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(54) **ROPEWAY SYSTEM, METHOD OF OPERATING SUCH A SYSTEM, AND ROPEWAY SYSTEM SWITCHING DEVICE**

SEILBAHNANLAGE, VERFAHREN ZUM BETRIEB SOLCH EINER ANLAGE UND SCHALTVORRICHTUNG FÜR EINE SEILBAHNANLAGE

SYSTÈME DE TÉLÉPHÉRIQUE, PROCÉDÉ DE FONCTIONNEMENT D'UN TEL SYSTÈME ET DISPOSITIF DE COMMUTATION POUR SYSTÈME DE TÉLÉPHÉRIQUE

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(73) Proprietor: **Rolic Invest S.AR.L.**
**1724 Luxembourg (LU)**

(72) Inventors:
- **WIESER, Hartmut**
  **I-39040 Racines (IT)**
- **OBEXER, Stephan**
  **I-39030 Vandoies Di Sopra (IT)**

(74) Representative: **Eccetto, Mauro et al**
**Studio Torta S.p.A.**
**Via Viotti, 9**
**10121 Torino (IT)**

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## Description

### TECHNICAL FIELD

**[0001]** The present invention relates to a ropeway system, in particular for passenger transport.

### BACKGROUND ART

**[0002]** A ropeway system normally comprises at least a hauling rope; a transportation unit comprising a carriage selectively connectable to the hauling rope; a first and second turnaround station; and a path extending through the first and second turnaround stations.

**[0003]** Ropeway systems of the above type are normally referred to as automatic-catch ropeways, and connect two separate areas where the first and second turnaround stations are located.

**[0004]** Often, however, passengers, such as skiers at skiing resorts, need to reach selected destinations without having to trudge between two ropeway systems, in this case, ski lifts. Some ropeway system such as those disclosed in FR 913,146 and EP 1,927,523 are provided with an intermediate station located between the first and the second turnaround stations so as to allow passengers getting in and off the transportation unit at the intermediate station. However also this type of ropeway systems lacks flexibility.

### DISCLOSURE OF INVENTION

**[0005]** It is an object of the present invention to provide a ropeway system, in particular for passenger transport, designed to eliminate this drawback of the known art.

**[0006]** It is a further object of the present invention to provide a highly versatile ropeway system.

**[0007]** According to the present invention, there is provided a ropeway system, in particular for transporting persons; the ropeway system comprising at least a hauling rope; a transportation unit comprising a carriage selectively connectable to the hauling rope; a plurality of turnaround stations; the ropeway system being characterised by comprising an intermediate switching station for the transportation unit; said transportation unit being advanced at least along a part of a path extending through the first, the second and the third turnaround stations and the intermediate switching station.

**[0008]** A number of turnaround stations can thus be connected by an intermediate switching station for selectively switching the transportation unit to one of the turnaround stations.

**[0009]** It is an object of the present invention to provide a method of operating a ropeway system.

**[0010]** According to the present invention, there is provided a method of operating a ropeway system, in particular for transporting persons; the method including the steps of advancing a transportation unit at least partly along a portion of path extending through a plurality of turnaround stations and an intermediate switching station by selectively connecting the transportation unit by means of a carriage to at least a hauling rope; wherein the intermediate switching station is directly connected to each one of said plurality of turnaround stations.

### BRIEF DESCRIPTION OF THE DRAWINGS

**[0011]** A number of non-limiting embodiments of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figures 1 to 4 show schematic plan views, with parts removed for clarity, of four embodiments of a ropeway system in accordance with the present invention;

Figures 5, 6 and 7 show larger-scale, schematic plan views, with parts removed for clarity, of respective details of the Figure 1 ropeway system;

Figures 8 and 9 show partly sectioned front views, with parts removed for clarity, of details of the Figure 1 ropeway system at different operating stages;

Figure 10 shows a larger-scale, schematic plan view, with parts removed for clarity, of a detail of the Figure 3 ropeway system;

Figure 11 shows a partly sectioned front view, with parts removed for clarity, of a detail in Figure 10.

### BEST MODE FOR CARRYING OUT THE INVENTION

**[0012]** Number 1 in Figure 1 indicates as a whole an automatic-catch ropeway system for passenger transport. Ropeway system 1 comprises a hauling rope 2; transportation units 3, each having a respective carriage 4 with a clamp 5 for selectively connecting the transportation unit 3 of carriage 4 to hauling rope 2; three turnaround stations 6, 7, 8; and an intermediate switching station 9 for switching transportation units 3.

**[0013]** Ropeway system 1 comprises auxiliary advancing devices 10, 11, 12, 13 (shown schematically) located at turnaround stations 6, 7, 8 and intermediate switching station 9 respectively, and which serve to drive transportation units 3 with a given speed profile, when transportation units 3 are disconnected from hauling rope 2.

**[0014]** Accordingly, each auxiliary advancing device 10, 11, 12, 13 comprises tracks (not shown in Figure 1) for guiding carriage 4; and drive units 14 and 33, which contact carriage 4 to drive carriage 4 with a given speed profile.

**[0015]** Auxiliary advancing devices 10, 11, 12, 13, in fact, drive transportation units 3 at a slower speed on average than that of hauling rope 2 at respective turnaround stations 6, 7, 8, and have incoming and outgoing portions, in which transportation units 3 travel at the same speed as hauling rope 2, and portions in which transportation units 3 travel at reduced speed (slower than that of hauling rope 2) to allow passengers on and off.

**[0016]** Intermediate switching station 9, in actual fact,

constitutes a fourth turnaround station, and is connected directly to the three turnaround stations 6, 7, 8.

**[0017]** Hauling rope 2 and auxiliary advancing devices 10, 11, 12, 13 define, for transportation units 3, a path P1, which comprises forward and return portions 15, 16 between intermediate switching station 9 and turnaround station 6; forward and return portions 17, 18 between intermediate switching station 9 and turnaround station 7; and forward and return portions 19, 20 between intermediate switching station 9 and turnaround station 8.

**[0018]** In the Figure 1 example, hauling rope 2 is looped about pulleys 21, 22, 23, 24, 25, 26, and is supported by supports not shown in the drawings.

**[0019]** Auxiliary advancing device 13 defines an endless path P2 partly overlapping path P1. More specifically, path P2 has three portions in common with path P1, and three portions separate from path P1.

**[0020]** Ropeway system 1 comprises three switching devices 27, 28, 29, each for selectively directing transportation units 3 along path P1 or path P2, when the two paths P1, P2 branch off downstream from a common portion, i.e. downstream from a portion along which paths P1 and P2 overlap.

**[0021]** With reference to Figure 5, switching device 27 is located at the point where path P2 departs from path P1.

**[0022]** More specifically, auxiliary advancing device 13 comprises tracks 30 and 31, which extend along path P2; and drive unit 14, which extends alongside tracks 30 and 31. In the Figure 5 example, each track 30, 31 is substantially defined by two parallel rails; tracks 30 define the portion common to paths P1 and P2; and tracks 31 define path P2 only.

**[0023]** Auxiliary advancing device 13 also comprises tracks 32, which define part of path P1; and drive unit 33 located alongside tracks 32 and 30.

**[0024]** Auxiliary advancing device 13 also comprises a supporting frame 34 (Figures 8 and 9) supporting tracks 30, 31, 32.

**[0025]** Switching device 27 comprises parts mounted on auxiliary advancing device 13, and parts mounted on carriages 4.

**[0026]** In the Figure 5 example, switching device 27 comprises two plates 35 supported by frame 34 (Figure 9) and adjacent to tracks 30, 31, 32; three cams 36, 37, 38; and a cam follower assembly 39 fitted to carriage 4.

**[0027]** More specifically, cam follower assembly 39 comprises two pins 39A, 39B for engaging cam 36.

**[0028]** Each plate 35 is connected at one end to a track 30, and at the other end to a track 31 and a track 32. In other words, carriages 4 reach plates 35 from tracks 30, and can leave plates 35 along tracks 31 or tracks 32.

**[0029]** With reference to Figures 8 and 9, carriage 4 comprises a frame 40; at least two wheels 41 for engaging tracks 30, 31, 32; and three pairs of seats 42, 43, 44 for fixing cam follower assembly 39. Selection of path P1 or P2 is determined by the position of cam follower assembly 39 on frame 40, which supports panels 45 and 46 that cooperate with drive units 33 and 14 respectively.

**[0030]** Each cam 36, 37, 38 is fixed to supporting frame 34 (Figure 9) of auxiliary advancing device 13, has an inverted-U-shaped cross section, and extends over plates 35. More specifically, cam 36 is straight and parallel to tracks 30 and 32 (to path P1), and cams 37 and 38 are parallel to tracks 30 and 31 (to path P2).

