HU000027783T2

(19) **HU**

(11) Lajstromszám: **E 027 783** (13) **T2**

MAGYARORSZÁG
Szellemi Tulajdon Nemzeti Hivatala

EURÓPAI SZABADALOM
SZÖVEGÉNEK FORDÍTÁSA

(21) Magyar ügyszám: **E 13 707532**
(22) A bejelentés napja: **2013. 02. 07.**

(96) Az európai bejelentés bejelentési száma:
EP 20130707532
(97) Az európai bejelentés közzétételi adatai:
EP 2812226 A1 **2013. 08. 15.**
(97) Az európai szabadalom megadásának meghirdetési adatai:
EP 2812226 B1 **2016. 04. 13.**

(51) Int. Cl.: ***B61L 5/02*** *(2006.01)*
B61L 15/00 *(2006.01)*
B61L 27/00 *(2006.01)*

(86) A nemzetközi (PCT) bejelentési szám:
PCT/AT 13/000021
(87) A nemzetközi közzétételi szám:
WO 13116882

(30) Elsőbbségi adatok:
1712012 **2012. 02. 09.** **AT**

(72) Feltaláló(k):
LEITNER, Josef, A-8741 Weisskirchen (AT)
KOPILOVITSCH, Harald, A-8753 Hetzendorf (AT)

(73) Jogosult(ak):
voestalpine SIGNALING Zeltweg GmbH, 8740 Zeltweg (AT)

(74) Képviselő:
Danubia Szabadalmi és Jogi Iroda Kft., Budapest

(54) **Szerkezet vasúti váltó átállítására**

Device for Controlling a Rail Switch

The invention pertains to a device for controlling a rail switch that comprises a tongue device with two stock rails and tongue rails assigned to the stock rails, wherein a plurality of control devices are arranged offset in the longitudinal rail direction, and wherein the control devices are mechanically coupled to one another by means of a coupling rod assembly in such a way that they are driven equidirectionally.

The invention furthermore pertains to a rail switch that comprises a tongue device with two stock rails that are mounted on crossties and tongue rails assigned to the stock rails, as well as a device for controlling the rail switch.

Control devices for tongue rails are generally known from the prior art. In conventional control devices, the tongue rail is mechanically switched over with the aid of an electric or hydraulic switch drive, wherein a switch lock is also provided separately of the switch drive or integrated therein and a separate end position checking device is provided in any case. The switch lock serves for fixing the tongue rail in its respective end position. A plurality of control devices that are arranged offset in the longitudinal rail direction and include, if applicable, respectively integrated locking devices are required in order to switch over modern high-speed switches, wherein only the first of these control devices is usually connected to the drive unit and the remaining control devices are mechanically coupled to the first control device and to one another in such a way that they are driven equidirectionally. The planes, in which the control or locking devices engage on the tongue rails, are respectively referred to as control or locking planes.

AT 500296 A1 discloses a switch control device, in which two control devices that respectively include an integrated switch lock are arranged offset in the longitudinal rail direction, wherein the coupling rod assembly for connecting the control devices extends laterally outside the crossties.

However, the arrangement of the coupling rod assembly outside the track has the disadvantage that this impairs the packing process. The packing process becomes even more complicated if coupling rod assemblies, which couple a plurality of control devices arranged offset in the longitudinal rail direction to one another, are used in curved switches. Depending on the curve radius, a corresponding inclination of the coupling rod assembly occurs in curved switches such that the space available for the packing process is significantly reduced.

US 2003/042370 A1 discloses a device for controlling a rail switch that comprises a tongue device with two stock rails and tongue rails assigned to the stock rails, wherein a plurality of control devices are arranged offset in the longitudinal rail direction, and wherein the control devices are mechanically coupled to one another by means of a coupling rod assembly in such a way that they are driven equidirectionally, wherein the coupling rod assembly respectively comprises between two adjacent control devices a separate double rod assembly consisting of two parallel and longitudinally moveable coupling rods that mechanically couple the two adjacent control devices to one another and extend between the two stock rails.

The present invention therefore aims to eliminate the above-described disadvantages. The coupling rod assembly should impair the packing process as little as possible. The coupling rod assembly should furthermore have the most compact design possible and also be suitable for use in curved switches without creating any problems.

