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H. C. WELLMAN ET AL
ADJUSTABLE ELEVATING DEVICE

2,292,309

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FIG. 1

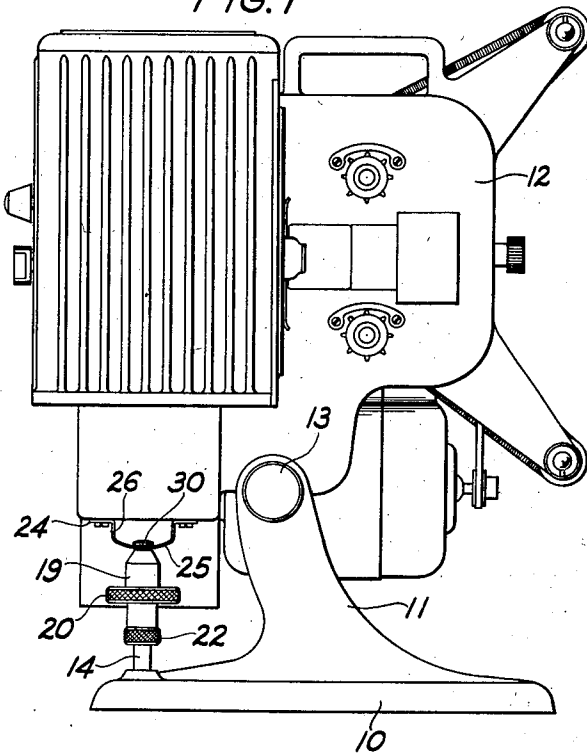


FIG. 2

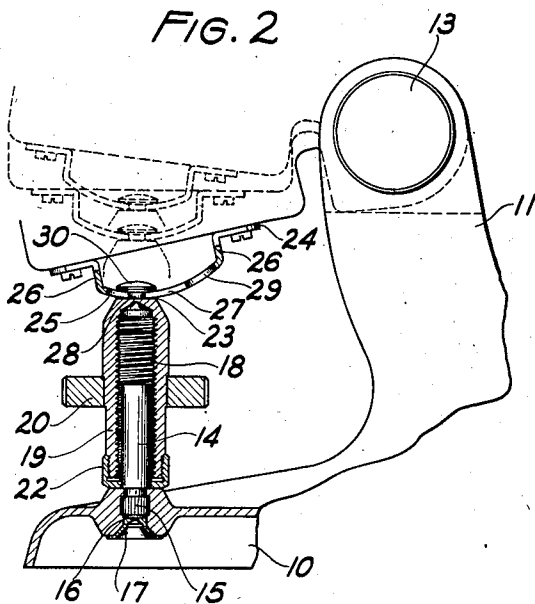
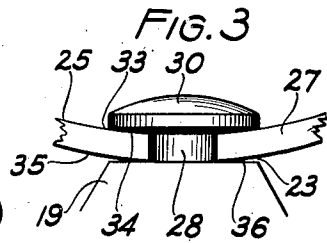


FIG. 3



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ADJUSTABLE ELEVATING DEVICE

Howard C. Wellman and Norman H. Unterborn,
Rochester, N. Y., assignors to Eastman Kodak
Company, Rochester, N. Y., a corporation of
New Jersey

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This invention relates to an adjustable elevating device, and particularly to an elevating device for a pivoted member which prevents an uncontrolled pivotal movement of the member relative to its support, or a pivoted movement independent of the elevating device.

One object of the present invention is to provide an adjustable elevating device for pivoted members which will positively hold the member in any adjusted position against pivotal movement relative to the elevating device as might be occasioned by vibration, pressure on the member directly, or the like.

Another object of the invention is to provide an elevating device of the type described which provides for a free and easy pivotal adjustment of the member regardless of its position of adjustment.

And still another object is to provide an elevating device which has no lost motion whatsoever.

A further object is to provide an elevating device which includes an adjustable elevating member on the support for the pivoted member and an elevating bracket on the member itself, the two being connected in a manner which permits an easy pivotal movement of said member when said elevating member is adjusted, but prevents any movement of said member without an adjustment of said elevating device.

A further object is to provide an elevating device of the type described wherein the elevating member is a screw, but is so arranged that no screw threads are exposed to view or damage at any time, and a positive stop is provided to limit the extent of adjustment of said screw.

