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Inventor(s)	Chen; Ken-Ching et al.

Slide rail mechanism

Abstract

A slide rail mechanism is provided and includes a supporting frame and a slide rail assembly. The supporting frame includes a disengaging feature. The slide rail assembly is movable with respect to the supporting frame. The slide rail assembly includes a first rail and a second rail. The second rail and the first rail displace synchronously during a displacement of the second rail with respect to the supporting frame away from a first predetermined position along a first predetermined direction. The disengaging feature of the supporting frame is configured to terminate a displacement synchronization between the second rail and the first rail when the second rail and the first rail are synchronously displaced to a second predetermined position along the first predetermined direction.

Inventors: **Chen; Ken-Ching (Kaohsiung, TW), Yang; Shun-Ho (Kaohsiung, TW), Chang; Wei-Chen (Kaohsiung, TW), Wang; Chun-Chiang (Kaohsiung, TW)**

Applicant: **KING SLIDE WORKS CO., LTD.** (Kaohsiung, TW); **KING SLIDE TECHNOLOGY CO., LTD.** (Kaohsiung, TW)

Family ID: **1000008768172**

Assignee: **KING SLIDE WORKS CO., LTD. (Kaohsiung, TW); KING SLIDE TECHNOLOGY CO., LTD. (Kaohsiung, TW)**

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References Cited

U.S. PATENT DOCUMENTS

Patent No.	Issued Date	Patentee Name	U.S. Cl.	CPC
4988214	12/1990	Clement	312/333	A47B 88/493
7357468	12/2007	Hwang	N/A	N/A
10729241	12/2019	Chen	N/A	H05K 7/1489
11064807	12/2020	Chen	N/A	N/A
2011/0176755	12/2010	Chen	N/A	N/A
2016/0278522	12/2015	Chen	N/A	N/A
2019/0200757	12/2018	Chen	N/A	A47B 88/443

FOREIGN PATENT DOCUMENTS

Patent No.	Application Date	Country	CPC
3 307 038	12/2017	EP	N/A
2018-187344	12/2017	JP	N/A
2019-81083	12/2018	JP	N/A
2020-11032	12/2019	JP	N/A
2021-30057	12/2020	JP	N/A
2021-79077	12/2020	JP	N/A

Primary Examiner: Hansen; James O

Background/Summary

BACKGROUND OF THE INVENTION

1. Field of the Invention

(1) The present invention relates to a slide rail product, and more specifically, to a slide rail mechanism having rails with synchronous displacing function.

2. Description of the Prior Art

(2) U.S. Pat. No. 7,357,468 B2 discloses a slide rail assembly including three rails, i.e., an inner rail, a middle rail and an outer rail. The middle rail and the inner rail can displace synchronously to extend with respect to the outer rail. After the middle rail is positioned with respect to the outer rail, the inner rail and the middle rail can be disengaged from each other for allowing the inner rail to be independently displaced to a fully extended position. Furthermore, the inner rail and the middle rail

can be sequentially retracted into the outer rail during a retracting operation of the slide rail assembly.
(3) From the above, the conventional slide rail assembly only enables the inner rail and the middle rail to be synchronously extended. However, to meet different requirements, it becomes an important topic to provide an improved slide rail product.

SUMMARY OF THE INVENTION

(4) The present invention provides a slide rail mechanism having rails with synchronous displacing function.
(5) According an aspect of the present invention, a slide rail mechanism includes a supporting frame and a slide rail assembly. The supporting frame includes a disengaging feature. The slide rail assembly is movable with respect to the supporting frame. The slide rail assembly includes a first rail, a second rail and a third rail. The first rail is an outer rail. The second rail is a middle rail, and the third rail is an inner rail. The second rail and the first rail displace synchronously during a displacement of the second rail with respect to the supporting frame away from a first predetermined position along a first predetermined direction. The disengaging feature of the supporting frame is configured to terminate a displacement synchronization between the second rail and the first rail when the second rail and the first rail are synchronously displaced to a second predetermined position along the first predetermined direction.
(6) According another aspect of the present invention, a slide rail mechanism includes a supporting frame and a slide rail assembly. The supporting frame includes a disengaging feature. The slide rail assembly is movable with respect to the supporting frame. The slide rail assembly includes a first rail, a second rail and a third rail. A disengaging structure is arranged on the first rail. The second rail and the first rail displace synchronously during a displacement of the second rail with respect to the supporting frame away from a first predetermined position along a first predetermined direction. The disengaging feature of the supporting frame is configured to terminate a displacement synchronization between the second rail and the first rail when the second rail and the first rail are synchronously displaced to a second predetermined position along the first predetermined direction. The third rail and the second rail displace synchronously during a displacement of the third rail along the first predetermined direction, and the disengaging structure is configured to terminate a displacement synchronization between the third rail and the second rail when the third rail and the second rail are synchronously displaced to a disengaging position along the first predetermined direction.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

