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(54) **Device for actuating a switch for a model railroad**

(57) A device (1) for actuating a switch (2) for a model railroad, comprising:

a support body (25) constrainable to a switch (2) for a model railroad;

a trolley (31) slidably associated with said support body (25) and movable between a first and a second position along a direction substantially transverse to points (7) of said switch (2); said trolley (31) being constrainable to said points (7);

a motor (41) associated with said trolley (31);

a transmission member (39) operatively placed between said motor (41) and said trolley (31) for transferring at least one sliding motion from said motor (41) to said trolley (31); said transmission member (39) being alternately switchable between a first configuration in which the trolley (31) is movable from the first to the second position and a second configuration in which the trolley (31) is movable from the second to the first position.

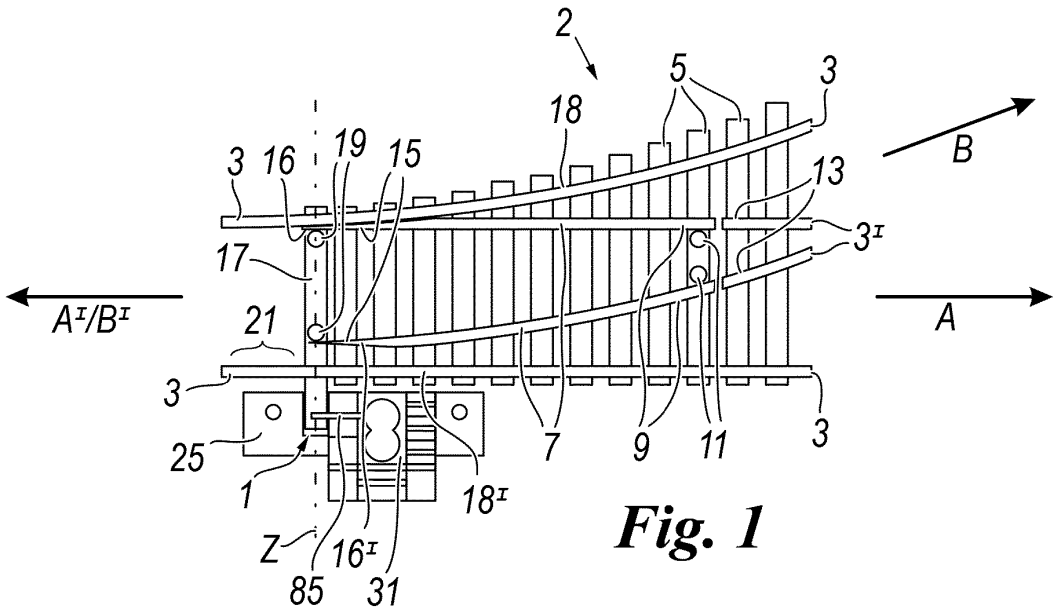

Fig. 1

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Description

[0001] A device for actuating a switch for a model railroad forms an object of the present finding.

[0002] The switch, which in technical jargon is usually termed turnover, is adapted to deviate the travel of a train from one track to another.

[0003] The switch usually has fixed components, such as external rails, and movable components such as internal rails adapted to deviate the travel of the train.

[0004] The internal rails are commonly called points.

[0005] The points have a first end, commonly called heel, rotatably constrained to a fixed tie by means of first pins.

[0006] A second end of the points, commonly called point contact, is rotatably constrained to a tie movable by means of second pins. Said movable tie constrains the two point contacts of the points at a slightly lower distance than the internal distance between the two rails that constitute a main track.

[0007] Said movable tie can be moved in a direction transverse to the points. Such movable tie allows the movement of the point contact of the points and the simultaneous rotation of the points themselves.

[0008] The rotation of the points allows placing the point contact of one of the two points in contact with the respective rail, facilitating the passage of the train and preventing the derailing thereof.

[0009] In order to move the movable tie, a point movement device is placed in proximity to the main track.

[0010] Said point movement device usually comprises a motor capable of moving the movable tie, causing the rotation of the points and thus the deviation of the train travel.

[0011] Said motors are usually electric motors, comprising a pair of solenoids arranged axially and adapted to move a slider along an axis defined by the conformation of said solenoids. Such solenoids are generally facing and substantially parallel to the main track or to the points.

[0012] The two solenoids respectively allow moving said slider in a direction defined by the conformation of said solenoids and in the opposite direction. Said solenoids can be supplied with electrical power, for example by means of a push-button panel that allows alternately deviating the electric current to one of the two solenoids. The solenoids can also be power supplied by means of suitable digital installations operating via two channels respectively connected to the solenoids.

[0013] The slider is associated with a metallic rod which, being in turn associated with a guide having a particular conformation, allows moving the movable tie and hence rotating the points.

[0014] The movement of the movable tie and the simultaneous rotation of the points allow the passage of the train on the main track or alternatively allow deviating the travel of the train from the main track to a secondary or diverged track.

