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(54) Title: SLIDING DEVICE FOR A VEHICLE SEAT PROVIDED WITH AN IMPROVED LOCKING ARRANGEMENT

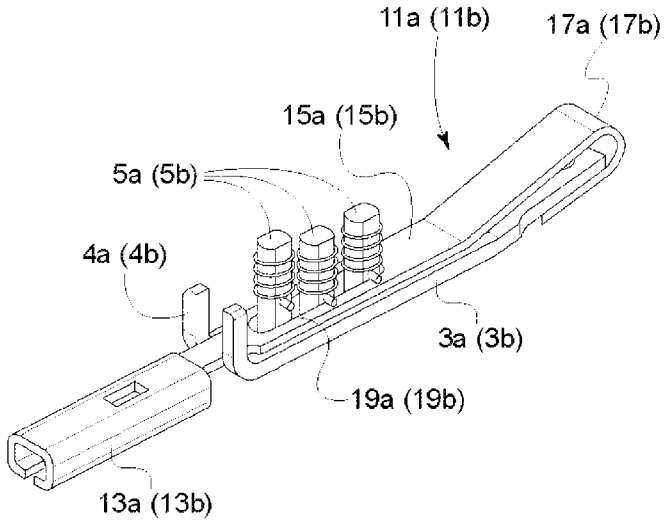

Fig. 4

(57) Abstract: Sliding device for a vehicle seat provided with an improved locking arrangement, which comprises a pair of locking assemblies (la, lb), each including a plurality of locking pins (5a, 5b) for locking the upper rails of the sliding device to the respective lower rails. Said locking arrangement further includes a releasing assembly for driving said locking pins to an unlocking configuration for adjusting the position of the vehicle seat. Said releasing assembly comprises a releasing member (9) and a pair of connecting members (11a, lib), which are in a force transmission connection with the releasing member (9) and with the locking pins (5a, 5b) of a respective locking assembly. Such connecting members are entirely received inside the respective tracks, so that the locking arrangement has a very compact design and the moving parts of said locking arrangement are protected from dirt and dust.

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Description

Title of Invention: Sliding device for a vehicle seat provided with an improved locking arrangement

Technical Field

[0001] The present invention relates to a sliding device for a vehicle seat provided with an improved locking arrangement.

[0002] More particularly, the present invention relates to a sliding device for a vehicle seat provided with a locking arrangement having a compact construction and an improved reliability.

Background Art

[0003] Vehicle seats generally have a sliding function for pushing or pulling the seat cushion in a forward or backward direction, a height adjustment function for adjusting the height of the seat cushion, and a reclining function for adjusting the inclination of the seat backrest relative to the seat cushion.

[0004] The aforesaid sliding function is generally implemented by a sliding device which comprises a pair of parallel tracks, each of which comprises a lower rail attached to the vehicle floor and an upper rail attached to the vehicle seat, the upper rail being constrained to the lower rail, but being able to slide relative to said lower rail.

[0005] The sliding device further comprises a locking arrangement for allowing / preventing a movement of the upper rails relative to the lower rails. Such locking arrangement is normally in a locking configuration, in which it prevents the upper rails from sliding with respect to the lower rails, thus avoiding accidental displacements of the seat with respect to the vehicle floor.

[0006] Such locking arrangement normally comprises a pair of locking assemblies, one for each track.

[0007] The sliding device is further provided with a releasing member which can be used by a user for moving the locking assemblies of the locking arrangement to an unlocking configuration, in which the upper rails are free to move relative to the lower rails, so that the position of the seat with respect to the vehicle floor can be adjusted. Such releasing member can be made, for instance, as a "U"-shaped handle or towel bar having two substantially parallel arms, the end portions of which are configured to simultaneously act upon respective locking assemblies for driving them to their unlocking configuration.

[0008] Sliding devices are known from the art in which, in order to provide a positive engagement between the upper and lower rails, the lower rail of each track is provided with a series of apertures, aligned and preferably equally spaced from one another

along the longitudinal axis of said lower rail, and each locking assembly is connected to the respective upper rail and comprises one or more locking pins configured to penetrate into respective apertures of the lower rail and engage with the edge of said apertures.

[0009] Preferably, several locking pins are provided and the size of said locking pins, the distance between said locking pins, the size of the apertures in the lower rails and the distance between said apertures are chosen so that at least one locking pin is always aligned with a corresponding aperture, so that it can penetrate into said aperture and engage the edge thereof.

[0010] Most preferably, the size of said locking pins, the distance between said locking pins, the size of the apertures in the lower rails and the distance between said apertures are chosen so that at least a first locking pin is positioned so as to penetrate into a corresponding aperture and engage the forward side of the edge thereof and at least a second locking pin is positioned so as to penetrate into a corresponding aperture and engage the rearward side of the edge thereof, whereby a "chuckless" engagement is obtained.

[0011] Such locking pins are normally biased, e.g. by means of springs, to a locking configuration, in which at least some of them engage respective apertures of the lower rails.

[0012] In order to move the locking assemblies to their unlocking configuration for adjusting the position of the vehicle seat with respect to the vehicle floor, a releasing member – such as a releasing towel bar or handle – is provided, which acts upon respective connecting members, one for each locking assembly: said connecting members, in turn, act upon the locking pins of the respective locking assembly for moving them to an unlocking configuration, in which they are disengaged from the apertures of the respective lower rail.

[0013] To this purpose, the locking pins are generally provided with an enlarged head and the connecting members are provided with fork-shaped elements adapted to engage the pin heads for extracting said pins from the apertures of the lower rails.

[0014] Such locking arrangements for a sliding device for vehicle seats are disclosed, for instance, in documents US 2003/006355, US 7980525 and US 6637712.

