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(54) Point regulator

(57) What is disclosed is a point regulator for driving the two tongues of a railway switch between two switch positions, at least comprising two moving rods connected to the respective tongues, which move said tongues, and a driving mechanism for said moving rods, as well as locking means for locking the moving rods in positions corresponding to the switch positions of the tongues. The driving mechanism comprises a driving member that can move to and fro in the direction of movement of the moving rods, which driving member can be selectively connected to the moving rods by means of a connecting member, in such a manner that, starting from the switch positions,

- a driving movement of the driving member leads to a corresponding movement of the moving rods, and
- in the case of the switch being trailed, a movement of a open moving rod under the influence of a force being exerted thereon by a passing track vehicle will not lead to a corresponding movement of the driving member as a result of the selective connection between the driving member and the moving rods.

The point regulator is preferably adapted for being reset to its original position after being trailed.

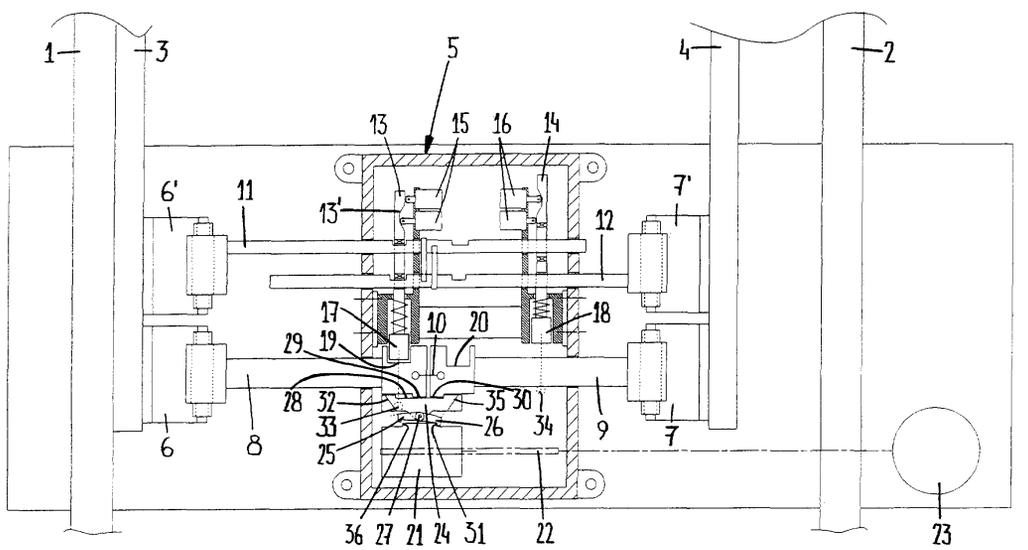

FIG. 1

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Description

[0001] The invention relates to a point regulator for driving the two tongues of a railway switch between two switch positions, at least comprising two moving rods connected to the respective tongues, which move said tongues, and a driving mechanism for said moving rods, as well as locking means for locking the moving rods in positions corresponding to the switch positions of the tongues.

[0002] Such a point regulator is used for moving railway switches forming part of a railway system for track vehicles (trains, trams, underground railway cars or the like) to and fro between the two switch positions thereof. Besides the aforesaid moving rods, by means of which the tongues can be moved to and fro, such a point regulator usually also comprises control rods, which can check whether the switch is correctly positioned in either one of its two switch positions.

[0003] Switches may be used for diverting a track vehicle from a main line to a branch line, for example. If the switch is in the position in which the track vehicle can be diverted to the branch line, but a track vehicle on the main line approaches the switch from the opposite direction, the switch is occasionally "trailed". The driving mechanism of some known point regulators therefore comprises parts that will break when a specific force is exceeded and thus allow the movement of the moving rods without the driving mechanism being activated or the tongues and the point regulator being damaged or the track vehicle being derailed. A drawback of this solution, however, is that when a switch is trailed in this manner, at least the broken parts need to be replaced or repaired. Some other known point regulators can be trailed in reverse direction, to be true, but the features being used therein (such as a spring-mounted open tongue) have specific drawbacks.

[0004] It is an object of the present invention to provide a point regulator in which the aforesaid drawback is overcome in a simple yet efficient manner.

[0005] In order to accomplish that object, the present invention provides a point regulator of the kind referred to in the introduction, wherein the driving mechanism comprises a driving member that can move to and fro in the direction of movement of the moving rods, which driving member can be selectively connected to the moving rods by means of a connecting member, in such a manner that, starting from the switch positions,

- a driving movement of the driving member leads to a corresponding movement of the moving rods, and
- in the case of the switch being trailed, a movement of a open moving rod under the influence of a force being exerted thereon by a passing track vehicle will not lead to a corresponding movement of the driving member as a result of the selective connection between the driving member and the moving rods.

[0006] During normal operation of the point regulator, in which the switch is switched between its two switched positions, a driving force is transmitted from the driving member to the moving rods via the connecting member, so that the tongues of the railway switch are correctly moved to and fro. On the other hand, if, starting from either one of the switch positions, a track vehicle exerts a force on a open moving rod by trailing the switch, the aforesaid selective connection between the driving member and the moving rods prevents the force that is exerted by the passing track vehicle from being transmitted to the driving member, so that the driving member will break. In such a disconnected position, the moving rods can freely be moved, without the driving member moving in the same direction. This makes it possible for the connection between the driving member and the moving rods to be restored without repairs or the like being required.

[0007] In an embodiment of the point regulator according to the invention that can be used to advantage, the aforesaid selective connection between the driving member and the moving rods by means of a connecting member can be obtained in an advantageous manner in that the connecting member is provided with two hooks, which are each movable between an engaging position, in which they are in engagement with the driving member, and a release position, in which they are out of engagement with the driving member, wherein each of the hooks can only transmit a force between the driving member and the moving rods in one direction in the engaging position, the direction of one hook being opposed to the direction of the other hook, and wherein said hooks are driven in such a manner that in each of the two switch positions it is the hook in the engaging position that, starting from the respective switch position, can transmit a driving force from the driving member to the moving rods, whilst the other hook is in the release position in that case.

[0008] The hook, which is in its engaging position in a respective position of the switch, is capable of transmitting a movement of the driving member to the moving rods. Said transmission involves the transmission of a force in a specific direction between the driving member and the moving rods. Once the other switch position is reached, the hook takes up its release position. If the moving rods would subsequently be moved while the switch is being trailed, a force of opposite sense would be exerted, which force could only be transmitted by the hook, which is in its release position in the aforesaid switch position, however. In this way the moving rods can be moved without the driving member moving in the same direction. Once the other switch position has been reached, the situation is reversed, with the aforesaid hook being moved to its engaging position again and the other hook reaching its release position.

[0009] It is noted that besides the aforesaid hooks also other connecting means may be used, assuming that such means are capable of performing a similar func-

tion.

[0010] In order to enable movement of the hooks between their engaging position and their release position, it is preferable in another embodiment of the point regulator according to the invention for the locking means to mate with the hooks for the purpose of placing the hooks into the engaging position or into the release position thereof.

[0011] From a constructional point of view this can e. g. be realised if the locking means consist of two locking pins that are movable in a direction substantially transversely to the direction of movement of the moving rods, which locking pins interlock in the two switch positions with locking recesses or the like formed in the moving rods, and which move a corresponding hook to its release position in said interlocked position.

[0012] It is noted that such locking pins may also interlock with control rods that may be used. The control rods may also be provided with locking recesses or the like in that case, which recesses can mate with corresponding locking cams or the like on the locking pins in the two switch positions.

[0013] Furthermore it is advantageous if said mating interaction between the locking pins and the hook takes place via respective actuating elements, which are spring-loaded to a position in which on the one hand the hooks take up their engaging position and in which on the other hand a hook is prevented from moving to its release position under the influence of an external force being exerted thereon.

[0014] These aspects ensure that the hooks are placed into their engaging position in a reliable manner during normal use of the railway switch, without any shocks or vibrations to which the point regulator or the railway switch is subjected being able to interfere with the position of the hooks.

