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LAITE KAAVINPALKIN SÄÄTÄMISEKSI PAPERIRAINAN VALMISTUSLAITTEISTOSSA
DEVICE FOR THE ADJUSTMENT OF A DEWATERING FOIL IN A PAPER MACHINE

Description

The present invention relates to an adjusting device with the features of the generic term of claim 1.

Such an adjusting device is known from EP 1 215 336 A2 and WO 98/38380 A1.

Known lines for producing a paper belt have a self-contained circulating wire belt, onto which a mixture of substances for producing the paper belt is deposited at the start of the line. In order to remove the liquid contained therein from the mixture of substances, there are present beneath the wire belt scraper bars, which extend transversely to the wire belt, and which are spaced apart from one another in the direction of movement of the wire belt. Arranged additionally beneath the wire belt are suction boxes, through which the liquid that has exited from the mixture of substances is extracted. Furthermore, felt belts as well as drying cylinders, by means of which the paper belt is dried, are provided in the line after the wire belt.

The liquid that has passed through the wire belt is scraped off by the scraper bars when they make contact with the underside of the wire belt. Furthermore, when the surface of the scraper bars encloses an acute angle with the wire belt, which angle opens in the direction of movement of the wire belt, a suction force is exerted by the scraper bars on the wire belt or on the liquid that has exited from the mixture of substances. Since the scraping effect and the suction force, which are exerted by a scraper bar, are dependent on the elevation and on the angular position of the scraper bar with respect to the wire belt, there is a requirement to provide a positioning device, by means of which the scraper bar is adjustable with respect to the support bar for the scraper bar in its elevation and/or in its angular position, with the result that the scraper bar is adjustable in its elevation and/or in its angular position with respect to the wire belt.

It is known from EP 2762635 A1 to provide control blocks between a support bar for the scraper bar and the scraper bar which blocks can be displaced by means of a positioning spindle in the longitudinal direction of the support bar and/or the scraper bar. The control blocks and the scraper bar in this case are provided with sliding

guides, by means of which, in the event of a displacement of the control blocks, the scraper bar is capable of adjustment in its elevation and/or in its angular position with respect to the support bar and thus with respect to the wire belt.

With this known device, however, there is the difficulty that components of the mixture of substances are contained in the liquid exiting from the mixture of substances, which components find their way into the sliding guide, causing it to move sluggishly, on account of which very high actuating forces must be applied via the positioning spindle for the displacement of the control blocks with respect to the scraper bar. For this reason, the positioning spindle must be heavily dimensioned or more frequent cleaning of the sliding guide must be undertaken.

The present invention is based on the task of avoiding these disadvantages inherent in the known state of the art. According to the invention, this is solved by an adjusting device with the features of claim 1.

The positioning device is preferably formed by a pivotable angle lever mounted on the support bar and an adjusting rod articulated on the one hand on the angle lever and on the other hand on the scraper bar, wherein the scraper bar is displaceable parallel to the support bar by pivoting the angle lever. The adjusting rod in this case can be capable of adjustment in its effective length. Furthermore, an adjusting cylinder, which is mounted rotatably with respect to the angle lever, is arranged on the angle lever and can be pivoted with it.

The rotatable adjusting cylinder is preferably formed with a spirally extending groove on its side facing the angle lever and an arcuately curved adjusting plate formed with teeth is fastened to the support bar, which cooperates with the spirally extending groove in such a way that the angle lever can be pivoted by a rotation of the adjusting cylinder. The angle lever in this case can be pivotable between two stops. Furthermore, the adjusting cylinder can be rotatable by means of a crank.

Furthermore, support plates are preferably attached to the scraper bar and to the support bar, on which support plates guide elements are mounted, the pivot bolts of which are oriented transversely to the longitudinal direction of the scraper bar

and/or the direction of sliding. The guide elements can be of H-shaped configuration, with two longitudinal struts spaced apart from one another and a transverse strut connecting them, wherein the free ends of the longitudinal struts are penetrated by the pivot bolts.

According to a further preferred embodiment, to the support bar a support plate is fastened, on which the one ends of two guide elements are mounted, wherein the pivot axes of these guide elements enclose an acute angle of 1° to 10°, preferably of about 5°, and wherein the other ends of the guide elements are mounted on support elements, which are mounted on a support plate fastened to the scraper bar, and the pivot axes of the guide elements mounted on the support elements as well as the pivot axes of the support elements mounted on the support plate fastened to the scraper bar, cross each another spatially. The angular position of the scraper bar relative to the support can be adjusted in this case by up to 5°, preferably by about 3°, by displacing the scraper bar relative to the support bar. Furthermore, the two guide elements have different angular positions relative to a vertical plane of, for example, 19,1° and 33,5° in their initial position, which angular positions increase to angular positions of, for example, 33,7° and 51,5° relative to the vertical plane when the scraper bar is displaced relative to the support bar.

The object of the invention is explained in more detail below with reference to two embodiments shown in the drawing. They show:

FIG. 1 support bar, a scraper bar coupled thereto and a positioning device for the displacement of the scraper bar with respect to the support bar in a line for producing a paper belt, in a first position of the scraper bar with respect to the support bar, in a side view,

FIG. 1A the support bar, the scraper bar and the positioning device according to FIG. 1, in a second position of the scraper bar with respect to the support bar, in a side view,

FIG. 2 the support bar, the scraper bar and the positioning device according to FIG. 1 and FIG. 1A, in a disassembled axonometric representation,

FIG. 3 the support bar and the scraper bar with a guide of a first embodiment coupling these two bars, in an axonometric representation,

FIG. 3A the support bar, the scraper bar and the guide of the first embodiment coupling the scraper bar and the support bar, in a first distance position of the scraper bar with respect to the support bar, in a face view,

FIG. 3B the support bar, the scraper bar and the guide of the first embodiment in a second distance position of the scraper bar with respect to the support bar, in a face view,

FIG. 4 the support bar and the scraper bar and a guide of a second embodiment coupling these two bars, in a disassembled axonometric representation,

FIG. 4A the support bar, the scraper bar and the guide of the second embodiment coupling these two bars, in an axonometric representation,

FIG. 4B the support bar, the scraper bar and the guide of the second embodiment coupling the support bar and the scraper bar in a first angular position of the scraper bar with respect to the support bar, in a face view,

FIG. 4C the support bar, the scraper bar and the guide of the second embodiment coupling the support bar and the scraper bar in a second angular position of the scraper bar with respect to the support bar, in a face view,

FIG. 5, FIG. 5A the support bar, the scraper bar and the guide of the second embodiment coupling the support bar and the scraper bar, in the first angular position of the support bar and the scraper bar relative to one another, in a face view and in a side view,

FIG. 5B, FIG. 5C the support bar, the scraper bar and the guide of the second embodiment coupling the support bar and the scraper bar, in the second angular position of the scraper bar and the support bar relative to one another, in a face view and in a side view, and

FIG. 6, FIG. 6A, FIG. 6B, FIG. 6C the support bar, the scraper bar and the guide of the second embodiment coupling the support bar and the scraper bar according to FIG. 5 to FIG. 5C with measurements.

DETAILED DESCRIPTION OF THE INVENTION

FIG. 1 shows a scraper bar 1, a support bar 2 assigned thereto and a wire belt 3 situated above the scraper bar 1 in a facility for producing a paper belt. The wire belt 3 is caused to travel over a wearing layer 11 situated on the scraper bar 1. The scraper bar 1 is configured with a scraper edge 12, by means of which liquid, which exits from a pulp that is present on the wire belt 3 and finds its way to the underside of the wire belt 3, is scraped away from the wire belt 3.