[0015] However, a locking arrangement of the kind disclosed in the aforesaid documents is not free from drawbacks.

[0016] More particularly, in the known locking arrangements the connecting members connecting the releasing member to the locking assemblies are either partially or completely arranged outside the tracks of the sliding device.

[0017] This entails the need for providing enough room for receiving said connecting members when designing the sliding device.

[0018] Moreover, as they are at least partially arranged outside the tracks of the sliding

device, such connecting members are exposed to dust and dirt, which may accumulate between the moving parts of these connecting members and cause malfunctioning thereof.

[0019] Such dust and dirt may also penetrate into the tracks of the sliding device and interfere with the movement of the locking pins from their locking configuration to their unlocking configuration, and vice versa. Usual malfunctioning issues include increased release efforts, increased sliding efforts and noise issues, which may trigger users' dissatisfaction.

[0020] Therefore, a main object of the present invention is to provide a sliding device for a vehicle seat provided with an improved locking arrangement having a compact structure.

[0021] A further object of the present invention is to provide a sliding device for a vehicle seat provided with an improved locking arrangement showing an improved reliability, namely avoiding the risk of malfunctioning due to accumulation of dirt and dust close to the moving parts of said locking arrangement.

[0022] These and other objects are achieved by a sliding device as claimed in the appended claims.

Summary of Invention

[0023] The invention relates to sliding device for a vehicle seat which comprises a pair of parallel tracks, each including a lower rail, intended to be attached to the vehicle floor, and an upper rail, intended to be attached to the vehicle seat and slidably mounted to said lower rail, each lower rail comprising a plurality of apertures, aligned and equally spaced from one another along the longitudinal axis of said lower rail.

[0024] The sliding device further comprises a locking arrangement which comprises a locking assembly associated to each track for selectively allowing / preventing a movement of said upper rails relative to said lower rails. Each locking assembly is connected to a respective upper rail and comprises one or more locking pins configured to penetrate into corresponding apertures of the respective lower rail and to engage the edges of said apertures, said locking pins being biased to a locking configuration, for instance by spring means.

[0025] According to a preferred embodiment of the invention, each locking assembly comprises a plurality of locking pins. According to a particularly preferred embodiment of the invention, such locking pins are sized and arranged so that, for any position of the upper rail relative to the lower rail, at least one locking pin is aligned with a corresponding aperture of the respective lower rail and can penetrate into said aperture and engage the edge thereof.

[0026] The locking arrangement is further provided with a releasing assembly for simul-

taneously switching said locking assemblies from a locking configuration, in which the movement of the upper rails of the tracks relative to the respective lower rails is prevented, to an unlocking configuration, in which the movement of said upper rails relative to the respective lower rails is allowed.

[0027] Said releasing assembly comprises a releasing member and a pair of connecting members, one for each locking assembly, each of said connecting members being in a force transmission connection with the releasing member, on one hand, and with the locking pins of the respective locking assembly, on the other hand.

[0028] Accordingly, when a user applies a force to the releasing member, such force is transmitted from the releasing member to the connecting members, and from said connecting members to the locking pins of the respective locking assembly, thus driving said locking pins from their locking configuration to their unlocking configuration.

[0029] According to the invention, such connecting members are entirely received inside the respective tracks, and they are arranged between the upper rail and the lower rail of the respective track.

[0030] This arrangement allows to obtain a compact structure, which turns out to be advantageous in packaging the sliding device with respect to the external release systems proposed in the prior solutions, in which the connecting members of the releasing assembly are arranged at least partially outside the respective tracks.

[0031] According to a preferred embodiment of the invention, each locking assembly comprises a support plate, which is fastened (e.g. welded and/or staked) to the respective upper rail and is provided with a window through which the locking pins can slide for moving from their unlocking configuration to their locking configuration, and vice versa.

[0032] Each connecting member is correspondingly made as a spring plate which comprises an engaging portion for engagement with the releasing member, a driving portion for driving the locking pins from their locking configuration to their unlocking configuration, and a connecting portion for connection to the support plate of the locking assembly.

[0033] According to this preferred embodiment, when a user applies a force to the releasing member, such force is transmitted to the spring plate and causes a rotation of said spring plate, which, in turn, drives the locking pins to their unlocking configuration.

[0034] According to a preferred embodiment of the invention, the locking pins are provided with transversely projecting pegs and the driving portion of the spring plate comprises a window having a width larger than the diameter of the locking pins but smaller than the sum of the diameter of the locking pins and the length of the projecting pegs, so that the edge of the window of the driving portion of the spring plate can engage such

pegs for driving the locking pins to their unlocking configuration.

[0035] According to a preferred embodiment of the invention, the releasing member is made as a "U"-shaped handle having two substantially parallel arms and the engaging portion of each spring plate is configured to receive the end portion of a respective arm of said releasing handle.

Brief Description of Drawings

[0036] Further features and advantages of the invention will become more evident from the detailed description of a preferred embodiment thereof, given by way of non limiting example, with reference to the attached drawing, in which:

Fig. 1

[0037] Figure 1 is a perspective view of a sliding device according to the invention;

Fig. 2

[0038] Figure 2 is a cross-sectional view of the sliding device of Figure 1 taken along the line II-II;

Fig. 3a

[0039] Figure 3a is an enlarged view of the detail III of Figure 2, illustrated in a first, locking configuration;

Fig. 3b

[0040] Figure 3b is an enlarged view of the detail III of Figure 2, illustrated in a second, unlocking configuration;

Fig. 4

[0041] Figure 4 is a perspective view of the connecting member of the locking assembly of Figure 2;

Fig. 5a

[0042] Figure 5a partially shows, in a cross-sectional view, the locking arrangement of a sliding device according to a variant of the invention;

Fig. 5b

[0043] Figure 5b partially shows, in a perspective, partially cut-away view, the locking arrangement of Figure 5a;

Fig. 6a

[0044] Figure 6a shows a first locking configurations of the locking pins of the locking assembly of Figure 2;

Fig. 6b

[0045] Figure 6b shows a second locking configurations of the locking pins of the locking assembly of Figure 2;

Fig. 6c

[0046] Figure 6c shows a third locking configurations of the locking pins of the locking

assembly of Figure 2.