[0015] When trailing of the railway switch according to the present invention takes place, resulting in the driving member and the moving rods being disconnected from each other, it is important, with a view to restoring the connection between the driving member and the moving rods (after the track vehicle has passed), that the driving member can pass the hook in question. To that end, locking means are preferably used for retaining a hook in the release position thereof when said hook has been released by the corresponding locking pin and the driving member and the moving rods are disconnected from each other and are being moved with respect to each other. The hook in question must not be moved to the engaging position until the driving member and the moving rods have reached their interconnected, mating position again, so that normal operation of the railway switch becomes possible again.

[0016] According to an advantageous manner of gearing the operation of the locking means to the position of the driving member and the moving rods relative to each other, the locking means can be activated and deactivated by mating with the driving member.

[0017] Within this framework a constructional embodiment of the point regulator according to the invention is proposed in which the locking means consist of two pivoted catches that mate with a respective hook, which catches can engage a curved track of the driving member with a first end and mate directly or indirectly with a corresponding hook with an opposite second end so as to retain said hook in the release position.

[0018] In this way the operation of the locking means is synchronised with the position of the driving member and the moving rods with respect to each other.

[0019] As already noted in the foregoing, the locking means (which may consist of locking pins, for example) are capable of mating with the hooks for placing said hooks into the engaging position or into the release position thereof. To realise this function, a special variant of the point regulator according to the invention is proposed in which the connecting member consists of a sliding plate supporting the hooks, which is in essence connected to the moving rods but which can move to a limited extent with respect to said moving rods in the direction of movement thereof, the relative movement of the sliding plate and the moving rods being used for unlocking the locking means.

[0020] Upon movement of the driving member from one switch position, the sliding plate will first make a limited movement relative to the moving rods, which relative movement will result in the locking means moving to an unlocked position. Only after said unlocking has taken place will the sliding plate and the moving rods no longer be able to move relative to each other and will the driving member carry the moving rods along in the desired direction.

[0021] A constructional solution for linking the movement of the sliding plate with respect to the moving rods and the movement of the locking means is provided in a simple manner if the sliding plate and the locking means comprise mating curved means for effecting the unlocking of the locking means.

[0022] A constructional solution within this framework is to provide the sliding plate with curved tracks and to provide the locking means with follow-on rollers that mate with said curved tracks.

[0023] When a railway switch is trailed by a passing track vehicle, as explained in the foregoing, the two tongues generally do not move synchronically at first, but one of the tongues will generally start its movement before the other tongue. In order to ensure that the point regulator is not damaged in such a case and, in addition, to prevent the open moving rod (i.e. the non-locked moving rod) from moving too easily and thus undesirably under the influence of vibrations caused by a correctly passing vehicle, the two moving rods are preferably interconnected, which connection is broken when a specific force is exceeded. When the passing track vehicle engages one tongue first, the moving rod that is connected thereto will be able to move before the other moving rod moves in the same direction. When the orig-

inal situation is restored, the connection can be effected again.

[0024] The invention will be explained in more detail hereinafter with reference to the drawing, which shows an embodiment of a point regulator according to the invention.

[0025] In the drawing:

- Fig. 1 is a schematic top plan view of a part of a railway switch in which an embodiment of the point regulator according to the invention is used;
- Fig. 2 shows six successive stages of the operation of the point regulator of Fig. 1 during normal use of the switch, in which the switch is moved from one position to the other;
- Fig. 3 shows six successive stages of the switch of Fig. 1 being trailed;
- Fig. 4 is a larger-scale, schematic view of a detail of the point regulator of Fig. 1; and
- Fig. 5 shows five successive stages of the operation of the detail that is shown in Fig. 4.

[0026] In Fig. 1, a part of a railway system comprising two rails 1 and 2 is shown. Two tongues 3 and 4 can be driven between two positions by a point regulator 5. In the position of the tongue that is shown in Fig. 1, the tongue 3 is the so-called closed tongue, whilst the opposite tongue 4 is the open tongue. In another position of the switch (e.g. see Fig. 2F), the tongue 4 is the closed tongue and the tongue 3 is the open tongue.

[0027] The tongues 3 and 4 are provided with tongue attachments 6 and 7. Moving rods 8 and 9 forming part of the point regulator 5 are connected to said tongue attachments. In the illustrated embodiment, the tongues 3 and 4 additionally have secondary tongue attachments 6' and 7', to which so-called control rods 11, 12 are connected. The control rods 11, 12 are intended to mate with locking pins 13 and 14, which in turn mate with switch assemblies 15 and 16. In the switch position that is shown in Fig. 1, the left-hand locking pin 13, for example, may take up a position (for example as a result of the mating interaction between the projections formed on the locking pin and recesses formed in the control rods 11, 12) such that a recess 13' formed in said locking pin 13 mates with the switch assembly 15, in such a manner that the latter confirms a correct position of the switch. In the other position of the switch (not shown) the same thing happens as a result of the mating interaction between the control rods 11, 12, the right-hand locking pin 14 and the switch assembly 16.

[0028] The locking pins 13, 14 are also provided with locking heads 17, 18, which are intended to mate with locking recesses 19, 20 in the moving rods 8 and 9, respectively. Again in the position that is shown in Fig. 1, the locking head 17 of the left-hand locking pin 13 engages in the locking recess 19 of the left-hand moving rod 8, thus securing the aforesaid position of the switch (and the corresponding positions of the tongues).

[0029] The point regulator 5 also comprises a driving member 21, in the form of a nut that is fixed to a driven screw shaft 22 in the illustrated embodiment. The nut 21 can be moved to and fro in Fig. 1 by rotating the screw shaft 22 by means of a motor 23. As a result, a connecting member 24 is driven in the same direction, in a manner yet to be described hereinafter, which connecting member in turn causes the moving rods 8 and 9 to move in the same direction. For example, when the nut 21 is moved to the right, starting from the position of the switch that is shown in Fig. 1, as a result of the motor 23 being suitably driven, the moving rods 8 and 9 will likewise move to the right and the tongue 4 will come to abut against the associated rail 2, whilst the opposite tongue 3 will be moved away from the associated rail 1.

[0030] Two hooks 25, 26, which are pivot-mounted to the connecting member 24 by means of a pivot 27, provide the connection between the nut 21 and the connecting member 24.

[0031] As is also shown in Fig. 1, the connecting member 24 is provided with a recess 28 at its upper side, in which two shoulders 29 and 30 of the moving rods 8 and 9 engage. The combined width of the shoulders 29 and 30 is smaller than the total width of the recess 28. The reason for this will become apparent hereinafter.

[0032] The normal operation of the switch that is shown in Fig. 1 by means of the point regulator 5 (in which the switch is enabled to move between the two switch positions) will now be explained in more detail with reference to Fig. 2).

[0033] Fig. 2a shows the starting position, which corresponds to Fig. 1. The right-hand hook 26 is in an engaging position, in which said hook engages a shoulder 31 of the nut 21. Rotation of the screw shaft 22 causes the nut 21 to move to the right, with the shoulder 31 carrying along the connecting member 24 via the hook 26. The start of said movement is shown in Fig. 2b. Because the width of the recess 28 (see Fig. 1) allows limited movement of the connecting member 24 with respect to the moving rods 8, 9, said moving rods 8 and 9 will initially remain stationary, also because the locking pin 13 is still in a locked position (with the locking heads 17 present in the locking recess 19). An ascending curved track 32 is formed in the connecting member 24, which can mate with a follow-on roller 33 mounted on the left-hand locking pin 13. During the movement to the right of the connecting member 24, the follow-on roller 33 is moved upwards along the curved track 32, causing the locking head 17 to move out of the locking recess 19 of the left-hand moving rod 8. This process is nearly complete in Fig. 2b.

[0034] After the locking pin 13 has thus been moved to an unlocked position (also the control rods 11 and 12 are released in this position), the shoulder 29 of the moving rods 8 reaches the left-hand end of the recess 28 in the connecting member 24, so that the moving rods 8 and 9 are carried along upon continued movement of the nut 21, and thus of the connecting member 24, to

the right. Such a movement is shown in Fig. 2d. The switch is now in a position between the aforesaid two positions of the switch.