[0015] In order to allow the passage of the train in an opposite direction, it is necessary that the point in contact with the respective rail can be spaced from the latter, allowing the passage of the wheels of the train and preventing the derailment thereof. For such purpose, the metallic rod, being connected to the points, can be bent, allowing the rotation of said points and the passage of the train in the above-described direction.

[0016] After the aforesaid wheels have passed beyond the point contact of the point, the point itself will return in contact with the rail.

[0017] US patents 6,491,263 and US 3,379,873 are also known; both describe a device for actuating a switch for a model railroad.

[0018] The abovementioned solutions nevertheless have various drawbacks tied to a bulky presence of the solenoids.

[0019] A further drawback of the abovementioned solutions derives from the presence of the rod and/or of the device for moving the points having large bulk, such to not make the switch realistic, in particular making it disproportionate and hard to manage in complex switches.

[0020] In order to overcome such drawbacks, according to a second embodiment of the device for actuating a model railroad switch, switches have been obtained in which the device for actuating a model railroad switch is housed in a cavity obtained on a plastic body, on which the switch is placed.

[0021] Even this alternative solution has drawbacks linked to a difficult, troublesome shape of the plastic body, as well as to the unchanged size of the device for moving the points and the size of the rod.

[0022] Object of the present invention is to obtain a device for actuating a switch for a model railroad that is adapted to solve the abovementioned problems.

[0023] These and other objects, which will be clearer to the man skilled in the art, are achieved by a device for actuating a switch for a model railroad obtained in accordance with the enclosed claims.

[0024] For a greater comprehension of the present finding, the following drawings are enclosed for purely exemplifying, non-limiting purposes:

figure 1 shows a top view of a device for actuating a switch for a model railroad according to the present invention, applied to a model railroad switch;
figure 2 shows a top view of a first detail of the device of figure 1;
figure 3 shows a side view of the detail shown in figure 2;
figure 4 shows a top view of a second detail of figure 1;
figure 5 shows a side view of the detail of figure 4;
figure 6 shows a partially exploded side view of the device of figure 1;
figures 7a-7d show side views of different configurations of a detail of figure 6;
figures 8a-8d show top views of the views of figure 7;

figure 9 shows a schematic view of a detail of figure 6; figures 10 and 11 show top views of various configurations of the device and the switch of figure 1.

[0025] With reference to the abovementioned figures, a device for actuating a switch 2 for a model railroad is indicated with the reference number 1. Said switch 2 is a mechanism adapted to deviate the path of a train (not shown in the figures) from a main track (not indicated in the figures) to a diverged or secondary track (not indicated in the figures), in accordance with the direction of the arrow B (Fig. 1).

[0026] The switch 2 usually has fixed components, such as external rails 3 and 3' constrained to fixed ties 5, and movable components, such as internal rails 7 adapted to deviate the travel of the train.

[0027] The internal rails 7 are commonly called points.

[0028] The points 7 have a first end 9, commonly termed heel, rotatably constrained to one of the aforesaid fixed ties 5 by means of first pins 11. Said first pins 11 allow the rotation of the points 7 on an imaginary horizontal plane, on which the aforesaid rails 3 and 3' are placed. The first pins 11 are positioned in proximity to ends 13 of the external rails 3', in order to allow the easy passage of the train from the rails 3' to the points 7, and vice versa.

[0029] A second end 15 of the points 7, commonly called point contact, is rotatably constrained to a movable tie 17 by means of second pins 19. Analogous to the first pins 11, also the second pins 19 allow the rotation of the points 7 on the imaginary horizontal plane on which for example the rails 3 are placed.

[0030] The movable tie 17 can be moved in a substantially transverse direction Z with respect to the rails 3 and the points 7.

[0031] When the train moves, e.g. in a direction defined by one of the arrows A or B, the rotation of the points 7 around the pins 11 allows deviating the travel of the train from the main track to the secondary or diverged track, or vice versa.

[0032] For such purpose, the movable tie 17 can place one of the point contacts 15 in contact with the respective rail 3.

[0033] The point contacts 15 are spaced from each other by a distance that is less than the distance present between the rails 3, the latter distance being measured at a portion 21 of the main track. In such a manner, when a first point contact 16 is in contact with a respective first rail 18, a second point contact 16' is spaced from a respective second rail 18'. The distance present between the second point contact 16' and the respective second rail 18' allows the easy passage of a wheel (not shown in the figures) of the train on said second rail 18', preventing said rail from derailing following the impact with the second point contact 16'.

[0034] The movable tie 17 and the points 7 connected thereto are moved by means of the device 1, connected to said points 7 by means of the aforesaid movable tie 17.

[0035] Said device 1 is usually laterally constrained to the main track, and preferably at the point contacts 15.

[0036] The device 1 comprises a support body 25 (Fig. 2) constrainable to the switch 2, in particular to the ties 15, by means of normal constraining means (not shown in the figures), e.g. screws or nails, via suitable holes 27.

