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A4B B11
H2C CCF

(56) Documents Cited:

US 6856505 A **US 6811039 A**
US 6435354 A **US 6305556 A**

(58) Field of Search:

UK CL (Edition X) **A4B, H2C**
INT CL **A47B, F16L, H02B, H05K**
Other:

(54) Abstract Title: **Cable management arm for telescoping slide assembly**

(57) A cable management arm 1 comprises front 11 and rear 12 arms pivoted together at a hinge 13 which is slidable along the slot of a support rail 2. The support rail is connected at its ends to first and second sliding members 3,4. The first slide member is fixed to a middle rail B of a 3-rail telescoping assembly and moves with this rail. The second slide member is slidable within the opposing rail assembly and moves as driven by the support rail. One end of the front arm 11 is pivotally attached to an insertion socket 7 which is secured to an inner rail C. One end of rear arm 12 is pivotally attached to a first connector 5, via a transferring member 14, and secured to an outer rail A. Locking members are arranged between sliding members and connectors to ensure that various parts are movable only in the correct direction.

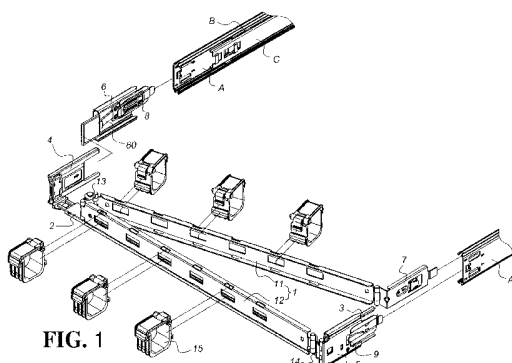
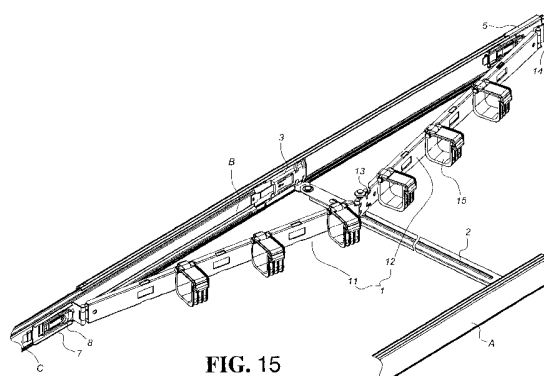
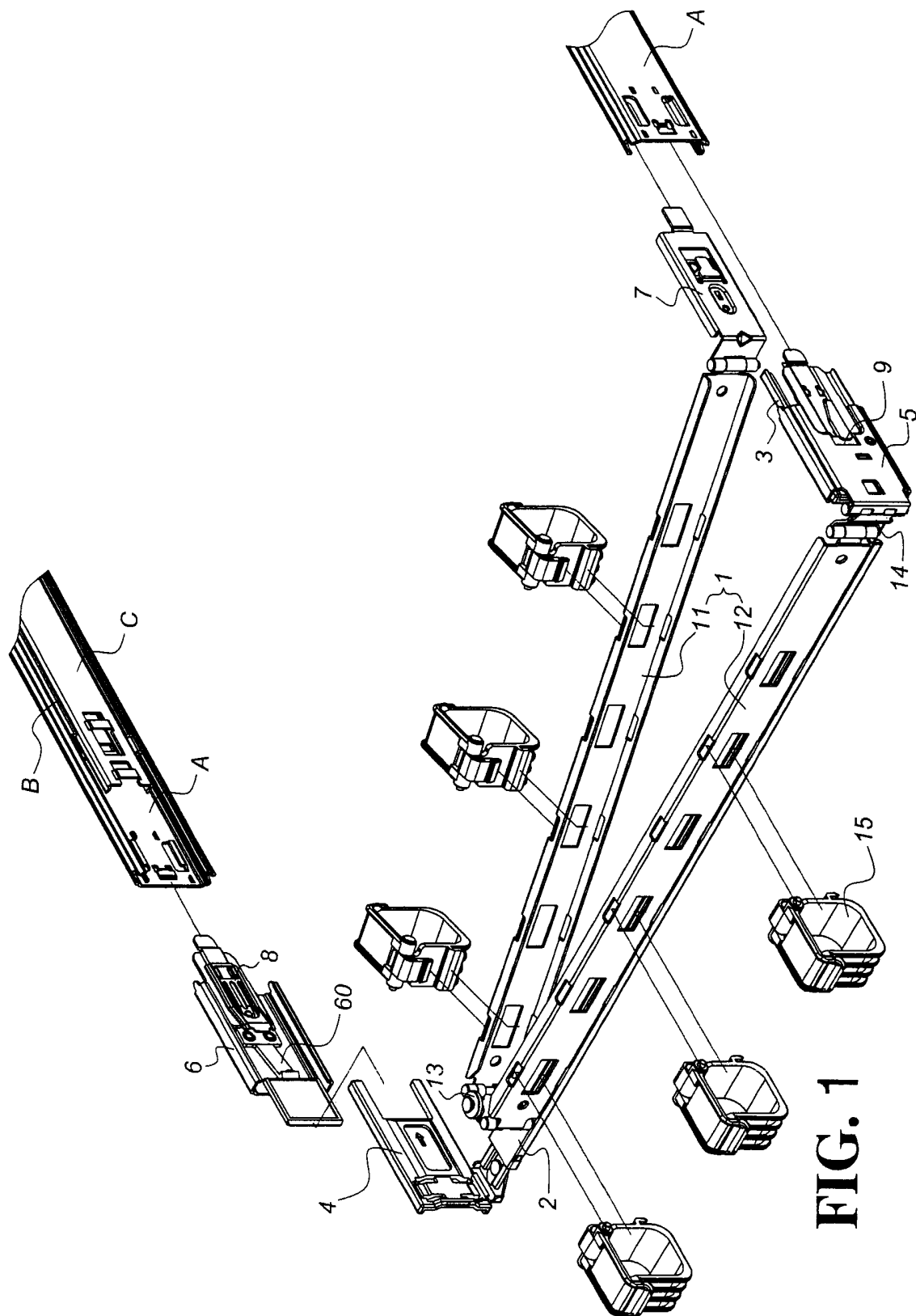


