



AFRICAN REGIONAL INDUSTRIAL PROPERTY  
ORGANIZATION (ARIPO)

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(30) Priority Data:			
(33) Country:	ZA		
(31) Number:	91/0681		
(32) Date:	30.01.91		
(84) Designated States:			
	GH		

(51) International Patent Classification Int. Cl.<sup>5</sup> B23D 47/12

(54) Title: SAW BLADE DRIVE

(57) Abstract: The saw blade drive is intended for driving a circular saw blade forming part of a non-explosive mining machine. The drive has a motor, a gear train driven by the output shaft of the motor and a hollow spindle driven by the gear train. The spindle in use is locked in a rotationally fast manner to a hub carrying the saw blade. Thus the saw blade rotates in unison with the spindle. The drive also includes a bolt of which the shank passes through the hollow of the spindle and a nut having an internally threaded recess engaged with a threaded end of the shank. The nut bears upon the hub and holds the hub in rotationally fast engagement with the spindle. The head of the bolt is remote from the blade and no part of the drive extends beyond that surface of the blade which is remote from the head of the bolt. This configuration obviates fouling of the blade and permits convenient replacement of the blade, with access being required from one side only of the drive.

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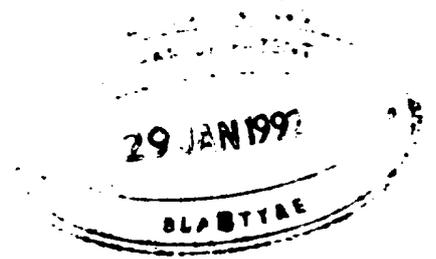
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### BACKGROUND TO THE INVENTION

This invention relates to a drive for a saw blade.

In a copending patent application filed simultaneously with the present application, it is proposed to provide a selective non-explosive mining apparatus in which cuts are made into the working face in a mine working using rotating circular saw blades.

An object of the present invention is to provide a drive for the circular saw blade which is designed for convenient replacement of the blade and which permits the blade to operate in limited access conditions.



**SUMMARY OF THE INVENTION**

According to the present invention there is provided a circular saw blade drive comprising a motor, a gear train driven by the output shaft of the motor, a hollow spindle driven by the gear train and lockable in a rotationally fast manner to a hub carrying the saw blade so that in use the saw blade rotates in unison with the spindle, a bolt of which the shank passes through the hollow of the spindle and a nut having an internally threaded recess engagable with a threaded end of the shank, the nut bearing upon the hub and holding the hub in rotationally fast engagement with the spindle, the head of the bolt being remote from the blade and no part of the drive extending beyond that surface of the blade which is remote from the head of the bolt.

In the preferred form of the invention, the motor is an hydraulic motor and the gear train is a reduction gear train which includes a pinion carried by the output shaft of the motor and a gear fast with the spindle and meshing with the pinion.

The spindle may have an out-of-round portion, typically of hexagonal shape at the extremity of the spindle, that locates in a complementary cavity of the hub to hold the hub in rotationally fast manner to the spindle. Also, the nut may have a peripheral flange which bears upon an annular shoulder presented by the hub.

**BRIEF DESCRIPTION OF THE DRAWINGS**

The invention will now be described in more detail, by way of example only, with



reference to the accompanying drawings in which:

**Figure 1** shows a perspective view of an apparatus used in a non-explosive mining technique, the apparatus including a circular saw blade which is driven by a drive of the present invention; and

**Figure 2** shows a cross-sectional view through a drive of the invention.

#### DESCRIPTION OF AN EMBODIMENT

Figure 1 shows the relevant parts of a non-explosive mining apparatus which is described in detail in the previously mentioned copending patent application.

The apparatus of Figure 1 includes a skid mounted module 10 having a rail 12 on which a carriage 14 can be driven by a traverse drive 16. Pivoted to the carriage 14 at a lateral pivot 18 is a tilt frame 20. Pivoted to the tilt frame 20 at an upright pivot 22 is a ranging arm 24 carrying a circular saw 26 at its end. The circular saw includes an hydraulic motor 28 supplied with pressurised hydraulic fluid from a remote power pack (not illustrated) through the illustrated array of hydraulic hoses. The circular saw also includes a gearbox drive 30 by means of which the motor drive is applied to a diamond impregnated circular saw blade 32.

In use, hydraulic cylinders 31 and 33 respectively are used to tilt and slew the blade 32. With the carriage moving along the rail 12 and with the blade rotating and applied to the working face in a mine working, a continuous cut is formed in the working face.