[0037] Advantageously, said support body 25 can have a closure element (not shown in the figures) constrained above the support body 25 itself. Such closure elements allows protecting the device 25, for example from possible weathering agents or dust, in order to assure a correct functioning of the device 25 itself, simultaneously allowing the disassembly thereof in order to carry out normal maintenance operations. Said closure element is also realistically shaped and/or colored.

[0038] A trolley 31 is slidably associated with the support body 25. Said trolley 31 can slide along a direction Y (Fig. 2), that is for example transverse with respect to the points 7 in order to move them. Simultaneously, the trolley 31 can be constrained in a seat 29, e.g. by means of portions 34 of the support body 25 (Fig. 3).

[0039] Said seat 29, at end portions 33, can have means 37 for locking the trolley 31. Said locking means 37 allow the abutment of the trolley 31 in a first and second position, preventing said trolley 31 from exiting from the seat 29 and preventing the point contacts 15 from being excessively forced against the rails 3.

[0040] The trolley 31 can be moved from the first to the second position, and vice versa, by means of a motor 41; a transmission member 39 is operatively interposed between the trolley 31 and the motor 41, and is adapted to transfer a sliding motion from said motor 41 to said trolley 31.

[0041] The support body 25 has, for example, a through hole 42 (Fig. 2) with circular or polygonal form, inside of which the transmission member 39 can be housed, in particular an end portion 38 thereof. In order to house the transmission member 39 with greater ease and safety, the hole 42 has an extension 47 (Fig. 3 and 6) adapted to increase the contact surface between the support body 25 and said transmission member 39.

[0042] For such purpose, the external conformation of the end portion 38 and the internal conformation of the hole 42 and/or of the extension 47 are complementary to each other.

[0043] At said hole 42, the trolley 31 has an engagement portion 32 that interacts with the transmission member 39 for moving the trolley 31.

[0044] The trolley 31 has a hole or a cavity 43 (Fig. 4) in a manner such that, at least during the sliding of the trolley 31, the hole 42 and the hole or cavity 43 can be at least partly superimposed and/or facing.

[0045] Inside said hole or cavity 43, there is a contrast element 45 rigidly connected to the trolley 31 and engageable by said transmission member 39.

[0046] Said contrast element 45 can be an element with elongated form, e.g. a wire or the like, that joins two internal portions 49 of the cavity or of the hole 43, said

internal portions 49 being for example diametrically opposed and/or facing.

[0047] The motor 41 is preferably an electric motor. Preferably, the motor 41 comprises a hollow solenoid 51 at its interior, having an opening 53 at one of the ends 55 thereof.

[0048] In accordance with the present invention the motor 41 comprises a single solenoid 51.

[0049] Inside the solenoid 51, a slider 57 is slidably housed; such slider 57 is made of a ferromagnetic material, e.g. ferromagnetic metal.

[0050] Said slider 57 is generally housed in an internal cavity 61 of the solenoid 51, said solenoid 51 and slider 57 being coaxial.

[0051] When the solenoid 51 is supplied with electrical power, the slider 57 is moved along the aforesaid axis X, being adapted to at least partially project from the opening 53.

[0052] The movement of the slider 57 along the axis X is determined by the generation of a magnetic field by the solenoid 51, allowing the passage of said slider 57 through the opening 53.

[0053] The transmission member 39 is connected to the slider 57 in order to be moved. Said transmission member 39 can be alternately switched between a first configuration in which the trolley 31 is movable from the first to the second position, and a second configuration in which the trolley 31 is movable from the second to the first position.

[0054] Said transmission member 39 comprises a tubular support portion 59 arranged vertically, usually having cylindrical form and in this manner adapted to slidably house the slider 57. The solenoid 51 is wound on the outside of the tubular portion 59 and has turns in contact with the air in order to dissipate the heat developed during the activation of said solenoid 51.

[0055] The transmission member 39 comprises a slidably movable pusher 63 associated inside the tubular portion 59.

[0056] In the described embodiment, a first base 67 of the pusher 63 lies in abutment against the slider 57. In detail, said pusher 63 is thrust upward when the motor 41 is activated, and falls downward due to gravity when said motor 41 is deactivated.

[0057] According to an alternative embodiment, the slider 57 and the pusher 63 can be rigidly connected together or they can be obtained in one piece.

[0058] Said pusher 63 at a second base 69 has a thrust element 71. Such thrust element 71 consists of a projection capable of engaging the contrast element 45 in order to move the trolley 31 from the first to the second position, or vice versa.

[0059] In the described embodiment, said thrust element 71 is a projection that projects from the second base 69 in a direction defined by the axis X.

[0060] For such purpose, the thrust element 71 can have a substantially triangular or trapezoidal form. If said thrust element 71 has a substantially trapezoidal form, e.g. a rectangular trapezoid (Fig. 7), one side of said trapezoid identifiable with the height of the trapezoid itself lies on the second base 69 (Fig. 7a and 7c).