In order to attain this objective, a control device of the initially described type is essentially enhanced in such a way that the coupling rod assembly respectively comprises between two adjacent control devices a separate

double rod assembly consisting of two parallel and longitudinally moveable coupling rods that mechanically couple the two adjacent control devices to one another and extend between the two stock rails, wherein the two parallel coupling rods feature cranked end sections. The packing process is hardly impaired due to the fact that the separate double rod assembly consisting of two parallel coupling rods extends between the two stock rails, particularly about centrally between the two stock rails. In this case, even an inclination of the coupling rods in a curved switch hardly has any disadvantageous effects on the packing process such that the inventive control device can be readily used in curved switches. Since a separate double rod assembly consisting of two parallel coupling rods is respectively arranged between two adjacent control devices, the coupling rod assembly can in a curved switch be very well adapted to the curvature of the switch such that the additional space required due to the inclination of the coupling rods can be minimized. In this way, it can also be ensured, in particular, that the coupling rod assembly remains positioned in the centre of the track.

In order to minimize the space required for the double rod assembly, the two coupling rods need to be arranged as close to one another as possible. According to the invention, the two parallel coupling rods feature cranked end sections in order to still allow the eccentric engagement of the coupling rods on the lever arm for realizing the required lever arm. In this case, the cranked end sections may be realized in the form of separate end pieces that are connected to the coupling rods.

In straight switches, the inventive design with a plurality of separate coupling rods also provides the advantage that the coupling rod assembly can be modularly assembled in accordance with the number of control planes and the length of the switch. A large number of control planes particularly can be coupled to one another in this way. If a control device needs to be replaced, it is not necessary to remove the complete coupling rod assembly because it does not extend continuously over the individual control devices, but rather comprises coupling rods that respectively connect two adjacent control devices to one another separately. In fact, it suffices to disconnect the coupling rod assembly from the control device to be replaced such that the control device can then be easily removed. This can be achieved in that the individual coupling rods end a certain distance from the control device referred to the longitudinal rail direction.

The conversion of the coupling rod motion in their longitudinal direction into a lateral switch-over motion of the control devices is preferably realized in that the at least one coupling rod respectively engages on the control device by means of an angular lever on both of its ends. This angular lever simultaneously ensures the aforementioned clearance between the coupling rods and the control device in the longitudinal rail direction and makes it possible to adjust the switch-over stroke in the control planes.

The inventive design makes it possible to mechanically couple a plurality of control devices to one another. If at least three control devices are coupled to one another, the inventive arrangement is realized in such a way that the control devices comprise a first control device, a second control device and a third control device, wherein the second control device is arranged between the first and the third control device, wherein a first angular lever and a second angular lever engage on the second control device, wherein the first angular lever is connected to a coupling rod in order to couple the first control device to the second control device, and wherein the second angular lever is connected to a coupling rod in order to couple the second control device to the third control device.

When rail switches are switched over, it is basically required to take into account the different displacements along the longitudinal rail direction. In this case, the required displacement is the smaller the closer the coupling point of the respective control device is arranged to the mounting point of the tongue rail. It is furthermore necessary to take into account different switch-over forces, wherein these switch-over forces increase as the distance from the mounting point of the tongue rail decreases. This is caused by the lever principle, as well as the fact that the cross section of the tongue rail is smaller in a region situated farther from the mounting point of the tongue rail than in a region situated adjacent to the mounting point. The respectively required displacement preferably can be realized with the aid of the aforementioned angular levers in that the angular lever arranged on one end of the coupling rod has a greater lever ratio than the angular lever arranged on the other end of the coupling rod. In this context, the term lever ratio refers to the ratio between the effective lengths of the two lever arms of the angular lever.

A particularly space-saving construction is preferably achieved in that the control devices are respectively arranged in a space between two adjacent crossties. According to another preferred embodiment, this makes it possible to pivotably support the angular levers on the crossties. The crossties consequently serve as mountings for the angular levers such that separate mountings are not required.

Due to the inventive design, the coupling rod assembly preferably can extend above the crossties. This simplifies the installation, the maintenance and the potential replacement of the rod assembly.