[0035] Fig. 2e shows a position in which the right-hand tongue 4 has practically reached the associated rail 2. In Fig. 2f the right-hand tongue abuts against the associated rail 2, and the co-operation between a follow-on roller 34 connected to the right-hand locking pin 14 and a second curved track 35 of the connecting member 24 causes the right-hand locking pin 14 move downwards to a locked position, in which the locking head 18 of the locking pin 14 engages in the locking recess 20 of the moving rod 9. The switch is now locked in the new position. Once the locking pin 14 has reached its fully locked position (which is not quite the case in Fig. 2f), a situation corresponding to the situation in Fig. 1 or Fig. 2a, albeit in mirror reflection, will have been reached.

[0036] In Fig. 1 or Fig. 2a the left-hand hook 25 is in a lifted release position, in which the hook cannot engage a shoulder 36 of the nut 21. In the other position of the switch, the same applies to the other hook 26, which will be out of engagement with the shoulder 31 of the nut in a release position. The purpose of this will become apparent hereinafter.

[0037] In the position of the switch that is shown in Fig. 1, Fig. 2a and Fig. 3a, the left-hand locking hook 25 and the left-hand locking pin 13 mate (an example of such mating interaction will be explained hereinafter with reference to Figs. 4 and 5). As already said before, the left-hand locking hook 25 occupies a release position (such that movement of the connecting member 24 will not lead to the hook 25 in question engaging the corresponding shoulder 36 of the nut 21 in said release position) in this position of the switch as a result of said mating interaction. Similarly it applies that the right-hand locking pin 14 and the right-hand hook 26 will mate in the other position of the switch, as a result of which the latter will be in the release position in said other position of the switch, in which it cannot mate with the shoulder 31 of the nut 21.

[0038] It is noted in this connection that the locking pin 14 has not reached its fully locked position yet in Fig. 2f, and consequently the right-hand hook 26 has not pivoted up to its release position. Only when the locking head 18 of the right-hand locking pin 14 is accommodated in the locking recess 20 of the right-hand moving rod 9 in its entirety will the right-hand hook 26 take up a release position that corresponds to the release position of the left-hand hook 25 in Fig. 1, Fig. 2a or Fig. 3a.

[0039] Now the so-called trailing of the switch will be discussed with reference to Fig. 3. Fig. 3a shows a situation which corresponds to the situation that is shown in Fig. 1 and Fig. 2a. Important in this connection is, as already noted before, that the left-hand hook 25 is in a release position, in which it cannot mate with the shoulder 36 of the nut 21. When a track vehicle approaches, a force is exerted on the right-hand tongue 4, which is thus forced to move in the direction of the associated rail 2. As a result, the moving rod 9 is likewise moved to the right. The moving rod 8 is still locked in position by the locking pin 13 and cannot move in the same direction, therefore. The aforesaid connection 10 between the moving rods 8 and 9 will be released when a specific force is exceeded, so that initially only the moving rod 9 moves to the right. This situation is shown in Fig. 3b. In the position of the switch as shown, the left-hand locking pin 13 engages in the right-hand control rod 12 with some play, which control rod can thus move to the right already as well as a result of said trailing of the switch, before the locking pin 13 has reached its unlocked position (the same applies in the other position of the switch, of course with regard to the right-hand locking pin 14 and the left-hand control rod 11.

[0040] During the movement to the right of the moving rod 9, the moving rod carries along the connecting member 24 to the right with its shoulder 30. Since the hook 25 is in its lifted release position, the hook can pass the stationary nut 21. The width of the recess 28 in the nut 21 allows movement of the connecting member 24, whilst the moving rod 8 initially remains stationary. During said movement to the right of the connecting member 24, the curved track 32 thereof causes the follow-on roller 33 and the locking pin 13 to move upwards to the unlocked position. Fig. 3 shows the situation just before said unlocked position is reached.

[0041] Upon continued movement to the right of the right-hand moving rod 9, the end of the recess 28 in the connecting member 24 eventually reaches the shoulder 29 of the left-hand moving rod 8, as a result of which also the left-hand moving rod is carried along to the right. The nut 21 remains at its original position. This situation is shown in Fig. 3d. It is noted that the locking pin 13 is fully unlocked just before this situation is reached.

[0042] The right-hand tongue 4 is the first tongue that substantially reaches its new position (Fig. 3e), after which the built-up velocity of the moving rod 8 and the tongue 4 causes the other tongue 3 to move further to the right as well until the moving rods 8 and 9 have taken up their original positions relative to each other again, in which position the connection 10 between the two moving rods 8 and 9 is restored (Fig. 3f). After this, or just before this, the locking head 18 of the right-hand locking pin 14 enters the locking recess 20 of the right-hand moving rod 9, the switch having reached its new position, in which position it is locked.

[0043] As a result of a tension in the tongue 3 (i.e. a force to the left which the tongue 3 exerts on the moving rods 8 as a result of its tendency to return to its neutral position, the tongue 3 behaving like a leaf spring), wherein a neutral position corresponds to the closed position or, if said trailing of the switch takes place slowly and the maximum distance (the thickness of the wheel flange of a passing track vehicle) over which the track vehicle can drive the tongue does not provide sufficient energy, the connection may not be restored, so that said restoring of the connection will have to take place during

restoration of a normal situation as will be described in more detail hereinafter.

[0044] To restore a normal situation, the nut 21 must be moved to the right by driving the screw shaft 22 to the right until the hooks 25, 26 and the nut 21 can mate again.

[0045] The mating interaction between the hooks 25, 26 and the nut 21 functioning as a driving member will now be explained in more detail with reference to Fig. 4 and Fig. 5, which show a detail of an embodiment of the point regulator five according to the invention.

[0046] As already noted before, the hooks 25 and 26 are pivot-mounted on a pin 27, which is fixed to the connecting member 24. Two hook actuating elements 37 and 38 pivot-mounted on pins 39 and 40, which are likewise connected to the connecting member 24. Each hook actuating element 37, 38 supports a pin 41, which engages in an elongated slot 42 in each hook 25, 26. The two hook actuating elements 37, 38 are loaded by a tension spring 43 in the direction of a rotated position as occupied by the right-hand hook actuating element 38 in Fig. 4. As a result of the mating interaction between the pin 41 and the elongated slot 42, rotation of a hook actuating element 37, 38 about its respective pivot 39, 40 results in rotation of the hook 25, 26 about the pin 27.

[0047] Rotation of a hook actuating element 37, 38 against the force of the tension spring 43 takes place as a result of the engagement of the follow-on roller 33 with the hook actuating element, as is shown in Fig. 4 for the left-hand hook actuating element 37. In said figure, the follow-on roller 33, which is connected to the left-hand locking pin 13, engages the hook actuating element 37 in such a manner that said element is rotated in anti-clockwise direction about the pin 39, as a result of which the corresponding hook 25 is rotated in clockwise direction about the pin 27 to a position in which said hook releases the shoulder 36 of the nut 21. The right-hand hook 26, on the other hand, and engages the opposite shoulder 31 of the nut 21. When rotation of the screw shaft 22 causes the nut 21 to move to the right in this position, the mating interaction between the right-hand hook 26 and the shoulder 31 results in the connecting member 24 being carried along to the right, as a result of which the moving rods 8 and 9 will eventually moved to the right as well. This is what is called the normal operation of the point regulator upon movement of the switch from one a position to another.

[0048] Because the left-hand hook 25 is not in engagement with the shoulder 36 of the nut 21, a forced movement of the moving rod 9 (the switch being trailed) may furthermore lead to a movement to the right of the connecting member 24, however, without the nut 21 being carried along. This will be explained in more detail with reference to Fig. 5.