FIG. 15



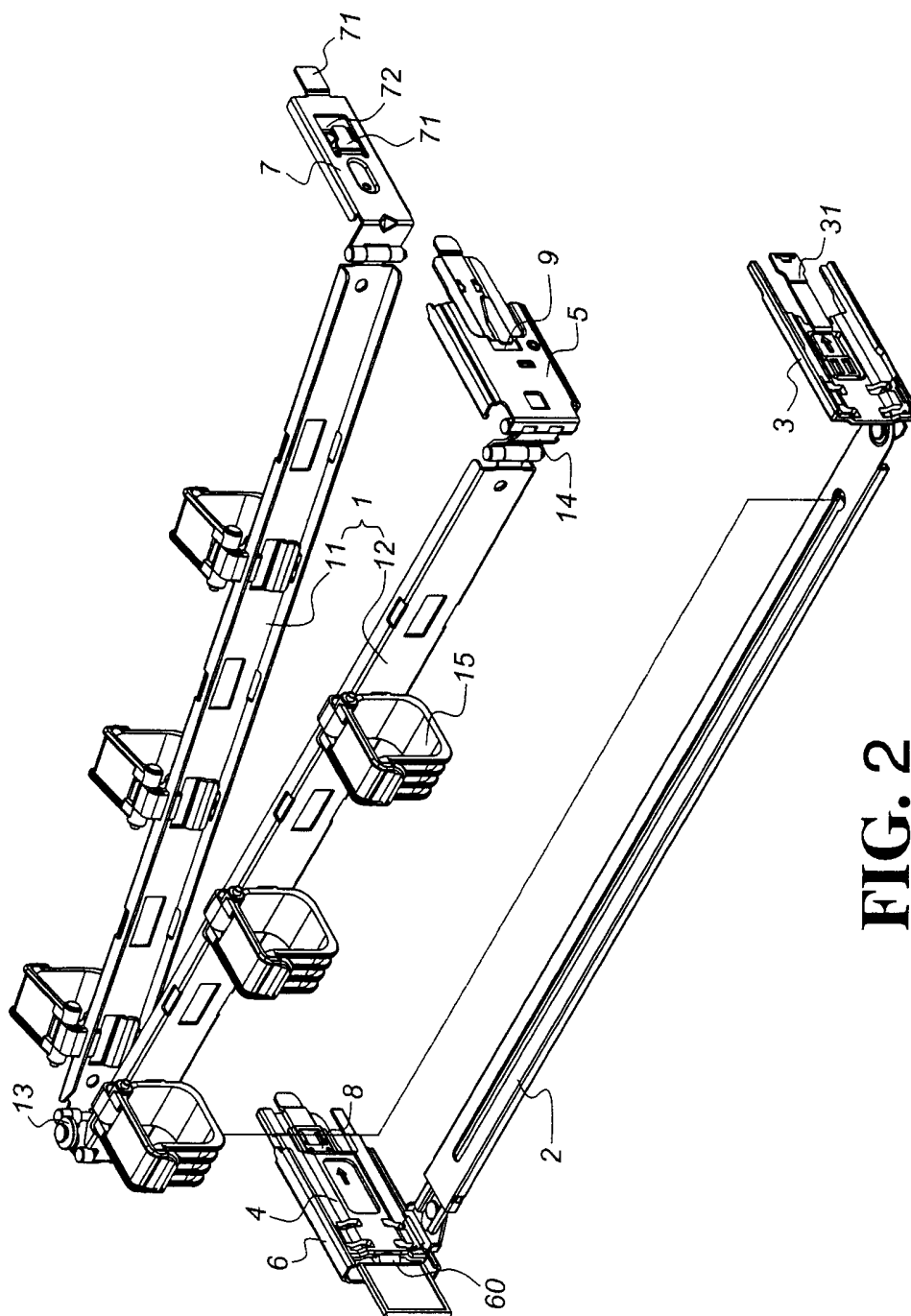


FIG. 3

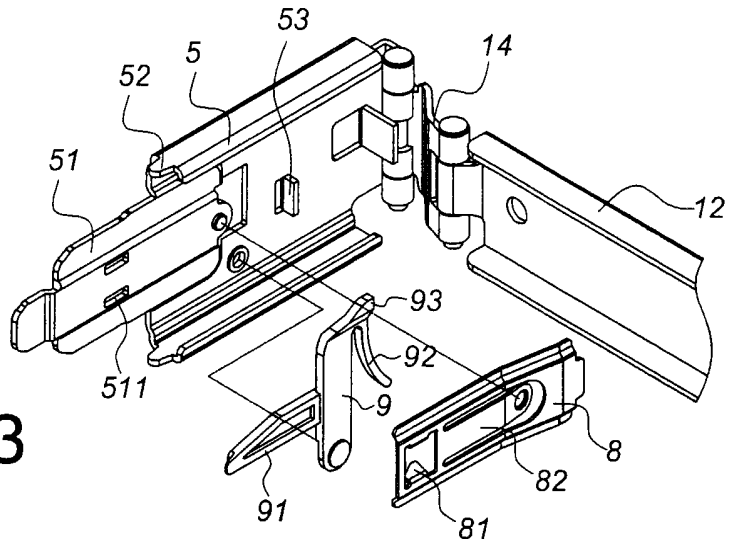


FIG. 4

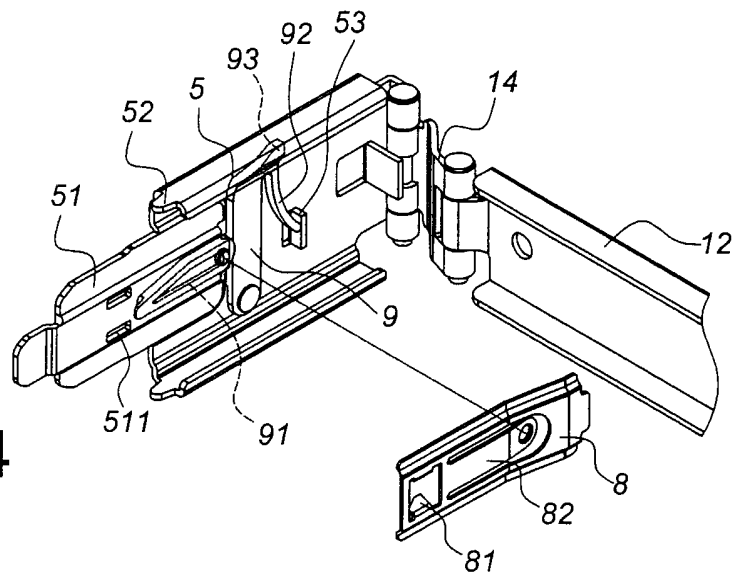
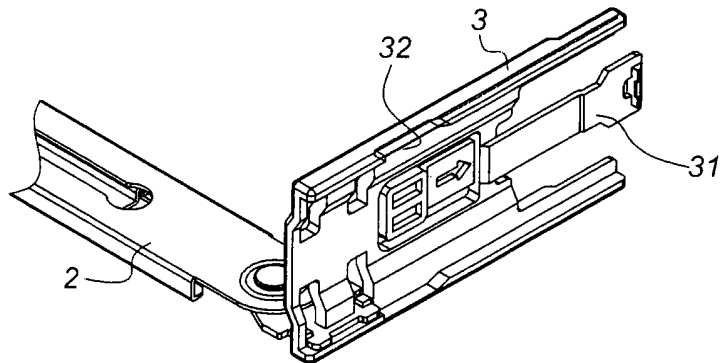


