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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
6 November 2014 (06.11.2014)

WIPO | PCT

(10) International Publication Number
WO 2014/177253 A2

(51) International Patent Classification:
E21C 27/34 (2006.01)

(21) International Application Number:
PCT/EP2014/001045

(22) International Filing Date:
17 April 2014 (17.04.2014)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
13165990.6 30 April 2013 (30.04.2013) EP

(71) Applicant: **CATERPILLAR GLOBAL MINING EUROPE GMBH** [DE/DE]; Industriestrasse 1, 44534 Lünen (DE).

(72) Inventors: **SIEPENKORT, Gerhard**; Marie-Christ-Platz 2, 44534 Lünen (DE). **HESSE, Norbert**; Bahnhofstrasse 9, 45731 Waltrop (DE). **TILLESSEN, Uwe**; Südkamener Strasse 73, 59174 Kamen (DE). **DUHNKE, Klaus**; Gutenbergstrasse 9, 59368 Werne (DE). **BETTERMANN, Diedrich**; Fröndenberger Str. 26, 59427 Unna (DE).

(74) Agent: **KRAMER BARSKE SCHMIDTCHEN**; Landsberger Str. 300, 80687 Munich (DE).

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

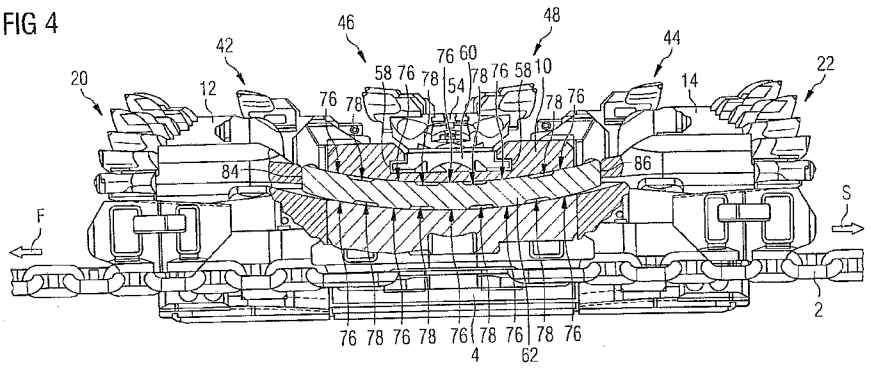
(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— *without international search report and to be republished upon receipt of that report (Rule 48.2(g))*

(54) Title: MINING PLOW WITH PUSHROD

FIG 4



(57) Abstract: A mining plow (1) for a longwall mining system in an underground mine is disclosed. The mining plow (1) comprises a plow body (10) and a pushrod (62). The pushrod (62) is displaceably arranged within the plow body (10) to form a positive coupling between a first cutting bit carrier (12) pivotably supported on the plow body (10) via a first pivot pin and a second cutting bit carrier (14) pivotably supported on the plow body (10) via a second pivot pin. The pushrod (62) is arch-shaped to pass around a central roof cutting bit carrier assembly which may facilitate a wear-protected arrangement of the pushrod (62) within the plow body (10).

WO 2014/177253 A2

Description

MINING PLOW WITH PUSHROD

Technical Field

[01] The present disclosure generally relates to mining plows, and more particularly to mining plows used in longwall mining systems in underground mines.

Background

[02] Mining plows are extraction machines used in longwall mining, in particular, in longwall mining of medium and thin material thickness seams. The mining plow is guided on a face conveyer and cuts along the longwall face in a reciprocating manner to extract material. The extracted material drops onto the face conveyer which transports the extracted material to a drift or gate.

[03] Generally, mining plows comprise cutting bit carriers equipped with several cutting bits to extract material from the longwall face. In certain types of mining plows, two of those cutting bit carriers are arranged on opposing ends of the mining plow, both cutting bit carriers being mirror symmetrically designed with respect to one another. Said both cutting bit carriers can be pivotably mounted to a plow body of the mining plow via pivot pins. A change in the pivoting position of the cutting bit carriers is achieved via a positive coupling between both cutting bit carriers through a pushrod. The pushrod ensures that only the cutting bit carrier being the leading cutting bit carrier in a respective travel direction cuts along the longwall face, whereas the other cutting bit carrier

being the trailing cutting bit carrier in the respective travel direction performs no mining work.

[04] For a low profile slim mining plow for cutting small material thickness seams, DE 20 2010 000 455 U1 exemplary discloses a pushrod slidably arranged between two pivotably mounted cutting bit carriers. The pushrod is formed as a straight rod and is arranged outside of a plow body of the mining plow.

[05] Furthermore, US 4,403,809 A discloses a mining plow. The plow includes groups of main cutters mounted on a respective carrier pivotably mounted on a plow body. Additionally, two separate floor cutters are provided. In one embodiment, those floor cutters are mounted in carriers fixed to or integrally formed with an arcuate slide plate that is arranged outside of the plow body. A setting device including a tooth wheel meshing with racks provided at the slide plate positions the floor cutters in their rest and working positions.

[06] The present disclosure is directed, at least in part, to improving or overcoming one or more aspects of prior systems.

Summary of the Disclosure

[07] According to a first aspect of the present disclosure, a mining plow is disclosed. The mining plow may be configured to be used in a longwall mining system in an underground mine, and may comprise a plow body constructed to be guided at a conveyor. The plow body may have a first end with a first pivot pin, and may have a second end with a second pivot pin, the second end opposing the first end. The mining plow may further comprise a first cutting bit carrier pivotably supported on the first pivot pin, a second cutting bit carrier pivotably supported on the second pivot pin, a central roof cutting bit carrier assembly which is at least partially arranged between the first cutting bit carrier and the second cutting bit carrier, and a pushrod displaceably arranged within the plow body to form a positive coupling between the first cutting bit carrier and the

second cutting bit carrier. The pushrod may be arch-shaped to pass around the central roof cutting bit carrier assembly.

[08] Other features and aspects of this disclosure will be apparent from the following description and the accompanying drawings.

