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(54) **SWITCH-POSITIONING SYSTEM**

(57) A system (260) for accurately positioning railway switches, comprising a frame (261) made of a rigid structure, which frame is fastenable between two rails (320A, 320B) of the switch in such a way that it extends between the two rails during use, and wherein the frame is provided with a central positioning marker (264) which, dur-

ing use, is situated on the centre line of the track which is formed by the two rails (320A, 320B), and wherein the frame (261) is configured to be fastened to at least one sleeper (310) at at least two locations on either side of the two rails.

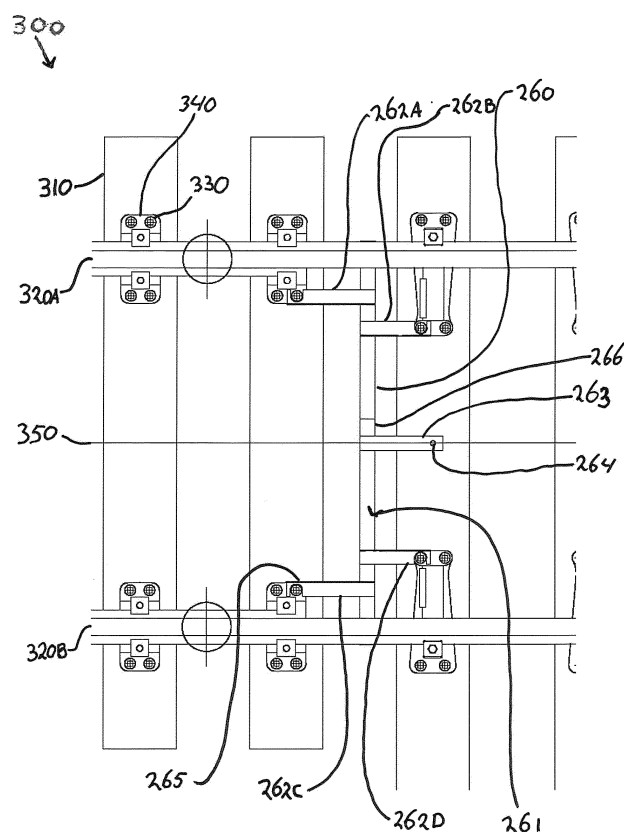


Fig. 3

Description

[0001] The present invention relates to a system for accurately positioning railway switches. The present invention further relates to a method for positioning a switch during installation of the switch by means of such a switch-positioning system and a switch comprising such a switch-positioning system.

[0002] The rail infrastructure network has a number of main components. These main components can primarily be divided into tracks and switches. A switch allows a rail vehicle, such as a train, a rapid transit train, a tram or the like, to access several different tracks.

[0003] Switches come in many variations, such as standard switches, double switches, symmetrical switches, etc., and are made up of components of all kinds. The facing end of the switch is formed by the side where the switch comprises one track, with track being defined as two parallel rails. Obviously, the trailing end of the switch is the side where the track either continues straight through or diverges. A number of variants are also used with respect to the degree of divergence; switches with a sharp divergence, or angle ratio, must be traversed at a different maximum speed to switches with a weak divergence or angle ratio. The greater the angle ratio, the weaker the divergence and the higher the maximum permissible speed at which the switch may be traversed. In addition to the various fixed track parts (rails and common crossings), a switch also comprises various electrical and moving parts, which are usually housed in the switch machine. The switch machine is used to actuate the so-called switch rails of the switch in order to be able to change the switch from the main line to the branch.

[0004] Switches are one of the most important main components of the rail infrastructure network. The life of the switch can be roughly divided into the following four phases: 1. the design phase, 2. the construction phase, 3. the maintenance and use phase, 4. the demolition phase.

[0005] During the design phase, the exact design of the switch is determined. This involves not only designing the switch itself, with features such as the angle ratio, but also the exact location and position of the switch in the construction plan and with respect to the other components of the rail infrastructure to be constructed.

[0006] When the design of the switch is complete, and the various parts of the switch have been made, the switch is transported to its final destination in various parts during the construction phase owing to its size. The different parts are then coupled to one another in order to thus form a large assembly. These parts are not uncoupled again during the use or maintenance phase.

[0007] Installing the switch in the correct position must be carried out in a very careful manner. Small deviations from the desired position may cause problems in the rest of the track to be installed and may lead to large, undesired forces arising at those parts of the track and the switch itself. This, in turn, has negative consequences in

terms of robustness and maintenance of the switch and the track. Vibrations caused by heavy rail vehicles traversing incorrectly placed switches also lead to wear to other parts around the track and to buildings in the immediate surroundings. Installation, and above all positioning, therefore has to be carried out with the utmost care, which currently takes a great deal of time. Correct positioning is currently carried out using various measurements and inferences, which makes positioning a labour-intensive and time-consuming activity.