Yet another object is to provide an elevating device of the type set forth which is extremely simple in construction though effective in operation, and one which can be manipulated with ease and rapidity.

The novel features that we consider characteristic of our invention are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and its methods of operation, together with additional objects and advantages thereof, will best be understood from the following description of specific embodiments when read in connection with the accompanying drawing in which,

Fig. 1 is a side elevation of a motion picture projector equipped with an elevating device constructed in accordance with a preferred embodiment of the present invention,

Fig. 2 is an enlarged view, partly in elevation and partly in section, showing the lower part of the projector and the elevating device constituting the present invention,

Fig. 3 is an enlarged detail of a part of the elevating device taken on a line through the slot in the elevating bracket, and showing the connection between the elevating bracket on the projector and the elevating screw,

Fig. 4 is an enlarged plan view of a preferred form of elevating bracket forming a part of the elevating device,

Fig. 5 is a side elevational view of an elevating bracket suitable for use in the elevating device.

Like reference characters refer to corresponding parts throughout the drawing.

The elevating device constituting the present invention is adapted for tilting a member relative to a support on which it is pivoted. Broadly, the elevating device comprises an adjustable elevating member mounted on the support for the member to be tilted and engaging an elevating bracket carried by said member. The connection between the elevating member and the elevating bracket is such that, in addition to being positive and arranged so that the bracket member can pivot relative to the elevating member when moved by an adjustment thereof, the pivoted member cannot move about its pivot without the elevating member also being moved.

While for the purpose of illustrating the application of our novel elevating device we have shown it as applied to a motion picture projection apparatus, it will be readily understood that the same could be used equally well with any pivoted member regardless of its shape or purpose.

Referring now to the drawing, the numeral 10 designates a support, or base, having an arm 11 to which a motion picture apparatus 12, or any other sort of apparatus, may be pivoted at 13 so that the projection beam of said apparatus can be raised or lowered to suitably project an image upon a screen, or other suitable image receiving surface, situated at a point remote from the projector. With an apparatus of this character, as will be known to those skilled in the art, it is desirable and necessary to be able to tilt the projector easily and rapidly, generally in a darkened room, so that the projected image can be made to strike an image receiving surface which may be higher or lower than the projection lens proper. At the same time, it is necessary that the elevating device for such an appa-

ratus be free from lost motion, or putting it another way, incapable of movement without the supervision of the operator, such movement being found in known elevating devices and caused by vibration in the apparatus or an accidental pressure of one kind or another on the machine.

The elevating device constituting the present invention comprises an elevating member mounted on the support for the projector to act along a line disposed laterally of the axis of the pivot point of the projector on the base. Such an elevating member may, as shown, comprise a vertical stud 14 the lower end of which includes a spline portion 15 adapted to be driven into a hole 16 in the support to prevent the stud from rotating relative thereto. The stud may be secured to the support in any suitable manner, and as one suitable way of accomplishing this, the lower end of said stud may be made tubular and riveted over a part of the support after being inserted therethrough, as shown at 17 in Fig. 2.

The stud 14 includes a threaded portion 18 adjacent its upper end and with which an internally threaded elevating screw 19 is in threaded engagement. This screw is provided with a knurled knob 20 non-rotatably attached thereto in any suitable manner to facilitate rotation and adjustment of the screw up and down the stud 14. Onto the lower end of the screw 19 is threaded a cap 22 having an opening through which the smooth portion of the stud 14 has a sliding fit. This cap, in addition to keeping dirt out of the threads on the screw and stud, will serve as a positive stop, when engaging the threads on the stud, to prevent the screw from being turned completely off of the stud if the member to be elevated permits such an extended adjustment. It will be readily understood that the particular elevating arrangement shown has no threads exposed to view or damage at any time, and that it incorporates a positive stop to prevent the same from becoming accidentally disassembled.