(1) FIG. **1** is a perspective diagram of a slide rail mechanism according to an embodiment of the present invention.
(2) FIG. **2** is an exploded diagram of the slide rail mechanism according to the embodiment of the present invention.
(3) FIG. **3** is diagram of the slide rail mechanism as a slide rail assembly is in a retracted state according to the embodiment of the present invention.
(4) FIG. **4** is a diagram of the slide rail assembly as a second rail and a first rail are synchronously displaceable along a first predetermined direction according to the embodiment of the present invention.
(5) FIG. **5** is a diagram of the slide rail assembly as a displacement synchronization between the second rail and the first rail is terminated according to the embodiment of the present invention.
(6) FIG. **6** is a diagram of the slide rail assembly as a third rail and the second rail are not synchronously displaceable with respect to the first rail along the first predetermined direction

according to the embodiment of the present invention.
(7) FIG. **7** is a diagram of the slide rail assembly as the third rail and the second rail are synchronously displaceable with respect to the first rail along the first predetermined direction according to the embodiment of the present invention.
(8) FIG. **8** is a diagram of the slide rail assembly as a displacement synchronization between the third rail and the second rail is terminated according to the embodiment of the present invention.
(9) FIG. **9** is a diagram of the slide rail assembly as the second rail is displaced with respect to the first rail to a third predetermined position along the first predetermined direction according to the embodiment of the present invention.
(10) FIG. **10** is a diagram of the slide rail assembly in an extended state according to the embodiment of the present invention.
(11) FIG. **11** is a diagram of the slide rail assembly as the third rail is displaced with respect to the second rail away from a fourth predetermined position along a second predetermined direction according to the embodiment of the present invention.
(12) FIG. **12** is a diagram of the slide rail assembly as the second rail is displaceable away from the third predetermined position by the third rail displacing with respect to the second rail along the second predetermined direction according to the embodiment of the present invention.
(13) FIG. **13** is a diagram of the slide rail assembly as the second rail displaces with respect to the first rail away from the third predetermined position along the second predetermined direction according to the embodiment of the present invention.
(14) FIG. **14** is a diagram of the slide rail assembly as the first rail is displaceable away from the second predetermined by the second rail displacing along the second predetermined direction according to the embodiment of the present invention.

DETAILED DESCRIPTION

(15) In the following detailed description of the preferred embodiments, reference is made to the accompanying drawings which form a part hereof, and in which is shown by way of illustration specific embodiments in which the invention may be practiced. In this regard, directional terminology, such as “top”, “bottom”, “left”, “right”, “front”, “back”, etc., is used with reference to the orientation of the Figure (s) being described. The members of the present invention can be positioned in a number of different orientations. As such, the directional terminology is used for purposes of illustration and is in no way limiting. Accordingly, the drawings and descriptions will be regarded as illustrative in nature and not as restrictive. Also, if not specified, the term “connect” is intended to mean either an indirect or direct mechanical connection. Thus, if a first device is connected to a second device, that connection may be through a direct mechanical connection, or through an indirect mechanical connection via other devices and connections.
(16) As shown in FIG. **1** and FIG. **2**, a slide rail mechanism includes a supporting frame **22** and a slide rail assembly **24**. The slide rail assembly **24** is longitudinally movable with respect to the supporting frame **22**. In this embodiment, by way of example, a longitudinal direction, i.e., a length direction or a displacing direction of a rail of the slide rail assembly **24**, can be parallel to an X axis. A transverse direction, i.e., a lateral direction of the rail of the slide rail assembly **24**, can be parallel to a Y axis. A vertical direction, i.e., a height direction of the rail of the slide rail assembly **24**, can be parallel to a Z axis.
(17) The slide rail assembly **24** includes a first rail **26**, a second rail **28** and a third rail **30**. The first rail **26** is an outer rail. The second rail **28** is a middle rail. The third rail **30** is an inner rail. In this embodiment, by way of example, the second rail **28** can be movably mounted between the first rail **26** and the third rail **30**.
(18) Preferably, the slide rail mechanism further includes a slide rail device **32**. The slide rail device **32** includes the supporting frame **22** and a supporting rail **34** connected to the supporting frame **22**. In this embodiment, by way of example, the supporting rail **34** can be fixedly connected to the supporting frame **22**, such that the supporting rail **34** and the supporting frame **22** can be