[0049] Again referring to Fig. 4 it becomes apparent that two catches 44 and 45 are furthermore used, which catches can rotate about pivots 46 and 47, which are likewise fixed to the connecting member 24. The catches are interconnected by a tension spring 48, which attempts to rotate the left-hand catch 44 in clockwise direction about the associated pivot and which attempts to rotate the right-hand catch 45 in anti-clockwise direction about the associated pivot 47. Present on the nut 21 is a curved member 49, which can mate with the catches 44 and 45. For example, the curved member 49 will rotate the left-hand catch 44 in anti-clockwise direction, seen in Fig. 4, to a position in which the left-hand hook actuating element 37 can rotate in clockwise direction under the influence of the tension spring 43, when the follow-on roller 33 that mates therewith moves upwards along the curved track (which, as has become apparent in the foregoing, takes place when the connecting member 24 moves to the right). As a result, the left-hand hook actuating element 37 will take up a position in which the left-hand hook 25 will engage the shoulder 36 of the nut 21. This is a position that occurs during normal use of the switch, in which the switch is moved from one position to another whilst the relative position of the connecting member 24 and the nut 21 remains unchanged.

[0050] A position of a hook actuating element as shown in Fig. 4 for the right-hand hook actuating element 38 is very reliable and not sensitive to outside influences, because the force exerted on the right-hand hook 26 cannot result in rotation of the right-hand hook actuating element 38, since the transmission of the forces between the elongated slot 42 in question and the pin 41 takes place in a direction substantially through the pivot 40 of the right-hand hook actuating element 38. It is highly improbable, therefore, that external shocks or vibrations will lead to the hook 26 unintentionally becoming detached from the shoulder 31 as a result of rotating in upward direction. The same applies to the left-hand hook 25, of course, when said hook is in the position in which it engages the left-hand shoulder 36 of the nut 21.

[0051] Reference is now made to Fig. 5. Fig. 5a shows a position which corresponds to the position that is shown in Fig. 4 and Fig. 1. In this position, the locking pin 13 that is shown in Fig. 1 is in its locked position, so that the follow-on roller 33 thereof has rotated the hook actuating element 37, and thus the left-hand hook 25, to the release position in the manner described above. When trailing of the switch takes place in this position, the right-hand moving rod 9 will in the first place exert a force to the right on the connecting member 24. As Fig. 5b shows, the connecting member 24 has slightly moved to the right already, and the hook 25 has already passed the shoulder 36. The follow-on roller 33 has released the hook actuating element 37, but rotation of said element is not possible because the hook 25 now rests on the upper side of the nut 21 past the shoulder 36. The right-hand hook actuating element 38 and the right-hand hook 26 remain in their original position.

[0052] Once the connecting element 24 and the elements connected thereto have been moved sufficiently

far to the right (Fig.5c), the left-hand catch 44 will start to move downwards, causing the catch 44 to rotate in clockwise direction into locking engagement with the hook actuating element 37. As a result, clockwise rotation of the hook actuating element 37 under the influence of the tension spring 43, with an associated anticlockwise rotation of the left-hand hook 25, is not possible when the connecting member 24 has been moved even further to the right with respect to the stationary nut 21 (Fig. 5d). Such a movement of the left-hand hook 25 would be undesirable, since this would lead to a situation in which the hook 25 would form a barrier for the arriving shoulder 31 of the nut 21 upon resetting of the mechanism (in which the original position of the nut 21 and the connecting member 24 relative to each other is restored so as to enable subsequent normal use of the switch). Providing the end of the hook 25 and the aforesaid shoulder 31 with corresponding bevels (so as to push the hook 25 upwards with the shoulder 31) would not be a solution, since, as already noted before, the transmission of the forces between the slot 42 of the left-hand hook 25 and the pin 41 of the left-hand hook actuating element 37 would take place in a direction substantially through the pivot 39 of the left-hand hook actuating element 37, so that such a force could not result in rotation of the hook actuating element 37 and thus of the hook 25. In addition, friction and spring force would result in forces that interfere with the trailing of the switch. When the left-hand hook actuating element 37 and the left-hand hook 25 are retained in the position that is shown in Fig. 5d by means of the catch 44, however, the nut 21 with the shoulder 31 can move past the hook 25 during resetting (sees Fig. 5e), after which the curved member 49 will eventually engage the catch 44 and release the hook actuating element 37, which subsequently will pivot under the influence of the force exerted by the tension spring 43, causing the left-hand hook 25 to rotate upwards. The left-hand hook 25 can mate with the left-hand shoulder 36 of the nut 21 again in that case.

[0053] It is noted that Fig. 5d and Fig. 5 show a position of the connecting member 24 that substantially corresponds to the fully trailed position of the switch, i.e. a position in which, referring to Fig. 3f, the right-hand tongue 4 has come to abut against the associated rail 2. In this position the right-hand locking pin 14 will move to the locked position, in which the follow-on roller 34 thereof has moved downwards along the curved track 34 of the connecting member 24 and will engage the right-hand hook actuating element 38 so as to rotate said element against the force of the tension spring 43, during which movement the right-hand hook 26 will also be pivoted about the pivot 27. After the nut 21 has been reset as well (fully moved to the right in Fig. 5e), a situation that is the mirror image of the situation in Fig. 5a is eventually obtained.

[0054] It is noted that the mating interaction between the locking pins and the hooks via the hook actuating elements driven by the follow-on roller is only an example of such mating interaction. Also other constructional solutions are possible, for example a construction in which guide slots are formed in the locking pins themselves, which guide slots directly mate with pins on the hooks that engage in the slots.

[0055] The invention is not limited to the embodiment as described in the foregoing, which can be varied in several ways within the scope of the invention as defined in the claims.

Claims

1. A point regulator for driving the two tongues of a railway switch between two switch positions, at least comprising two moving rods connected to the respective tongues, which move said tongues, and a driving mechanism for said moving rods, as well as locking means for locking the moving rods in positions corresponding to the switch positions of the tongues, **characterized in that** the driving mechanism comprises a driving member that can move to and fro in the direction of movement of the moving rods, which driving member can be selectively connected to the moving rods by means of a connecting member, in such a manner that, starting from the switch positions,

   - a driving movement of the driving member leads to a corresponding movement of the moving rods, and
   - in the case of the switch being trailed, a movement of a open moving rod under the influence of a force being exerted thereon by a passing track vehicle will not lead to a corresponding movement of the driving member as a result of the selective connection between the driving member and the moving rods.

2. A point regulator according to claim 1, wherein the connecting member is provided with two hooks, which are each movable between an engaging position, in which they are in engagement with the driving member, and a release position, in which they are out of engagement with the driving member, wherein each of the hooks can only transmit a force between the driving member and the moving rods in one direction in the engaging position, the direction of one hook being opposed to the direction of the other hook, and wherein said hooks are driven in such a manner that in each of the two switch positions it is the hook in the engaging position that, starting from the respective switch position, can transmit a driving force from the driving member to the moving rods, whilst the other hook is in the release position in that case.

3. A point regulator according to claim 2, wherein the locking means mate with the hooks for the purpose of placing the hooks into the engaging position or into the release position thereof.

4. A point regulator according to claim 3, wherein the locking means consist of two locking pins that are movable in a direction substantially transversely to the direction of movement of the moving rods, which locking pins interlock in the two switch positions with locking recesses or the like formed in the moving rods, and which move a corresponding hook to its release position in said interlocked position.

5. A point regulator according to claim 4, wherein said mating interaction between the locking pins and the hook takes place via respective actuating elements, which are spring-loaded to a position in which on the one hand the hooks take up their engaging position and in which on the other hand a hook is prevented from moving to its release position under the influence of an external force being exerted thereon.

6. A point regulator according to claim 5, wherein locking means are used for retaining a hook in the release position thereof when said hook has been released by the corresponding locking pin and the driving member and the moving rods are disconnected from each other and moved with respect to each other.

7. A point regulator according to claim 6, wherein the locking means can be activated and deactivated by mating with the driving member.

8. A point regulator according to claim 7, wherein the locking means consist of two pivoted catches that mate with a respective hook, which catches can engage a curved track of the driving member with a first end and mate directly or indirectly with a corresponding hook with an opposite second end so as to retain said hook in the release position.