FIG. 5



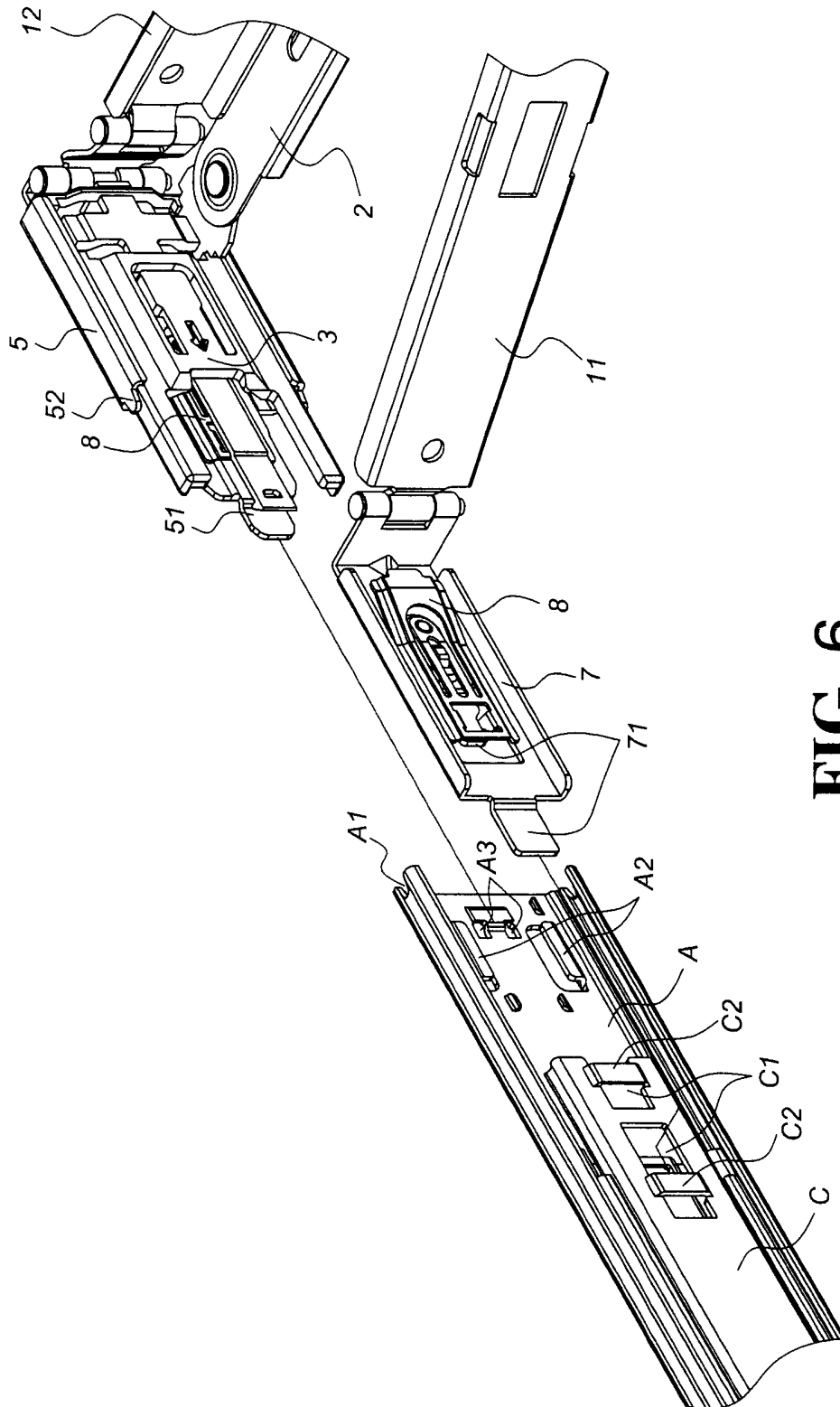


FIG. 6

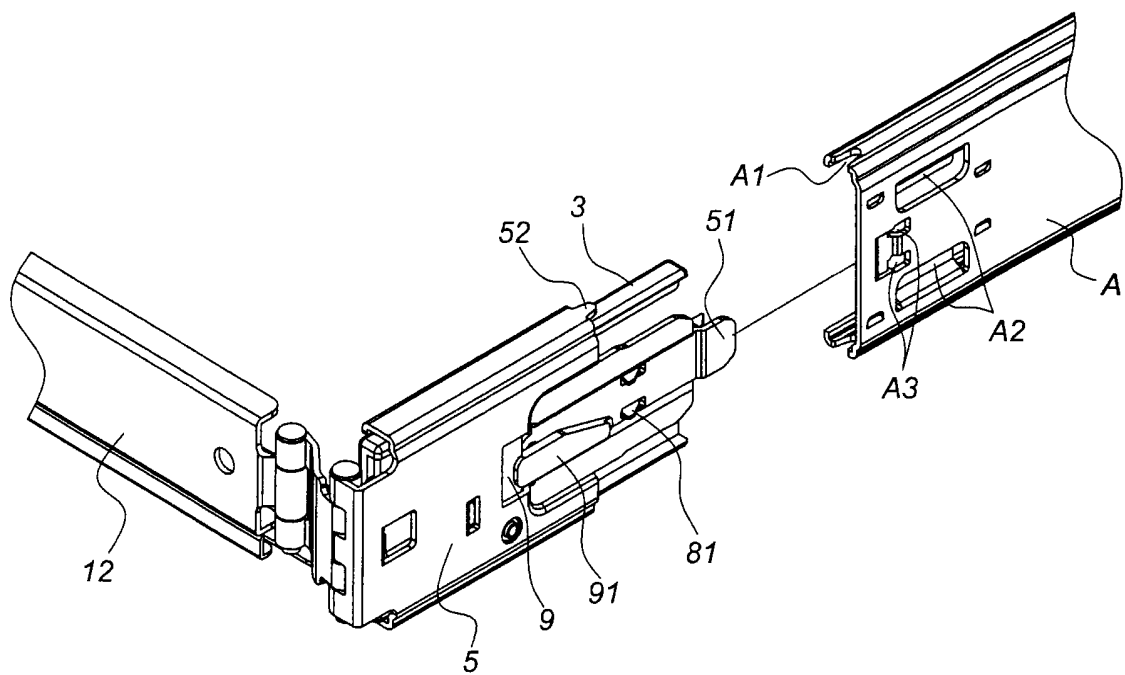


FIG. 7

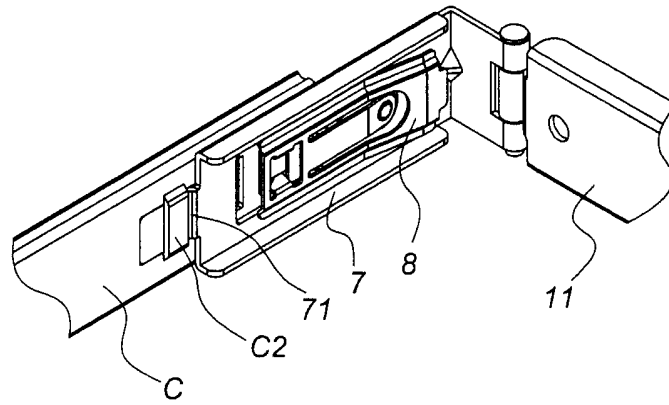


FIG. 8

