Title: LEVER-ACTIVATED POSITIONING AND LOCKING DEVICE

FIG. 8
LEVER-ACTIVATED POSITIONING AND LOCKING DEVICE

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority of US provisional patent application 61/445,749, filed on February 23, 2011.

BACKGROUND

(a) Field

[0002] The subject matter disclosed generally relates to the field of positioning and locking device. More particularly, this description relates to a lever-activated positioning and locking device for installing camera equipment to a camera support.

(b) Related Prior Art

[0003] In the entertainment industry, motion picture cameras typically have many different accessories attached to them in order to capture the images that are desired. Examples of typical accessories are lens lights, focus adjustment devices, flags, LCD monitors, lens drive assemblies and motors.

[0004] Typically, available locking devices for positioning and locking camera equipment to a camera support which can be adjustable in position are limited in terms of simplicity and ease with which the device can be adjusted. For example, some existing devices are only adjustable in position using a screw-type device to apply or to release an initial tension retaining the device in a fixed position. Only upon unscrewing the screw-type device can the locking device be moved to a chosen position. To retain the chosen position, a user then has to re-screw the device in tension. This process is time consuming and on a movie set reducing the time to adjust and configure camera equipment is of the essence. Also, the screw-type device is sometimes difficult to maneuver if, for example, someone has tightened it too hard or if it is in an area which is difficult to reach with the fingers.
There is therefore a need for an improved lever-activated positioning and locking device for installing camera equipment to a camera support which allows the adjusting of the device’s position as desired, via a simple and easy manipulation which can be performed single-handedly.

SUMMARY

According to an embodiment, there is provided a lever-activated positioning and locking device (device) for adjusting the position of equipment on a camera support in a lateral direction via a support interface. The device comprises: a slider body for slidable mounting to the support interface and enabling sliding movement of the slider body relative to the support interface in the lateral direction, the slider body having a hollow portion, the hollow portion comprising a slope part sloping toward the support interface; a lever pivotally mounted to the slider body about a pivot axis, the lever comprising a cylindrical mounting projection having a center axis, the center axis being parallel, while non-concentric with the pivot axis; an intermediate plate pivotally mounted to the slider body about the pivot axis at a proximal end, the intermediate plate having a distal flat portion located substantially near the slope part; and a push-rod assembly mounted on the cylindrical mounting projection about the center axis, the push-rod assembly having an end for interacting with the slope part. Upon lateral positioning of the device relative to the camera support, pivoting the lever toward a locking position causes the end of the push-rod assembly to interact with the slope part and push on the distal flat portion of the intermediate plate thereby causing the intermediate plate to pivot toward the support interface to cause friction between the support interface and the intermediate plate and lock the device in place.
According to another embodiment, the slider body further comprises a dove-tail portion for slidable mounting to a corresponding portion of the support interface.

According to another embodiment, the dove-tail portion is adapted to provide the slider body to slide in the lateral direction and wherein the dove-tail portion is adapted to prevent the slider body from moving in a direction substantially perpendicular to the lateral direction.

According to another embodiment, the lever comprises two sides and wherein the cylindrical mounting projection comprises two cylindrical mounting projections, one cylindrical mounting projection on either side of the lever.

According to another embodiment, the push-rod assembly comprises two push rods and a roller having two ends, each push rod comprises a first end comprising a lever mounting hole and second end comprising a roller mounting hole, the lever mounting hole of each push rod is for mounting on a respective one of the two cylindrical mounting projections, the two ends of the roller are inserted in the roller mounting hole of a respective one of the two push rods.

According to another embodiment, the device further comprises a pin for pivot mounting of the lever about the pivot axis.

According to another embodiment, the push-rod assembly travels within the hollow portion of the slider body, the end of the push-rod assembly having a locking interface for applying pressure on the slope part toward the intermediate plate thereby causing the intermediate plate to pivot toward the support interface to cause friction between the support interface and the intermediate plate and lock the device in place.

According to another embodiment, the center axis being parallel, while non-concentric with the pivot axis and wherein pivoting the lever toward the
locking position causes the push-rod assembly to translate toward the slope part, thereby causing the intermediate plate to pivot toward the support interface to cause friction between the support interface and the intermediate plate and lock the device in place.