Brief Description of the Drawings

[09] Fig. 1 shows a view of the front side of an exemplary disclosed mining plow, the front side facing towards the longwall face during operation;

Fig. 2 shows a view of the traverse side and front side of a plow body of the exemplary disclosed mining plow;

Fig. 3 shows a view of the bottom side of the exemplary disclosed mining plow, the bottom side facing towards the bottom floor during operation;

Fig. 4 shows a view of the bottom side of the exemplary disclosed mining plow, in which a region around a pushrod is shown as a cross-sectional view along cutting plane Z-Z shown in Fig. 1;

Fig. 5 shows a view of a traverse side of the exemplary disclosed mining plow, in which a region around a pushrod is shown as a cross-sectional view along cutting plane A-A shown in Fig. 1;

Fig. 6 shows an isometric view of an exemplary disclosed pushrod;

Fig. 7 shows a view on a top side of the exemplary disclosed pushrod, the top side facing towards the roof during operation;

Fig. 8 shows a view on a longitudinal side of the exemplary disclosed pushrod; and

Fig. 9 shows a view on a traverse side of the exemplary disclosed pushrod.

Detailed Description

[10] The following is a detailed description of exemplary embodiments of the present disclosure. The exemplary embodiments described therein and illustrated in the drawings are intended to teach the principles of the present disclosure, enabling those of ordinary skill in the art to implement and use the present disclosure in many different environments and for many different applications. Therefore, the exemplary embodiments are not intended to be, and should not be considered as, a limiting description of the scope of patent protection. Rather, the scope of patent protection shall be defined by the appended claims.

[11] The present disclosure is based in part on the realization that an arrangement of a pushrod within a plow body of a mining plow may considerably reduce wear of the pushrod. The plow body may protect the pushrod from environmental influences during operation of the mining plow. For example, dirt and flying material rocks may considerably cause wear and damages of the pushrod if arranged outside of the plow body of the mining plow.

[12] The present disclosure may be further based in part on the realization that assembly restrictions of mining plows, in particular of low profile slim mining plows, complicate an arrangement of a pushrod within a plow body of the mining plow. Specifically, space required for fitting the pushrod may be already occupied by other parts and components of the mining plow. Accommodating the pushrod within the plow body may result in an enlarged plow body of the mining plow (particularly for low profile slim plows) to provide sufficient space for all components. However, such an enlarged plow body may lead to a deteriorated load behavior of the mining plow.

[13] In the following, an arrangement of a pushrod within a plow body of a mining plow is disclosed. The proposed design may even cope with high assembly restrictions of low profile slim mining plows to facilitate a protected arrangement of the pushrod within the plow body without enlarging the same.

[14] In another aspect of the present disclosure, a solution which may reduce wear of a pushrod and a pushrod guiding recess within a plow body of a mining plow is disclosed.

[15] A mining plow according to the present disclosure is indicated by reference sign 1 in Figs. 1, and 3 to 5.

[16] Mining plow 1 can be moved using a plow chain 2 (only shown in part) along plow guides of a revolving conveyor, namely a face conveyor (not shown), extending along a longwall face in an underground mine, for example, along a length of up to 500 m.

[17] To facilitate a guidance of mining plow 1 during movement, a plow body 10 of mining plow 1 is constructed to be guided at the revolving conveyor. As can be seen in Fig. 5, mining plow 1 is guided via a guide shoe 4 and a guide recess 6 on guide bars (not shown) being part of the plow guide along the face conveyor. Both guide shoe 4 and guide recess 6 are arranged on the rear side (also referred to as goaf side) of mining plow 1. Plow chain 2 is connected to mining plow 1 via a pulling device 8 which serves as a catch for plow chain 2. Said pulling device 8 comprises chain swivels and cleaning wedges and is disposed in a recess of the mining plow structure on an underside of plow body 10. To move mining plow 1 along the plow guide of the face conveyor, plow chain 2 is pulled in a pulling direction, which may be either a first travel direction (as indicated by arrow F) or a second travel direction (as indicated by arrow S).

[18] Mining plow 1 is equipped with two floor cutting bit carriers (also referred to as scraper arms), namely a first cutting bit carrier 12 and a second cutting bit carrier 14, to perform mining work in both travel directions (arrows F and S). Both cutting bit carriers 12 and 14 comprise a cutting bit column 16 and 18, respectively. Each cutting bit column 16 and 18 includes a plurality of cutting bits 20, 22 for extracting material from the longwall face during movement of mining plow 1 along the same.

[19] Turning to Fig. 2, plow body 10 is shown. A first pivot pin 28 at a first end 24 of plow body 10 is arranged to pivotably support first cutting bit carrier 12 (see Fig. 1). Likewise, second cutting bit carrier 14 is pivotably supported on plow body 10 via a second pivot pin 30 at a second end 26 of plow body 10. The weight of cutting bit carriers 12 and 14 rests on oblique first and second supporting surfaces 32 and 34 that are oriented concentrically about the pivot axis of the respective pivot pin 28, 30.

[20] Mining plow 1 further comprises a detachable attachment member 36 to increase a height of mining plow 1, and thus to increase the extraction height. Attachment member 36 is equipped with a first ancillary cutting bit column 38 and a second ancillary cutting bit column 40, both comprising a plurality of cutting bits 42, 44 for each travel direction (arrows F and S).

[21] Roof cutting along the longwall face is facilitated by a plurality of cutting bits 46, 48 carried in two rows (also referred to as a first roof cutting bit column 50 and a second roof cutting bit column 52) by roof cutting bit carrier 54, altogether forming part of a roof cutting bit carrier assembly 56. Roof cutting bit carrier assembly 56 further comprises groove guides 58, which are formed as part of a recess at a central front section of plow body 10 between first cutting bit carrier 12 and second cutting bit carrier 14. Said recess extends along a height direction (as indicated by arrow H) in plow base 10. By means of a height adjustment device 60, which also forms part of roof cutting bit carrier assembly 56, roof cutting bit carrier 54 is fastened to plow body 10 in a height-adjustable manner and guided in grooves 58 such that roof cutting bit carrier 54 can be displaced vertically in height direction (arrow H) along groove guides 58 which, therefore, also extend in the height direction (arrow H) of mining plow 1.

