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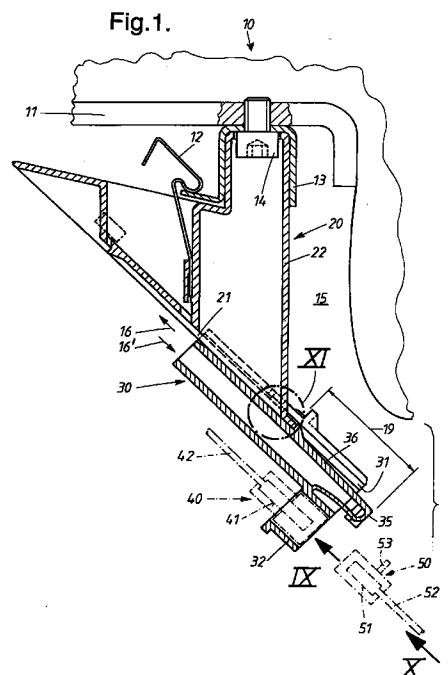
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(54) **Device for fastening an electrical plug at an inaccessible position, in particular in a motor vehicle**

(57) In a device for fastening electric plugs 40 at an inaccessible position it is nevertheless important to make it possible to connect the mating connectors 50 conveniently. For this purpose, a two-part fastening device is proposed consisting of a fixed rail part 20 and of a sliding carriage part 30 longitudinally displaceable thereon which carries fittings 32 for the electric plugs 40. In addition the sliding carriage part 30 is provided with a sprung handle 35. The sliding carriage part 30 can be displaced between two positions on the rail part 20, it being possible in a first run-out position to connect the mating connectors 50 especially conveniently to the plugs 40. In the other retracted position on the other hand the plugs 40 and mating connectors 50 connected to one another are at the inaccessible positions 15 in the vehicle. Both these positions are fixed by means of stopping and opposing stopping members and can be rendered inoperative by means of the handle 35 provided on the sliding carriage part 30.



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## Description

### Field of the Invention

The invention is aimed at a device of the type specified in the introductory part of claim 1. In a vehicle, electric plugs also have to be fastened at poorly accessible points. A seat frame in a motor vehicle where a whole series of plugs have to be fixed beneath the seat may serve as an example. The contacts in the interior of these plugs are connected to electric leads which serve, e.g. for the control system of a seat adjuster, a seat heater, a device for tightening the belt in the event of an accident, a triggering device for an air bag or lead to further electrically operated devices. During assembly or disassembly of the seat the plugs must be connected to or disconnected from corresponding mating connectors which for their part have opposite contacts. These opposite contacts are connected to electric supply or control leads which belong, e.g. to a loom of cables laid in fixed manner in the bodywork.

### Background of the Invention

In the known devices the connection and disconnection is a complicated process; two hands are needed in order to hold the plug with one hand and to guide the mating connector into it in targeted manner with the other hand. In doing so it is difficult to determine visually whether after this troublesome procedure the plug and its mating connector are properly connected. Faulty connections can result in grave consequences in the event of an accident. Even in the case of an adjustment of the seat there is the risk that the plugs disengage unnoticed from the mating connectors and the contact is broken or at least becomes imperfect.

### Summary of the Invention

The object underlying the invention is to develop a device of the type specified in the introductory part of claim 1 which permits reliable and comfortable connection and disconnection between the mating connectors and the plugs. This is achieved according to the invention by means of the measures quoted in the characterising part of claim 1, to which the following special significance is attached.

Due to its mounting on the sliding carriage part a mating connector can be connected easily when the sliding carriage part assumes its first position, that is the run-out position, on the fixed rail part. The handling of the mating connector is convenient; it is already possible to recognise readily by eye whether the mating connector is properly connected in the plug or not. This run-out position, however, is only temporary and exists only during the assembly or disassembly of the component provided with the plug, e.g. a motor vehicle seat. The final position, which is not visible and difficult to access in the motor vehicle, can, however, be reached easily in

the case of the invention because the sliding carriage part with the plugs and mating connectors previously connected to one another can be transferred with ease on the rail part into its second position, that is a retracted position. Thus the plug arrives only subsequently after the completed connection of the mating connector at the poorly accessible position in the motor vehicle. Both positions are secured by means of stopping and opposing stopping members which are arranged between the sliding carriage part or a handle located on it on the one hand and the rail part on the other hand. By operating the handle against a spring loading acting on it the stopping and opposing stopping members are detached from one another and readily permit a displacement of the sliding carriage part between its two aforementioned positions. This allows handling with only a single hand; after connecting up the mating connector in the run-out position the handle on the sliding carriage part need only be operated in order to bring the sliding carriage part into its final retracted position.

Further measures and advantages of the invention emerge from the subsidiary claims, the following description and the drawings. In the drawings, an embodiment of the invention is illustrated.

### Brief Description of the Drawings

Figure 1 is a longitudinal section through the two-part device according to the invention in a first position of the movable part of this device with a plug, wherein the path of the section is to be gathered from the dashed section line I-I in the front elevation shown in Figure 9, that is before connecting up a mating connector in the plug;

Figure 2 is an enlarged segment of the device shown in Figure 1 in the same position of the movable part where, however, the mating connector is partially inserted into the plug mounted in the movable part;

Figure 3 shows the device according to the invention in an enlarged representation corresponding to Figure 2 after the mating connector is fully inserted into the plug;

Figure 4 shows the actuating position of a handle provided on the movable part of the device in a representation corresponding to Figure 3 with the mating connector fully connected up,

Figure 5 shows the movable part of the device according to the invention on its own in plan view;

Figure 6 shows the part of the device according to the invention installed in fixed position on the motor vehicle in side view;

Figure 7 shows an inclined plan view on to the fixed part of the device according to the invention of Figure 6, that is to say in the line of sight of the arrow VII of Figure 6;

Figure 8 shows the front view on to the fixed part of the device according to the invention in the line of sight of the arrow VII of Figure 6;

Figure 9 shows a segment of both parts of the device according to the invention in the first position in front elevation along the arrow IX indicated in Figure 1;

Figure 10 shows the corresponding rear view of a set of mating connectors to be connected to the plugs of the device in the line of sight of the arrow X of figure 1;

Figure 11 shows a segment between the two parts of the device at the location labelled in Figure 1 by XI in plan view, from which the bonding of the two parts of the device can be seen;

Figure 12 is a representation of a longitudinal section corresponding to Figure 1, the two parts of the device according to the invention when the movable part is located in a second, final position in the motor vehicle; and

Figure 13 shows, in side view, the two parts of the device according to the invention when they are located in the second position found in Figure 12 and ensure cohesion of the parts of the device at that location which is labelled by XIII in Figure 12.

#### Description of the Preferred Embodiment

The device according to the invention consists of two parts 20, 30, that is to say of a rail part 20 shown in Figures 6, 7 and 8 and of a sliding carriage part 30 illustrated in Figure 5. Both parts 20, 30 of the device are mirror symmetrical in construction with respect to their longitudinal centre. In both its peripheral regions the rail part 20 comprises longitudinal rails 21, which are best seen in figures 7 and 8 and on which the sliding carriage part 30 with a U-shaped guide 23 can be pushed in the direction of the arrows 16 of Figure 1 and can be pushed out in the direction of the arrows 16' of Figure 1 or Figure 12. Between its two peripheral longitudinal rails 21 the rail part 20 also further possesses a profiled housing 22 which serves for the static attachment of the rail part 20 to the frame 11 of a seat 10 according to Figure 1. The attachment of the rail part 20 to the seat frame 11 ensues through a snap-on spring 12 which engages behind an assembly rail 13 according to Figure 1, and by means of one or more fastening screws 14, which are anchored in the seat frame 11. These screws 14 also hold the assembly rail 13 fast. The assembled

rail part 20 is located at a poorly accessible position 15 labelled by 15 in Figure 1 beneath the seat 10.