[0014] According to another embodiment, the lever comprises a substantially flat interface and wherein the hollow portion further comprises a substantially flat portion, wherein when the lever is pivoted toward a locking position, the substantially flat interface interacts with the substantially flat portion of the hollow portion and the lever adopts the locking position.

[0015] According to another embodiment, there is provided a lever-activated positioning and locking device (device) for adjusting the position of equipment on a camera support in a lateral direction via a support interface. The device comprises: a slider body for slidable mounting to the support interface and enabling sliding movement of the slider body relative to the support interface in the lateral direction, the slider body having a hollow portion, the hollow portion comprising a slope part sloping toward the support interface; a lever pivotally mounted to the slider body about a pivot axis, the lever comprising a mounting located outside the pivot axis; a push assembly mounted on the mounting, the push assembly having an end for interacting with the slope part; and an intermediate member connected to the slider body and having at least a portion between the end of the push assembly and the support interface; wherein upon lateral positioning of the device relative to the camera support, pivoting the lever toward a locking position causes the end of the push assembly to interact with the slope part and push on the intermediate plate thereby causing the intermediate plate to move toward the support interface to cause friction between the support interface and the intermediate plate and lock the device in place.

[0016] Features and advantages of the subject matter hereof will become more apparent in light of the following detailed description of selected embodiments, as illustrated in the accompanying figures. As will be realized, the
subject matter disclosed and claimed is capable of modifications in various respects, all without departing from the scope of the claims. Accordingly, the drawings and the description are to be regarded as illustrative in nature, and not as restrictive and the full scope of the subject matter is set forth in the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] Further features and advantages of the present disclosure will become apparent from the following detailed description, taken in combination with the appended drawings, in which:

[0018] Fig. 1 is a perspective view from one side of a lever-activated positioning and locking device in accordance with an embodiment;

[0019] Fig. 2 is a perspective view from another side of the lever-activated positioning and locking device of Fig. 1;

[0020] Fig. 3A is a top perspective view of a slider body in accordance with an embodiment;

[0021] Fig. 3B is bottom perspective view of the slider body of Fig. 3A;

[0022] Fig. 3C is a top view of the slider body of Fig. 3A;

[0023] Fig. 3D is a first end elevation view of the slider body of Fig. 3A;

[0024] Fig. 3E is a side elevation view of the slider body of Fig. 3A;

[0025] Fig. 3F is a second end elevation view of the slider body of Fig. 3A;

[0026] Fig. 4A is a perspective view of a lever in accordance with an embodiment;

[0027] Fig. 4B is a first side elevation view of the lever of Fig. 4A;

[0028] Fig. 4C is a second side elevation view of the lever of Fig. 4A;

[0029] Fig. 4D is a front elevation view of the lever of Fig. 4A;

[0030] Fig. 4E is a top view of the lever of Fig. 4A;
[0031] Fig. 5A is a perspective view of an intermediate plate in accordance with an embodiment;

[0032] Fig. 5B is a top view of the intermediate plate of Fig. 5A;

[0033] Fig. 5C is a side elevation view of the intermediate plate of Fig. 5A;

[0034] Fig. 5D is an end elevation view of the intermediate plate of Fig. 5A;

[0035] Fig. 6A is a perspective view of a push rod in accordance with an embodiment;

[0036] Fig. 6B is a top elevation view of the push rod of Fig. 6A;

[0037] Fig. 6C is a side view of the push rod of Fig. 6A;

[0038] Fig. 7A is a perspective view of a roller in accordance with an embodiment;

[0039] Fig. 7B is a side elevation view of the roller of Fig. 7A;

[0040] Fig. 7C is an end elevation view of the roller of Fig. 7A; and

[0041] Fig. 8 is a perspective exploded view of a lever-activated positioning and locking device in accordance with an embodiment.

[0042] It will be noted that throughout the appended drawings, like features are identified by like reference numerals.

DETAILED DESCRIPTION

[0043] In embodiments there are disclosed a lever-activated positioning and locking device for adjusting the position of equipment on a camera support in a lateral direction.

[0044] Referring now to the drawings, and more particularly to Figs. 1 and 2, there is shown a lever-activated positioning and locking device 10 for adjusting the position of equipment 11 on a camera support in a lateral direction. The lever-activated positioning and locking device 10 includes a support interface 12 for attachment to the camera support, where the support interface 12 has a
substantially level surface 14. There is also shown on Figs. 1 and 2 a slider body 16 that is slidably mounted to the support interface 12 enabling travel of the slider body 16 in the lateral direction.

