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(54) **Railway, tramway or the like turnout of so-called English type**

(57) A railway, tramway or the like turnout of so-called English type, which turnout comprises four points and wherein

two tracks cross each other and have one pair of rails (B1, B1', B2, B2'), which cooperate with first and second pairs of points (A1, A1'; A2, A2') respectively, one point (A2, A1') of each of said first and second pairs of points being located in the middle of the turnout and the other two points (A1, A2') of the two pairs of points being located at the opposed outer areas of the turnout; said turnout comprising a point-controlling switch stand of the type having the form and function of a tie in which motorized means are housed for combined displacement of

at least the outer points, and rigid mechanical connecting means being provided for connecting each of the points (A2; A1') in the central area of the turnout, belonging to the first and second pairs of points respectively with one of the outer points (A1, A2') of the other pair of points, which outer point assumes the closed position with the corresponding point in the central area of the stand, a second stand is further provided, having the form and function of a tie, which is designed to be located at a predetermined distance from the first switch stand, and said rigid connecting means are fastened to the corresponding points in such a position that said rigid connecting means extend into said second stand.

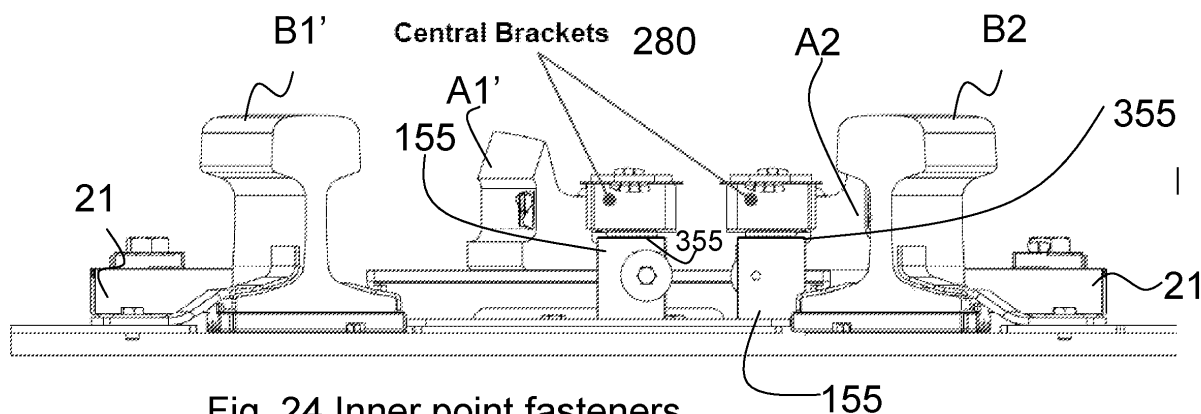


Fig. 24 Inner point fasteners

Description

[0001] The invention relates to a railway, tramway or the like turnout, of so-called English type according to the preamble of claim 1.

[0002] An English type turnout of this type is known from EP-1024988 (WO99/020512). This document discloses an English-type turnout in which the switch stand is provided in the form of a tie and is mounted in the railway line instead of a tie. The disclosure of EP 1024988 is incorporated herein. In this document, the turnout is of trailable type and has means that alternately change it from trailable to non-trailable. All mechanical parts for driving and locking/unlocking the switch points in the various thrown positions (so called point locking devices), as well as other control devices are held within the tie-like switch stand.

[0003] As explained in the disclosure of the above document and the preamble of claim 1, the English-type turnout comprises four points and is used when two tracks cross each other. The two tracks have one pair of rails each, which cooperate with first and second pairs of points, one point of each of said first and second pairs of points being located in the middle of the turnout and cooperating with one of the innermost rails, whereas the other two points of the two pairs of points are located at the opposed outer areas of the turnout and cooperate with the outermost rail.

[0004] In the device disclosed in EP1024988, point displacement is applied to the two outer points of the two pairs of points only. Each of the outer points is connected to an inner point by means of a rigid connecting rod. For proper operation of the turnout, the thrown position of the points is alternately assumed by one outer point of one of the two pairs of points and by the inner point of the other pair of points, which also determines which ones of the two points of the one and the other pairs have to be connected together.

[0005] Therefore, the outer points pull along the inner points during their displacement and also, when lock devices are provided for locking the outer points in their thrown position against the associated outer rail, they also lock the inner point associated therewith, which has reached its thrown position against the associated inner rail.

[0006] The connecting rods are located below the tracks, in channel formed in the borrow for accommodating said rods, which is not protected at present. On the other hand, these rods are an important and critical feature for proper operation of the turnout and, should one of these get broken, the corresponding inner point would be free to assume any position relative to the associated rail, as it would be disengaged from the point locking means and the point displacing means.

[0007] A first object of the present invention consists in making a turnout as described hereinbefore safer for railway traffic, particularly against any damage.

[0008] The invention solves this problem by providing

a turnout as defined in the preamble of claim 1, which further comprises the characteristics of the characterizing part of claim 1.

[0009] The provision of a stand that accommodates the rods, which stand has exactly the same size as a tie, and which stand replaces a tie, allows the rods to be protected from any damage or obstacle to their free sliding motion, such as buildup of borrow, or any part of material falling into the rod channel and hence interfering with free rod motion.

[0010] The dependent claims disclose further advantageous characteristics of the invention.

[0011] Particularly, the turnout has point lock/unlock means for locking/unlocking the points in and from their thrown positions also for the central points. These means are provided in the central area of the switch stand and are shared by the two central points, sliders being provided for driving said central points, and cooperating with means for locking/unlocking the latter in and from the point thrown position, which means allow or prevent translation of said sliders, when one of the two central points reaches the closed or thrown position or when the turnout is operated to displace the points into the other closed or thrown position, respectively.

[0012] Still according to this advantageous variant embodiment, the lock/unlock means for the central points are also connected to means for transferring a point displacement drive generated by a motor, whereby the central points are pulled or pushed by the outer points not only through the connecting rods, but also through the common lock/unlock means, which are directly controlled by the driving motor, like the outer points.

[0013] In a further improvement of the invention, the first switch stand and the second stand for the connecting rods are formed with a modular construction.

[0014] The latter is particularly formed as described and shown in EP 1594732.

[0015] According to yet another improvement, the lock/unlock means for locking/unlocking the central points in and from the closed position are also modular and formed like said means for locking/unlocking the frog of a turnout, as described in EP 1594732.

[0016] A further object of the invention is to provide a turnout of so-called English type with a construction in which the locking/unlocking, i.e. point locking and displacement features for the central points are independent from those for the outer points, to prevent any damage or malfunction of the lock/unlock means for the outer points and/or the connecting rods that connect them to the corresponding central point, from causing failure of the central points to be locked in position or connected to the displacing means.

[0017] The invention solves this problem by the characteristics of claim 15.

[0018] The independent claims relate to further improvements.

[0019] The provision of lock/unlock means for the central points that are shared by the two central points and

independent of those of the outer points, and that are also dynamically connected to the motorized point displacing means, affords control and monitoring of the central points independent of the outer points, and also, in addition to the rigid connecting rods between the inner, i.e. central and the outer points, provides a double safety feature for the outer points and the inner points which always ensures the possibility of displacing all the points and locking them in the closed position even when one of the lock/unlock means or the transfer of the point displacing drive is damaged, regardless of whether this involves said means for the inner points or those for the outer points.

[0020] The invention also has the object to provide a turnout of the English type that has a efficient and cost-effective construction and allows easy replacement of the operating units.

[0021] This object is fulfilled by a turnout as defined in claim 17.

[0022] The modular construction helps to maintain low fabrication costs and speeds up and facilitates maintenance, replacement of damaged parts and repair of these parts.

[0023] The dependent claims relate to advantageous improvements of the invention.

[0024] The invention and the advantages derived therefrom will appear more clearly from the following description of a non limiting exemplary embodiment as shown in the accompanying drawings, in which:

Fig. 1 shows a turnout of so-called English type according to the prior art.

Fig. 2 is a plan view of a section of an enlarged detail of an English-type turnout of the present invention.

Fig. 3 is a perspective view of the detail of Fig. 2.

Fig. 4 shows the turnout ties as viewed in the axial direction.

Figure 5 is a longitudinal sectional view of the tie-like switch stand in which the housing stand is highlighted as a modular element of said switch stand.

Figure 6 is a view like Figure 5, in which the motor module is highlighted.

Fig. 7 is a view like Figure 6, in which the drive module is highlighted.

Fig. 8 is a perspective view of the motor module, separate from the stand.

Fig. 9 is a perspective view of the drive module, separate from the stand.

Figs. 10A, 10B and 10C are views like Figure 5, in which the point locking module is highlighted, which constitutes the lock/unlock means for locking/unlocking the right outer point, the inner points, and the left outer point.

Fig. 11 is a perspective view of the two point locking modules for the two outer points.

Fig. 12 shows the point locking module shared by the inner points.

Fig. 13 shows, like Figure 5, the modules for fasten-

ing the rails and the points to the switch stand and the point pulling means respectively.

Figs. 14 and 15 are enlarged lateral views of the modules for fastening a rail and the means for fastening the associated outer point to the sliders for pulling the associated point locking device, in a normal condition and after trailing respectively.

Figs. 16A and 16B are enlarged lateral views of the means for fastening the inner rails and the inner points to the stand and the sliders of the point locking devices respectively, and in a normal condition and after trailing respectively.

Figs. 17 to 19 are exploded and perspective views of various steps for assembling the modular switch stand as shown in Figs. 5 to 16.

Fig. 20 is a view like Fig. 5 of the second tie-like stand for accommodating the rods for connection of the outer points to the inner points, with the stand being highlighted as a modular element.

Fig. 21 is a view like Fig. 20, which highlights the connecting rod module.

Fig. 22 is a view like Fig. 20, which highlights the modules for fastening the connecting rods to the points.

Fig. 23 is an exploded perspective view of the second stand for housing the connecting rods, with the latter outside the stand.

Fig. 24 is a lateral view of the central area of the turnout, showing the brackets for fastening the connecting rods to the inner points.

Fig. 25 is a view like Fig. 24 of the area of an outer point, which shows the bracket for fastening the connecting rod to the outer point.

[0025] Figure 1 shows a prior art turnout of so-called English type, which is provided at crossings and has four points. Such turnout is described in greater detail in EP 1024987 and EP 1219521 which disclose particular embodiments thereof and shall be deemed to be part hereof for all technically compatible parts, concerning the construction of means and devices that can be used in combination with the guiding principle of the present invention. In the English-type turnout as shown therein and in the one of the present invention, two tracks are provided with the rails B1, B1' and B2, B2' cooperating with the points A1, A1' and A2, A2' respectively. A switch stand 1 having a shape and a size substantially corresponding to those of a rail tie houses the means for displacing the points A1, A1' and A2, A2'. The rails B1, B1', B2, B2' are secured to the tie-like switch stand 1. In both the prior art device and the device of the present invention, the four points A1, A1', A2, A2' cooperate in pairs with the rails B1, B1', B2, B2' of a track and are operated together. For this purpose, the switch stand as described in the above documents uses a single drive for the four points A1, A1', A2, A2' whereas, the outermost points A1, A2' only are provided with means for removably locking them in the thrown position against the associated rail B1, B2'. The

inner points A1', A2 are locked in the thrown position by a rigid connection 55, e.g. a connecting rod for connection to the outer point A1, A2', which assumes the thrown position with the innermost one A2, A1'.

[0026] Therefore, in the so-called English turnout, two tracks cross each other and have a pair of rails B1, B1', B2, B2' cooperating with a first and a second pair of points A1, A1' and A2, A2' respectively. A point A2, A1' respectively of each of said first and second pairs of points is located in the central area of the turnout and the other two points A1, A2' of the two pairs of points are located at the opposed outer areas of the turnout.

[0027] The mechanical connecting rods connect each of the points A2 and A1' in the central area of the turnout, belonging to the first and second pairs of points respectively with one of the outer points A1 and A2' of the other pair of points, which outer point assumes the closed position with the corresponding point in the central area of the stand.

[0028] In the prior art turnout, the points are alternately moved to the closed position, i.e. to the thrown position of said point A1, A2, A1', A2' against an associated rail B1, B1', B2, B2', one of the two points of each of said two pairs are driven by common means for combined point displacement. The closed position, also known as thrown position, is simultaneously reached by the two points A1, A2; A1', A2', one of which is a point of the first pair of points A1, A1', while the other is a point of the second pair of points A2, A2'. One of the points in said closed position is always a point A1, A2' located in the outer area of the turnout, whereas the other point A2, A1' is a point located in the inner area of the turnout.