defined as an integral structure i.e., the supporting rail **34** can be considered as a part of the supporting frame **22**.

(19) The supporting frame **22** includes a disengaging feature **36** configured to terminate a displacement synchronization between the first rail **26** and the second rail **28**. In this embodiment, by way of example, the disengaging feature **36** can be a notch formed by excavating. However, the present invention is not limited to this embodiment.

(20) Preferably, the supporting frame **22** further includes a blocking feature **37** adjacent to the disengaging feature **36** and configured to block the first rail **26**. In this embodiment, by way of example, the blocking feature **37** can be a blocking wall. However, the present invention is not limited to this embodiment.

(21) Preferably, a blocking portion **38** is arranged on the supporting rail **34** and configured to block the first rail **26**. In this embodiment, by way of example, the supporting rail **34** can include a bracket **40** located adjacent to an end portion, e.g., a front end portion, of the supporting rail **34**, and the blocking portion **38** is arranged on the bracket **40**.

(22) The disengaging feature **36** can terminate the displacement synchronization between the first rail **26** and the second rail **28**. The blocking feature **37** and the blocking portion **38** can prevent displacements of the first rail **26** along two different directions when the displacement synchronization between the first rail **26** and the second rail **28** is terminated. The disengaging feature **36**, the blocking feature **37** and the blocking portion **38** do not cooperate with one another. Understandably, in another embodiment, at least one of the blocking feature and the blocking portion can be omitted.

(23) Preferably, the supporting rail **34** includes a plurality of rails and a supporting channel for at least partially accommodating the plurality of rails. In this embodiment, by way of example, the supporting rail **34** can include a first movable rail **42** and a second movable rail **44**. The first movable rail **42** and the second movable rail **44** can be at least partially accommodated inside the supporting channel, and the first movable rail **42** can be located between the supporting rail **34** and the second movable rail **44**.

(24) Preferably, the slide rail assembly **24** further includes a first auxiliary member **46** and a second auxiliary member **48**. The first auxiliary member **46** is arranged on the first rail **26**. The second auxiliary member **48** is arranged on the second rail **28**.

(25) Preferably, one of the first auxiliary member **46** and the second auxiliary member **48** is movable, and the other one of the first auxiliary member **46** and the second auxiliary member **48** is immovable. In this embodiment, by way of example, the first auxiliary member **46** can be pivotally connected to the first rail **26** by a shaft **50**, and the second auxiliary member **48** is fixedly connected to the second rail **28**.

(26) Preferably, the slide rail assembly **24** further includes an auxiliary rail **52** arranged on the first rail **26**. The first rail **26** is movably mounted the supporting rail **34** or the supporting frame **22** by the auxiliary rail **52**. Furthermore, the auxiliary rail **52** includes a first auxiliary wall **54***a*, a second auxiliary wall **54***b* and a middle wall **56** connected to and located between the first auxiliary wall **54***a* and the second auxiliary wall **54***b*. The middle wall **56** is connected, e.g., fixedly connected, to a first side L**1** of the first rail **26**. The first auxiliary wall **54***a* and the second auxiliary wall **54***b* are configured to hold the supporting rail **34** or the supporting frame **22**. In this embodiment, by way of example, the first auxiliary wall **54***a* and the second auxiliary wall **54***b* can hold a first wall **57***a* and a second wall **57***b* of the supporting rail **34**. However, the present invention is not limited to this embodiment. Besides, the second rail **28** is at least partially movably mounted inside a first channel on a second side L**2** of the first rail **26** opposite to the first side L**1** of the first rail **26**, and the third rail **30** is at least partially movably mounted inside a second channel on the second rail **28**.