As Figure 1 illustrates, the sliding carriage part 30 serves for fixing an assemblage of plugs of which only one plug 40 is illustrated by dotted lines in Figure 1 and several plugs 40 are illustrated in Figure 9. A corresponding number of profiled casings 32 formed on the sliding carriage part 30, which are best seen in Figure 9, serve this purpose. In Figure 9 the associated plugs 40 with their correspondingly coded opposite profile are indicated in outline by dotted lines. The plugs 40 are held fast in the casings 32 assigned to them in their correct plug-in positions by means of latching or end limit stops. Thus in the aforementioned inwards and outwards movement 16, 16' of the sliding carriage part 30, the plugs 40 fitted in the casings 32 are carried along with it. The contacts 41 indicated in Figure 1 and provided in the interior of the plugs 40 are connected to corresponding electric leads 42 which lead to sundry devices arranged in the region of the seat, such as, e.g. a seat heater. As can be seen in Figure 9, the individual plugs 40 are held together as a set of plugs by means of the casings 32 formed on the sliding carriage part 30.

Associated with this set of plugs 40 is a corresponding set of mating connectors 50 which advantageously adhere together and can be seen in rear view in Figure 10. These mating connectors 50 for their part possess opposite contacts 51 which, as is indicated schematically in Figure 1, are connected to electric leads 52. These leads 52 can belong to leads of a loom of cables laid in fixed manner in the bodywork of the vehicle.

This set of mating connectors 50 according to Figure 10 can be connected in very convenient manner to the plugs 40 mounted in the sliding carriage part 30, as long as the sliding carriage 30 is located in a first defined position shown in Figures 1 and 9 on the rail part 20 fastened in fixed manner to the seat 10. According to Figure 1, this first position is characterised in that the plugs 40 mounted in the sliding carriage part 30 are located in the open space 17 beneath the seat 10 and are therefore conveniently accessible for the manual connecting up of the mating connectors 50. This can be seen in Figure 2 where the mating connector is guided by one hand in the direction of the arrow 18 into the rigidly positioned plug 40 but in Figure 2 has not yet reached its final connecting position in the plug 40; the contacts 41 have not yet come into proper electrical connection to the opposite contacts 51. In this first position, the sliding carriage part 30 is located with a substantial section of its length 19 in a run-out position in front of the rail part 20 installed rigidly on the seat 10, for which reason this position of the sliding carriage part 30 is to be designated below in short as the "run-out position".

This run-out position of the sliding carriage part 30 is fixed by two stopping and opposing stopping members 33, 23 and 34, 24 working together with one another in pairs. The opposing stopping members 23, 24 are located on the rail part 20 while one stopping

member 33 is formed on the sliding carriage part 30 in the region of a special handle 35 and the other stopping member 34 is formed in the region of the aforementioned U-shaped guide 31 of the sliding carriage part 30. In the present case the handle 35 and the stopping members 33, 34 are designed in one piece with the sliding carriage part 30 constructed of elastic synthetic material and together with the aforementioned U-shaped guide 31 and the casings 32 form a coherent body as is best seen in Figure 5.

Overall the sliding carriage part has the following structure discernible in Figures 2 and 5. The handle 35 consists of the free end of a rocker 36 which is formed on the back end 37 of the sliding carriage part 30 and is separated from its peripheral guides 31 by slots which have been cut free. The stopping member 34 is here one component of a toothed directed locking mechanism 24, 34 shown in detail in Figure 11. The stopping member here consists of a locking tooth 34 with a saw-tooth profile which is formed on the U-guide 31 and the steep side of which engages behind a corresponding opposing locking tooth 24 on the steep side of the latter in the run-out position. As Figure 5 shows, the locking tooth 34 on the sliding carriage side is provided in duplicate, that is to say on each of the two U-guides 31 and projects into the open space above the rocker 36. As can be seen in Figure 7, the opposing locking tooth 24 on the rail side is likewise arranged in duplicate and is located in the region of the peripheral longitudinal rails 21, but as can be seen from the plan view of Figure 8, it is raised up into a higher plane colliding with the locking tooth 34. In the run-out position of the rail and sliding carriage part 20, 30 according to Figure 4, the steep sides of the two teeth 34, 34' engage behind one another as stated and thus prevent a push-out movement of the sliding carriage part 30 in the direction of the push-out arrow 16'. On the other hand the further push-in movement in the direction of the arrow 16 of Figure 1 still to be described in more detail is readily possible from this run-out position of Figure 11.

From Figure 11 it can also finally be gathered how a sliding carriage part 30 can be fitted on the rail part 20. The position of the sliding carriage part detached from the rail part 20 is labelled in Figure 11 by 30" and is to be designated in short as the "disassembly position" in what follows. The sliding carriage part 30" is plugged by its back end 37 discernible in Figure 5, which is advantageously pointed according to Figure 2, on to the advantageously likewise pointed front edge 23 of the rail part 20 according to Figures 6 and 7. This initiating plug-on movement is illustrated in Figure 11 by the arrow 16". In the transition from the disassembly position 30" to the run-out position 30 of Figure 11 the locking tooth 34 travels with its inclined tooth back 34' discernible in Figure 11 on the correspondingly oppositely inclined back 24' of the opposing locking tooth 24 on the rail side. An elastic deformation ensures until finally through the backs 24', 34' of the teeth running on one another the locking tooth 34 snaps being the

opposing locking tooth 23.

The further push-in movement 16 from the run-out position shown pulled out in Figure 11 is, however, not possible because this is prevented by the further pair of stopping and opposing stopping members 33, 23. This is best seen in Figure 2 in association with Figures 5 and 6. The stopping and opposing stopping member 33, 23 are the two components of a locking mechanism here likewise provided in duplicate. As shown in Figure 5, the rocker 36 is provided at both peripheral edges with a locking elevation 33 which strikes against the aforementioned front edge 23 of the slide part. This can be seen in Figure 2. By this means the push-in movement 16 of the sliding carriage part illustrated by the dotted arrow 16 in Figure 2 is initially blocked. The sliding carriage part 30 can thus neither be pushed in further in the direction of the arrow 16 nor be pushed out further in the direction of the arrow 16'. The run-out position 30 of the sliding carriage in Figure 2 is thus fixed.

As has already been mentioned, according to Figure 2 it is now possible to plug in the mating connector 50 in the direction of the correcting arrow 18 into the fixedly positioned plug 40 on the sliding carriage part 30. This has partially taken place in Figure 2. The final connection is effected in Figure 3 where the contacts 41 and the opposite contacts 51 have a good electrical connection to one another. Now the sliding carriage part 30 can be conveyed into a second position 30' discernible in Figure 12 where the sliding carriage part is positioned well concealed at an inaccessible position 15 beneath the seat 10. The final "retracted" position of the sliding carriage part is then established.

In order to convey the sliding carriage from the run-out position 30 shown in Figure 3 into the retracted position 30' of Figure 12 it is necessary to release the locking elevation 33 on the rocker 36 from the effectively locking front edge 23 on the rail part 20. This happens according to Figure 3 simply in that the free end of the rocker 36 functioning as a handle 35 is pushed in the direction of the force arrow 43 which can be seen in figure 3. This is of course only possible when there is complete connection between the plug and mating connector 40, 50 according to Figure 3, while in the preceding position of Figure 2 this is precluded for the following reason.