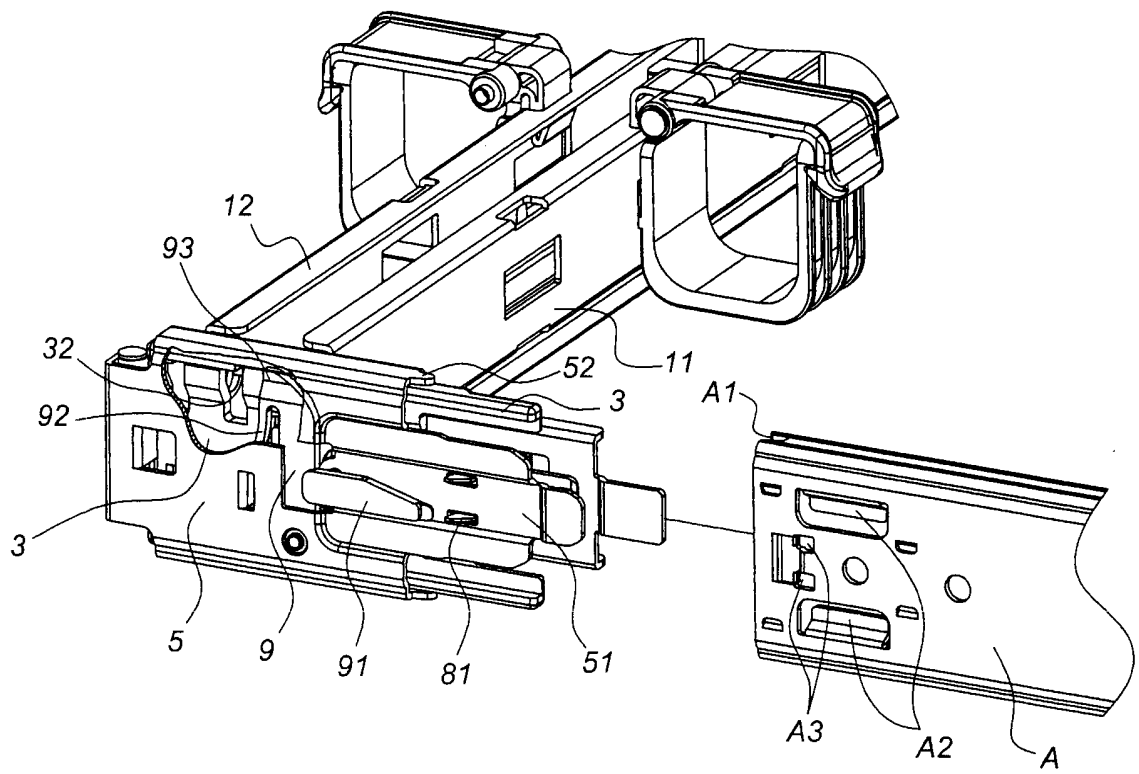


FIG. 9

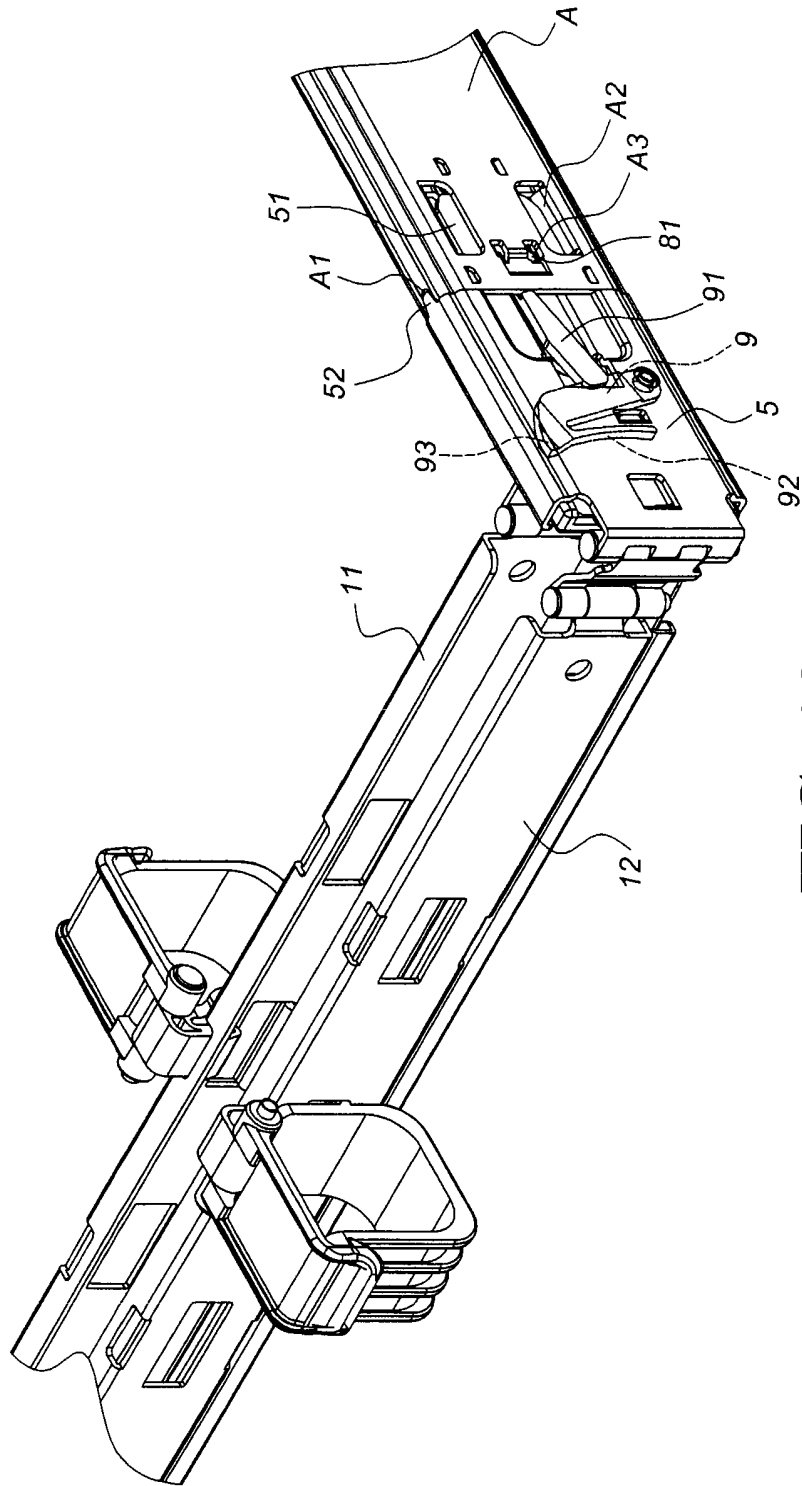


FIG. 10

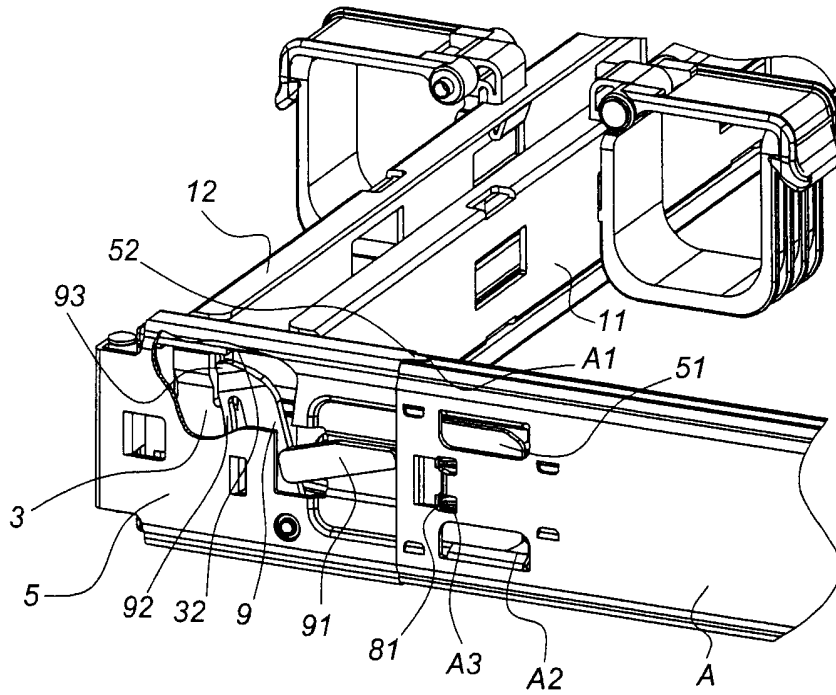


FIG. 11

