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(54) **HYDRAULIC MILLING MACHINE FOR EXCAVATORS**

HYDRAULISCHE FRÄSMASCHINE FÜR BAGGER

FRAISEUSE POUR PELLES HYDRAULIQUES

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Description

FIELD OF THE ART

[0001] The invention concerns the technology of the mechanisms for the motion transmission from an hydraulic motor to milling rotating tools, included in the international classification E01 c.

STATE OF THE ART

[0002] It is known the employment of hydraulic motor to activate rotating operating tools and in particular milling machines that operate on stony compact materials. The known equipment, besides transmitting the necessary torque to operate the heavy milling operations, must also bear the bending stress and the shocks caused by the rapid impact of the tools against the rocky walls. The bending stress is increased by the fact that the milling drums are assembled overhanging on the motor shaft in order to perform penetrations in the rocky walls.

[0003] The patent US 4,883,134 discloses a motor-driven milling machine construction for cutting trenches in the ground, in which there are two rotating semi-drums with cutting tools at their periphery. The drums are mounted on a central support. The sole function of the motor is to transmit a rotational torque to the semi-drums without transmitting any other forces. The stress exerted on the cutting tools is directly transmitted to the central support without going through the motor frame.

[0004] The document DE 195 39 249 A1 is directed to a milling machine. A milling machine is provided for forming trenches. The machine comprises a pair of coaxially arranged semi-drums, which are supported at an exterior perimeter on a support ring. The drums are connected to a shaft which is rotated by motors, the motors being arranged in an interior space between the semi-drums. The semi-drums are supported at a central support which is a plate extending substantially in a vertical direction having an opening provided in the central support for passing the shaft therethrough. The vertical plate extends throughout the entire height of the semi-drums wherein supporting elements are integrally formed with the plate to both sides. The supporting elements project perpendicularly with respect to the vertical plate and are intended for receiving the semi-drums. Between the drums and the supporting elements bearings are respectively inserted.

[0005] Such operational needs have demonstrated that motor shaft it is often not able to bear for long the combined effect of the heavy stresses during the milling operations. The problem to be solved is to increase the overall resistance and the life of the transmission organs. The present invention suggests an optimal solution for the problems that still affect this field of technology. The finding object of the present invention is also characterized by limited dimensions, economic realization and convenience during maintenance operations.

DESCRIPTION

[0006] The invention is now disclosed with reference to the figures of the attached drawings as a not limiting example.

Figure 1 is a view of the extractable transmission shaft that transmits the torque from a central hydraulic motor with two milling side drums.

Figure 2 is a view of an extractable transmission shaft that transmits the torque from a central hydraulic motor to a single side milling drum.

Figures 1 and 2 highlight the simplicity of execution of the transmission shaft that is inserted and extracted with surprising simplicity just because its only function is to transmit the torque of the hydraulic central motor without bearing any other stress that milling drums are likely to encounter during heavy excavation operations.

Figure 3 is a schematic section of the rotor of an hydraulic motor that can be applied to a frame structure of an operator machine. It can be noticed a central groove 2 where the grooved shaft, that transmits the torque of the hydraulic motor without suffering any milling related stress, is inserted and extracted.

Figure 4 is an axis section of a support for a milling drum. It can be noticed the central grooves of the drum in which can be inserted and extracted the grooved shaft that transmits to the milling drum only the torque of the hydraulic motor but it does not suffer the other stresses caused by the heavy milling conditions.

Figure 5 is an axis section of the side supports applied to the frame structure through the connecting bolts. It can be noticed that inside said supports are inserted taper roller bearings upon which are assembled the hubs of the side milling drums. Figure 5 presents a case where in the axial grooves of the side drums and of the hydraulic central motor can be inserted and then extracted the grooved shaft that transmits the torque to the milling drums held by the supports bolted to the frame structure. It can be noticed that the grooved shaft it is not yet assembled or it has already been extracted.

Figure 6 presents a grooved shaft already inserted in the groove of the side drums and in the main groove of the hydraulic motor.

Figure 7 represents a version of the invention with a single side drum. It can be noticed that the grooved shaft it has not been inserted yet or it has been already extracted from the central groove.

Figure 8 represents the same version of figure 7 with the grooved shaft already inserted in the relative grooves.

Figure 9 schematizes an external view of the application of two side drums.

Figure 10 schematizes an external view of the application of a single drum.

Figure 11 is a three-dimensional representation of the application of two side drums.

Figure 12 schematizes a side view of the application of the milling machine at the edge of an operator arm of a machine.

Figure 13 schematizes in perspective a milling head with two side drums.

[0007] In the figures each single detail is marked as follows:

- 1 is a grooved shaft that can be inserted and extracted in the groove rotor of an hydraulic motor.
- 2 is the grooved rotor of a central hydraulic motor.
- 3 is the inner groove of the hub of a milling drum.
- 4 is a milling drum.
- 5 is a support that is bolted to a frame central structure.
- 6 is a hydraulic stator bolted to the frame central structure.
- 7 is the frame central structure.
- 8 is closing cover of the version with a single side drum.
- 9 are bolts for the application to the central structure.
- 10 are the bearings for the support of the drums applied to support 5 bolted to the structure frame.
- 11 is a partially grooved shaft for the version with a single side drum.
- 12 indicates the distributor of the hydraulic motor.
- 13 are elastic retaining rings of the extractable grooved shafts.
- 14 are milling tools applied to the drum of a milling machine. The evidence of the figures highlights the simplicity of realization and convenience of the maintenance operations for the replacement of the grooved shaft.

[0008] The extraordinary resistance of the device object of the present invention is of course obtained by the characteristic separation of two kinds of stresses. Only the torsion stresses for the transmission of the motor torque of the hydraulic motor are absorbed by the grooved shaft inserted in the central rotor while the other stresses are absorbed by the frame structure through the bolted side supports.