That is, as is shown in Figure 2, the mating connector possesses a radial projection 53 which points towards the rocker 36. If the mating connector 50 is only partially inserted into the plug 40, as Figure 2 shows, then its projection 53 travels under the handle 35 of the rocker 36 and blocks its actuation made plain by the dotted arrow 43' in Figure 2. The handle 35 is blocked. The two components 23, 33 of the locking mechanism between the sliding carriage part and rail part 30, 20 are secured in their engagement. Thus it is precluded that the sliding carriage part 30 can be conveyed into the final pushed-in position 30' of Figure 12 in the case of such an imperfect coupling position of the two plugs 40,

50. This is possible only in the complete connection position of Figure 3. Then, as Figure 4 makes clear, due to the action of force 43 at its handle end 35 the rocker can be conveyed into a pivot position 36' in which its locking elevation 33 is released from the barring edge 25 on the rail side. Only now is the further push-in movement 16 according to Figure 4 possible.

The blockage of the actuation 43' of the rocker 36 described in Figure 2 is given in the present case in that the mating connector projection 53 strikes against a catch 38 which is located in the region at the end of the rocker handle 35. The starting pivot position of the rocker 36 according to Figures 2 and 3 is essentially determined by two additional spring tongues 39 which, as Figure 5 shows, are positioned on both sides of this catch 38. The spring tongues 39 are S-shaped and one arc of the S is formed in the region of the rocker handle 35, while the other arc of the S is seated in the region of the casings 32 for fixing the plugs 40. In the fully coupled position of the mating connector 50 according to Figure 3 the projection 53 comes into the region of a recess 44 provided on the rocker 36. As is best seen in Figure 5, this recess 44 consists simply of the open space enclosed by the two lateral S-spring tongues 39 behind the catch 38. On pressing in the direction of the force arrow 43 of Figure 4, the mating connector projection 53 moves into this recess 44. As is evident from Figure 4, the spring tongue 39 is strongly deformed and after release of the rocker handle 35 strives to switch over from its release pivot position 36' of Figure 4 to its starting pivot position 36 of Figure 3.

In the release pivot position 36' of the rocker of Figure 4, where the locking components 23, 33 are disengaged, the sliding carriage can now be conveyed into the full retracted position 30' of Figure 12 already mentioned. In doing so, the two plugs 40, 50 firmly connected to one another are carried along too. They are now in fact located a considerable way 54 behind the aforementioned front edge 23 of the rail part 20. Now two further pairs of stopping and opposing stopping members 45, 25 and 46, 26 respectively come into engagement which secures the retracted position 30' of the rail part.

One pair of members 45, 25 consists again of a locking mechanism, that is to say, as can best be seen in Figure 5, of a further locking elevation 45 on the rocker 36 and of a counterlocking edge 25 which can be seen in Figure 12. As a comparison of the previously described locking edge 23 in Figure 3 shows, this counterlocking edge 25 acts in the opposite direction and normally precludes the push-out movement of the sliding carriage part discernible by means of the arrow 16' in Figure 12. However, the opposite movement 16 in the direction of the dotted arrow in Figure 12 is also blocked because the members 46, 26 are now effective as limit stops and fundamentally preclude a further movement.

As can be seen from the plan view of Figure 5 and the side elevation of Figure 13, the sliding carriage part 30 possesses two limit stop members 46 preceded by

run-up slopes 47 arranged in the region of the two U-guides 31. As best emerges from Figure 6, the sliding carriage part 20 possesses on its housing 22 two lateral flaps 28 opposite one another, the front flap edge 26 of which forms the limit stop edge working together with the limit stop member 46. Thus, as is shown by the dotted arrow 16 of Figure 13, the further push-in movement of the sliding carriage part located in the retracted position 30' is fundamentally precluded.

As is shown in the side view in Figure 13, however, in the retracted position 30' of the sliding carriage the run-up slope 47 of the sliding carriage part 30 has moved under the lower flap surface 27 of the flap 28 and fills a gap 29 located between the U-guide 31 of the sliding carriage part on the one hand and the flap undersurface 27 on the other hand. By this means any play between the rail part 20 and the sliding carriage part located in the retracted position 30' is eliminated, as a result of which rattling noises when driving the motor vehicle are eliminated.

In order that the mating connector 50 can be conveniently disconnected again from the plug 40, it is possible to take the sliding carriage part back out of its retracted position 30' of Figure 12 as required into the run-out position of Figure 3 again. For this purpose it is only necessary to convey the rocker 36 from its starting pivot position presented in Figure 12 by exercising pressure on its handle end 35 back into a release pivot position 36' analogous to Figure 4. In this case in the retracted position 30' of Figure 13 the locking components 45, 35 are disengaged in analogous manner to that explained with reference to the locking components 33, 23 in Figure 4 in the case of the run-out position 30. After the displacement of the sliding carriage part up to the run-out position 30 of Figure 3 the stopping and opposing stopping members 23, 33 already described snap in. In doing this it is not necessary to hold the rocker 36 compressed in its release pivot position 36' of Figure 4 for the entire duration of the displacement path. Actuation of the rocker 36 merely in the first moment is sufficient for the release of the locking components 25, 45 of Figure 12. As has already been made clear in Figure 11, the end position of the push-out movement 16' is reached by means of the limit stop action of the described locking and opposing locking teeth 34, 24 and the locking elevation 33 on the sliding carriage side snaps automatically behind the locking edge 23 on the rail side. That is, as Figures 3 and 5 show, the locking elevation 33 is preceded by a sloping ramp 48 with which the interfering components on the sliding carriage part 20 are surmounted by means of an automatic elastic outswing movement; during the push-out movement 16' of Figure 3 the locking elevation 33 snaps automatically behind the locking edge 23.

In order to enable a corresponding automatic elasticity during the displacement of the sliding carriage part 30 on the rail part 20 in the region of the second locking elevation 45 on the rocker 36, the latter is followed by a ramp provided with a corresponding counterslope 49,

as can be seen in Figure 5 and 12.