[0061] The thrust element 71, having substantially trapezoidal conformation, has a greater base h2 and a smaller base h1. Said thrust element 71 also has an oblique portion 83 placed at the top of the aforesaid projection.

[0062] During the sliding motion of the pusher 63, the pusher 63 can be moved in the direction C moving closer to the trolley 31 and in a direction D moving away from the trolley 31, and the oblique portion 83 engages the contrast element 45 determining the movement of said trolley 31 between the first position and the second position.

[0063] During the sliding of the pusher 63, the oblique portion 83, being rotatably movable, alternately assumes two opposite angular positions (Fig. 7a and 7c). Said angular positions respectively define the first and the second configuration of the transmission member 39.

[0064] The pusher 63, at a substantially intermediate portion 73 thereof, has at least one radial projection 77. In the described embodiment, the pusher 63 has two diametrically opposed radial projections 77.

[0065] Inside the tubular portion 59, a cavity (Fig. 6 and 7) is obtained defining a guide 81 (Fig. 9); inside such guide 81, the radial projections 77 are slidably housed. The guide 81 has a zigzag annular conformation comprising an upper profile 74 and a lower profile 76. The upper profile 74 has maximum points 74' and minimum points 74" alternated with each other. The lower profile 76 has maximum points 76' and minimum points 76" alternated with each other. Said guide 81, during the sliding of the pusher 63 along the axis X, causes the rotation of said pusher 63 around the axis X and the sliding of the radial projections 77 inside the guide 81.

[0066] The maximum points 74' of the upper profile 74 are placed in an advanced position with respect to the maximum points 76' of the lower profile 76, with reference to the rotation direction of the pusher 63 around the axis X indicated by the arrow L (Fig. 8a and 8b).

[0067] The minimum points 76" of the lower profile 76 are placed in an advanced position with respect to the minimum points 74" of the upper profile 74.

[0068] During the activation of the motor 41, the pusher 63 is thrust upward and the radial projections 77 follow an ascending section of the guide 81 until the maximum point 74' of the upper profile 47 is reached. In other words, the radial projections 77 rise upward along the portion 78.

[0069] Upon deactivation of the motor 41, the pusher 63 falls due to gravity and the radial projections 77 fall on a descending section of the guide 81 until the minimum point 76" of the lower profile 76 is reached. In other words, the radial projections 77 fall along the portion 80.

[0070] In particular, the above-described sliding in the directions C and D (Fig. 7a-7d) allows an overall rotation of 180°, defined by two single rotations of 90° (Fig. 8a-8d).

[0071] In other words, following the activation and sub-

sequent deactivation of the motor 41, the pusher 63 rotates each time 180°, alternately determining said first and second configuration of the transmission member 39.

[0072] In order to allow the movement of the movable tie 17 along the axis Z, the aforesaid movable tie 17 and the trolley 31 are connected with each other, in particular by means of a connection element 85 (Fig. 4 and 5). When the trolley 31 is moved, for example from the first to the second position, the connection element 85 allows the integral movement of the movable tie 17, integrally constrained with the trolley 31.

[0073] Alternatively, the train can travel along the switch in directions A' and B' having direction opposite the directions A and B.

[0074] In such case, in order to prevent the derailing of the train, the points 7 must be rotated, allowing the free passage of the train according to the directions A' or B'.

[0075] Advantageously, in order to prevent the movement of the points 7 during the passage of the train in the direction A' or B', the connection element 85 is elastically deformable. For example, such connection element 85 is a helical spring having a high number of turns. Said spring is for example made with a steel wire. In such case, if for example a train travels along the switch 2 in the direction A' and the position of the points 7 only allows the passage of the train in the direction B', the connection element 85 can be transversely deformed, allowing a partial rotation of the points 7 and a partial movement of the movable tie 17. During the partial rotation of the points 7 and the movement of the movable tie 17, the position of the trolley 31 remains unchanged.

[0076] Once the wheels have traveled beyond the point contacts 15 (freeing them), there is no longer any thrust of the train wheel against said point contacts 15 of the points 7; the connection element 85 can thus bring the point contacts 15 back into an original position.

[0077] The use of such connection element 85 in the form of a spring allows considerably reducing the longitudinal dimension of the connection element 85; hence, connection elements 85 can be obtained having more realistic proportions. In addition, the reduction of the longitudinal dimension of the connection element 85 allows obtaining a device 1 having reduced size and more realistic proportions with respect to the switch 2.

[0078] Advantageously, in order to maintain the trolley 31 stopped in the first position (Fig. 10) or in the second position (Fig. 11), said device 1 has parking means 90 functionally interposed between the support body 25 and the trolley 31.

[0079] For such purpose, the parking means 90 comprise an elastically deformable element 87 associated with the support body 25. In addition, the parking means 90 comprise a projection 91 obtained on the trolley 31 and being engaged with the elastically deformable element 87 in a manner so as to lock trolley 31 in the first or in the second position.