[0029] Prior art turnouts further have lock/unlock means which only directly operate on the drive means for the outer points of said two pairs of points. These means are located at the rail associated with the corresponding outer point and lock the outer points A1, A2' in their respective closed position. The inner points are moved and locked in their closed position by the connecting rods 55 only, which rigidly connect each of them to a corresponding outer point, i.e. the one that assumes the closed position with the inner point with which it is connected.

[0030] Figures 2 to 25 show an English turnout of the present invention. Concerning construction, this turnout has substantially the same functional parts and substantially the same configuration as the prior art turnout. However, as shown in the figures, in accordance with a first advantageous characteristic, a housing stand is also provided for the connecting rods 55.

[0031] Particularly, as shown in Figures 2 and 3, the connecting rods 55 are fastened to the ends of their respective points A1, A2, A1', A2', whereas such ends of the points are aligned with the central longitudinal axis of a railway tie. The housing stand 1' is provided as a replacement of the tie and acts both as a tie and as a housing compartment, similar to the switch stand 1, which acts both as a tie and as a housing for the point

displacing means and the other operating units required for operation of the turnout.

[0032] In the illustrated embodiment, the ends of the points are also advantageously provided at a distance from the central longitudinal axis of the switch stand 1 that houses the point displacing means and the other operating units of the turnout that is equal to the center-to-center distance of the ties, whereby the switch stand 1 and the housing stand 1' for the connecting rods 55 replace two parallel adjacent ties.

[0033] Of course, this geometry shall be intended without limitation, because the two stands 1, 1' may be also located at a distance other than the center-to-center distance of the ties.

[0034] The fastening position of the connecting rods may also not be at the ends of the points, as the connecting rods may be also fastened to the points at an intermediate location on the side of the switch stand 1 opposite to the point ends. Also in this case, the rods will substantially coincide with the central longitudinal axis of the tie, for the housing stand to be used both as a housing for the connecting rods 55 and as a tie. Here, the switch stand 1 is closer to the point ends than to the rod housing stand.

[0035] As described in greater detail hereafter, the connecting rods 55 are driven by rigid brackets below the bottom plane of the rails and at such a depth that said rods fall with their longitudinal axis and their displacement stroke within the cross section of the tie and hence of the housing stand 1'. The brackets 155 for fastening the connecting rods to the points form downward vertical extensions at whose ends the connecting rod is connected. Otherwise, the connecting rod may have angled ends radially extending from its longitudinal axis and having such a length as to maintain the rod section oriented horizontal or parallel to the displacement stroke thereof, in the cross section of the housing stand 1, obviously when the latter is being operated.

[0036] The rails are fastened to the box of the switch stand 1 and to the housing stand 1' in a similar manner. Several fastening arrangements may be provided, including those described in EP 1024987, EP 1219521 and EP1594732. Particularly, the fastening arrangement as described in EP1594732 will be used in this example: The stands 1, 1' have a vertical threaded pin 20 in their opposed end areas external to the corresponding outer rail A1, A2', the fastening base 121 of a rail locking element 21 being fitted on said pin. The locking element 21 has a vertical extension 221 which is supported in a cantilever fashion towards the corresponding rail 4, 5. The vertical extension 221 has a wedge shape, corresponding to the flared I shape of the rail. Said extension may be adapted to be secured by one or more threaded pins against the corresponding rail, in a position in which it is wedged in the flared recesses of the I section of the rail. This provides accurate, self-centering and clearance-free positioning. As shown in the figures, a similar fastening arrangement is also provided for the inner rails

B2, B1', although in this case the fastening means are smaller for space requirement reasons.

[0037] According to yet another characteristic of the invention, as described in greater detail below, the switch stand 1 houses a drive motor M which, through a drive 10 that converts the rotary motion of the motor into a linear motor, drives in a sliding fashion the point pulling rods, which pulling rods are provided in combination with point locking means. The latter consist of point locking means which lock the points against displacement applied thereon, and are operated as soon as a point reaches its closed position, i.e. its thrown position against the corresponding rail. If the motion to displace the point away from its thrown position against the rail so that the other point/s, previously not thrown, can be moved into said position, is applied by the motor and the drive, the locking means are switched to the idle position thanks to an overrun that generally controls the point pulling rods. The lock/unlock means generally consist of hook-like means or latches which are moved into an active or inactive locking state according to the position of the point with which they are connected relative to the rail. The displacement of the hook-like means or latches is controlled by cams that are displaced with the pulling rods and act upon said hook-like or latch means by displacing them, according to the position of the point and the stroke being run, from a position of engagement with a hook-receiving or retaining seat to a position of disengagement from said seat.

[0038] The point locking devices and the latches may have any construction whatever, for instance as described in any one of EP 1024987, EP 1219521 and EP1594732 or of other types.

[0039] According to the invention, dedicated point locking means 141, 142, 143 are also provided for the inner points.

[0040] In this case, since there is a small space for accommodating said means, such point locking means are shared by both inner points A2, A1'.

[0041] Particularly, for this purpose, a common dedicated point pulling rod is provided for the inner points A2, A1', which pulling rod has automatic point displacement locking means which are triggered every time that one of the points reaches its closed position, irrespective of which inner point has reached said position. Likewise, the inner points are both unlocked and translated together when the displacement thereof is controlled by the motor.

[0042] In this case, a construction of the dedicated point pulling and locking devices for the inner points is advantageously as described concerning the frog moving and locking means in EP 1594732.

[0043] Referring to the figures, a further characteristic, to be described in greater detail below, is that both the switch stand 1 and the housing stand 1' have a modular construction, and that substantially identical elements are used to form identical parts, or parts having identical functions.

[0044] The example of the turnout as shown in Figures 2 to 25 relates to a particular embodiment in which the switch stand 1 with its operating units and the housing stand 1' with the point tip connecting rods, have a modular construction.

[0045] The detailed construction characteristics of the turnout as described with reference to this embodiment shall not be intended to be limited to the combination with the modular embodiment, but are also applicable to a non-modular construction.

[0046] As shown in the figures, and particularly in Figures 17, 18, 19 and 23, the switch stand 1 and the housing stand 1' have a box module 100 in the form of a channel section with lateral longitudinal fins having holes in pre-determined positions for receiving cover elements and/or lateral flanges for fastening operating modules such as the point pulling and locking modules, and the rail fastening modules, as described hereinafter. The ends of the channel section (also known as omega section) are closed by end heads 130 that may also be removably fastened or possibly welded.

[0047] Figures 5 to 7 are schematic views of the switch stand, in which the various modules are highlighted from time to time in gray. Figure 5 shows the box module 100. Figure 6 shows the motor module M, which is separately shown in Figure 8. The motor module M has an independent case having a base flange 10, whereby it can be removably fastened, by bolts or the like to the bottom of the box 100. On the side facing the interior of the box 100, the motor module M has an output shaft having a part 11 of a coupling joint 12 for a drive module 110 fastened thereto. Such drive module is highlighted in gray in Figure 7 and separately in Figure 9. Particularly the coupling joint fastened to the shaft of the motor M can be opened and allows separation of the drive of the motor M. Also, the drive module consists of a drive that converts the rotary motion of the motor M into a linear translational motion directed along the longitudinal axis of the box 100 and the point displacement axis. The illustrated embodiment comprises a threaded rod 111 cooperating with a nut screw, not shown. EP 1024987, EP 1219521 and EP1594732 describe a few embodiments of such drive in greater detail.

[0048] The threaded drive actuating rod has a terminal 112 for removable coupling to the remaining operating parts that pull the points along their stroke, whereas the drive 110 has the joint part 113 connected to the corresponding part on the shaft of the motor M.

[0049] Figures 17 to 19 show the above mentioned modular operating parts by exploded views.

[0050] Figures 10A to 10C show the switch stand in the same manner as Figures 5 to 7, with the point pulling and locking modules for the outer points A1 and A2' and the inner points A1', A2 respectively, which are referenced 141, 142, 143.

[0051] These are shown alone in Figures 11 and 12 and are also visible in the exploded views of Figures 18 and 19.

[0052] These modules have a pulling rod 144 which is dynamically connected to pulling sliders 145 that project out of an upper fastening plate 146. The fastening plate 146 has lateral holes for fixation to the lateral longitudinal fins of the box 100 and also forms the closing cover of said box 100 when the module is mounted to the box. The pulling sliders 145 have threaded holes for fixation of point fastening brackets thereto.

[0053] The pulling rod 144 has a terminal for removable coupling to a further connecting rod of the central module 142 and for one of the external modules 141 and also for coupling to the terminal of the drive 110.

[0054] As shown in the figures, the point displacing motion is transferred by the drive 110 to the pulling rod of the point pulling and locking module 141 and to the pulling rod of the central point pulling and locking module 142, i.e. the one for the inner points. The motion to the last point pulling and locking module 143, which is located at the distal end of the stand 1 with respect to the drive 110, is transferred to the pulling rod 144 of this module through the pulling rod of the intermediate module 142.

[0055] The central module has the same construction as the modules 141 and 143 for the outer points, both in terms of fixation to the flange of the box 100 and in terms of the presence of pulling sliders, which in this case are shared by both points.

[0056] Concerning construction, the point pulling and locking module 141, 142, 143, may have any construction whatever, e.g. as described in EP 1024987 and EP 1219521, which provide hook-like means as means for removably locking the points in the closed positions, or as described in EP 1594732, which provides latches and engagement seats, which latches are displaced to engagement or disengagement with or from said seats, by cams that are displaced in synchronism with the actuation of the points by the same point displacing means. The figures do not show the particular construction of the point pulling and locking devices, but this is described in detail in the above mentioned documents, and in this example it is identical to the one of EP 1594732.

[0057] Figure 14 and figures 14 and 15 and 16A and 16B show the modules for fastening the rails to the stand and the points to the pulling sliders 145 of the point pulling and locking modules 141, 142, 143.

[0058] The rails are fastened to the box 100 as described above with reference to EP 1584732.

[0059] More in detail, as shown in Figure 14, each outer point A1, A2' (the point A2 is shown in figure 14, but the construction is the same and symmetrically reversed for the point A1') is fastened to a pulling slider 145 by means having calibrated rupture characteristics. A pin 200 is fastened to each pulling slider 145 by means of bolts or in any other removable manner. The pin 200 is axially engaged in a receiving seat 210 which is composed of two parts connected together by a fastening pin 220 having calibrated rupture characteristics under the action of an external force, i.e. formed in such a manner as to break under the action of a predetermined internal force that

strives to displace the point although the latter is locked in its position. One part of the seat 210 is formed in the part of the bracket 230 connected to the point and one part of the said seat that complementa the first part formed in the bracket 230 connected to the point consists of a removable part 250 that is fastened to said part of the bracket 230 through said calibrated rupture pin 22. Advantageously, the two seat parts 210 formed in the two bracket parts 230, 250 that complement each other to form the wholly closed receiving seat, have at least identical angular extensions, 180° for each part, or the seat part formed by the removable bracket 250 has an angular extension of more than 180°.

[0060] Figure 15 shows a condition in which the calibrated rupture fastening pin 220 is operated.

[0061] In this case the rupture threshold is 40 KN. If a train runs through the switch in the wrong direction and forces the switch points by its wheels with a force of at least 40 KN in the point displacement direction, in a switch condition opposite to the preset one, the fastening pins 220 break and, although the point locking devices are operating, the points are released therefrom and can move without causing any further damage to the other operating parts.

[0062] Figure 16A and Figure 16B show the brackets for fastening the inner points A1', A2 to the pulling sliders 145 of the central point pulling and locking module 142.

[0063] The principle is similar to the one that regulates fixation of outer points. The only difference is that each pulling slider 145 of the two that are available is connected to a single inner point respectively whereas, as particularly shown in Figure 3, for the outer points both pulling sliders are connected to the points.

[0064] In Figure 16 identical parts are referenced by the same numbers as in Figures 14 and 15.

[0065] As shown in Figures 17 to 19, the box parts that are open at their top as they are not filled by operating units are closed by a plurality of cover elements having the same size as said open or exposed parts. Such cover elements are referenced 260.

[0066] Figures 20 to 22 show, like Figures 5 to 7, the housing stand 1 for the point connecting rods 55.