Referring now to Figure 2, the drive 30 is shown in more detail in a position inverted with respect to the view of Figure 1. The hydraulic motor 28 drives a hollow splined pinion 34 which meshes at 36 with a gear 38. The pinion 36 and gear 38 constitute a reduction gear train. The gear 38 is mounted fast on a hollow spindle 40. The hollow splined pinion 34, gear 38 and the majority of the spindle 40 are located in a casing constituted by a lower cover 42 to which the motor is bolted and an upper casing part 44 connected to the cover 42 by bolts 46.

A bearing 48 ensures that the spindle is rotatable relative to the casing part 44 while a bearing 50 ensures that the spindle is rotatable relative to the cover 42. The spindle projects out of the casing through the casing part 44. At the extremity 52 of its projecting end, the spindle 40 is formed externally with a hexagonal cross-section. The internal cavity of an annular hub 54 is complementary in shape to the extremity 52 of the spindle 40 and receives that extremity snugly. The hub is thus engaged in a rotationally fast manner by the extremity 52 and is caused to rotate in unison with the spindle 40. The circular saw blade 32 is fixed to the hub 54 and is therefore caused to rotate in unison with the hub and the spindle.

The assembly just described is held together by a bolt which has a head 58 and a shank 60. The shank 60 passes through the spindle 40 and its threaded end 62 is engaged in a threaded nut 64. The nut has a flange 66 that bears against an annular shoulder 68 of the hub 54 and holds the hub in engagement with the end of the spindle. The nut has a short hexagonal extension 71 which engages in a complementary recess in the hub 54 to prevent rotation of the nut 64 when the bolt is tightened up.

A first important feature of the illustrated embodiment is the fact that no part of the drive protrudes beyond the surface 70 of the blade 32. Thus the surface of the flange 66 is flush with the surface 70. As a result there is no part of the drive which



can foul on an external obstruction located axially in front of the blade when the blade is rotating.

A second important feature of the illustrated embodiment is the fact that access is only necessary from one side to detach the blade 32. In the orientation illustrated in Figure 2, access from the bottom is required. To detach the blade 32, a spanner is applied to the head 58 of the bolt to unscrew it from the nut 64. Once the bolt is detached from the nut, the blade and nut can be lifted slightly or the saw can be lowered to clear the extremity 52 of the spindle moved sideways away from the spindle and casing. This is a major advantage since there will in practice often be no room for an operator to approach the blade 32 from both sides, particularly when the blade is close to a surface such as the surface of a hanging wall or footwall in a mine working. For instance, with the saw blade 32 in a low position, close to a footwall, as illustrated in Figure 1, there is no access from beneath the blade.

To install a new blade, the new blade and nut are slipped sideways and then dropped onto the extremity 52 of the spindle. The threaded end 62 of the bolt is then engaged with the nut 66 to secure the assembly.

In another version of the invention, a swivel arrangement is incorporated between the drive assembly 30 and the tilt frame 20 to allow the drive assembly to be rotated through a full 180°. This renders the apparatus more flexible as one saw can now cut the footwall and the hanging wall without having to carry out a major, time-consuming dismantling and reassembling procedure. Also, should it be preferable, one saw only can be used to create the necessary slots in a variety of mining methods. The relative importance of factors such as mining speed and capital expenditure will dictate the preferred combination of saws.



CLAIMS

1.

A circular saw blade drive comprising a motor and a gear train driven by the output shaft of the motor, characterised by a hollow spindle driven by the gear train and lockable in a rotationally fast manner to a hub carrying the saw blade so that in use the saw blade rotates in unison with the spindle, a bolt of which the shank passes through the hollow of the spindle and a nut having an internally threaded recess engagable with a threaded end of the shank the nut bearing upon the hub and holding the hub in rotationally fast engagement with the spindle, the head of the bolt being remote from the blade and no part of the drive extending beyond that surface of the blade which is remote from the head of the bolt.

2.

A circular saw blade drive according to claim 1 characterised in that the motor is an hydraulic motor.

3.

A circular saw blade drive according to claim 1 characterised in that the gear train is a reduction gear train and includes a pinion carried by the output shaft of the motor and a gear fast with the spindle and meshing with the pinion.



4.

A circular saw blade drive according to claim 1 characterised in that the spindle has an out-of-round portion that locates in a complementary cavity of the hub to hold the hub in rotationally fast manner to the spindle.

5.

A circular saw blade drive according to claim 4 characterised in that the out-of-round portion of the spindle is provided by a hexagonally shaped extremity of the spindle.

6.

A circular saw blade drive according to claim 1 characterised in that the nut has a peripheral flange which bears upon an annular shoulder presented by the hub.