[0080] According to a preferred embodiment, the elastically deformable element 87 can have an elongated form and be constrained at two ends 89, e.g. in proximity to the portions 34 (Fig. 6).

[0081] Advantageously said elastically deformable element 87 is, for example, a helical spring with a high number of turns. Said spring is made for example with a steel wire.

[0082] The projection comprises a rotatable element 91 constrained to the trolley 31, e.g. by means of a rotation pin 93 on which said rotatable element 91 can rotate.

[0083] During the sliding of the trolley 31 between the first and the second position, the locking element 87 constantly engages the rotatable element 91, such locking element 87 remaining deformed in the transverse direction thereof, although minimally.

[0084] When the trolley 31 is moved by the action of the thrust element 71, the rotatable element 91 is forced against the locking element 87, causing further transverse deformation thereof, to a greater extent than that indicated above. The deformation of the locking element 87 allows the rotatable element 91 to pass, for example, below said locking element 87 allowing the movement of the trolley 31 between the first position and the second position.

[0085] Electrical contacts 95 are present at a portion of the support body 25 placed in proximity to the seat 29. Such contacts 95 are electrically isolated from each other, and when connected with each other they allow sending an electrical signal. Such electrical signal allows, for example, activating a control traffic light for the switch 2 and/or supplying electrical power to a railroad crossing and/or supplying electrical power to a traffic light of the aforesaid railroad crossing and/or polarizing a so-called neutral portion of the switch etc.

[0086] In order to connect together two electrical contacts 95 and send the electrical signal, the trolley 31 has, in proximity to the aforesaid electrical contacts 95, a portion 97 adapted to connect together at least two electrical contacts 95. Said portion 97 has, for example, a coating (not shown in the figures) made of a conductive material. Such projection 97, during the movement of the trolley 31 between the first and the second position, connects together suitable electrical contacts 95, sending at least one said electrical signal.

[0087] The invention thus described attains the proposed object, since it describes a device for actuating a switch for a model railroad comprising a single motor that, when it is activated or deactivated, allows alternately switching a transmission member from a first to a second configuration. The motor thus allows obtaining a device for actuating a model railroad switch having realistic proportions, with respect to the switch to which it is associable, said motor also being adapted to be vertically arranged with respect to said switch.

Claims

1. Device (1) for actuating a switch (2) for a model railroad, comprising:

   - a support body (25) constrainable to a switch (2) for a model railroad;
   - a trolley (31) slidably associated with said support body (25) and movable between a first and a second position along a direction substantially transverse to points (7) of said switch (2); said trolley (31) being constrainable to said points (7);
   - a motor (41) associated with said trolley (31);
   - a transmission member (39) operatively placed between said motor (41) and said trolley (31) for transferring at least one sliding motion from said motor (41) to said trolley (31); said transmission member (39) being alternately switchable between a first configuration in which the trolley (31) is movable from the first to the second position and a second configuration in which the trolley (31) is movable from the second to the first position, **characterized in that** said transmission member (39) comprises a pusher (63) connected to the motor (41) and linearly movable, said pusher (63) having an oblique portion (83) that can move closer to and/or move away from the trolley (31) in order to move the trolley (31) between the first position and the second position; said oblique portion (83) being rotatably movable between two opposite angular positions respectively defining the first and the second configuration of the transmission member (39).

2. Device according to claim 1, wherein said oblique portion (83) abuts against said trolley (31), engaging it at an engagement portion (32), moving said trolley (31) from the first position to the second position, or vice versa.

3. Device according to claim 1, wherein said transmission member (39) comprises a tubular support portion (59), said pusher (63) comprising at least one radial projection (77) slidably housed in a guide (81) obtained inside said tubular portion (59) in a manner such that said pusher (63), by linearly sliding inside said tubular portion (59), is rotatable in a rotation direction perpendicular to a direction defined by said linear sliding.

4. Device according to claim 3, wherein said guide (81) has a zigzag annular conformation.

5. Device according to claim 3, wherein said guide (81) comprises an upper profile (78) and a lower profile (80) having zigzag form, said profiles allowing the rotation of the pusher (63) around the axis X.

6. Device according to any one of the preceding claims, wherein said motor (41) comprises a solenoid and a slider (57) made of a ferromagnetic material, said slider (57) slidably housing in said solenoid.

7. Device according to any one of the preceding claims, wherein said device (1) has parking means (90) functionally interposed between said support body (25) and said trolley (31) in order to lock said trolley (31) in the first and in the second position.

8. Device according to claim 7, wherein said parking means (90) comprise a projection (91) constrained to said trolley (31) and an elastically deformable element (87) constrained to said support body (25), said elastically deformable element (87) engaging said projection (91) in order to lock the trolley (31) in the first position or in the second position.

9. Device according to claim 8, wherein said elastically deformable element (87) has a helical spring conformation.

10. Device according to claims 8 or 9, wherein said projection (91) comprises a rotatable element constrained to said trolley (31).