The upper end of the elevating screw 19 is provided with a groove 23 extending transversely thereof, and which may for ease in manufacture be a peripheral groove cut on a lathe; although for the purpose of this invention the groove need not extend around the screw but need only extend across the same in the direction of the pivotal movement of the projector as will be clearly understood from the following description. To the under side of a part of the projector is attached by bolts a U-shaped slotted elevating bracket 24 of the form best shown in Figs. 2 and 4. This bracket is mounted on the projector so that the portion 25 connecting the arms 26 thereof extends in a plane parallel to the plane of movement of the projector. This portion 25 of the bracket 24 is adapted to extend laterally into the groove 23 in the elevating screw and this may be accomplished by having this portion provided with a slot 27 the longitudinal edges of which are adapted to engage the shank 28 to underlie and overlie, respectively, the opposite walls in the screw formed by the groove 23. For the purpose of assembly the slot 27 terminates at one end in an enlarged opening 29 which is large enough to pass over the end 30 of the elevating screw.

Inasmuch as the walls of the groove 23 overhang the edges of the slot 27 in the bracket 24 it will be readily appreciated that this provides a positive connection between the two by means of which the projector is raised or lowered, and tilted about its pivot point, by adjustment of

the elevating screw. As the projector tilts about its pivot point the bracket 24 attached thereto must necessarily move transversely of the screw, as will be apparent from an inspection of the dotted line positions of the parts which show the same in three positions of adjustment. Such a transverse movement is provided for by the slot 27. In addition to this transverse movement it will be noticed that the portion 25 of the bracket moves through an arcuate path relative to the elevating screw. To account for this movement the portion 25 is curved, as shown, so that there will be no binding action between the same and the elevating screw during any part of the complete range of adjustment relative thereto.

In addition to the curvature of the portion 25 of the bracket 24 permitting the necessary relative adjustment of the bracket screw, this curvature is relied upon, in combination with the slotted portion of the elevating screw, to prevent an uncontrolled movement of the projector relative to the base. To this end the width of the groove 23 is made in accordance with the curvature and thickness of the portion 25 of the bracket so that at any point of adjustment one face 33 of the portion 25 will be in engagement with a portion of the upper wall 34 of the groove 23, while the other face 35 of said portion will be in engagement with the lower wall 36 of the groove, see Fig. 3. Therefore, since both faces of the portion 25 of the bracket 24 are in engagement with opposite walls of the groove 23 at all times there can be no movement of the bracket, and consequently the projector, without a corresponding adjustment of the elevating screw. In Fig. 3, the upper wall 34 of the groove 23 is shown curved concentrically with the portion 25 of the bracket so that the two are in surface contact throughout the length of the groove. While this is the ideal condition, it is pointed out that the wall 34 could be made straight and still serve its purpose since the upper face 33 would even then engage the upper wall 34 of the groove at both ends even though it be a two-point contact rather than a surface contact. It needs hardly be pointed out that the portion 25 of the elevating bracket is of such length that the enlarged opening 29 never comes directly opposite the end 30 of the elevating screw to permit the two to become accidentally disengaged.

To facilitate satisfactory assembly tolerances, and to insure a more desirable connection between the bracket and the elevating screw, the portion 25 of the bracket may be formed as shown in Fig. 5. Referring to Fig. 5, it will be noticed that the curved portion of the bracket to one side of the slot is disposed a slight distance laterally of the corresponding portion on the other side of the bracket. This arrangement insures that the part which is raised the most will be in engagement with the upper wall of the groove 23 and the other, or lower, part will be in engagement with the lower wall of the groove for the purpose set forth. This permits of small manufacturing tolerances in the width of the groove 23, and the thickness and curvature of portion 25 of the bracket being easily accounted for without affecting the operation of the device. It goes without saying that the bracket is made of metal which is not resilient enough to permit a ready deformation of the portion 25 thereof, or any part for that matter.

While we have shown the elevating bracket as having a slotted portion adapted to engage both sides of the shank 28 of the elevating screw formed by the peripheral groove 23 it is pointed out that the invention is not limited to this specific structure. For instance, the device would work in the manner set forth above if the bracket included only that portion to one side of the slot 27 therein, and which portion could extend laterally into a slot in only one side of the elevating screw. In the same sense, the bracket shown in Fig. 5 could be comprised of two separate curved portions adapted to engage separate slots in opposite sides of the elevating screw if these were displaced laterally relative to one another, as shown, without going beyond the spirit of the invention. These last-mentioned modifications are so like the embodiments shown that a specific showing of the same is not deemed necessary, and would operate in exactly the manner set forth with the preferred modifications, differing only from the standpoint of rigidity.