[0008] In light of the above, it is an object of the invention to provide an improved means of positioning switches. More particularly, it is an object of the invention to provide a robust switch-positioning system which allows a switch to be positioned in a simple, quick but above all accurate manner.

[0009] In accordance with the invention, a first aspect provides a switch-positioning system for accurately determining a position of a railway switch, comprising a frame made of a rigid structure, which frame is fastenable between two rails of the switch in such a way that it extends between the two rails during use, and wherein the frame is provided with a central positioning marker which, during use, is situated on the centre line of the track which is formed by the two rails, and wherein the frame is configured to be fastened to at least one sleeper at at least two locations on either side of the two rails. However, in an example, the frame is configured to be fastened to at least two separate sleepers on either side of the two rails. In total, the frame is thus fastened at four points, two per side/rail, either of one sleeper or of two or more different sleepers.

[0010] The design phase, during which the exact design of the switch is developed and designed in relation to the entirety of the rail infrastructure to be newly built or replaced, is followed by the construction phase of the switch.

[0011] During this construction phase, the different parts of the switch are usually supplied separately via rail and/or by road. The different parts are then coupled to one another during the construction phase, in order to thus form the entire switch. After the switch has been constructed, positioned and installed, the switch will remain coupled together as a single part.

[0012] During the design phase, the position and location of the switch itself and with respect to the rest of the rail infrastructure is accurately calculated, established and implemented in the overall construction plan. In this design, the switch is positioned on the basis of a number of reference points in the switch. These are unique, theoretical points which are related to the facing end of the switch, the trailing end of the switch and the so-called mathematical point.

[0013] It goes without saying that, during the construction phase, the overall design must be very carefully followed. Currently, the switch is constructed and put in place during the construction phase in the absence of the reference points from the design phase, as these are

not visible during the construction phase. Therefore, other points are used as reference points, or the original reference points from the design are recalculated on the basis of calculations, measurements or inferences from visible reference points. This process is not only labour-intensive and inefficient, but there is also a real risk of errors in the measurements or calculations. Furthermore, deviations may occur as a result of margins in the calculations or measurements, making the construction phase and the positioning of the switch inefficient. Inefficiency is particularly undesired on busy sections of track such as in the Netherlands and in fact in most of (western) Europe. It is therefore also an object to as far as possible reduce the time taken to carry out this work.

[0014] Nowadays, accurately constructing and positioning the switch currently does not just take a great deal of time, but a certain degree of uncertainty remains as to whether the switch has been placed accurately enough and whether after placement it will also remain properly in its place during use thereof. After all, the currently used calculations or measurements are indirect and are inferred from the original design. It is therefore a further object to not only ensure efficient construction and placement, but to be able to accurately determine whether the switch is in the correct place.

[0015] The inventor had the insight that it should be possible to make the reference points used during the design phase directly visible during the construction phase. If these reference points, or at least one reference point, from the design phase are directly visible during the construction phase, the switch can be placed in an efficient, quick and accurate manner and the actual location can be easily and accurately compared with the desired, theoretical location in accordance with the design phase.

[0016] Accordingly, a switch-positioning system is provided which is configured to allow the position of the switch to be efficiently, quickly and accurately determined. To this end, the switch-positioning system according to a first aspect of the invention comprises a frame which is made of a rigid or stiff structure, for example made of metal. The frame is configured to be placed or clamped in the track of the switch in such a way that it extends between two rails of the switch and is fastenable thereto during use. The frame is further provided with a central positioning marker, corresponding to at least one of the reference points from the design phase, such as the theoretical point of the facing end of the switch, the theoretical point of the trailing end of the switch, or the mathematical point of the centre of the switch, for example. The frame is further configured to be fastened to at least one (but preferably to at least two separate) sleepers, on either side of the frame. Therefore, the frame is fastened at at least four points, two on the side of one rail, optionally distributed between two separate sleepers, and two on the opposite rail, likewise optionally distributed between the same two separate sleepers. In an example, the frame is configured to be fastened to one

or more sleepers, rails, collar bolts or other parts, the position of which is known with minimal tolerance, at at least four, five, six, seven, eight or even more points.

[0017] As mentioned above, the frame is very rigid or stiff, and is made, for example, of metal such as iron, steel, aluminium or another metal or metal alloy having the property of being very rigid. As a result of the stiff or rigid property, the frame has virtually no clearance. The central positioning system is therefore very accurate and stable, especially if the frame is made of a metal or metal alloy having a low coefficient of expansion, such as an alloy based on chromium, molybdenum, titanium, tungsten or similar materials, for example. Metals with a high carbon content would also be suitable.