## Claims

1. Device for fastening at least one electric plug (40) at a poorly accessible position (15), especially on the seat frame (11) beneath a seat (10) in a vehicle, and with an electric mating connector (50) which can be connected manually to the fastened plug (40), characterised by a two part fastening device, consisting of a fixed rail part (20) and of a sliding carriage part (30) displaceable longitudinally thereon, which has on the one hand a mounting (32) for the electric plug (40) and on the other hand a sprung handle (35), wherein the sliding carriage part (30) or its handle (35) possesses two sets of stopping members (33, 34, 45, 46), while two sets of opposing stopping members (23, 24; 25, 26) complementary to the latter are located on the rail part (20), the opposing stopping members (23, 24; 25, 26) can be brought in pairs into engagement with the stopping members (33, 34; 45, 46) and by that means fix the sliding carriage part (30) on the rail part (20) in two positions displaced longitudinally with respect to one another, that is to say a run-out position (30) of the sliding carriage part serving as the first position, where the plug (40) mounted in the sliding carriage part (30) is conveniently accessible and can be easily connected to (18) or disconnected from the mating connector (50), and a retracted position (30') of the sliding carriage part forming the second position, where the mating connector (50) connected to the plug (40) is located at the poorly accessible position (15) in the vehicle, and in both positions (30,30') by actuation (45) of the handle (35) against its spring force the stopping members (33 or 45) located on the handle (35) can be conveyed into a release position with respect to the opposing stopping members (23 or 25) and render the sliding carriage part freely displaceable longitudinally (16, 16') by hand between its two positions (30,30') on the rail part (20).
2. Device according to claim 1, characterised in that the mating connector (50) possesses a projection (53) facing towards the handle (35) of the sliding carriage part (30) and the handle (35) has a recess (44) associated with the projection (53), wherein the recess (44) of the handle (35) is aligned with the projection (53) of the mating connector (50) only in the full proper connection position thereof and renders the handle (35) capable of actuation (45), while in the case of an incomplete plug-in position of the mating connector (50) the projection (53) thereof is directed towards the handle (35) and blocks its actuation (45') for the purpose of releasing the stopping and opposing stopping members (33,23).
3. Device according to claim 1 or 2, characterised in that, starting from the run-out position (30) of the sliding carriage part, by actuation of the handle (35) and thus release of the stopping and opposing stopping members (33, 23), the sliding carriage part can be pulled off into a third disassembly position (30'') wholly detached from the rail part (20).
4. Device according to one or more of claims 1 to 3, characterised in that the handle (35) consists of the free end of a sprung rocker (36) which can be pushed (45) from its spring-loaded locking pivot position, where the rocker (36) is at a distance from the plug (40) mounted in the sliding carriage part, into a release pivot position (36') close the plug where the stopping members are released from the opposing stopping members (23, 33 and 25, 45 respectively).
5. Device according to claim 4, characterised in that the rocker (36) is constructed in one piece with the sliding carriage (30) and consists of elastic material such as plastic.
6. Device according to claim 4 or 5, characterised in that at least in regions the rocker (36) has an S-shaped spring tongue (39) placed underneath which substantially determines the spring loading of the rocker (36).
7. Device according to claim 6, characterised in that the rocker possesses two S-shaped spring tongues (39), one arc of the S thereof being seated on the free end of the rocker and the other arc of the S thereof being seated on the sliding carriage part.
8. Device according to claim 2 and 7, characterised in that between them the two spring tongues (39) enclose the recess (44) with which the projection (53) provided on the mating connector (50) is aligned in its correct connection position in the plug (40).
9. Device according to one or more of claims 2 to 8, characterised in that the rocker (36) possesses a profiled catch (38) which faces towards the projection (53) of the mating connector (50) and in an incomplete plug-in position of the mating connector (50) collides with the projection (53) thereof and blocks swinging of the rocker out of the way (36').
10. Device according to one or more of claims 1 to 9, characterised in that for mounting the plug (40) or of a whole set of plugs (40) the sliding carriage part (30) has one or more profiled casings (32) with which the plug(s) (40) exhibiting a coded opposite profile can be positioned.
11. Device according to one or more of claims 1 to 10,

characterised in that those stopping and opposing  
stopping members which limit the first run-out posi-  
tion (30) of the sliding carriage part (20) in the push-  
out direction (16') on the rail part consist of locking  
elements (24,34) which, starting from the third 5  
released disassembly position (30'') of the sliding  
carriage part, can indeed be conveyed elastically in  
the push-in direction during the transition into the  
second run-out position but then block the opposite  
displacement (16') of the sliding carriage part in the 10  
push-out direction.

12. Device according to one or more of claims 1 to 11,  
characterised in that those stopping and opposing 15  
stopping members which determine the second  
retracted position (30)' of the sliding carriage part  
on the rail part (20) consist of limit stop elements  
(45, 25; 46, 26) which have run-up slopes (47,27)  
capable of being moved into one another and the  
run-up slopes (47,27) moved into one another elim- 20  
inate a play (29) between the rail part and the slid-  
ing carriage part (20; 30') avoiding undesired  
rattling noises.

