

PATENT SPECIFICATION

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(54) SLIDE HOLDERS

(71) We, EASTMAN KODAK COMPANY, a Company organized under the Laws of the State of New Jersey, United States of America, 343 State Street, Rochester, New York, 14650, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a slide holder which may be releasably connected to a group of photographic slides or transparency mounts (hereinafter called 'slides') to facilitate handling of the slides in a group.

Slide projectors having means for supporting a plurality of slides and for transporting one slide at a time in an automatic or semi-automatic manner to and from a projection station are well known in the art. In many such projectors, the slides are loaded into a rotary magazine while in other projectors the slides are assembled in groups in face to face relationship. U.S.A. Patent Specification No. 3,427,739 shows an adapter for converting a projector of the former type to one of the latter type.

Slides are normally returned from a processor in boxes which may be used for storage after the slides are arranged in a desired sequence. When showing slides so stored by a projector having a magazine which accepts slides in groups of this type, it is advantageous to be able to transfer the slides directly from the storage box to the magazine, a function to which the slide holder of the present invention is particularly suited.

Other apparatus has been suggested in the prior art for transferring assembled slides from a storage container to a projector magazine. One such apparatus is shown in U.S.A. Patent Specification No. 2,698,765. In the magazine clip disclosed in that patent, the slides are gripped between a pair of plates which are urged toward each other by a tension spring. To release the grip, a pair

of members are manually moved toward each other to stretch the spring and move the plates away from each other. Because the clip does not have a stable open condition, the plates will again grip the slides as soon as the members are released, the magazine clip must be removed from the slides during the projection operation. A slide clip which can remain with the slides during projection is shown in U.S.A. Patent Specification No. 3,552,846. The gripping force of the Hansen clip is relieved by special structure on the projector, thus substantially preventing use of the clip except in conjunction with a projector designed specifically for that clip.

Canadian Patent Specification No. 763,785 shows a slide clip for transferring slides from a storage tray to a projector magazine in which the slides may be gripped between a pair of arms which are spring urged apart. The arms may be moved toward each other against the spring force by a toggle-like lever to grasp the slides. In one position, the lever permits the spring force to release the slides, while in a second position, the lever pulls the two slide gripping arms towards one another to releasably retain the slides therebetween. While the operation of the mechanism disclosed in the abovementioned Canadian Patent Specification appears to be suitable for its intended purpose, the device is constructed with a large number of parts which must be assembled at what obviously would be greater cost than the manufacturing cost of the slide holder of the present invention. Further, it will become apparent that operation of this slide clip requires more manual dexterity than the operation of the slide holder of the present invention.

It is an object of the present invention to provide an inexpensive, easily operable slide holder of simple construction for releasably gripping a plurality of slides to assist in the handling thereof.

In accordance with the invention a slide holder for receiving and releasably holding a

[Price 33p]

Price 75p

stack of photographic slides comprises a pair of spaced slide gripping members adapted to be positioned on opposite sides of a stack of slides, the gripping members being movable toward each other to grip the slide stack and away from each other to release the slide stack; a plate having two spaced, parallel edges; one member being connected to the plate along the other edge, both members extending from one side of the plate in directions generally perpendicular to portions of the plate near the respective edges; and overcentre spring means operatively connected to said plate and in a first stable condition bending the portions of the plate near the edges toward said one side of said plate so causing the members to move toward each other to grip the stack of slides therebetween, and in a second stable condition bending the portions of the plate near the edges away from the said one side of the plate so causing the members to move away from each other to release the stack of slides therebetween.

In accordance with the invention also, a slide holder for receiving and releasably holding a stack of slides, comprises a sheet of resilient material bent along two parallel, spaced lines into a generally U-shaped configuration in cross-section along a plane perpendicular to the said lines and thus forming a generally rectangular plate having two opposed edges defined by the lines to form the base of the U-shaped configuration, the plate having a pair of spaced slots each extending in a direction perpendicular to the said opposed edges and including a region between the said slots which is curved about an axis parallel to the edges and forms a bow movable from one side to the other side of a plane containing the said edges to form overcentre spring means; and side wall members extending from the plate from one and the other of the opposed edges to form the legs of the U-shaped configuration, whereby the side wall members are moved toward each other to grip a stack of slides therebetween by a flexure of the plate when the bow is moved to one side of the plate and are moved away from each other to release the stack of slides therebetween by a flexure of the plate when the bow is moved to the other side of the plate.

A preferred embodiment of the slide holder of the present invention is formed of a sheet of flexible material having a generally box-like configuration with one open side, a generally rectangular upper plate and four depending walls each attached only to the upper plate. The upper plate has two parallel slots and the region between the slots is stretched to form a bowed area which acts as an overcentre spring having two stable conditions to, in

one condition, urge two of the depending walls toward each other and, in the other condition, to urge those depending walls away from each other.

