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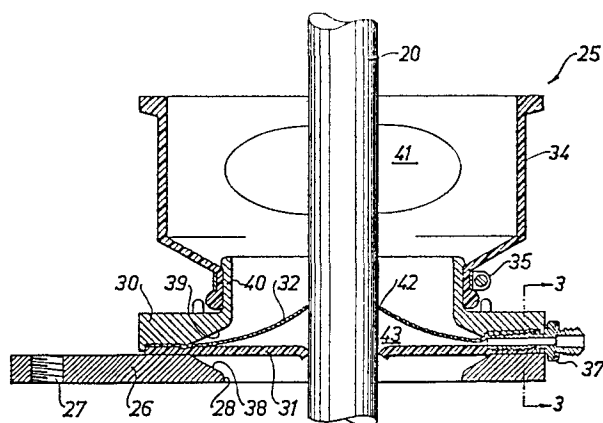
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54 Dust collector hood for a rock drill.

57 A collector hood (25) is mounted on the feed beam (11) for a rock drill (15). The drill stem (20) extends through two annular diaphragms (31, 32) which form a rear wall of the hood (25). A pressure fluid is supplied between the two diaphragms (31, 32) and since the inner one of the diaphragms (31) is less stiff than the outer one (32), it bends inwardly so that the pressure fluid flows into the hood (25) through a clearance (42) around the drill stem whereas the outer diaphragm (32) maintains its sealing contact with the drills stem.



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Rock drilling apparatus

This invention relates to a rock drilling apparatus comprising a feed beam, a rock drill that is mounted on the feed beam to be reciprocable therealong and operates a drill string, power means for moving said rock drill along said feed beam, a collector hood mounted on the front end of the feed beam for collecting the drill dust that flows out of the borehole, said drill string extending through said collector hood, a first annular rubber diaphragm that forms a rear wall of the collector hood and forms a seal against the drill string.

It is important to have a good seal against the drill stem at the rear end of the collector hood both when water is used as a flushing fluid and when compressed air is used. The seal is particularly important when water is used as a flushing fluid and the boreholes are directed upwards because water and drill dust tend to flow backwardly along the drill string to the rock drill. This drill dust results in a substantially increased wear of the front parts of the rock drill and particularly in wear of the drill string chuck and its rotation transmission.

Several patents show collectors with a rubber diaphragm at the rear end of the hood and/or air supply to the rear end of the hood. US-A-2712921, 2730333, 2781185, 3924696, 3946818, and 3965998 can be mentioned as examples.

It is an object of the invention to provide a rock drilling apparatus of the kind described which has a collector hood with an improved seal against the drill string and permits for a drill bit of substantially larger diameter than the drill string to be forced through the seal.

The invention will be described with reference to the drawings which show a preferred embodiment of the invention.

Fig 1 is a longitudinal view of a feed beam for a rock drill.

Fig 2 is a longitudinal section through a collector hood mounted on the front end of the feed beam shown in Fig 1.

Fig 3 is a section along line 3-3 in Fig 2.

The feed beam generally designated 11 in Fig 1 comprises a profile beam 12 with end plates 13, 14 affixed to it. A rotary-percussive rock drill 15 is mounted on the beam 12. The rock drill 15 is movable along the beam 12 by means of power means 16 located in the profile beam 12. The rock drill 15 operates a drill string 20 that has a drill bit 21 at its end. The feed beam is arranged to be pivotably supported on a chassis but the support of the feed beam is not illustrated.

A drill string centralizer unit 17 is screwed to the end plate 13 by means of screws 18. The centralizer unit 17 is not part of the invention and it is therefore not described in detail. Suffice it to say that it comprises two cooperating pivotable guide shoes that are pivotable by means of a hydraulic cylinder 19 between their guiding position and an open position. The guide shoes can also be used as jaws to clamp the drill string affixed which is conventional in the art.