**[0031]** In actual use, as shown in Figure 8, carriage 4 is driven along tracks 30 by drive unit 14, and cam follower assembly 39 is about to engage cam 36. Once cam 36 is engaged, carriage 4 is moved forward to position wheels 41 on plates 35, as shown in Figure 9. At this stage, carriage 4 is also engaged by drive unit 33, as shown in Figure 5. In the Figure 5, 8 and 9 example, cam 36 directs carriage 4 along path P1. If cam follower assembly 39 had engaged seats 43 or seats 44, carriage 4 would have been directed along path P2.

**[0032]** The pair of pins 39A, 39B serves to determine the position and orientation of carriage 4 when wheels 41 rest on plates 35, which serve solely to support, without guiding or orienting, carriage 4.

**[0033]** With reference to Figures 6 and 7, switching devices 28 and 29 differ from switching device 27 as regards the position of cams 36, 37, 38. In Figure 6, straight cam 36 is located on the opposite side with respect to Figures 5; in Figure 7, straight cam 36 is located centrally between the two curved cams 37 and 38. Carriage 4, with cam follower assembly 39 engaging seat 42, therefore proceeds along path P1 as it travels through switching device 27 (Figure 5), and proceeds along path P2 as it travels through switching devices 28 and 29 (Figures 6 and 7 respectively.).

**[0034]** The position of cam follower assembly 39 determines which of paths P1 and P2 is selected. The route of each transportation unit 3 can therefore be defined beforehand as a function of the position of the respective cam follower assembly 39, and can be indicated on transportation unit 3 to enable passengers to select the right transportation unit 3 for a given destination.

**[0035]** Figure 2 shows a ropeway system 101, which differs from ropeway system 1 by comprising three ropeway systems connected to one another by auxiliary advancing device 13 at intermediate switching station 9.

**[0036]** Ropeway system 101 comprises three hauling ropes 102A, 102B, 102C, which, together with auxiliary advancing devices 10, 11, 12, 13, define path P1 extending between turnaround stations 6, 7, 8 and intermediate switching station 9.

**[0037]** Moreover, pulleys 24, 25, 26 are replaced by return pulleys 124, 125, 126 for hauling ropes 102A, 102B, 102C respectively.

**[0038]** Switching devices 27, 28, 29 operate the same way as described for the first embodiment.

**[0039]** Figure 3 shows a ropeway system 201, which differs from ropeway system 1 by being defined by the union of three ropeway systems, which may operate independently of one another, and which are connected to one another by auxiliary advancing device 13.

**[0040]** Ropeway system 201 comprises three hauling ropes 202A, 202B, 202C, and, in addition to switching devices 27, 28, 29, three further switching devices 250.

**[0041]** Moreover, pulleys 21, 22, 23, 24, 25, 26 are replaced by return pulleys 221, 222, 223, 224, 225, 226 for hauling ropes 202A, 202B, 202C.

**[0042]** Switching devices 27, 28, 29 operate the same way as described for the first embodiment.

**[0043]** Ropeway system 201 also comprises three further auxiliary advancing devices 251, 252, 253, each of which comprises tracks (not shown in Figure 3), and drive units 254, 255. Each drive unit 254 defines a path P3 that connects a forward portion 15, 17, 19 to a respective return portion 16, 18, 20; and each drive unit 255 defines part of path P1. The function of each switching device 250 is to direct transportation units 3 along path P1 or path P3.

**[0044]** With reference to Figure 10, each switching device 250 is located at the point where path P3 departs from path P1.

**[0045]** More specifically, auxiliary advancing device 251 (auxiliary advancing devices 252 and 253 are substantially identical) comprises tracks 256 and 257 extending along path P3; and drive unit 254 extending alongside tracks 256 and 257. In the Figure 10 example, each of tracks 256, 257 is substantially defined by two parallel rails; tracks 256 define the portion common to paths P1 and P3; and tracks 257 define path P3 only.

**[0046]** Auxiliary advancing device 251 also comprises further tracks 258 defining only part of path P1; drive unit 255 alongside tracks 258 and partly alongside tracks 256; and a supporting frame 259 (Figure 11) supporting tracks 256, 257, 258.

**[0047]** With reference to Figure 3, hauling ropes 202A, 202B, 202C define, together with auxiliary advancing devices 10, 11, 12, 13, 251, 252, 253, path P1 extending between turnaround stations 6, 7, 8 and intermediate switching station 9.

**[0048]** With reference to Figure 10, switching device 250 comprises parts mounted on auxiliary advancing device 251, and parts mounted on carriages 4. More specifically, switching device 250 comprises two plates 260 supported by frame 259 (Figure 11) and adjacent to tracks 256, 257, 258; two cams 261, 262; and a cam follower assembly 263 fitted to carriage 4.

**[0049]** Each plate 260 is connected at one end to a track 256, and at the other end to a track 257 and a track 258. In other words, carriages 4 reach plates 260 from tracks 256, and can leave plates 260 along tracks 257 or tracks 258.

**[0050]** With reference to Figure 11, carriage 4 comprises a frame 40; at least two wheels 41 for engaging tracks 256, 257, 258; and panels 45 and 46 that cooperate respectively with drive units 255 and 254.

**[0051]** Each cam 261, 262 is supported by supporting frame 259 (Figure 11) of auxiliary advancing device 251, has an inverted-U-shaped cross section, and extends over plates 260. More specifically, cam 261 is straight and parallel to path P1, and cam 262 is curved and parallel to path P3.

**[0052]** With reference to Figure 10, cam follower assembly 263 comprises two pins 263A, 263B for engaging one of cams 261, 262.

**[0053]** Accordingly, carriage 4 is equipped with an actuating device 264 for regulating the position of cam follower assembly 263 crosswise to the travelling direction, as shown in Figure 11. In the Figure 11 example, actuating device 264 comprises a prismatic guide fixed to frame 40; a slide supporting cam follower assembly 263 and which slides along the prismatic guide; and an electric step motor which rotates a screw connected to the slide to form a screw-nut screw coupling with the slide.

**[0054]** The position of cam follower assembly 263, and therefore the route of transportation unit 3, can thus be selected as a function of traffic and user demand of ropeway system 201.

**[0055]** More specifically, the electric step motor may be remote-controlled and powered solely at switching devices 27, 28, 29, 250.

**[0056]** Switching devices 27, 28, 29, 250 described have the big advantage of being simple in design and permitting frequent use. In fact, the moving parts of switching devices 27, 28, 29, 250 are reduced to a minimum; and carriage 4, in particular wheels 41 of carriage 4, is allowed to run along plates 35, 260. In fact, when carriage 4 rests on plates 35, 260, these in no way serve to direct and orient carriage 4, which at this stage is directed and oriented by one of cams 36, 37, 38, 261, 263 and by cam follower assembly 39, 263.

**[0057]** In a variation, not shown, of the Figure 3 embodiment, each of switching devices 25, 26, 27 is replaced by a switching device 250.

**[0058]** Figure 4 shows a ropeway system 301, which differs from ropeway system 201 as regards intermediate switching station 9.

**[0059]** Ropeway system 301 comprises three hauling ropes 202A, 202B, 202C; and switching devices 27, 28, 29, which operate in the same way as described for the first embodiment.

**[0060]** In an embodiment not shown, each switching device 27, 28, 29 is replaced by a device 250.

**[0061]** Ropeway system 301 also comprises an auxiliary advancing device 351 located at intermediate switching station 9 and in turn comprising tracks for supporting transportation units 3 at intermediate switching station 9, and three drive units 352, 353, 354 for driving transportation units 3 along the tracks.

**[0062]** The tracks comprise an annular track 355 extending along an annular path P2 having three portions in common with path P1; and six tracks 356, each of which is parallel to one of portions 15-20 of path P1, is adjacent to path P2, and is connected to track 355.

**[0063]** Switching devices 27, 28, 29 are located along annular track 355, at a portion common to paths P1 and P2, and close to the point at which paths P1 and P2 separate.

**[0064]** In the Figure 4 example, each drive unit 352, 353, 354 comprises three straight branches 357 parallel and close to a track 356; and a curved branch 358 parallel to annular track 355 and connecting straight branches 357.

**[0065]** One straight branch 357 of drive unit 352 is parallel to return portion 16, and two straight branches are parallel to and close to respective forward portions 19 and 17.

**[0066]** Drive units 353 and 354 are substantially identical to drive unit 352, from which they differ solely by being offset 120° in the Figure 4 example.

**[0067]** The present invention is obviously not limited to, and includes various variations of, the embodiments described. For example, the turnaround stations may be more than three in number; the cam follower assemblies may be grip-roller types; and the cams may simply be bars gripped by the cam follower assembly rollers.

**[0068]** Nor is the present invention limited to the applications described, and also applies to mono-, two-, three-, four-rope systems, etc.

**[0069]** The drive unit described includes both the type comprising a number of mechanically connected wheels, and the type featuring a linear motor divided between the station and the transportation units.