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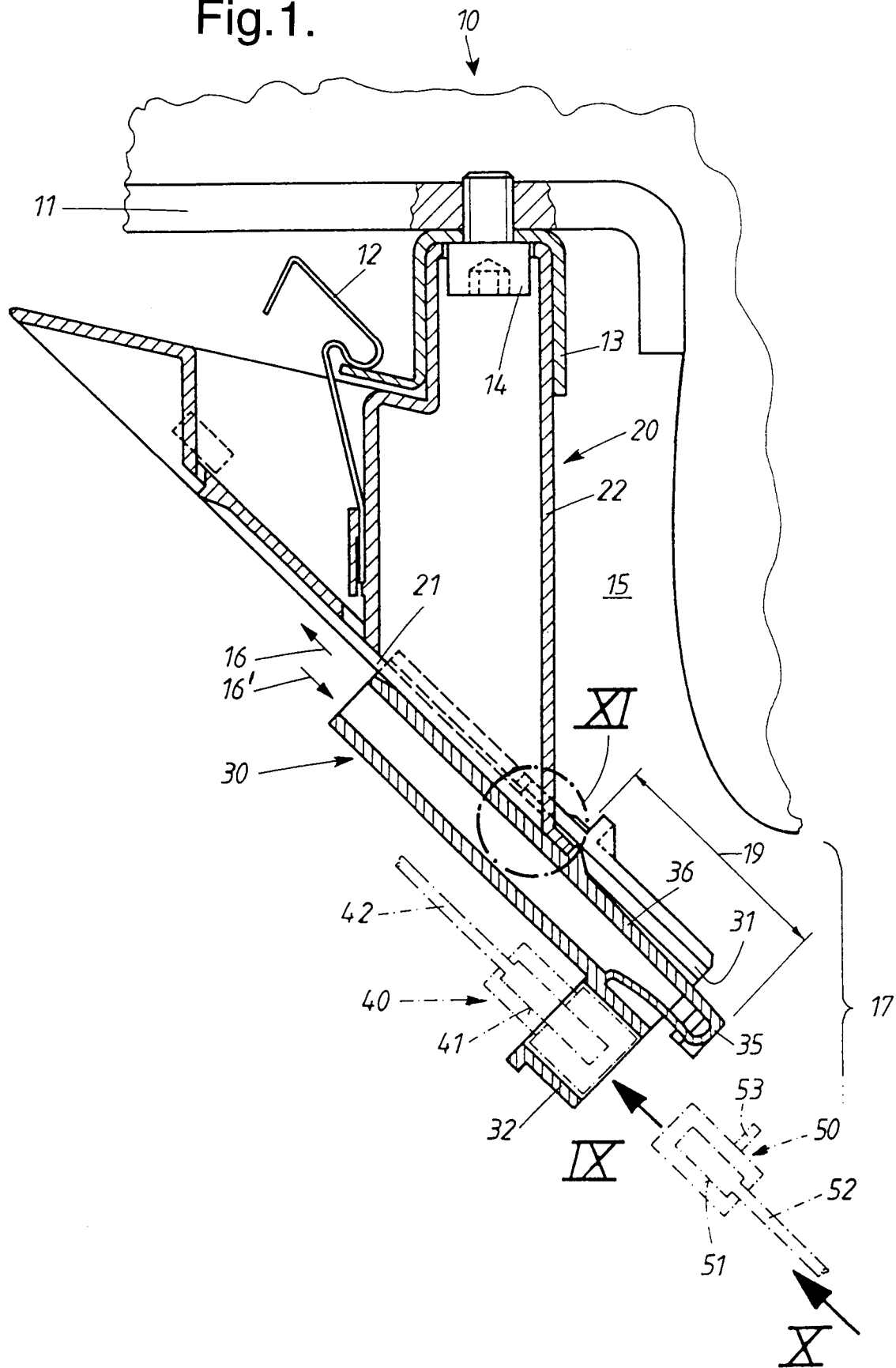
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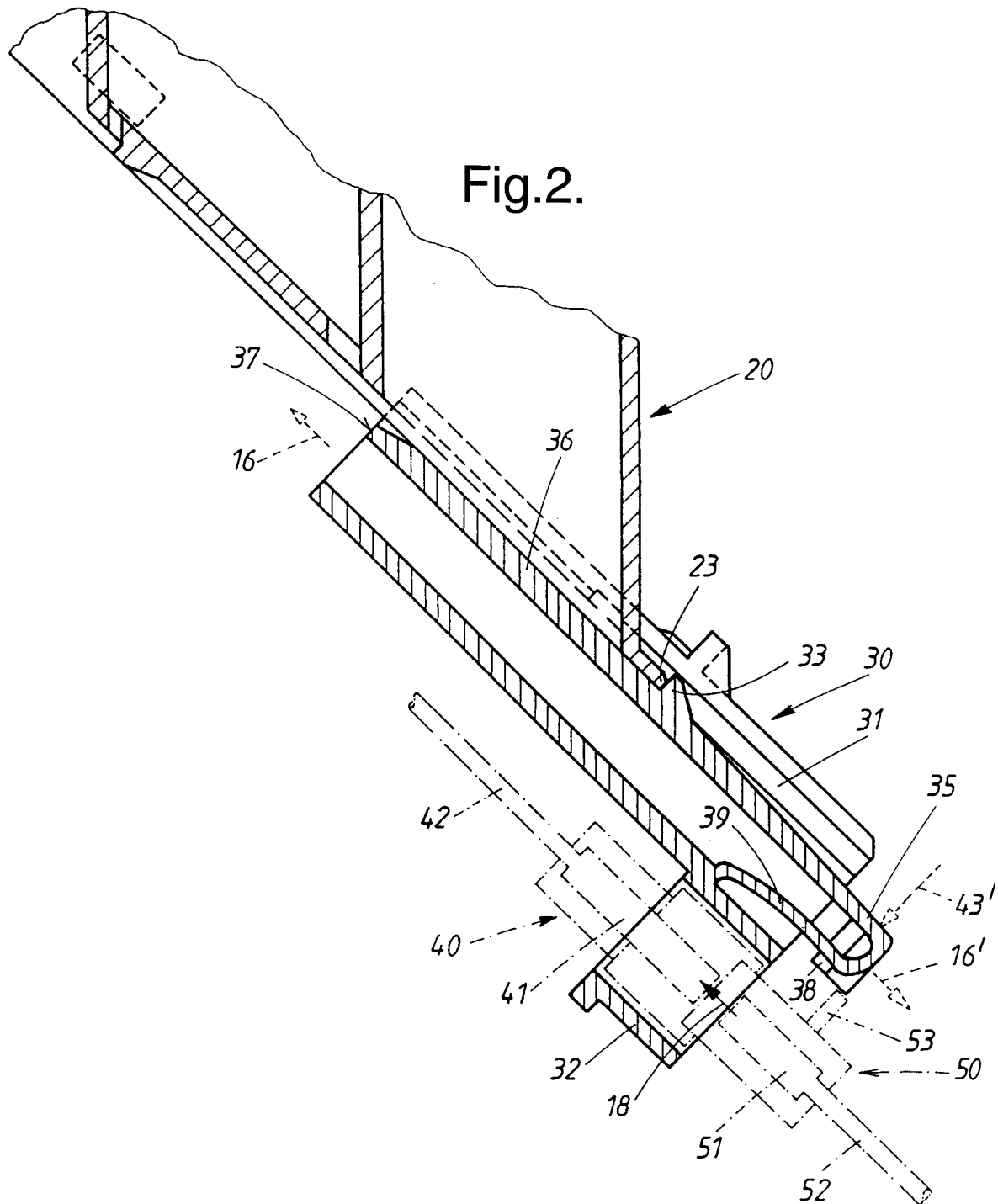
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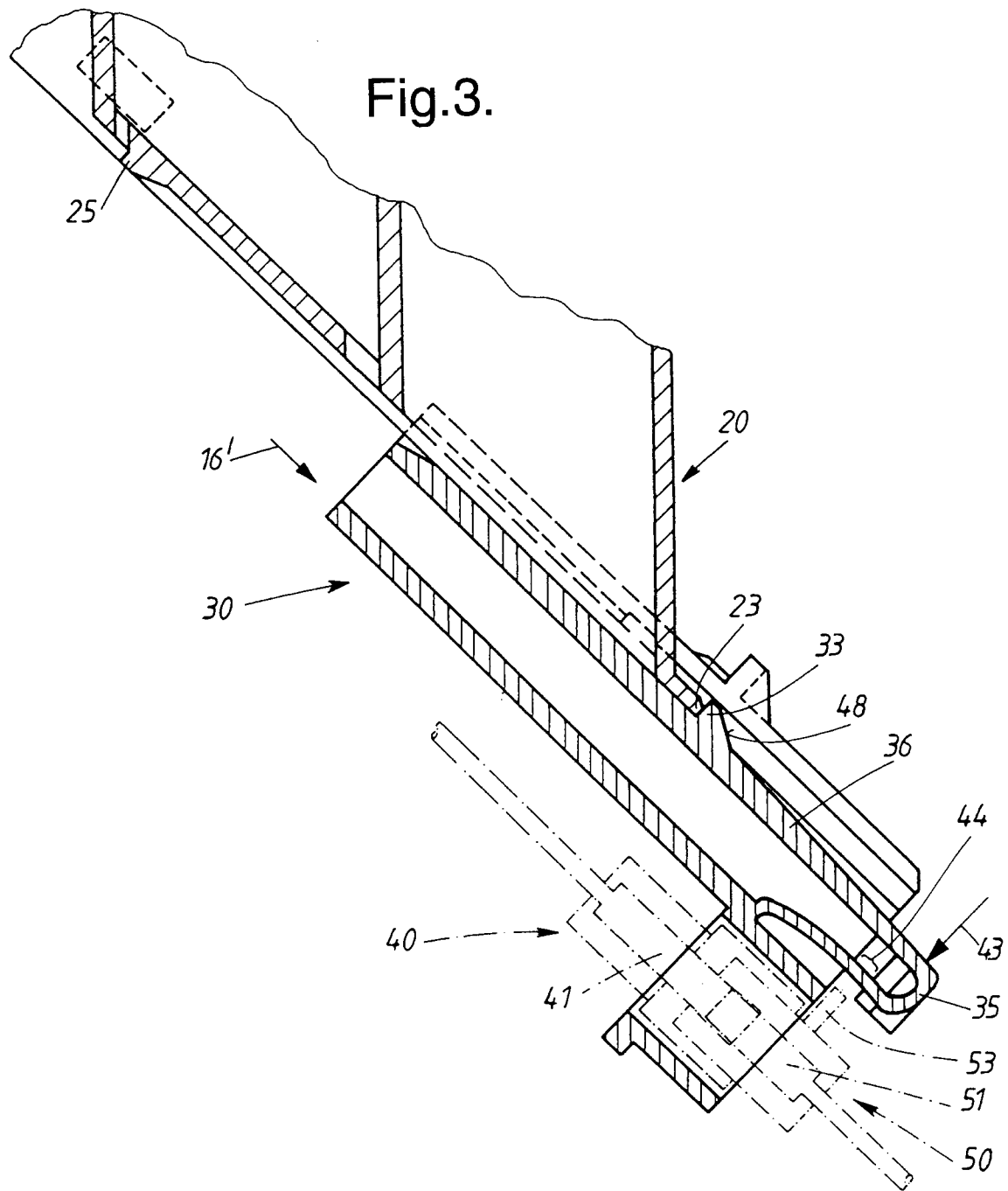
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Fig.1.