In order to allow a simple measurement of the switch-over stroke on the angular lever, it is preferred that the angular levers respectively engage on the control device by means of an intermediately arranged and pivotably coupled pendulum support.

In order to prevent the coupling rod assembly from being subjected to compressive forces and therefore from potentially buckling or bulging when the rail switch is switched over, it is preferred that the coupling rod assembly respectively comprises two parallel coupling rods between two adjacent control devices, wherein said coupling rods mechanically couple the two adjacent control devices to one another and extend between the two stock rails. In this way, a double rod assembly is provided, in which the respective coupling rod being acted upon is only subjected to tensile forces.

In order to ensure that the control devices are coupled to one another in such a way that they are driven equidirectionally, a preferred enhancement proposes that the cranked end sections provided on one end of the two coupling rods intersect one another and the cranked end sections provided on the other end of the two coupling rods are realized in a diverging fashion.

Lateral forces may be applied to the coupling rods due to the cranked design of their end sections. It is therefore advantageous if the two parallel coupling rods cooperate with guide rollers in order to absorb these lateral forces.

The invention is described in greater detail below with reference to an exemplary embodiment that is schematically illustrated in the drawings. In these drawings, Figure 1 shows a top view of a rail switch, Figure 2 shows a top view of a double rod assembly between two control planes, Figure 3 shows the detail III of Figure 1 and Figure 4 shows the detail IV of Figure 1.

Figure 1 shows a section of a rail switch that comprises two stock rails 1 and 2, as well as tongue rails 3 and 4 that can be brought in contact with the respective stock rails. The stock rails 1 and 2 are mounted on crossties 5 with the aid of conventional mounting devices. Control devices are provided for switching over the rail switch and arranged in the three control planes 6, 7 and 8. A first control device 9 is arranged in the first control plane 6, a second control device 10 is arranged in the second control plane 7 and a third control device 11 is arranged in the third control plane 8. The control devices 9, 10 and 11 extend transverse to the longitudinal rail direction and are mounted on the two tongue rails 3 and 4. The control devices 9, 10 and 11 are realized, in particular, as described in AT 500 296 A1 and feature an integrated switch lock, by means of which the tongue rails 3 and 4 can be locked in the respective end position.

Figure 1 furthermore shows end position checking devices 12 and 13 that serve for mechanically sensing the current state of the rail switch and for generating a check signal, based on which it can be reliably determined if the rail switch was correctly switched over and if the closed and the open tongue rail respectively are in their correct end position.

In order to switch over the rail switch, the first control device 9 cooperates with a drive unit 14 that is realized, for example, in the form of a hydraulic drive. The drive unit 14 drives the control device 9 such that it carries out a switch-over stroke in the direction of the double arrow 15. The first control device 9 is mechanically coupled to the second control device 10 and the third control device 11 with the aid of a coupling rod assembly 16 such that all three control devices 9, 10 and 11 carry out an equidirectional switch-over motion. In this respect, the first control device 9 and the second control device 10 are coupled to one another with the aid of a double rod assembly 17 and the second control device 10 and the third control device 11 are coupled to one another with the aid of a double rod assembly 18. The double rod assembly 17 and the double rod assembly 18 are realized in the form of separate components in this case.

The double rod assembly 17 is illustrated in an enlarged fashion in Figure 2. The double rod assembly 17 features two coupling rods 19 and 20 that are arranged parallel to one another and feature cranked end sections. In this case, the cranked end sections are realized in the form of separate components that can be screwed onto the respective coupling rods 19 and 20. In this way, the same components can be used for realizing different cranks in accordance with the respective requirements. According to Figure 2, the coupling rods 19 and 20 feature end sections 21 that are cranked outward, i.e. extend in a diverging fashion, on the right end in the drawing and cranked end sections 22 that intersect one another on the left end in the drawing. The end sections 21 and 22 are respectively connected in an articulated fashion to angular levers 23 and 24, wherein these angular levers are in turn respectively connected to the control devices 9 and 10 that are not illustrated in Figure 2 by means of pendulum supports 25 and 26. The angular levers 23 and 24 are respectively mounted on mounting plates 29 and 30 such that they can be respectively pivoted about pivoting axes 27 and 28. The respective mounting plates 29 and 30 are mounted on a crosstie 5, for example, with the aid of screws. The coupling rods 19 and 20 are mounted in the centre with the aid of a clamp 31 that extends over the coupling rods, wherein the clamps 31 can once again be fixed on a crosstie 5 with the aid of a mounting plate 32. In this case, the arrangement must allow a motion of the coupling rods 19 and 20 in the direction of the double arrow 33, as well

