(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 035 982**
A1

(12) # EUROPEAN PATENT APPLICATION

(21) Application number: 81850036.5

(22) Date of filing: 06.03.81

(51) Int. Cl.³: E 21 C 11/02

(30) Priority: 11.03.80 SE 8001884

(43) Date of publication of application:
16.09.81 Bulletin 81/37

(84) Designated Contracting States:
AT BE CH DE FR GB IT LI SE

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(54) **A rock drilling rig.**

(57) In a rock drilling rig for tunnel driving the boom or booms (41, 42) that carry the rock drills (55, 56) are pivotably mounted on rotatable discs *32*. The discs *32* are parts of mountings (29, 30) that are mounted on support plates (21, 22). The support plates (21, 22) are pivotable so that the centre axes (45, 46) of the discs *32* can be swung along part-circular paths. The rig permits driving of larger tunnel areas than prior art rigs of comparable size and cost.

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Fig.1

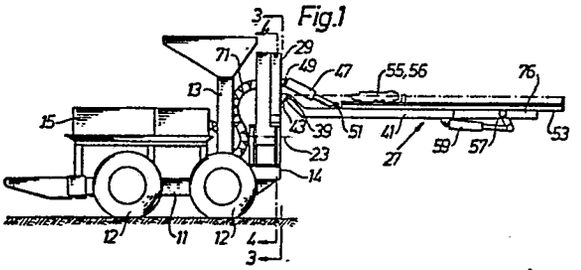


Fig.2

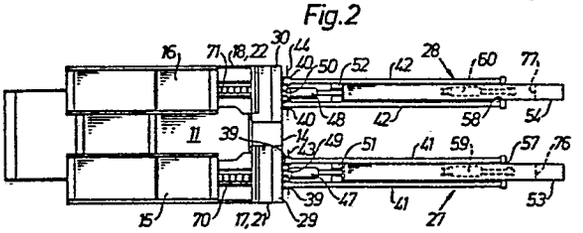
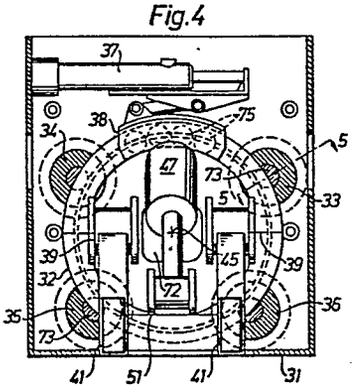


Fig.4



A rock drilling rig

This invention relates to a rock drilling rig for tunnel driving.

It is an object of the invention to provide a rock drilling rig by which larger tunnel areas can be drilled than can be drilled by means of prior art rigs of comparable size and costs.

The invention will be described with reference to the accompanying drawings.

Fig. 1 is a side view of a drilling rig according to the invention.

Fig. 2 is a top plan view of the rig shown in Fig. 1.

Fig. 3 is a front view seen as indicated by arrows 3-3 in Fig. 1, but two rock drill boom structures that are shown in Figs. 1 and 2 are not shown in Fig. 3.

Fig. 4 is a section taken along line 4-4 in Fig. 1.

Fig. 5 is a section taken along line 5-5 in Fig. 4.

Fig. 6 shows an alternative central mounting arrangement for a rock drill boom structure.

In Figs 1 - 3, a rock drilling rig for tunnel driving is shown. It comprises a chassis 11 on wheels 12. The chassis 11 carries a console 13 with an operator's panel, a bracket 14, and two removable power units 15,16. Two support units 17,18 are screwed to the bracket 14 and they comprise pivots 19,20 on which two rigid support plates 21,22 are pivot-

ably mounted. The axes 23,24 of the pivots 19,20 are horizontal and extend in the longitudinal direction of the chassis 11 and of the tunnel being driven. Two double-acting hydraulic cylinders 25,26 are coupled to swing the support plates 21,22 about the axes 23,24.