Description of Embodiments

[0047] With reference to Figure 1, a sliding device 10 according to the invention is shown.

[0048] In a per se known manner, the sliding device 10 comprises a pair of parallel tracks 20a, 20b, each comprising a lower rail 30a, 30b, intended to be attached to the vehicle floor, and an upper rail 40a, 40b, intended to be attached to the frame of a vehicle seat.

[0049] Each upper rail 40a, 40b is constrained to the respective lower rail 30a, 30b, but can slide relative to said lower rail.

[0050] In order to selectively allow / prevent a sliding movement of the upper rails relative to the lower rails of the tracks 20a, 20b, a locking arrangement is provided. Said locking arrangement comprises two locking assemblies, one for each track 20a, 20b.

[0051] One of said locking assemblies is shown in Figures 2 – 4. It is to be intended that the other locking assembly is identical to the one shown in Figures 2 – 4.

[0052] Each locking assembly 1a, 1b comprises a support plate 3a, 3b, which is fastened (e.g. welded and/or staked) to the respective upper rail 40a, 40b, and one or more locking pins 5a, 5b (three in the shown embodiment), which are configured to pass through apertures 42a, 42b provided in the respective upper rail 40a, 40b and through a window provided in the support plate 3a, 3b and penetrate into apertures provided in the respective lower rail 30a, 30b for locking the upper rails to the lower rails and preventing any movements of said upper rails relative to said lower rails.

[0053] As will be disclosed in greater detail below, the locking pins 5a, 5b are arranged so that, at any position of the upper rails relative to the lower rails, at least one of them – and preferably two of them – is aligned with a corresponding aperture of the respective lower rail and penetrates therethrough.

[0054] The locking pins 5a, 5b have a substantially cylindrical body ending with a conical or frusto-conical tip for facilitating their insertion into said apertures of the lower rails.

[0055] The locking pins 5a, 5b are biased to their locking configuration, in which at least some of them penetrate into corresponding apertures of the respective lower rail. To this purpose, a helical spring 7a, 7b is wound around the body of each locking pin 5a, 5b and biases such locking pin downwards, towards the lower rail.

[0056] In order to allow a user to adjust the position of the seat relative to the vehicle floor, the locking arrangement of the sliding device according to the invention also comprises a releasing assembly for moving the locking pins 5a, 5b from the aforesaid locking configuration to an unlocking configuration, in which all the locking pins are extracted from the apertures of the respective lower rail, thus allowing the upper rails to slide relative to the lower rails.

[0057] In general, the releasing assembly comprises a releasing member 9 and a pair of

connecting members 11a, 11b, one for each locking assembly 1a, 1b, each connecting member being in a force transmission connection with the releasing member 9, on one hand, and with the locking pins 5a, 5b of the respective locking assembly, on the other hand.

[0058] According to the invention, the connecting members 11a, 11b are entirely received inside the respective tracks 20a, 20b, each of said connecting members being arranged between the upper rail and the lower rail of the respective track.

[0059] In the shown embodiment, the releasing member is made as a "U"-shaped releasing handle or towel bar 9 comprising a middle gripping portion 9c and two substantially parallel arms 9a, 9b, each penetrating into a respective track 20a, 20b.

[0060] As better visible in Figure 4, in the shown embodiment each connecting member is made as a spring plate 11a, 11b which is arranged above the support plate 3a, 3b of the locking assembly and substantially extends from the rear end of said support plate and projects beyond the front end of said support plate, which is correspondingly provided with a channel 4a, 4b for the passage of said spring plate.

[0061] The spring plate 11a, 11b comprises an engaging portion 13a, 13b for engaging the respective arm 9a, 9b of the releasing handle 9, a driving portion 15a, 15b for driving the locking pins 5a, 5b of the respective locking assembly 1a, 1b from their locking configuration to their unlocking configuration, and a connecting portion 17a, 17b for connection to the support plate 3a, 3b of the respective locking assembly 1a, 1b.

[0062] The engaging portion 13a, 13b is made as a hollow body configured to receive and engage the end portion of a respective arm 9a, 9b of the releasing handle.

[0063] The driving portion 15a, 15b is made as a flat body, which is arranged above the support plate 3a, 3b of the respective locking assembly and is provided with a window 19a, 19b, which preferably overlies the window of said support plate 3a, 3b, so that the locking pins 5a, 5b can slide through both the window of the support plate 3a, 3b and the window 19a, 19b of the driving portion 15a, 15b of the spring plate 11a, 11b.

[0064] As better visible in Figures 3a and 3b, for allowing the locking pins 5a, 5b to be driven by the spring plate 11a, 11b, such locking pins are provided with transversely projecting pegs 21a, 21b. Preferably, each locking pin 5a, 5b is provided with two diametrically opposed transversely projecting pegs 21a, 21b.

[0065] The window 19a, 19b of the driving portion of the spring plate is designed so that its width is larger than the diameter of the locking pins 5a, 5b, but smaller than the sum of the diameter of said locking pins and of the length of the transversely projecting pegs 21a, 21b.