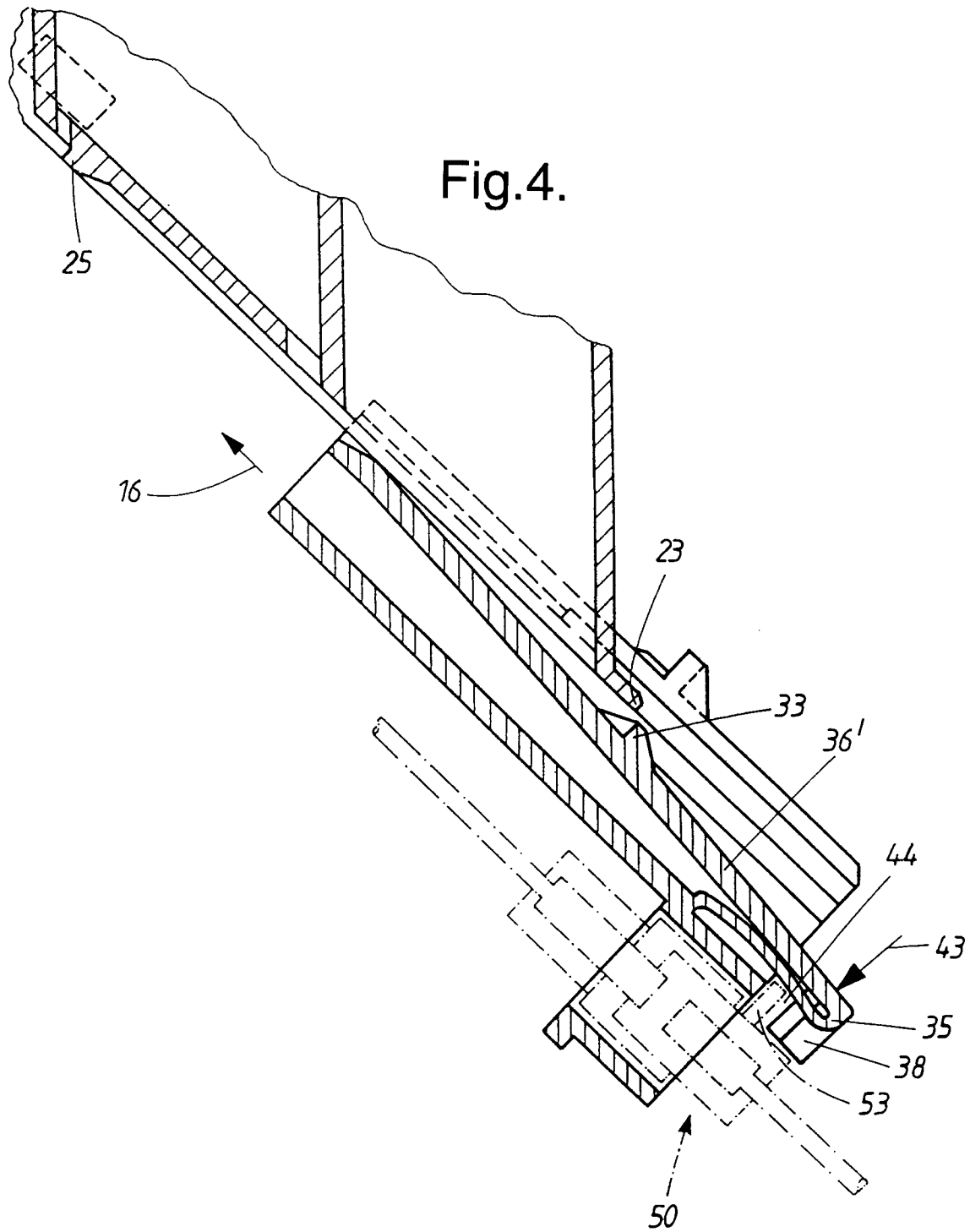
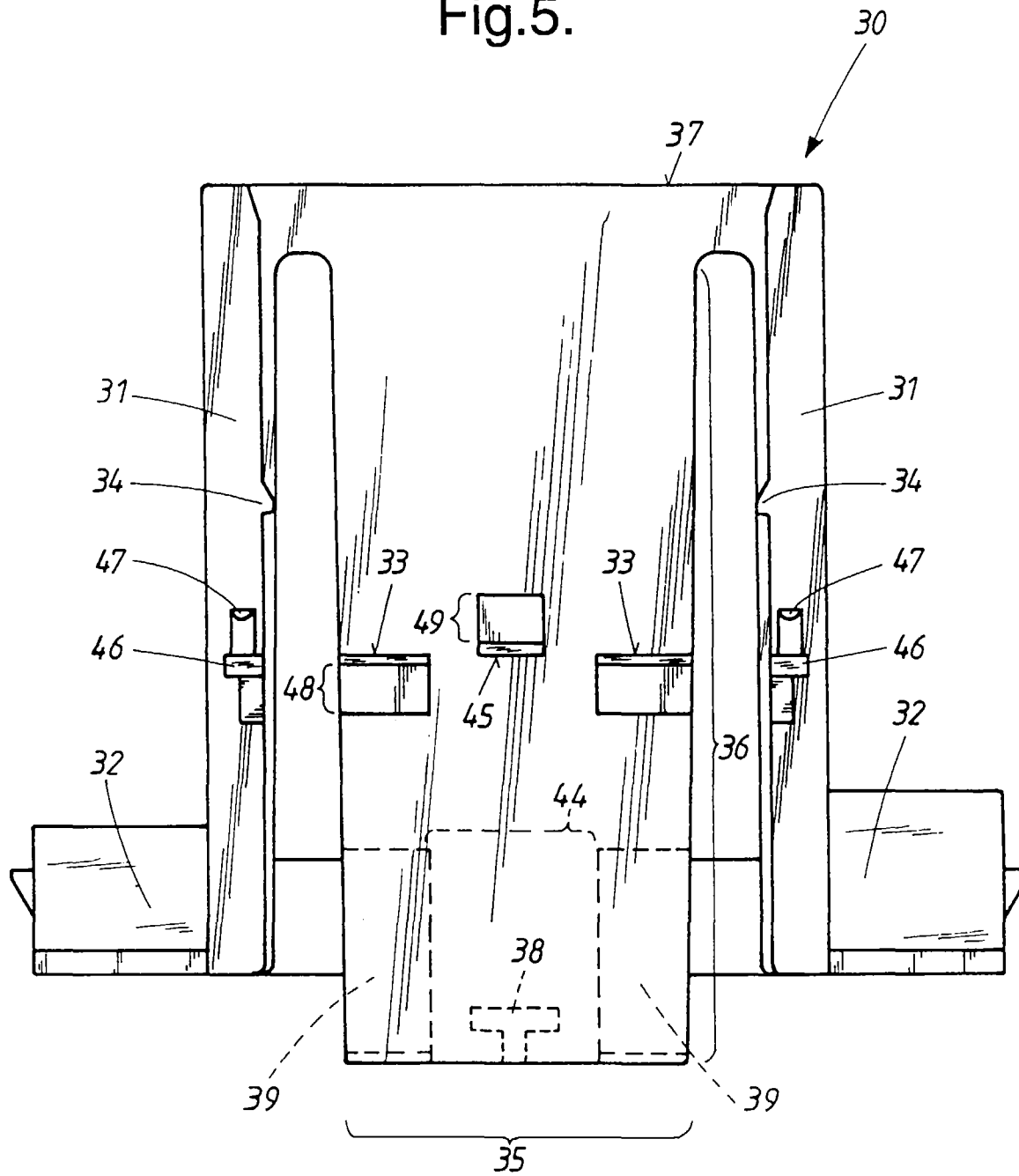
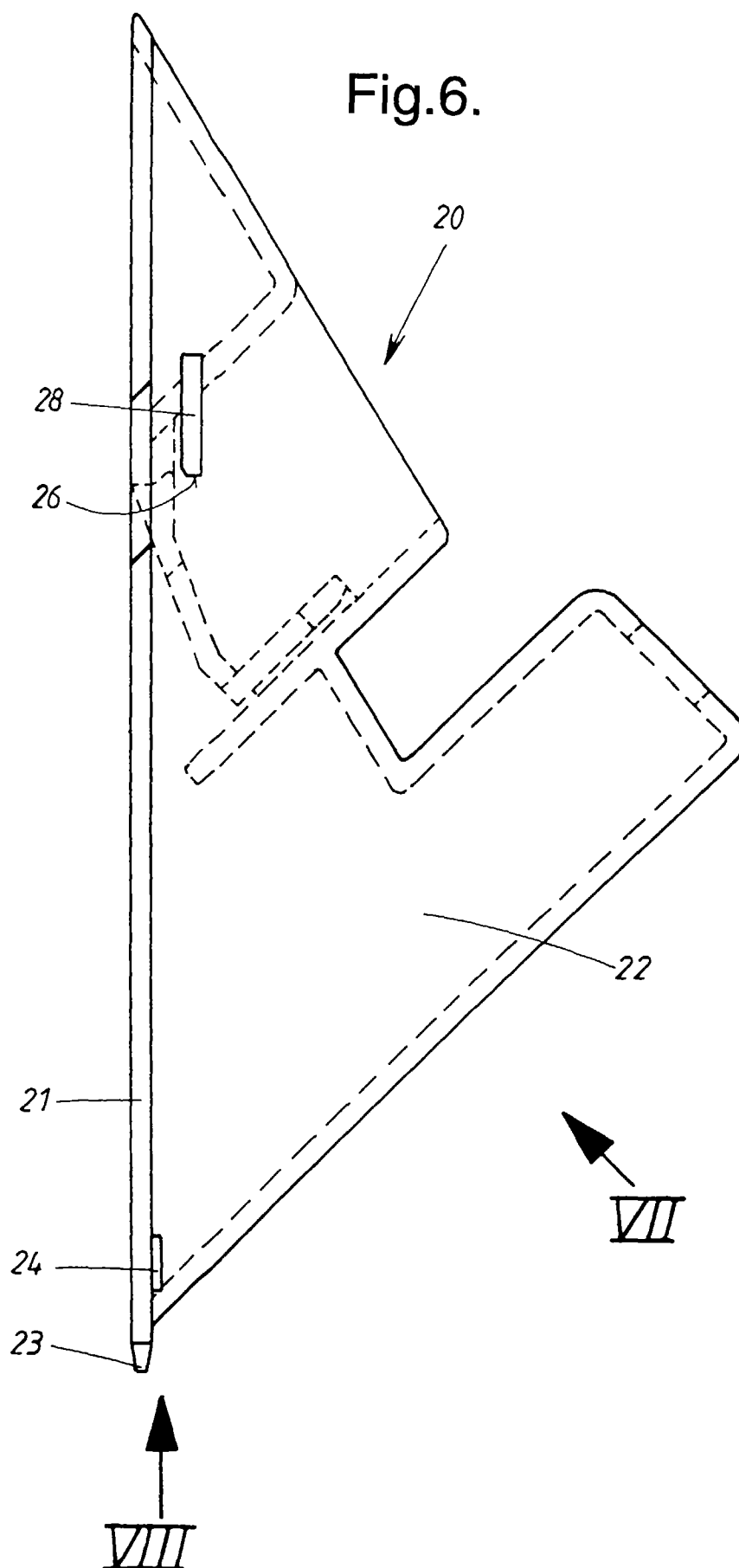