[22] A pushrod 62 is displaceably arranged within plow body 10 to form a positive coupling between first cutting bit carrier 12 and second cutting bit carrier 14. To assemble pushrod 62, a pushrod guiding recess 64 is provided. Pushrod 62 can slide within pushrod guiding recess 64 extending through plow

body 10 from first end 24 to second end 26. Pushrod 62 serves to disengage second cutting bit carrier 14 from the longwall face as first cutting bit carrier 12 cuts along the longwall face during travel of mining plow 1 in first travel direction (arrow F). As first cutting bit carrier 12 is engaged with the longwall face, it thereby pushes against an end of pushrod 62 causing a displacement of the same within pushrod guiding recess 64 to pivot second cutting bit carrier 14 in a disengaged position from the longwall face such that second cutting bit carrier 14 does not perform any mining work in first travel direction (arrow F). Likewise, in case mining plow 1 travels in second travel direction S, pushrod 62 is pushed by second cutting bit carrier 14, which performs mining work in the second travel direction (arrow S), against first cutting bit carrier 12 to disengage the same. Pivoting of first cutting bit carrier 12 and second cutting bit carrier 14 is facilitated by pivot pins 28, 30 and oblique surfaces 32, 34 as already described above in conjunction with Fig. 2.

[23] Both, pushrod 62 and pushrod guiding recess 64 are arch-shaped along their longitudinal axis to pass around central roof cutting bit carrier assembly 56 being partly arranged between first cutting bit carrier 12 and second cutting bit carrier 14 as can be seen, for example, in Fig. 4.

[24] Pushrod guiding recess 64 opens on an underside of plow body 10 in a bottom opening 66 of plow body 10. A cover 68 is installed in bottom opening 66 and secured thereto, for example, via weld joints. Similar to pushrod 62 and pushrod guiding recess 64, cover 68 is formed in an arch-shape.

[25] Cover 68 comprises a plurality of cleaning throughholes 70, each extending from a top side of cover 68 to a bottom side of cover 68. Cleaning throughholes 70 are configured to guide particles and dirt within pushrod guiding recess 64 to the environment. A quantity of cleaning throughholes 70 is not limited to the shown plurality of throughholes. Instead, cover 68 may comprise at least one cleaning throughhole 70.

[26] Turning now to Figs. 6 to 9, exemplary disclosed pushrod 62 is described in detail.

[27] Pushrod 62 is formed in an arch-shape and comprises a substantially rectangular cross-section. Alternatively, pushrod 62 may comprise any other cross section, for example, a substantially circular cross-section. Pushrod 62 extends longitudinally between a first end 72 and a second end 74. Pushrod 62 may be made of any suitable material including, but not limited to, quenched and tempered steel such as 42CrMo4V 900-1050.

[28] Along pushrod 62, a plurality of side guiding walls 76 and a plurality of side cleaning recesses 78 are provided in an alternating manner. In the shown embodiment, side guiding walls 76 and side cleaning recesses 78 are provided at both opposing longitudinal sides of pushrod 62. Likewise, on a bottom side of pushrod 62, a plurality of bottom guiding walls 82 and a plurality of bottom cleaning recesses 80 are provided in an alternating manner.

[29] Side guiding walls 76 are raised structures between side cleaning recesses 78 as bottom guiding walls 82 are raised structures between bottom cleaning recesses 80. For example, a depth of cleaning recesses 78, 80 may be within a range from 10 mm to 20 mm. Guiding walls 76, 82 are configured to guide pushrod 62 within plow body 10 and to facilitate a smooth and low friction movement of pushrod 62 within pushrod guiding recess 64.

[30] In some embodiments, guiding walls 76 and 82 may be machined to provide improved sliding characteristics, and/or may be coated with a sliding coating to improve sliding properties of pushrod 62 within pushrod guiding recess 64 provided in plow body 10. Guiding walls 76, 82 may vary in width and length. For example, a width of guiding walls 76, 82 may be within a range from 80 mm to 180 mm, and a length of guiding walls 76, 82 may be within a range from 100 mm to 300 mm.

[31] Cleaning recesses 78, 80 are configured to collect dirt and particles intruded into pushrod guiding recess 64 during operation of mining plow

1 cutting along the longwall face. The collected dirt and particles are guided via bottom cleaning recesses 80 and cleaning throughholes 70 provided in cover 68 to the environment, namely the bottom floor below mining plow 1. Cleaning recesses 78, 80 may vary in width and length. For example, a width of cleaning recesses 78, 80 may be within a range from 80 mm to 180 mm and a length of cleaning recesses 78, 80 may be within a range from 50 mm to 200 mm.

[32] Pushrod 62 further includes chamfered edges at transitions between an upper side and longitudinal sides of pushrod 62, and between the bottom side and longitudinal sides of pushrod 62. At the upper side of pushrod 62, an arch shaped bar 83 is formed which extends longitudinally between first end 72 and second end 74.

[33] A first cutting bit carrier contact wall 84 configured to provide the positive coupling to first cutting bit carrier 12 is provided at first end 72 of pushrod 62. Similarly, a second cutting bit carrier contact wall 86 configured to provide the positive coupling to second cutting bit carrier 14 is provided at second end 74 of pushrod 62. Both, first cutting bit carrier contact wall 84 and second cutting bit carrier contact wall 86 are at least partially convex shaped facilitating a smooth pivoting of respective cutting bit carriers 12, 14. Both cutting bit carrier contact walls 84, 86 may be hardened.

[34] A longitudinal length of pushrod 62 may be within a range from 600 mm to 1800 mm and an arch-angle measured between opposing cutting bit carrier contact walls 84 and 86 may be within a range from 10° to 30°, which may, for example, depend on the assembly restrictions caused by presence of central roof cutting bit carrier assembly 56 occupying space within plow body 10.

Industrial Applicability

[35] The above described mining plow 1 with pushrod 62 is configured to be used in a longwall mining system in an underground mine.

[36] Particularly, the proposed arch-shaped design of pushrod 62 and pushrod guiding recess 64 may facilitate a slim design of plow body 10 as a result of both pushrod 62 and pushrod guiding recess 64 extending around central roof cutting bit carrier assembly 56, which requires space within plow body 10. In contrast, a straight pushrod arranged within a plow body would require an extended dimension of the plow body as a central roof cutting bit carrier assembly may otherwise block a direct connection between cutting bit carriers for both travel directions. An enlarged plow body may lead to an unwished deteriorated load behavior of the mining plow during operation.

[37] Furthermore, the proposed solution is particularly applicable in low profile slim plows, which may generally have increased assembly restrictions, and deteriorated load behavior due to enlarged dimensions may be particularly unwished.

[38] Moreover, a plow body with enlarged dimensions, particularly with respect to the traverse side, may require extended shield canopies of a plurality of shield supports extending along the longwall face to keep the same open by supporting the roof. Extended shield canopies may further affect the available supporting forces of each shield support at a tip of the shield canopy.