[0066] Said transversely projecting pegs 21a, 21b are arranged on the body of the locking pins 5a, 5b so that they are substantially in abutment against the driving portion 15a, 15b of the spring plate 11a, 11b when the locking pins are completely inserted into the

apertures 32a, 32b of the lower rails 30a, 30b (locking configuration).

[0067] The connecting portion 17a, 17b of the spring plate 11a, 11b is made as a flat body downwardly bent into a "C" shape, so that its end can be connected (e.g. by means of rivets 23a, 23b) to the underside of the support plate 3a, 3b of the respective locking assembly.

[0068] The operation of the locking arrangement of the sliding device according to the invention can be summarized as follows.

[0069] In a rest condition, the springs 7a, 7b bias the locking pins 5a, 5b of the locking assemblies 1a, 1b towards the apertures 32a, 32b of the lower rails 30a, 30b and at least some of said locking pins penetrate into corresponding apertures of the respective lower rail (see Figure 3a). In such a locking configuration, the upper rails 40a, 40b cannot slide relative to the lower rails 30a, 30b.

[0070] When a user wishes to adjust the position of the vehicle seat relative to the vehicle floor, he / she applies a force to the releasing handle 9, by pulling the middle gripping portion 9c of said handle upwards.

[0071] As a result, the spring plate 11a, 11b is also pulled upwards and it rotates about the connecting point to the support plate 3a, 3b (see arrow F in Figure 2).

[0072] More particularly, the driving portion 15a, 15b of the spring plate moves upwards and the edge of the window 19a, 19b engages the transversely projecting pegs 21a, 21b of the locking pins 5a, 5b. By overcoming the elastic resistance of the springs 7a, 7b, the driving portion 15a, 15b of the spring plate lifts the locking pins 5a, 5b, so that they move upwards (guided by the apertures 42a,42b of the respective upper rail) until they become disengaged from the apertures 32a, 32b of the respective lower rail 30a, 30b (see Figure 3b). In such an unlocking configuration, the upper rails 40a, 40b can slide relative to the lower rails 30a, 30b and the position of the vehicle seat can be adjusted.

[0073] When the user releases the releasing handle 9, the springs 7a, 7b bias the locking pins 5a, 5b back towards the respective lower rail 30a, 30b, and at least some of said locking pins penetrate into corresponding apertures of said lower rail, thus locking the upper rail relative to the lower rail in a new, desired position.

[0074] The locking arrangement of the sliding device according to a variant of the invention is partially shown in Figures 5a – 5b.

[0075] The locking arrangement according to such variant is similar to the one shown in Figures 2 – 4 and comprises a pair of locking assemblies 1a, 1b and a releasing assembly including a releasing member and a pair of connecting members 11a, 11b, one for each locking assembly.

[0076] In this variant, too, each locking assembly 1a, 1b comprises a support plate 3a, 3b and a plurality of locking pins 5a, 5b.

[0077] However, in this variant, the support plate 3a, 3b is not fastened to the respective

upper rail by welding or staking; on the contrary, each support plate 3a, 3b is fastened to the respective upper rail by riveting, namely by orbital riveting.

[0078] The connecting portion 17a, 17b of the spring plate 11a, 11b is correspondingly fastened by riveting, namely by orbiting riveting, both to the support plate 3a, 3b and to the upper rail 40, 40b.

[0079] To this purpose, a rivet 25a, 25b is provided, the upper shoulder of which engages the upper rail and provides for the connection between the connecting portion 17a, 17b of the spring plate 11a, 11b and said upper rail, and the lower shoulder of which engages the underside of the support plate and provides for the connection between the connecting portion 17a, 17b of the spring plate 11a, 11b and said support plate.

[0080] It is to be noted that the upper section of the connecting portion 17a, 17b of the spring plate 11a, 11b is provided with a slot 27a, 27b, the length of which is larger than the thickness of the stem of the rivet 25a, 25b, so that said rivet does not interfere with the movements of the spring plate 11a, 11b when the locking pins move from their locking configuration to their unlocking configuration and vice versa.

[0081] Thanks to this solution, welded connections can be avoided and the locking assemblies and the connecting members can be fastened to each other and to the respective upper rail by cold working.

[0082] This prevents the risk of distortion of the rails induced by heat during welding operation and represents a remarkable advantage, since such distortion of the rails may entail high sliding efforts and noise issues.

[0083] Referring now to Figures 6a – 6c, possible locking configurations of the locking pins 5a, 5b are schematically shown.

[0084] The size of said locking pins 5a, 5b, the distance between said locking pins, the size of the apertures 32a, 32b in the lower rails and the distance between said apertures can be chosen so as to obtain a “chuckless” engagement.

[0085] In a first possible configuration, shown in Figure 6a, the middle pin 5’’ penetrates into an aperture 32’’ of the lower rail and engages the front side of its edge (primary locking), while the front pin 5’ penetrates into a further aperture 32’ of the lower rail, immediately preceding the aperture 32’’, and engages the rear side of its edge (secondary locking); the rear pin 5’’’ does not penetrate into any aperture of the lower rail and abuts against the web between two adjacent apertures (namely, the aperture 32’’ and the following one).

[0086] In a second possible configuration, shown in Figure 6b, the front pin 5’ penetrates into an aperture 32’ of the lower rail and engages the front side of its edge (primary locking), while the rear pin 5’’’ penetrates into a further aperture 32’’ of the lower rail, immediately following the aperture 32’, and engages the rear side of its edge (secondary locking); the middle pin 5’’ does not penetrate into any aperture of the

lower rail and abuts against the web between two adjacent apertures (namely, the apertures 32' and 32'').