[0067] Here, Figure 20 highlights the box 100 as a first construction element. The box 100 advantageously has a construction similar to the one of the switch stand of the previous figures, as also shown in Figure 23. This figure clearly shows that the box having a channel section and lateral longitudinal flanges is closed at its top by cover elements 260 that leave open windows 27 for the angled end portions 155 of the pulling rods 55 whereby they are connected from the bottom to the ends of their respective points.

[0068] Figure 21 highlights the rods as construction modules. These are in the form of straight elongate elements 255 of predetermined length, whose ends portions have end rod driving portions 155 connected thereto for driving the rods below the rail level, to a position coinciding with the interior of the housing stand 1'.

[0069] Figure 22 shows the means for fastening the connecting rods 55 to the points as the last modular elements.

[0070] These are shown in greater detail in Figures 24 and 25, for the inner points and the outer points respectively.

[0071] According to the combination of Figures 2 and 3, the rods are connected to the corresponding end of a point through a terminal 280 that is fastened by transverse through screws to the point face opposite to the rail against which it is thrown, in the end section of said point. The bracket 280 has a receiving seat for an end pin 355 located at the press-fit ends of the angled fastening terminals 155 of the connecting rods 55, which pin is locked when it is press fitted therein. The press-fit terminal 355 may be locked in position in the seat of the bracket 280 fastened to the point in any manner.

Claims

1. A railway, tramway or the like turnout of so-called English type, which turnout comprises four points and wherein two tracks cross each other and have one pair of rails (B1, B1', B2, B2'), which cooperate with first and second pairs of points (A1, A1'; A2, A2') respectively, one point (A2, A1') of each of said first and second pairs of points being located in the middle of the turnout and the other two points (A1, A2') of the two pairs of points being located at the opposed outer areas of the turnout;
said turnout comprising a point-controlling switch stand of the type having the form and function of a tie in which motor means are housed for combined displacement of at least the outer points, and rigid mechanical connecting means being provided for connecting each of the points (A2; A1') in the central area of the turnout, belonging to the first and second pairs of points respectively with one of the outer points (A1, A2') of the other pair of points, which outer point assumes the closed position with the corresponding point in the central area of the stand,
characterized in that a second stand is provided, having the form and function of a tie, which is designed to be located at a predetermined distance from the first switch stand, and said rigid connecting means are fastened to the corresponding points in such a position that said rigid connecting means extend into said second stand.
2. A turnout as claimed in claim 1, **characterized in that** it comprises motorized means for combined displacement of the points, whereby each time that the turnout is actuated, one of the two points of each of said two pairs is alternately moved to the closed position, i.e. the

thrown position of said point (A1, A2; A1', A2') against an associated rail (B1, B1', B2, B2'), said closed position being simultaneously reached by the two points (A1, A2; A1', A2'), one of which is a point of the first pair of points (A1, A1') and the other is a point of the second pair of points (A2, A2') and one of said points in said closed position is always a point (A1, A2') located in the outer area of the turnout and the other point (A2; A1') is a point located in the inner area of the turnout;

and lock/unlock means (141, 142, 143) for locking/unlocking at least the outer points of said two pairs of points in the closed position thereof, which means are located in the area of the rail that is associated with the corresponding outer point and lock said outer points (A1, A2') in their respective closed positions, each of said lock/unlock means being moved to the active locking position when the corresponding point (A1, A2') reaches the closed position against the corresponding rail, whereas said lock/unlock means (141, 142, 143) are automatically moved to an unlocking position when the turnout is actuated to move the points into the closed position of the other two points (A2, A2'), i.e. when said motorized point displacing means are actuated, said motorized point displacing means and/or at least said lock/unlock means for locking/unlocking the points in the closed position being housed in the first switch stand (1).

3. A turnout as claimed in claim 1 or 2, **characterized in that** said point connecting means consist of connecting rods, which are connected by each of their ends, through vertical fastening brackets, to a corresponding point, and extend to a given extent below the rails and the points, while being also connected to the points at a given distance from said first switch stand that houses at least said motorized point displacing means and/or at least said lock/unlock means for locking/unlocking the points in the closed position, in the direction of the longitudinal extension of the points and/or tracks and in a position coinciding with the interior of said second stand, and whereas the vertical fastening brackets project outwards from said second stand through slot-like apertures oriented in the point displacing direction, which are at least as long as the point displacing stroke.
4. A turnout as claimed in one or more of the preceding claims, **characterized in that** said point connecting rods are connected to the free ends of the points.
5. A turnout as claimed in one or more of the preceding claims, **characterized in that** said connecting rods for rigid connection of the points are oriented in the point displacing direction, and essentially in the direction of longitudinal extension of the second tie-like stand.

6. A turnout as claimed in one or more of the preceding claims, **characterized in that** the free end of the points is located at a distance from the first switch stand that is substantially equal to the center-to-center distance of the ties, said second stand being provided instead of the tie directly adjacent to the switch stand.
7. A turnout as claimed in one or more of the preceding claims, **characterized in that** it has lock/unlock means for locking/unlocking the inner points of said two pairs of points, which means are shared by both inner points (A2, A1') and are moved into the active locking state for locking both of said inner points (A2, A1') when one of these two inner points reaches its closed position against the corresponding rail at the same time as the outer point of the other pair of points, whereas said lock/unlock means (141, 142, 143) are automatically moved into the unlocking state when the turnout is actuated to move the points into the closed position of the other two points, i.e. when said motorized point displacing means are actuated.
8. A turnout as claimed in one or more of the preceding claims, wherein the motorized displacing means are shared by both outer and inner points and are connected to both inner and outer points.
9. A turnout as claimed in one or more of the preceding claims, **characterized in that** the lock/unlock means for locking/unlocking the inner points in their closed position are also housed in the first switch stand.
10. A turnout as claimed in one or more of the preceding claims, **characterized in that** the lock/unlock means are of non-trailable type.
11. A turnout as claimed in claim 10, **characterized in that** the lock/unlock means have mechanical members or are connected to the outer points and/or the inner points via said mechanical members, which mechanical members have a predetermined rupture behavior when the force applied thereon exceeds a predetermined value, so that they break and release the drive means under the action of a predetermined point displacing force directly applied on the points, particularly by rolling stock wheels.
12. A turnout as claimed in one or more of the preceding claims, **characterized in that** at least the first stand and at least said motorized point displacing means and at least said lock/unlock means for locking/unlocking the inner and outer points are formed with a modular construction, whereby the modules include one motor module (M), one drive module (10), and at least one or two separate point locking, controlling and coupling modules (141, 142, 143); each module has its own case or frame, which case or frame has means for fastening it in predetermined positions, cooperating with coincident fastener means, in predetermined positions on the tie-like box module (100), the case (100) consists of a C-section open at its top, that is closed by a cover, a portion of the cover of the case (100) is formed by the upper covers of the modules and the other portions of the cover of the box (100) are formed by special covers (260), said case (100) has lateral longitudinal flanges (110) having holes (215) allowing the different modules to be fastened thereon, the cases or frames also having holes at predetermined positions coinciding with the holes of the case (100) and being mounted in a predetermined position with reference to the case (100) and to the other modules (16) by fastener means.
13. A turnout as claimed in claim 12, **characterized in that** the rigid point connecting rods and the corresponding second housing stand also have a modular construction.
14. A turnout as claimed in claim 12 or 13, **characterized in that** the lock/unlock means shared by the inner points also have a modular construction, and consist of a locking module of a modular switch stand, for the frog of a traditional turnout.
15. A railway, tramway or the like turnout of so-called English type, which turnout comprises four points and wherein two tracks cross each other and have one pair of rails (B1, B1', B2, B2'), which cooperate with first and second pairs of points (A1, A1'; A2, A2') respectively, one point (A2, A1') of each of said first and second pairs of points being located in the middle of the turnout and the other two points (A1, A2') of the two pairs of points being located at the opposed outer areas of the turnout; said turnout further comprising motorized means for combined displacement of the points, whereby each time that the turnout is actuated, one of the two points of each of said two pairs is alternately moved to the closed position, i.e. the thrown position of said point (A1, A2; A1', A2') against an associated rail (B1, B1', B2, B2'), said closed position being simultaneously reached by the two points (A1, A2; A1', A2'), one of which is a point of the first pair of points (A1, A1') and the other is a point of the second pair of points (A2, A2') and one of said points in said closed position is always a point (A1, A2') located in the outer area of the turnout and the other point (A2; A1') is a point located in the inner area of the turnout; the turnout also comprising lock/unlock means (141,

142, 143) for locking/unlocking at least the outer points of said two pairs of points in the closed position thereof, which means are located in the area of the rail that is associated with the corresponding outer point and lock said outer points (A1, A2') in their respective closed positions, each of said lock/unlock means being moved to the active locking position when the corresponding point (A1, A2') reaches the closed position against the corresponding rail, whereas said lock/unlock means (141, 142, 143) are automatically moved to an unlocking position when the turnout is actuated to move the points into the closed position of the other two points (A2, A2'), i.e. when said motorized point displacing means are actuated;

at least said motorized point displacing means and/or at least said lock/unlock means for locking/unlocking the points in the closed position, being housed in a switch stand (1) that essentially has the size and shape of a tie and is designed to be mounted in the track instead and with the function of a tie,

characterized in that

it further has lock/unlock means for locking/unlocking the inner points of said two pairs of points, which means are shared by both inner points (A2, A1') and are moved into the active locking state for locking both of said inner points (A2, A1') when one of these two inner points reaches its closed position against the corresponding rail at the same time as the outer point of the other pair of points, whereas said lock/unlock means (141, 142, 143) are automatically moved into the unlocking state when the turnout is actuated to move the points into the closed position of the other two points of said two pairs, i.e. when said motorized point displacing means are actuated.

16. A turnout as claimed in claim 15, **characterized in that** it has the characteristics as claimed in one or more of claims 1 to 14.

17. A railway, tramway or the like turnout of so-called English type, which turnout comprises four points and wherein

two tracks cross each other and have one pair of rails (B1, B1', B2, B2'), which cooperate with first and second pairs of points (A1, A1'; A2, A2') respectively, one point (A2, A1') of each of said first and second pairs of points being located in the middle of the turnout and the other two points (A1, A2') of the two pairs of points being located at the opposed outer areas of the turnout;

said turnout comprising a point-controlling switch stand of the type having the form and function of a tie in which motor means are housed for combined displacement of at least the outer points,

characterized in that

at least the first stand and at least said motorized point displacing means and at least said lock/unlock

means for locking/unlocking the inner and outer points are formed with a modular construction, whereby

the modules include one motor module (M), one drive module (10), and at least one or two separate point locking, controlling and coupling modules, each module has its own case or frame, which case or frame has means for fastening it in predetermined positions, cooperating with coincident fastener means, in predetermined positions on the tie-like case module (100),