**[0070]** The ropeway systems may also operate with any type of switching device other than those described.

## Claims

1. A ropeway system (1), in particular for transporting persons; the ropeway system (1; 101; 201; 301) comprising at least a hauling rope (2; 102A, 102B, 102C; 202A, 202B, 202C); a transportation unit (3) comprising a carriage (4) selectively connectable to the hauling rope (2; 102A, 102B, 102C; 202A, 202B, 202C); a plurality of turnaround stations (6, 7, 8); the ropeway system being **characterised by** comprising an intermediate switching station (9) for the transportation unit (3); said transportation unit (3) being advanced at least along a part of a path (P1) extending through the first, the second and the third turnaround stations (6, 7, 8) and the intermediate switching station (9).

2. Ropeway system according to claim 1, wherein the intermediate switching station (9) is a central turnaround station.

3. Ropeway system according to claim 1 or 2, wherein the intermediate switching station (9) is directly connected to each of said turnaround stations (6, 7, 8) .

4. Ropeway system according to any one of foregoing claims, wherein said path (P1) comprises first forward and backward portions (15, 16) between the intermediate switching station (9) and a first turnaround station (6); second forward and backward portions (17, 18) between the intermediate switching station (9) and a second turnaround station (7); and third forward and backward portions (19, 20) between the intermediate switching station (9) and a third turnaround station (8).

5. Ropeway system according to any one of the foregoing claim, wherein the intermediate switching station (9) comprises at least an auxiliary advancing device (13; 251; 252; 253; 351) suitable to advance the transportation unit (3) along path (P1) and a further path (P2; P3) partly superimposed to said path (P1), when the transportation unit (3) is disconnected from the hauling rope (2; 102A, 102B, 102C; 202A, 202B, 202C); and a switching device (27; 28; 29; 250) for selectively directing the transportation unit (3) along said path (P1) or the further path (P2; P3).

6. Ropeway system according to claim 5, wherein the auxiliary advancing device (13; 251; 252; 253; 351) comprises first tracks (30; 256; 355) extending along a section where path (P1) is superimposed to path (P2; P3); second tracks (31; 257; 355) extending along the further path (P2; P3); and third tracks (32; 258; 356) extending along the path (P1); the first, the second and the third tracks (20, 31, 32; 256, 257, 258: 355, 356) being suitable for guiding said carriage (4).

7. Ropeway system according to claim 6, wherein the auxiliary advancing device (13; 251; 252; 253; 351) comprises a drive unit (33; 254, 255; 352, 353, 354) for advancing the transportation unit (3) along said first tracks (30; 256; 355); second tracks (31; 257; 355); and third tracks (32; 258; 356).

8. Ropeway system according to claim 6 or 7, wherein the switching device (27, 28, 29; 250) comprises support means (35; 260) for supporting the carriage (4) and connecting the first tracks (30; 256; 355) to the second and the third tracks (30, 31; 257, 258; 355, 356), at least two cams (36, 37, 38; 261, 262) suitable for guiding the carriage (4) in the area of said support means (35; 260); and a cam follower assembly (29; 263), which is mounted on the carriage (4) and is suitable to engage one of said at least two cams (26, 37, 38; 261, 262).

9. Ropeway system according to claim 8, wherein the carriage (4) comprises a frame (40), which supports wheels (41) suitable to engage said first, second or third tracks (20, 31, 32; 256, 257, 258); and said cam follower assembly (39; 263).

10. Ropeway system according to any one of the claims from 5 to 9 comprising a number of switching devices (27, 28, 29) arranged in the intermediate switching

station (9) equal to the number of turnaround stations (6, 7, 8)

**11.** Ropeway system according to claim 8 or 9; wherein the auxiliary advancing device (251; 252; 253) comprises a switching device (250); which is arranged along the further path (P3) and comprises two cams (261, 262) and a cam follower assembly (263) mounted in a selectively mobile manner on the carriage (4) so as to selectively engage one of the two cams (261, 262) .

**12.** Ropeway system according to claim 11, wherein the carriage (4) is coupled to an actuating device (264) suitable to displace the cam follower assembly (263) with respect to the carriage (4).

**13.** A method of operating a ropeway system (1), in particular for transporting persons; the method including the steps of advancing a transportation unit (3) at least partly along a portion of path (P1) extending through a plurality of turnaround stations (6, 7, 8) and an intermediate switching station (9) by selectively connecting the transportation unit (3) by means of a carriage (4) to at least a hauling rope (2; 102A, 102B, 102C; 202A, 202B, 202C); wherein the intermediate switching station (9) is directly connected to each one of said plurality of turnaround stations (6, 7, 8).

**14.** Method according to claim 13 including the step of advancing the transportation unit (3) in the intermediate switching station (9) by means of at least an auxiliary advancing device (13; 251; 252; 253; 351) along path (P1) and a further path (P2; P3) partly superimposed to said path (P1), when the transportation unit (3) is disconnected from the hauling rope (2; 102A, 102B, 102C; 202A, 202B, 202C); and directing the transportation unit (3) along said path (P1) or the further path (P2; P3) along said auxiliary advancing device (13; 251; 252; 253; 351).

**Patentansprüche**

**1.** Seilbahnsystem (1), insbesondere für den Personentransport; wobei das Seilbahnsystem (1; 101; 201; 301) umfasst: wenigstens ein Zugseil (2; 102A, 102B, 102C; 202A, 202B, 202C); eine Transporteinheit (3), die einen Wagen (4) umfasst, der selektiv mit dem Zugseil (2; 102A, 102B, 102C; 202A, 202f3, 202C) verbindbar ist; eine Vielzahl von Wendestationen (6, 7, 8); wobei das Seilbahnsystem **dadurch gekennzeichnet ist, dass** es eine Zwischenschaltstation (9) für die Transporteinheit (3) umfasst; wobei die Transporteinheit (3) wenigstens entlang eines Teils eines Wegs (P1) vorgerückt wird, der sich durch die ersten, die zweiten und dritten Wendestationen (6, 7, 8) und die Zwischenschaltstation (9) erstreckt.

**2.** Seilbahnsystem nach Anspruch 1, wobei die Zwischenschaltstation (9) eine zentrale Wendestation ist.

**3.** Seilbahnsystem nach Anspruch 1 oder 2, wobei die Zwischenschaltstation (9) direkt mit jeder der Wendestationen (6, 7, 8) verbunden ist.

**4.** Seilbahnsystem nach einem der vorangehenden Ansprüche, wobei der Weg (P1) umfasst: erste Vorwärts- und Rückwärtsabschnitte (15, 16) zwischen der Zwischenschaltstation (9) und einer ersten Wendestation (6); zweite Vorwärts- und Rückwärtsabschnitte (17, 18) zwischen der Zwischenschaltstation (9) und einer zweiten Wendestation (7); und dritte Vorwärts- und Rückwärfisabschnitte (19, 20) zwischen der Zwischenschaltstation (9) und einer dritten Wendestation (8).

**5.** Seilbahnsystem nach einem der vorangehenden Ansprüche, wobei die Zwischenschaltstation (9) umfasst: wenigstens eine Hilfsvorschub- bzw. -vorrückvorrichtung (13; 251; 252; 253; 351), die geeignet ist, die Transporteinheit (3) entlang des Wegs (P1) und eines weiteren Wegs (P2; P3), der dem Weg (P1) teilweise überlagert ist, vorzurücken, wenn die Transporteinheit (3) von dem Zugseil (2; 102A, 102B, 102C; 202A, 202B, 202C) getrennt wird; und eine Schaltvorrichtung (27; 28; 29; 250) zum selektiven Leiten der Transporteinheit (3) Entlang des Wegs (P1) oder des weiteren Wegs (P2; P3).

**6.** Seilbahnsystem nach Anspruch 5, wobei die Hilfsvorrückvorrichtung (13; 251; 252; 253; 351) umfasst: erste Führungen (30; 256; 355), die sich entlang eines Abschnitts erstrecken, wo der Weg (P1) dem Weg (P2; P3) überlagert ist; zweite Führungen (31; 257; 355), die sich entlang des weiteren Wegs (P2; P3) erstrecken; und dritte Führungen (32; 258; 356), die sich entlang des Wegs (P1) erstrecken; wobei die ersten, die zweiten und die dritten Führungen (20, 31, 32; 256, 257, 258; 355, 356) geeignet sind, um den Wagen (4) zu führen.

**7.** Seilbahnsystem nach Anspruch 6, wobei die Hilfsvorrückvorrichtung (13; 251; 252; 253; 351) eine Antriebseinheit (33; 254; 255; 352, 253, 354) zum Vorrücken der Transporteinheit (3) entlang der ersten Führungen (30; 256; 355); zweiten Führungen (31; 257; 355) und dritten Führungen (32; 258; 356) umfasst.