[0018] The frame comprises a central positioning marker forming part of the frame, or a positioning marker securely connected to the frame. In this way, the clearance between the frame and the positioning marker is minimal. The frame itself is connected to very precise, fixed points of the switch, namely to the bolts by means of which the rails are fastened to the sleepers, preferably the bolts on the inside of the track. The frame is fastened to the track on two sides, namely to the sleeper(s) at the side of one rail and to the sleeper(s) at the other, opposite side of the other rail. A feature of the frame according to the invention is that the frame is fastened to at least one, but preferably two different sleepers on either side. In this way, the frame is fastened at four fixed points, which minimizes the risk of clearance, or minimizes rotation or otherwise incorrect orientation. The inaccuracy of the reference point, which is defined by the central positioning marker, is minimal. Movement or clearance of the frame in the longitudinal direction of the track or the transverse direction of the track, or rotation with respect to the track, is minimized.

[0019] A significant advantage of the switch-positioning system according to the invention is that it can be easily placed in the switch and, if desired, can also be removed again after use and placement. After the switch has been designed, and the separate parts have been made, the switch-positioning system can be quickly and easily fastened to the switch. The switch can then be accurately positioned so that it is placed in the correct position in accordance with the design and construction plan. If desired, the switch-positioning system can subsequently be removed.

[0020] However, the switch-positioning system can also be permanently fastened in the switch, either by already fastening the switch-positioning system during the construction phase, or by subsequently installing it. If the switch-positioning system is permanently fastened in the switch, the position and location of the switch can also be ascertained during the use phase. It is thus possible to establish whether the switch has changed position over the course of time, for example as a result of subsidence. It is possible to remotely determine whether the switch has shifted, moved, etc., without influencing the running of the trains, for example by using total stations

and reflectorless measurement. In addition, measurement trains and laser scanning can quickly and accurately recognize the fixed points and it is thus possible to quickly and efficiently determine the location of the switch or monitor the behaviour of the switch.

[0021] For the purposes of the permanent embodiment in the switch, the switch-positioning system can be provided with communication means by means of which the system is set up for long-distance and/or short-distance communication, for example using an optical or radio-graphic communication module. This can be configured on the basis of IEEE 802.11 standards but also on the basis of short-distance communication protocols such as Bluetooth or other personal area networks (PANs) which meet the IEEE 802.15.1 standard, for example. In particular, communication can also be provided by means of dedicated railway standards such as GSM-R, which is also used for communication between the staff responsible for the movement of trains and the train driver or communication between the train control system and the signalling system within an ERTMS system. Communication over long distances is also possible using GSM/GPRS/3G/4G or similar networks or using an M2M connection. Future protocols based on the next generations of 3GPP standards such as FRMRS standards may also be used for communication between the switch-positioning system and other parts of the railway.

[0022] Using this communication, it is possible, firstly, to collect information about the location and geometry of the switch over a longer period of time, both in an absolute and a relative sense. This can be achieved with the aid of sensors which are fastened to or accommodated in the device. Examples of these are position sensors which are able to ascertain a changing position using, for example, a potentiometer principle. Alternative sensors may also be used, for example in the form of inductive position sensors or proximity sensors, eddy-current sensors, ultrasonic sensors, Hall effect sensors, piezoelectric sensors, rotary encoders, GPS or other sensors which can be used to directly or indirectly gather information about the geometry of the device. In this way, it is possible to establish whether the switch has subsided, rotated or moved to a different position over the course of time, which would lead to an excessive reduction in the quality of the switch and parts of the track connected thereto. Secondly, it is also possible to detect an incident, for example in the event of an obstruction at the switch, as a result of which the geometry of the switch changes and on the basis of which this obstruction can be detected and communicated to the train protection system or railway management for further processing of the notification. Notifications regarding changes to the geometry and location of the switch can be passed on and communicated to the rail infrastructure manager for further processing. In particular, these notifications or the information from the sensor(s) are stored locally in the device and read out or sent at set times. However, it is preferred for these data to be immediately stored remotely, for ex-

ample in a database at a central location, such as in a general data centre or a data centre specifically used within the railway. There, the geometric data can be read out for further processing by third parties. As such, a logging facility is created, with it being possible to subsequently read out the geometric data and the development thereof over time.

[0023] For the purposes of this permanent embodiment, the system can be configured with permanent fastening means, by means of which the system is connected to the switch in a virtually non-detachable manner in order to limit or prevent vandalism or theft. In particular, this can be effected by engagement with the switch which can only be undone or released using the correct key. This key may be a physical key but also a digital key in the form of a chip card with an (NFC/RFID) tag or a similar digital key, or in the form of a code to be entered into the system.