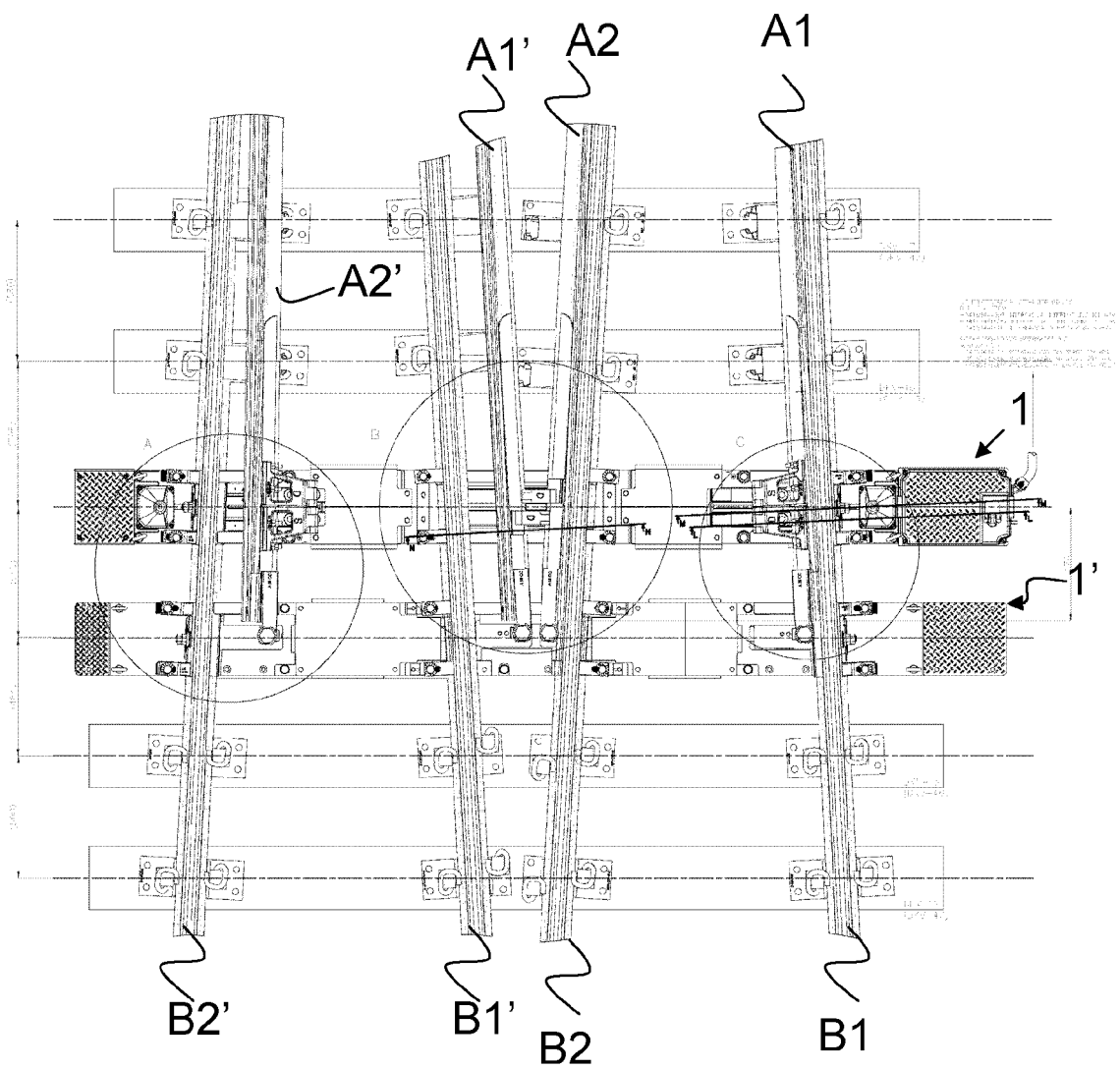
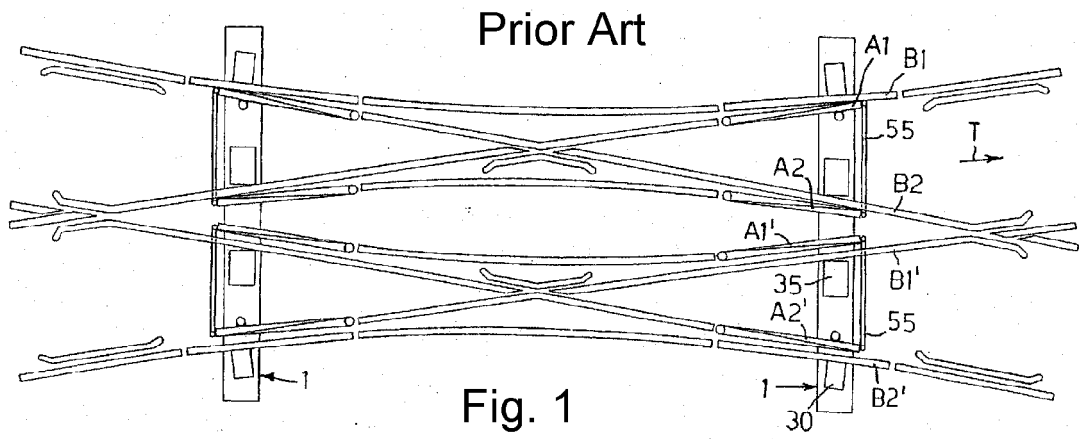
the case (100) consists of an C-section open at its top, that is closed by a cover,

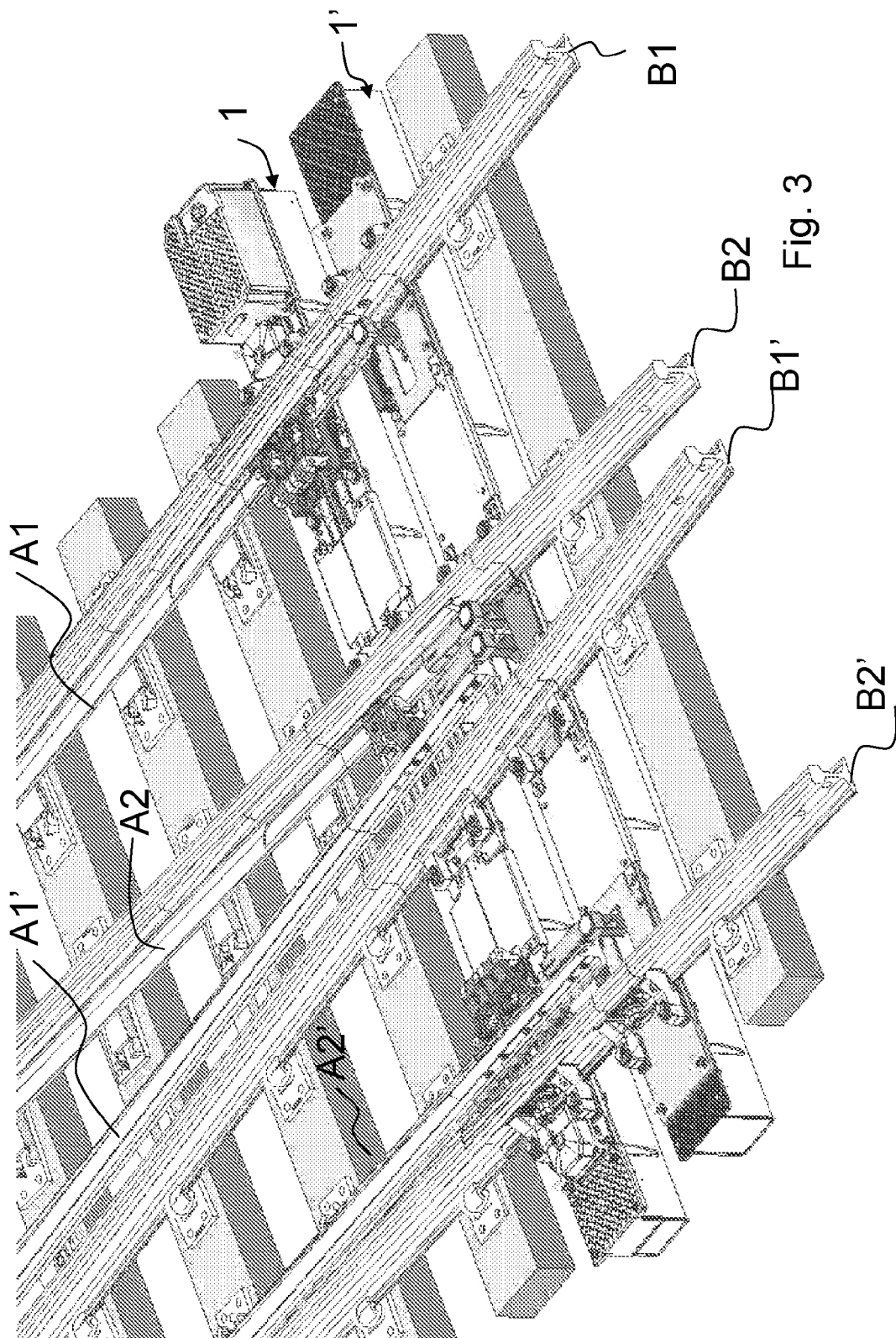
a portion of the cover of the case (100) is formed by the upper covers of the modules and the other portions of the cover of the box (100) are formed by special covers (260),

said case (100) has lateral longitudinal flanges (110) having holes (215) allowing the different modules to be fastened thereon,

the cases or frames also having holes at predetermined positions coinciding with the holes of the case (100) and being mounted in a predetermined position with reference to the case (100) and to the other modules (16) by fastener means.

18. A turnout as claimed in claim 17, **characterized in that** it has the characteristics as claimed in one or more of claims 1 to 16.





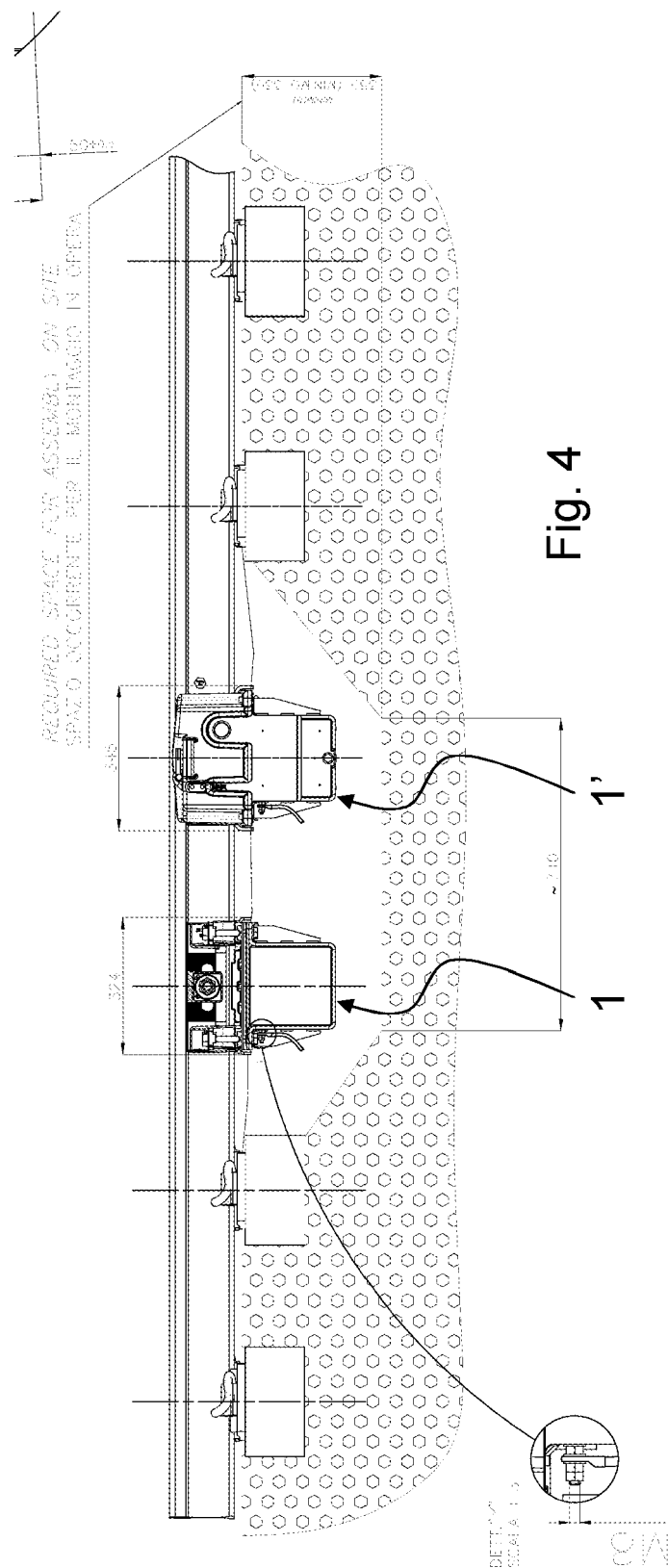
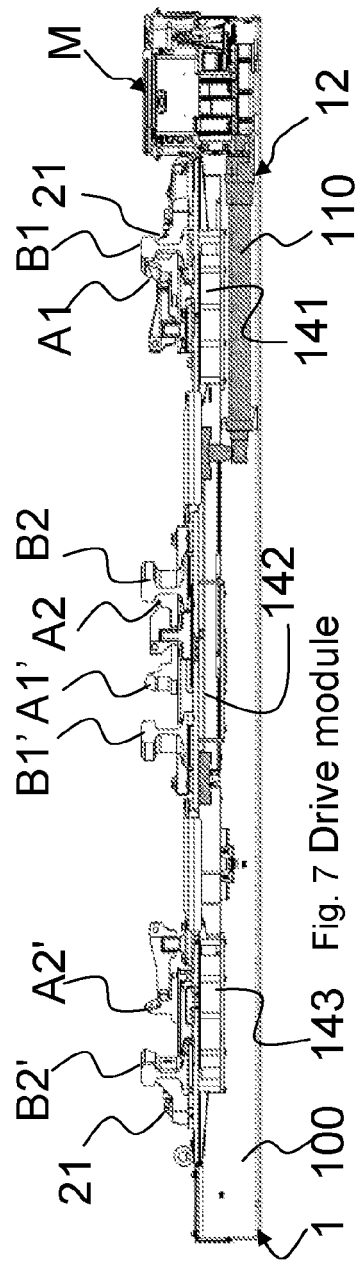
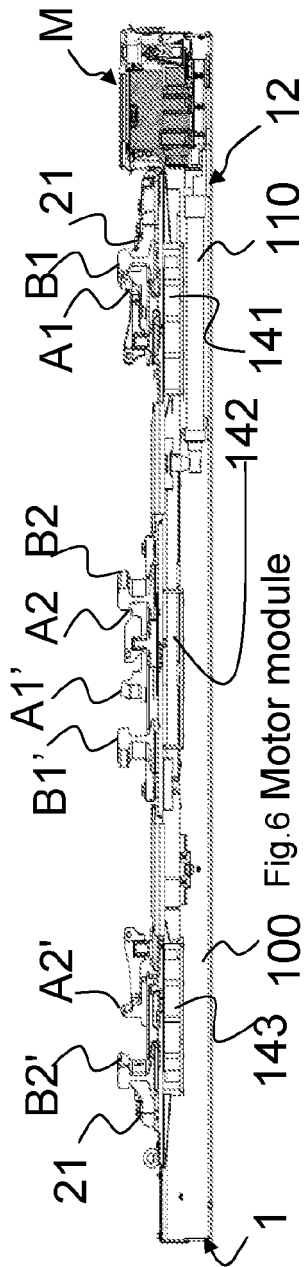
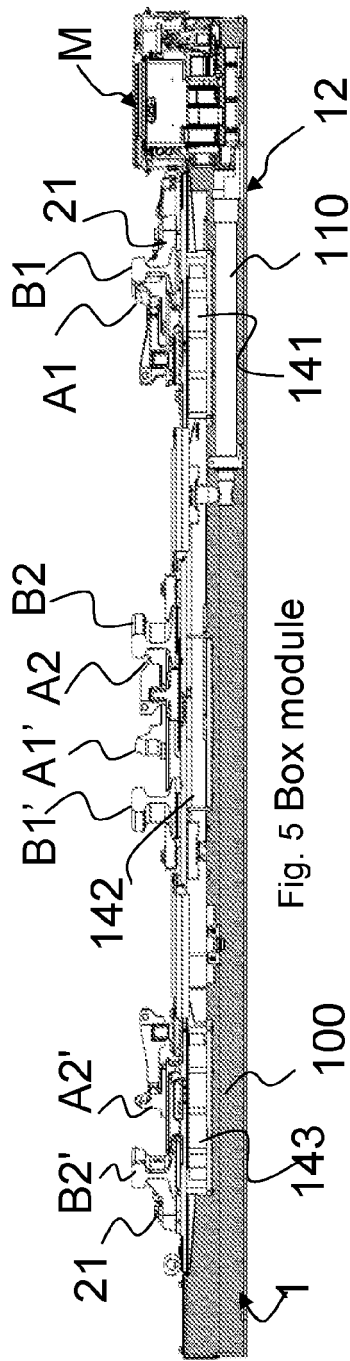