**8.** Seilbahnsystem nach Anspruch 6 oder 7, wobei die Schaltvorrichtung (27, 28, 29; 250) umfasst: Halteeinrichtungen (35; 260) zum Halten des Wagens (4)

und Verbinden der ersten Führungen (30; 256; 355) mit den zweiten und dritten Führungen (30, 31; 257, 258; 355, 356), wenigstens zwei Nocken (36, 37, 38; 261, 262), die geeignet sind, um den Wagen (4) in dem Bereich der Halteeinrichtung (35; 260) zu führen; und eine Nockenmitnehmeranordnung (29; 263), die auf den Wagen (4) montiert ist und geeignet ist, in eine der wenigstens zwei Nocken (26, 37, 38; 261, 262) einzugreifen.

**9.** Seilbahnsystem nach Anspruch 8, wobei der Wagen (4) umfasst: einen Rahmen (40), der Räder (41) hält, die geeignet sind, um mit ersten, zweiten oder dritten Führungen (20, 31, 32; 256, 257, 258) einzugreifen; und die Nockenmitnehmeranordnung (39; 263).

**10.** Seilbahnsystem nach einem der Ansprüche 5 bis 9, das eine Anzahl von Schaltvorrichtungen (27, 28, 29), die in der Zwischenschaltstation (9) angeordnet sind, umfasst, die gleich der Anzahl von Wendestationen (6, 7, 8) ist.

**11.** Seilbahnsystem nach Anspruch 8 oder 9; wobei die Hilfsvorrückvorrichtung (251; 252; 253) eine Schaltvorrichtung (250) umfasst; die entlang des weiteren Wegs (P3) angeordnet ist und zwei Nocken (261, 262) und eine Nockenmitnehmeranordnung (263) umfasst, die in einer selektiv beweglichen Weise auf dem Wagen (4) montiert ist, um selektiv in eine der Nocken (261, 262) einzugreifen.

**12.** Seilbahnsystem nach Anspruch 11, wobei der Wagen (4) mit einer Betätigungsvorrichtung (264) gekoppelt ist, die geeignet ist, um die Nockenmitnehmeranordnung (263) in Bezug auf den Wagen (4) zu verschieben.

**13.** Verfahren zum Betrieb eines Seilbahnsystems (1), insbesondere für den Personentransport; wobei das Verfahren die folgenden Schritte umfasst: Vorrücken einer Transporteinheit (3) wenigstens entlang eines Wegs (P1), der sich durch eine Vielzahl von Wendestationen (6, 7, 8) und eine Zwischenschaltstation (9) erstreckt, durch selektives Verbinden der Transporteinheit (3) mittels eines Wagens (4) mit wenigstens einem Zugseil (2; 102A, 102B, 102C; 202A, 202B, 202C); wobei die Zwischenschaltstation (9) direkt mit jeder der Vielzahl von Wendestationen (6, 7, 8) verbunden ist.

**14.** Verfahren nach Anspruch 13, das umfasst: den Schritt des Vorrückens der Transporteinheit (3) in der Zwischenstation (9) mittels wenigstens einer Hilfsvorrückvorrichtung (13; 251; 252; 253; 351) entlang des Wegs (P1) und eines weiteren Wegs (P2; P3), der dem Weg (P1) teilweise überlagert ist, wenn die Transporteinheit (3) von dem Zugsseil (2; 102A, 102B, 102C; 202A, 2028, 202C) getrennt ist; und Leiten der Transporteinheit (3) entlang des Wegs (P1) oder des weiteren Wegs (P2; P3) entlang der Hilfsvorrückvorrichtung (13; 251; 252; 253; 351).

**Revendications**

**1.** Système de téléphérique (1), en particulier pour le transport de personnes, le système de téléphérique (1 ; 101 ; 201 ; 301) comprenant au moins un câble tracteur (2 ; 102A, 102B, 102C ; 202A, 202B, 202C) ; une unité de transport (3) comprenant un chariot (4) sélectivement raccordable au câble tracteur (2 ; 102A, 102B ; 102C, 202A, 202B, 202C) ; une pluralité de stations de rotation (6, 7, 8) ; le système de téléphérique étant **caractérisé en ce qu'**il comprend une station d'aiguillage intermédiaire (9) pour l'unité de transport (3) ; ladite unité de transport (3) étant avancée au moins le long d'une partie d'un trajet (P1) s'étendant sur les première, deuxième et troisième stations de rotation (6, 7, 8) et la station d'aiguillage intermédiaire (9).

**2.** Système de téléphérique selon la revendication 1, dans lequel la station d'aiguillage intermédiaire (9) est une station de rotation centrale.

**3.** Système de téléphérique selon la revendication 1 ou 2, dans lequel la station d'aiguillage intermédiaire (9) est directement raccordée à chacune desdites stations de rotation (6, 7, 8).

**4.** Système de téléphérique selon l'une quelconque des revendications précédentes, dans lequel ledit trajet (P1) comprend des premières portions avant et arrière (15, 16) entre la station d'aiguillage intermédiaire (9) et une première station d'aiguillage (6) ; des deuxièmes portions avant et arrière (17, 18) entre la station d'aiguillage intermédiaire (9) et une deuxième station d'aiguillage (7) ; et des troisièmes portions avant et arrière (19, 20) entre la station d'aiguillage intermédiaire (9) et une troisième station de rotation (8).

**5.** Système de téléphérique selon l'une quelconque des revendications précédentes, dans lequel la station d'aiguillage intermédiaire (9) comprend au moins un dispositif d'avancement auxiliaire (13 ; 251 ; 252 ; 253 ; 351) adapté pour faire avancer l'unité de transport (3) le long du trajet (P1) et d'un trajet supplémentaire (P2 ; P3) partiellement superposés audit trajet (P1), quand l'unité de transport (3) est déconnectée du câble tracteur (2 ; 102A, 102B, 102C ; 202A, 202B, 202C) ; et un dispositif d'aiguillage (27 ; 28 ; 29 ; 250) permettant de diriger sélectivement l'unité de transport (3) le long dudit trajet (P1) ou du trajet supplémentaire (P2 ; P3).

**6.** Système de téléphérique selon la revendication 5, dans lequel le dispositif d'avancement auxiliaire (13 ; 251 ; 252 ; 253 ; 351) comprend des premières voies (30 ; 256 ; 355) s'étendant le long d'une section où le trajet (P1) est superposé au trajet (P2 ; P3) ; des deuxièmes voies (31, 257, 355) s'étendant le long du trajet supplémentaire (P2 ; P3) ; et des troisièmes voies (32, 258, 356) s'étendant le long du trajet (P1) ; les premières, les deuxièmes et les troisièmes voies (20, 31, 32 ; 256, 257, 258 ; 355, 356) étant adaptées pour guider ledit chariot (4).

**7.** Système de téléphérique selon la revendication 6, dans lequel le dispositif d'avancement auxiliaire (13 ; 251 ; 252 ; 253 ; 351) comprend une unité d'entraînement (33 ; 254, 255 ; 352, 353, 354) pour faire avancer l'unité de transport (3) le long desdites premières voies (30 ; 256 ; 355) ; deuxièmes voies (31 ; 257 ; 355) ; et troisièmes voies (32 ; 258 ; 356).

**8.** Système de téléphérique selon la revendication 6 ou 7, dans lequel le dispositif d'aiguillage (27, 28, 29 ; 250) comprend des moyens de support (35 ; 260) permettant de supporter le chariot (4) et de raccorder les premières voies (30 ; 256 ; 355) aux deuxièmes et troisièmes voies (30, 31 ; 257, 258 ; 355, 356), au moins deux cames (36, 37, 38 ; 261, 262) adaptées pour guider le chariot (4) dans la région dudit moyen de support (35 ; 260) ; et un ensemble de galet de came (29 ; 263), qui est monté sur le chariot (4) et est adapté pour mettre en prise une desdites au moins deux cames (26, 37, 38 ; 261, 262).

**9.** Système de téléphérique selon la revendication 8, dans lequel le chariot (4) comprend un châssis (40) qui supporte des roues (41) adaptées pour mettre en prise lesdites premières, deuxièmes ou troisièmes voies (20, 31, 32 ; 256, 257, 258) ; et ledit ensemble de galet de came (39 ; 263).

**10.** Système de téléphérique selon l'une quelconque des revendications 5 à 9 comprenant un nombre de dispositifs d'aiguillage (27, 28, 29) agencés dans la station d'aiguillage intermédiaire (9) égal au nombre de stations de rotation (6, 7, 8).

**11.** Système de téléphérique selon la revendication 8 ou 9 ; dans lequel le dispositif d'avancement auxiliaire (251 ; 252 ; 253) comprend un dispositif d'aiguillage (250) ; qui est agencé le long du trajet supplémentaire (T3) et comprend deux cames (261, 262) et un ensemble de galet de came (263) monté d'une façon sélectivement mobile sur le chariot (4) afin de mettre sélectivement en prise l'une des deux cames (261, 262).