A collector in the form of a hood 25 is screwed to the centralizer unit 17 and it is coaxial with the drill string. A support in the form of a spur 24 is screwed to the collector 25. The collector 25 comprises a rigid frame in the form of a mounting plate 26 that is screwed to the centralizer unit 17. The mounting plate 26 has a threaded hole 27 into which the spur 24 is to be screwed and it has a large central hole 28. A ring 30 is screwed to the mounting plate 26 and two annular flexible diaphragms 31, 32 of rubber are clamped between the ring 30 and the mounting plate 26. A flexible sleeve 34 of rubber is affixed to the ring 30 by means of a hose clamp 35, and the sleeve 34 extends somewhat past the spur 24 so that it will contact the rock when the spur 24 is forced against the rock. The sleeve 34 has an outlet 41. The ring 30 and the mounting plate 26 have radially directed semi-circular depressions 36 a and 36 b resp.

as can be seen in Fig 3 and a fitting 37 is clamped between the two rubber diaphragms 31, 32.

The mounting plate 26 has a bevelled surface 38 from its central hole 28 and the ring 30 has a corresponding bevelled surface 39 from its central hole 40 so that the two diaphragms 31, 32 are clamped only along their peripheries.

The holes 28, 40 should be large enough to permit the drill bit 21 of the drill string 20 to pass through, and the holes in the diaphragms 31, 32 should be somewhat smaller than the drill string 20 so that they provide seals against the drill string 20 as shown in Fig 2.

The diaphragms 31, 32 should be flexible enough to permit the drill bit to pass through them also when the drill bit is twice as wide as the drill stem or even wider. The bevel surfaces 38, 39 and the wide radii at the end of the bevel surfaces are important for the flexing of the diaphragms 31, 32. The outer diaphragm 31 is stiffer than the inner diaphragm 32 so that the inner diaphragm 32 flexes inwardly towards the sleeve 34 when a pressure fluid is conveyed through the fitting 37 to the space between the two diaphragms 31, 32 as shown in Fig 2. Thus, the diaphragm 32 adjusts automatically the size of an outlet in the form of a clearance 42 between the diaphragm 32 and the drill stem 20 so that a certain pressure is maintained in the chamber 43 formed between the diaphragms. The flexible diaphragms 31, 32 can be made of the same quality of rubber and they will still have different stiffness when they have different thickness as shown.

The rock drilling apparatus as described can be used for upward directed drilling in mines for example fan drilling and ring drilling in sublevel caving and sublevel stoping. Then, water is usually used as a flushing fluid which is supplied to the drill bit 21 through a central hole in the drill string 20. The drill string is usually made up of extension rods screwed to one another in a conventional way. Water should then also be supplied to the fitting

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37 so that the space 43 between the diaphragms 31, 32 is filled with clean water. Any water leaking past the outer diaphragm 31 when the diaphragm is worn will then be comparatively clean and the drill dust loaded water that flows out of the borehole into the hood 25 will be conveyed to the floor through the outlet 41 and a non-illustrated hose connected to the outlet. Since there will not be much drill dust on the outer diaphragm 31, this diaphragm will have a long life. The inner diaphragm 32 is not in tight contact with the drill string and will also have a long life.

When compressed air is used as a flushing fluid, the outlet 41 should be coupled to a dust collector that operates with vacuum. The same fluid, compressed air, should be supplied to the fitting 37. The clean air in the space between the diaphragms 31, 32 will prevent dust laden air in the hood 25 from leaking past the diaphragms 31, 32 also when the diaphragms are worn. The suction in the hood 25 will normally not prevent dust laden air to pass the diaphragms 31, 32 if compressed air is not supplied to the space between the diaphragms 31, 32 since the dust laden air rushes out of the borehole with a comparatively high velocity.