The scraper bar 1 is coupled to the support bar 2 by guides 4 and 5, which are pivotally mounted on the scraper bar 1 and on the support bar 2. Additionally, a positioning device 6 is provided by means of which the scraper bar 1 is capable of displacement parallel to the support bar 2. The distance of the scraper bar 1 with respect to the support bar 2 is caused to vary by a displacement of the scraper bar 1 with respect to the support bar 2 by means of the guides 4 of a first embodiment. The angular position of the scraper bar 1 with respect to the support bar 2 and/or with respect to the wire belt 3 is varied by a displacement of the scraper bar 1 with respect to the support bar 2 by means of the guides 5 of a second embodiment.

By adjusting the height of the scraper bars, their scraping effect can be controlled and the height of the wire belt and thus its course can be influenced. Furthermore, the scraper bars can be adjusted to a non-effective position.

By adjusting the angular position of the scraper bars, the angle between the wire belt and the surface of the scraper bars, which is formed in the direction of movement of the wire belt after the front scraper edge of the scraper bars, can be adjusted in size and thus in its suction effect.

The positioning device 6 is configured with an angled lever 61, which is mounted by means of a pivot bolt 62 between two support plates 63 situated at a distance from one another. The support plates 63 are attached to the support bar 2. A adjusting rod 64 that is adjustable in its length is provided, furthermore, which is articulated with its one end on the associated end of the angled lever 61, and with its other end on the scraper bar 1. The scraper bar 1 is displaced in the direction of the arrow A by pivoting of the angled lever 61 in the anticlockwise direction, as a result of which, by using guides 4 of the first embodiment, the distance of the scraper bar 1 to the support bar 2 is reduced and/or the scraper bar 1 is displaced downwards from the wire belt 3. By using guides 5 of the second embodiment, the scraper bar 1 is displaced in its angled position with respect to the support bar 2 and/or with respect to the wire belt 3.

Attached to the angled lever 61 is a retaining ring 65, by means of which an adjusting cylinder 66 is connected to the angled lever 61 in such a way that it is capable of being caused to pivot together with the latter, while nevertheless being capable of rotation with respect to the angled lever 61. The adjusting cylinder 66 is caused to rotate by means of a crank 67. An adjusting plate 68 is attached to the support plates 63, furthermore, which is configured in the form of a curved arch on its edge assigned to the adjusting cylinder 66 and is configured with teeth 68a along its edge. The adjusting plate 68 interacts with the adjusting cylinder 66 in such a way that the angled lever 61 is caused to pivot by a rotation of the adjusting cylinder 66. The pivoting movement is restricted by two stops 69. The scraper bar 1 is displaced with respect to the support bar 2 by pivoting of the angled lever 61.

Represented in FIG. 1 is the position of the guides 4, 5, in which the scraper bar 1 has not been displaced and bears against the underside of the wire belt 3 over its entire surface. Represented in FIG. 1A is the position of the guides 4, 5, in which the scraper bar 1 has been displaced, wherein it has been

adjusted either in its distance or in its angular position with respect to the support bar 2.

Represented in FIG. 2 are the individual components of the apparatus according to FIG. 1 and FIG. 1A in an axonometric, disassembled position. As can be seen therefrom, furthermore, the adjusting rod 64 consists of two bolts 64a and 64b, which are screwed into a threaded sleeve 64c, wherein the thread of the bolts 64a and 64b and the threaded sleeve 64c are configured in such a way that the adjusting rod 64 is lengthened or shortened by a rotation of the threaded sleeve 64c. A presetting of the scraper bar 1 with respect to the support bar 2 is achieved thereby. As represented in FIG. 2, furthermore, the adjusting cylinder 66 is configured on its side facing towards the angled lever 61 with a spirally extending groove 66a, into which teeth 68 an of the adjusting plate 68 protrude. The adjusting plate 68, which is present between two plates of the angled lever 61 that are situated at a distance from one another, is rigidly attached to the support plates 63 and thus to the support bar 2. A rotation of the adjusting cylinder 66, as a result of a number of teeth 68a protruding into the spiral-shaped groove 66 an of the adjusting cylinder 66, causes pivoting of the adjusting cylinder 65 and thus pivoting of the angled lever 61, with the result that the scraper bar 1 is displaced with respect to the support bar 2.

The movement of the wire belt 3 across the surface 13 of the scraper bar 1 takes place in the direction of the arrow B.

Represented axonometrically in FIG. 3 are the scraper bar 1, the support bar 2, a guide 4 coupling these two bars 1 and 2, and the positioning device 6.

As represented in FIG. 3A and FIG. 3B, a guide 4 of the first embodiment, by means of which the distance between the scraper bar 1 and the support bar 2 is adjustable, is configured with an H-shaped guide element 41, which exhibits two longitudinal struts 41a, 41b and a transverse strut 41c connecting these together. A support plate 42 is attached to the scraper bar 1, and a support plate 43 is attached to the support bar 2. The two support plates 42, 43 are configured with transversely projecting tabs, present in which are bores, in which the guide element 41 are

mounted by means of pivot bolts 42a, 43a. A displacement of the scraper bar 1 with respect to the support bar 2 causes pivoting of all the guides 4 that are present between the scraper bar 1 and the support bar 2, with the result that the distance of the scraper bar 1 from the support bar 2 is changed.

In FIG. 3A, the wire belt 3 bears against the surface 13 of the scraper bar 1. In FIG. 3B, the distance of the scraper bar 1 from the support bar 2 has been reduced, with the result that the scraper bar 1 has been displaced downwards away from the wire belt 3.

The length of the support bars and the scraper bars can be as much as 11 m. the width of the support bars and the scraper bars can be from 35 mm to 80 mm. the length of the guides can be about 15 mm.

Represented in FIG. 4 and FIG. 4A is a guide 5 of the second embodiment, which serves the purpose, by a displacement of the scraper bar 1 with respect to the support bar 2, of changing the angular position of the scraper bar 1 with respect to the support bar 2 and/or with respect to the wire belt 3. It is possible thereby to ensure that, in the direction of movement B of the wire belt 3, the front scraper edge 12 of the scraper bar 1 bears against the underside of the wire belt 3 and that the upper surface 13 of the scraper bar 1 includes an acute angle with the wire belt 3. A negative pressure is produced in this way on the underside of the wire belt 3 by the movement of the wire belt 3 across the scraper bar 1, by means of which negative pressure a suction force is exerted on the wire belt 3 and/or on the liquid which exits from the mixture of substances that is present on the wire belt 3.

The guide 5 exhibits two guide elements 51 and 52, which are mounted by means of pivot bolts 53a, 53b on a support plate 53, which is attached to the support bar 2. The support plate 53 is provided for this purpose with transversely projecting tabs, which are provided with bores, into which the pivot bolts 53a, 53b are inserted. In this case, the pivot axes 53c, 53d of the two guide elements 51, 52 enclose an acute angle of 5,5°, for example. A support plate 54 is attached to the scraper bar 1, in which support plate U-shaped support elements 55, 56 are pivotably mounted by means of pivot bolts 54a, 54b, wherein their pivot axes 54c, 54d

are oriented parallel to one another. The other ends of the guide elements 51, 52 are mounted by means of pivot bolts 55a, 56a in the U-shaped support elements 55, 56, wherein the pivot axes 55b, 56b likewise include an acute angle of 5,5°, for example, with one another. The pivot axes 53c, 55b and/or 53d, 56b are oriented parallel to one another. The pivot axes 54c and 55b, as well as the pivot axes 54d and 56b run at an angle of about 90° in relation to one another and intersect one another spatially.