Two rock drill boom structures 27,28 are mounted on the support plates 21,22. They comprise mountings 29,30. Each one of these mountings 29,30 comprises a housing 31 in which a disc 32 is rotatably supported at its periphery by four supports 33-36, as can be seen in Fig. 4. The disc 32 can be turned in both directions by means of a double acting hydraulic cylinder 37 and a hydraulically controlled gripping unit 38, and it can be firmly arrested in its position by means of clamping bolts 73 that are carried by the supports 33 - 36. The clamping bolts 73 are biassed by springs 74 (Fig. 5) to clamp the disc 32 axially against the supports 33-- 36 and they can be hydraulically released. The gripping unit 38 comprises four hydraulically activated gripper pistons 75 that grip when subject to hydraulic pressure. The clamping bolts 73, the gripper pistons 75 and the hydraulic cylinder 37 are coupled in parallel to a common control valve as described in Applicant's European patent publication No. 0 003 006 which is incorporated herein by way of reference and which describes a mounting of this kind in more detail. The discs 32 carry two pairs of lugs 39,40 on which two booms 41,42 are pivotably mounted to pivot about pivots that form axes 43,44 that are perpendicular to the axes 45,46 of the discs 31. The rotation axes 45,46 of the discs 32, i.e. the control axes of the discs, are perpendicular to the axes 23,24 of the pivots 19,20. The booms 41,42 are swingable about the axes 43,44 by means of hydraulic cylinders 47,48 that are pivotably coupled between lugs 49,50 on the discs 32 and supports 51,52 on the booms 41,42.

Feed beams 53,54 for rock drills, e.g. hydraulic, percussive rock drills 55,56, are axially slidably mounted in holders 76,77 and the holders 76,77 are pivotably mounted on pivots 57,58 on the outer ends of the booms 41,42. The holders 76,77 and thereby the feed beams 53,54 are pivotable about the axes of the pivots 57,58 by means of hydraulic cylinders 59,60. mounted on the pivots 57,58. Then the feed beams 53,54 are axially slidably mounted in the holders 76,77. The feed beams 53,54 and the holders 76,77 are not illustrated in detail, but reference is made to Applicant's German patent publication DEOS 28 20325 which describes the feed beams and which is incorporated herein by way of reference.

Bundles 70,71 of hydraulic power lines for the feed beams 53,54 and for the rock drills 55,56 extend from the power units 15,16 through apertures 72 in the discs 32.

In Fig. 3 the rig is shown without the boom structures, and a possible tunnel profile is shown by lines 61 and the largest possible area to be drilled is shown by dotted lines 62.

When drilling the tunnel face, the operator preferably starts with the support plates 21,22 in their illustrated vertical positions, and drills most of the holes without swinging the support plates. Instead, he swings the booms 40,41 about the axes 43,44 and he rotates the discs 32 about the axes 45,46. Then he rotates the discs 32 until the axes 43,44 are horizontal. The operator proceeds now by indexing the support plates 21,22 about the axes 23,24 instead of turning the discs 31 in order to reach the places for the contour holes. The axes 45,46 of the discs 32 and the circular line about which the axes 45,46 move are indicated in Fig. 3.

The support plates 21,22 can be swung through 110 degrees by means of the hydraulic cylinder 25,26. As can be seen in Fig. 3, the support plates 21,22 can be swung into positions in which they extend obliquely downwardly-outwardly. They can also be swung past their vertical positions so that they are directed somewhat inwardly in order to reduce the overall width of the rig during transport.

Claims:

1. A rock drilling rig for tunnel driving comprising a chassis (11), a support (21,22) pivotably mounted on the chassis to pivot about a first axis (23,24) that extends in the longitudinal direction of the chassis, a boom (41,42) pivotably mounted on said support to pivot about a second axis (43,44) that is transverse to and off-set to said first axis, a feed beam (53,54) for a rock drill (55,56) pivotably mounted on the outer end of said boom and arranged to permit drilling of holes in said longitudinal direction, c h a r a c t e r i z e d i n that said boom (41,42) is pivotable about said second axis (43,44) such that it can be swung to extend obliquely radially outwardly with respect to said first axis (23,24).