9. A point regulator according to any one of the preceding claims, wherein the connecting member consists of a sliding plate supporting the hooks, which is in essence connected to the moving rods but which can move to a limited extent with respect to said moving rods in the direction of movement thereof, the relative movement of the sliding plate and the moving rods being used for unlocking the locking means.

10. A point regulator according to claim 9, wherein the sliding plate and the locking means comprise mating curved means for effecting the unlocking of the locking means.

11. A point regulator according to claim 10, wherein the sliding plate is provided with curved tracks and the locking means are provided with follow-on rollers that mate with said curved tracks.

12. A point regulator according to any one of the preceding claims, wherein the two moving rods are interconnected, which connection is broken when a specific force is exceeded.

13. A point regulator according to any one of the preceding claims, wherein the driving member can be reset to the original position with respect to the moving rods after a open moving rod has been moved as a result of the railway switch being trailed.

14. A point regulator according to claim 13, wherein said resetting of the driving member is carried out by means of a manually operated crank, an external drive unit or the like.

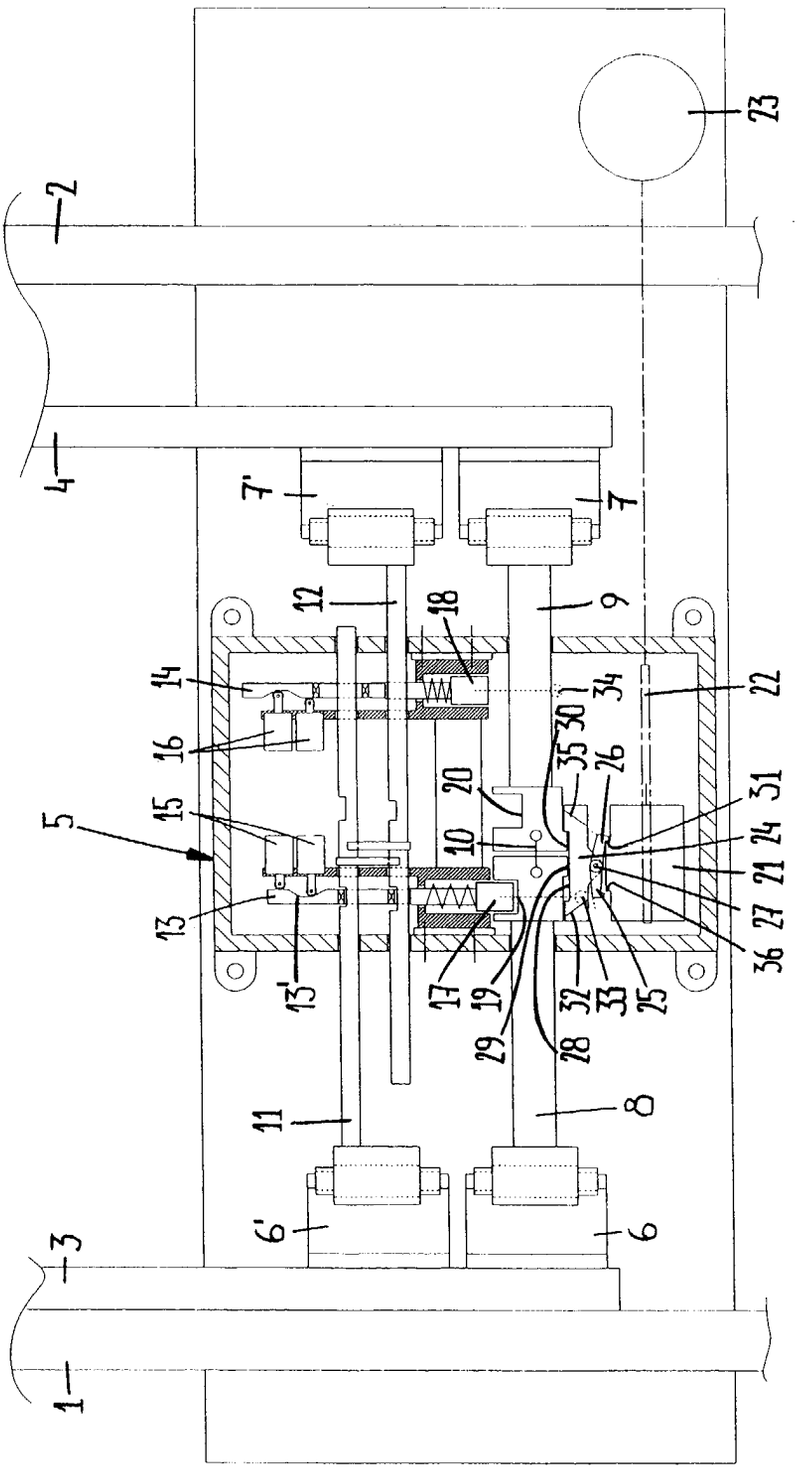
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FIG.1