The guide element 51 is thus capable of pivoting about the pivot axes 53c and 55b, and the support element 55 assigned thereto is capable of pivoting about the pivot axis 54c with respect to the support plate 54. The guide element 52 is similarly capable of pivoting about the pivot axes 53d and 56b, and the support element 56 assigned thereto is capable of pivoting about the pivot axis 54d with respect to the support plate 54. The guide elements 51 and 52 are capable of pivoting in different ways by means of these multiple bearings. In the initial position, the guide elements 51 and 52enclose acute angles with the vertical plane, wherein the guide element 51 is inclined rather less than the guide element 52. A displacement of the scraper bar 1 with respect to the support bar 2 changes its angular position with respect to the support bar 2 and/or with respect to the wire belt 3.

A displacement of the scraper bar 1 in the direction of the arrow A (see FIG. 1, FIG. 1A) causes the guide elements 51 and 52 to pivot further with respect to the vertical plane, with the result that the scraper bar 1 is displaced downwards by means of the guide elements 51 and 52 and the support elements 53 and 56. Since the pivot axes of the two guide elements 51 and 52 enclose an acute angle with one another, the displacement of the support element 56 in the downward direction by the guide element 52 is greater than the displacement of the support element 55 by the guide element 51, with the result that the support plate 54 and with it the scraper bar 1 are displaced about the pivot bolts 54a, 54b in the clockwise direction. The scraper bar 1 is displaced thereby with respect to the support bar 2. In this case, the pivoting of the scraper bar 1 can be controlled in such a way that its scraper edge 12 remains on the underside of the wire belt 3.

In FIG. 4B that position of the scraper bar 1 is represented, in which its surface 13 bears against the underside of the wire belt 3 over its entire surface. As soon as the scraper bar 1 has been displaced in its angular position because of the adjusting movement with respect to the support bar 2 and/or the wire belt 3 caused by the guide elements 51, 52, the support elements 55 and 56 and the support plate 54, wherein the scraper edge 12 of the scraper bar 1 remains on the underside of the wire belt 3, its surface 13 encloses an acute angle of 3°, for example, with the wire belt 3. This position of the scraper bar 1 is represented in FIG. 4C.

An illustrative example is represented in FIG. 5 to FIG. 5C and in FIG. 6 to FIG. 6C.

In the initial position represented in FIG. 5 and FIG. 5A, the normal planes on the pivot axes 53c, 55b of the guide element 51 and on the pivot axes 53d, 56b of the guide element 52 enclose an angle of 5,5° with one another, and the pivot axis 55b of the pivot bolt 55a encloses an angle of 5,5° with the support plate 54. In addition, the central plane of the guide element 51 encloses an angle of 19,1° with the vertical plane, and the central plane of the guide element 52 encloses an angle of 33,5° with the vertical plane.

The pivoting of the scraper bar 1 is explained based on FIG. 5B and FIG. 5C. If the scraper bar 1 is displaced by 3,5 mm with respect to the support bar 2, the angular positions of the guide elements 51 and 52 are increased to the extent that the central plane of the guide element 51 encloses an angle of 33,7° with the vertical plane, and the central plane of the guide element 52 encloses an angle of 51,4° with the vertical plane. Because of this positioning movement, the scraper bar 1 is caused to pivot in such a way that its surface 13 encloses an angle of 3° with the wire belt 3. The angle which the pivot axis 55b encloses with the support plate 54 is increased to 8,5° as a result.

The normal planes on the pivot axes of the guide element 51 and of the guide element 52 remain at an angle of 5,5°.

As can be appreciated from FIG. 6, FIG. 6A, FIG. 6B and FIG. 6C, according to this illustrative embodiment, the scraper bar 1 exhibits a width of 65 mm, and the guide

elements 51 and 52 each exhibit a length of 15,5 mm. The mean distance of the two guide elements from one another is 28,25 mm. Furthermore, the pivot axis 54c is situated at a distance of 33,52 mm and at a vertical distance of 27,77 mm from the scraper edge 12, and the pivot axis 54d is situated at a longitudinal distance of 63,12 mm and at a vertical distance of 30,5 mm from the scraper edge 12.

The advantage of this constructive design is that the scraper bar is used for the sliding movement for the displacement of the scraper bar with respect to the support bar, for which reason no control blocks are required, and that very large sliding forces can be transmitted by the scraper bar, which is very heavily dimensioned per se, with the result that any contamination of the guides connecting the scraper bar and the support bar and increased friction in the pivot bearings resulting therefrom are not significant.

It is essential for the invention that, in a line for producing paper, as a result of the connection of a scraper bar to a support bar by means of pivotable guide elements and pivotable support elements, the elevation and/or the angular position of the scraper bar with respect to the support bar and thus with respect to the wire belt can be changed by a displacement of the scraper bar with respect to the support bar.

Patenttivaatimukset

1. Kaavinpalkin (1) säätölaite järjestelmässä paperirainan valmistamiseksi viirahihnalla (3), joka on varustettu kaavinpalkeilla (1) sen liikkeen suuntaan nähden poikittain kohdistettuina ja erilleen toisistaan sijoitettuina, jolloin säätölaitteessa on kaavinpalkki (1), tukipalkki (2) ja asetinlaite (6), jolloin kaavinpalkki (1) on tuettu tukipalkin (2) avulla ja on säädettävissä suhteessa tukipalkkiin (2) ja viirahihnaan (3) asetinlaitteen (6) avulla, ja jossa kaavinpalkki (1) ja tukipalkki (2) on kytketty toisiinsa niille asennettujen ohjainten (4, 5) avulla, **tunnettu** siitä, että kaavinpalkkia (1) sen pituussuunnassa suhteessa tukipalkkiin (2) siirtämällä kaavintangon (1) etäisyyttä tai kiertokulmaa voidaan säätää suhteessa tukipalkkiin (2) ja siten suhteessa viirahihnaan (3).

2. Patenttivaatimuksen 1 mukainen säätölaite, **tunnettu** siitä, että asetinlaite (6) on tukipalkkiin asennetun (2) käännettävän kulmavivun (61) ja yhtäältä kulmavipuun (61) ja toisaalta kaavinpalkkiin (1) nivelletyn säätötangon (64) muodostama, jolloin kaavinpalkki (1) on siirrettävissä tukipalkin (2) suuntaisesti kulmavipua (61) kääntämällä.

3. Patenttivaatimuksen 2 mukainen säätölaite, **tunnettu** siitä, että säätötanko (64) on teholliselta pituudeltaan säädettävä.

4. Jonkin patenttivaatimuksen 2 ja 3 mukainen säätölaite, **tunnettu** siitä, että kulmavipuun (61) on järjestetty sen kanssa kääntyvä säätösylinteri (66), joka on asennettu kulmavipuun (61) nähden kiertyväksi.

5. Patenttivaatimuksen 4 mukainen säätölaite, **tunnettu** siitä, että säätösylinteriin (66) on muodostettu kulmavipua (61) päin olevalle puolelle spiraalimainen ura (66a) ja että tukipalkkiin (2) on kiinnitetty kaarevaksi muodostettu säätölevy (68), jossa on hampaat (68a), joka toimii yhdessä spiraalimaisen uran (66a) kanssa siten, että kulmavipua (61) voidaan kääntää säätösylinteriä (66) kiertämällä.