[39] The proposed design allows a protected arrangement of pushrod 62 within plow body 10 while maintaining a slim design of plow body 10. An arrangement of a pushrod outside a plow body of a mining plow, which allows the pushrod to be formed in a straight manner, may in contrast considerably increase wear of the pushrod due to the impact of extracted pieces of rock, which may fly around or lying in the way of mining plow 1 during operation.

[40] In another aspect, cleaning recesses 78, 80 facilitate maintaining only a small quantity of dirt and particles within pushrod guiding recess 64. Said dirt and particles may intrude into pushrod guiding recess 64 during operation of mining plow 1. Without cleaning recesses 78 and 80, dirt and particles may accumulate within pushrod guiding recess 64, which may lead to an increased

wear of pushrod 62 and pushrod guiding recess 64. Note that cleaning recesses 78, 80 in combination with cleaning throughholes 70 provided in cover 68 as exemplary disclosed herein may be also applicable in mining plows with pushrods being formed as a straight rod. According to this aspect, a pushrod and a mining plow comprising the pushrod may comprise all the features described herein (individually, in part), except the arch-shapes of pushrod 62, pushrod guiding recess 64, bar 83, opening 66 and cover 68. Instead, a pushrod may be formed as a straight rod, for example, with a straight bar, and a straight pushrod guiding recess may be provided in a plow body covered by a straight cover with at least one cleaning throughhole.

[41] According to the above mentioned aspect, a mining plow may be configured to be used in a longwall mining system in an underground mine, and may comprise a plow body constructed to be guided at a conveyor. The plow body may have a first end with a first pivot pin and a second end with a second pivot pin, the second end opposing the first end. A first cutting bit carrier may be pivotably supported on the first pivot pin, a second cutting bit carrier may be pivotably supported on the second pivot pin, a central roof cutting bit carrier assembly may be at least partially arranged between the first cutting bit carrier and the second cutting bit carrier, and a pushrod may be displaceably arranged within the plow body to form a positive coupling between the first cutting bit carrier and the second cutting bit carrier. The pushrod may comprise a plurality of cleaning recesses configured to collect dirt and particles intruded into a pushrod guiding recess during operation of the mining plow.

[42] As will be appreciated by a person skilled in the art, the above mentioned aspect can be further developed with some embodiments as exemplary disclosed herein, including, but not limited to, side cleaning recesses, bottom cleaning recesses, side guiding walls, and/or bottom guiding walls.

[43] In some embodiment of the above mentioned aspect, the pushrod may comprises a plurality of side cleaning recesses provided at opposing

longitudinal sides of the pushrod, and/or a plurality of bottom cleaning recesses provided at a bottom side of the pushrod.

[44] In some embodiment of the above mentioned aspect, a pushrod guiding recess may open on an underside of the plow body in a bottom opening, and the mining plow may further comprise a cover installed in the bottom opening. The cover may comprise at least one cleaning throughhole configured to guide dirt and particles within the pushrod guiding recess to the environment.

[45] In some embodiments of the above mentioned aspect, the pushrod may comprise a substantially rectangular cross-section, or a substantially circular cross-section.

[46] Although the preferred embodiments of this invention have been described herein, improvements and modifications may be incorporated without departing from the scope of the following claims.

Claims

1. A mining plow (1) configured to be used in a longwall mining system in an underground mine, comprising:

a plow body (10) constructed to be guided at a conveyor, the plow body (10) having a first end (24) with a first pivot pin (28) and a second end (26) with a second pivot pin (30), the second end (26) opposing the first end (24);

a first cutting bit carrier (12) pivotably supported on the first pivot pin (28);

a second cutting bit carrier (14) pivotably supported on the second pivot pin (30);

a central roof cutting bit carrier assembly (56) at least partially arranged between the first cutting bit carrier (12) and the second cutting bit carrier (14); and

a pushrod (62) displaceably arranged within the plow body (10) to form a positive coupling between the first cutting bit carrier (12) and the second cutting bit carrier (14), the pushrod (62) being arch-shaped to pass around the central roof cutting bit carrier assembly (56).

2. The mining plow (1) of claim 1, wherein the central roof cutting bit carrier assembly (56) comprises:

groove guides (58) at least partially arranged between the first cutting bit carrier (12) and the second cutting bit carrier (14); and

a height adjustment device (60) guided in the groove guides (58).

3. The mining plow (1) of claim 1 or 2, wherein the plow body (10) comprises a pushrod guiding recess (64) being arch shaped and

extending around the central roof cutting bit carrier assembly (56) to accommodate the pushrod (62).

4. The mining plow (1) of any one of the preceding claims, wherein the pushrod (62) comprises a plurality of guiding walls (76, 82) configured to guide the pushrod (62) within the plow body (10).

5. The mining plow (1) of any one of the preceding claims, wherein the pushrod (62) comprises a plurality of side guiding walls (76) provided at opposing longitudinal sides of the pushrod (62), and a plurality of bottom guiding walls (82) provided at a bottom side of the pushrod (62).

6. The mining plow (1) of any one of the preceding claims, wherein the pushrod (62) comprises a plurality of cleaning recesses (78, 80) configured to collect dirt and particles intruded into a pushrod guiding recess (64) during operation of the mining plow (1).

7. The mining plow (1) of any one of the preceding claims, wherein the pushrod (62) comprises a plurality of side cleaning recesses (78) provided at opposing longitudinal sides of the pushrod (62), and a plurality of bottom cleaning recesses (80) provided at a bottom side of the pushrod (62).

8. The mining plow (1) of any one of claims 3 to 7, wherein the pushrod guiding recess (64) opens on an underside of the plow body (10) in a bottom opening (66), and the mining plow (1) further comprises a cover (68) installed in the bottom opening (66).

9. The mining plow (1) of claim 8, wherein the cover (68) comprises at least one cleaning throughhole (70) configured to guide dirt and particles within the pushrod guiding recess (64) to the environment.

10. The mining plow (1) of claim 8 or 9, wherein the cover (68) is arch-shaped.

11. The mining plow (1) of any one of the preceding claims, wherein the pushrod (62) comprises:

a first cutting bit carrier contact wall (84) at a first end (72) of the pushrod (62), the first cutting bit carrier contact wall (84) being at least partially convex shaped; and

a second cutting bit carrier contact wall (86) at a second end (74) of the pushrod (62), the second end (74) opposing the first end (72), and the second cutting bit carrier contact wall (86) being at least partially convex shaped.

12. The mining plow (1) of claim 11, wherein the first cutting bit carrier contact wall (84) and/or the second cutting bit carrier contact wall (86) is/are hardened.