In the detailed description of a preferred embodiment of the invention presented below by way of example reference is made to the accompanying drawings, in which:—

Fig. 1 is a perspective view of a slide holder according to the present invention shown with a group of slides held therein;

Fig. 2 is a sectional view taken along line 2—2 of Fig. 1 and further showing a portion of a slide projector and adapter for receiving slides held in a holder according to the present invention;

Fig. 3 is a perspective view of the slide projector, adapter and slide holder of Fig. 2; and

Fig. 4 is a sectional view taken along line 4—4 of Fig. 3.

Slide holders according to the present invention provide a convenient means for handling a stack of slides and for moving the stack from a storage container to the slide magazine of a projector or similar device and then back to the storage container. When used in conjunction with a projector having a magazine as shown in U.S.A. Patent Specification, No. 3,427,739, such a holder may be left on the slides as they are being indexed through the magazine. The holder securely holds the slides while they are being moved between the storage container and the projector, is easily releasable to remove the slides therefrom and is readily actuated to re-engage the slides to move them back to the storage container after projection.

Referring to Fig. 1, the slide holder 10 of the illustrated embodiment of the present invention is formed of a sheet of resilient, incompressible material such as steel. The sheet is bent along lines *a*, *b*, *c* and *d* to form a generally box-shaped configuration having one open side opposite a generally rectangular upper plate 12 and four side wall members 14, 16, 18 and 20 which depend from the edges of upper plate 12. While the dimension of upper plate 12 in a direction parallel to bends *a* and *c* is approximately determined by the width of the slides which make up a stack 22, the upper plate's dimension in a direction parallel to bends *b* and *d* can be chosen to correspond to the maximum number of slides to be positioned in the holder.

A pair of slots 24 and 26 have been provided in plate 12. The slots are parallel to bends *a* and *c* and have enlarged, rounded ends to prevent fatigue failure. Between the slots, a central portion 28 has been stretched so that, as can be seen best in Fig. 2, central portion 28 is bowed. Four other slots 30, 32, 34 and 36 have been provided along

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bends *a* and *c* so that upper plate 12 may be flexed in the regions close to bends *b* and *d* as will be explained hereinafter.

Referring still to Fig. 2, bowed portion 28 acts as an overcentre spring having two stable conditions, one of which is shown in full line in that figure while the other is shown in phantom line. In the full line condition, i.e. where bowed member 28 is above the plane of upper plate 12 and the axis of curvature of the bow is below plate 12, the two edges of plate 12 near bends *b* and *d* are curved downwardly by the spring force of the bow (this is permitted by slots 20, 32, 34 and 36) so that slide gripping members 14 and 18 are moved to active positions clamping the group of slides therebetween, resilient pads 38 and 40 being provided to help grip the slides. When moved to the phantom line position below the plane of plate 12 so that the axis of curvature of the bow is above the plate, the bowed portion causes a slight bending of these edges of upper plate 12 so that slide gripping members 14 and 18 are moved outwardly to release the slide group. Central portion 28 is moved from its full line to its phantom line position by pressing downwardly on the central region of the bow, and is moved to its full line position from its phantom line position by pressing inwardly on gripping members 14 and 18.

To move the bowed member to its phantom line position, it must be pushed to a position below the plane of upper plate 12. If the top edges of the slides were in immediate contact with the bottom surface of plate 12, the slides would prevent such movement of the bowed member to a position below plate 12. Therefore, we have provided means for spacing the top edges of the slides from the upper plate. In the preferred embodiment, this spacing means is a depression 42 and 44 in the plate in the region of each of the junctions between the bowed member and the plate. However, other means suitable for this purpose will readily occur to those skilled in the art.

It is desirable to minimize the amount of force required to move bowed portion 28 between its raised, full line position, and its lowered, phantom line position while maximizing the amount of movement of slide gripping members 14 and 18. The material of the bowed member will ripple as the bowed member passes the plane of plate 12. Therefore, slots 46 have been provided in the bowed member to accommodate this ripple by weakening the material. The slots may be formed in many patterns, the pattern shown is preferred for the following reasons. If slots 46 were parallel, running in a direction from bend *b* to bend *d*, the ripple would be accommodated along the length of the slots. By forming the slots on

an angle, less force is required to move the bowed portion past plate 12 because the ripples can then cause a twisting of the material between the slots, less force being required to twist the metal than to ripple it. We have constructed experimental models of the slide holder wherein the slots were arranged in two parallel rows as shown, but with all of the slots in each row parallel to each other and converging with the slots of the other row toward bend *a*. It was found that more force was required to open the slide so constructed if the operator depressed the bowed portion at point *e* than was required if point *f* were depressed. Although the reason for this result has not been fully investigated, it is believed that more twisting of the metal between the slots results if the bow is depressed at a point approximately on a perpendicular to the direction of the slots. Therefore, in the preferred embodiment, the slots are arranged in opposed directions so that a force applied anywhere along the bow portion will be on a perpendicular to at least some of the slots.