(27) The supporting rail **34** and the auxiliary rail **52** are members for achieving the first rail **26** to be mounted on the supporting frame **22** indirectly and do not involve with terminating the displacement synchronization between the first rail **26** and the second rail **28** and/or preventing the

displacement of the first rail **26** when the displacement synchronization between the first rail **26** and the second rail **28** is terminated. Understandably, in another embodiment, at least one of the supporting rail and the auxiliary rail can be omitted, e.g., the first rail can be movably mounted on the supporting frame directly or by the auxiliary rail indirectly, or the first rail can be movably mounted on the supporting rail directly.

(28) Preferably, the slide rail assembly **24** further includes a working member **58** movably mounted on the second rail **28**. A corresponding feature **60** is arranged on the third rail **30** and configured to cooperate with the working member **58**.

(29) Preferably, the working member **58** is pivotally connected to the second rail **28** by a connecting member **62**.

(30) Preferably, a retaining member **64** is arranged on the first rail **26**. The retaining member **64** includes a disengaging structure **66** and a blocking structure **68** located adjacent to the disengaging structure **66**. The disengaging structure **66** is configured to terminate a displacement synchronization between the third rail **30** and the second rail **28**. The blocking structure **68** is configured to block the second rail **28** for preventing a displacement of the second rail **28**. The disengaging structure **66** and the blocking structure **68** do not cooperate with each other. Understandably, in another embodiment, at least one of the disengaging structure and the blocking structure can be omitted. Furthermore, in this embodiment, by way of example, the disengaging structure **66** can be an inclined surface or an arc surface, and the blocking structure **68** can be an erecting wall. However, the present invention is not limited to this embodiment. Besides, understandably, in another embodiment, the disengaging structure and/or the blocking structure can be integrally formed with the first rail.

(31) As shown in FIG. **3**, the slide rail assembly **24** is in a retracted state with respect to the supporting frame **22** or the slide rail device **32**. The second rail **28** and the first rail **26** can displace synchronously during a displacement, e.g., a longitudinal displacement, of the second rail **28** with respect to the supporting frame **22** away from a first predetermined position P**1**, e.g., a retracted position as shown in FIG. **3**, along a first predetermined direction D**1**, e.g., an opening direction. Furthermore, since the third rail **30** is at least partially mounted inside the second channel on the second rail **28**, the third rail **30** is displaced together with the second rail **28** and the first rail **30** along the first predetermined direction D**1** when the second rail **28** and the first rail **26** are displaced synchronously. Besides, the first rail **26** is frictionally displaceable with respect to the supporting rail **34** or the supporting frame **22** by the first auxiliary wall **54***a* and the second auxiliary wall **54***b* of the auxiliary rail **52** holding the supporting rail **34**.

(32) Preferably, as shown in FIG. **4**, during the displacement of the second rail **28** with respect to the supporting frame **22** away from the first predetermined position P**1** along the first predetermined direction D**1**, the first auxiliary member **46** and the second auxiliary member **48** abut against each other, such that the second rail **28** drives the first rail **26** to synchronously displace together with the second rail **28** by an abutment of the first auxiliary member **46** and the second auxiliary member **48**.

(33) Preferably, the first auxiliary member **46** is configured to be retained in a first state S**1** for abutting against the second auxiliary member **48** in response to a resilient deformation of a resilient member **70** and/or a support of the supporting frame **22**. In this embodiment, by way of example, the second auxiliary member **48** can include at least one abutting portion **72**, e.g., a hook portion or a hook-shaped structure as shown in FIG. **3**, and the first auxiliary member **46** can include a corresponding portion **69**, as shown in FIG. **4**, configured to abut against the at least one abutting portion **72** for enabling synchronous displacements of the second rail **28** and the first rail **26** along the first predetermined direction D**1**.

(34) Preferably, the resilient member **70** includes at least one resilient portion **71** configured to resiliently press at least one extending portion **73** of the first auxiliary member **46** along the transverse direction, e.g., the Y axis, and the first auxiliary member **46** is supported by the

supporting frame **22**, such that the first auxiliary member **46** is retained in the first state S**1** as shown in FIG. **4**.

(35) As shown in FIG. **5**, the disengaging feature **36** of the supporting frame **22** is configured to terminate the displacement synchronization between the second rail **28** and the first rail **26** when the second rail **28** and the first rail **26** are synchronously displaced to a second predetermined position P**2** along the first predetermined direction D**1**.