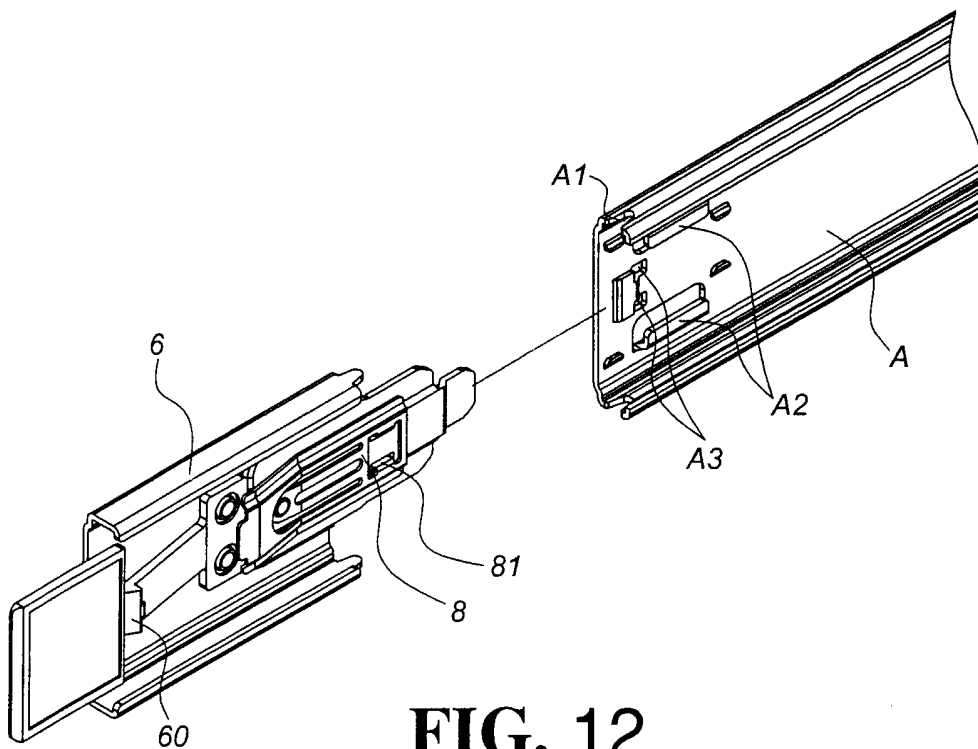


FIG. 12

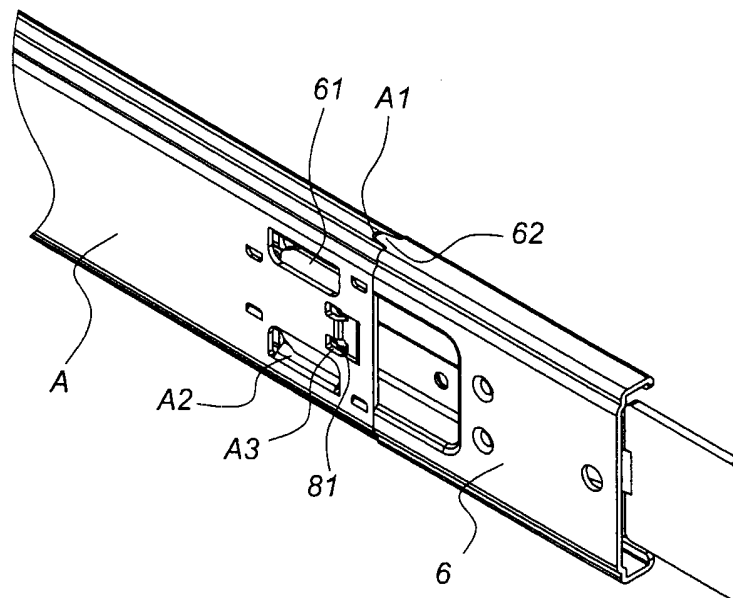


FIG. 13

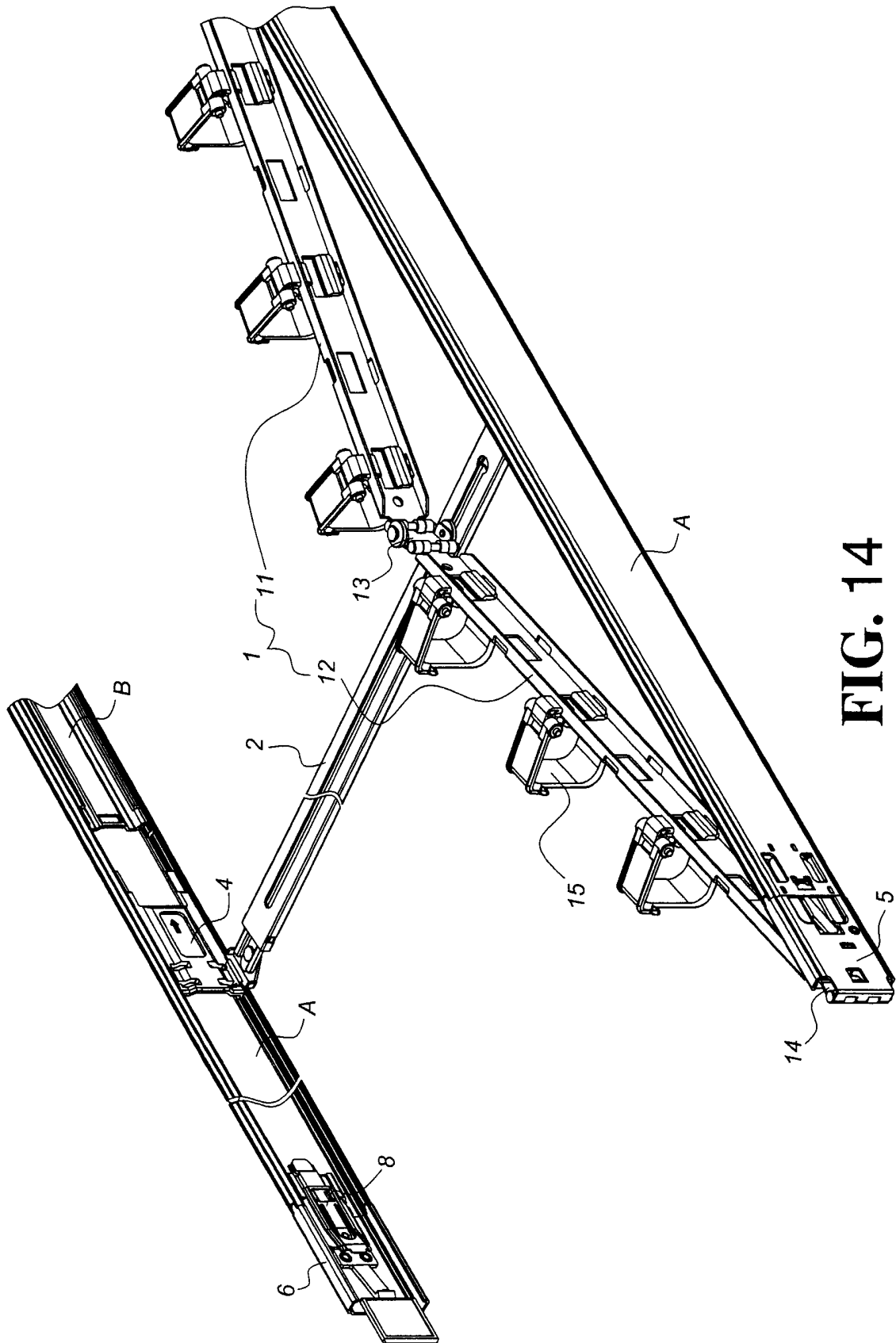
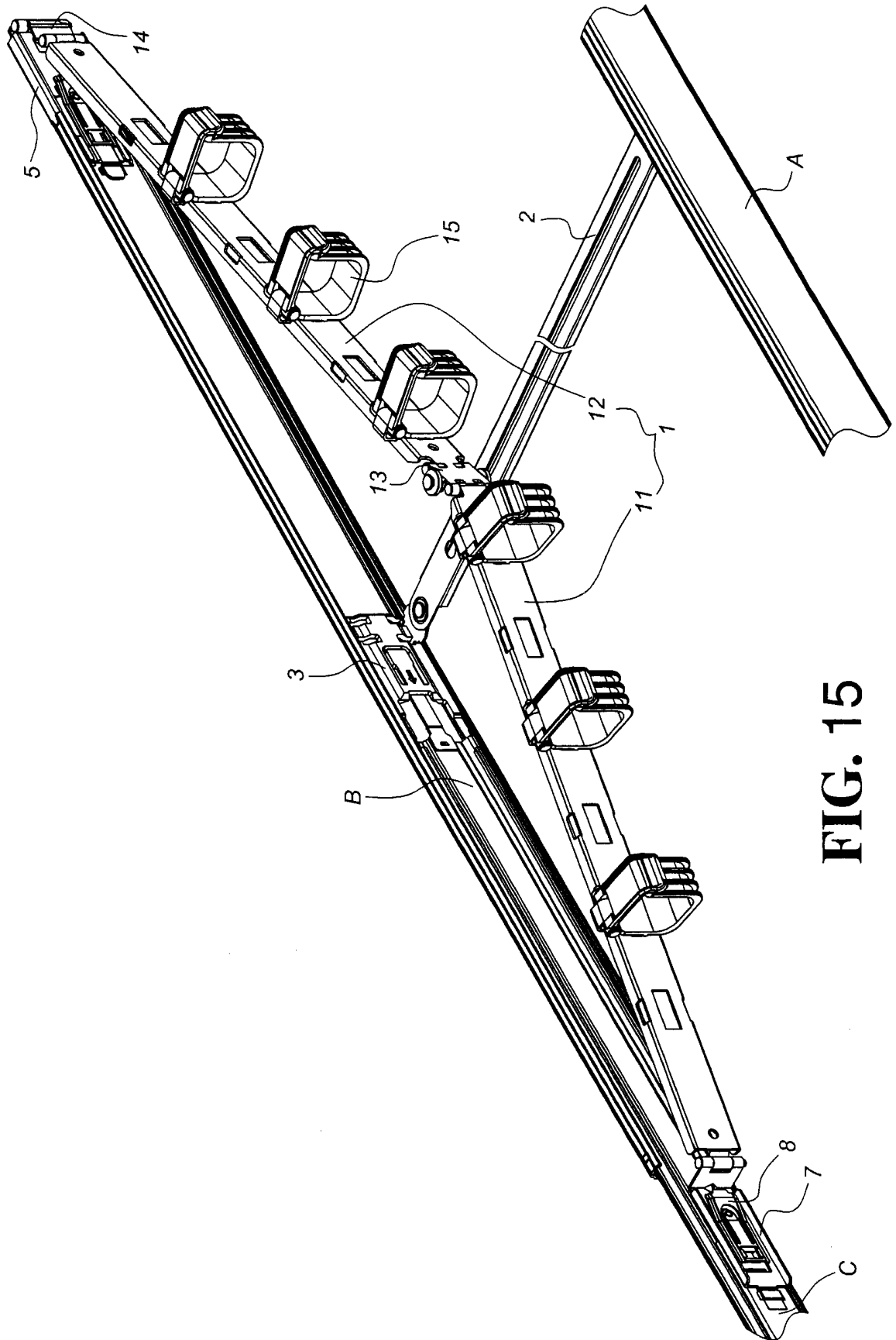