6. Jonkin patenttivaatimuksen 2–5 mukainen säätölaite, **tunnettu** siitä, että kulmavipua (61) voidaan kääntää kahden rajoittimen (69) välillä.

7. Jonkin patenttivaatimuksen 4–6 mukainen säätölaite, **tunnettu** siitä, että säätösylinteriä (66) voidaan kiertää kammen (67) avulla.

8. Jonkin patenttivaatimuksen 1–7 mukainen säätölaite, **tunnettu** siitä, että kaavinpalkkiin (1) ja tukipalkkiin (2) on kiinnitetty tukilevyt (42, 43), joihin on asennettu kääntöpulttien (42a, 43a) avulla ohjainelementit (41), ja että kääntöpultit (42a, 43a) on kohdistettu poikittaissuuntaisesti kaavinpalkin (1) pitkittäissuuntaan tai siirtymissuuntaan nähden.

9. Patenttivaatimuksen 8 mukainen säätölaite, **tunnettu** siitä, että ohjainelementit (41) on muodostettu H-muotoisiksi, ja niissä on kaksi erillään toisistaan olevaa pitkittäistukea (41a, 41b) ja nämä yhdistävä poikittaistuki (41c), jolloin kääntöpultit (42a, 43a) kulkevat pitkittäistukien (41a, 41b) vapaiden päiden läpi.

10. Jonkin patenttivaatimuksen 1-7 mukainen säätölaite, **tunnettu** siitä, että tukipalkkiin (2) on kiinnitetty tukilevy (53), johon on asennettu kahden ohjainelementin (51, 52) yhdet päät, jolloin näiden ohjainelementtien (51, 52) ensimmäiset kiertoakselit (53c, 53d) sulkevat sisäänsä terävän kulman, joka on 1° - 10°, edullisesti noin 5°, että ohjainelementtien (51, 52) toiset päät on asennettu tukielementteihin (55, 56), jotka on asennettu kaavinpalkkiin (1) kiinnitettyyn tukilevyyn (54), jolloin tukielementteihin (55, 56) asennettujen ohjainelementtien (51, 52) toiset kiertoakselit (55b, 56b) ja kaavinpalkkiin (1) kiinnitettyyn tukilevyyn (54) asennettujen tukielementtien (55, 56) ensimmäiset kiertoakselit (54c, 54d) kulkevat spatiaalisesti keskenään ristiin.

11. Patenttivaatimuksen 10 mukainen säätölaite, **tunnettu** siitä, että kaavinpalkkia (1) tukipalkkiin (2) nähden siirtämällä kaavinpalkin (1) kiertokulmaa voidaan säätää 5°:iin saakka, edullisesti noin 3°.

12. Jonkin patenttivaatimuksen 10–11 mukainen säätölaite, **tunnettu** siitä, että molemmilla ohjainelementeillä (51, 52) on lähtöasemassa pystytasoon nähden erilaiset kiertokulmat, esim. 19,1° ja 33,5°, jotka kiertokulmat kasvavat kaavinpalkkia (1)

tukipalkkiin (2) nähden siirrettäessä kiertokulmiin, jotka ovat esimerkiksi 33,7° ja 51,5° pystytasoon nähden.