**12.** Système de téléphérique selon la revendication 11, dans lequel le chariot (4) est couplé à un dispositif d'actionnement (264) adapté pour déplacer l'ensemble de galet de came (263) par rapport au chariot (4).

**13.** Procédé de commande d'un système de téléphérique (1), en particulier pour transporter des personnes ; le procédé comprenant les étapes d'avancement d'une unité de transport (3) au moins en partie le long d'une portion de trajet (P1) s'étendant à travers une pluralité de stations de rotation (6, 7, 8) et une station d'aiguillage intermédiaire (9) en raccordant sélectivement l'unité de transport (3) au moyen d'un chariot (4) à au moins un câble tracteur (2 ; 102A, 102B, 102C ; 202A, 202B, 202C) ; dans lequel la station d'aiguillage intermédiaire (9) est directement raccordée à chacune de ladite pluralité de stations de rotation (6, 7, 8).

**14.** Procédé selon la revendication 13, comprenant l'étape d'avancement de l'unité de transport (3) dans la station d'aiguillage intermédiaire (9) au moyen d'au moins un dispositif d'avancement auxiliaire (13 ; 251 ; 252 ; 253 ; 351) le long d'un trajet (P1) et d'un trajet supplémentaire (P2 ; P3) en partie superposé audit trajet (P1) lorsque l'unité de transport (3) est déconnectée du câble tracteur (2 ; 102A, 102B, 102C ; 202A, 202B, 202C) ; et de direction de l'unité de transport (3) le long dudit trajet (P1) ou du trajet supplémentaire (P2 ; P3) le long dudit dispositif d'avancement auxiliaire (13 ; 251 ; 252 ; 253 ; 351).

Fig.1

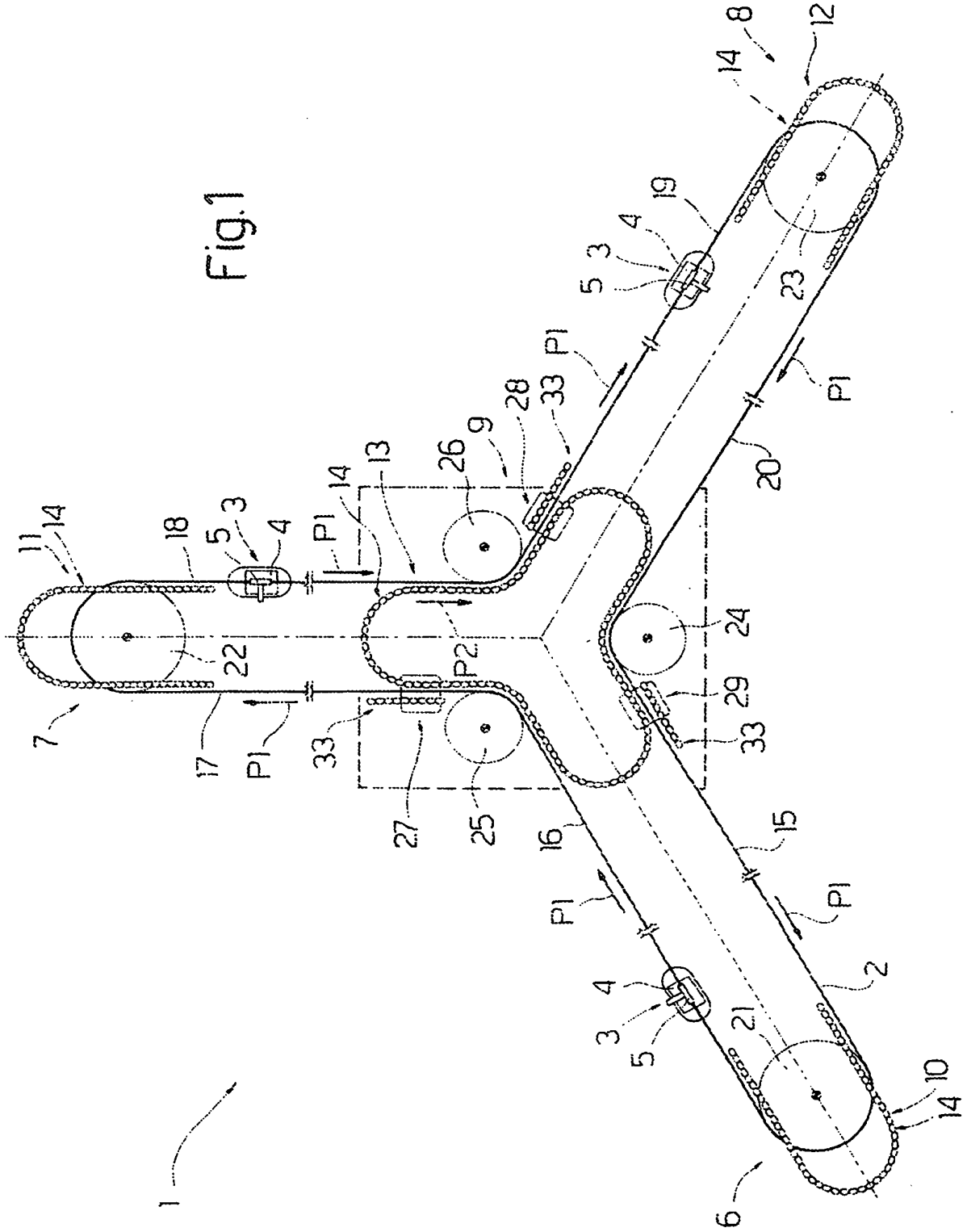

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P1
P2

Fig.2

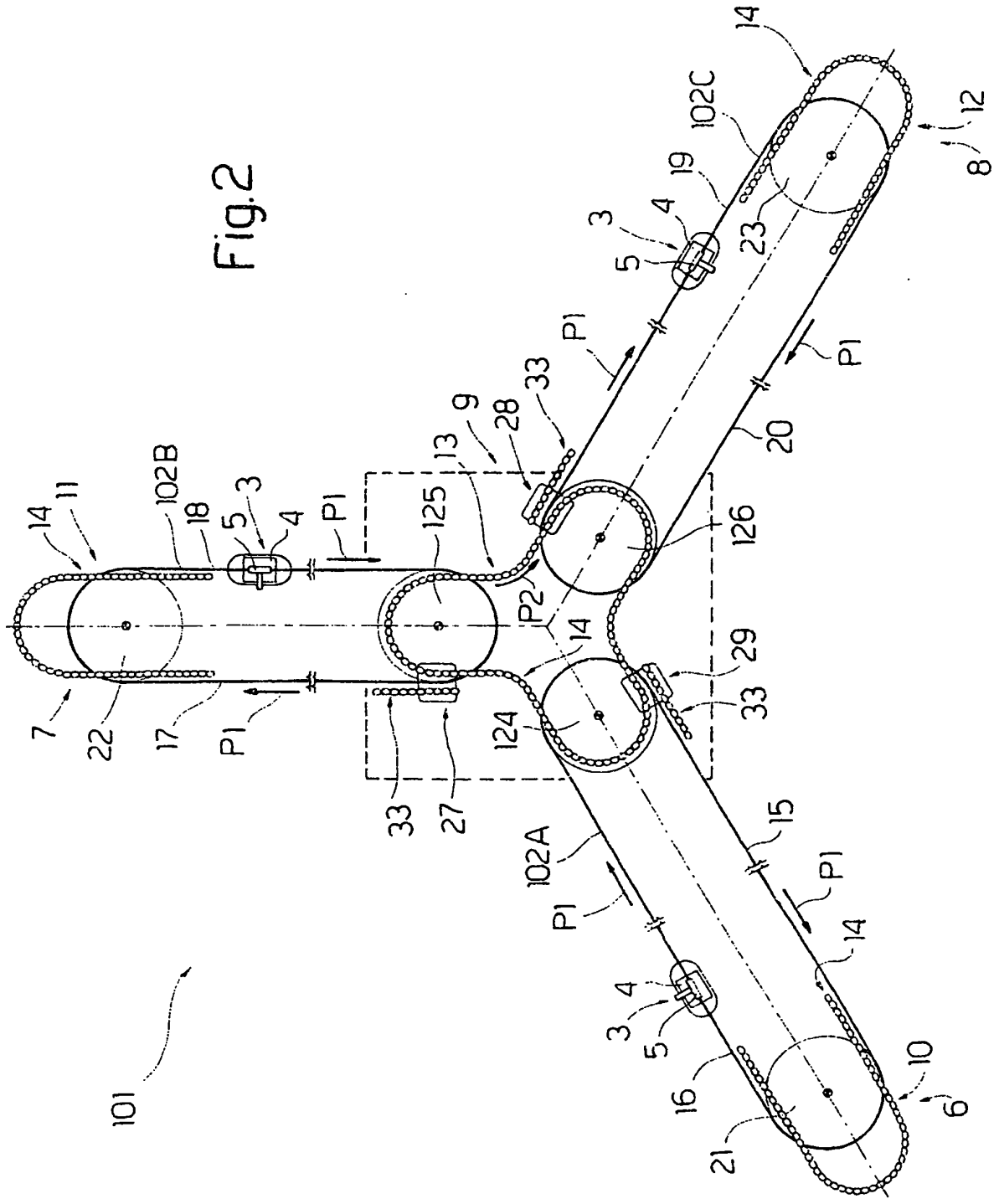

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102A
102B
102C
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P2
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Fig.3