[0087] In a third possible configuration, shown in Figure 6c, the rear pin 5''' penetrates into an aperture 32'' of the lower rail and engages the front side of its edge (primary locking), while the middle pin 5'' penetrates into another aperture 32' of the lower rail, immediately preceding the aperture 32'', and engages the rear side of its edge (secondary locking); the front pin 5' does not penetrate into any aperture of the lower rail and abuts against the web between two adjacent apertures (namely, the aperture 32' and the preceding one).

[0088] The above description of a preferred embodiment of the invention has been given merely by way of example and several variants and modifications within the reach of the person skilled in the art can be envisaged, without departing from the scope of the invention as defined by the appended claims.

Claims

[Claim 1] Sliding device (10) for a vehicle seat, comprising a pair of parallel tracks (20a, 20b), each comprising a lower rail (30a, 30b) and an upper rail (40a, 40b), each of said upper rails (40a, 40b) being constrained to a respective lower rail, but slidable relative to said lower rail, wherein said lower rails (30a, 30b) are provided with a plurality of apertures (32a, 32b) arranged along the longitudinal axes of said lower rails, wherein said sliding device is provided with a locking arrangement including two locking assemblies, one for each of said tracks (20a, 20b), wherein each of said locking assemblies (1a, 1b) comprises a support plate (3a, 3b) fastened to the respective upper rail (40a, 40b) and one or more locking pins (5a, 5b), which are configured to pass through a window provided in said support plate (3a, 3b) and penetrate into corresponding apertures (32a, 32b) of the respective lower rail (30a, 30b), wherein said locking arrangement further comprises a releasing assembly for moving said locking pins (5a, 5b) from a locking configuration to an unlocking configuration, wherein said releasing assembly comprises a releasing member (9) and a pair of connecting members (11a, 11b), one for each locking assembly (1a, 1b), each connecting member (11a, 11b) being in a force transmission connection with said releasing member (9), on one hand, and with said locking pins (5a, 5b) of said locking assembly, on the other hand, characterized in that said connecting members (11a, 11b) are entirely received inside the respective tracks (20a, 20b), each of said connecting members being arranged between the upper rail and the lower rail of the respective track.

[Claim 2] Sliding device (10) according to claim 1, wherein each of said connecting members is made as a spring plate (11a, 11b), which is arranged above said support plate (3a, 3b) of said locking assembly and substantially extends from the rear end of said support plate and projects beyond the front end of said support plate.

[Claim 3] Sliding device (10) according to claim 2, wherein said spring plate (11a, 11b) comprises an engaging portion (13a, 13b) for engaging said releasing member, a driving portion (15a, 15b) for driving said locking pins of said locking assembly from their locking configuration to their unlocking configuration, and a connecting portion (17a, 17b) for connecting said spring plate to said support plate of said locking

assembly.

[Claim 4] Sliding device (10) according to any of the preceding claims, wherein said releasing member is made as a "U"-shaped releasing handle (9) comprising a middle gripping portion (9c) and two substantially parallel arms (9a, 9b), each penetrating into a respective track.

[Claim 5] Sliding device (10) according to claims 3 and 4, wherein said engaging portion (13a, 13b) of said spring plate is made as a hollow body configured to receive and engage the end portion of a respective arm (9a, 9b) of said releasing handle.

[Claim 6] Sliding device (10) according to any of the preceding claims, wherein said locking pins (5a, 5b) are provided with transversely projecting pegs (21a, 21b), preferably with two diametrically opposed transversely projecting pegs (21a, 21b).

[Claim 7] Sliding device (10) according to claims 3 and 6, wherein said driving portion (15a, 15b) is made as a flat body provided with a window (19a, 19b), said window having a width which is larger than the diameter of said locking pins (5a, 5b), but smaller than the sum of the diameter of said locking pins (5a, 5b) and of the length of the transversely projecting pegs (21a, 21b).

[Claim 8] Sliding device (10) according to claim 6 or 7, wherein said transversely projecting pegs (21a, 21b) are arranged on the body of said locking pins (5a, 5b) so that they are substantially in abutment against said driving portion (15a, 15b) of said spring plate (11a, 11b) when they are completely inserted into said apertures (32a, 32b) of said lower rails.

[Claim 9] Sliding device (10) according to claim 3, wherein said connecting portion (17a, 17b) of said spring plate (11a, 11b) is made as a flat body which is downwardly bent into a "C" shape, so that its end is connected to the underside of said support plate (3a, 3b) of said locking assembly.

[Claim 10] Sliding device (10) according to claim 3 or 9, wherein said connecting portion (17a, 17b) of said spring plate (11a, 11b) is connected by orbital riveting to said support plate (3a, 3b) and to said upper rail (40a, 40b) and wherein said support plate (3a, 3b) is connected by orbital riveting to said upper rail (40a, 40b).

[Claim 11] Sliding device (10) according to any of the preceding claims, wherein said locking pins (5a, 5b) are biased towards said apertures (32a, 32b) of said lower rails by means of springs (7a, 7b).

[Fig. 1]