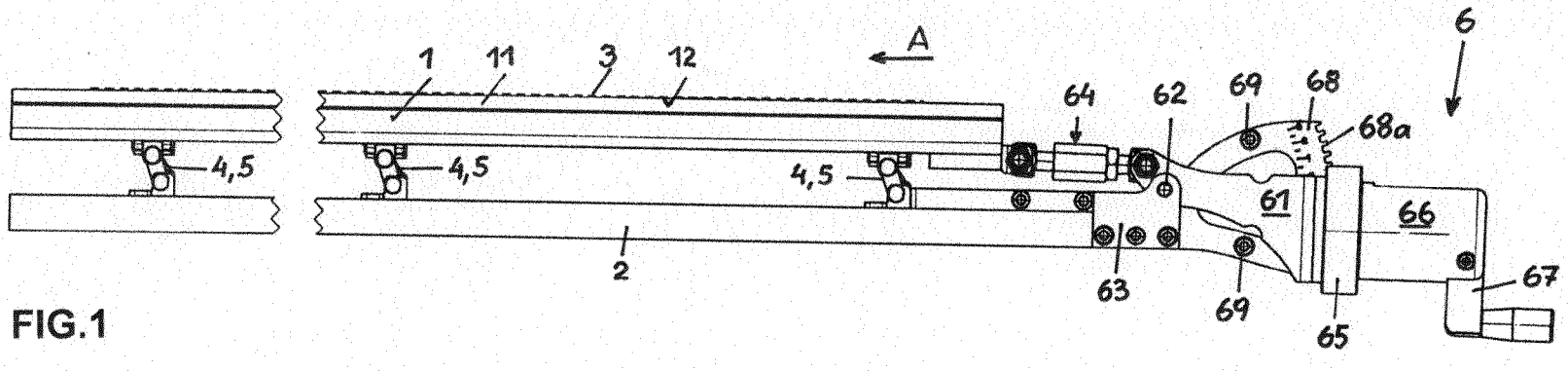

1
11
3
12
A
6
64
62
69
68
68a
4,5
4,5
4,5
61
66
2
63
69
65
67

FIG.1

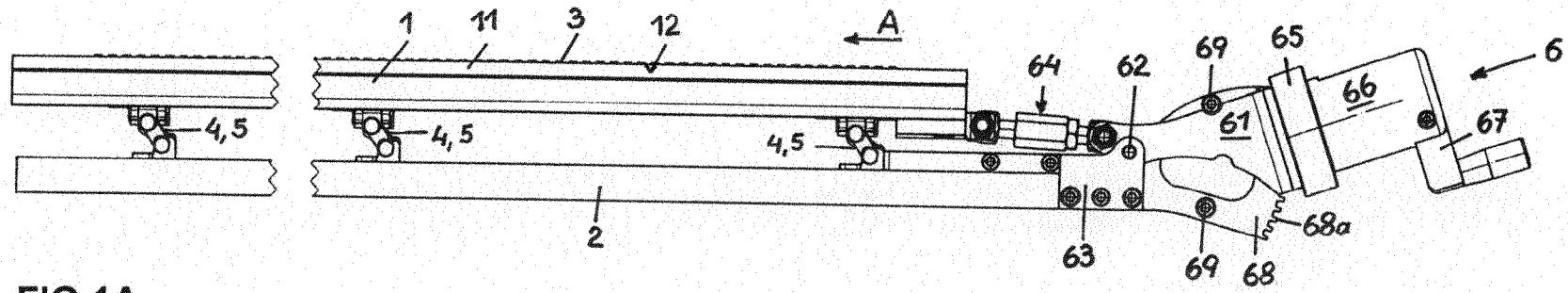

1
11
3
12
A
6
64
62
69
65
66
4,5
4,5
4,5
61
67
2
63
69
68
68a

FIG.1A

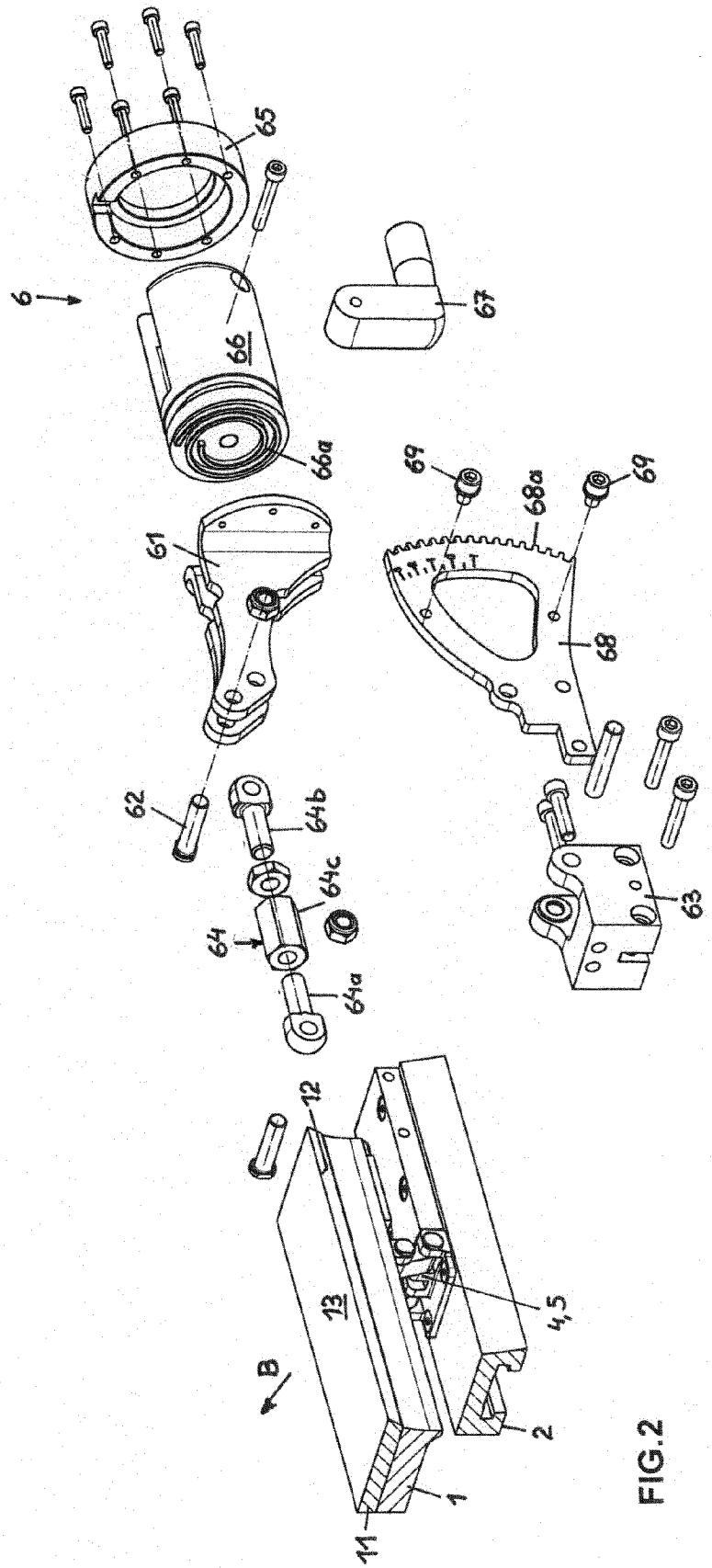


FIG.2

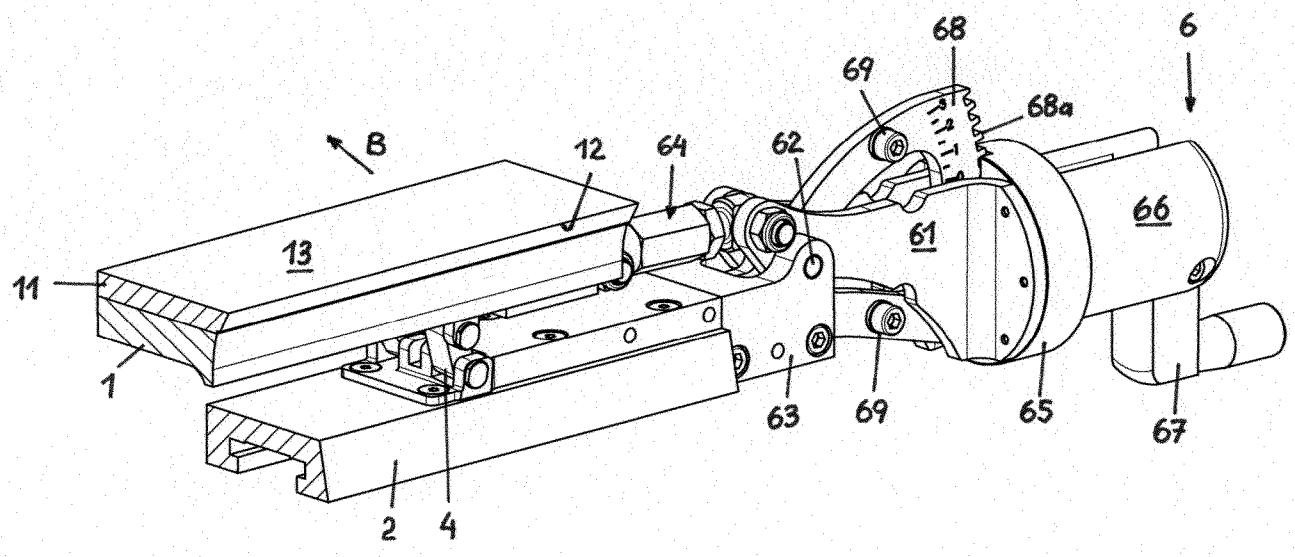


FIG.3