(36) Preferably, the disengaging feature **36** is configured to providing a moving space for the first auxiliary member **46** for allowing the resilient member **70** to be released to drive the first auxiliary member **46** to move from the first state S**1** to a second state S**2** for disengaging the first auxiliary member **46**, e.g., the corresponding portion **69** of the first auxiliary member **46**, from the second auxiliary member **48**, e.g., the abutting portion **72** of the second auxiliary member **48**, to terminate the displacement synchronization between the second rail **28** and the first rail **26** when the second rail **28** and the first rail **26** are located at the second predetermined position P**2**. In this embodiment, by way of example, the corresponding portion **69** of the first auxiliary member **46** can be moved to be misaligned with the abutting portion **72** of the second auxiliary member **48** along the longitudinal direction, e.g., the X axis, so as to terminate the displacement synchronization between the second rail **28** and the first rail **26**.

(37) Preferably, when the first auxiliary member **46** is in the second state S**2**, the blocking feature **37** of the supporting frame **22** can block the first auxiliary member **46** to block the first rail **26** for preventing the first rail **26** from displacing away from the second predetermined position P**2** along a second predetermined direction D**2**, e.g., a retracting direction, opposite to the first predetermined direction D**1**. Besides, the blocking portion **38** on the bracket **40** of the supporting rail **34** can block the first auxiliary member **46** or the auxiliary rail **52** to block the first rail **26** for preventing the first rail **26** from displacing away from the second predetermined position P**2** along the first predetermined direction D**1**.

(38) As shown in FIG. **6** and FIG. **7**, the slide rail assembly **24** further includes at least one first slide-aiding device **74** and a second slide-aiding device **76**. The at least one first slide-aiding device **74** is movably mounted between the second rail **28** and the first rail **26** for facilitating a smooth displacement of the second rail **28** with respect to the first rail **26**. The second slide-aiding device **76** is movably mounted between the second rail **28** and the third rail **30** for facilitating a smooth displacement of the third rail **30** with respect to the second rail **28**. In this embodiment, by way of example, the first slide-aiding device **74** can include a plurality of first slide-aiding members **78**, and the second slide-aiding device **76** can include a plurality of second slide-aiding members **80**, wherein the first slide-aiding member **78** or the second slide-aiding member **80** can be a ball, a roller, or the like.

(39) The corresponding feature **60** on the third rail **30** is spaced apart from the working member **58** on the second rail **28** by a predetermined longitudinal distance when the slide rail assembly **24** is in a state as shown in FIG. **6**. The third rail **30** and the second rail **28** can be displaced along the first predetermined direction D**1** when the first rail **26** is located at the second predetermined position P**2**. Preferably, the third rail **30** and the second rail **28** can displace synchronously during a displacement of the third rail **30** along the first predetermined direction D**1**. In this embodiment, by way of example, as shown in FIG. **7**, during the displacement of the third rail **30** along the first predetermined direction D**1**, the corresponding feature **60** and the working member **58** abut against each other, such that the third rail **30** drives the second rail **28** to synchronously displace together with the third rail **30** by an abutment of the corresponding feature **60** and the working member **58**.

(40) Preferably, the third rail **30** includes a first wall **82***a* and a second wall **82***b*, and the corresponding feature **60** is arranged on the first wall **82***a*. In this embodiment, by way of example, the corresponding feature **60** can be a wall of a hole structure H. The first wall **82***a* of the third rail **30** can support the working member **58** for locating the working member **58** in an initial state K**1** as shown in FIG. **6**. During the displacement of the third rail **30** along the first predetermined

direction D**1**, the hole structure H on the third rail **30** can be moved to a position corresponding to a synchronization feature **84** of the working member **58**, such that the working member **58** can be driven to move, e.g., pivot, from the initial state K**1** to a predetermined state K**2** as shown in FIG. **7** by a resilient object **86**, so as to enable the corresponding feature **60** on the third **30** and the synchronization feature **84** to abut against each other for allowing synchronous displacements of the third rail **30** and the second rail **28** along the first predetermined direction D**1**.

(41) Preferably, as shown in FIG. **7**, the second rail **28** includes a through hole **88**, and a working portion **90** of the working member **58** extends toward the first rail **26** through the through hole **88**. The working portion **90** of the working member **58** can cooperate with the retaining member **64**, e.g., the disengaging structure **66** and the blocking structure **68** of the retaining member **64**, on the first rail **26**.