FIG. 14



CABLE MANAGEMENT ARM ASSEMBLY

The present invention relates to a cable management arm assembly, and more particularly, to one provided with a support rail movably connected to rear ends of telescoping slides to automatically move by
5 following the telescoping slides and the expansion of a frame.

For electronic products including servers stacked up in the storage space over the drawer type telescoping slides. Those slides are usually provided on both sides of the electronic product and allow the electronic product to slide on those slides while a cable management arm is made
10 available to accommodate and contain cables connected to the electronic product.

As taught in US Patent Nos. 3,710, 199; 4,353,518; 4,614,383; 5,460,441; 5,571,256; 5,893,539; 5,921,402; 6,070,742; 6,215,069 B1; 6,303,864 B1; 6,305,556 B1; 6,326,547 B1; 6,327,139 B1; 6,407,933 B1; 15 6,435,354 B1; 6,442,030 B1; 6,501,020 B2; 6,523,918 B1; 6,600,665 B2; 6,646,893 B1; 6,715,718 B1; 6,805,248 B2; 6,811,039 B2; 6,854,605 B2; 6,856,505 B1; 6,867,980 B2; 6,896,344 B2; 6,902,069 B2; 6,945,504 B2; and US Patent Application No 2003/0026084 A1, those cable management arm are adapted with slides having both ends of the cable
20 management arm serving as supports. Those cable management arms are foldable by means of a folding member (usually a hinge) disposed between both ends, and the folding member is suspended to stay far away from either support when the cable management arm is folded.

Whereas the cables and the cable management arm of the prior art
25 are given with inherited weight, the folding member provided on the cable management arm tends to droop, affecting the operation in an intensively stacked up storage space.

Furthermore, a cable management arm assembly operating in conjunction with slides characterized in that the slides help share the burden of the weight of the frame, prevent the frame from drooping at where the frame is folded and extend service life and allow easy operation as disclosed in Germany Patent No. DE202004019451U is an
5 innovative improvement recently made by the same applicant.

The primary purpose of the present invention is to provide a cable management arm assembly operating in conjunction with slides that allows fast installation and easy subsequent operation by mounting in a
10 rail connection fashion a cable management arm support mechanism that may slide into the slides.

To achieve the purpose, the present invention includes a frame, a support rail, a first and a second sliding members, a first and a second connectors and an insertion socket. The frame comprises a front arm
15 and a rear arm pivoted to each other to slide on the support rail. Both ends of the frame are respectively connected to the insertion socket and the first connector. Both ends of the support rail are respectively connected to the first and second sliding members. The first and second sliding members are respectively received into the first and second
20 connectors. A locking member is disposed on each of the first and second connectors and the insertion socket so as to lock them to the rear ends of outer rails and an inner rail of the slides. A limiting member is provided on the first connector connected to the frame to retain and release the first sliding member when the first sliding member is inserted
25 into the first connector. Once the first connector is inserted to the rear end of the outer rail, the limiting member is pushed to swing so as to release the first sliding member for the support rail to move when the slides extend and the front and the rear arms of the frame unfold.

There now follows a description of preferred embodiments of the invention, by way of non-limiting example, with reference being made to the accompanying drawings in which:

Figure 1 is an exploded view of a preferred embodiment of the present invention;

Figure 2 is another exploded view of the preferred embodiment of the present invention;

Figure 3 is an exploded view showing local part of the preferred embodiment of the present invention;

Figure 4 is another exploded view showing local part of the preferred embodiment of the present invention;

Figure 5 is schematic view showing local members of the preferred embodiment of the present invention;

Figure 6 is a schematic view showing local assembly members of the preferred embodiment of the present invention;

Figure 7 is another schematic view showing local assembly members of the preferred embodiment of the present invention;

Figure 8 is a first schematic view showing local assembly status of the preferred embodiment of the present invention;

Figure 9 is another schematic view showing local assembly members of the preferred embodiment of the present invention;

Figure 10 is a second schematic view showing local assembly status of the preferred embodiment of the present invention;

Figure 11 is a third schematic view showing local assembly status

of the preferred embodiment of the present invention;

Figure 12 is a fourth schematic view showing local assembly status of the preferred embodiment of the present invention;

Figure 13 is a fifth schematic view showing local assembly status
5 of the preferred embodiment of the present invention;

Figure 14 is a schematic view showing the assembly of the preferred embodiment of the present invention in its extended status; and

Figure 15 is another schematic view showing the assembly of the preferred embodiment of the present invention in its extended status.

10

A preferred embodiment of the present invention is a cable management arm in conjunction with slides. The cable management arm may be assembled to the rear ends of outer rails and inner rails of the slides, and each of the slides is a three-section slide comprising an outer
15 rail (A), a middle rail (B) and an inner rail (C), as illustrated in Figures 14 and 15.

Referring to Figures 1 and 2, the cable management arm includes a frame (1), a support rail (2), a first and a second sliding members (3, 4), a first and a second connectors (5, 6), and an insertion socket (7).