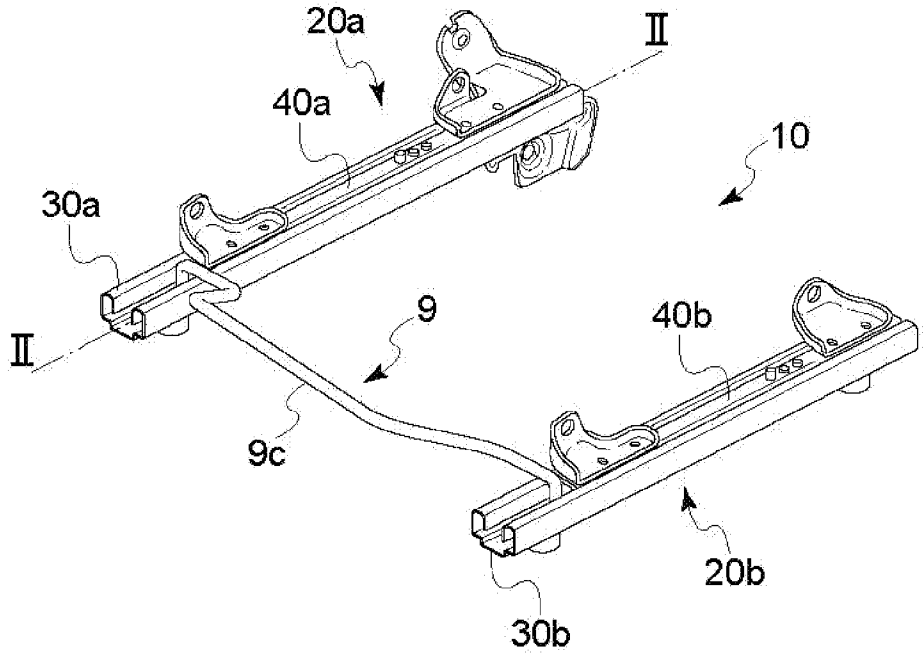

Fig. 1

[Fig. 2]

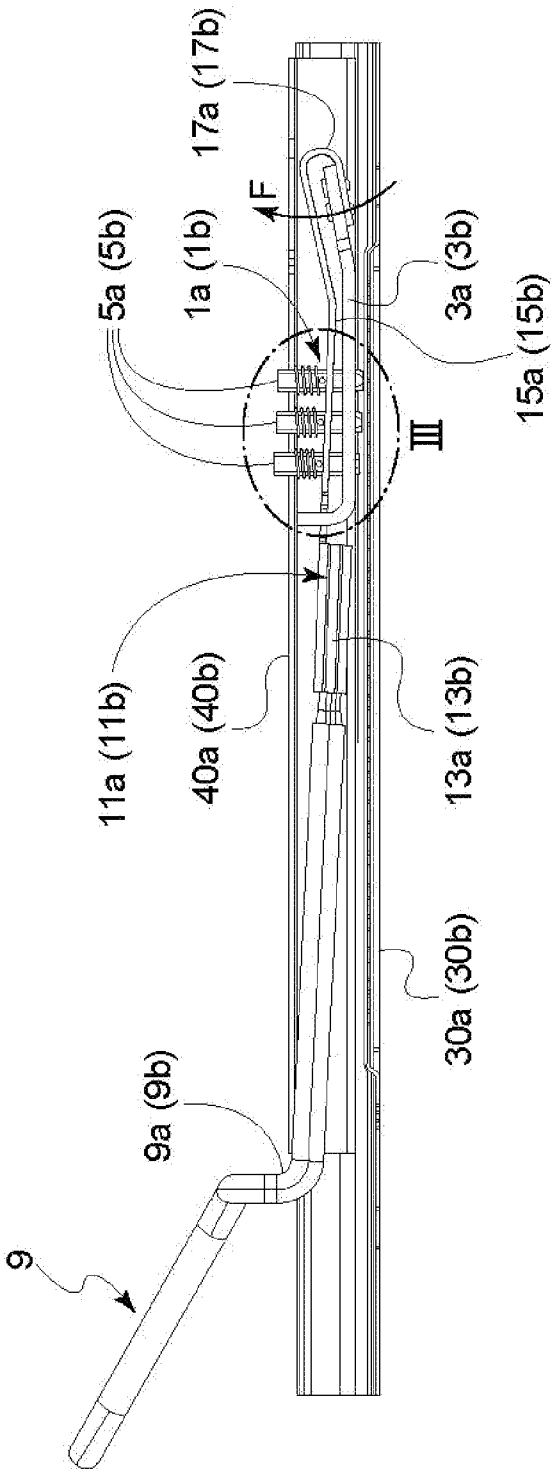
17a (17b)
F
5a (5b)
1a (1b)
3a (3b)
15a (15b)
III
11a (11b)
40a (40b)
13a (13b)
30a (30b)
9a (9b)
9

Fig. 2

[Fig. 3a]

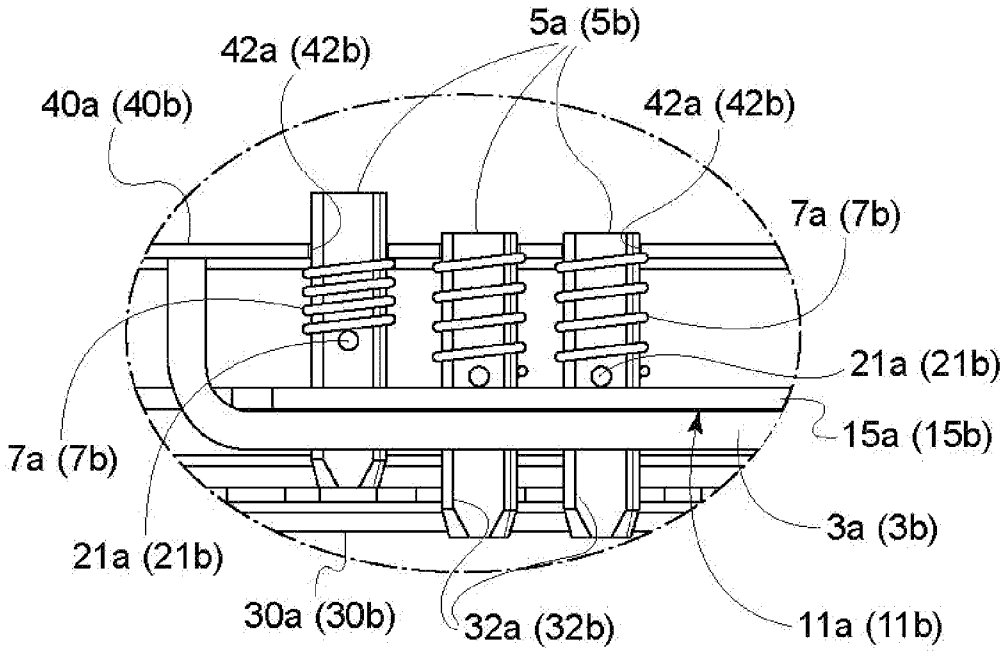

Fig. 3a

[Fig. 3b]