[0009] The invention of course allows for several variations of practical realization as far as the dimensioning and the structural proportioning are concerned and for the technological choices of the material for the realization of the details.

Claims

1. Hydraulic milling machine for excavators comprising:

a milling drum (4);

a support (5), said support including a bearing (10) for supporting said milling drum (4) inside said support (5);

a frame structure (7), said frame structure (7) having applied thereon a hydraulic motor (12), which comprises a rotor (2) having a first grooved shaft connection (2) for engagement with a grooved motor shaft (1; 11) for driving said milling drum (4) by said hydraulic motor (12), and said frame structure (7) being adapted to have mounted thereon said support (5) such that only torsional stresses, caused by said milling drum (4) during operation thereof, act on said grooved motor shaft (1; 11);

wherein said grooved motor shaft (1; 11) is extractable from said drum (4) while said drum (4) is connected to said frame structure (7);

characterized in that

said bearings (10) are taper roller bearings, said milling drum (4) comprises an integrally formed hub with a second grooved shaft connection (3) for engagement with said grooved motor shaft (1; 11), a first annular groove is provided in said drum (4) adjacent said second grooved shaft connection (3); a second annular groove either provided in said frame structure (7), opposite to said first and second grooved shaft connections (2, 3), or provided in a further milling drum (4) adjacent to a second grooved shaft connection (3) thereof;

wherein said first and second annular grooves are provided exteriorly with respect to said grooved motor shaft (1; 11), when said shaft (1; 11) is in an inserted condition for receiving elastic retaining rings (13).

Patentansprüche

1. Hydraulische Fräsmaschine für Bagger, welche umfasst:

eine Frästrommel (4);

eine Stütze (5), wobei die Stütze ein Lager (10) umfasst, um die Frästrommel (4) im Inneren der Stütze (5) zu stützen;

eine Rahmenstruktur (7), wobei die Rahmenstruktur (7) darauf aufgebracht einen Hydraulikmotor (12) aufweist, der einen Rotor (2) mit einer genuteten Wellenverbindung (2) für einen Eingriff mit einer ersten genuteten Motorwelle (1; 11) zum Antreiben der Frästrommel (4) durch den Hydraulikmotor (12) umfasst, und wobei die Rahmenstruktur (7) geeignet ist, um daran die Stütze (5) derart befestigt aufzuweisen, dass nur Torsionsspannungen, die durch die Frästrommel (4) während des Betriebes derselben verursacht werden, auf die genutete Mo-

torwelle (1; 11) wirken;
wobei die genutete Motorwelle (1; 11) aus der Trommel (4) herausziehbar ist, während die Trommel (4) mit der Rahmenstruktur (7) verbunden ist;

dadurch gekennzeichnet, dass

die Lager (10) Kegelrollenlager sind,
die Frästrommel (4) eine integral gebildete Nabe mit einer zweiten genuteten Wellenverbindung (3) für einen Eingriff mit der genuteten Motorwelle (1; 11) umfasst;
eine erste Ringnut in der Trommel (4) benachbart zu der zweiten genuteten Wellenverbindung (3) vorgesehen ist;
eine zweite Ringnut entweder in der ersten Rahmenstruktur (7) der ersten und der zweiten genuteten Wellenverbindung (2, 3) gegenüberliegend vorgesehen ist oder in einer weiteren Frästrommel (4) benachbart zu einer zweiten genuteten Wellenverbindung (3) davon vorgesehen ist;
wobei die erste und die zweite Ringnut außen in Bezug auf die genutete Motorwelle (1; 11) vorgesehen sind, wenn die Welle (1; 11) sich in einem eingesetzten Zustand befindet, um elastische Sicherungsringe (13) aufzunehmen.

ledit tambour à fraiser (4) comprend un moyeu formé intégralement, avec une deuxième liaison d'arbre rainuré (3) pour engagement avec ledit arbre de moteur rainuré (1 ; 11),
une première rainure annulaire est disposée sur ledit tambour (4) adjacente à la dite deuxième liaison d'arbre rainuré (3) ;
une deuxième rainure annulaire soit disposée dans ladite structure de cadre (7), faisant face audites première et deuxième liaisons d'arbre rainuré (2, 3), soit disposée sur un autre tambour à fraiser (4) adjacent à une deuxième liaison d'arbre rainuré (3) de celui-ci ;
dans lequel lesdites première et deuxième rainures annulaires sont disposées à l'extérieur par rapport audit arbre de moteur rainuré (1 ; 11), lorsque ledit arbre (1 ; 11) est dans un état inséré pour recevoir les anneaux de retenue élastiques (13).

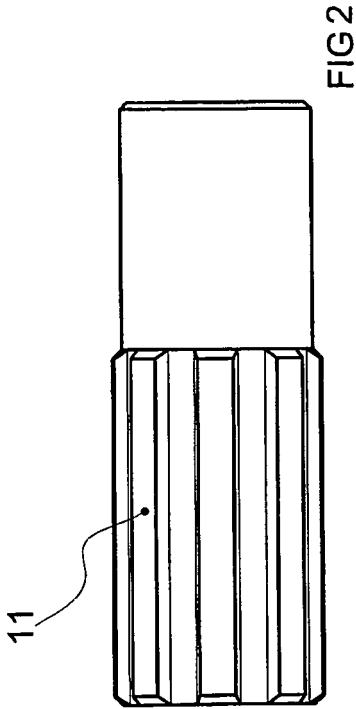
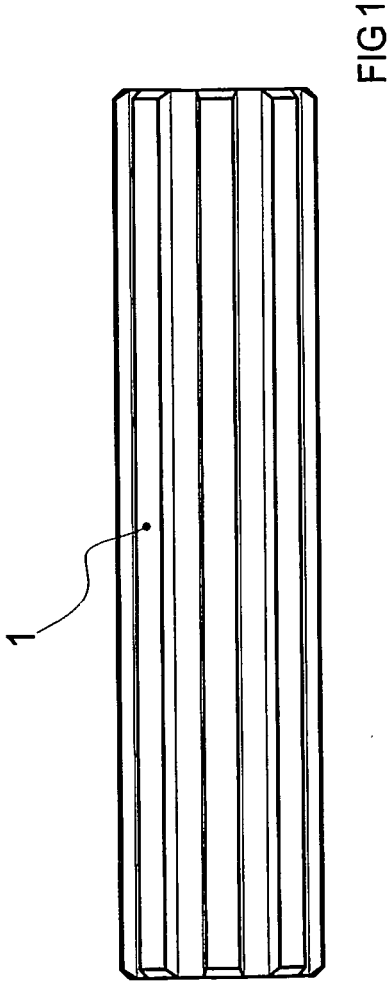
Revendications