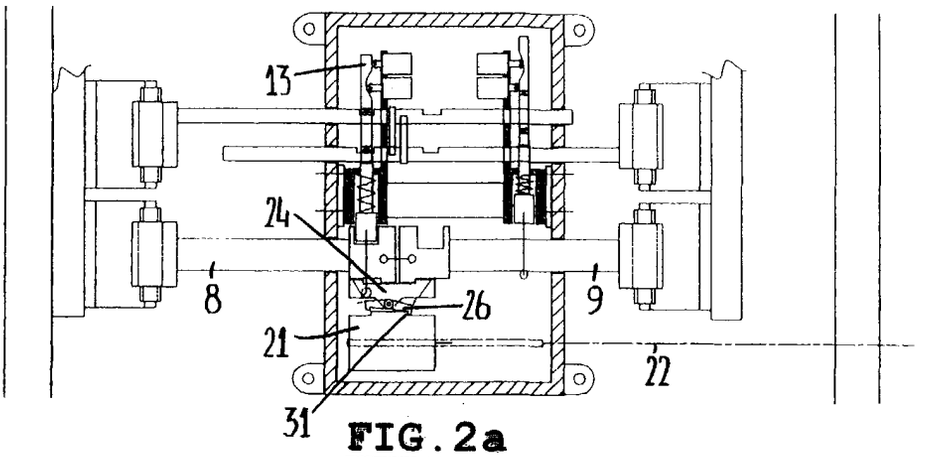

FIG. 2a

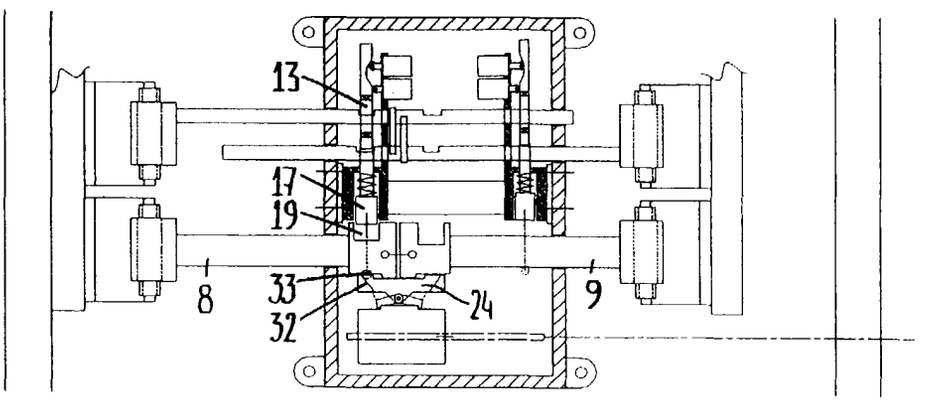

FIG. 2b

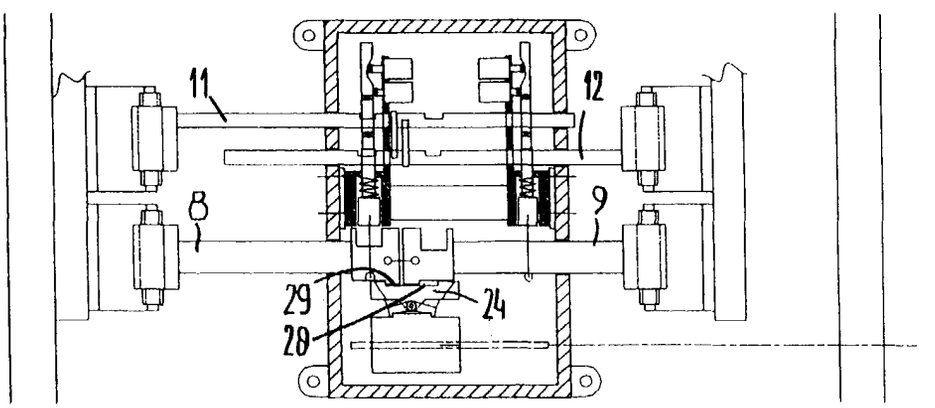

FIG. 2c

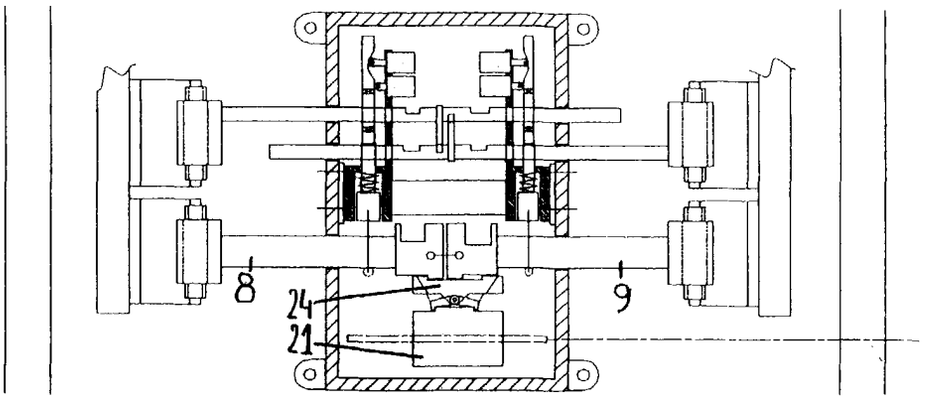

FIG.2d

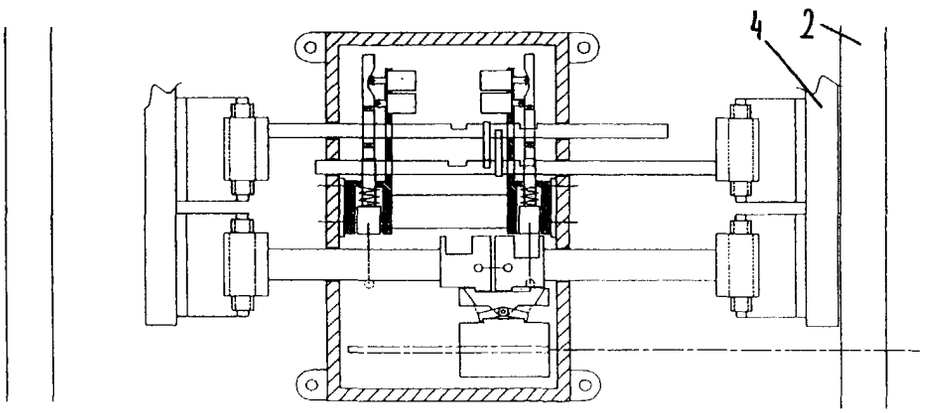

FIG.2e

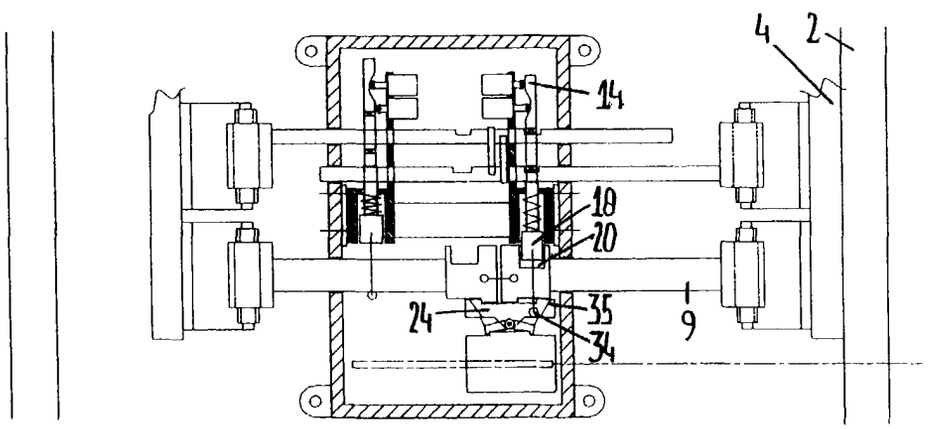

FIG.2f

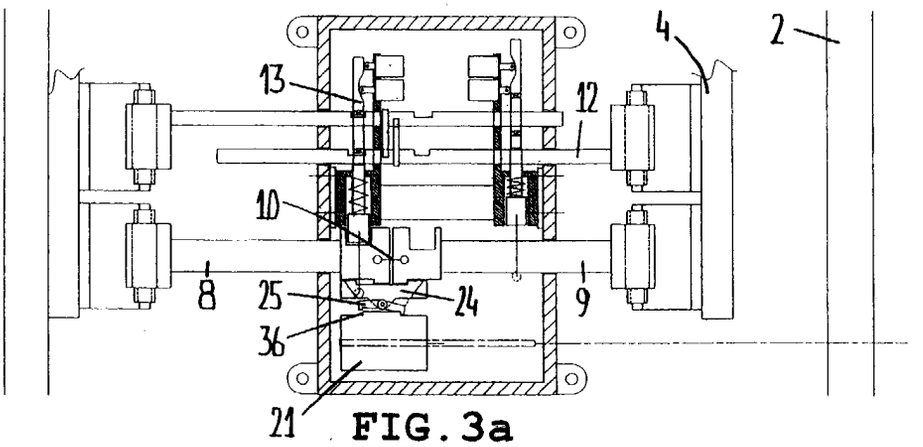

FIG. 3a