[0024] In an example, the frame is provided on either side with fastening means, in particular fastening eyelets, which are configured to connect the frame to the fastening bolts which fasten the rails to the sleeper.

[0025] The frame can be fastened to the track, preferably at four points which are divided between two rails and one or two, or more, sleepers. These are preferably the positions at which the sleepers are fastened to the rails. By embodying the fastening means as a connecting eyelet, these are configured and designed for the bolts which connect the rails to the sleepers to pass through. This has the advantage that no extra facilities need to be installed at the track; instead, use is made of very precisely arranged fastening points which are already present. As an alternative, the fastening means may also be fork-shaped. This has the further advantage over the eyelets that the bolts do not need to be completely removed, but merely slightly loosened, following which the fastening means can be slid underneath, and the bolts can then be tightened again.

[0026] In an example, the frame is made as a single part. The frame may also be assembled from several separate parts, for example different beams welded to one another, but is preferably made as a single part. This has the advantage that the clearance is further minimized, as no clearance can arise between the parts of the frame.

[0027] In an example, the central positioning marker comprises a marking indication.

[0028] In an example, the central positioning marker comprises a geometrical bolt which is configured to accommodate a measuring prism.

[0029] The central positioning marker can be configured either as a marker, or as a physical element. The marker has the advantage that such a frame is easier to produce and a physical element has the advantage that it can be specifically configured for the placement of measuring apparatus such as a measuring prism.

[0030] In an example, the frame comprises a hinge in order for the frame to be able to pivot in the longitudinal

direction, and wherein the hinge preferably comprises a locking device in order to lock the hinge position during use.

[0031] By providing the frame with a hinge, it is readily possible for the frame to pivot in the longitudinal direction, which makes placement in the track very simple. This is due to the fact that the bolts of the sleepers and rails can then be loosened by several turns, following which the frame can then be slid under the bolts in a hinged manner and thus at an angle in the track. The frame is then brought back to its maximum length, at which the two parts of the hinge are thus at an angle of 180°, and the hinge is then preferably locked. This can be achieved by locking means, for example by means of one or more bolts. Subsequently, the bolts of the sleepers are preferably tightened again and the switch-positioning system can be placed in operation. These bolts are preferably collar bolts.

[0032] In an example, the central positioning marker is situated in the centre of the longitudinal direction between either side of the two rails, in order to indicate the theoretical point of the facing side of the switch.

[0033] In an example, the central positioning marker is situated in the centre of the longitudinal direction between either side of the two rails, in order to indicate the mathematical point of the centre of the switch.

[0034] In an example, the central positioning marker is situated in the centre of the longitudinal direction between either side of the two rails, in order to indicate the theoretical point of the trailing side of the switch.

[0035] As already stated, the switch has one or more reference points during the design phase. These are the theoretical points (of the switch). These points may be situated at the facing end of the switch, the trailing end of the switch but also in or in the vicinity of the centre of the switch. One of the features or properties of a switch is the angle ratio or the angle of the switch. This angle is formed by the two centre lines of the tracks across which the switch is distributed. This angle is also referred to as the crossing angle. The crossing angle is often expressed as an angle ratio rather than in degrees. The theoretical point where the two centre lines of the two tracks intersect is also referred to as the mathematical point and is one of the most important reference points of the switch. In an example, the switch-positioning system is configured in such a way that the central positioning marker coincides with or corresponds to the mathematical point. Such a switch-positioning system can be placed in or in the vicinity of the centre of the switch, where the two centre lines of the tracks intersect. In an alternative switch-positioning system, the central positioning markers may correspond to the theoretical points of the switch at the facing end or at the trailing end of the switch. In this way, a switch-positioning system is provided for all parts of the switch, the facing end, the centre and the trailing end, allowing the switch to be accurately positioned.

[0036] In an example, the frame is constructed from a

main bar which extends between the two rails during use and which main bar is provided with two side bars on either side, which side bars are configured to be fastened, during use, to at least two sleepers.

[0037] The frame may be formed in a number of ways but is preferably constructed from a single main bar which, during use, has a longitudinal direction which is at right angles to the longitudinal direction of the track. A number of branches are formed from the main bar or beam, which extend in such a way and are of such a length that they can be fastened to the (collar) bolts of at least one, preferably two, or more sleepers. Such a frame is of simple construction and relatively lightweight.

[0038] In an example, the frame is configured to be permanently fastened in the switch. As stated, the switch-positioning system can be used in different phases of the life of the switch. This may be during the construction phase but also during the use phase in order to, optionally automatically, measure fixed reference points within one or more switches in a quick and accurate manner.