as a change of the clearance between the coupling rods 19 and 20. A slight change of this clearance between the coupling rods 19 and 20 occurs during a pivoting motion of the respective angular lever 23 or 24.

The detail illustrated in Figure 3 elucidates how the coupling rods 19 and 20 engage on the control device 9 with the aid of the angular lever 23 and the rod 25. In this case, the angular lever 23 serves for converting the switch-over motion of the control device 9 in the direction of the double arrow 15 into an axial motion of the coupling rods 19 and 20 in the direction of the double arrow 33. For this purpose, the angular lever 23 is arranged on the mounting plate 29 such that it can be pivoted about a pivoting axis 27. The first lever arm of the angular lever 23 extends between the coupling point 34 of the coupling rod 20 and the pivoting axis 27 of the angular lever 23. With respect to the coupling rod 19, the first lever arm of the angular lever 23 extends between the coupling point 35 of the coupling rod 19 on the angular lever 23 and the pivoting axis 27. The second lever arm 36 of the angular lever 23 extends between the pivoting axis 27 and the coupling point 37 of the angular lever 23 on the pendulum support 25. The pivotable arrangement on the coupling point 37, as well as the pivotable arrangement on the coupling point 38, makes it possible to convert the switch-over motion of the control device 9 in the direction of the double arrow 15 realized by means of the drive unit 14 into a pivoting motion of the angular lever 23 along the circular arc 39. The angular lever 23 in turn converts the pivoting motion into an axial motion of the coupling rods 19 and 20 along the double arrow 33.

Figure 4 shows how the axial motion of the coupling rods 19 and 20 is converted into a switch-over motion of the control device 10 in the direction of the double arrow 15. The coupling rods 19 and 20 engage on an angular lever 24 with their outwardly cranked end sections 21, wherein said angular lever is respectively mounted on a mounting plate 30 and on the crosstie 5 such that it can be pivoted about the axis 28. The angular lever 24 in turn engages on the control device 10 by means of a pendulum support 26, wherein the conversion of the motions takes place analogous to the preceding description with reference to Figure 3.

The coupling rods 19 and 20 engage on the angular lever 23 at the inner coupling points 34 with the cranked sections 22 (Figure 3) and on the angular lever 24 at the outer coupling points 40 with the cranked end sections 21 (Figure 4). This means that the effective length of the first lever arm of the angular lever 23 is shorter than the effective length of the first lever arm of the angular lever 24. Consequently, the lever ratio of the angular lever 23 is greater than the lever ratio of the angular lever 24. This difference between the lever ratios causes the switch-over stroke of the control device 10 to be shorter than the switch-over stroke of the control device 9.

The drive of the control device 11 is realized with the aid of the double rod assembly 18 that comprises the coupling rods 41 and 42. The coupling rods 41 and 42 engage on the angular lever 45 at the inner coupling points 44 with their cranked end sections 43 that intersect one another such that the switch-over stroke of the control device 11 is shortened in comparison with the switch-over stroke of the control device 10 and takes place equidirectionally. Alternatively, intersecting control cables may also be used instead of the coupling rods. The angular lever 45 in turn engages on the control device 10 by means of the intermediately arranged pendulum support 46.

Figure 1 shows that the inventive arrangement of the coupling rod assembly 16 between the two stock rails 11, i.e. in the centre of the track, only requires very little space. The coupling rod assembly 16 extends above the crossties 5 and through these crossties in the region of the end position checking devices 12 and 13. This figure

furthermore shows that the control devices 9, 10 and 11 are respectively arranged in a space between two adjacent crossties 5. In this case, the respective coupling rods 19 and 20 or 41 and 42 do not continuously extend over the individual control planes, but rather only as far as the respective crosstie 5 situated adjacent to the control devices 9, 10 and 11. In this way, the control devices 9, 10 and 11 can be easily replaced without removing the coupling rods 19, 20, 41 and 42. In fact, only the individual angular levers need to be disconnected from the control devices such that the control devices can then be easily removed.