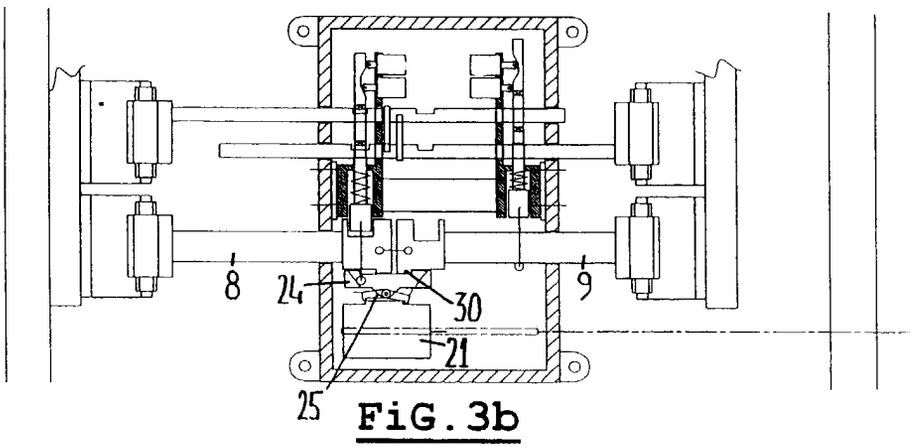

FiG. 3b

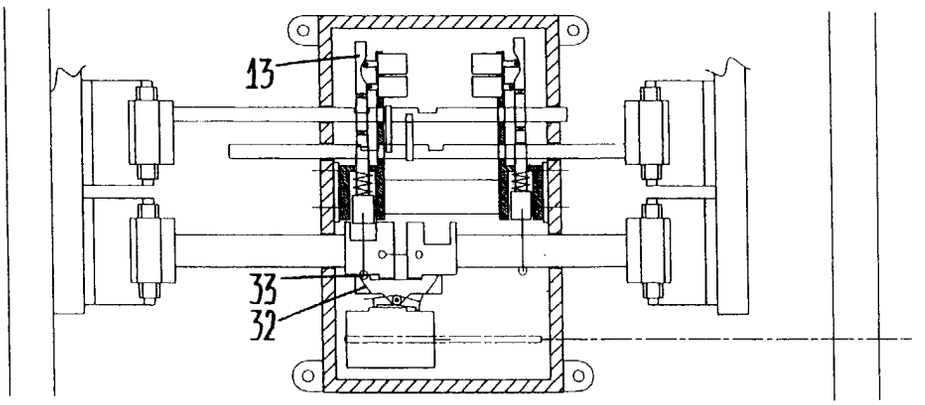

FIG. 3c

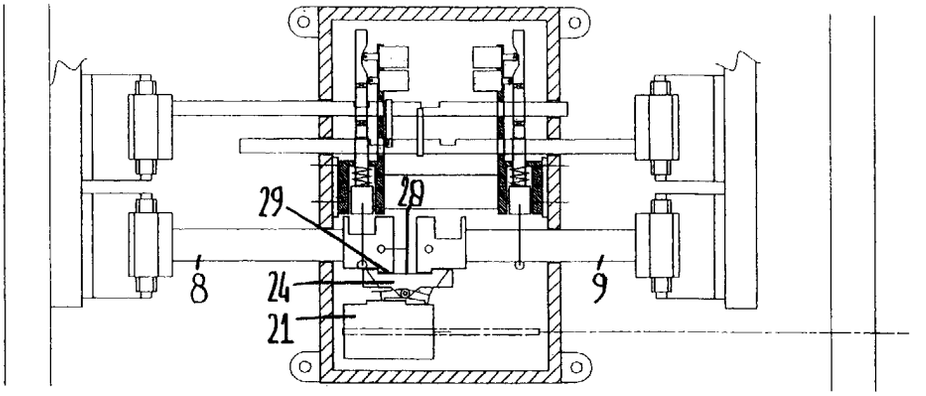

FIG.3d

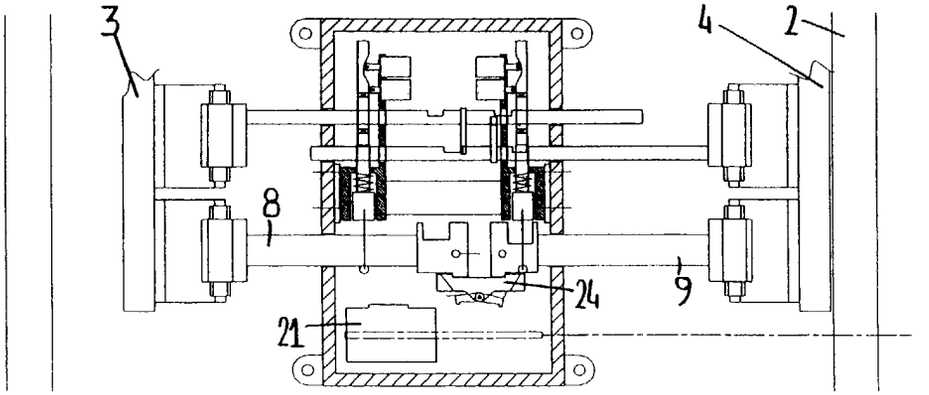

FIG.3e

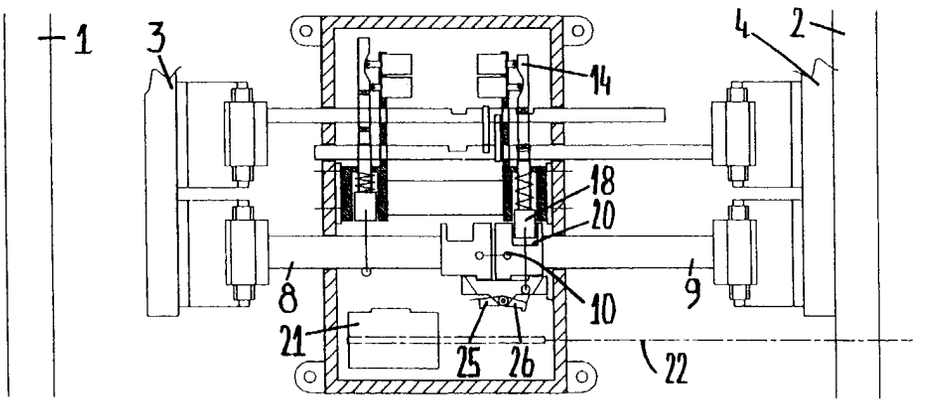

FIG.3f

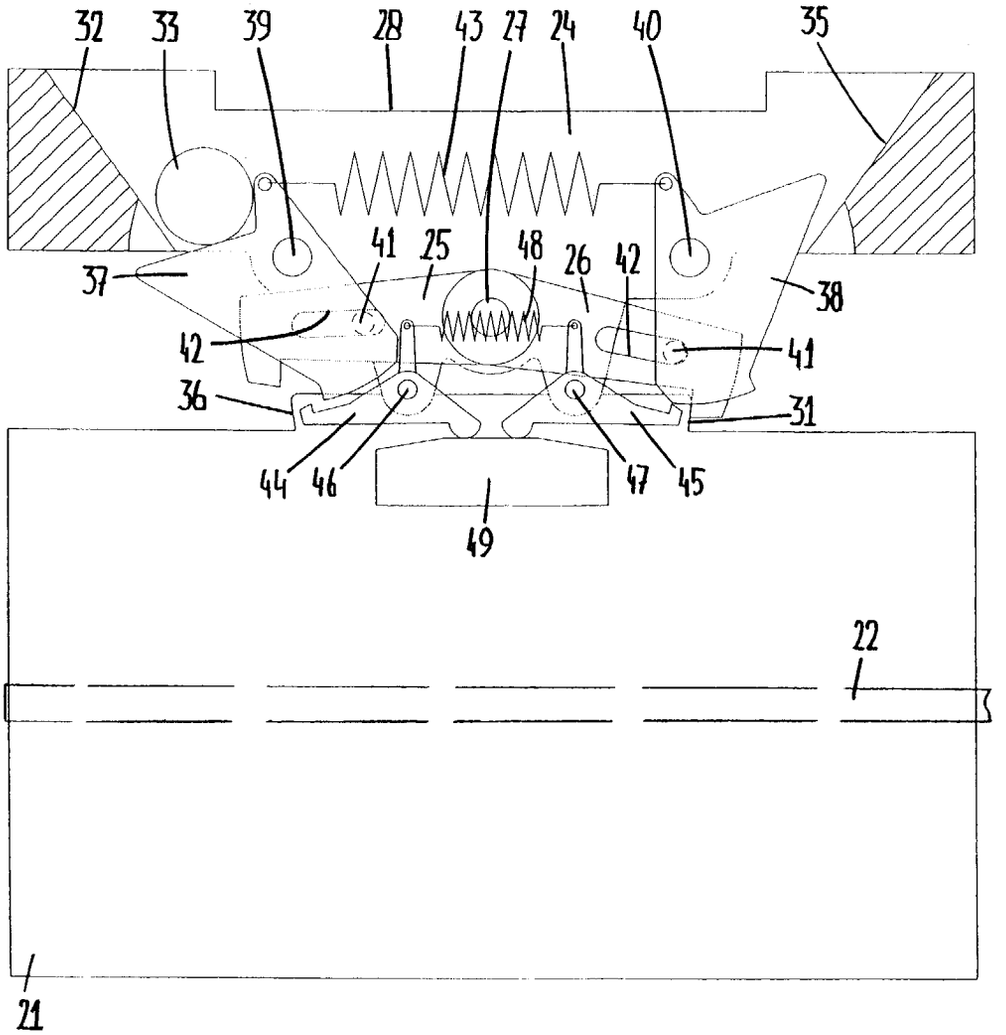
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FIG. 4