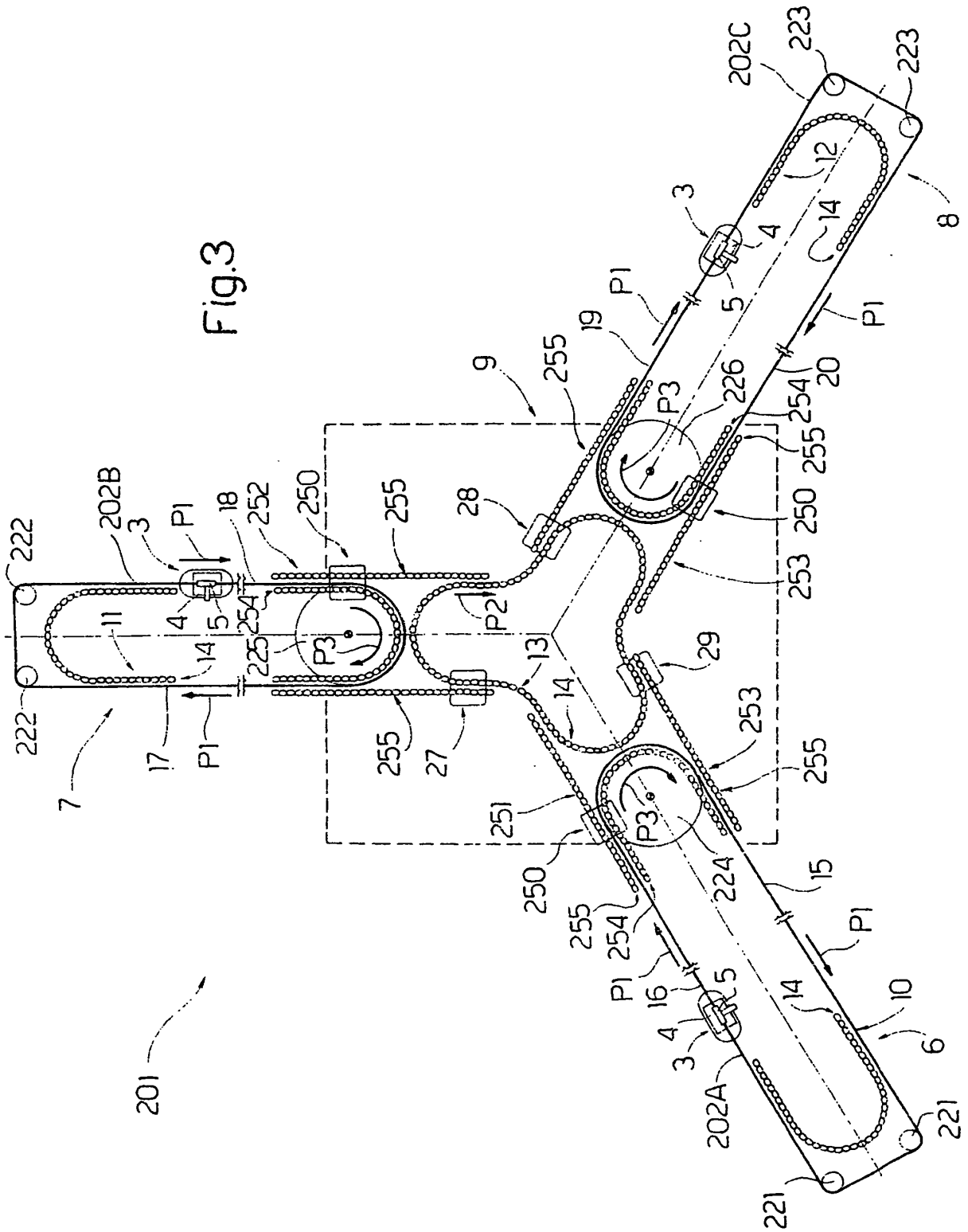
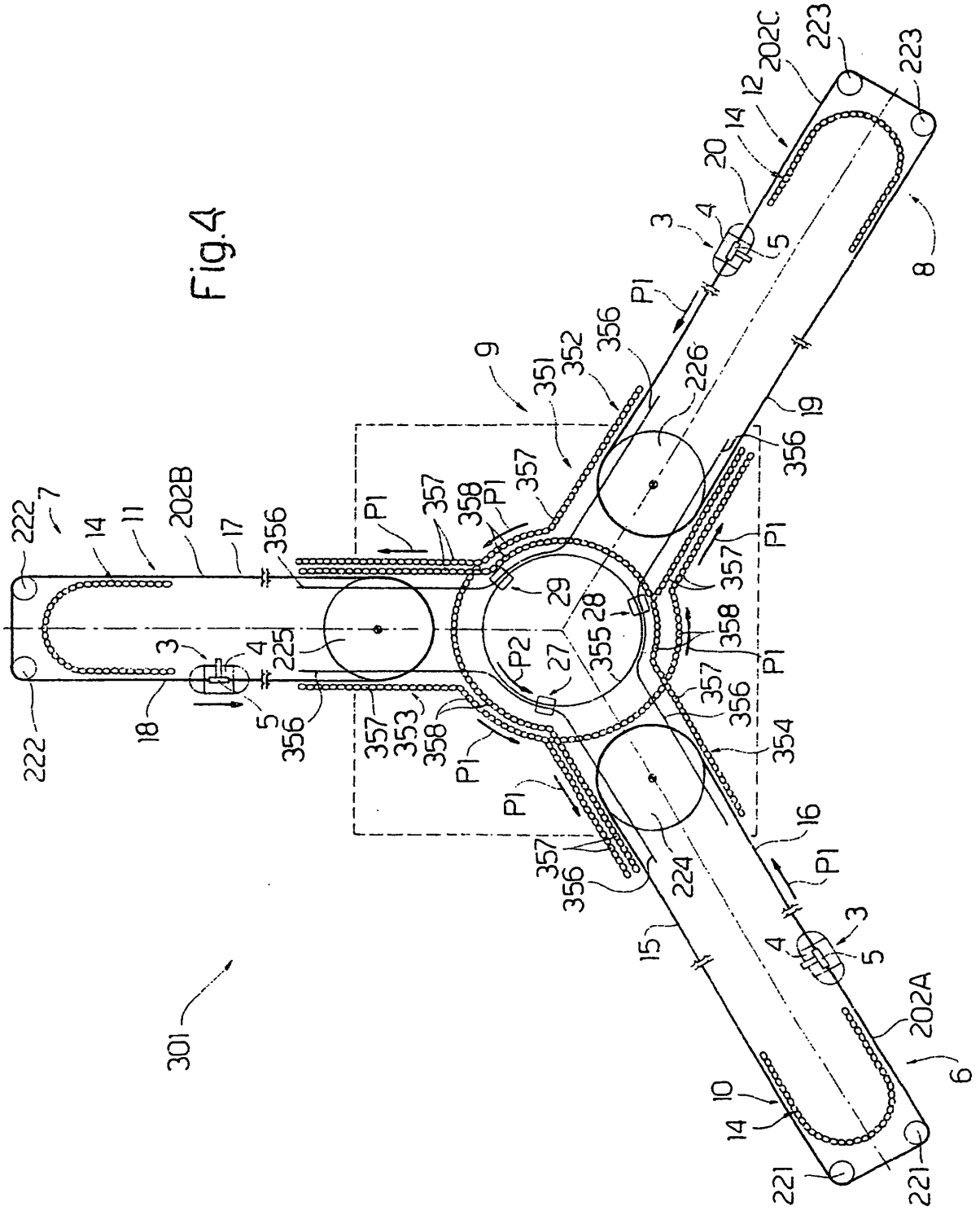

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202B
202C
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P3
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Fig.4