Szerkezet vasúti váltó átállítására

Szabadalmi igénypontok

1. Szerkezet vasúti váltó átállítására, amely váltó egy váltócsúcs-szerkezetet tartalmaz két tősínnel és a tősínekhez hozzárendelt csúcssínekkel, amely szerkezetnél több, főként legalább három állítókészülék van a sínek hosszirányában eltoltan elrendezve, ahol az állítókészülékek egy kapcsolórudazat segítségével az azonos irányú mozgatáshoz egymással mechanikusan össze vannak kapcsolva, ***azzal jellemezve***, hogy a kapcsolórudazat (16) két szomszédos állítókészülék (9, 10) között mindig egy-egy külön, két párhuzamos, rúdhosszirányban eltolhatóan megvezetett kapcsolórúdból (19, 20) álló kettős rudazatot tartalmaz, amely kapcsolórudak a két szomszédos állítókészüléket (9, 10) egymással mechanikusan összekapcsolják és a két tősín (1, 2) között húzódnak, ahol a két párhuzamos kapcsolórúd (19, 20) könyökös végszakaszokkal (21, 22) rendelkezik.

2. Az 1. igénypont szerinti szerkezet, ***azzal jellemezve***, hogy a két párhuzamos kapcsolórúd (19, 20) a két tősín (1, 2) között középen húzódik.

3. Az 1. vagy 2. igénypont szerinti szerkezet, ***azzal jellemezve***, hogy a két párhuzamos kapcsolórúd (19, 20) a két végén egy-egy könyökemelőn (23, 24) keresztül kapcsolódik az állítókészülékekhez (9, 10).

4. A 3. igénypont szerinti szerkezet, ***azzal jellemezve***, hogy a kapcsolórudak (19, 20) egyik végén elrendezett könyökemelő nagyobb emelőkarviszonnyal rendelkezik, mint a kapcsolórudak (19, 20) másik végén elrendezett könyökemelő (24).

5. Az 1-4. igénypontok bármelyike szerinti szerkezet, ***azzal jellemezve***, hogy az állítókészülékek egy első állítókészüléket (9), egy második állítókészüléket (10) és egy harmadik állítókészüléket (11) foglalnak magukban, ahol a második állítókészülék (10) az első állítókészülék (9) és a harmadik állítókészülék (11) között van elrendezve, emellett a második állítókészülékhez (10) egy első könyökemelő (24) és egy második könyökemelő (45) kapcsolódik, ugyanakkor az első könyökemelő (24) egy, az első állítókészüléknek (9) a második állítókészülékkel (10) való összekapcsolására szolgáló kapcsolórúddal (19), míg a második könyökemelő (45) egy, a második állítókészüléknek (10) a harmadik állítókészülékkel (11) való összekapcsolására szolgáló kapcsolórúddal (41) van összekötve.

6. A 3., 4. vagy 5. igénypont szerinti szerkezet, ***azzal jellemezve***, hogy a könyökemelők (23, 24, 45) a vasúti aljakon (5) elfordíthatóan vannak ágyazva.

7. A 3-6. igénypontok bármelyike szerinti szerkezet, ***azzal jellemezve***, hogy a könyökemelők (23, 24, 45) mindig egy csuklósan elfordíthatóan csatlakoztatott lengőtámasz (26, 46) közbeiktatásával vannak az átállító szerkezethez (10) hozzákapcsolva.

8. Az 1-7. igénypontok bármelyike szerinti szerkezet, ***azzal jellemezve***, hogy a két kapcsolórúd (19, 20) egyik végén kialakított könyökös végszakaszok (22) keresztezik egymást, míg a két kapcsolórúd (19, 20) másik végén kialakított könyökös végszakaszok (21) széttartóan vannak kiképezve.

9. Az 1-8. igénypontok bármelyike szerinti szerkezet, ***azzal jellemezve***, hogy a két párhuzamos kapcsolórúd (19, 20) vezetőgörgőkkel működik együtt.