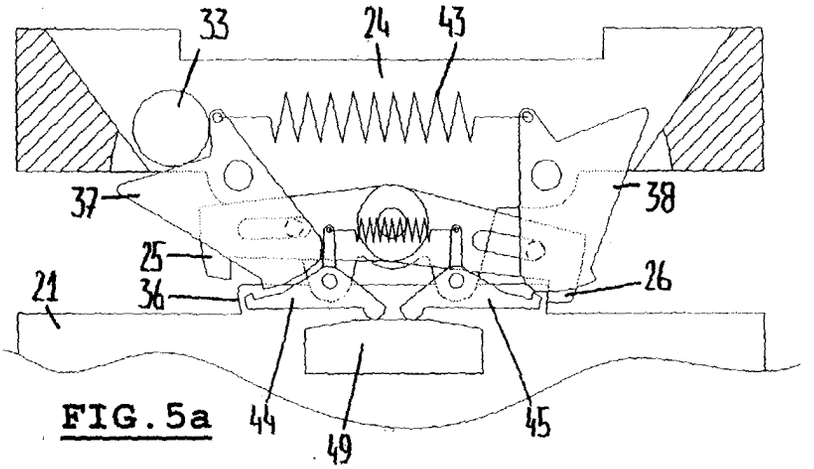

FIG.5a

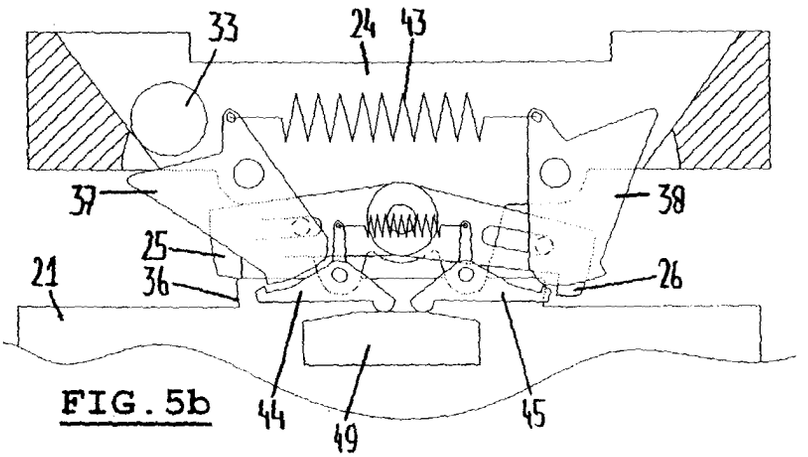

FIG.5b

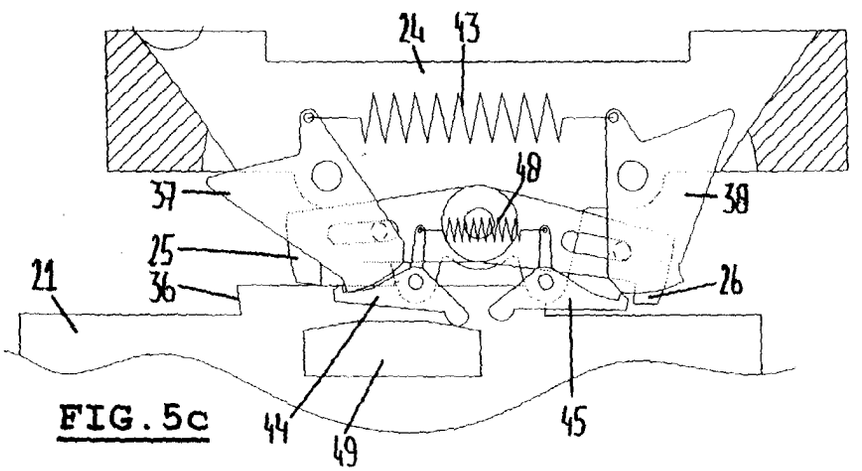

FIG.5c

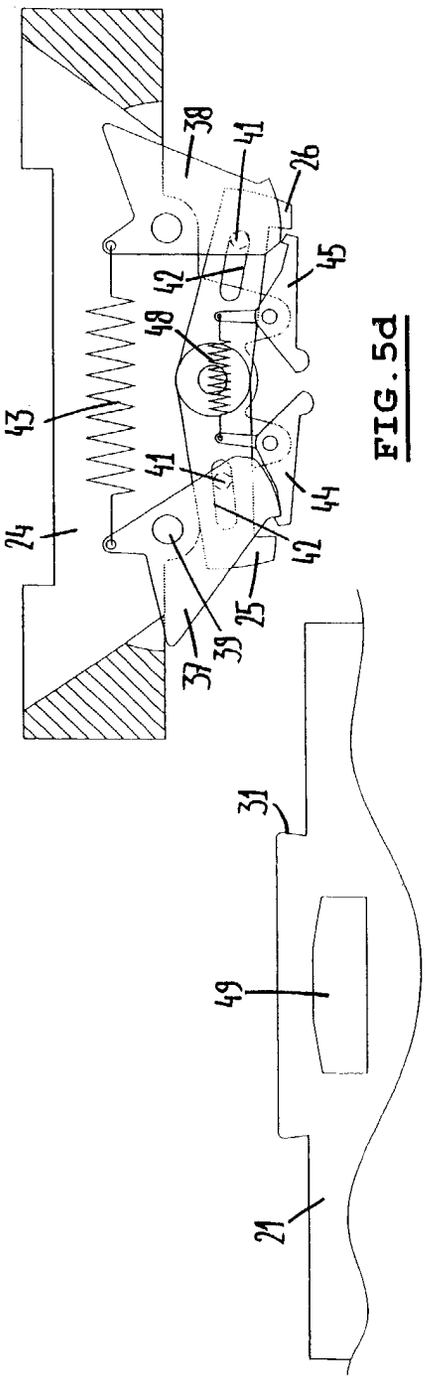
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FIG.5d

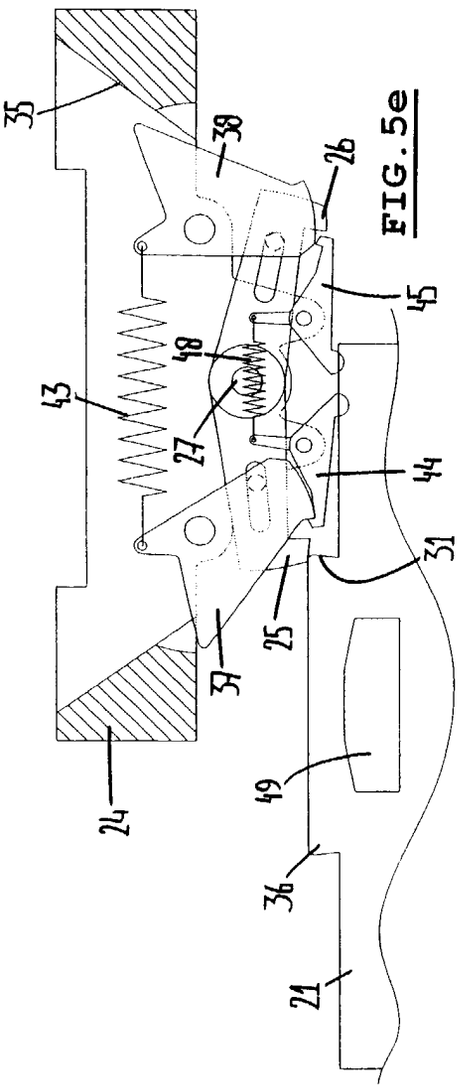
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FIG.5e

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 04 07 5987

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	US 6 270 041 B1 (MEINECKE JENS ET AL) 7 August 2001 (2001-08-07) * column 1, line 5 - column 3, line 44 *	1-14	B61L11/04 B61L5/10
A	DE 29 28 194 B (SIEMENS AG) 16 October 1980 (1980-10-16) * the whole document *	1	
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B61L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	23 July 2004	Reekmans, M

CATEGORY OF CITED DOCUMENTS

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