[0039] In an example, the length of the frame extending between the two rails of the switch at least virtually corresponds to the track gauge of the track, and in particular at least virtually corresponds to 1435 mm.

[0040] In a second aspect, a method is provided for positioning a switch during installation of the switch, which method comprises the following steps:

- designing the switch on the basis of at least one theoretical point and at least one mathematical point;
- constructing the switch;
- arranging at least one switch-positioning system according to one or more of the preceding descriptions in the switch, which switch-positioning system is positioned in the switch in order to indicate the theoretical point;
- arranging at least one switch-positioning system according to one or more of the preceding descriptions in the switch, which switch-positioning system is positioned in the switch in order to indicate the mathematical point.

[0041] In a third aspect, a railway switch is provided comprising at least one switch-positioning system according to one or more of the preceding descriptions.

[0042] The invention will be explained in further detail below with reference to the embodiments illustrated in the attached drawings, in which:

Figure 1 shows a diagrammatic representation of a switch;

Figure 2 shows a switch design;

Figure 3 shows a switch-positioning system according to an aspect of the invention.

[0043] Fig. 1 diagrammatically shows a switch 100 of the "standard type". The standard type is understood to mean a switch which leads straight through and diverges

to the left or the right. It should be clear to the person skilled in the art that the invention, in all of its aspects and examples, is not limited to such a type of switch, but is applicable to all types and variants of switches. The switch has a facing side 110, a trailing side 120 and a central section 130. The facing side forms the single track and at the trailing side there is a straight through track part 120A and a diverging track part 120B. A centre line 115, 125 can be indicated in the track at the facing side 110, and a centre line 155 can also be indicated in the diverging track part. The point where the centre lines 115, 125, 155 of the two tracks cross one another is defined as one of the theoretical points, in particular the mathematical point 131. It is possible to show several more theoretical points in the switch, which lie, for example, somewhere on the centre line 115 at the facing side 110 of the switch, or on the centre line 125, 155 at the trailing side 120A, 120B.

[0044] The degree to which the diverging part curves, being the crossing angle 132 which is formed by the centre lines 115, 155 of the tracks across which the switch is distributed is also shown in the form of an angle ratio. There are switches with various angle ratios, for example 1:9, 1:12, 1:15, 1:20. The angle ratio determines the maximum speed at which the diverging track part 120B may be traversed. This may be, for example, 40 km/h at 1:9 and 110 km/h at 1:20. The angle ratio is determined by the ratio of distance C to A, with A being $0.5 \times B$. For example, if A is 1, then B is 2, and if the length of C is then 9, the angle ratio A:C is therefore 1:9. In a switch, it is possible to indicate a free-space marker 140, which is also known as the fouling bar or clearance bar. This indicates the location up to which the track may be occupied when two tracks cross one another or converge.

[0045] Fig. 2 shows switch 200 from a top view. This figure once again shows the facing side 210 and the trailing side, as well as the centre line 215 of the straight through track part and the centre line 255 of the diverging track part. The switch 200 shown here therefore corresponds to the diagrammatic representation of a switch 100 such as in Fig. 1, except that the switch in Fig. 1 is right-handed and the switch 200 in Fig. 2 is left-handed.

[0046] In this example, three switch-positioning systems 260, 260' and 260" are arranged in the switch 200, distributed between the facing side 210, central section and trailing side.

[0047] Fig. 3 shows a switch-positioning system 260 which is fastened in a track part. In this case, it is a switch-positioning system 260 which is provided with a central positioning marker in the form of a marking point 264. The marking point is situated in the centre between the rails 320A, 320B. The illustrated switch-positioning system 260 is therefore configured to be installed at the facing side of a switch and can be used to accurately determine the position of the switch.

[0048] The switch-positioning system 260 comprises a frame which is made of a rigid material. Preferably, the frame is moulded or made from steel or another dimen-

sionally stable material in a section or shape which is extremely strong and stiff. This may be known steel sections such as hollow, square or rectangular box sections but also angular sections, I sections, U sections, etc.

[0049] The frame can be fastened between the two rails and preferably by a frame which is provided with a main beam or profile 261, with four angle profiles or branches 262A-D. Each angle profile is preferably at right angles to the main profile 261 and is provided with fastening means, shown in Fig. 3 in the form of fork-shaped elements which are configured to be clamped under the bolts 330. The length of the frame virtually corresponds to the distance between the two rails 320A, 320B. On both sides, the side of one rail 320A and the side of the other, opposite rail 320B, the frame is provided with transverse beams in order to be fastened to the bolts 330 at the free end. These bolts 330 are the bolts, or collar bolts in particular, by means of which the rail 320A, 320B is fastened to the sleeper 310, usually by means of a connection element 340. The free ends 265 of the angle profiles 262A-D are provided, for example, with an eyelet which corresponds to the dimensions of the bolts 330, but are preferably fork-shaped in order to be able to slide free ends of the angle profiles 262A-D under the bolts 330 in a simple manner. In this way, the frame can quickly and easily be arranged in the track but also removed, which enables permanent but also temporary placement.

