(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
29 September 2005 (29.09.2005)

PCT

(10) International Publication Number
WO 2005/090738 A1

(51) International Patent Classification[7]: E21B 21/01, 21/00, 4/00

(21) International Application Number: PCT/IT2005/000120

(22) International Filing Date: 4 March 2005 (04.03.2005)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
PD 2004 U 000027 19 March 2004 (19.03.2004) IT

(71) Applicant *(for all designated States except US)*: **COMACCHIO S.R.L.** [IT/IT]; Via Callalta, 24/B, I-31039 Riese Pio X (TV) (IT).

(72) Inventors; and

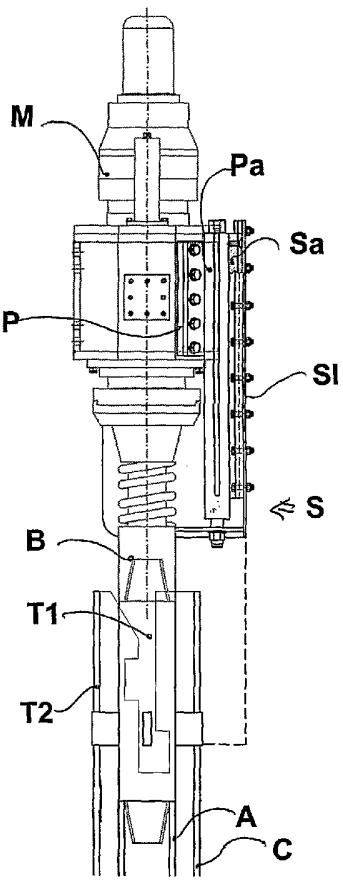
(75) Inventors/Applicants *(for US only)*: **COMACCHIO, Pasqualino** [IT/IT]; c/o Comacchio S.r.l., Via Callalta, 24/B, I-31039 Riese Pio X (TV) (IT). **COMACCHIO, Patrizio** [IT/IT]; c/o Comacchio S.r.l., Via Callalta, 24/B, I-31039 Riese Pio X (TV) (IT). **COMACCHIO, Renzo** [IT/IT]; c/o Comacchio S.r.l., Via Callalta, 24/B, I-31039 Riese Pio X (TV) (IT).

(74) Agent: **BENETTIN, Maurizio**; Via Sorio, 116, I-35141 Padova (IT).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

[Continued on next page]

(54) Title: DRILLING HEAD WITH PROTECTIVE SCREEN



(57) Abstract: A drill head for drilling machines having a protective screen (S) for conveying the drilling mud discharged from the drivers (TI, T2) of the sleeves and drill rods (A), wherein said screen (S) reduces the mud fallout area in the vicinity of the drilling zone. The screen panel (S) has a generically U-shaped cross section, or in any case such a cross section as to cover wholly or partly at least three sides around the area where the mud is discharged from the drivers (TI, T2) of the rod (A) and sleeve (C). The screen panel (S) is joined to the structure of the drill head by means of connection supports (P) and translation mechanisms (Pa), in such a way as to translate said screen panel (S) parallel to the rod (A) and the sleeve (C).

WO 2005/090738 A1

(84) **Designated States** *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

DRILLING HEAD WITH PROTECTIVE SCREEN

DESCRIPTION

The present patent concerns earth drilling machines with extraction of the drilled material by means of pressurised air/water flow with outer sleeve, and in particular it concerns the discharge of the drilled material and the extraction air/water.

Drilling machines are known, which are designed to obtain vertical or horizontal holes in the ground.

Said machines are provided with a drill head which, by means of the driver under the head, drives the drill rod and the outer tube also called sleeve.

The drill rod is rotated by a motor and is pushed downwards by a translation mechanism called head carriage.

In particular, the drill rod is hollow and permits the passage of air and/or water pumped under pressure inside said rod, thus obtaining drainage of the ground drilled.

As a result of the pressure received from the compressor or a water pump, the air/water and the earth drilled rise to the surface between said drill rod and said sleeve and are then discharged from their upper aperture, i.e. between the inner driver and the outer driver.

The upper aperture of the sleeve fixed to the driver, from which the drilling air/water is discharged together with the earth drilled, is located near the rotation head, which moves down along the slide by means of the head carriage.

During drilling the head, and therefore the drivers, are in an elevated position with respect to the ground.

The air/water under pressure and the earth drilled are discharged from the upper aperture, between the inner driver and the outer driver, spraying everything around, flooding and dirtying nearby machinery and the surrounding area (which is a nuisance if near boundaries or other constructions), soaking and dirtying the persons

passing by the drilling machine.

To remedy all the above-mentioned drawbacks, a new drill head provided with protective screen has been designed and implemented.