1. Machine à fraiser hydraulique pour pelles mécaniques comprenant :

un tambour à fraiser (4) ;
un support (5), ledit support incluant un palier (10) pour supporter ledit tambour à fraiser (4) à l'intérieur dudit support (5) ;
une structure de cadre (7), ladite structure de cadre (7) ayant appliqué sur elle un moteur hydraulique (12) qui comprend un rotor (2) ayant une première liaison d'arbre rainuré (2) pour l'engagement avec un arbre de moteur rainuré (1 ; 11) pour entraîner ledit tambour à fraiser (4) par ledit moteur hydraulique (12), et ladite structure de cadre (7) étant adaptée pour avoir monté sur elle ledit support (5) de telle sorte que seules les contraintes de torsion provoquées par ledit tambour à fraiser (4) pendant le fonctionnement de celui-ci agissent sur ledit arbre de moteur rainuré (1 ; 11).
dans lequel ledit arbre de moteur rainuré (1 ; 11) est extractible dudit tambour (4) tandis que ledit tambour (4) est relié à ladite structure de cadre (7) ;

caractérisé en ce que

lesdits paliers (10) sont des paliers à rouleaux coniques,



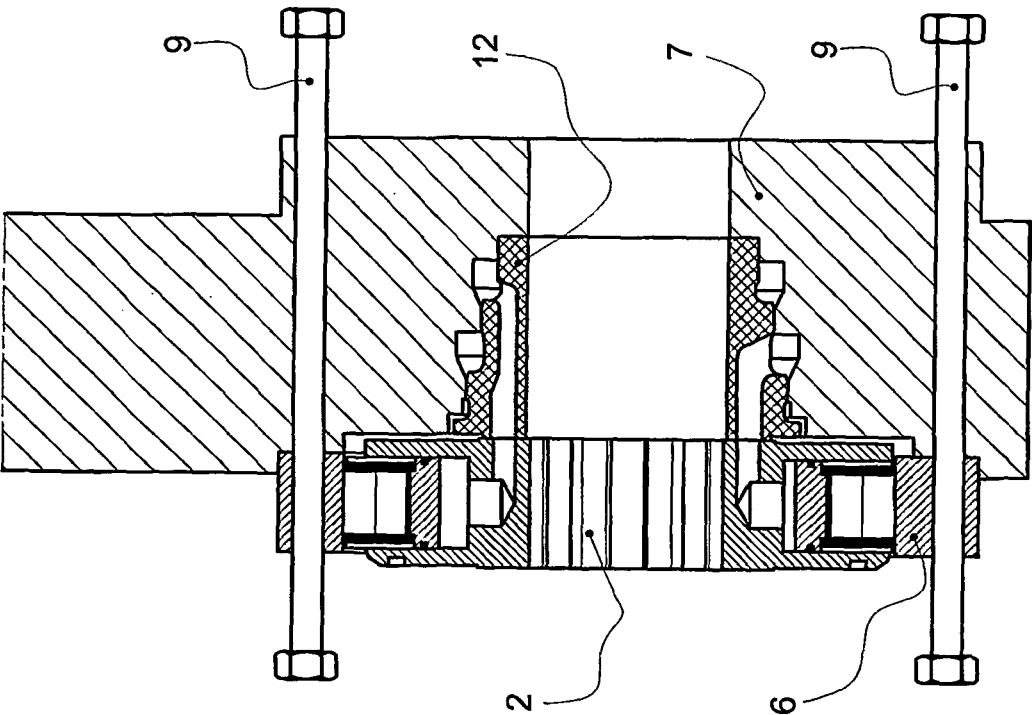