(42) When the third rail **30** drives the second rail **28** to synchronously displace together with the third rail **30** from a position as shown in FIG. **7** to a disengaging position as shown in FIG. **8**, the disengaging structure **66** on the first rail **26** is configured to terminate the displacement synchronization between the third rail **30** and the second rail **28**. In this embodiment, by way of example, the working portion **90** of the working member **58** on the second rail **28** can be guided by the disengaging structure **66** on the first rail **26** to drive the working member **58** to move away from the predetermined state K**2**, e.g., by pivoting at a predetermined angle, such that the corresponding feature **60** on the third rail **30** does not abut against the synchronization feature **84** of the working member **58** for terminating the synchronization displacement between the third rail **30** and the second rail **28**. When the synchronization displacement between the third rail **30** and the second rail **28** is terminated, the third rail **30** and the second rail **28** can be individually displaced with respect to the first rail **26** along the first predetermined direction D**1**. Besides, when the working member **58** is in a state as shown in FIG. **8**, the resilient object **86** is resiliently deformed.

(43) As shown in FIG. **9**, when the second rail **28** is further displaced to a third predetermined position P**3** along the first predetermined direction D**1**, the blocking structure **68** on the first rail **26** is configured to block the second rail **28** for preventing the second rail **28** from displacing away from the third predetermined position P**3** along the second predetermined direction D**2**. In this embodiment, by way of example, when the second rail **28** is located at the third predetermined position P**3**, the resilient object **86** is released to drive the working member **58** to move to a position as shown in FIG. **9**, such that the working portion **90** of the working member **58** can be blocked by the blocking structure **68** on the first rail **26** for preventing the second rail **28** from displacing away from the third predetermined position P**3** along the second predetermined direction D**2**.

(44) Preferably, a first restraining feature **92** is further arranged on the first rail **26**, and a second restraining feature **94** is further arranged on the second rail **28**. When the second rail **28** is located at the third predetermined position P**3**, a front end and a rear end of the first slide-aiding device **74** abut against the first restraining feature **92** and the second restraining feature **94** respectively for preventing the second rail **28** from displacing away from the third predetermined position P**3** along the first predetermined direction D**1**.

(45) As shown in FIG. **9** and FIG. **10**, when the second rail **28** is located at the third predetermined position P**3**, the third rail **30** can be further displaced to a fourth predetermined position P**4** along the first predetermined direction D**1**, so as to locate the slide rail assembly **24** in an extended state, e.g., a fully extended state, with respect to the supporting frame **22** or the slide rail device **32**. Preferably, when the third rail **30** is located at the fourth predetermined position P**4**, the second slide-aiding device **76** is located adjacent to an end portion, e.g., a front end portion, of the second rail **28**.

(46) As shown in FIG. **11** and FIG. **12**, during a displacement of the third rail **30** away from the fourth predetermined position P**4** along the second predetermined direction D**2**, the third rail **30** is configured to terminate a blocking between the blocking structure **68** and the second rail **28**.