[0045] Now referring to Figs. 3A to 3F, there is shown a slider body 16 that may be slidably mounted to a support interface 12 (Fig. 1) enabling travel of the slider body 16 in the lateral direction. The slider body 16 has a hollow portion 18 (aka grooved portion or carved out portion). The hollow portion 18 includes a slope part 20, sloping toward the support interface 12 (Fig. 1). Moreover, as shown in Figs. 3A, 3D and 3F, it is to be noted that the slider body 16 may include a dove-tail portion 38 to allow the slider body 16 to be slidably mounted to a corresponding portion of a support interface 12 (Fig. 1).

[0046] Now referring to Figs. 4A to 4E, there is shown a lever 22 to be pivotally mounted to the slider body 16 (Fig. 3A) about a pivot axis 24. The lever 22 of the lever-activated positioning and locking device 10 includes a cylindrical mounting projection 26 which has a centre axis 28. The center axis 28 of the cylindrical mounting projection 26 is non-concentric with the pivot axis 24. The cylindrical mounting projection 26 is only an example of a mounting which could take many other forms while providing the same function.

[0047] Now referring to Figs. 5A to 5D, there is shown an intermediate plate 30 of the lever-activated positioning and locking device 10 to be pivotally mounted to the slider body 16 (Fig. 1) about the pivot axis (Fig. 4B). Additionally, the intermediate plate 30 of the lever-activated positioning and locking device 10 includes holes 32.

[0048] Now referring to Figs. 6A to 6C, there is shown a push rod 36. In an embodiment, a pair of push rods 36 is provided and the rods are mounted on the cylindrical mounting projections 26 on either side of the lever 22. The push rod 36 has a first end 33 comprising a lever mounting hole 35 and second end 34 comprising a roller mounting hole 37. The lever mounting hole 35 is the one which is mounted on the cylindrical mounting projection 26. The two ends 42, 44
of a roller 40 shown in Figs. 7A to 7C are respectively inserted in a roller mounting hole 35. Two push rods 36 and the roller 40 constitute a push-rod assembly. The push-rod assembly is only an example of a push assembly which could take many other forms while providing the same function.

[0049]  It is to be noted that when the lever-activated positioning and locking device 10 is moved to a selected position by a user, pivoting the lever 22 toward a locking position causes the roller 40 of the push rod assembly to roll on the slope part 20 toward the intermediate plate 30. This movement is caused by the fact that the pivot axis of the lever 22 and the center axis 28 (Fig. 4B) of the cylindrical mounting projections 26 are parallel, but non-concentric. The downward movement of the end of the push-rod assembly causes the intermediate plate 30 to pivot toward the level surface 14 of the support interface 12 resulting in friction between level surface 14 and the intermediate plate 30 and lock the lever-activated positioning and locking device 10 in the selected position.

[0050]  Referring now to Fig. 8, there is shown a perspective exploded view of a lever-activated positioning and locking device 110 in accordance with an embodiment. The lever-activated positioning and locking device 110 is for adjusting the position of equipment (not shown) on a camera support in a lateral direction by a lateral sliding movement via a support interface 112. Fig 8 shows the lever-activated positioning and locking device 110 that comprises a slider body 116 for slidably mounting to the support interface 112 and enabling sliding movement of the slider body 116 relative to the support interface (not shown) in the lateral direction. The slider body 116 has a hollow portion 118. The hollow portion 118 comprises a slope part 120 sloping toward the support interface 112. The lever-activated positioning and locking device 110 also comprises a lever 122 pivotally mounted to the slider body 116 about a pivot axis 124. The lever 122 comprises a cylindrical mounting projection 126 which has a center axis 128. There is shown on Fig. 8 that the center axis 128 is parallel, while non-concentric with the pivot axis 124.
[0051] Still referring to Fig. 8, there is shown that the lever-activated positioning and locking device 110 further comprises an intermediate plate 130 pivotally mounted to the slider body 116 about the pivot axis 124 at a proximal end 180. The intermediate plate 130 has a distal flat portion 142 located substantially near the slope part 120. Additionally, the lever-activated positioning and locking device 110 comprises a push-rod assembly 144 mounted on the cylindrical mounting projection 126 about the center axis 128. The push-rod assembly 144 has an end 134 for interacting with the slope part 120. According to the configuration of the lever-activated positioning and locking device 110, when the lever-activated positioning and locking device 110 is displaced by a user at a selected position relative to the camera support, pivoting the lever 122 toward a locking position causes the end 134 of the push-rod assembly 144 to interact with the slope part 120 and push on the intermediate plate 130, thereby causing the intermediate plate 130 to pivot toward the support interface 112 to cause friction between the support interface 112 and the intermediate plate 130 and lock the lever-activated positioning and locking device 110 in the selected position.