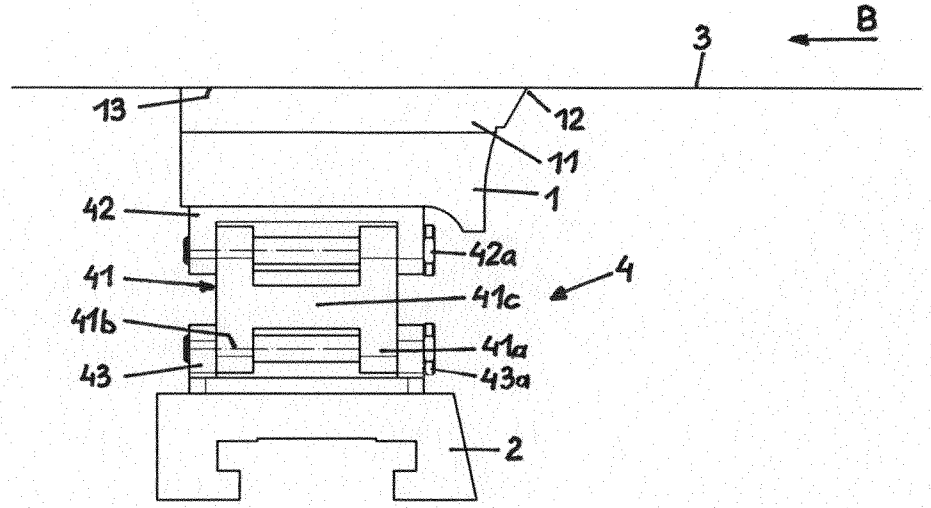

B
3
13
12
11
1
42
42a
4
41
41c
41b
41a
43
43a
2

FIG.3A

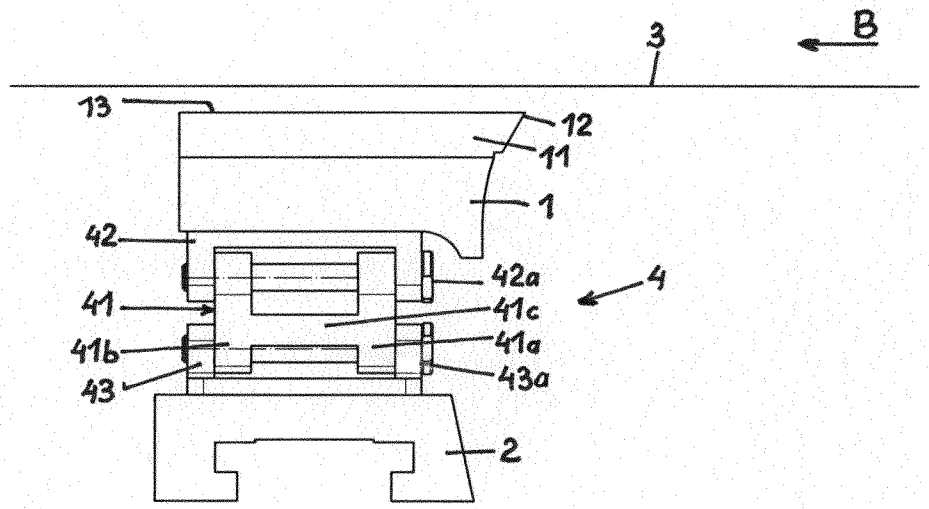

B
3
13
12
11
1
42
42a
4
41
41c
41b
41a
43
43a
2

FIG.3B

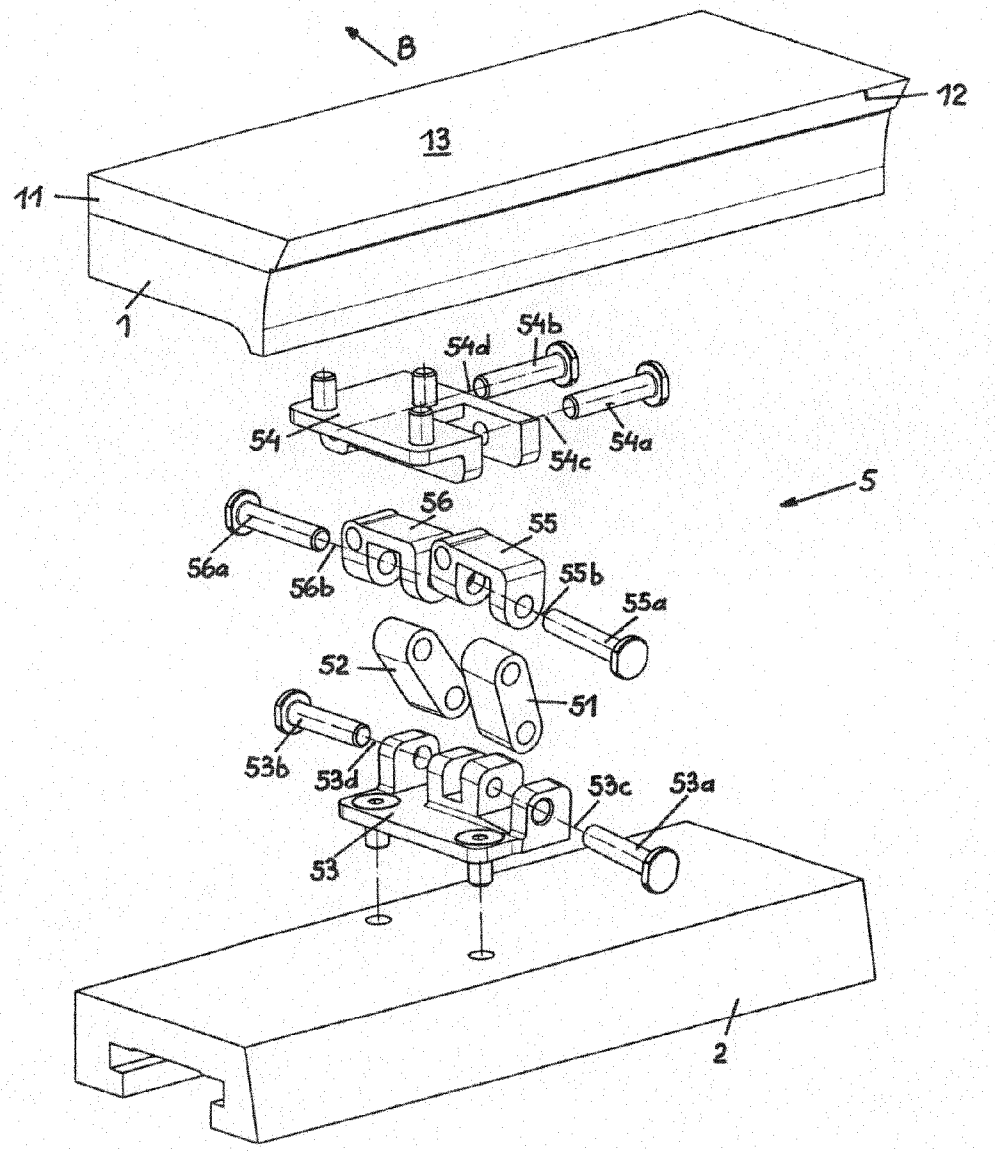

B
12
13
11
1
54d
54b
54
54c
54a
5
56
55
56a
56b
55b
55a
52
51
53b
53d
53c
53a
53
2