11. Device according to claim 1, wherein said trolley (31) is connectable to the points (7) by means of a connection element (85) having a helical spring conformation.

12. Switch (2) for a model railroad, comprising a device (1) for actuating said model railroad switch (2) according to any one of the preceding claims.

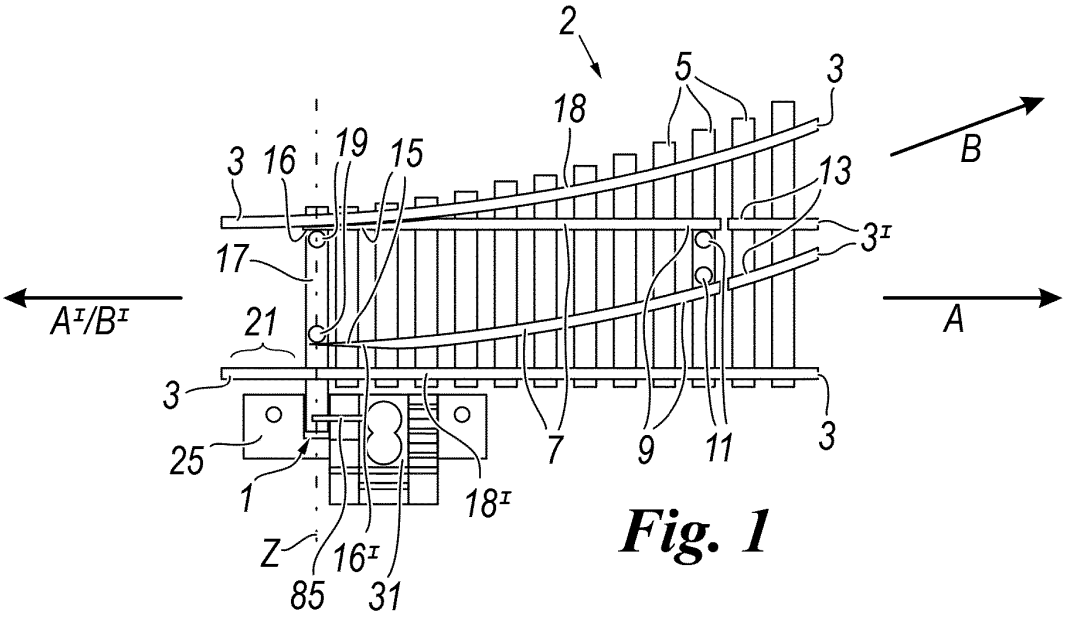

Fig. 1

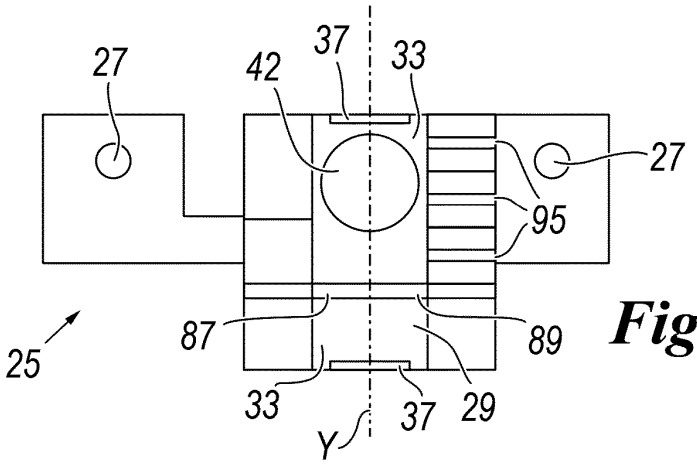

Fig. 2

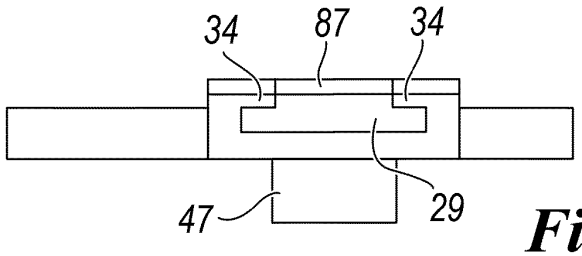

Fig. 3