Furthermore, a portion, e.g., a rear end portion r, of the third rail **30**, is configured to abut against the synchronization feature **84** of the working member **58** for driving the working member **58** to prevent the working portion **90** of the working member **58** from being blocked by the blocking structure **68** on the first rail **26**. When the working portion **90** of the working member **58** is not blocked by the blocking structure **68** on the first rail **26**, the second rail **28** is allowed to displace away from the third predetermined position P**3** along the second predetermined direction D**2**.
(47) As shown in FIG. **13** and FIG. **14**, one of the second rail **28** and the first auxiliary member **46** includes a first guiding feature **96**. Preferably, the other one of the second rail **28** and the first auxiliary member **46** includes a second guiding feature **98** for cooperating with the first guiding feature **96**. In this embodiment, by way of example, the first guiding feature **96** and the second guiding feature **98** can be an inclined surface or an arc surface. However, the present invention is not limited to this embodiment.
(48) During a displacement of the second rail **28** away from the third predetermined position P**3** along the second predetermined direction D**2**, the second rail **28** is configured to terminate a blocking between the blocking feature **37** and the first rail **26**. In this embodiment, by way of example, the second rail **28** can include the first guiding feature **96**, and the first auxiliary member **46** can include the second guiding feature **98**. The first guiding structure **96** of the second rail **28** can abut against the second guiding structure **98** of the first auxiliary member **46** for driving the first auxiliary member **46** from the second state S**2** as shown in FIG. **13** to the first state S**1** as shown in FIG. **14**, such that the blocking feature **37** on the supporting frame **22** does not block the first auxiliary member **46** on the first rail for allowing the first rail **26** to displace away from the second predetermined position P**2** along the second predetermined direction D**2**. Accordingly, the third rail **30**, the second rail **28** and the first rail **26** can be displaced along the second predetermined direction D**2** until the slide rail assembly **24** is moved back to the retracted state as shown in FIG. **3**.
(49) It should be noticed that the slide rail assembly **24** can be usually adapted for a cabinet or a rack, and the third rail **30** can be configured to support a carried object, such as an electronic apparatus or a drawer. The slide rail assembly **24** can ensure the second rail **28** and the first rail **26** to displace synchronously and prevent the third rail **30** and the second rail **28** from being pulled out along the first predetermined direction D**1** without a displacement of the first rail **26**. Therefore, the slide rail assembly **24** can solve a technical problem that it takes a lot of effort to overcome an excessive friction between a first rail and a supporting frame and/or between the first rail and a supporting rail caused by, e. g., a weight of a carried object, to pull out the first rail if a third rail and a second rail have been pulled out without a displacement of the first rail.
(50) From the above, the slide rail assembly **24** includes the characteristics of allowing synchronous displacements of the second rail **28** and the first rail **26** along the first predetermined direction D**1** with respect to the supporting frame **22** and/or allowing synchronous displacements of the third rail **30** and the second rail **28** along the first predetermined direction D**1**.
(51) Those skilled in the art will readily observe that numerous modifications and alterations of the device and method may be made while retaining the teachings of the invention. Accordingly, the above disclosure should be construed as limited only by the metes and bounds of the appended claims.

Claims

1. A slide rail mechanism comprising: a supporting frame comprising a disengaging feature; and a slide rail assembly movable with respect to the supporting frame, the slide rail assembly comprising a first rail, a second rail and a third rail, the first rail being an outer rail, the second rail being a middle rail, and the third rail being an inner rail; wherein the second rail and the first rail displace synchronously during a displacement of the second rail with respect to the supporting

frame away from a first predetermined position along a first predetermined direction; wherein the disengaging feature of the supporting frame is configured to terminate a displacement synchronization between the second rail and the first rail when the second rail and the first rail are synchronously displaced to a second predetermined position along the first predetermined direction; wherein the slide rail assembly further comprises a first auxiliary member and a second auxiliary member, the first auxiliary member is arranged on the first rail, the second auxiliary member is arranged on the second rail, and the second rail and the first rail displace synchronously by an abutment of the first auxiliary member and the second auxiliary member during the displacement of the second rail with respect to the supporting frame away from the first predetermined position along the first predetermined direction; wherein one of the first auxiliary member and the second auxiliary member is movable, and the one of the first auxiliary member and the second auxiliary member is configured to move to a first state for abutting against another one of the first auxiliary member and the second auxiliary member in response to a resilient deformation of a resilient member; wherein the disengaging feature of the supporting frame is configured to allow the resilient member to be released to drive the one of the first auxiliary member and the second auxiliary member from the first state to a second state to disengage from the another one of the first auxiliary member and the second auxiliary member for terminating the displacement synchronization between the second rail and the first rail when the second rail is displaced to the second predetermined position.

2. The slide rail mechanism of claim 1, wherein the second rail is movably mounted between the first rail and the third rail.

3. The slide rail mechanism of claim 1, wherein the disengaging feature of the supporting frame is formed by excavating and for providing a moving space for the one of the first auxiliary member and the second auxiliary member, and the supporting frame further comprises a blocking feature located adjacent to the disengaging feature and configured to block the first rail for preventing the first rail from displacing away from the second predetermined position along a second predetermined direction opposite to the first predetermined direction.

4. The slide rail mechanism of claim 3, wherein the slide rail assembly further comprises a working member movably mounted on the second rail, a corresponding feature is arranged on the third rail, and the third rail drives the second rail to synchronously displace together with the third rail by an abutment of the corresponding feature and the working member during a displacement of the third rail along the first predetermined direction.