[0052] According to an embodiment, the slider body 116 further comprises a dove-tail portion (not shown) for slidably mounting to a corresponding portion of the support interface (not shown). More particularly, the dove-tail portion (not shown) is adapted to provide the slider body 116 to slide in the lateral direction via the lateral sliding movement and the dove-tail portion (not shown) is adapted to prevent the slider body 116 from moving in a direction substantially perpendicular to the lateral direction.

[0053] According to an embodiment and still referring to Fig. 8, the lever 122 comprises two sides and the cylindrical mounting projection 126 comprises two cylindrical mounting projections 126, one cylindrical mounting projection 126 on either side of the lever 122.
According to an embodiment, the push-rod assembly 144 comprises two push rods 136 and a roller 140 which has two ends 149. Each push rod 136 comprises a first end 137 which comprises a lever mounting hole 150 and second end 139 which comprises a roller mounting hole 152. The lever mounting hole 150 of each push rod assembly 144 is for mounting on a respective one of the two cylindrical mounting projections 126. The two ends 149 of the roller 140 are inserted in the roller mounting hole 152 of a respective one of the two push rods 136.

According to an embodiment, the lever-activated positioning and locking device 110 further comprises a pin 154 for pivot mounting of the lever 122 about the pivot axis 124.

According to an embodiment, the push-rod assembly 144 travels within the hollow portion 118 of the slider body 116 and the end 134 of the push-rod assembly 144 has a locking interface 126 for applying pressure on the slope part 120 toward the intermediate plate 130. This causes the intermediate plate 130 to pivot toward the support interface 12 to cause friction between the support interface 112 and the intermediate plate 130, then locking the lever-activated positioning and locking device 110 in the selected position.

According to an embodiment, the center axis 128 is parallel, while non concentric with the pivot axis 124 and thus, pivoting the lever 122 toward the locking position causes the push-rod assembly 144 to translate toward the slope part 120. This action causes the intermediate plate 130 to pivot toward the support interface 112 to cause friction between the support interface 112 and the intermediate plate 130 and locks the lever-activated positioning and locking device 110 in the selected position.

According to an embodiment, the profile of the support interface 112 comprises one of cylindrical, square, regularly polygonal and irregularly polygonal.
According to an embodiment, the lever 122 comprises a cam portion 158 which has a substantially flat interface 500 and the hollow portion 118 further comprises a substantially flat portion 400. When the lever 122 is pivoted toward a locking position, it causes the substantially flat interface of the cam portion 158 to interact with the substantially flat portion of the hollow portion 118 and lock the lever-activated positioning and locking device 110 in the selected position.

While preferred embodiments have been described above and illustrated in the accompanying drawings, it will be evident to those skilled in the art that modifications may be made without departing from this disclosure. Such modifications are considered as possible variants comprised in the scope of the disclosure.
CLAIMS:

1. A lever-activated positioning and locking device (device) for adjusting the position of equipment on a camera support in a lateral direction via a support interface, the device comprising:

   - a slider body for slidable mounting to the support interface and enabling sliding movement of the slider body relative to the support interface in the lateral direction, the slider body having a hollow portion, the hollow portion comprising a slope part sloping toward the support interface;

   - a lever pivotally mounted to the slider body about a pivot axis, the lever comprising a cylindrical mounting projection having a center axis, the center axis being parallel while non-concentric with the pivot axis;

   - an intermediate plate pivotally mounted to the slider body about the pivot axis at a proximal end, the intermediate plate having a distal flat portion located substantially near the slope part; and

   - a push-rod assembly mounted on the cylindrical mounting projection about the center axis, the push-rod assembly having an end for interacting with the slope part;

wherein upon lateral positioning of the device relative to the camera support, pivoting the lever toward a locking position causes the end of the push-rod assembly to interact with the slope part and push on the distal flat portion of the intermediate plate thereby causing the intermediate plate to pivot toward the support interface to cause friction between the support interface and the intermediate plate and lock the device in place.
2. The device of claim 1, wherein the slider body further comprises a dove-tail portion for slidable mounting to a corresponding portion of the support interface.