2. A rock drilling rig according to claim 1 c h a r a c t e r - i z e d i n that said support (21, Fig. 4) on which the boom (41) is mounted is swingable in both directions from an upright position in which the inner end of the boom is located vertically above said first axis (23).

3. A rock drilling rig according to claim 1 in which there are two booms (41,42), each one mounted on a support (21,22) as defined in claim 1 c h a r a c t e r i z e d i n that the two supports (21,22) are mounted on each side of a central longitudinal vertical plane through the rig and swingable outwardly in opposite directions with respect to each other from upright positions in which the inner ends of the booms are located above said first axes (23,24).

4. A rock drilling rig for tunnel driving comprising a chassis (11), a support (21,22) pivotably mounted on the chassis to pivot about a first axis (23,24) that extends in the longitudinal direction of the chassis, a boom (41,42) pivotably mounted on said support to pivot about a second axis (43,44) that is transverse to and off-set to said first axis and a feed beam (53,54) for a rock drill (55,56) pivotably mounted on the outer end of said boom and arranged to permit drilling of holes in said longitudinal direction, c h a r a c t e r i z e d i n that said boom (41,42) is pivotably mounted on a member (32) to be pivotable about said second axis (43,44), and said member (32) is rotatably mounted on said support (21,22) to be rotatable about a third axis (45,46) that is substantially parallel with said first axis (23,24).

5. A rock drilling rig according to claim 4 c h a r a c t e r i z e d i n that said support on which the boom is mounted is swingable in both directions from an upright position in which said third axis (45,46) is located above said first axis (23,24) in a vertical plane through said first axis.

6. A rock drilling rig according to claim 5 in which there are two booms (41,42), each one mounted on a support (21,22) as defined in claim 2, c h a r a c t e r i z e d i n that the two supports(21,22) are mounted on each side of a central longitudinal vertical plane through the rig and swingable outwardly in opposite directions with respect to each other from upright positions in which said third axes are located above said first axes (23,24) in vertical planes through said first axes.

7. A rock drilling rig according to any one of claims 4 - 6, c h a r a c t e r i z e d i n that said member (32) on which the boom is mounted comprises a disc that is supported and guided at or near its periphery.

8. A rock drilling rig according to claim 7, c h a r a c t e r i z e d i n that said disc (32) has an aperture through which power lines for the feed beam (53,54) and said rock drill (55,56) extend.