13. The mining plow (1) of any one of the preceding claims, wherein the pushrod (62) comprises a substantially rectangular cross-section, or a substantially circular cross-section.

14. The mining plow (1) of any one of the preceding claims, wherein the pushrod (62) is made of quenched and tempered steel.

15. The mining plow (1) of any one of the preceding claims, wherein a plurality of guiding walls (76, 82) of the pushrod (62) is coated with a sliding coating.

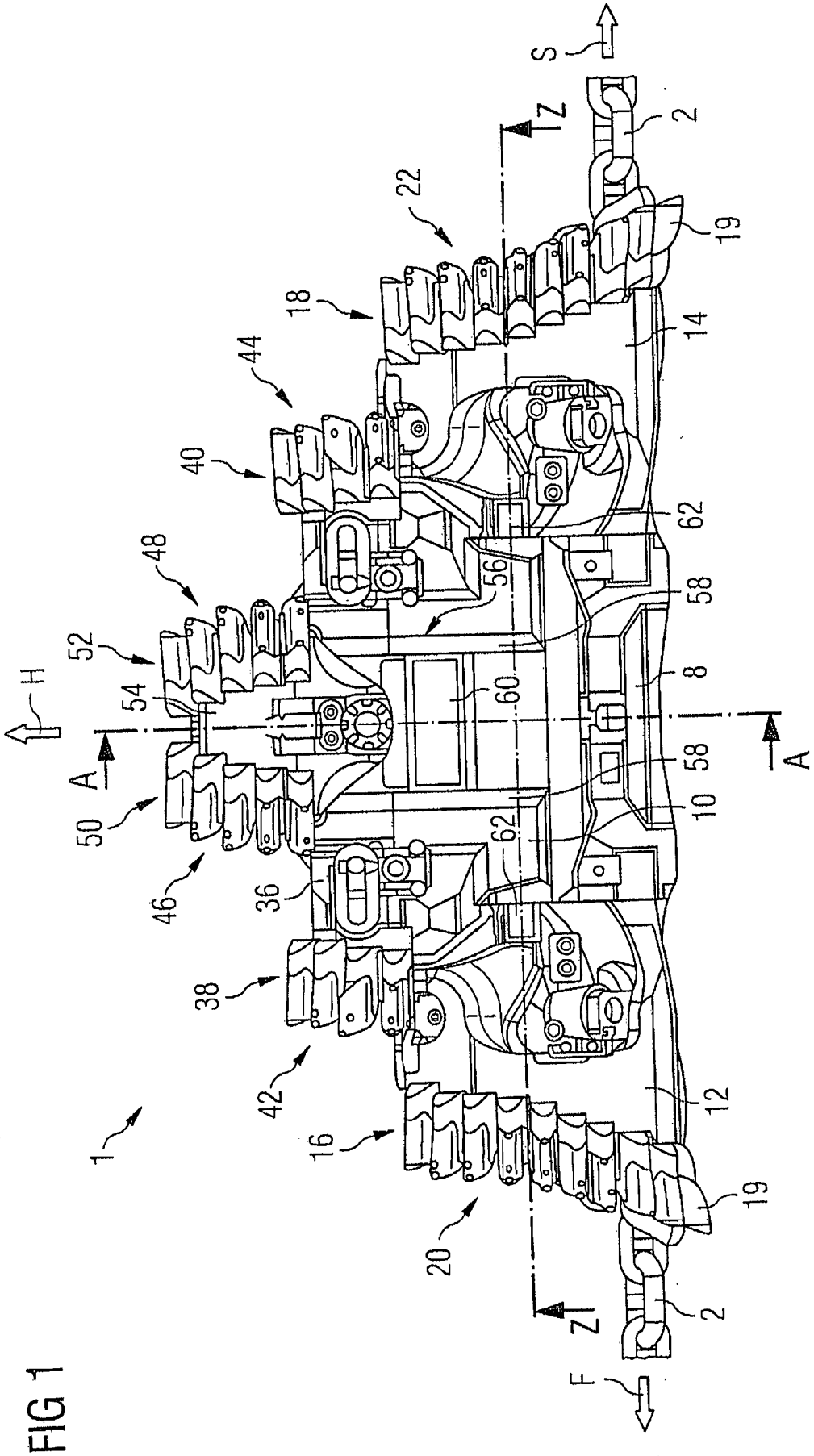

S
Z
Z
2
22
19
18
14
44