Fig. 4



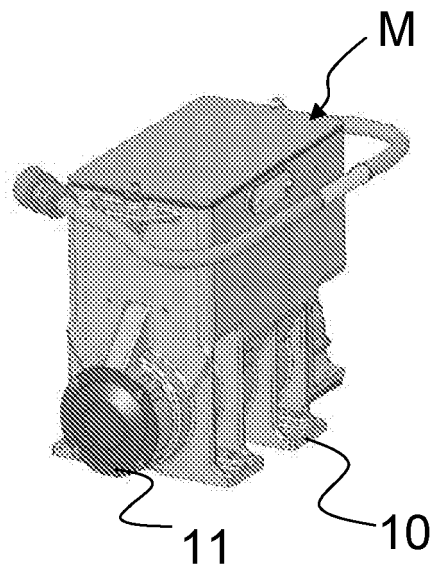


Fig. 8

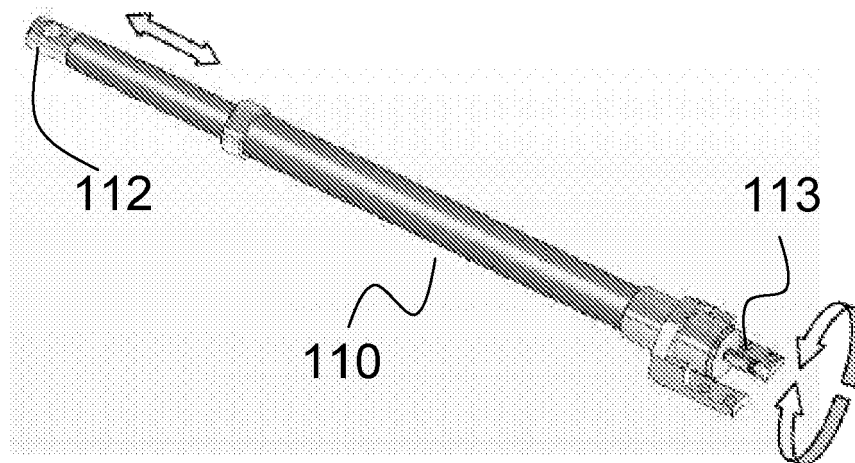


Fig. 9 Linear actuator

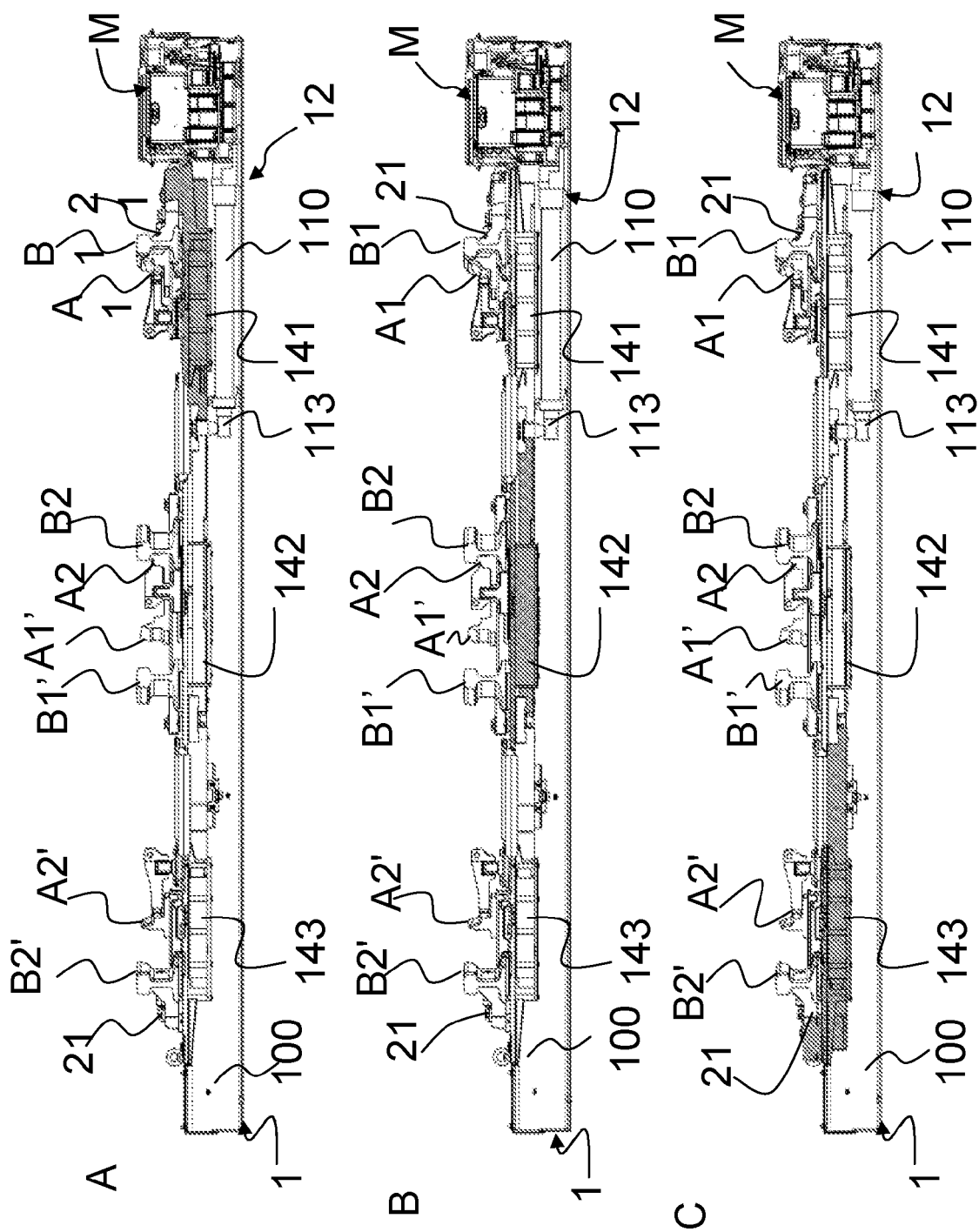


Fig.10 Point pulling and locking modules

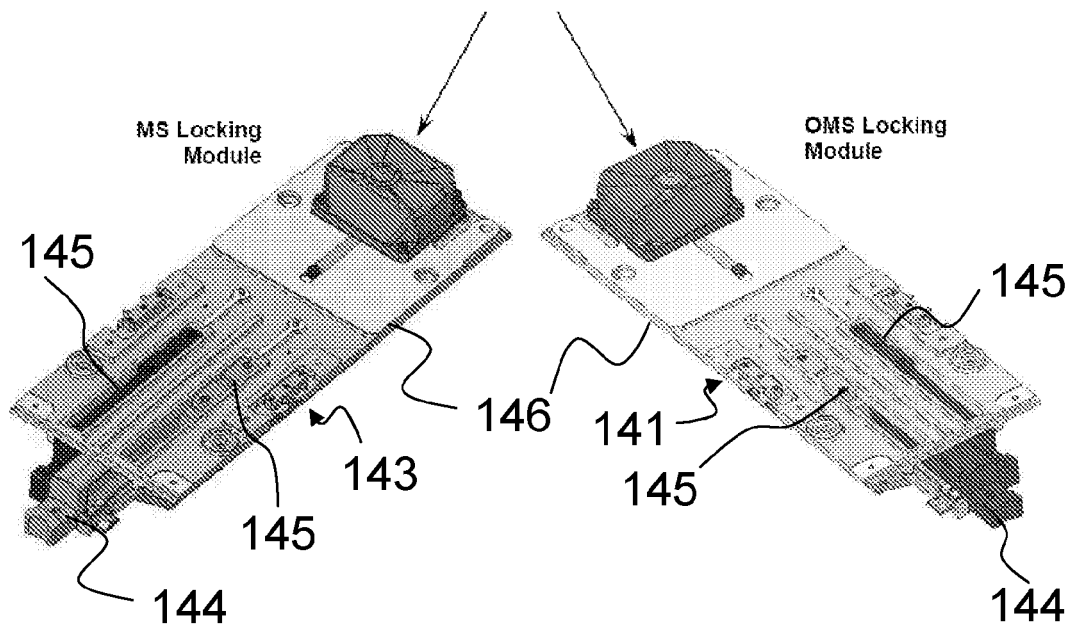