Fig.5.





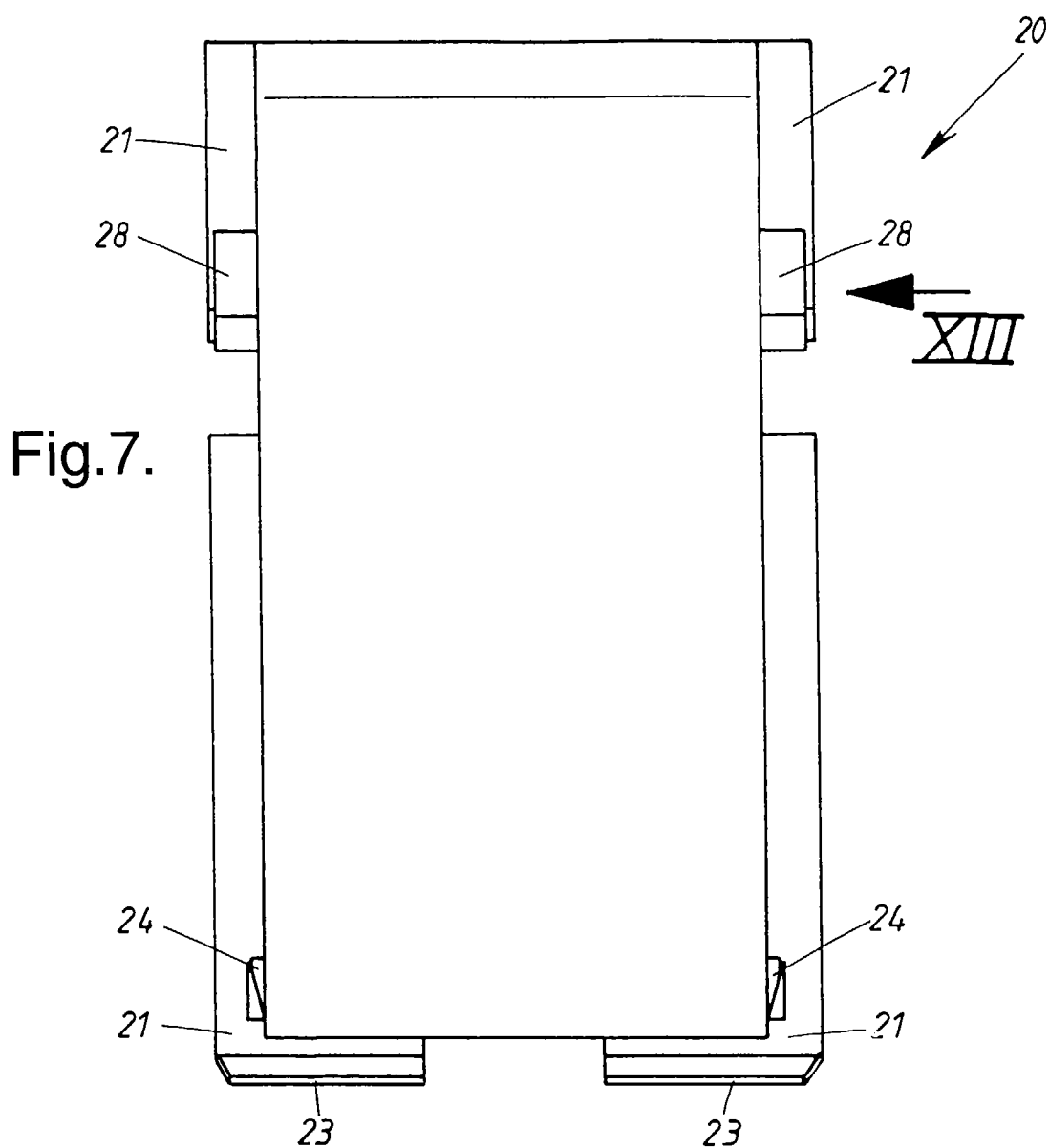
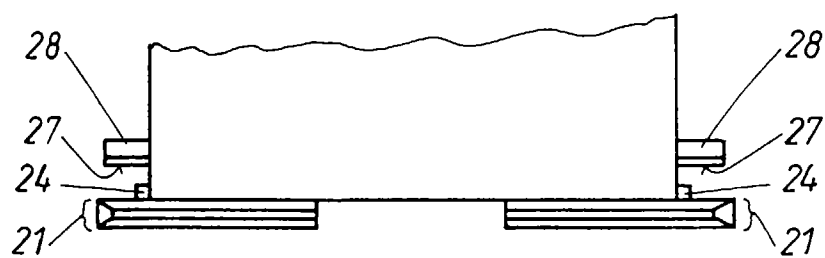


Fig.8.