40
62
48
56
58
52
H
54
60
8
A
A
58
50
10
62
46
36
38
42
12
1
16
19
20
2
F

FIG 1

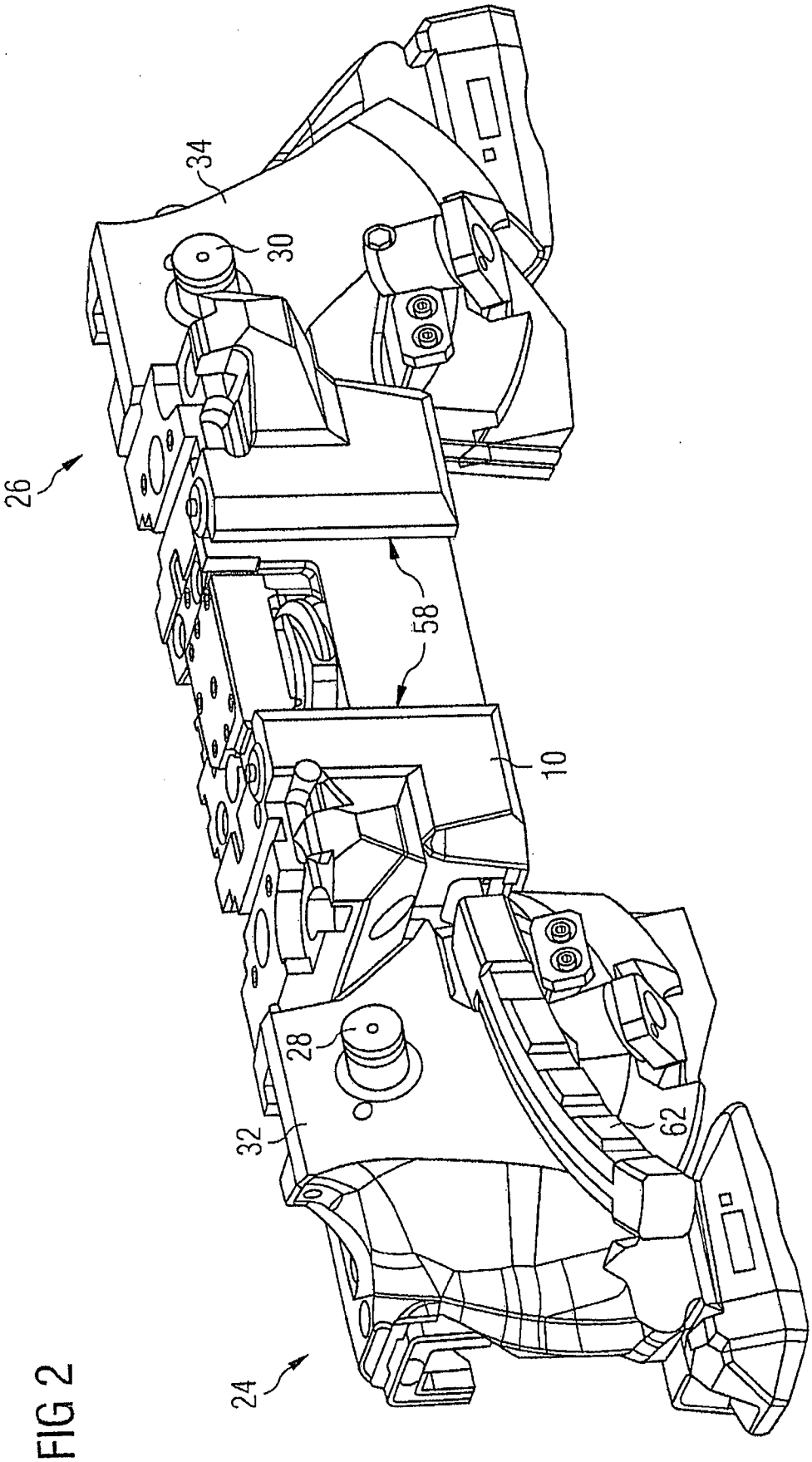


FIG 2

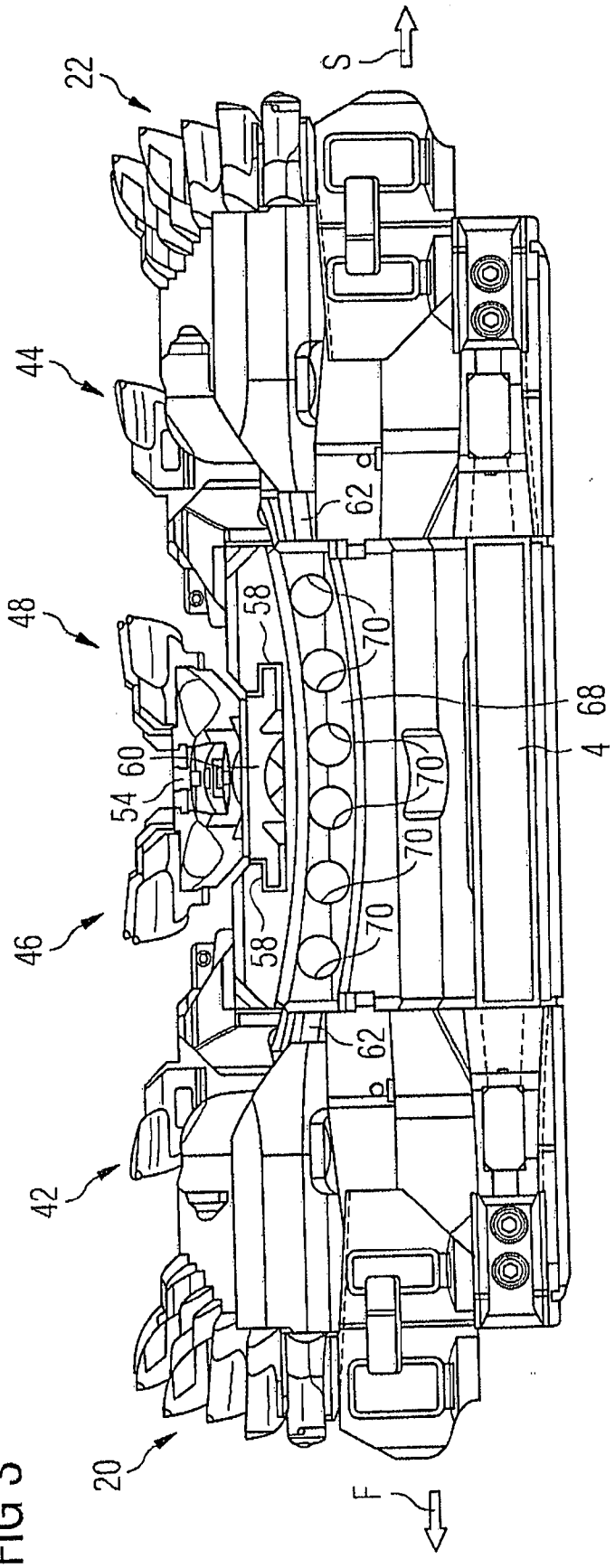


FIG 3

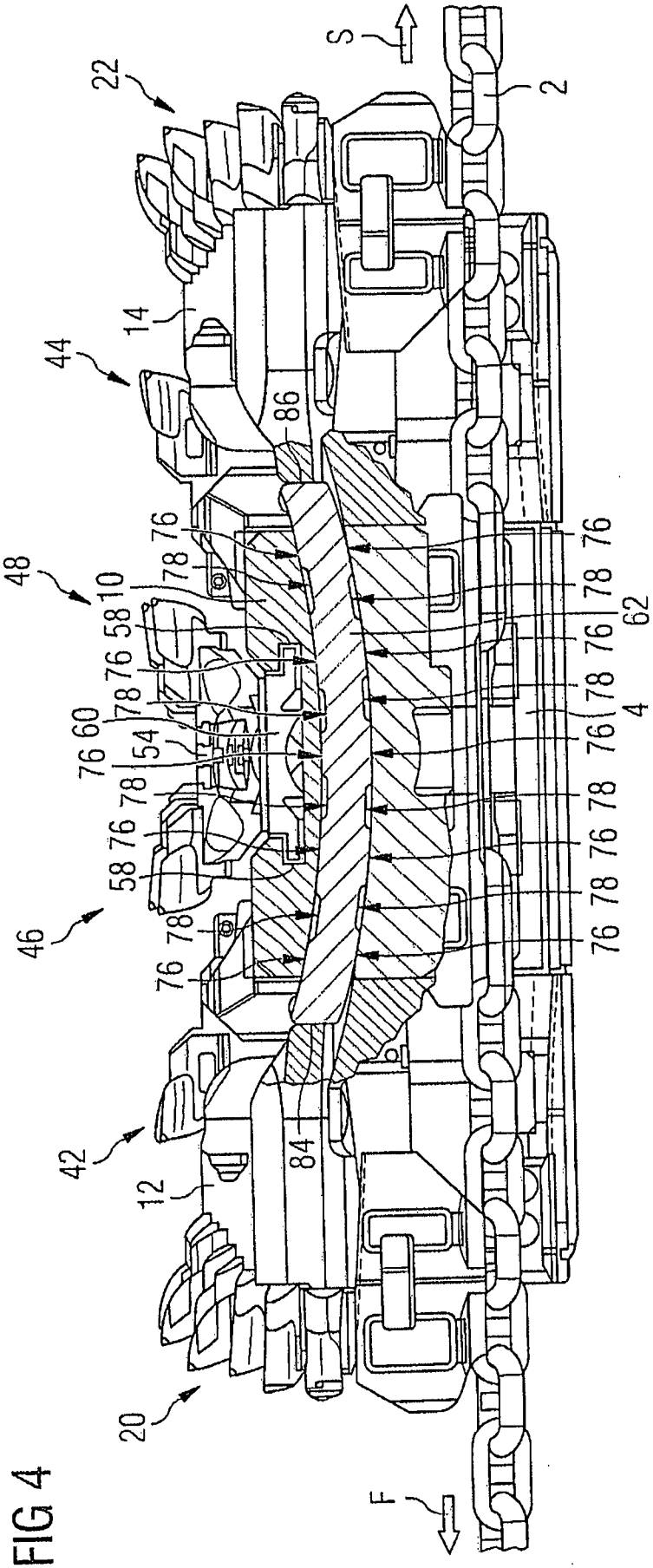
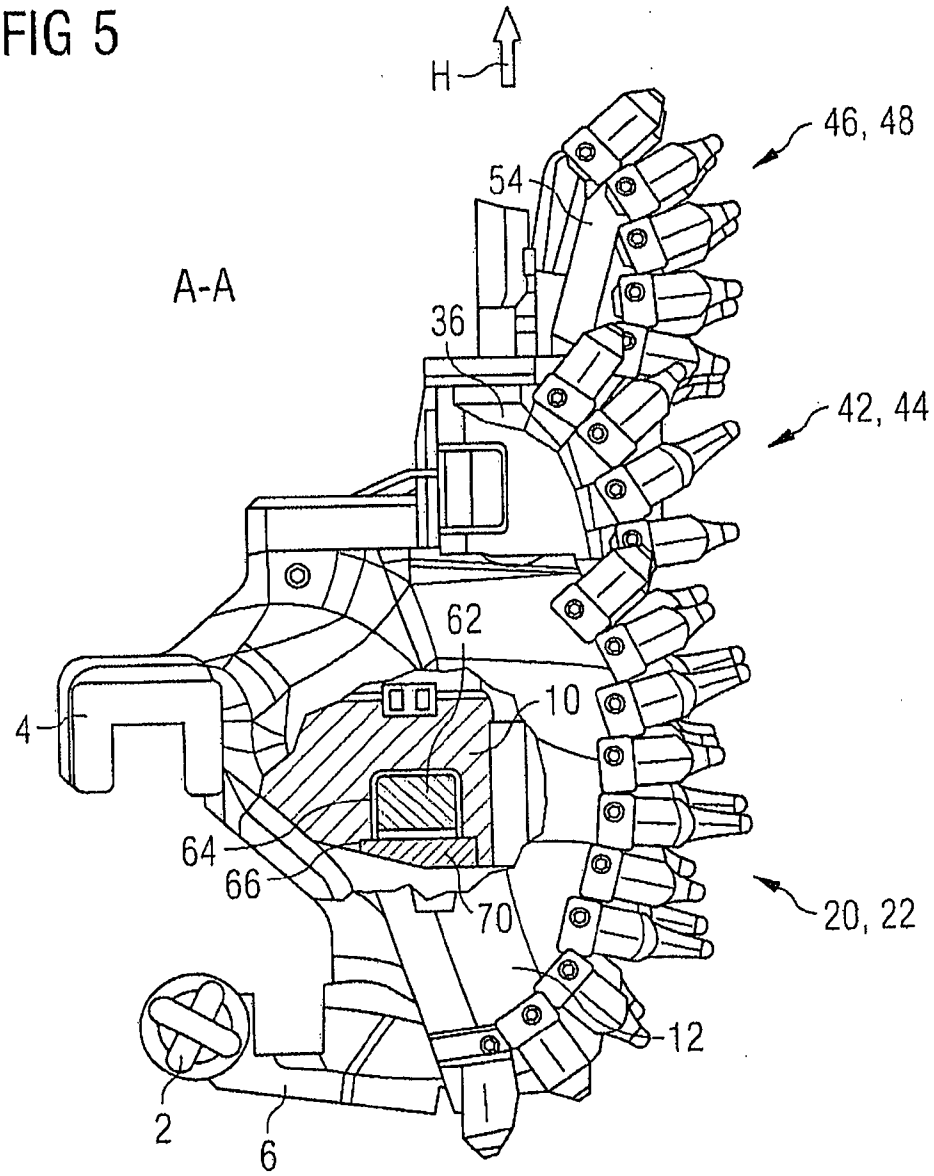