Fig.11 Point pulling and locking modules for the outer points

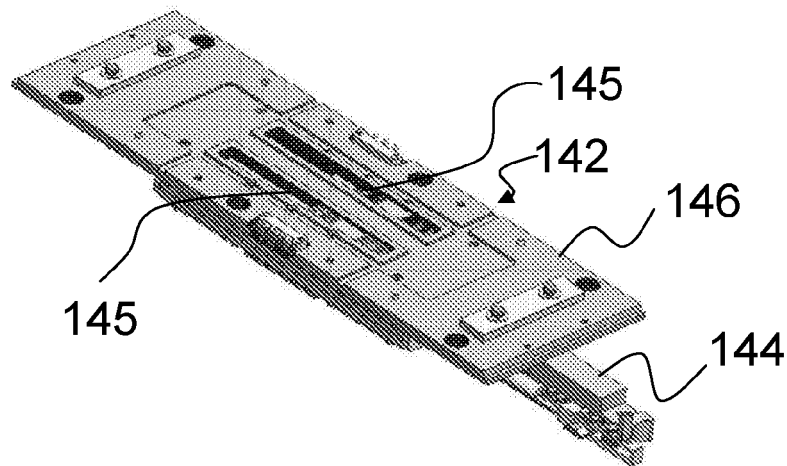
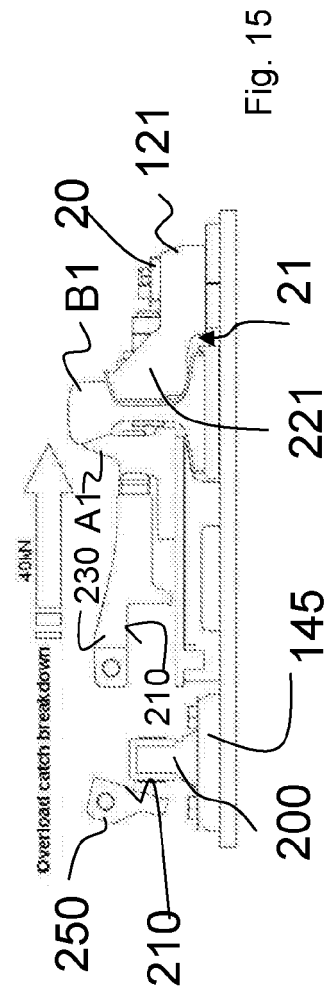
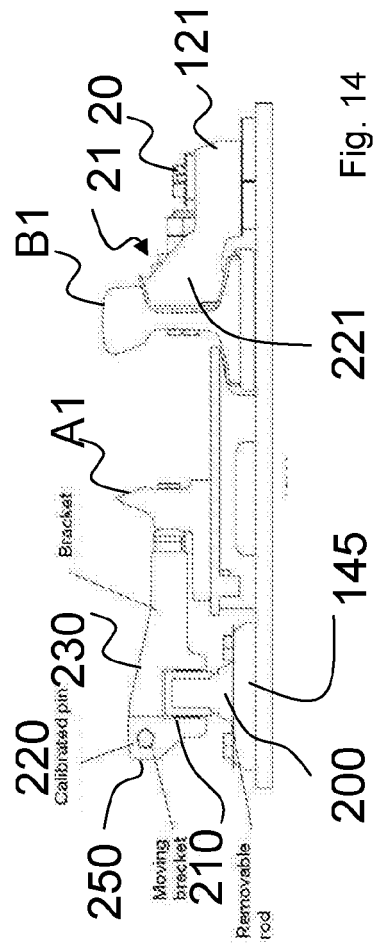
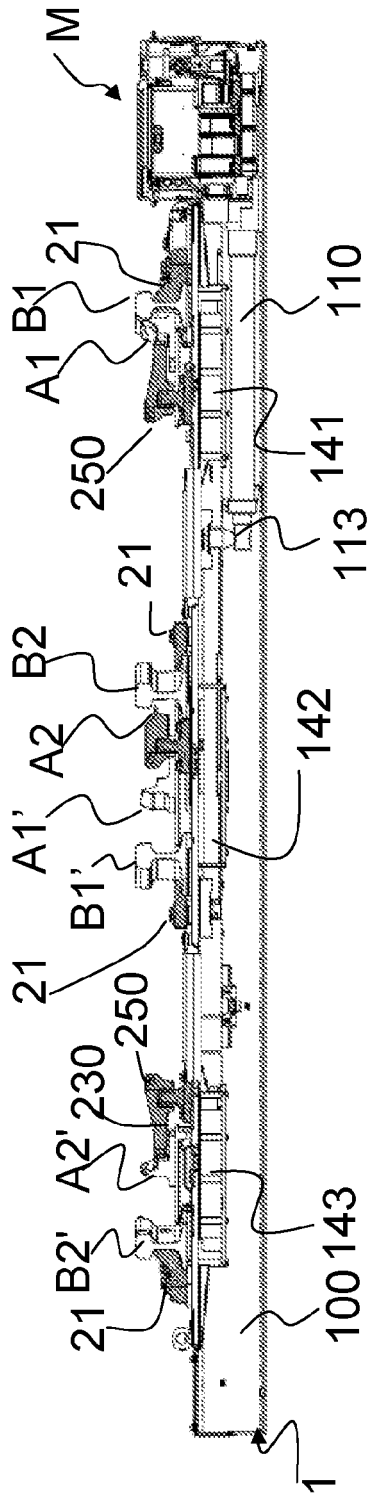
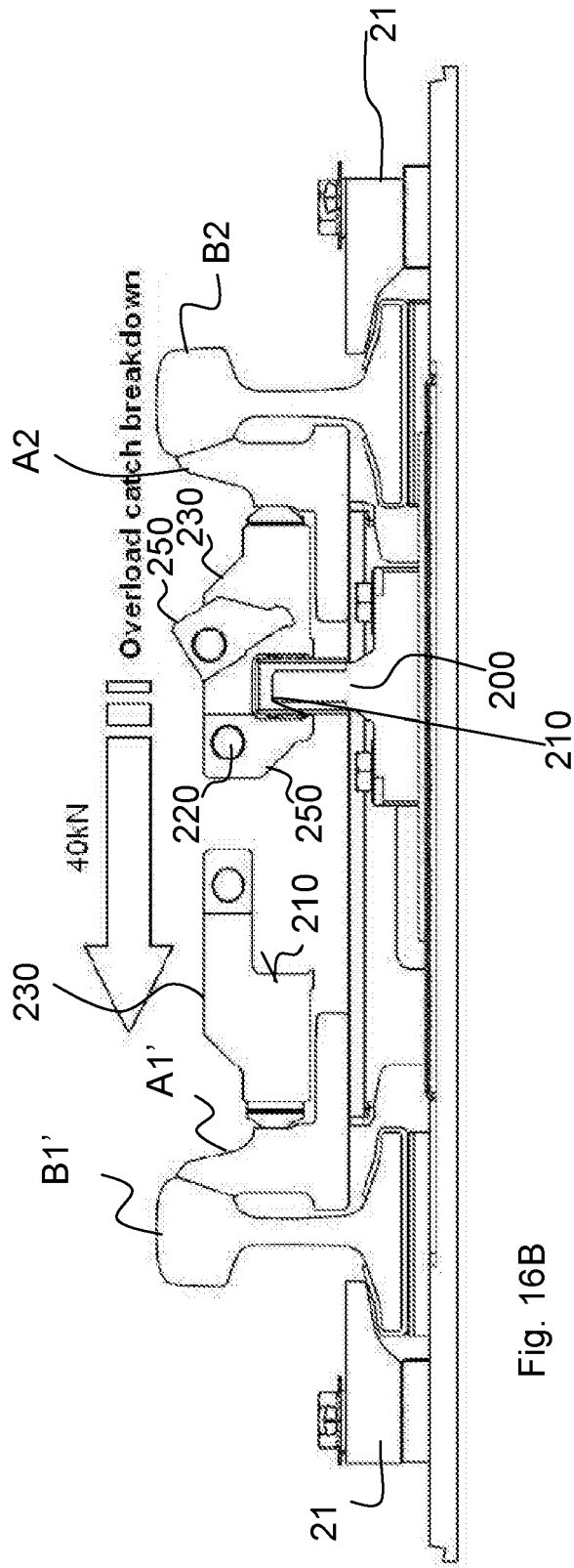
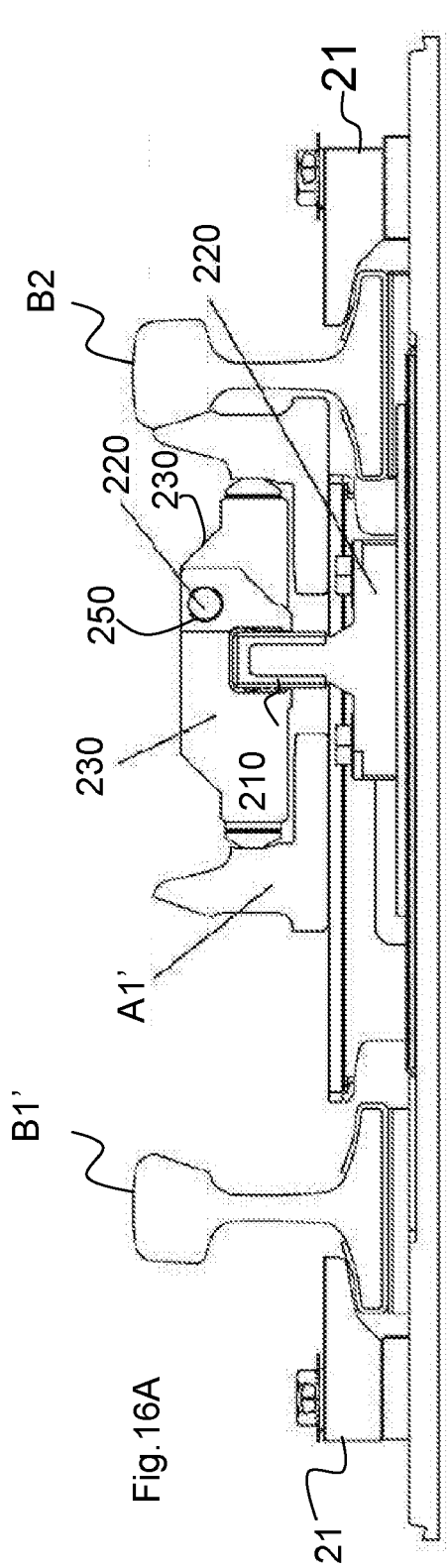