FIG.4

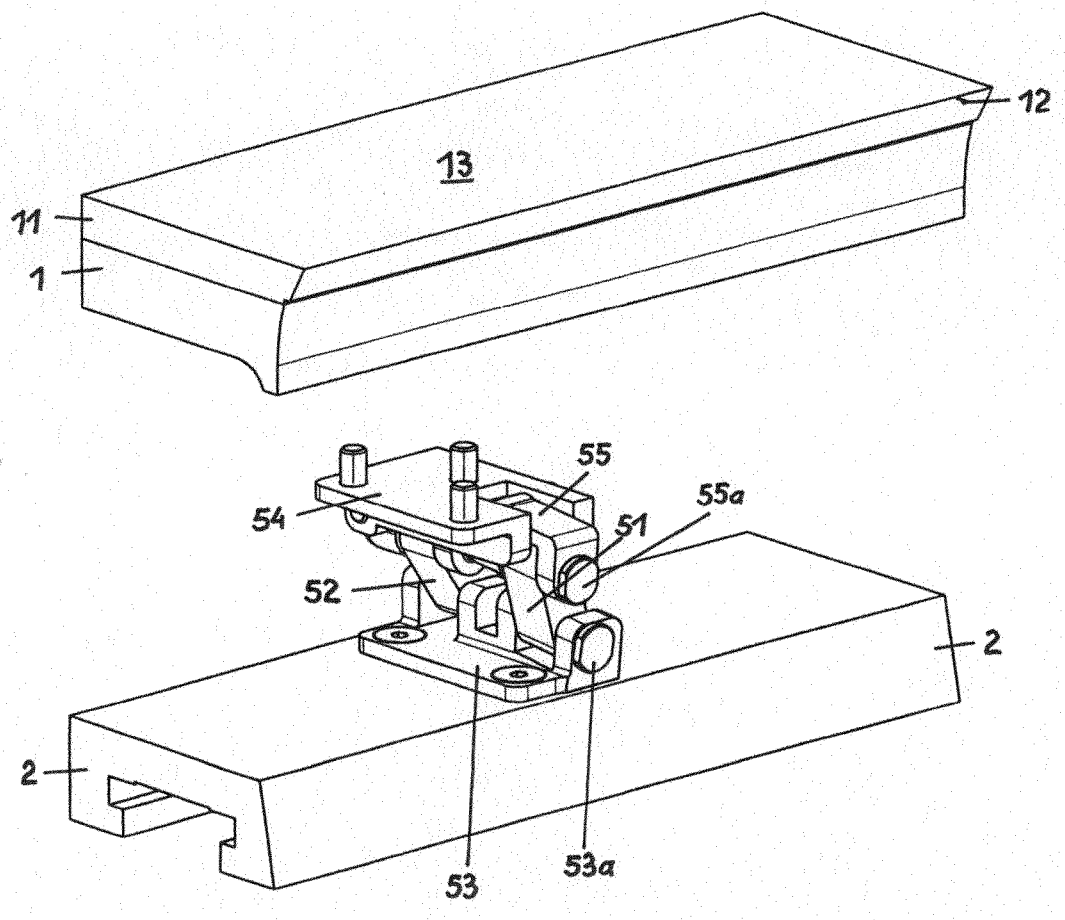


FIG.4A

FIG.4B

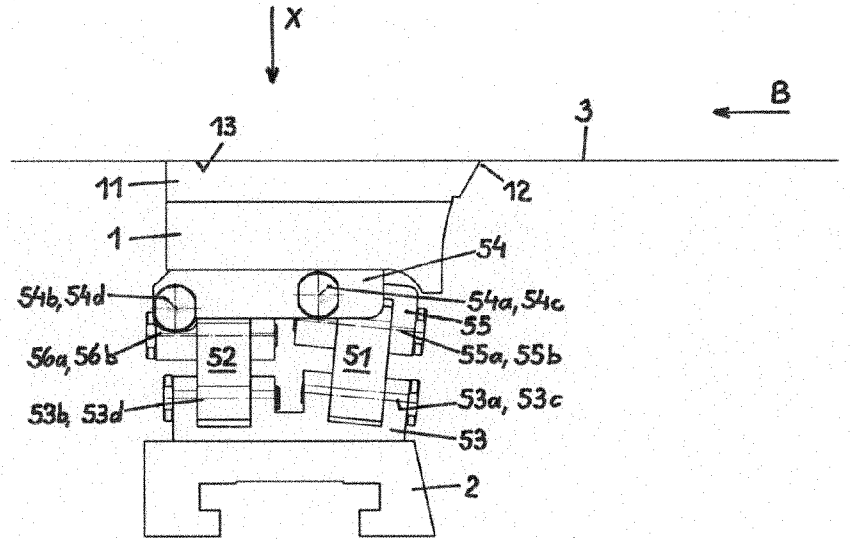
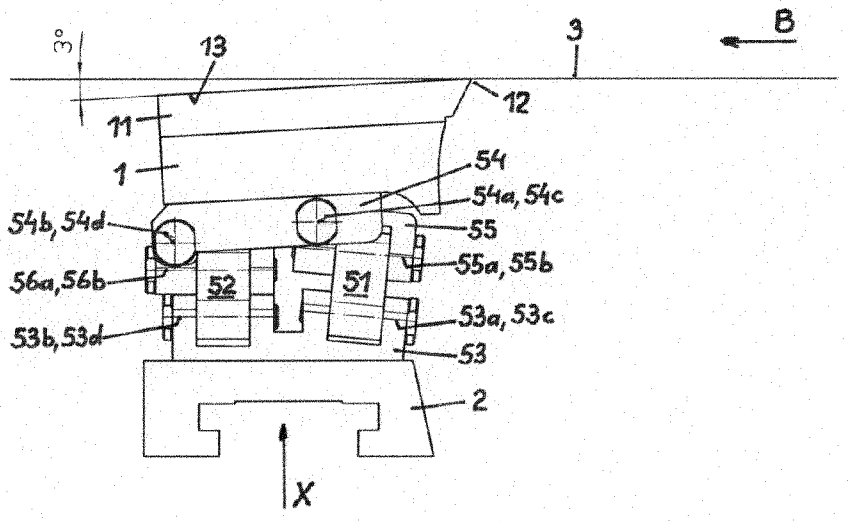

X
B
3
13
11
12
1
54
54b, 54d
54a, 54c
55
56a, 56b
52
51
55a, 55b
53b, 53d
53a, 53c
53
2

FIG.4C


3°
13
3
B
11
12
1
54
54a, 54c
54b, 54d
55
56a, 56b
52
51
55a, 55b
53b, 53d
53a, 53c
53
2
X