FIG 3

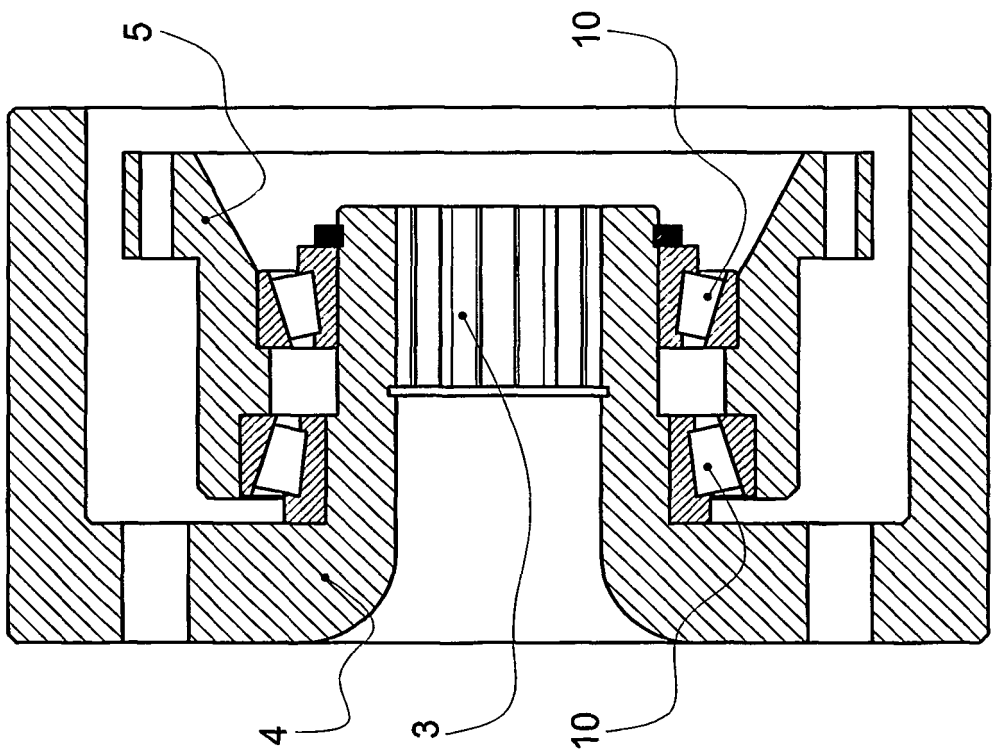


FIG 4

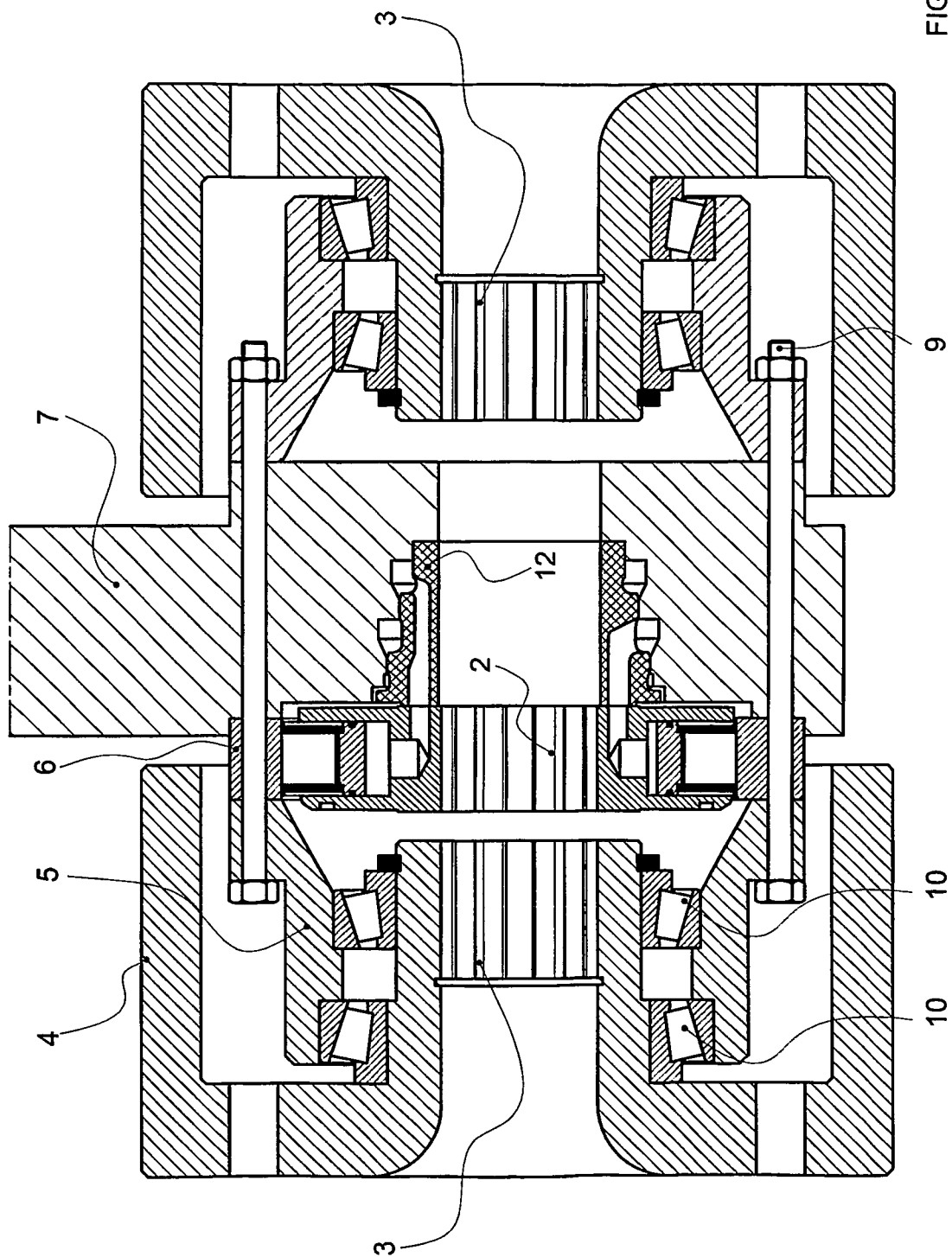


FIG 5

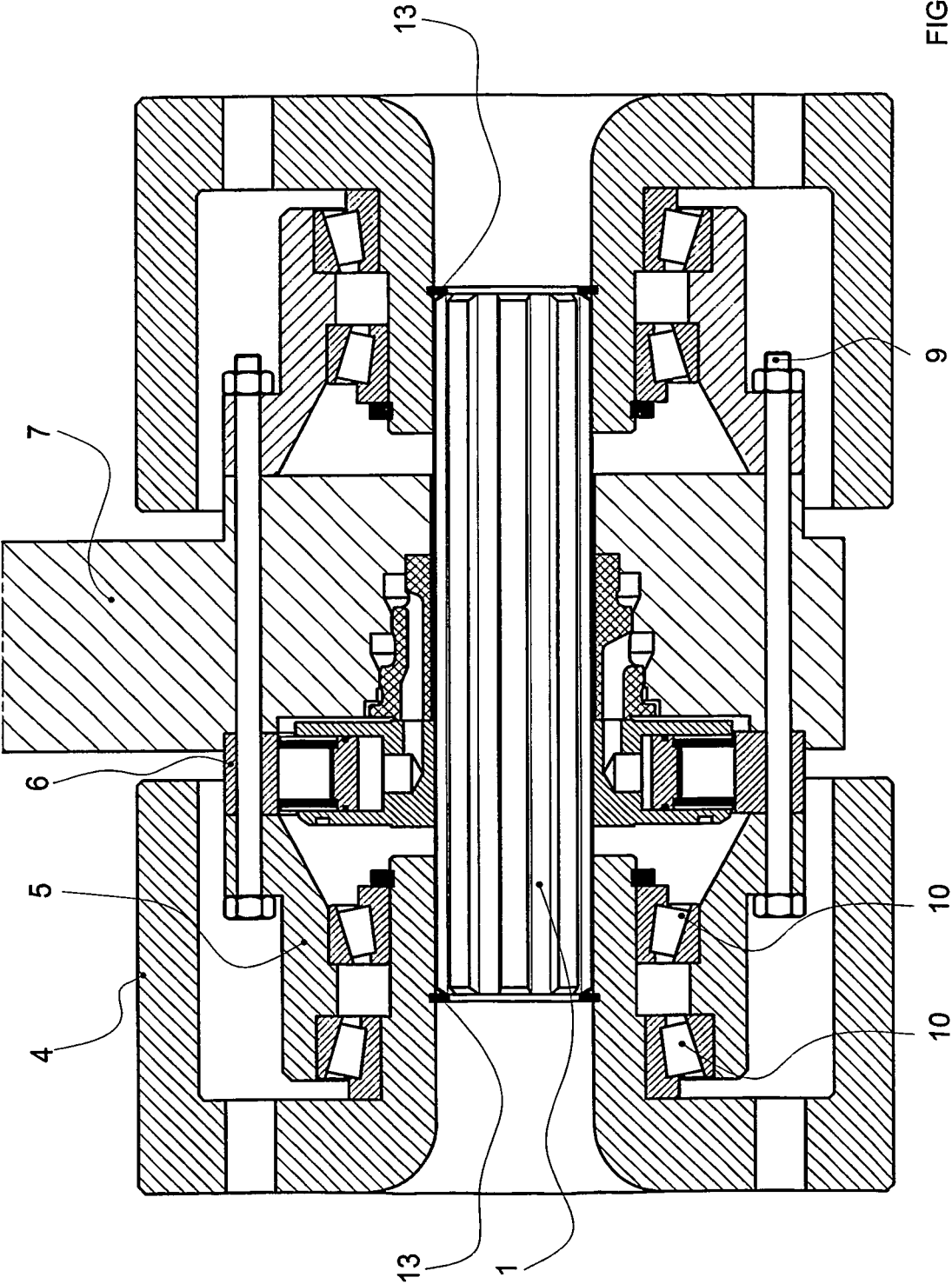


FIG 6

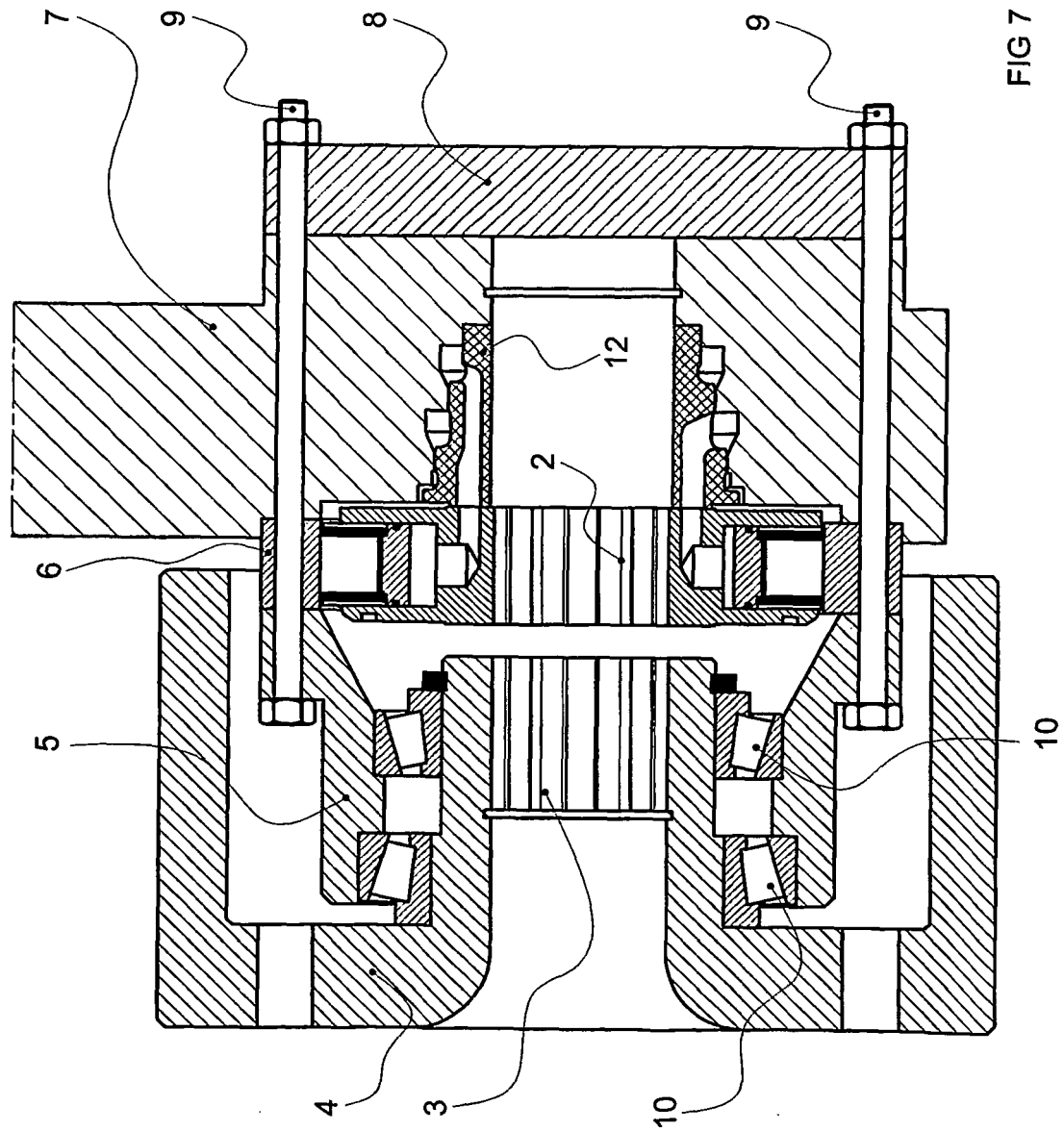


FIG 7

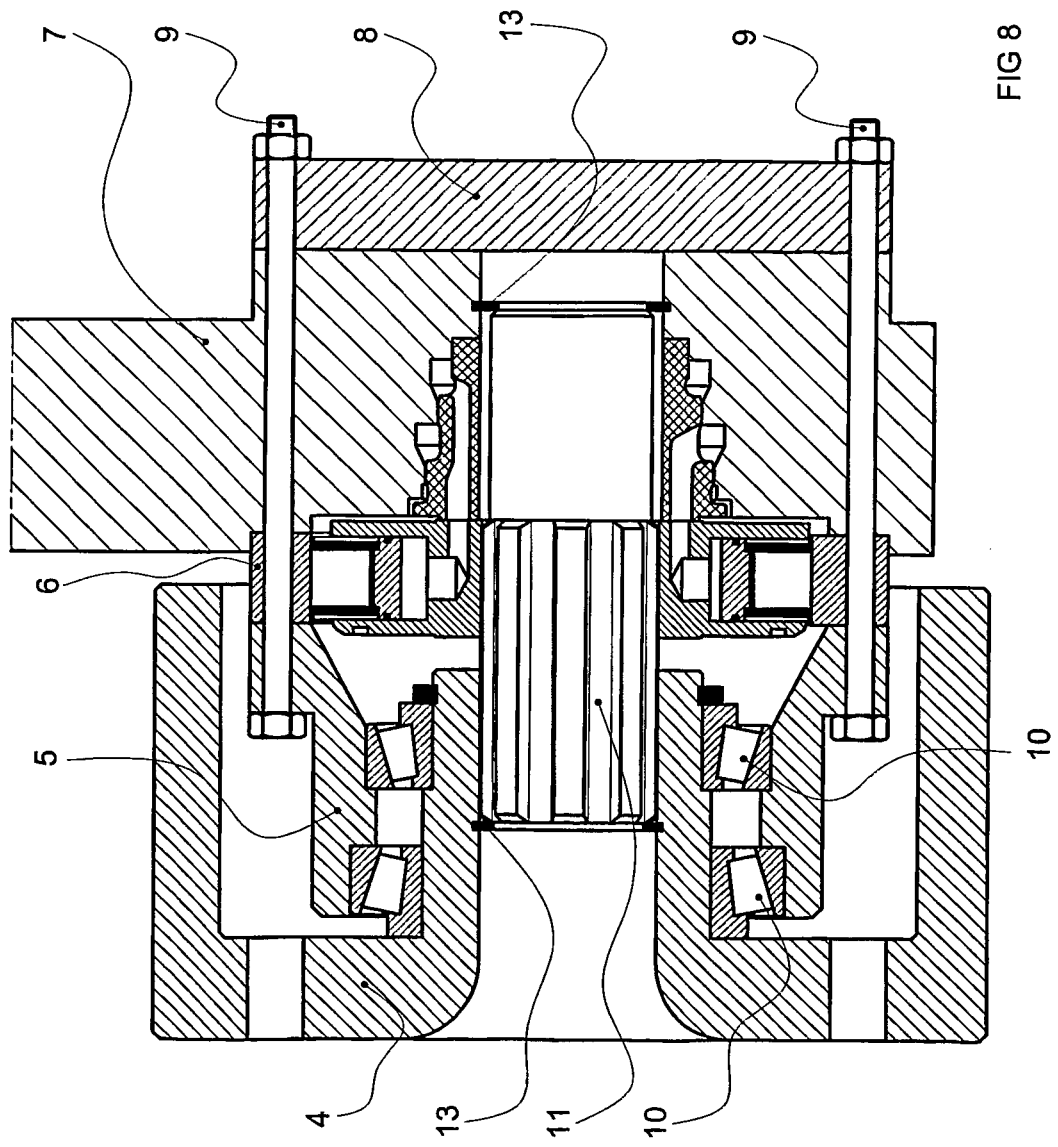
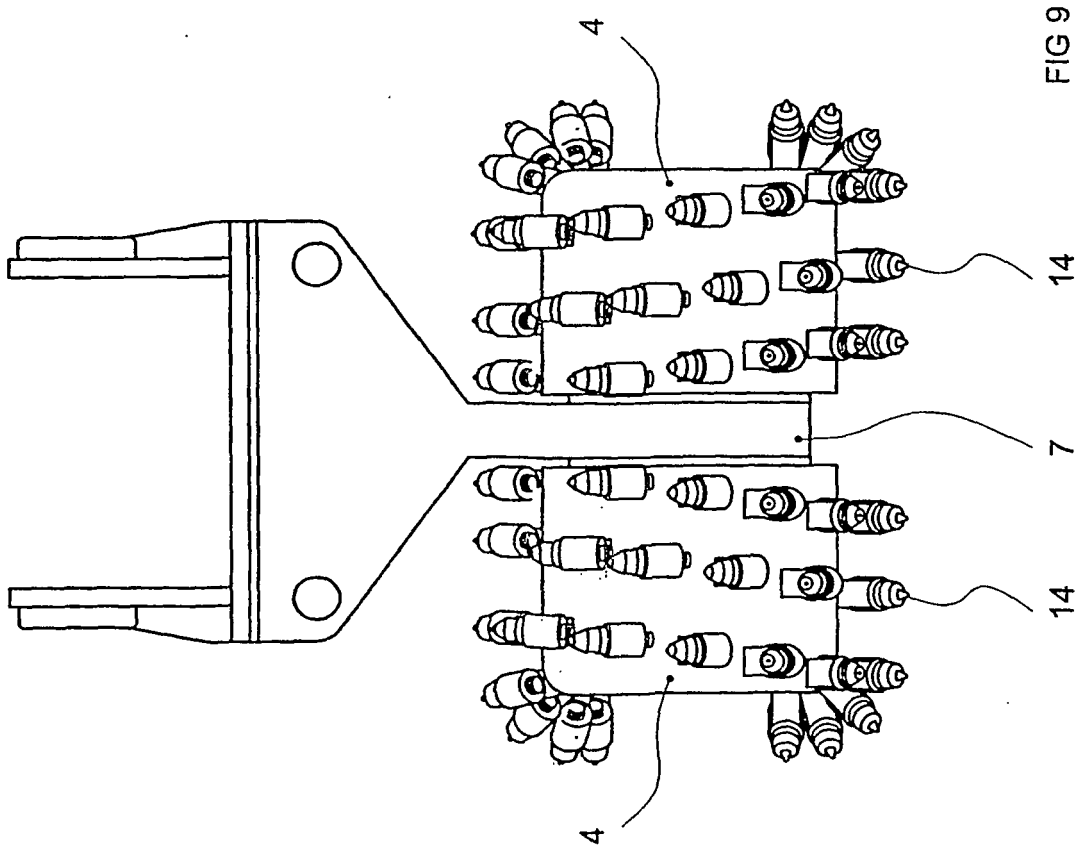