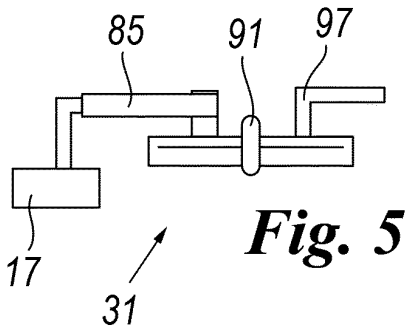

Fig. 5

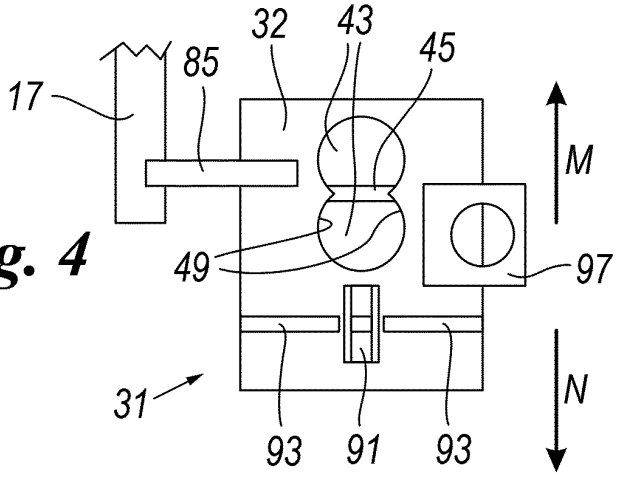

Fig. 4

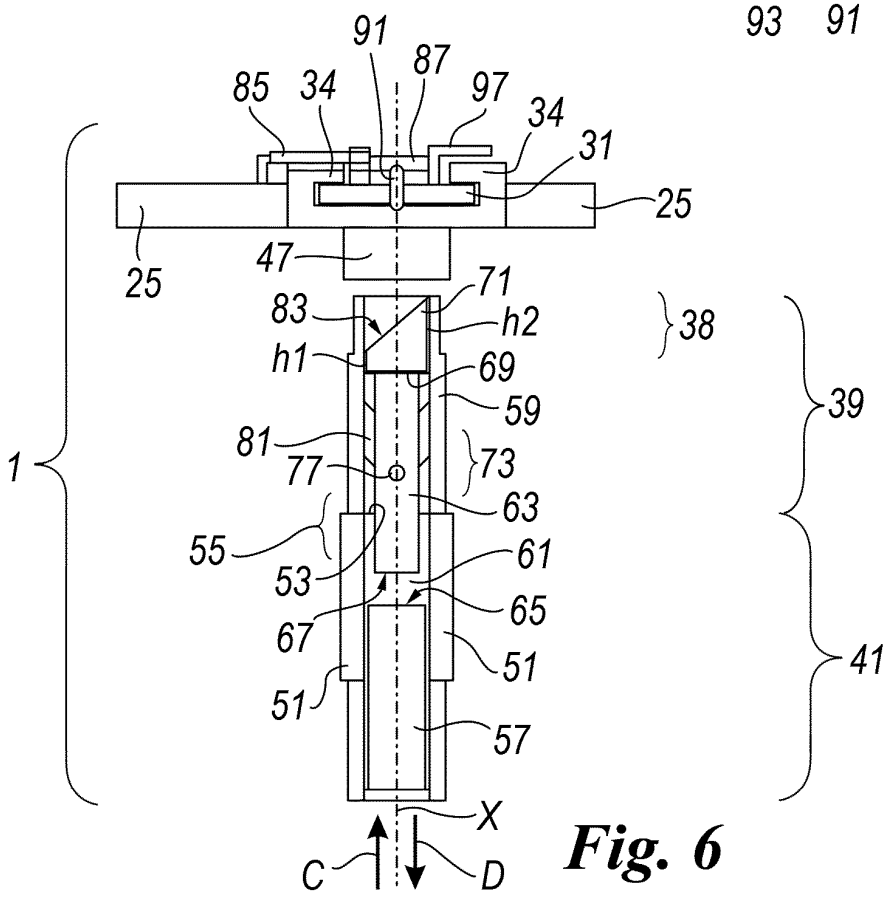

Fig. 6

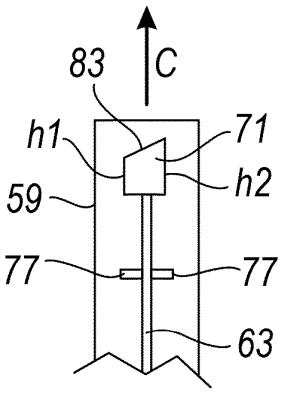

Fig. 7a

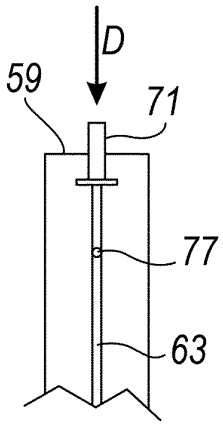

Fig. 7b

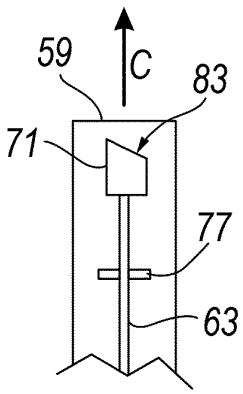

Fig. 7c

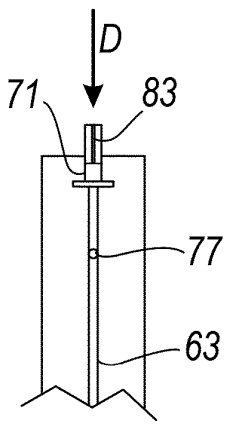

Fig. 7d

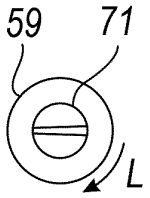

Fig. 8a

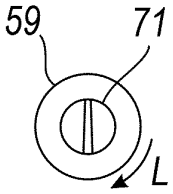

Fig. 8b

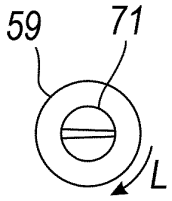