FIG 4

FIG 5



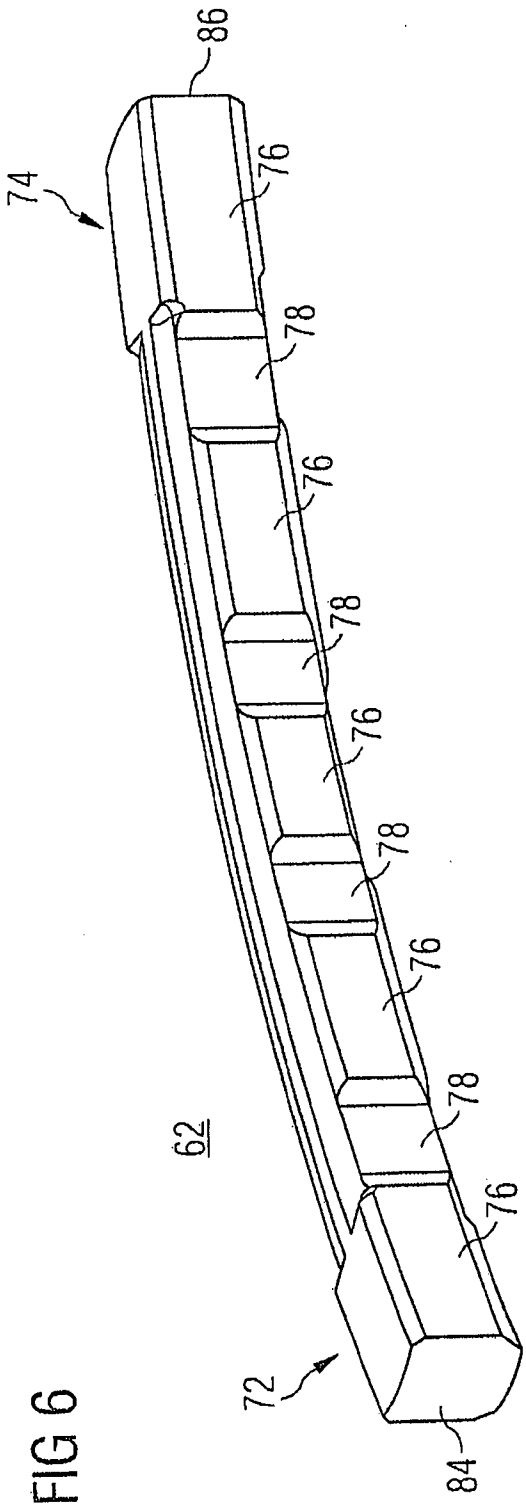

86
74
76
78
76
78
76
78
76
78
62
76
72
84

FIG 6

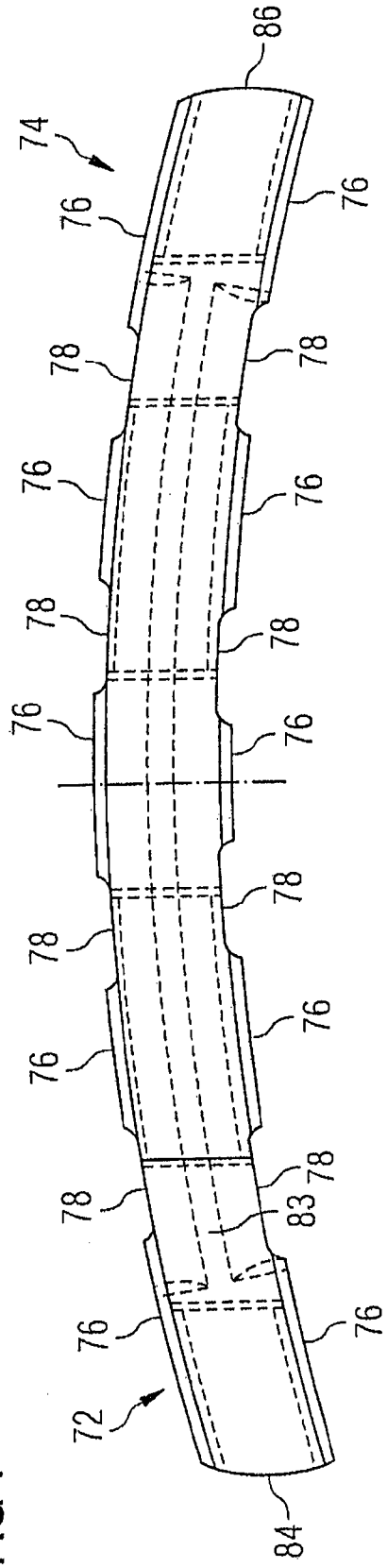

86
74
76
76
78
78
76
76
78
78
76
76
78
78
76
76
78
78
83
76
76
72
84

FIG 7

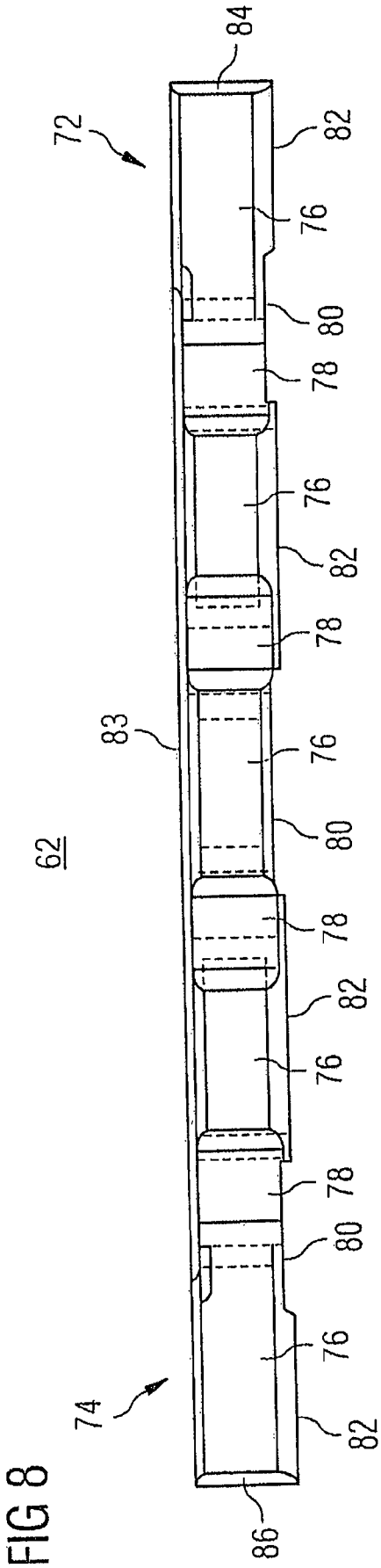

84
72
82
76
80
78
76
82
78
83
76
80
62
78
82
76
78
80
76
74
82
86

FIG 8

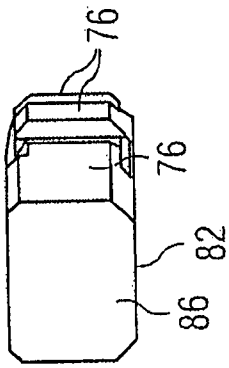

76
62
76
82
86

FIG 9