fig. 1,2; claims 1-3,7,8 * --	1,2,3, 14,15	
A	DE - A1 - 3 233 123 (PREINFALK) * Fig. 1; claim 3 * --	1,15	
A	US - A - 4 542 942 (ZITZ) --		
A	GB - A - 1 494 106 (REINHOLDT) ----		

RECHERCHIERTE SACHGEBIETE (Int Cl 5)
B 23 B 31/00 B 28 D 1/00 B 23 P 11/00 E 21 B 10/00 E 21 C 25/00 E 21 C 27/00 E 21 C 35/00

Der vorliegende Recherchenbericht wurde für alle Patentansprüche erstellt

Recherchenort	Abschlußdatum der Recherche	Prüfer
VIENNA	16-11-1990	RIEDER

KATEGORIE DER GENANNTEN DOKUMENTEN

X : von besonderer Bedeutung allein betrachtet
Y : von besonderer Bedeutung in Verbindung mit einer anderen Veröffentlichung derselben Kategorie
A : technologischer Hintergrund
O : nichtschriftliche Offenbarung
P : Zwischenliteratur
T : der Erfindung zugrunde liegende Theorien oder Grundsätze

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& : Mitglied der gleichen Patentfamilie, übereinstimmendes Dokument

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