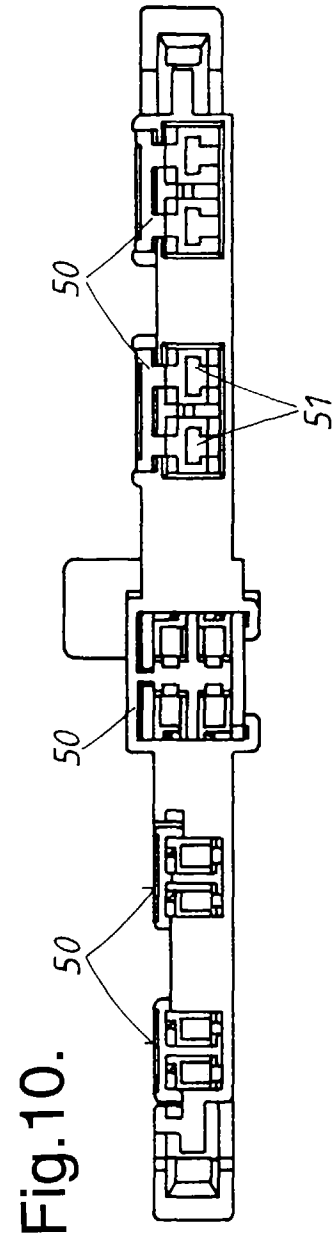
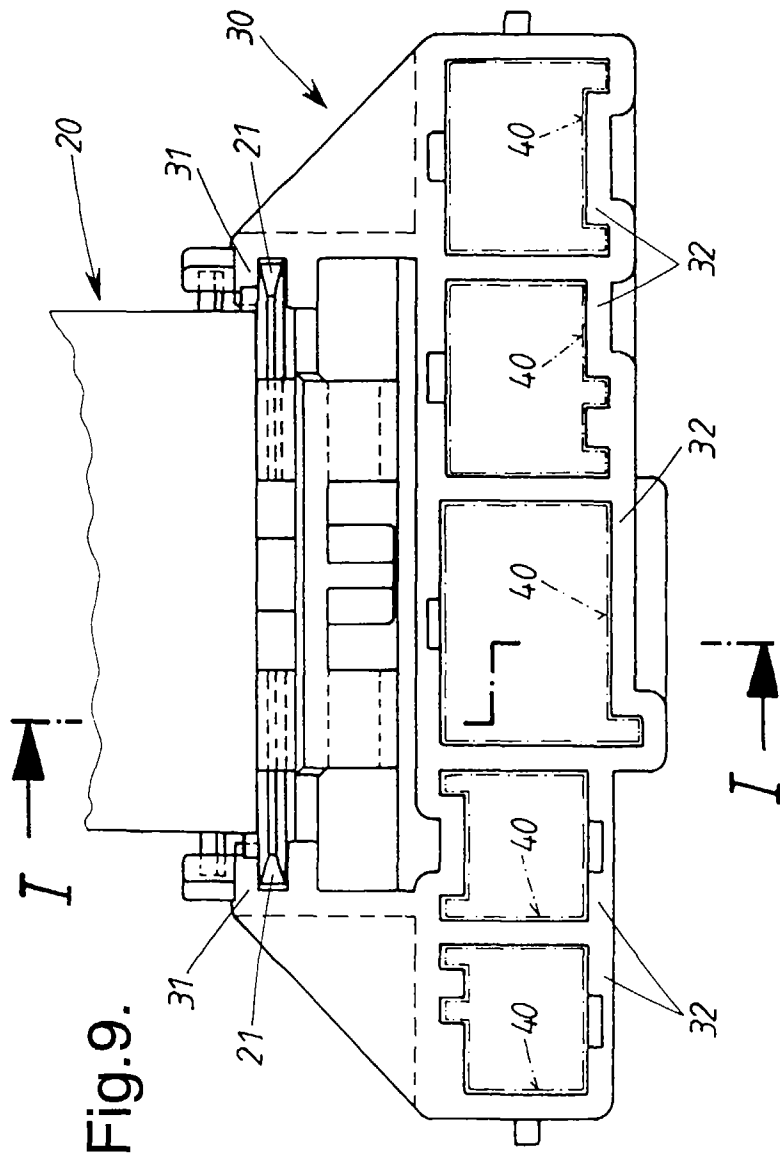


Fig.12.

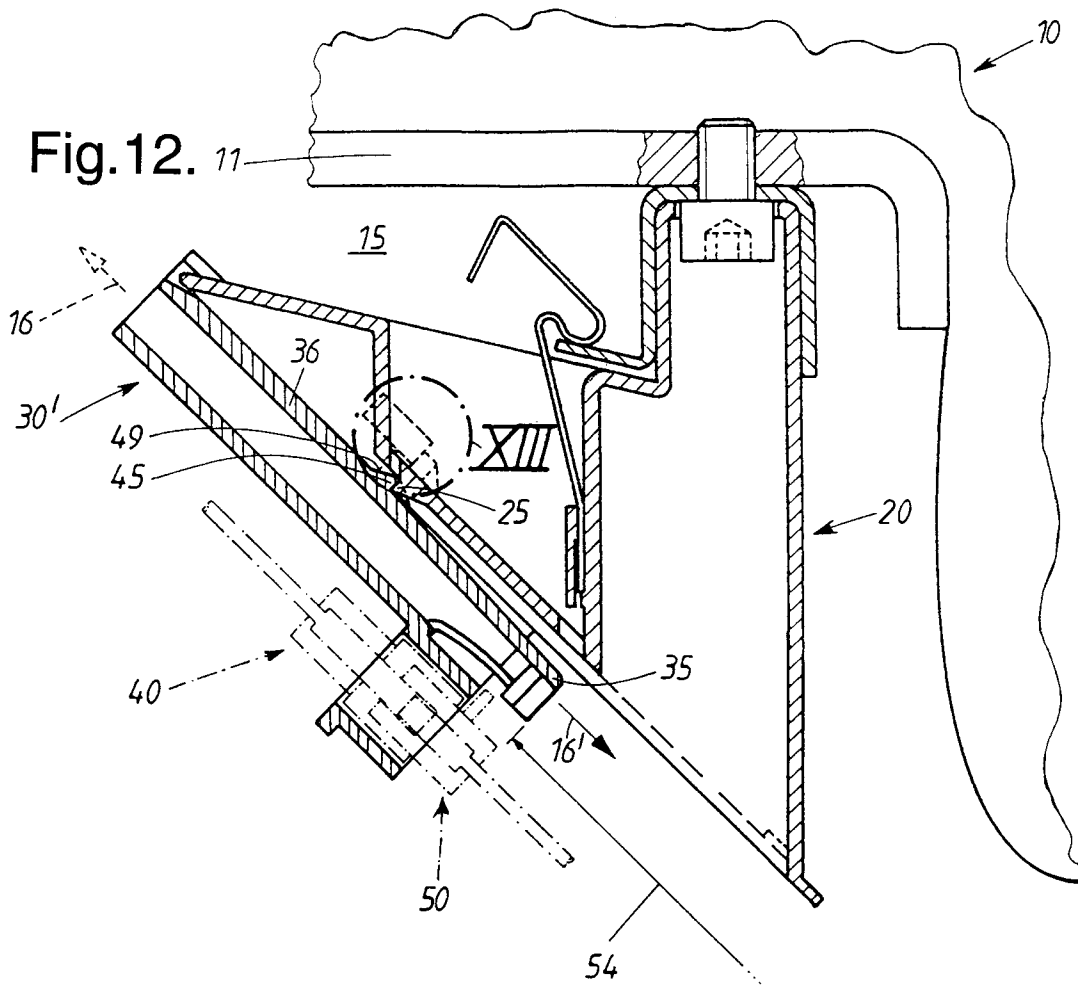


Fig.13.

Fig.11.