[0050] The frame is further provided with a central positioning marker 264 which, during use, is situated on the centre line 350 of the track which is formed by the two rails 320A, 320B. The central positioning marker 264 can be in the form of a visual indication for the placement of the measuring apparatus. However, it may also be a measuring bolt which is arranged on a transverse beam 263 at right angles to the frame along the centre line 350.

[0051] The frame illustrated in Fig. 3 is further configured in order to be able to pivot; to this end, a hinge 266 is arranged in the centre of the frame. This makes placement and removal very simple. Preferably, the hinge is provided with a securing means in order to secure the position of the hinge. In this way, it is possible, on the one hand, to ensure that the frame remains in the correct position during the measurement, and on the other hand it is possible to prevent unauthorized persons from removing the frame from the track as soon as the frame has been permanently placed in the track.

[0052] It should be noted that the example of the switch-positioning system illustrated in Fig. 3 is merely one example. The invention is not limited to the example shown here but provides for other variants which are not illustrated, for example for placement in the centre of the switch, in order to indicate the mathematical point. In this case the frame is moulded in such a way that it can be fastened to the sleepers, and in particular the bolts thereof, in accordance with the shape and orientation of the sleepers, the rails and the bolts at the mathematical point in the centre of the switch. Such a switch-positioning system is configured to indicate the mathematical point at

the centre of the switch. Accordingly, in an embodiment it is also provided to indicate the theoretical point or the theoretical points at the trailing side of the switch.

[0053] Finally, it should be noted that the invention is in no way limited to the embodiments described above, which can be varied in many ways within the scope of protection described by the following claims. For instance, the frame may have another shape, be made from different stiff materials and comprise different positioning markers, all of this in order to ensure that the theoretical and mathematical points of the switch are visible even after the design phase.

Claims

1. Switch-positioning system for accurately determining a position of a railway switch, comprising a frame made of a rigid structure, which frame is fastenable between two rails of the switch in such a way that it extends between the two rails during use, and wherein the frame is provided with a central positioning marker which, during use, is situated on the centre line of the track which is formed by the two rails, and wherein the frame is configured to be fastened to at least one sleeper at at least two locations on either side of the two rails.
2. Switch-positioning system according to Claim 1, wherein the frame is configured to be fastened to at least two different sleepers on either side of the two rails.
3. Switch-positioning system according to Claim 1 or 2, wherein the frame is provided on either side with fastening means, in particular fastening eyelets, which are configured to connect the frame to the fastening bolts which fasten the rails to the sleeper.
4. Switch-positioning system according to one or more of the preceding claims, wherein the frame is made as a single part.
5. Switch-positioning system according to one or more of the preceding claims, wherein the central positioning marker comprises a marking indication.
6. Switch-positioning system according to one or more of the preceding claims, wherein the central positioning marker comprises a geometrical bolt which is configured to accommodate a measuring prism.
7. Switch-positioning system according to one or more of the preceding claims, wherein the frame comprises a hinge in order for the frame to be able to pivot in the longitudinal direction, and wherein the hinge preferably comprises a locking device in order to lock the hinge position during use.
8. Switch-positioning system according to one or more of the preceding claims, wherein the central positioning marker is situated in the centre of the longitudinal direction between either side of the two rails, in order to indicate the theoretical point of the facing side of the switch.
9. Switch-positioning system according to one or more of the preceding claims, wherein the central positioning marker is situated in the centre of the longitudinal direction between either side of the two rails, in order to indicate the mathematical point of the centre of the switch.
10. Switch-positioning system according to one or more of the preceding claims, wherein the central positioning marker is situated in the centre of the longitudinal direction between either side of the two rails, in order to indicate the theoretical point of the trailing side of the switch.
11. Switch-positioning system according to one or more of the preceding claims, wherein the frame is constructed from a main bar which extends between the two rails during use and which main bar is provided with two side bars on either side, which side bars are configured to be fastened, during use, to at least one, but preferably two different sleepers.
12. Switch-positioning system according to one or more of the preceding claims, wherein the frame is configured to be permanently fastened in the switch.
13. Switch-positioning system according to one or more of the preceding claims, wherein the length of the frame extending between the two rails of the switch at least virtually corresponds to the track gauge of the track, and in particular at least virtually corresponds to 1435 mm.
14. Method for positioning a switch during installation of the switch, which method comprises the following steps:
 - designing the switch on the basis of at least one theoretical point and at least one mathematical point;
 - constructing the switch;
 - arranging at least one switch-positioning system according to one or more of the preceding claims in the switch, which switch-positioning system is positioned in the switch in order to indicate the theoretical point;
 - arranging at least one switch-positioning system according to one or more of the preceding claims in the switch, which switch-positioning system is positioned in the switch in order to indicate the mathematical point.