Fig. 8c

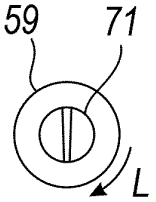

Fig. 8d

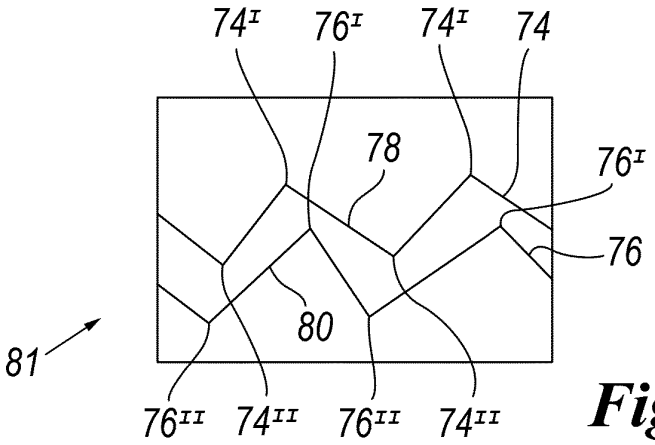

Fig. 9

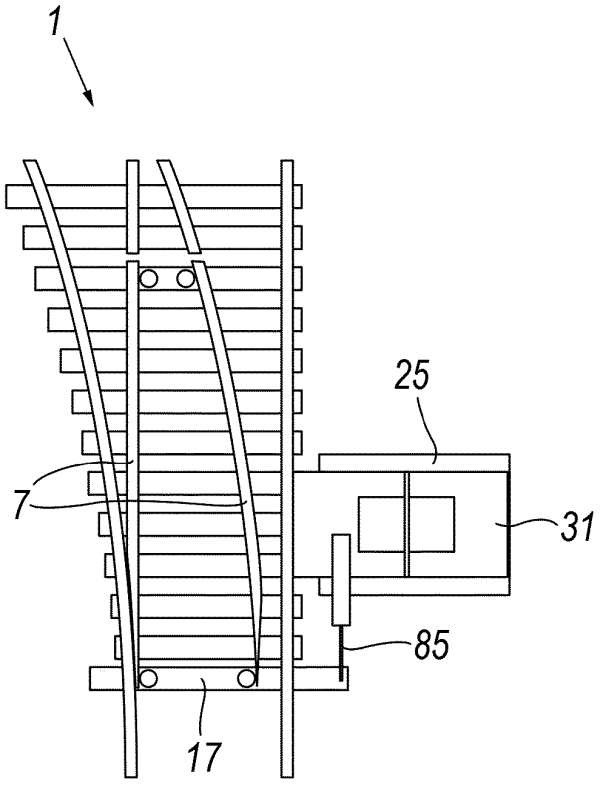

Fig. 10

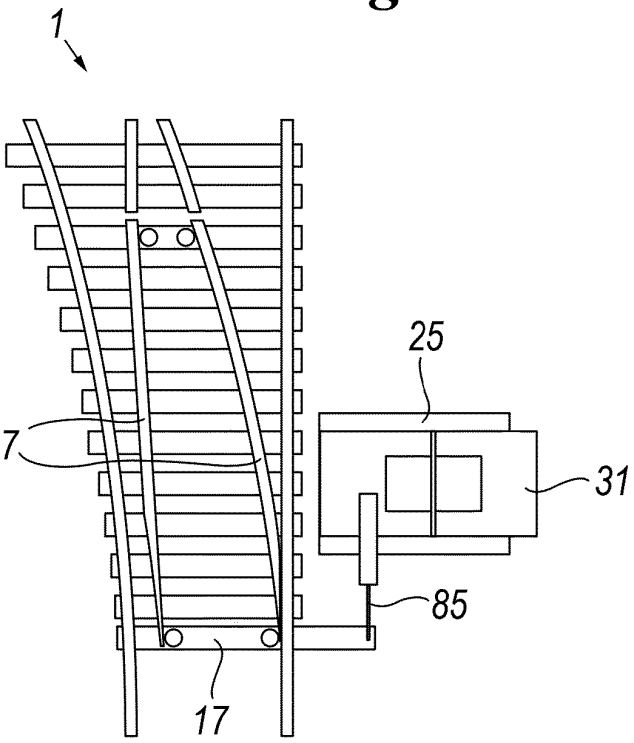

Fig. 11

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EUROPEAN SEARCH REPORT

Application Number
EP 13 16 8258

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	17 July 2013	Turmo, Robert

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