Claims:

1. Rock drilling apparatus comprising a feed beam (12), a rock drill (15) that is mounted on the feed beam to be reciprocable therealong and operates a drill string (20), power means (16) for moving said rock drill along said feed beam, a collector hood (25) mounted on the front end of the feed beam for collecting the drill dust that flows out of the borehole, said drill string extending through said collector hood, a first annular rubber diaphragm (31) that forms a rear wall of the collector hood and forms a seal against the drill string,
c h a r a c t e r i z e d b y
a second annular rubber diaphragm (32) that is located on the inner side of said first diaphragm (31), and an inlet (37) for supplying pressure fluid to a space (43) between the diaphragms, said second diaphragm (32) being so arranged that an outlet (42) to the interior of the collector hood (25) is formed between said second diaphragm and the drill string.
2. Rock drilling apparatus according to claim 1,
c h a r a c t e r i z e d i n
the said second diaphragm (32) is less stiff than said first diaphragm (31) so that it is bent by the action of the pressure fluid supplied between the diaphragms and thereby varies a clearance (42) between said second diaphragm and the drill string, which forms said outlet.
3. Rock drilling apparatus according to claim 1 or 2,
c h a r a c t e r i z e d i n
that the two diaphragms (31, 32) are commonly clamped along their peripheries.
4. Rock drilling apparatus according to claim 3,
c h a r a c t e r i z e d i n
that a fitting (37) is clamped between the two diaphragms (31, 32) so as to form said inlet.

5. Rock drilling apparatus according to any one of the preceding claims,
c h a r a c t e r i z e d i n
that the collector hood (25) comprises a rigid frame (26, 30), preferably a metal frame, that carries the diaphragms (31, 32) and an elastic sleeve (34), in particular a rubber sleeve.

6. Rock drilling apparatus according to any one of the preceding claims,
c h a r a c t e r i z e d i n
that said collector hood (25) and a drill string centralizer (17) are mounted adjacent each other on the front end of the feed beam (11), the drill string centralizer (17) being located rearwardly of the collector hood (25).