20 The frame (1) includes a front arm (11) and a rear arm (12). A pivot (13) is disposed between the front and the rear arms (11, 12) for the frame (1) to connect to and move on the support rail (2). Another end of the front arm (11) is pivotally connected to the insertion socket (7) and another end of the rear arm (12) is pivotally connected to the first
25 connector (5) through a transferring member (14). A number of cable

holders (15) are disposed on the front and the rear arms (11, 12). A locking member (8) is disposed on each of the first connector (5), the second connector (6) and the insertion socket (7) so as to secure them to the rear ends of the outer rails (A) and the inner rail (C). The first and second sliding members (3, 4) are respectively connected to both ends of the telescoping support rail (2). The first sliding member (3) is mounted in the first connector (5) in advance and contains a slot (32), as illustrated in Figure 5, for positioning purpose and moves synchronously with the middle rail (B) with a hooking plate (31) extending from the first sliding member (3) to connect to the rear end of the middle rail (B). The second sliding member (4) moves as driven by the support rail (2) and is subject to the extension of the frame (1). The second sliding member (4) is mounted in the second connector (6) in advance. A positioning member (60) is provided on the second connector (6) to provide one-way retaining function so that the second sliding member (4) will not escape from the rear end of the second connector (6). The positioning member (60) permits elastic movement to release the second sliding member (4). Each rear end of the outer rail (A) and the inner rail (C) is disposed with a means for insertion.

Now referring to Figures 6, 7, 12, and 13, the cross-section of each of the first and second connectors (5, 6) is substantially in agreement with that of the outer rail (A) to facilitate abutting between the outer rail (A) and the first and second connectors (5, 6). Insertion portions (51, 61) extend from the first and second connectors (5, 6), respectively. Each of the insertion portions (51, 61) is provided with a folded portion and has a narrower front to be inserted into the rear end of the outer rail (A). Hooks (81) provided on the locking members (8) on the first and second connectors (5, 6) extend through holes (511, 611) of the insertion

portions (51, 61). The first and second connectors (5, 6) are provided with tenons (52, 62) corresponding to recesses (A1) disposed on the outer rails (A) of the slides. The disposition of the tenons (52, 62) and the recess (A1) can be interchangeable. A limiting member (9) provided on the first connector (5) connected to the rear arm (12), as illustrated in Figures 3 and 4, elastically swings to be pivoted to the inner side of the first connector (5), and comprises a lever (91) to extend through the outer side of the first connector (5). The function of providing elastic swing of the limiting member (9) is achieved by extending an elastic rod (92) to hold against a protruding bit (53) disposed on the first connector (5) for providing a return force. The locking member (8) provided with the hooks (81) has an elastic arm (82) to be fixed to the first and second connectors (5, 6) and the insertion socket (7) [i.e., the first connector (5) as illustrated in Figures 3 and 4, and the same applies to other coordinating members]. The locking member (8) is made in an inclined and warped shape to define an end easy for pressing so as to raise the hooks (81) at the other end.

Referring to Figures 6 and 12 showing the means for insertion of the rear ends of the outer rail (A) and the inner rail (C), retaining plates (A2) and retaining holes (A3) are disposed on the inner side at the rear end of the outer rail (A) so as to limit the insertion portions (51, 61) of the first and second connectors (5, 6) while the hooks (81) of the locking member (8) are engaged in the retaining holes (A3). Accordingly, the assembly is secured, as illustrated in Figures 7 and 13, in conjunction with the tenons (52, 62) and the recesses (A1). As illustrated in Figures 2, 6, and 8, openings (C1) and raised convexes (C2) are provided to the rear end of the inner rail (C). Bending insertion bits (71) and a slot (72) are provided on the insertion socket (7) for the insertion bits (71) to insert

through the openings (C1) of the inner rail (C) to hold against the convexes (C2), and the hooks (81) of the locking member (8) pass through the slot (72) to hold against one of the openings (C1) adjacent to the convexes (C2) to secure the inner rail (C).

5 Furthermore, to connect the first connector (5) mounted with the first sliding member (3) to the rear end of the outer rail (A) as illustrated in Figures 9, 10, and 11, an angular end (93) of the limiting member (9) protrudes to hold against the slot (32) of the first sliding member (3) to restrict the first sliding member (3) for facilitating the assembly when the
10 first sliding member (3) is separately mounted in the first connector (5) in advance. Upon inserting the first connector (5) to the rear end of the outer rail (A), the lever (91) of the limiting member (9) holds against the end edge of the outer rail (A) to swing for the angular end (93) of the limiting member (9) to clear away from the slot (32) of the first sliding
15 member (3). According, the first sliding member (3) is released to synchronously move along with the middle rail (B). By applying the assembly design in the pattern wherein the cable management arm operates depending on the extension of the slides as illustrated in Figures 14 and 15, the front arm (11), the rear arm (12) of the frame (1) and the
20 support rail (2) smoothly spread up and move depending on the extension of the inner rail (C), the passive motion of the middle rail (B), and the sliding of the first and second sliding members (3, 4).

CLAIMS

1. A cable management arm assembly including a frame, a support rail, a first and a second sliding members, a first and a second connectors, and an insertion socket operating in conjunction
5 with slides; each slide being a three-section telescoping slide having an outer rail, a middle rail and an inner rail;

the frame comprising a front arm and a rear arm pivoted to each other to slide on the support rail; both ends of the frame being respectively connected to the insertion socket and the first
10 connector; both ends of the support rail being connected to the first and second sliding members; the first and second sliding members being respectively mounted in the first and second connectors; a locking member being disposed on each of the first and second connectors and the insertion socket to secure
15 them respectively to rear ends of the inner rail and the outer rails of the slides; a limiting member being disposed on the first connector connected to the frame to retain the first sliding member separately placed into the first connector; and the limiting member being pushed when the first connector is
20 inserted into the rear end of the slide to release the first sliding member for the support rail connected with the first sliding member to move.

2. The cable management arm assembly of Claim 1, wherein a pivot is disposed between the front and the rear arms of the frame, and the frame is connected to the support rail to slide by
25 means of the pivot.

3. The cable management arm assembly of Claim 1, wherein

another end of the rear arm is connected to the first connector with a transferring member.

4. The cable management arm assembly of Claim 1, wherein a number of cable holders are disposed on the front and the rear arms.
5. The cable management arm assembly of Claim 1, wherein a slot is disposed in the first sliding member subject to the positioning by the limiting member.
6. The cable management arm assembly of Claim 5, wherein the first sliding member moving synchronously with the middle rail is provided with a hooking plate to engage with the rear end of the middle rail.
7. The cable management arm assembly of Claim 1, wherein a positioning member is disposed on the second connector not connected to the frame, the positioning member elastically moving to retain or release the second sliding member accommodated in the second connector.
8. The cable management arm assembly of Claim 1, wherein tenons and recesses are disposed at end edges where the first and second connectors are abutted to the outer rails.
9. The cable management arm assembly of Claim 1, wherein the limiting member is pivotally connected to an inner side of the first connector in an elastic swing status, and is disposed with a lever extending to reach an outer side of the first connector.
10. The cable management arm assembly of Claim 9, wherein the

elastic swing function of the limiting member is achieved by extending an elastic rod to hold against a protruding bit of the first connector.

11. A cable management arm assembly including a frame, a support rail, a first and a second sliding members, a first and a second connectors, and an insertion socket operating in conjunction with slides;

the frame comprising a front arm and a rear arm pivoted to each other to slide on the support rail; both ends of the frame being respectively connected to the insertion socket and the first connector; both ends of the support rail being connected to the first and second sliding members; the first and second sliding members being respectively mounted in the first and second connectors; a locking member being disposed on each of the first and second connectors and the insertion socket to secure them to the slides; and a limiting member being disposed on the first connector connected to the frame to retain or release the first sliding member accommodated in the first connector.

12. A cable management arm assembly including a frame, a support rail, a first and a second sliding members, a first and a second connectors, and an insertion socket operating in conjunction with slides;

the frame comprising a front arm and a rear arm pivoted to each other to slide on the support rail; both ends of the frame being respectively connected to the insertion socket and the first connector; both ends of the support rail being connected to the first and second sliding members; the first and second sliding

members being respectively mounted in the first and second connectors; a locking member being disposed in each of the first and second connectors and the insertion socket to secure them to the slides; the first and second connectors being connected to rear ends of the slides; the first and second sliding members being guided into the slides; and the support rail connected with the sliding members moving as the slides extend and the frame spreads up.