301
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202B
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P1
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P2
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202C
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202A
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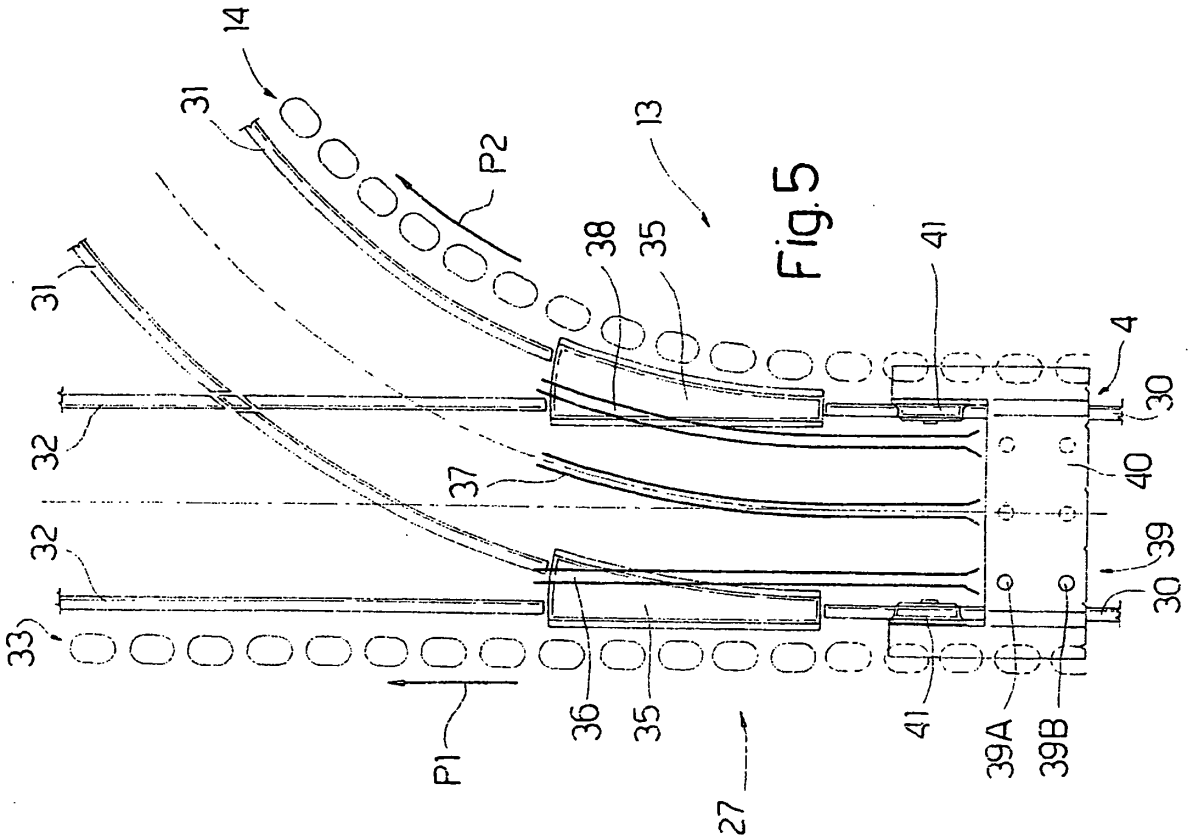



Fig.5

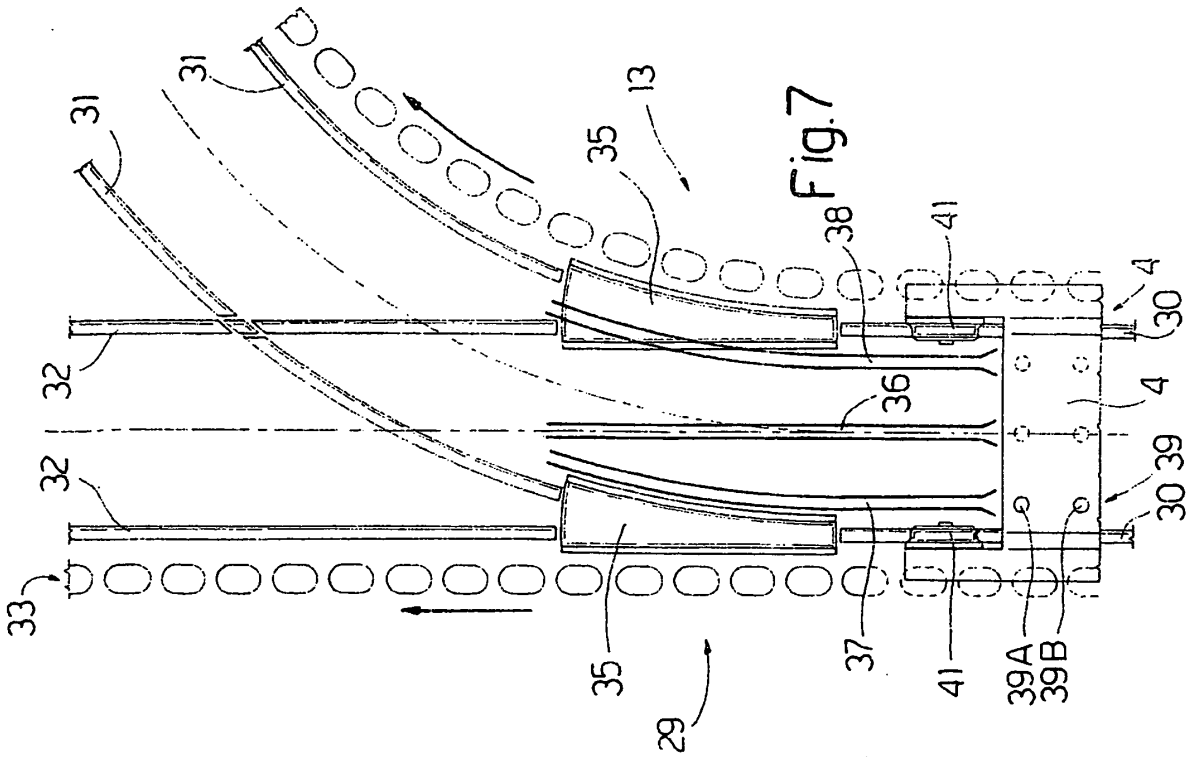

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39A
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Fig.7

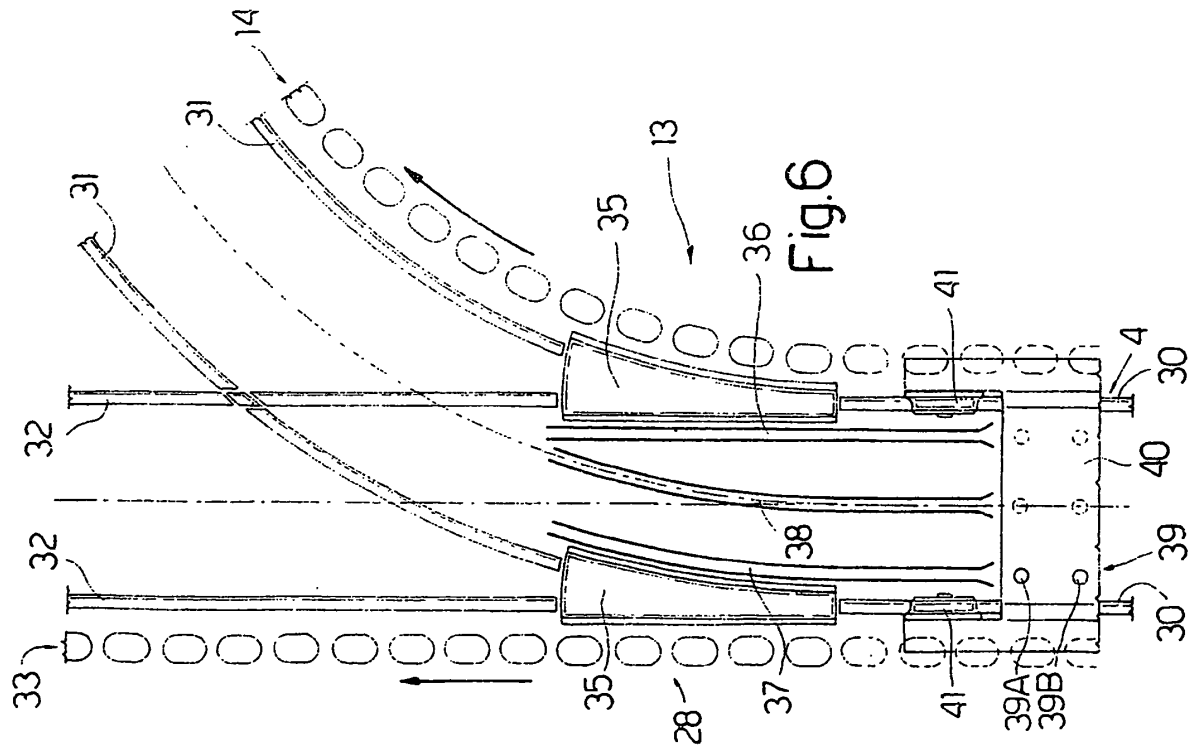

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39B
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Fig.6