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**ABSTRACT**

The saw blade drive is intended for driving a circular saw blade forming part of a non-explosive mining machine. The drive has a motor, a gear train driven by the output shaft of the motor and a hollow spindle driven by the gear train. The spindle in use is locked in a rotationally fast manner to a hub carrying the saw blade. Thus the saw blade rotates in unison with the spindle. The drive also includes a bolt of which the shank passes through the hollow of the spindle and a nut having an internally threaded recess engaged with a threaded end of the shank. The nut bears upon the hub and holds the hub in rotationally fast engagement with the spindle. The head of the bolt is remote from the blade and no part of the drive extends beyond that surface of the blade which is remote from the head of the bolt. This configuration obviates fouling of the blade and permits convenient replacement of the blade, with access being required from one side only of the drive.



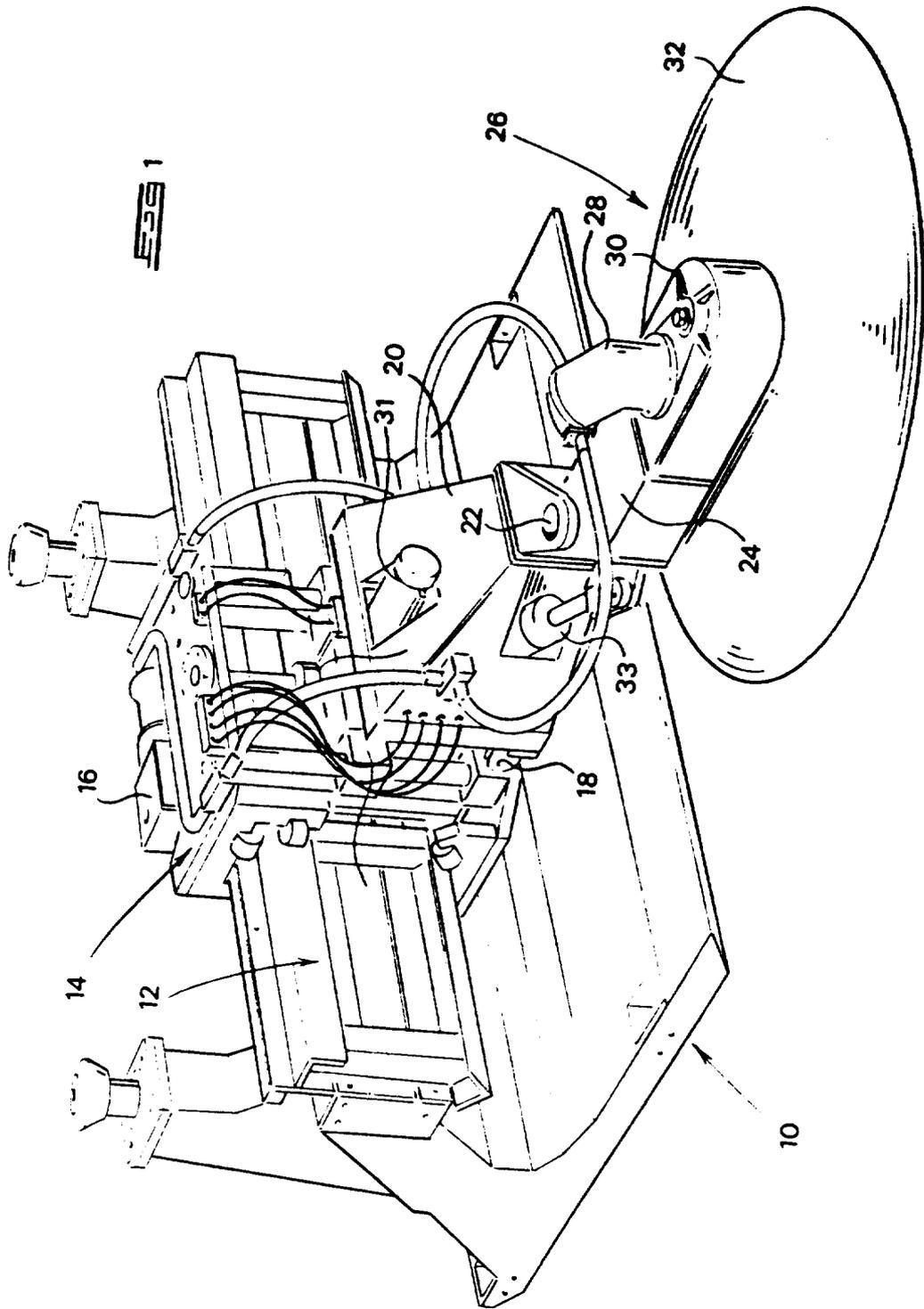


Fig. 1

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