The aim of the new head with screen is to contain the jet of air/water and earth drilled.

A further aim of the new head with screen is to convey the jet of water and earth drilled in a pre-set direction or area.

A further aim of the new head with screen is to prevent, or in any case considerably limit, dispersion of the air/water and earth drilled in the area surrounding the drilling machine.

A further aim of the new head with screen is to prevent accidents to persons caused by the spreading of the air/water and earth drilled in the areas surrounding the drilling machine.

These and other aims, direct and complementary, are achieved by the new drill head provided with protective screen comprising at least two connection and adjustment supports and a screen panel.

The connection and adjustment supports are applied to the drill head motor, while the screen panel is applied and connected to said supports.

The connection between panel and supports is such as to permit the adjustment of the position of said panel on said supports, both laterally, moving it away from or near to the drill rod, and parallel to the drill rod, thus covering or exposing the area of the driver apertures.

Said panel of the new screen conveys the water and the earth that are drilled and discharged between the inner driver and the outer driver to a circumscribed or in any case controlled area.

During drilling the screen is lowered to the height of the driver apertures, while for maintenance the screen is raised with respect to the apertures of said drivers.

Appropriate mechanical-electrical-hydraulic devices provide for translation of the screen parallel to the drill rod.

The characteristics of the new drill head with protective screen will be illustrated in greater detail in the following description, making reference to the drawings attached as a non-limiting example.

Figure 1 is a view of the head with the motor (M) of the drill rod to which the plates (P) and the screen panel (S) are applied.

Figure 2 is a side/front view of the invention applied to the drill head.

Substantially, the rotating shaft (B), housed in and fixed to the drill head, is screw-connected to the inner driver (T1) of the drill rod (A). The inner driver (T1) is connected to the outer driver (T2) of the drill sleeve (C).

The protective screen comprises at least two connection supports (P), which can be applied to the drill head, and a screen panel (S).

Each of said connection supports (P) is provided with at least one pneumatic-hydraulic piston or other translation device (Pa) for application, fixing and adjustment of the screen panel (S).

Said translation device (Pa) is positioned parallel to the axis of the shaft (B), or parallel to the drill rod (A) and to the sleeve (C).

The screen panel (S) basically consists of a generically U-shaped metal sheet (Sl), in one single element or several elements, or in any case bent and shaped in order to cover and envelop the drivers (T1, T2) and the rotation shaft (B) on three sides.

The inner part of the metal sheet (Sl) is provided with connection elements (Sa) for application, connection and adjustment to the translation devices (Pa) of the connection supports (P).

The screen panel (S) is applied to said translation devices (Pa) of said connection supports (P) in order to envelop and cover the shaft (B) and the drivers (T1, T2) on at least three sides.

During connection and disconnection of the head to/from the drill rod (A) and the sleeve (C), the translation devices (Pa) of the protective screen keep the screen panel (S) raised (position shown in figure 2) for easy access to the parts to be connected.

Throughout the drilling operation, said translation devices (Pa) move the screen panel (S) downwards or towards the drill tip (figure 2, position shown by a broken line), thus aligning it with and covering the gap between drill rod (A) and the sleeve (C) where the air/water and earth drilled are discharged.

The water and earth drilled that are discharged from the sleeve (C) encounter the screen panel (S) which retains them and conveys them to the base of the drill rod or towards a pre-set point/direction.

The connection devices (Sa) of the screen panel (S) permit adjustment of the position and angle-direction of said screen panel (S) according to the specific position of the drill rod and the items present in the area around the drilling site.

Therefore, with reference to the preceding description and the attached drawings, the following claims are expressed.

CLAIMS

1. Drill head for drilling machines, characterised in that it comprises a protective screen (S) for conveying the drilling mud discharged from the drivers (T1, T2) of the sleeves and drill rods (A), and wherein said screen (S) reduces the mud fallout area in the vicinity of the drilling zone.

2. Drill head for drilling machines according to claim 1, characterised in that said screen panel (S) has a generically U-shaped cross section or such a cross section as to cover wholly or partly at least three sides around the area where the mud is discharged from the drivers (T1, T2) of the rod (A) and sleeve (C).

3. Drill head according to claims 1, 2, characterised in that it is provided with supports (P) for connection to the drill head, to the motor body (M) or to the outer structure of the motor (M), and wherein said screen panel (S) is joined to said connection supports (P) by means of translation mechanisms (Pa) designed to translate said screen panel (S) parallel to the rod (A) and sleeve (C).

4. Drill head according to claims 1, 2, characterised in that it is provided with devices for joining and adjustment (Sa) between the translation mechanisms (Pa) and the screen panel (S) or the connection supports (P), and wherein said joining and adjustment devices (Sa) are such as to permit adjustment of the reciprocal position between said connection supports (P) and said screen panel (S).