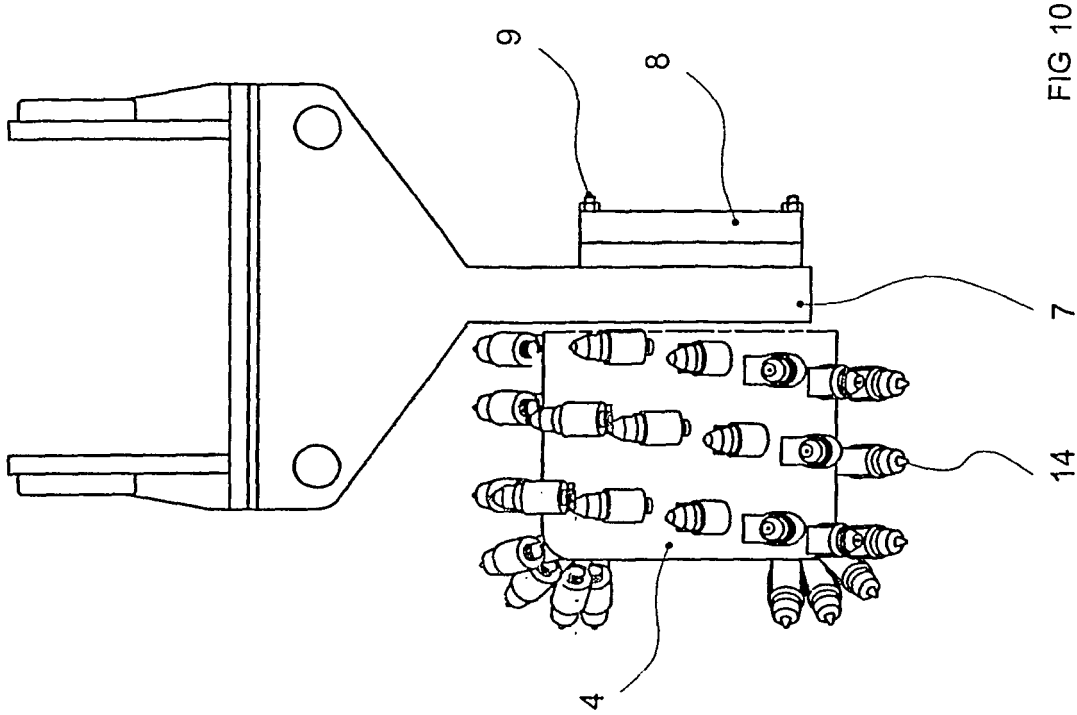
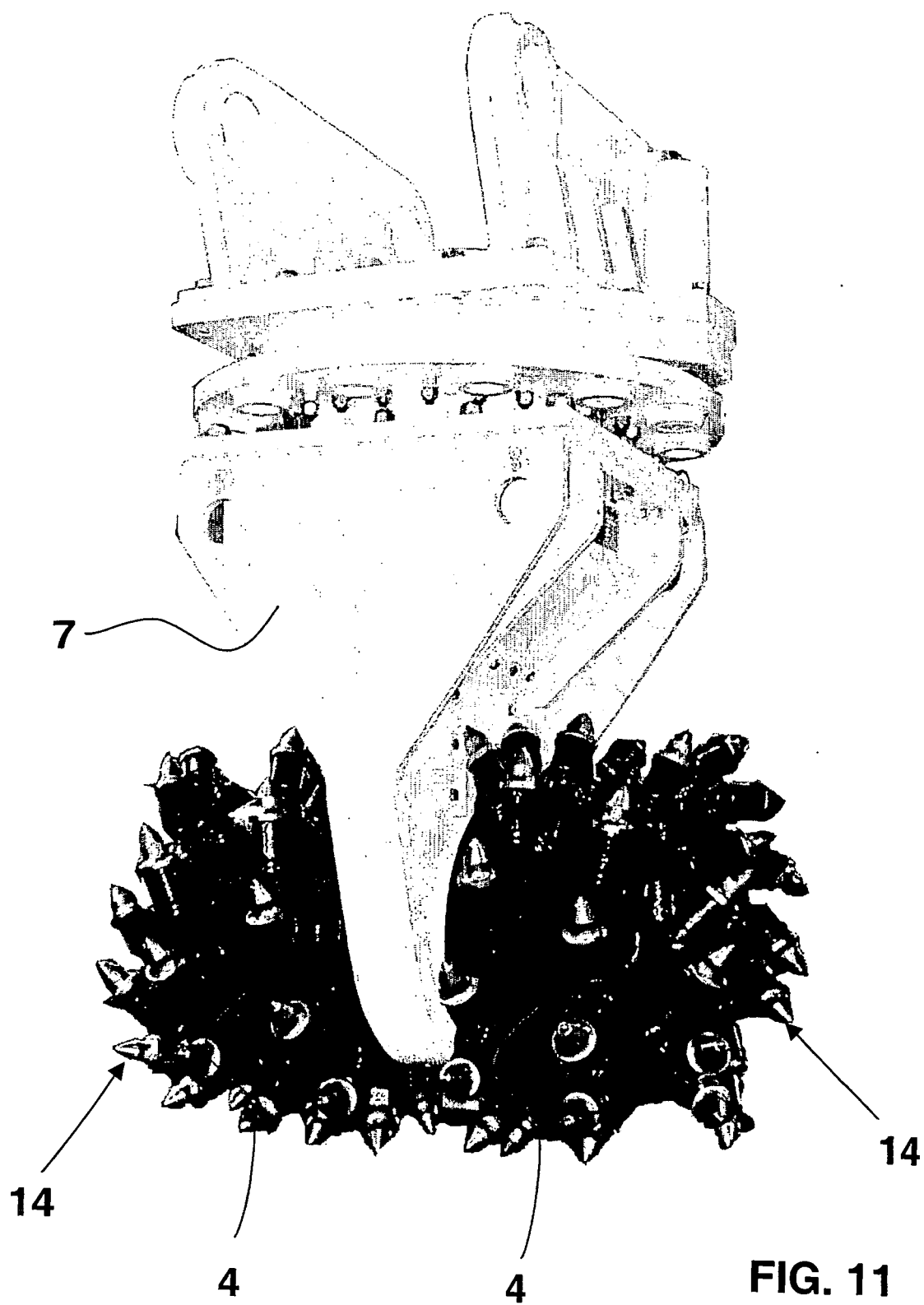
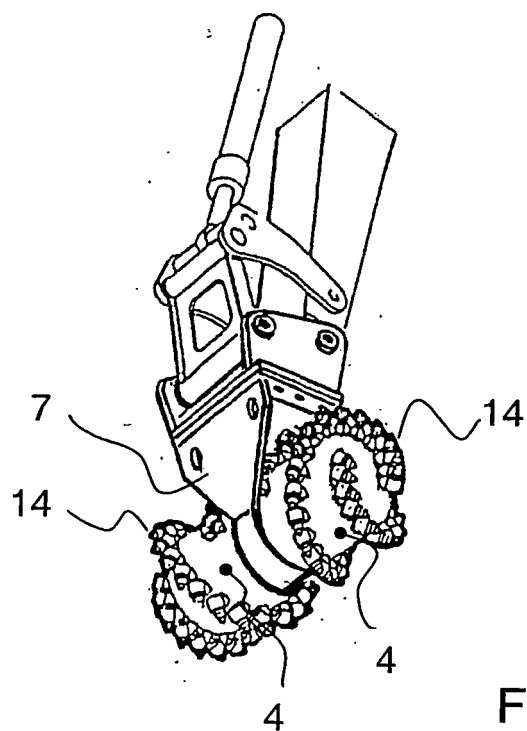
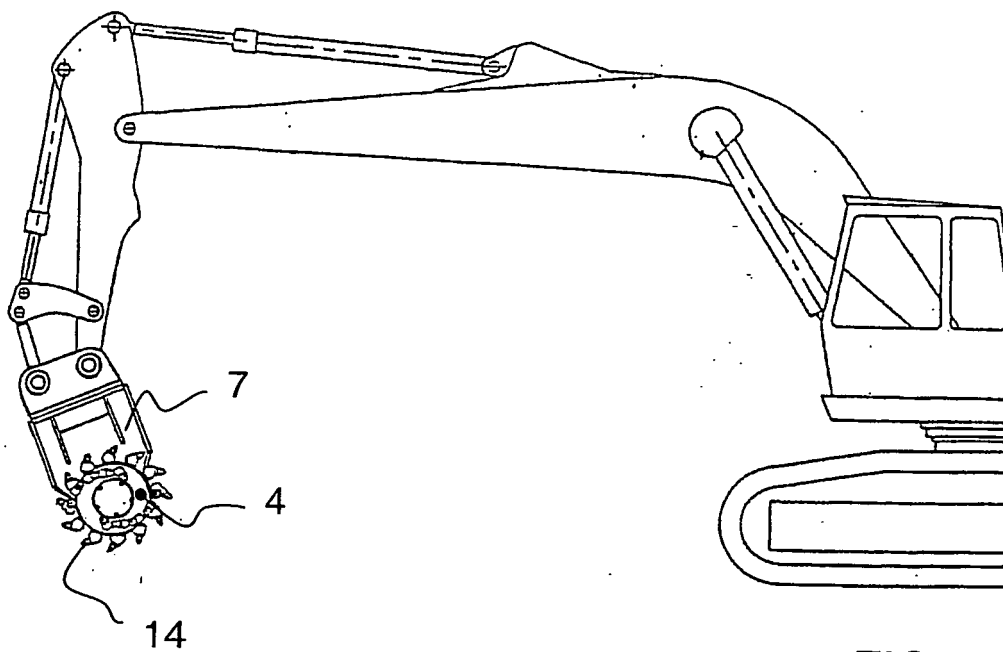


FIG 8







REFERENCES CITED IN THE DESCRIPTION

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