10. Az 1-9. igénypontok bármelyike szerinti szerkezet, ***azzal jellemezve***, hogy egy állítókészülékhez (9, 10, 11) főként egy hidraulikus állító hajtás kapcsolódik.

11. Vasúti váltó, amely tartalmaz egy váltócsúcs-szerkezetet két, vasúti aljakra (5) felerősített tősínnel (1, 2) és a tősínekhez (1, 2) hozzárendelt csúcssínekkel (3, 4), valamint tartalmaz egy az 1-10. igénypontok bármelyike szerinti szerkezetet a vasúti váltó átállítására.

12. A 11. igénypont szerinti vasúti váltó, ***azzal jellemezve***, hogy a kapcsolórudazat (16) a vasúti aljak (5) felett húzódik.

13. A 11. vagy 12. igénypont szerinti vasúti váltó, ***azzal jellemezve***, hogy az állítókészülékek (9, 10, 11) mindegyike egy aljrekeszben vagy két szomszédos vasúti alj (5) közötti teknő alakú aljban van elrendezve.

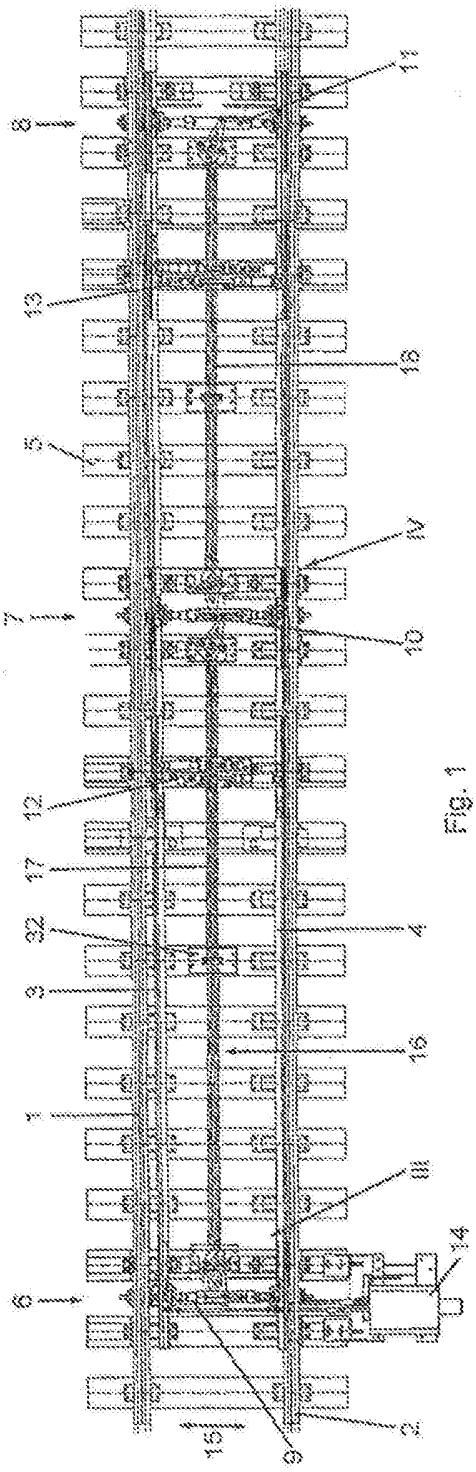

Fig. 1

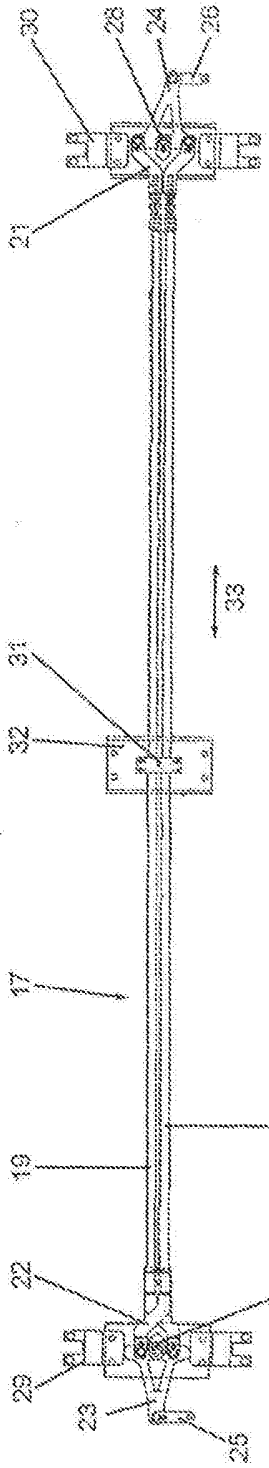

Fig. 2

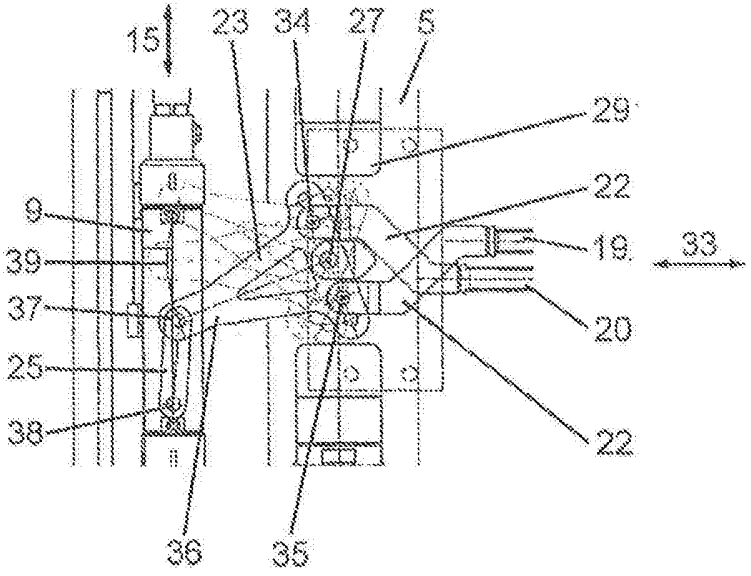
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Fig. 3

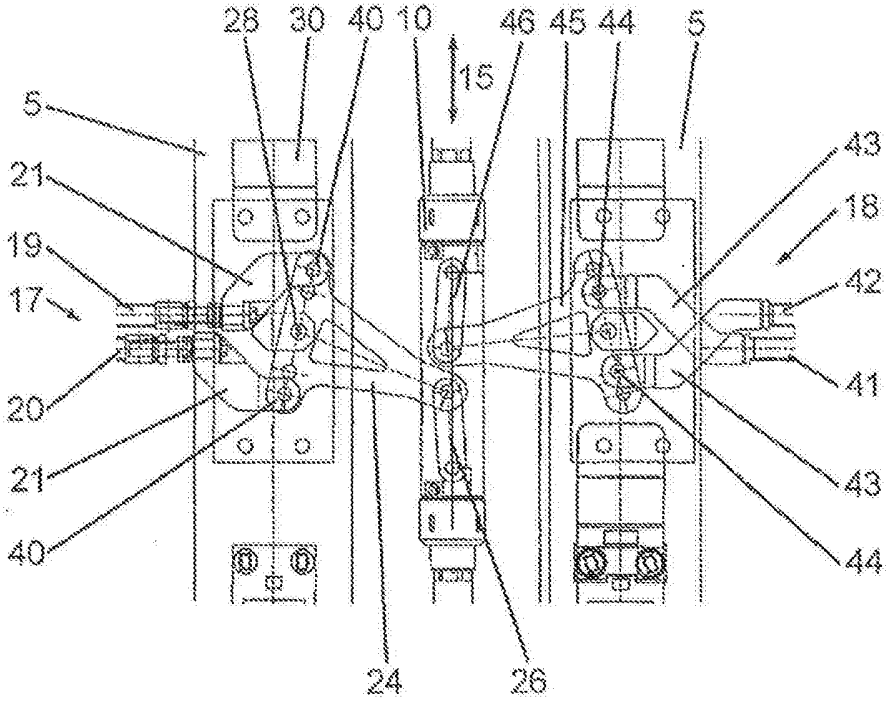
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Fig. 4