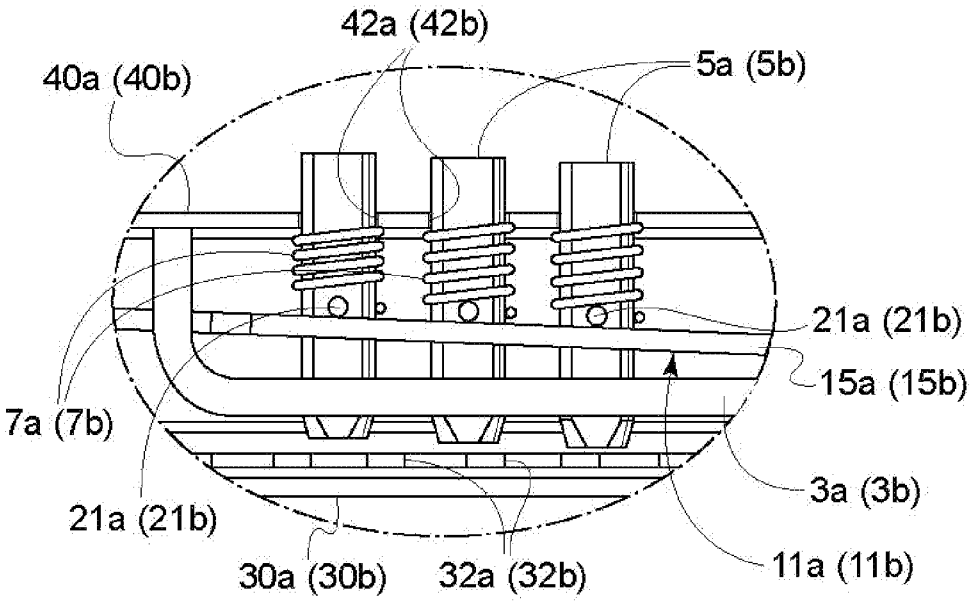

Fig. 3b

[Fig. 4]

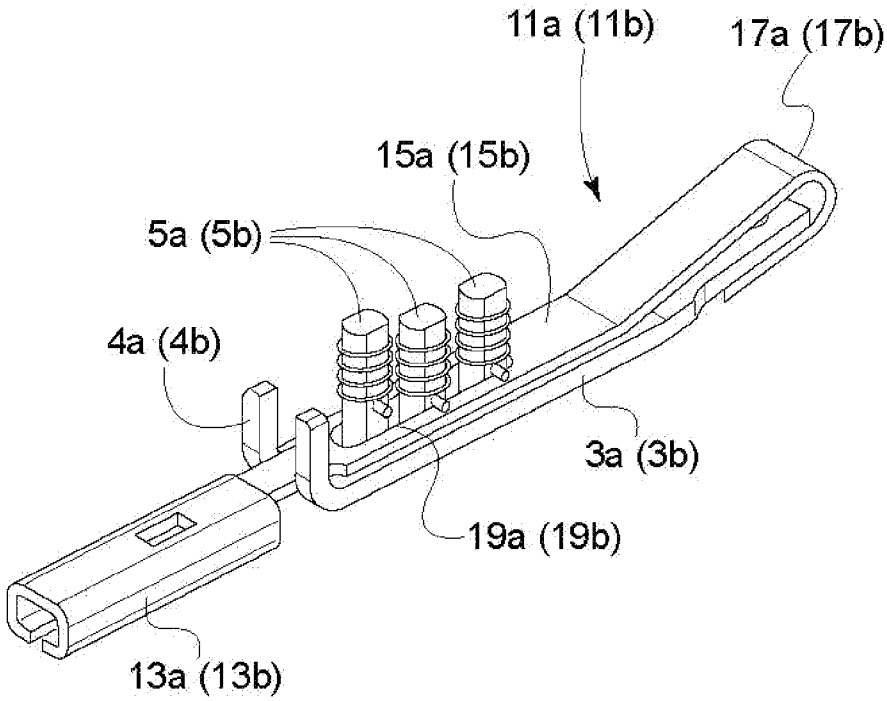

Fig. 4

[Fig. 5a]

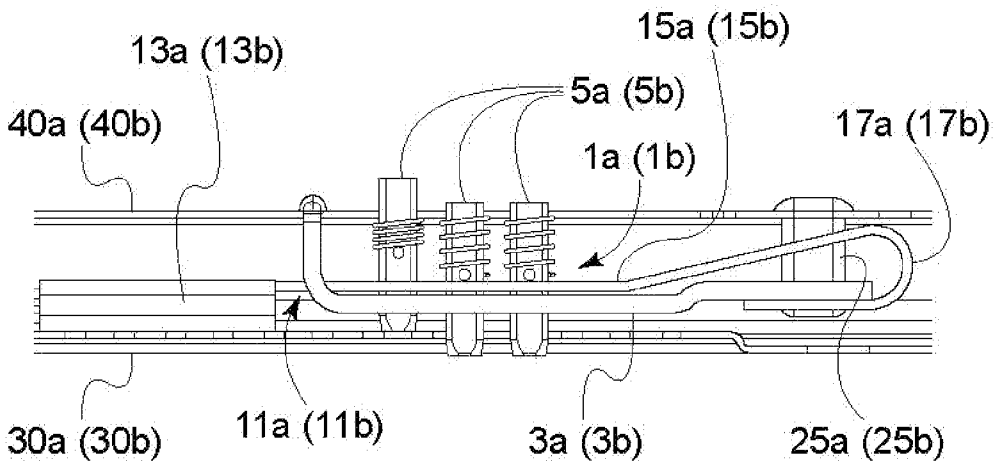

Fig. 5a

[Fig. 5b]