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Fig.1

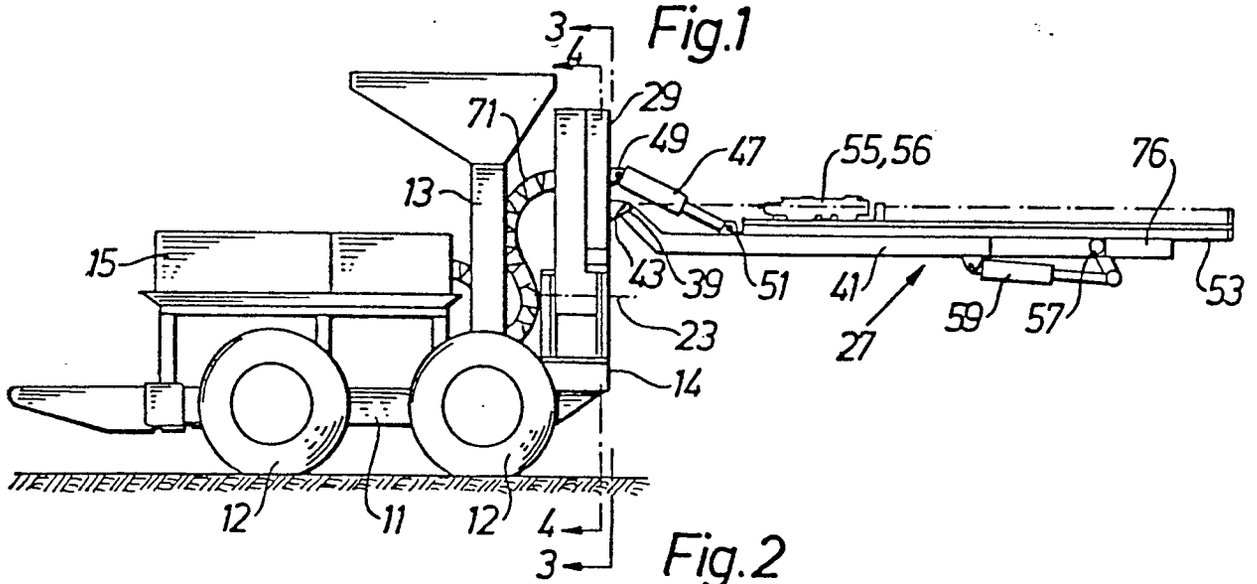

Fig.2

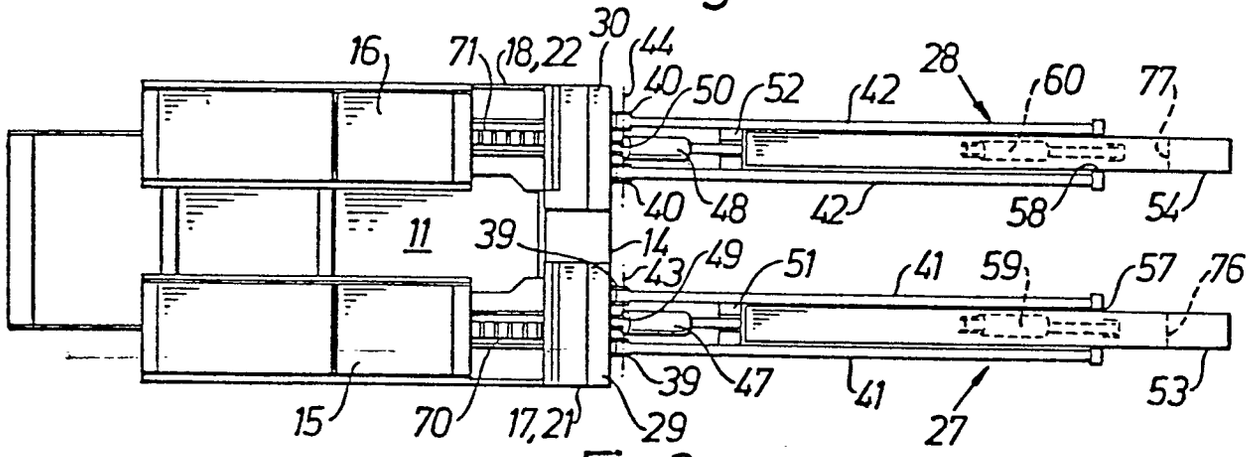

Fig.3

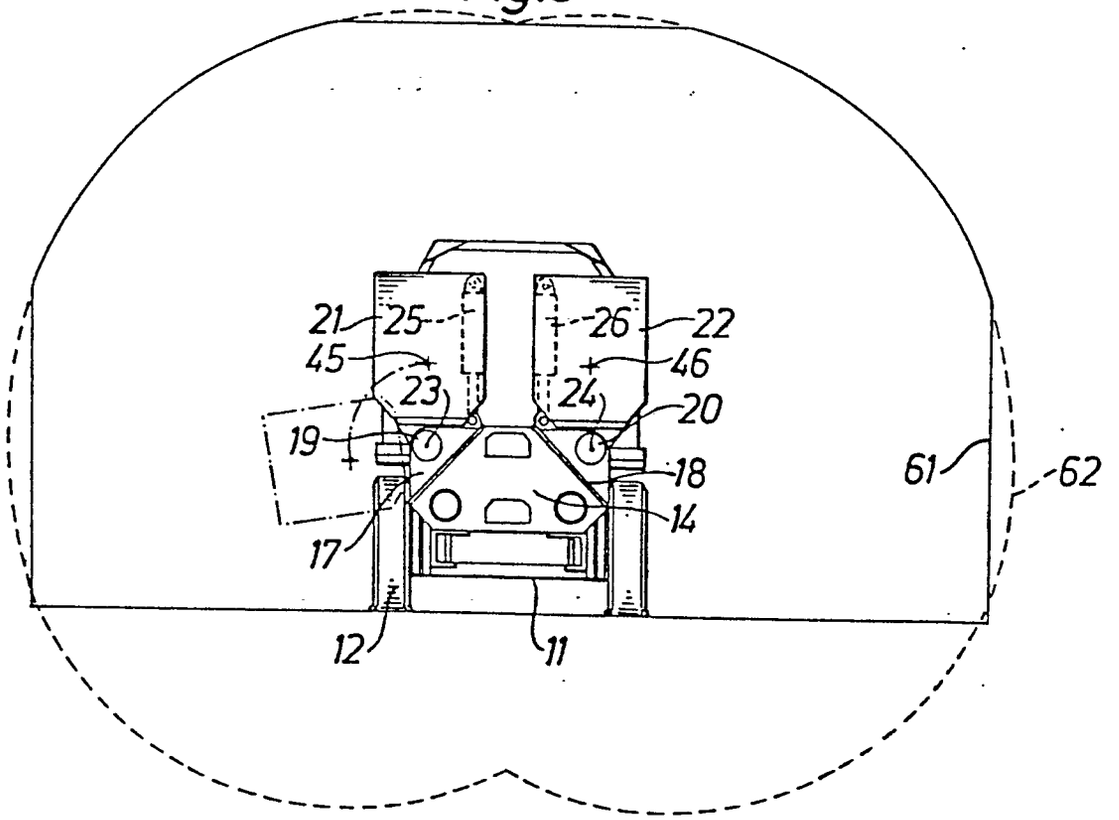

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Fig.4

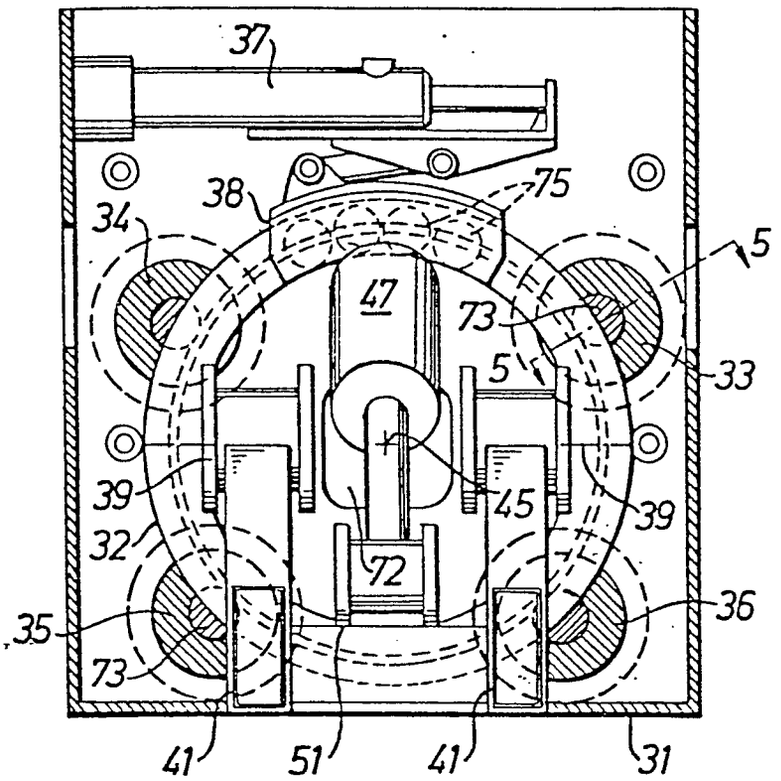


Fig.5

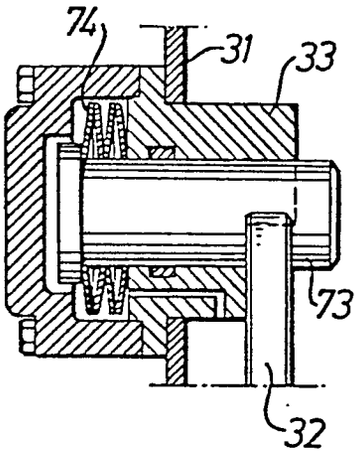
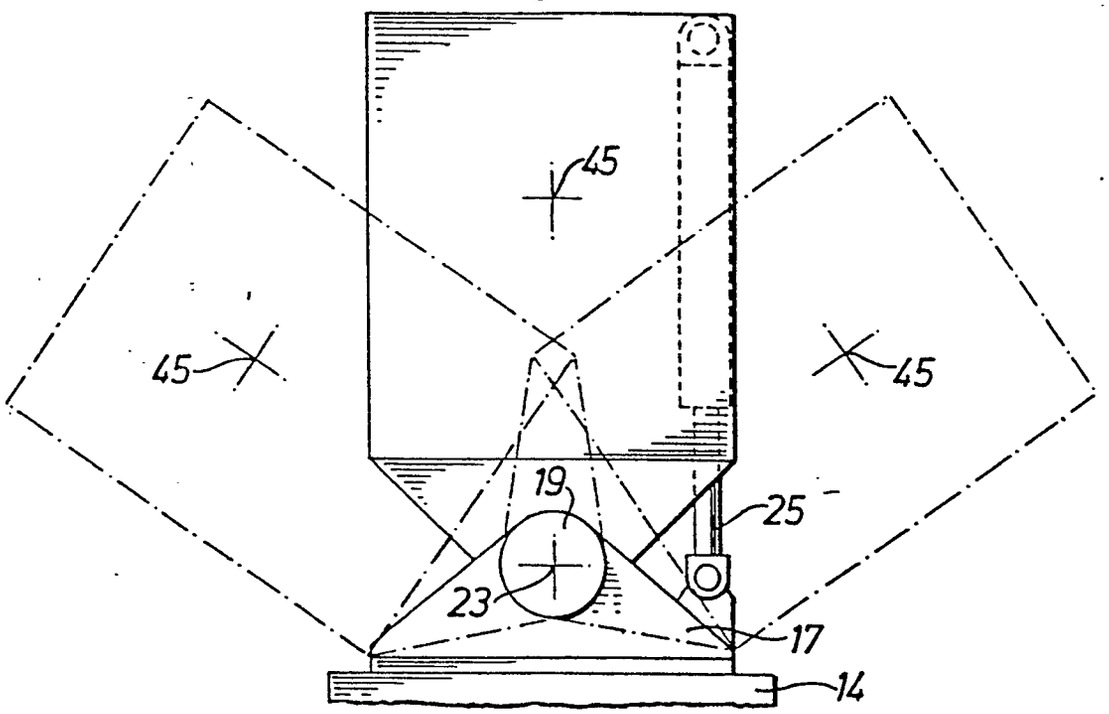


Fig.6



European Patent Office

EUROPEAN SEARCH REPORT

Application number

EP 81 85 0036.5

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.³)
	FR - A - 1 002 670 (NÜSSE & GRÄFER) * fig. 2 * --	1-6	E 21 C 11/02
	FR - E - 60 551 (NÜSSE & GRÄFER) * fig. 2 * --	1	
	GB - A - 249 259 (RIMMER) * fig. 2, 5 * --	7	
D	EP - A1 - 0 003 006 (ATLAS COPCO) * fig. 3 * --	7	TECHNICAL FIELDS SEARCHED (Int. Cl.³)
A	GB - A - 724 180 (HAUSHERR et al.) --		E 21 C 11/02
A	US - A - 4 067 398 (FRANZEN et al.) ----		

CATEGORY OF CITED DOCUMENTS

- X: particularly relevant
- A: technological background
- O: non-written disclosure
- P: intermediate document
- T: theory or principle underlying the invention
- E: conflicting application
- D: document cited in the application
- L: citation for other reasons

&: member of the same patent family, corresponding document

X The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Berlin	10-06-1981	ZAPP