5. The slide rail mechanism of claim 4, wherein the working member is pivotally connected to the second rail by a connecting member, and the working member is driven to a predetermined state by a resilient object for abutting against the corresponding feature.

6. The slide rail mechanism of claim 5, wherein a disengaging structure is arranged on the first rail, the disengaging structure is configured to terminate a displacement synchronization between the third rail and the second rail when the third rail and the second rail are synchronously displaced to a disengaging position along the first predetermined direction.

7. The slide rail mechanism of claim 6, wherein a blocking structure is further arranged on the first rail and located adjacent to the disengaging structure, the blocking structure blocks the second rail for preventing the second rail from displacing away from a third predetermined position along the second predetermined direction when the second rail is displaced to the third predetermined position along the first predetermined direction.

8. A slide rail mechanism comprising: a supporting frame comprising a disengaging feature; and a slide rail assembly movable with respect to the supporting frame, the slide rail assembly comprising a first rail, a second rail and a third rail, a disengaging structure being arranged on the first rail, and the slide rail assembly further comprising a working member movably mounted on the second rail; wherein the second rail and the first rail displace synchronously during a displacement of the second rail with respect to the supporting frame away from a first

predetermined position along a first predetermined direction; wherein the disengaging feature of the supporting frame is configured to terminate a displacement synchronization between the second rail and the first rail when the second rail and the first rail are synchronously displaced to a second predetermined position along the first predetermined direction; wherein the third rail and the second rail displace synchronously during a displacement of the third rail along the first predetermined direction, and the disengaging structure is configured to terminate a displacement synchronization between the third rail and the second rail when the third rail and the second rail are synchronously displaced to a disengaging position along the first predetermined direction; wherein a corresponding feature is arranged on the third rail, and the third rail drives the second rail to synchronously displace together with the third rail by an abutment of the corresponding feature and the working member during the displacement of the third rail along the first predetermined direction.

9. The slide rail mechanism of claim 8, wherein a blocking structure is further arranged on the first rail and located adjacent to the disengaging structure, the blocking structure blocks the second rail for preventing the second rail from displacing away from a third predetermined position along a second predetermined direction opposite to the first predetermined direction and the third rail is displaceable to a fourth predetermined position along the first predetermined direction when the second rail is displaced to the third predetermined position along the first predetermined direction, and the third rail is configured to terminate a blocking between the blocking structure and the second rail during a displacement of the third rail away from the fourth predetermined position along the second predetermined direction.

10. The slide rail mechanism of claim 9, wherein the supporting frame further comprises a blocking feature located adjacent to the disengaging feature and configured to block the first rail for preventing the first rail from displacing away from the second predetermined position along the second predetermined direction, and the second rail is configured to terminate a blocking between the blocking feature and the first rail during a displacement of the second rail away from the third predetermined position along the second predetermined direction.

11. The slide rail mechanism of claim 8, wherein the first rail is an outer rail, the second rail is a middle rail, and the third rail is an inner rail.

12. The slide rail mechanism of claim 8, wherein the slide rail assembly further comprises a first auxiliary member and a second auxiliary member, the first auxiliary member is arranged on the first rail, the second auxiliary member is arranged on the second rail, and the second rail and the first rail displace synchronously by an abutment of the first auxiliary member and the second auxiliary member during the displacement of the second rail with respect to the supporting frame away from the first predetermined position along the first predetermined direction.

13. The slide rail mechanism of claim 12, wherein one of the first auxiliary member and the second auxiliary member is movable, and the one of the first auxiliary member and the second auxiliary member is configured to move to a first state for abutting against another one of the first auxiliary member and the second auxiliary member in response to a resilient deformation of a resilient member.

14. The slide rail mechanism of claim 13, wherein the disengaging feature of the supporting frame is configured to allow the resilient member to be released to drive the one of the first auxiliary member and the second auxiliary member from the first state to a second state to disengage from the another one of the first auxiliary member and the second auxiliary member for terminating the displacement synchronization between the second rail and the first rail when the second rail is displaced to the second predetermined position.

15. The slide rail mechanism of claim 14, wherein the disengaging feature of the supporting frame is formed by excavating and for providing a moving space for the one of the first auxiliary member and the second auxiliary member.

16. The slide rail mechanism of claim 8, wherein the working member is pivotally connected to the

second rail by a connecting member, and the working member is driven to a predetermined state by a resilient object for abutting against the corresponding feature.