15. Railway switch comprising at least one switch-positioning system according to one or more of the preceding Claims 1-13.

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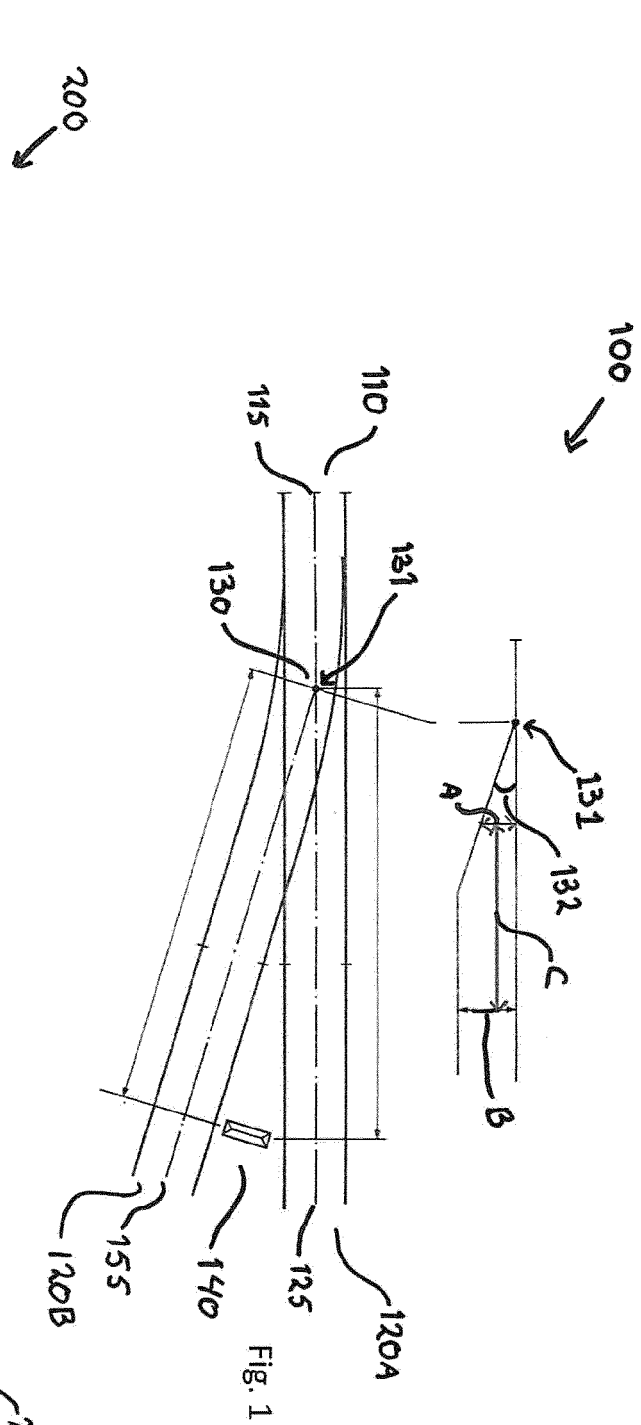
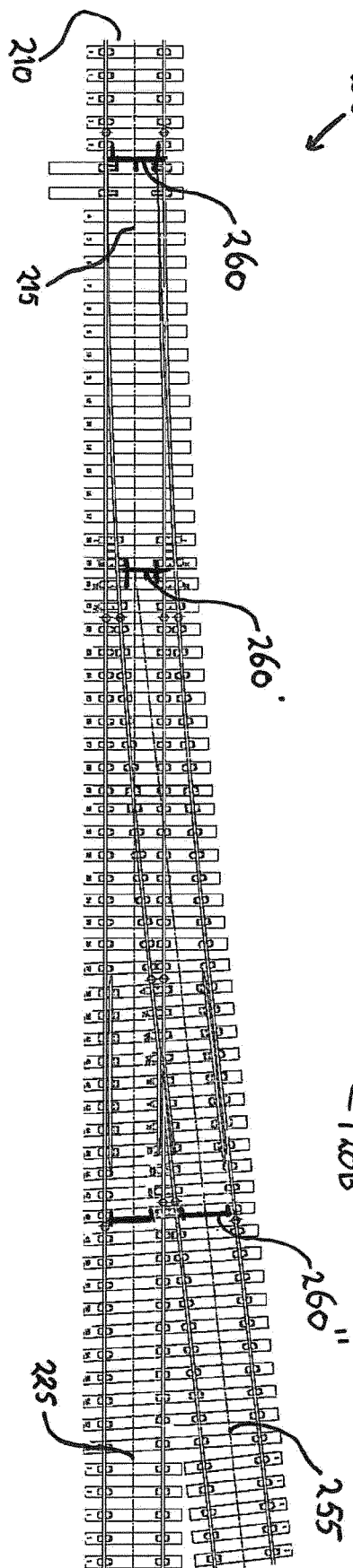