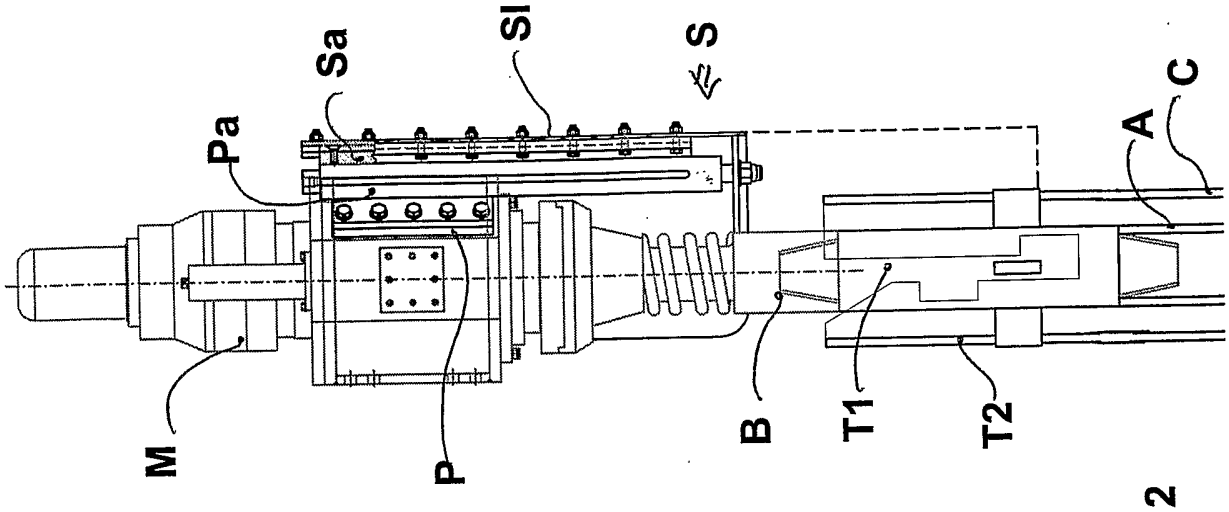


Fig. 2

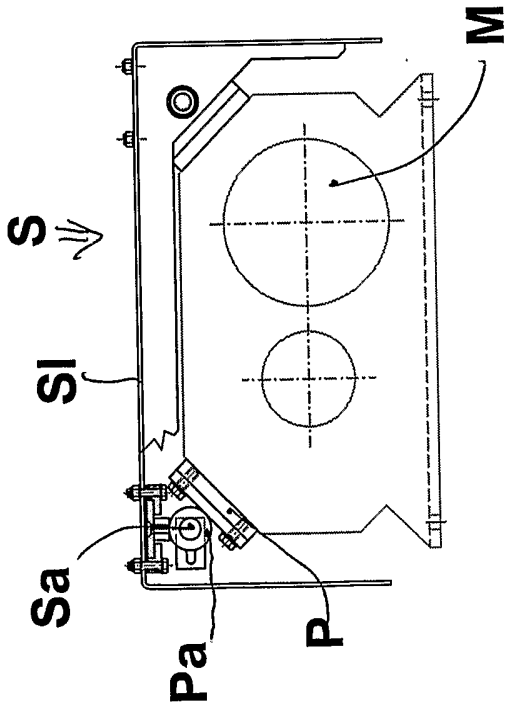


Fig. 1

INTERNATIONAL SEARCH REPORT

International Application No
PCT/IT2005/000120

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 E21B21/01 E21B21/00 E21B4/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 E21B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6 598 685 B1 (MASHBURN BENNY DONALD) 29 July 2003 (2003-07-29) column 1, line 55 - column 2, line 27; figure 1	1-4
A	US 5 379 852 A (STRANGE, JR. ET AL) 10 January 1995 (1995-01-10) abstract	1-4
A	US 4 495 073 A (BEIMGRABEN ET AL) 22 January 1985 (1985-01-22) abstract	1-4
A	US 3 997 009 A (FOX ET AL) 14 December 1976 (1976-12-14) abstract	1-4

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
1 June 2005	08/06/2005

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Morrish, S

Form PCT/ISA/210 (second sheet) (January 2004)

INTERNATIONAL SEARCH REPORT

International Application No
PCT/IT2005/000120

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6598685 B1	14-08-2003	US 2003150616 A1 AU 2003205369 A1 WO 03069123 A2	14-08-2003 04-09-2003 21-08-2003
US 5379852 A	10-01-1995	NONE	
US 4495073 A	22-01-1985	NONE	
US 3997009 A	14-12-1976	NONE	