Figs. 3 and 4 show the illustrated embodiment of the slide holder on a group of slides which are positioned in a top load stack slide adapter on a slide projector having automatic slide changing capabilities. The projector and the adapter will not be described in detail herein, it being sufficient to point out that they are identical to the projector and the top load stack slide adapter which are shown in hereinbefore mentioned, U.S.A. Patent Specification No. 3,427,739.

The slide stack is removed from a storage container by placing the slide holder over the stack in its open condition. The holder is then closed by squeezing members 14 and 18 together, and the slide stack can then be transferred to the projector's magazine as a group. When the slides are placed in the magazine, top bowed portion 28 is depressed to move slide gripping members 14 and 18 to their inactive positions releasing the slides. Side wall member 20 is positioned between the last slide of the group and a slide pressure plate 48 of the adapter so that the slide holder will be moved by the pressure plate along with the group of slides. The slides are sequentially removed from the stack for projection as described in the Robinson patent and are returned to the stack. Fig. 4 shows the position of the slide holder and a stack of slides in full line before projection and further shows the slide holder and slides in phantom line after five slides have been returned to the stack and one slide is being returned. After the last slide has been projected and returned to the magazine, the operator may close the slide holder by

manually moving slide gripping members 14 and 18 toward each other (toward their active positions) and thereby causing bowed member 28 to move to its raised position. The slides may now be removed from the adapter and returned to the storage container by lifting the slide holder.

WHAT WE CLAIM IS:—

1. A slide holder for receiving and releasably holding a stack of photographic slides comprising a pair of spaced slide gripping members adapted to be positioned on opposite sides of a stack of slides, the gripping members being moveable toward each other to grip the slide stack and away from each other to release the slide stack; a plate having two spaced, parallel edges; one member being connected to the plate along one of the said edges and the other member being connected to the plate along the other edge, both members extending from one side of the plate in directions generally perpendicular to portions of the plate near the respective edges; and overcentre spring means operatively connected to said plate and in a first stable condition bending the portions of the plate near the edges toward said one side of said plate so causing the members to move toward each other to grip the stack of slides therebetween, and in a second stable condition bending the portions of the plate near the edges away from the said one side of the plate so causing the members to move away from each other to release the stack of slides therebetween.

2. A slide holder according to claim 1 wherein the overcentre spring means is part of the plate and is flexible and has a region curved about an axis parallel to the said edges and movable from one side to the other side of a plane defined by the edges so as to flex the remaining part of the plate and thereby move the gripping members.

3. A slide holder for receiving and releasably holding a stack of slides, comprising a sheet of resilient material bent along two parallel, spaced lines into a generally U-shaped configuration in cross-section along a plane perpendicular to the said lines and thus forming a generally rectangular plate having two opposed edges defined by the lines to form the base of the U-shaped configuration, the plate having a pair of spaced slots each extending in a direction perpendicular to the said opposed edges and including a region between the said slots which is curved about an axis parallel to the edges and forms a bow movable from one side to the other side of a plane containing the said edges to form overcentre spring means; and side wall members extending from the plate from one and the other of the opposed edges to form the legs

of the U-shaped configuration, whereby the side wall members are moved toward each other to grip a stack of slides therebetween by a flexure of the plate when the bow is moved to one side of the plate and are moved away from each other to release the stack of slides therebetween by a flexure of the plate when the bow is moved to the other side of the plate.

4. A slide holder according to claim 3 further comprising means on the plate for spacing from the plate a stack of slides received between the side wall members.

5. A slide holder according to claim 4 wherein the spacing means comprises at least one raised portion on the surface of the plate from which the side wall members depend.

6. A slide holder according to claim 4 wherein the spacing means comprises a pair of raised portions on the surface of the plate from which the side wall members depend, one of the raised portions extending between one end of each of the slots and the other raised portion extending between the other end of each of said slots.

7. A slide holder according to any one of claims 3—6 wherein the plate is provided with a plurality of slots in the bowed region to permit the sheet to ripple in the region as the bow is moved from one side to the other side of the plane defined by the plate edges.