Fig. 12 Point pulling and locking modules for the inner points





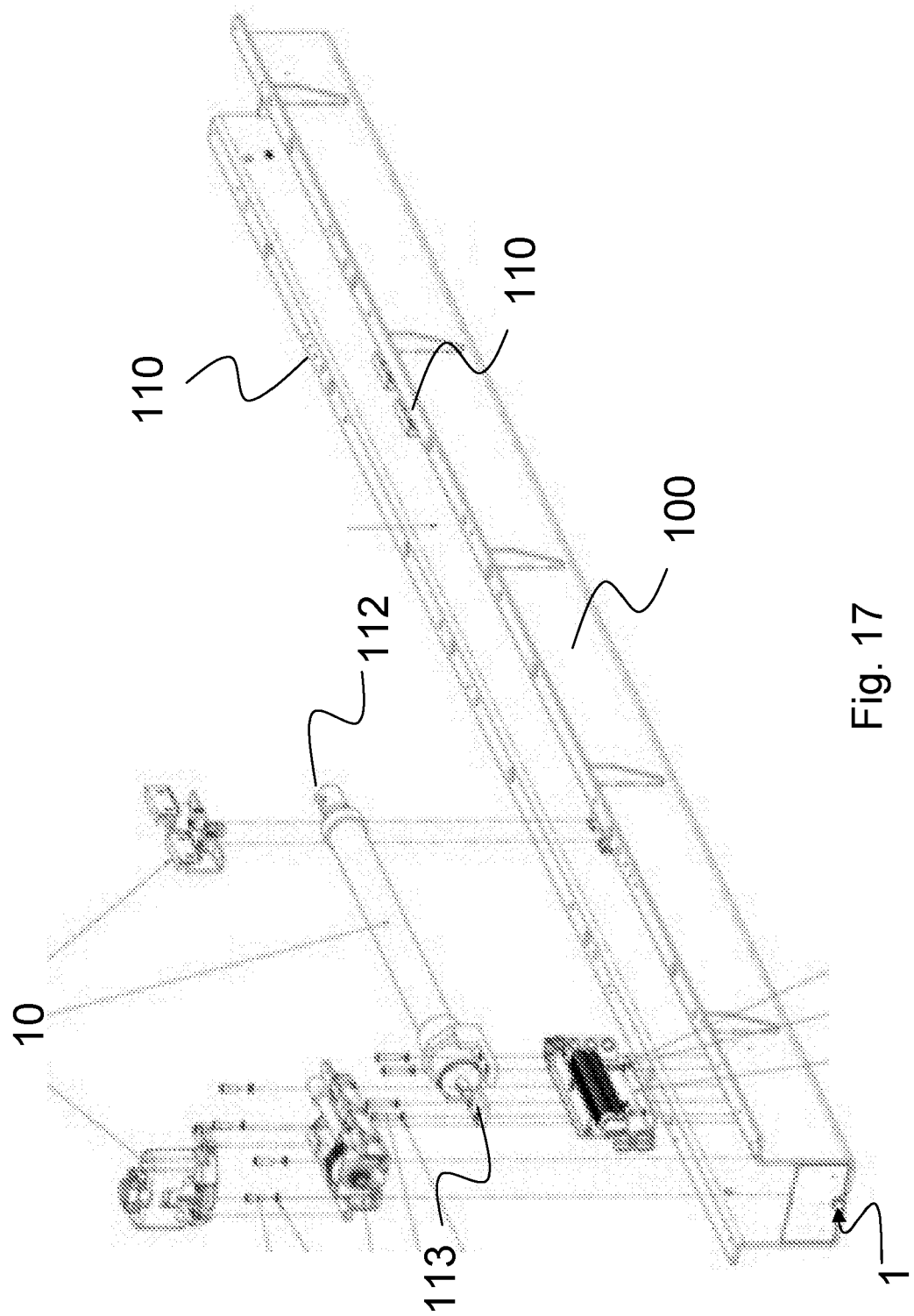


Fig. 17

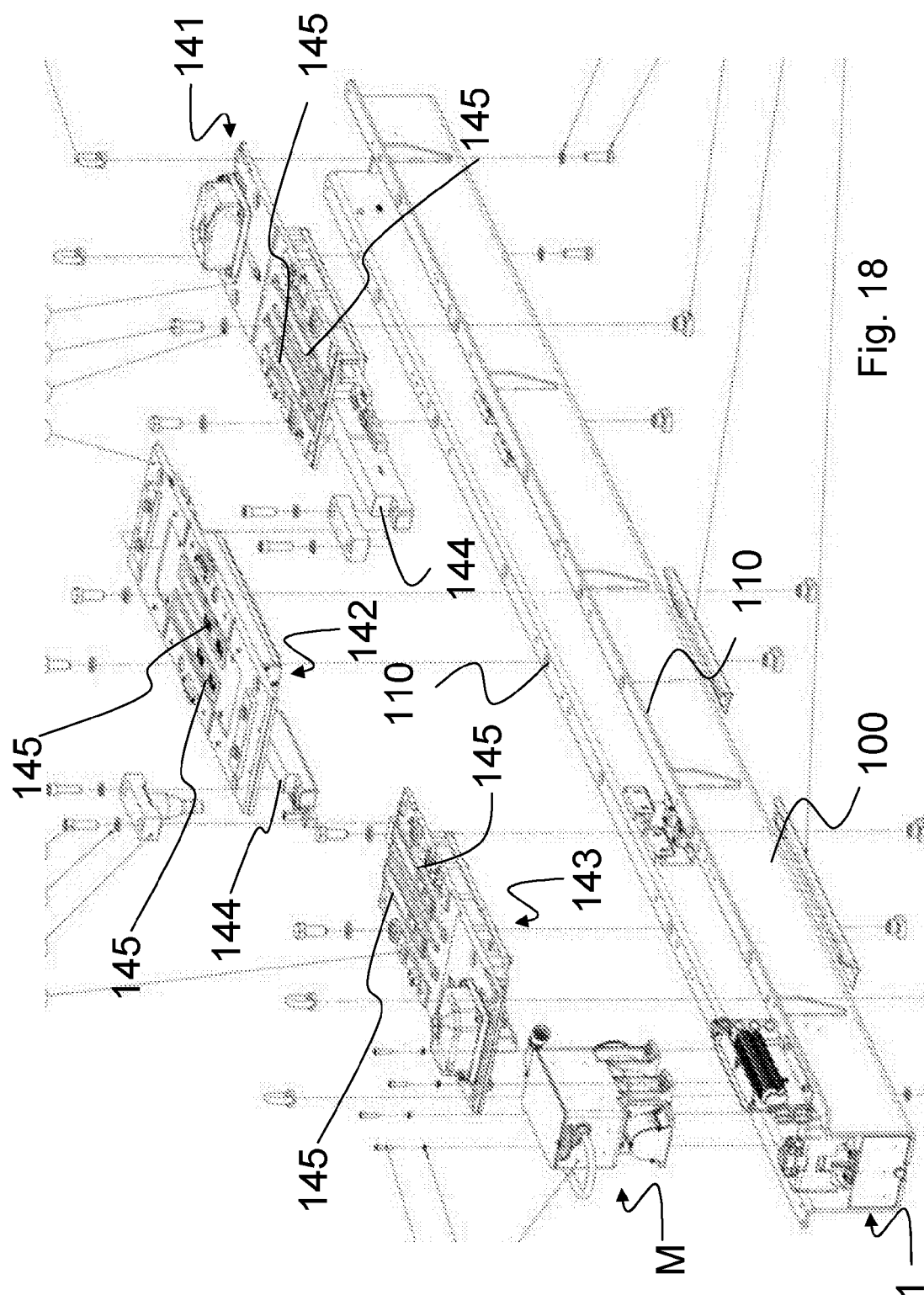


Fig. 18

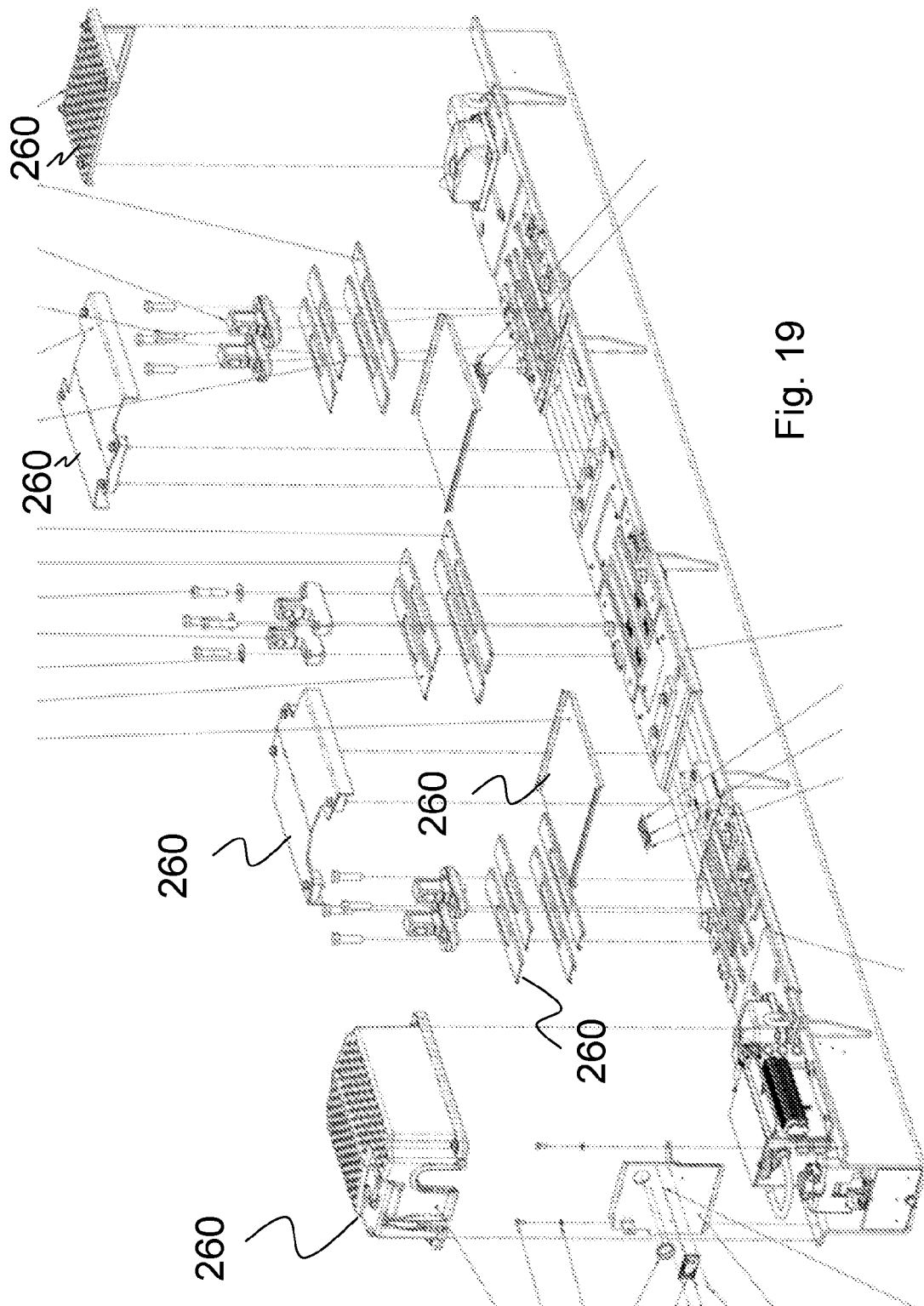
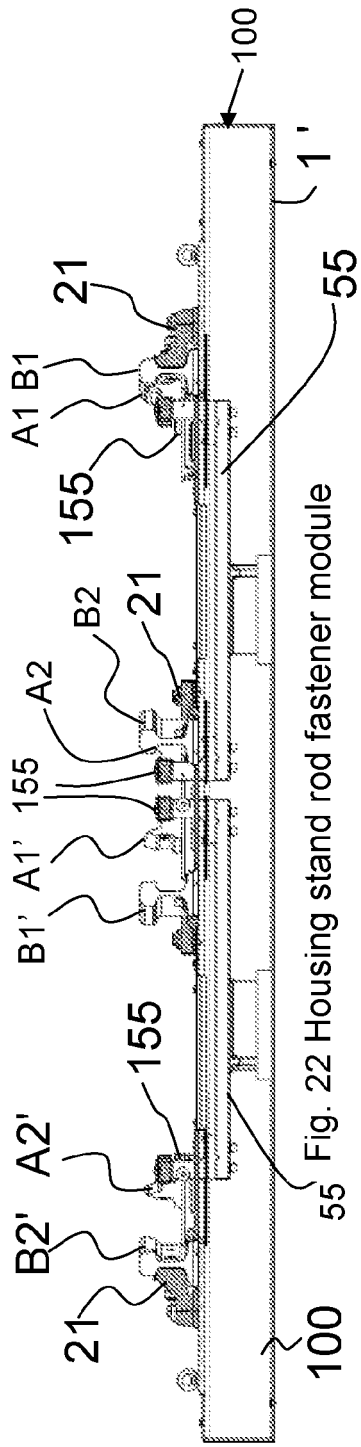
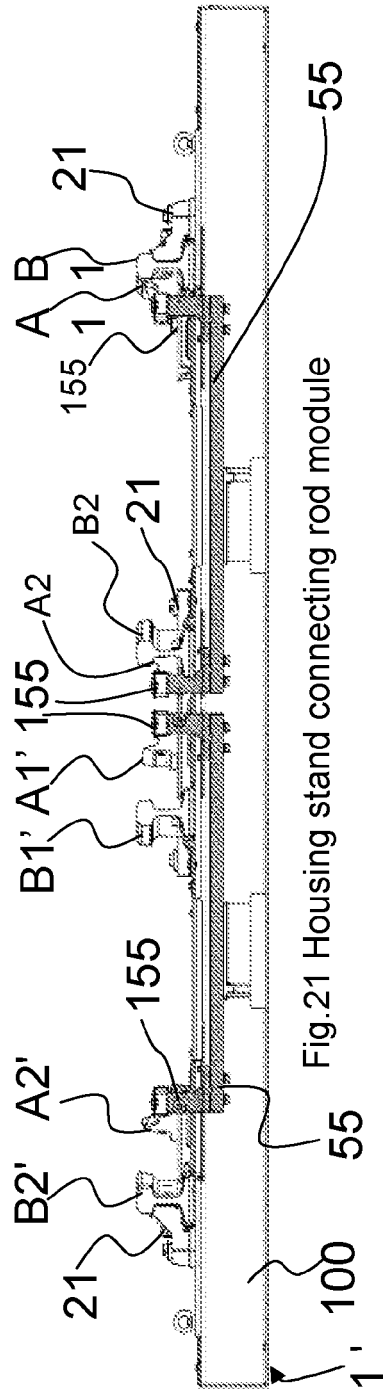
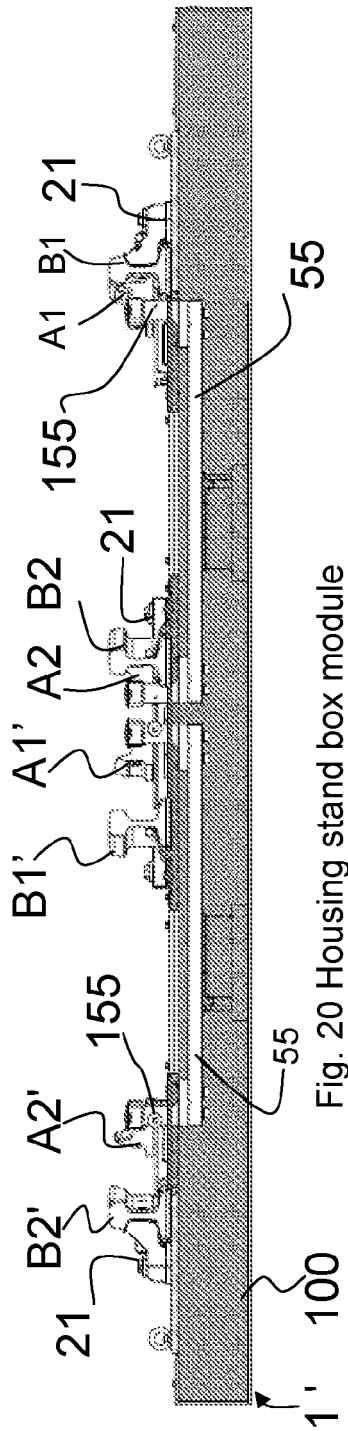