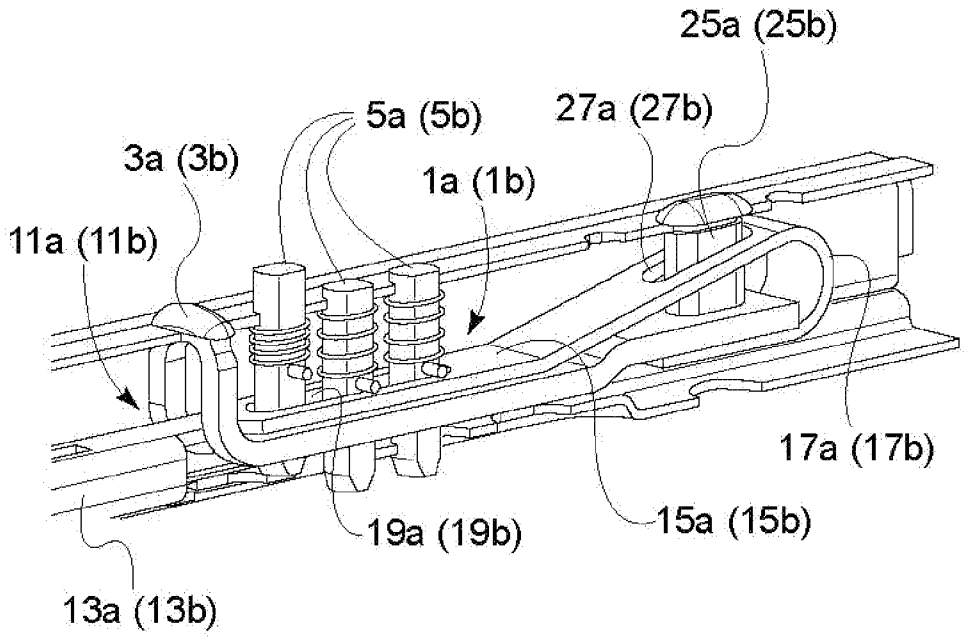

Fig. 5b

[Fig. 6a]

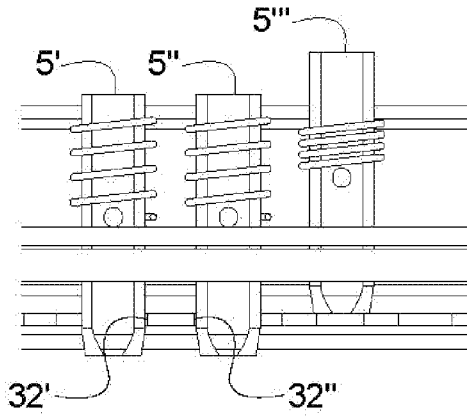

Fig. 6a

[Fig. 6b]

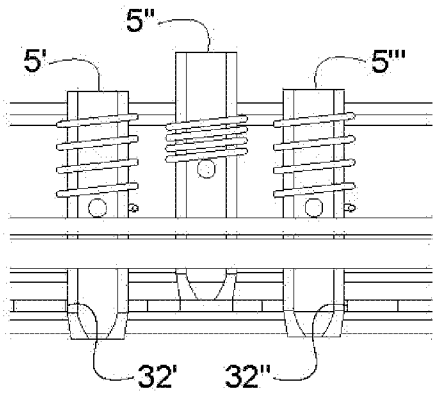

Fig. 6b

[Fig. 6c]

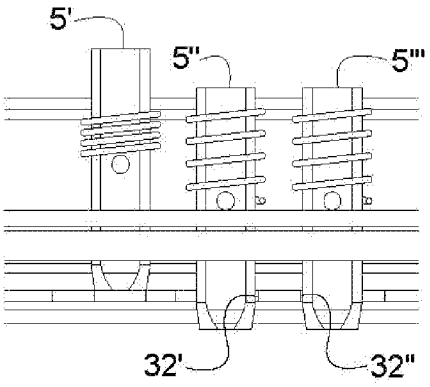

Fig. 6c

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2019/053183

A. CLASSIFICATION OF SUBJECT MATTER
INV. B60N2/08
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B60N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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X	FR 3 032 657 A1 (FAURECIA SIEGES D'AUTOMOBILE [FR]) 19 August 2016 (2016-08-19)	1,4,6,11
A	abstract; figures 1, 2, 3, 3A, 4, 5A, 5B, 7, 8 page 5, line 5 - page 13, line 13	2,3,5, 7-10
X	DE 10 2014 220476 A1 (JOHNSON CONTROLS GMBH [DE]) 11 February 2016 (2016-02-11) abstract; figures 1, 2, 6, 7 paragraph [0021] - paragraph [0032] paragraph [0036] - paragraph [0043]	1,11
A	DE 10 2014 104295 A1 (FAURECIA AUTOSITZE GMBH [DE]) 1 October 2015 (2015-10-01) abstract; figure 1 paragraph [0010] - paragraph [0021]	1-11

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
19 July 2019	21/08/2019

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Chevallier, Frédéric

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Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2019/053183

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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PCT/IB2019/053183

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