Fig. 2



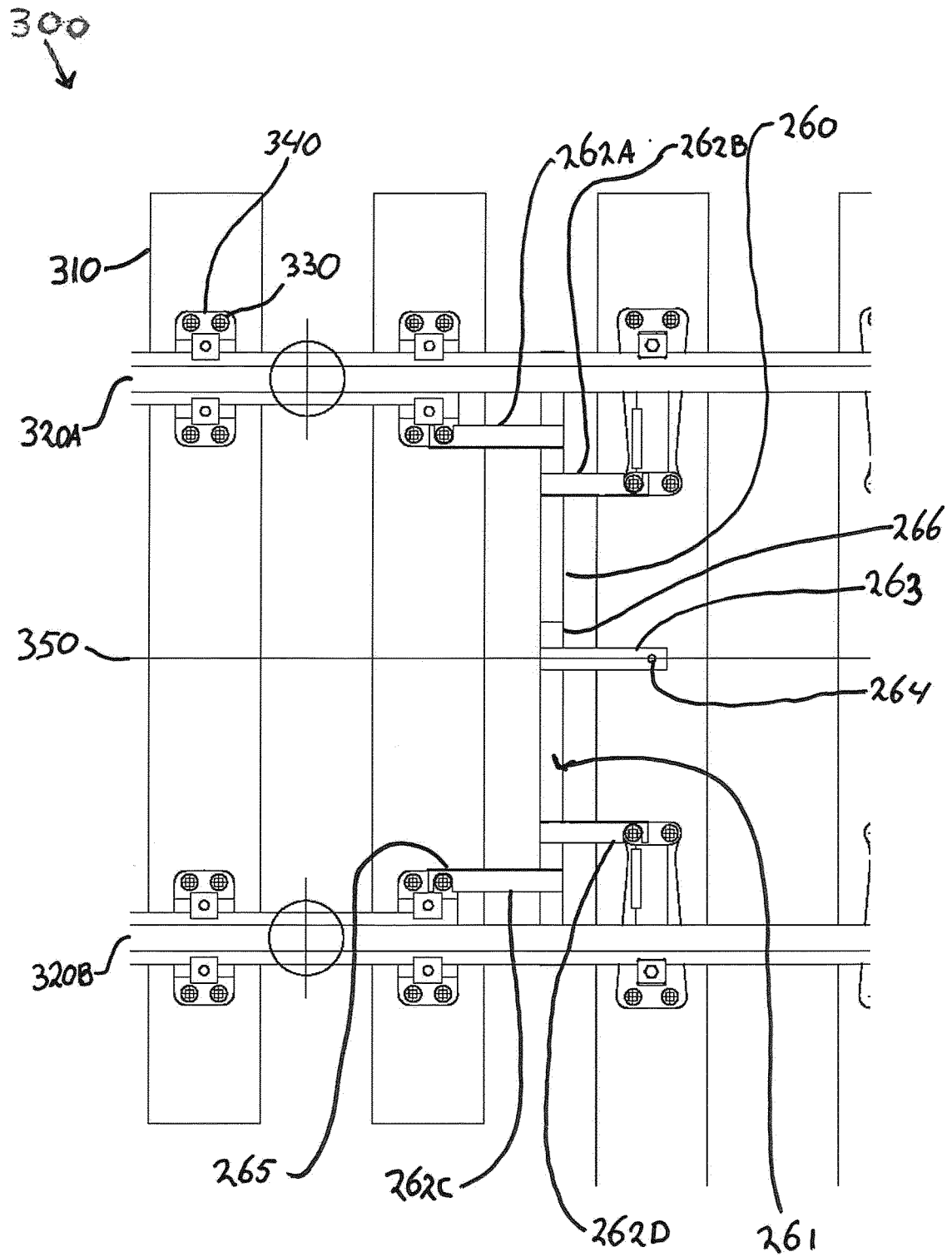


Fig. 3



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