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Fig. 1

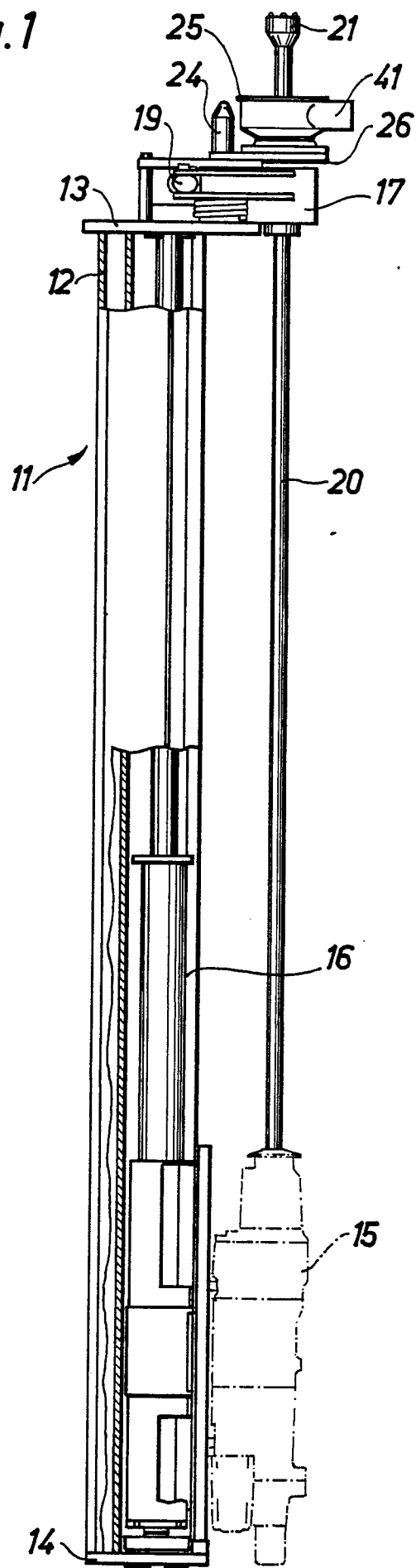


Fig. 2

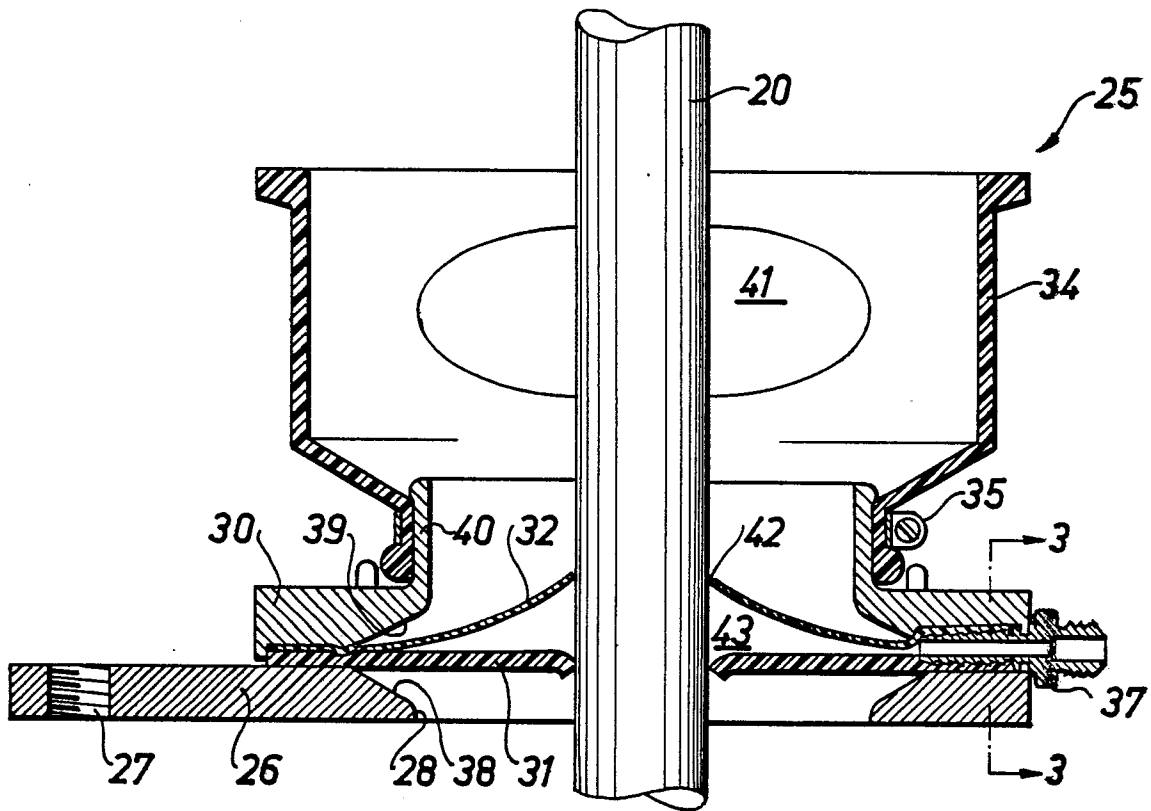
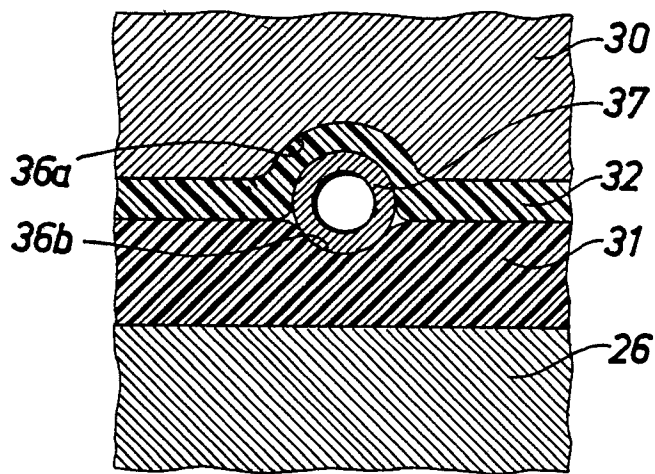


Fig. 3





European Patent
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EUROPEAN SEARCH REPORT

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Application number

EP 85 85 0182

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A	AT-A- 367 163 (HASEWEND) * Whole document * -----	1	E 21 C 7/00 E 21 C 7/02
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			E 21 C
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 14-08-1985	Examiner BENZE W.E.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	