3. The device of claim 2, wherein the dove-tail portion is adapted to provide the slider body to slide in the lateral direction and wherein the dove-tail portion is adapted to prevent the slider body from moving in a direction substantially perpendicular to the lateral direction.

4. The device of claim 1, wherein the lever comprises two sides and wherein the cylindrical mounting projection comprises two cylindrical mounting projections, one cylindrical mounting projection on either side of the lever.

5. The device of claim 4, wherein the push-rod assembly comprises two push rods and a roller having two ends, each push rod comprises a first end comprising a lever mounting hole and second end comprising a roller mounting hole, the lever mounting hole of each push rod is for mounting on a respective one of the two cylindrical mounting projections, the two ends of the roller are inserted in the roller mounting hole of a respective one of the two push rods.

6. The device of claim 1, further comprising a pin for pivot mounting of the lever about the pivot axis.

7. The device of claim 1, wherein the push-rod assembly travels within the hollow portion of the slider body, the end of the push-rod assembly having a locking interface for applying pressure on the slope part toward the intermediate plate thereby causing the intermediate plate to pivot toward the support interface to cause friction between the support interface and the intermediate plate and lock the device in place.
8. The device of claim 1, wherein the center axis being parallel, while non-concentric with the pivot axis and wherein pivoting the lever toward the locking position causes the push-rod assembly to translate toward the slope part, thereby causing the intermediate plate to pivot toward the support interface to cause friction between the support interface and the intermediate plate and lock the device in place.

9. The device of claim 1, wherein the lever comprises a substantially flat interface and wherein the hollow portion further comprises a substantially flat portion, wherein when the lever is pivoted toward a locking position, the substantially flat interface interacts with the substantially flat portion of the hollow portion and the lever adopts the locking position.

10. A lever-activated positioning and locking device (device) for adjusting the position of equipment on a camera support in a lateral direction via a support interface, the device comprising:
   - a slider body for slidable mounting to the support interface and enabling sliding movement of the slider body relative to the support interface in the lateral direction, the slider body having a hollow portion, the hollow portion comprising a slope part sloping toward the support interface;
   - a lever pivotally mounted to the slider body about a pivot axis, the lever comprising a mounting located outside the pivot axis;
   - a push assembly mounted on the mounting, the push assembly having an end for interacting with the slope part; and
   - an intermediate member connected to the slider body and having at least a portion between the end of the push assembly and the support interface;
wherein upon lateral positioning of the device relative to the camera support, pivoting the lever toward a locking position causes the end of the push assembly to interact with the slope part and push on the intermediate plate thereby causing the intermediate plate to move toward the support interface to cause friction between the support interface and the intermediate plate and lock the device in place.
INTERNATIONAL SEARCH REPORT

International application No.
PCT/CA2012/000199

A. CLASSIFICATION OF SUBJECT MATTER
IPC: F16M 11/04 (2006.01) . F16B 2/18 (2006.01) . F16D 63/00 (2006.01) . G03B 17/00 (2006.01)
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED
Minimum documentation searched (classification system followed by classification symbols)
IPC: F16M 11/04 (2006.01) . F16B 2/18 (2006.01) . F16D 63/00 (2006.01) . G03B 17/00 (2006.01)
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic database(s) consulted during the international search (name of database(s) and, where practicable, search terms used)
Database: EPPOQUE
Keywords: wedge, incline, slope, lever, pivot, push, friction, camera, mount, support, roller, lock, engage, secure, cam

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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[ ] Further documents are listed in the continuation of Box C.  [X] See patent family annex.

- * Special categories of cited documents
- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier application or patent but published on or after the international filing date
- "L" document which may (but not necessarily) be relevant to the claimed invention
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- "X" document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- "Z" document member of the same patent family

Date of the actual completion of the international search
29 May 2012 (29.05.2012)

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