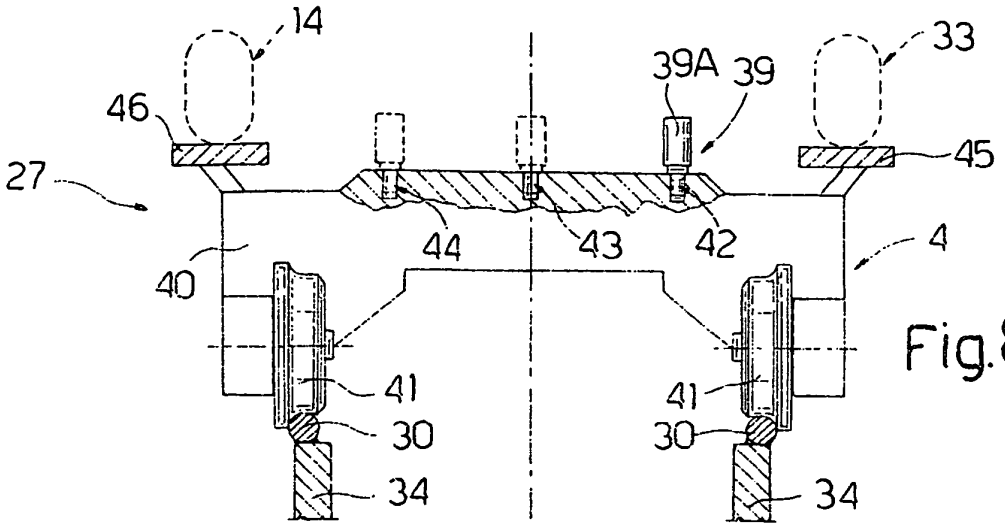



Fig.8

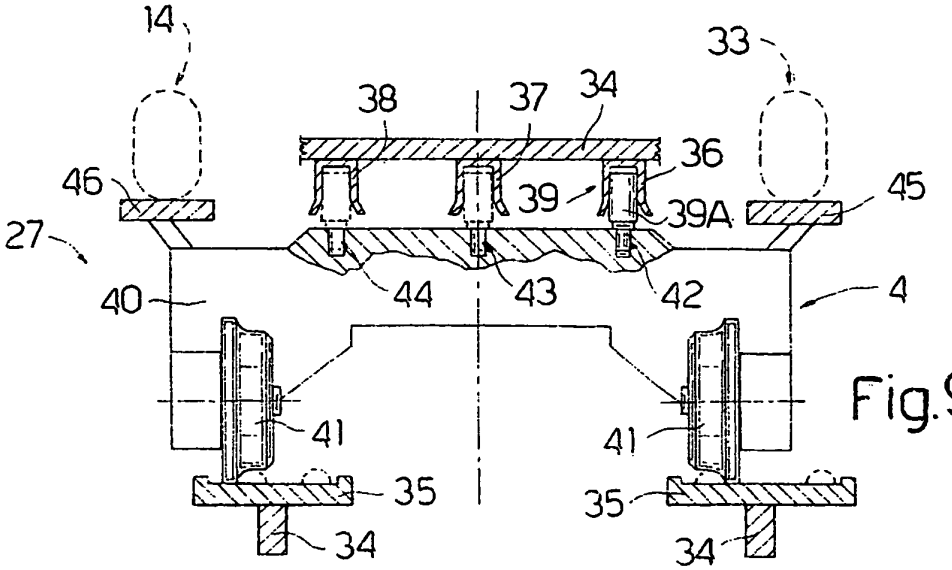



Fig.9

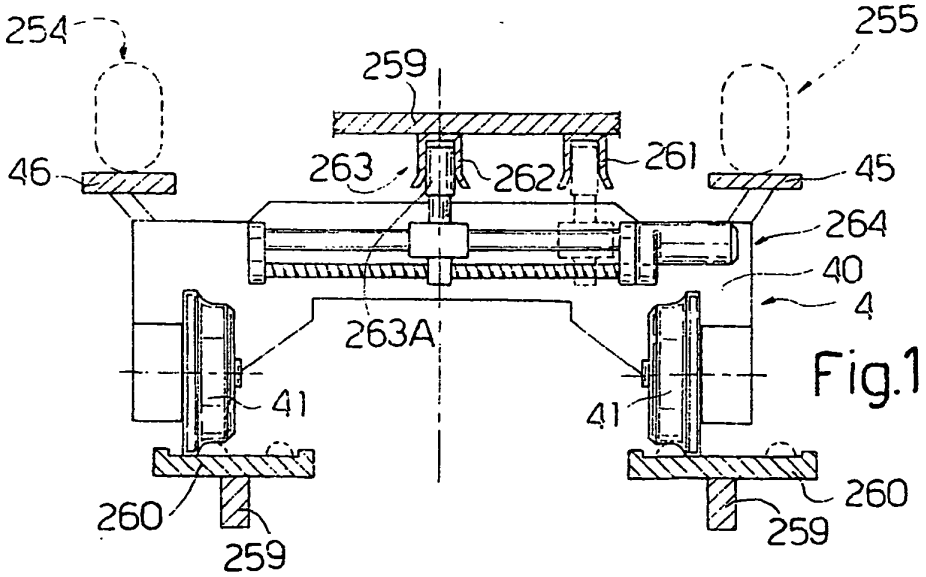



Fig.11

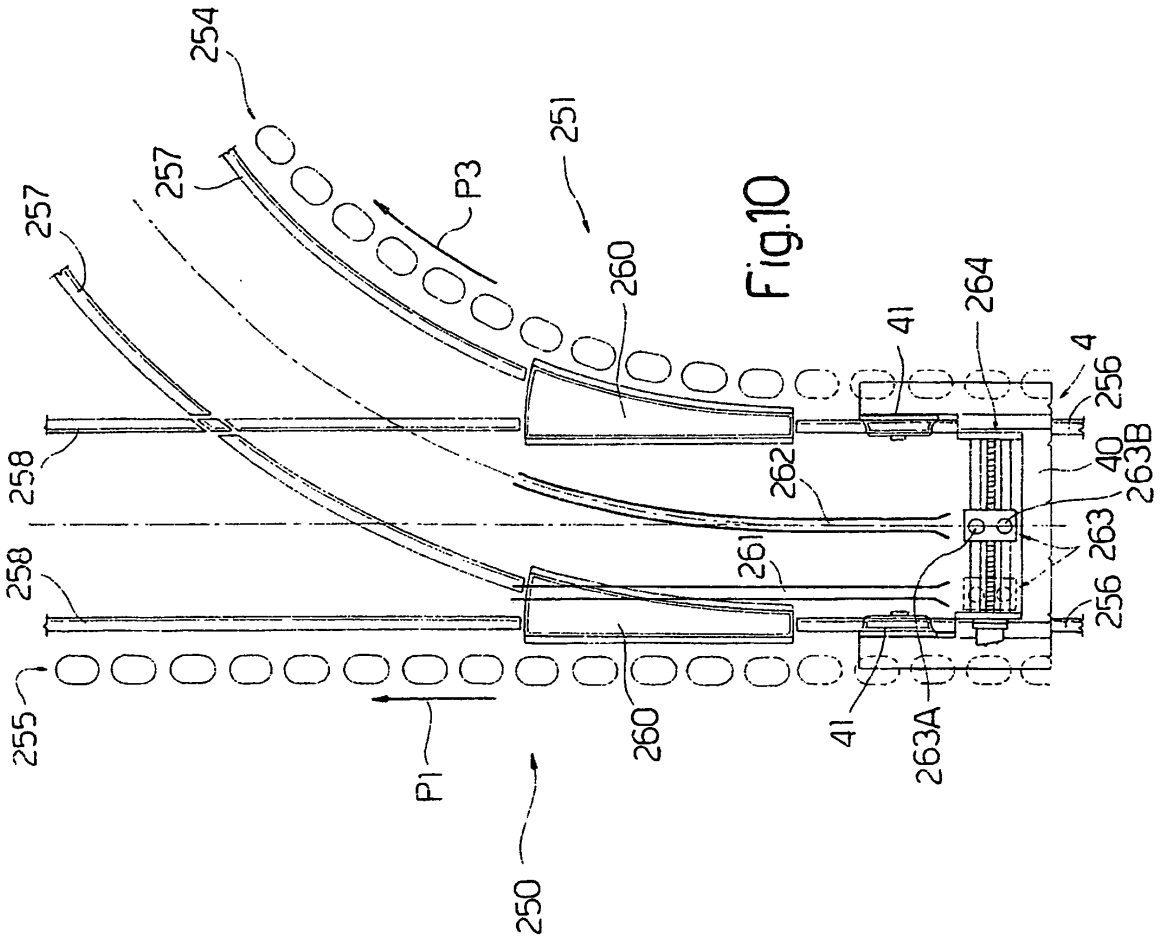

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257
257
251
P3
260
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264
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256
258
262
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263B
263
258
261
256
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P1
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41
263A
250

Fig.10

## REFERENCES CITED IN THE DESCRIPTION

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### Patent documents cited in the description


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