13. The cable management arm assembly of Claim 12, wherein a pivot is disposed between the front and the rear arms of the frame, and the frame is connected to the support rail to slide by means of the pivot.

14. The cable management arm assembly of Claim 12, wherein another end of the rear arm is connected to the first connector with a transferring member.

15. The cable management arm assembly of Claim 12, wherein a number of cable holders are disposed on the front and the rear arms.

16. The cable management arm assembly of Claim 12, wherein a positioning member is disposed on the second connector not connected to the frame, the positioning member elastically moving to retain or release the second sliding member accommodated in the second connector.

17. The cable management arm assembly of Claim 12, wherein an insertion portion extends from each of the first and second connectors, and the locking member is disposed with hooks to

extend through holes of the insertion portion.

18. The cable management arm assembly of Claim 12, wherein the locking member includes an elastic arm to be fixed to the first and second connectors, and the locking member is inclined and warped to define an end for pressing so as to raise the other end.
19. The cable management arm assembly of Claim 12, wherein the locking member includes an elastic arm to be fixed to the insertion socket, and the locking member is inclined and warped to define an end for pressing so as to raise the other end.
20. The cable management arm assembly of Claim 12, wherein retaining plates and retaining holes are disposed on an inner side of the rear end of each of the slides connected with the first and second connectors.
21. The cable management arm assembly of Claim 12, wherein openings and raised convexes are disposed on the rear end of the slide connected with the insertion socket.
22. The cable management arm assembly of Claim 12, wherein bending insertion bits and a slot are disposed on the insertion socket and hooks provided on the locking member disposed on the insertion socket penetrate through the slot.
23. The cable management arm assembly of Claim 12, wherein tenons and recesses are provided at end edges where the first and second connectors and the rear ends of the slides are abutted to each other.
24. A cable management arm assembly as hereinbefore described

with reference to and/or illustrated in the accompanying drawings.

Amendments to the claims have been filed as follows

CLAIMS

1. A cable management arm assembly for a telescopic sliding structure including a frame, a support rail, first and second sliding members, first and second insert members, and a connecting plate operating in conjunction with slides; each slide
5 being a three-part telescopic slide having an outer rail, a middle rail and an inner rail;

the frame comprises a front arm and a rear arm pivoted to each other to slide on the support rail; each end of the frame is connected to the connecting plate and the first insert member respectively; each end of the support rail is connected to the first and second sliding members respectively; the first and second sliding members
10 are mounted in the first and second insert members respectively; a clasp is disposed on each of the first and second insert members and the connecting plate to secure them respectively to rear ends of the inner rail and the outer rails of the slides; a latch member is disposed on the first insert member and connected to the frame to retain the first sliding member separately placed into the first insert member; and the latch
15 member is pushed when the first insert member is inserted into the rear end of the slide to release the first sliding member for the support rail connected with the first sliding member to move when the slides extent and the front and rear arms of the frame unfold.

2. The cable management arm assembly of Claim 1, wherein an end of the rear arm is connected to the first insert member with a hinge.
20

3. The cable management arm assembly of Claim 1, wherein a number of cable holders are disposed on the front and the rear arms.

4. The cable management arm assembly of Claim 1, wherein a groove is disposed in the first sliding member subject to the positioning of the latch member.

5. The cable management arm assembly of Claim 4, wherein the first sliding member moves synchronously with the middle rail and is provided with a hooking plate to engage with the rear end of the middle rail.
25

6. The cable management arm assembly of Claim 1, wherein the second insert member is not connected to the frame, the second insert member comprising a detent disposed thereon, the detent elastically moving to retain or release the second sliding member accommodated in the second insert member.
30

7. The cable management arm assembly of Claim 1, wherein projections and recesses are disposed at end edges where the first and second insert members are connected to the outer rails.

8. The cable management arm assembly of Claim 1, wherein the latch member is pivotally connected to an inner side of the first insert member in an elastic swing status, and is disposed with a lever extending to reach an outer side of the first insert member.

9. The cable management arm assembly of Claim 8, wherein the elastic swing function of the latch member is achieved by extending a resilient rod to hold against a protruding tab of the first insert member.

10. A cable management arm assembly including a frame, a support rail, first and second sliding members, first and second insert members, and a connecting plate operating in conjunction with slides;

the frame comprising a front arm and a rear arm pivoted to each other to slide on the support rail; an end of the frame is connected to the connecting plate and the first insert member respectively; an end of the support rail is connected to the first and second sliding members respectively; the first and second sliding members are mounted in the first and second insert members respectively; a clasp is disposed on each of the first and second insert members and the connecting plate to secure them to the slides; and a latch member is disposed on the first insert member connected to the frame to retain or release the first sliding member accommodated in the first insert member.

11. A cable management arm assembly including a frame, a support rail, first and second sliding members, first and second insert members, and a connecting plate operating in conjunction with slides;

the frame comprising a front arm and a rear arm pivoted to each other to slide on the support rail; an end of the frame being connected to the connecting plate and the first insert member respectively; an end of the support rail is connected to the first and second sliding members respectively; the first and second sliding members are mounted in the first and second insert members respectively; a clasp is disposed in each of the first and second insert members and the connecting plate to secure them to the slides; the first and second insert members are connected to rear ends of the slides; the first and second sliding members are guided into the slides; and the support rail

connected with the sliding members moves as the slides extend and the frame spreads up.

12. The cable management arm assembly of Claim 11, wherein a pivot member is disposed between the front and the rear arms of the frame, and the frame is connected
5 to the support rail to slide by means of the pivot member.

13. The cable management arm assembly of Claim 11, wherein an end of the rear arm is connected to the first insert member with a hinge.

14. The cable management arm assembly of Claim 11, wherein a number of cable holders are disposed on the front and the rear arms.

10 15. The cable management arm assembly of Claim 11, wherein the second insert member is not connected to the frame and a detent is disposed thereon, the detent elastically moving to retain or release the second sliding member accommodated in the second insert member.

15 16. The cable management arm assembly of Claim 11, wherein an insert portion extends from each of the first and second insert members, and the clasp is disposed with hooks to extend through holes of the insert portion.

17. The cable management arm assembly of Claim 11, wherein the clasp includes a resilient arm to be fixed to the first and second insert members, and the clasp is inclined and bent to define an end that can be pressed so as to raise the other end of the
20 clasp.

18. The cable management arm assembly of Claim 11, wherein the clasp includes a resilient arm to be fixed to the connecting plate, and the clasp is inclined and bent to define an end that can be pressed so as to raise the other end of the clasp.

19. The cable management arm assembly of Claim 11, wherein retaining plates and retaining holes are disposed on an inner side of the rear end of each of the slides
25 connected to the first and second insert members.

20. The cable management arm assembly of Claim 11, wherein openings and raised convexes are disposed on the rear end of the slide connected with the connecting plate.

30 21. The cable management arm assembly of Claim 11, wherein bent insert tabs and

a slot are disposed on the connecting plate and hooks are provided on the clasp disposed on the connecting plate to penetrate through the slot.

22. The cable management arm assembly of Claim 11, wherein projections and recesses are provided at end edges where the first and second insert members and the rear ends of the slides are connected to each other.

23. A cable management arm assembly as hereinbefore described with reference to and/or illustrated in the accompanying drawings.

Application No: GB0601555.6

Examiner: Mr Hal Young

Claims searched: 1-24

Date of search: 19 April 2006

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
A		US6305556 A (HEWLETT)
A		US6856505 A (CENTRAL)
A		US6435354 A (DELL)
A		US6811039 A (KING)

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^x :

A4B; H2C

Worldwide search of patent documents classified in the following areas of the IPC

A47B; F16L; H02B; H05K

The following online and other databases have been used in the preparation of this search report

WPI, EPODOC, JAPIO