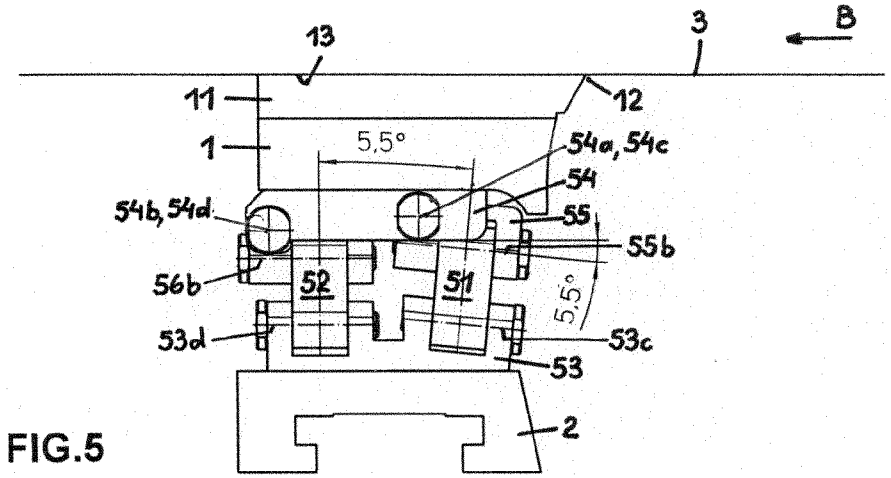


FIG.5

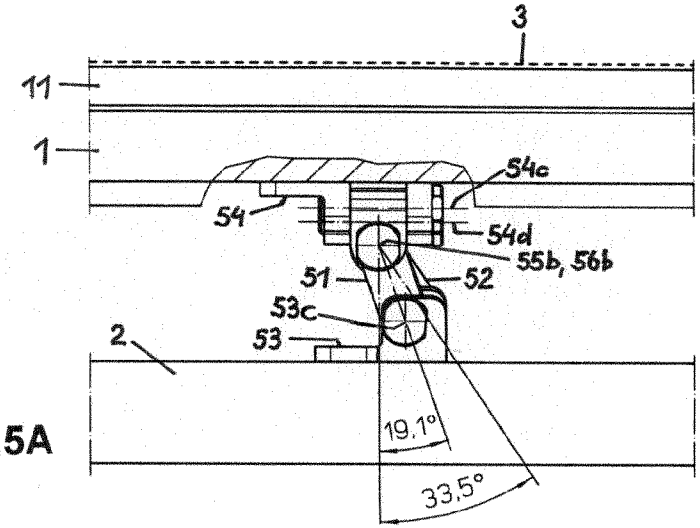


FIG.5A

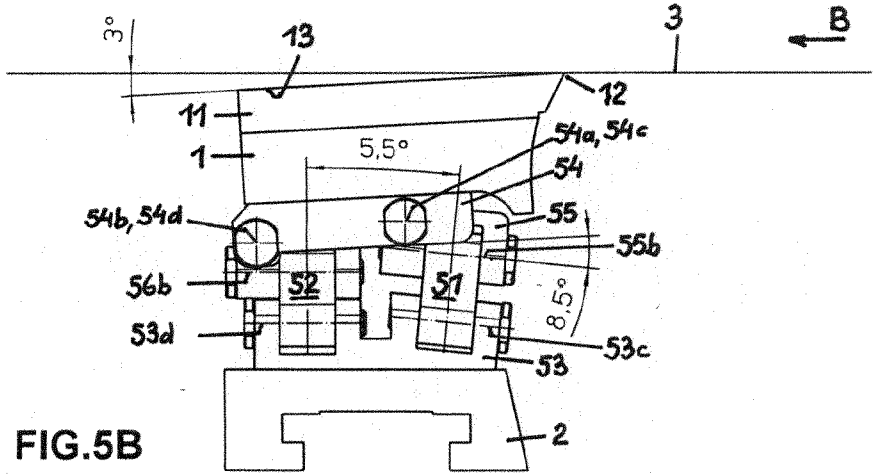


FIG.5B

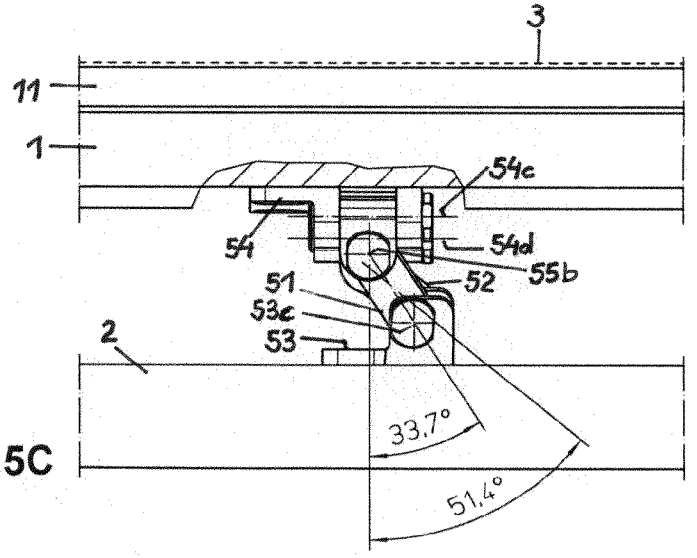


FIG.5C

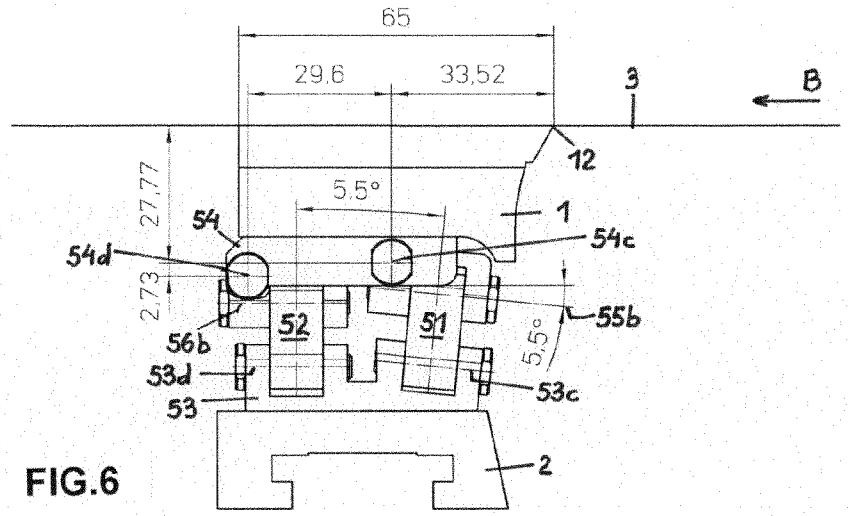


FIG.6

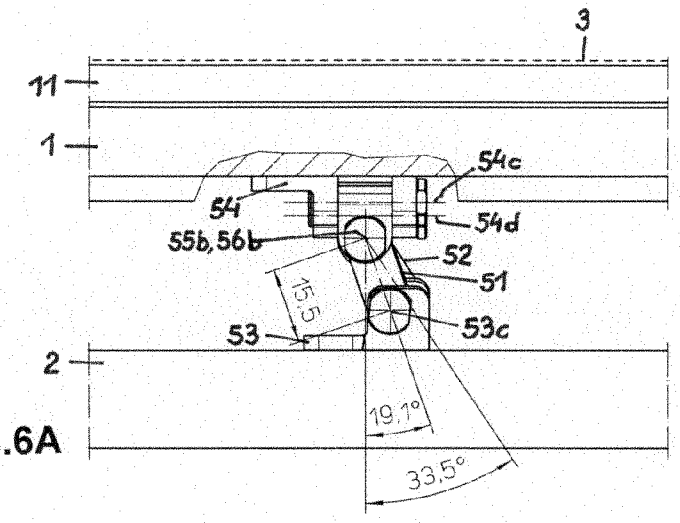


FIG.6A

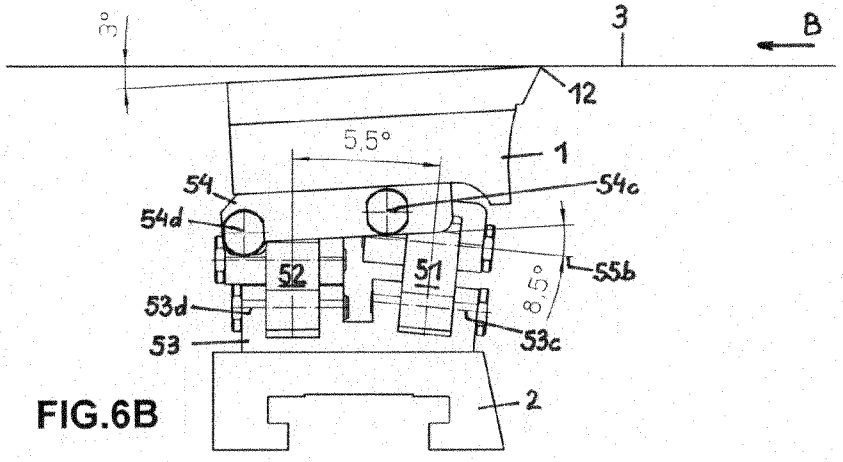


FIG.6B

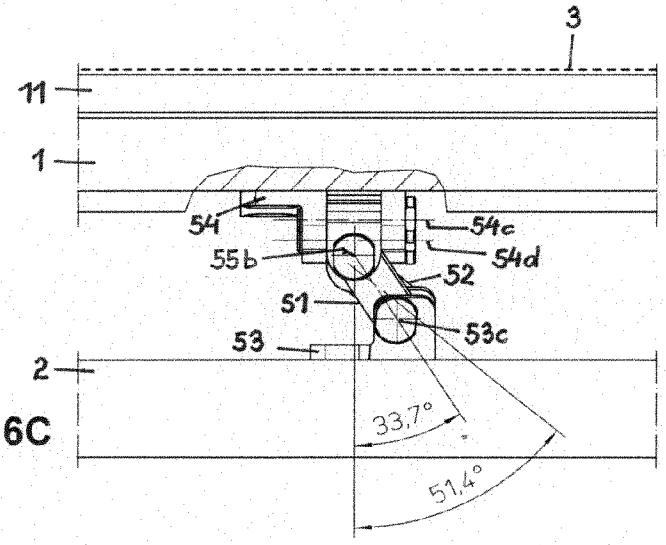


FIG.6C