8. A slide holder according to claim 7 wherein the slots are elongated and extend at an angle to the plate edges.

9. A slide holder according to claim 8 wherein the said angle is substantially different from ninety degrees.

10. A slide holder according to any one of claims 7—9 wherein approximately half the slots extend in a direction approximately at right angles to the direction in which the remaining slots extend.

11. A slide holder according to any one of claims 3—10 wherein each of the side wall members have resilient pads thereon to engage the slides of a stack therebetween.

12. A slide holder according to any one of claims 3—11 wherein the sheet is slotted at each end of the two opposed edges to facilitate the movement of the side wall members.

13. A slide holder according to any one of claims 3—12 in which the sheet is bent along to further parallel spaced lines defining the other opposed edges of the plate to provide a pair of further wall members extending between the opposed ends of the said side wall members.

14. A slide holder for receiving and releasably holding a stack of slides constructed and arranged substantially as hereinbefore described and shown in the accompanying drawings.

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manually moving slide gripping members 14 and 18 toward each other (toward their active positions) and thereby causing bowed member 28 to move to its raised position. The slides may now be removed from the adapter and returned to the storage container by lifting the slide holder.

WHAT WE CLAIM IS:—

1. A slide holder for receiving and releasably holding a stack of photographic slides comprising a pair of spaced slide gripping members adapted to be positioned on opposite sides of a stack of slides, the gripping members being moveable toward each other to grip the slide stack and away from each other to release the slide stack; a plate having two spaced, parallel edges; one member being connected to the plate along one of the said edges and the other member being connected to the plate along the other edge, both members extending from one side of the plate in directions generally perpendicular to portions of the plate near the respective edges; and overcentre spring means operatively connected to said plate and in a first stable condition bending the portions of the plate near the edges toward said one side of said plate so causing the members to move toward each other to grip the stack of slides therebetween, and in a second stable condition bending the portions of the plate near the edges away from the said one side of the plate so causing the members to move away from each other to release the stack of slides therebetween.

2. A slide holder according to claim 1 wherein the overcentre spring means is part of the plate and is flexible and has a region curved about an axis parallel to the said edges and movable from one side to the other side of a plane defined by the edges so as to flex the remaining part of the plate and thereby move the gripping members.

3. A slide holder for receiving and releasably holding a stack of slides, comprising a sheet of resilient material bent along two parallel, spaced lines into a generally U-shaped configuration in cross-section along a plane perpendicular to the said lines and thus forming a generally rectangular plate having two opposed edges defined by the lines to form the base of the U-shaped configuration, the plate having a pair of spaced slots each extending in a direction perpendicular to the said opposed edges and including a region between the said slots which is curved about an axis parallel to the edges and forms a bow movable from one side to the other side of a plane containing the said edges to form overcentre spring means; and side wall members extending from the plate from one and the other of the opposed edges to form the legs

of the U-shaped configuration, whereby the side wall members are moved toward each other to grip a stack of slides therebetween by a flexure of the plate when the bow is moved to one side of the plate and are moved away from each other to release the stack of slides therebetween by a flexure of the plate when the bow is moved to the other side of the plate.

4. A slide holder according to claim 3 further comprising means on the plate for spacing from the plate a stack of slides received between the side wall members.

5. A slide holder according to claim 4 wherein the spacing means comprises at least one raised portion on the surface of the plate from which the side wall members depend.

6. A slide holder according to claim 4 wherein the spacing means comprises a pair of raised portions on the surface of the plate from which the side wall members depend, one of the raised portions extending between one end of each of the slots and the other raised portion extending between the other end of each of said slots.

7. A slide holder according to any one of claims 3—6 wherein the plate is provided with a plurality of slots in the bowed region to permit the sheet to ripple in the region as the bow is moved from one side to the other side of the plane defined by the plate edges.

8. A slide holder according to claim 7 wherein the slots are elongated and extend at an angle to the plate edges.

9. A slide holder according to claim 8 wherein the said angle is substantially different from ninety degrees.

10. A slide holder according to any one of claims 7—9 wherein approximately half the slots extend in a direction approximately at right angles to the direction in which the remaining slots extend.

11. A slide holder according to any one of claims 3—10 wherein each of the side wall members have resilient pads thereon to engage the slides of a stack therebetween.

12. A slide holder according to any one of claims 3—11 wherein the sheet is slotted at each end of the two opposed edges to facilitate the movement of the side wall members.

13. A slide holder according to any one of claims 3—12 in which the sheet is bent along to further parallel spaced lines defining the other opposed edges of the plate to provide a pair of further wall members extending between the opposed ends of the said side wall members.

14. A slide holder for receiving and releasably holding a stack of slides constructed and arranged substantially as hereinbefore described and shown in the accompanying drawings.



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