Fig. 19



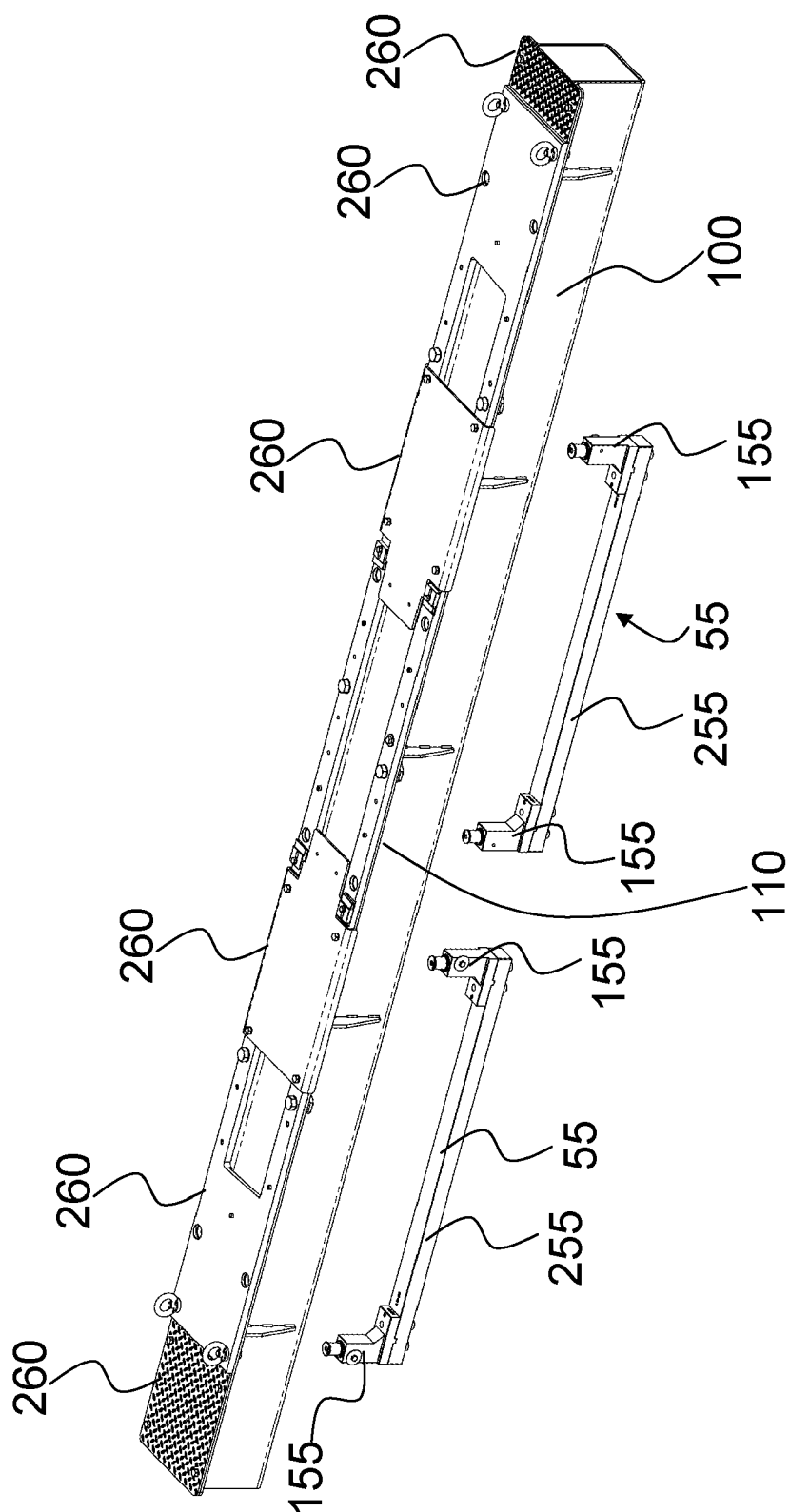


Fig. 23

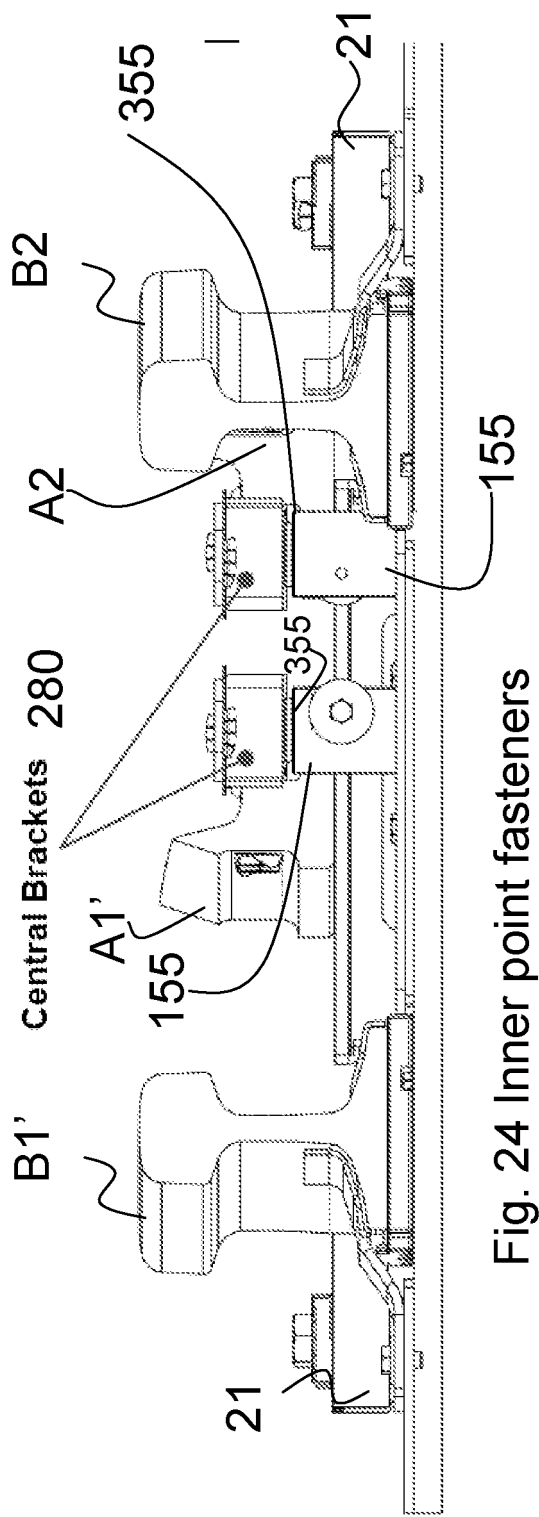


Fig. 24 Inner point fasteners

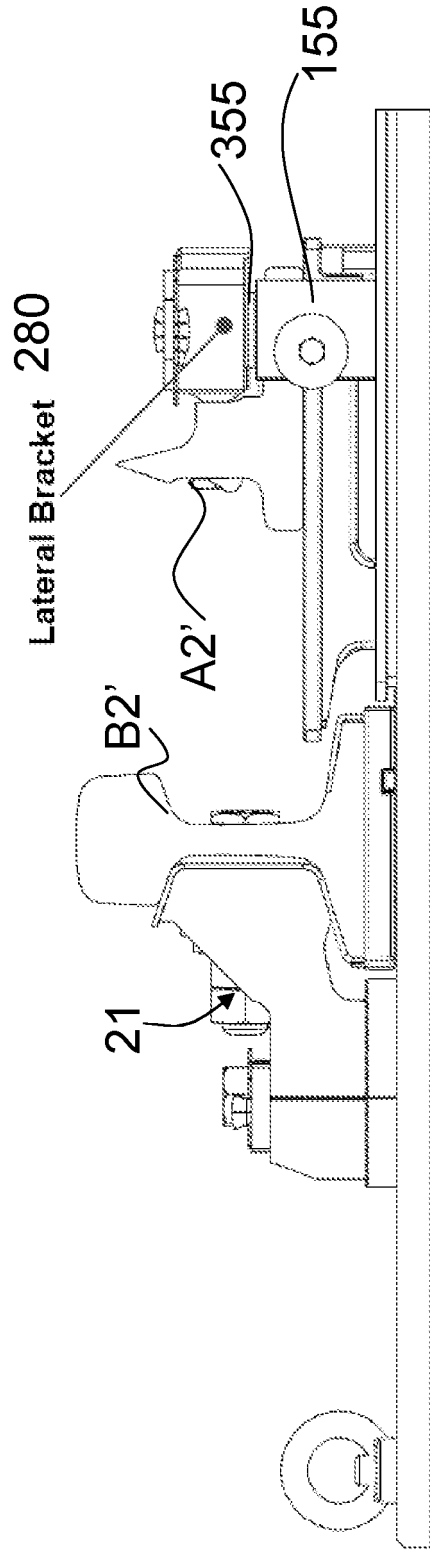
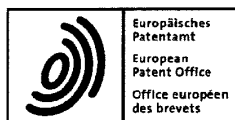


Fig. 25 Outer point fasteners

**PARTIAL EUROPEAN SEARCH REPORT**

Application Number

under Rule 62a and/or 63 of the European Patent Convention.
This report shall be considered, for the purposes of
subsequent proceedings, as the European search report

EP 11 17 0453

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A,D	EP 1 024 988 B1 (ALSTOM TRANSPORT SPA [IT] ALSTOM TRANSP S P A [IT]) 9 April 2003 (2003-04-09) * figures 1,2 * * claim 1 *	15	INV. B61L5/10
A,D	EP 1 219 521 A1 (ALSTOM TRANSP S P A [IT] ALSTOM FERROVIARIA SPA [IT]) 3 July 2002 (2002-07-03) * figure 1 * * paragraph [0023] - paragraph [0038] *	15	
A,D	EP 1 594 732 B1 (ALSTOM FERROVIARIA SPA [IT]) 12 March 2008 (2008-03-12) * paragraph [0017] - paragraph [0018] * * figures 1-3 *	15	
			TECHNICAL FIELDS SEARCHED (IPC)
			B61L
INCOMPLETE SEARCH			
The Search Division considers that the present application, or one or more of its claims, does/do not comply with the EPC so that only a partial search (R.62a, 63) has been carried out. Claims searched completely : Claims searched incompletely : Claims not searched : Reason for the limitation of the search: see sheet C			
Place of search		Date of completion of the search	Examiner
Munich		16 January 2012	Janhsen, Axel
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04E07)

**INCOMPLETE SEARCH
SHEET C**

Application Number

EP 11 17 0453

Claim(s) completely searchable:

15

Claim(s) not searched:

1-14, 16-18

Reason for the limitation of the search:

The original application contains several independent claims in the same category of claims. The applicant was invited accordingly to indicate the set of claims, which should be searched (Rule 62a(1) EPC). In his letter of response, dated the 23.12.2011, the applicant indicated claims 15 and 16 to be searched and examined. However, claim 16 is only containing a reference to features of other claims in such generality, that the subject-matter of claim 16 is rendered so unclear (84 EPC), that no search could be carried out in regard to claim 16 as well. As a consequence, only claim 15 had been searched.

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 11 17 0453

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16-01-2012

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