From the above description it will be readily understood that our novel elevating device although simple in construction and extremely efficient in operation has a neat appearance. It provides an elevating device which is readily accessible for easy operation, and one which can be easily and rapidly operated with the operator having complete control of the tilting operation at all times. It provides for a combined transverse and arcuate movement of the elevating bracket relative to the elevating screw without a binding action, and while maintaining a positive connection between the two parts at all times, and which connection is entirely free of lost motion. The particular connection between the bracket and elevating screw entirely eliminates any chance of the projector being tilted without an adjustment of the elevating screw, and at the same time no tendency of the projector to tilt due to vibration, or other means, can cause, or tend to cause, any accidental movement of the elevating screw.

Although we have shown and described certain specific embodiments of our invention, we are fully aware that many modifications thereof are possible. Our invention, therefore, is not to be restricted except insofar as necessitated by the scope of the appended claims.

Having thus described our invention, what we claim is new and desire to secure by Letters Patent of the United States is:

1. An elevating device of the type described comprising in combination a support, a member to be elevated pivoted to said support, an adjustable elevating member mounted on said support in spaced relation to the pivot point of said member and acting along a line spaced laterally of the axis of said pivot point, said elevating member including a groove extending substantially transversely to the direction of movement thereof, an elevating bracket attached to said pivoted member and including a portion extending in a plane parallel to the plane of movement of said member and projecting laterally into said groove, that portion of the bracket engaging said groove being curved to permit a free pivotal movement of said member and bracket relative to said elevating member as the latter is adjusted, and whereby each face of said portion is adapted to engage opposite walls of said groove at all times to prevent uncontrolled pivotal movement of said member relative to said support.

2. An elevating device of the type described comprising in combination a support, a member to be elevated pivoted to said support, an adjustable elevating member mounted on said support in spaced relation to the pivot point of said member and acting along a line spaced laterally of the axis of said pivot point, said elevating member provided with a groove extending substantially transversely to the direction of movement thereof, an elevating bracket attached to said member and including a portion extending in a plane parallel to the plane of movement of said member, said portion of said bracket provided with a slot extending longitudinally thereof and embracing the grooved portion of said elevating member, the slotted portion of said bracket being curved to permit a free pivotal movement of said member and bracket relative to said elevating member as the latter is adjusted, and whereby each face of said slotted portion is adapted to engage opposite walls of said groove at all times to prevent uncontrolled pivotal movement of said member relative to said support.

3. An elevating device of the type described comprising in combination a support, a member to be elevated pivoted to said support, an adjustable elevating member mounted on said support in spaced relation to the pivot point of said member and acting along a line spaced laterally of the axis of said pivot point, said elevating member provided with a groove extending substantially transversely to the direction of movement thereof and having one wall curved laterally of the groove, an elevating bracket attached to said pivoted member and including a portion extending in a plane parallel to the plane of movement of said member and projecting into said groove, that portion of the bracket engaging said groove being curved concentrically to the curved portion of said groove to permit a free pivotal movement of said member and bracket relative to said elevating member as the latter is adjusted, and whereby each face of said portion is adapted to engage opposite walls of said groove at all times, and the curved wall of said groove at all points along the same, to prevent uncontrolled pivotal movement of said member relative to said support.

4. An elevating device of the type described comprising in combination a support, a member to be elevated pivoted to said support, an elevating screw mounted on said support in spaced relation to the pivot point of said member and acting along a line spaced laterally of the axis of said pivot point, said screw provided with a groove extending substantially transversely thereof, a U-shaped bracket attached to said member with the bottom portion thereof extending in a plane parallel to the plane of movement of said member and provided with a slot the edges of which extend into said groove in said screw, said bottom portion of said bracket curved to permit free pivotal movement of said member and bracket relative to said screw and whereby each face of said portion engages opposite walls of said groove at all times to prevent uncontrolled pivotal movement of said member relative to said support.

5. An elevating device of the type described comprising in combination a support, a member to be elevated pivoted to said support, an adjustable elevating member mounted on said support in spaced relation to the pivot point of said member and acting along a line spaced laterally

of the axis of said pivot point, said elevating member provided with a groove extending substantially transversely to the direction of movement thereof, an elevating bracket attached to said member and including a pair of portions extending in a plane parallel to the plane of movement of said member and projecting laterally into said groove, those portions of the bracket engaging said groove being curved to permit a free pivotal movement of said member and bracket relative to said elevating member as the latter is adjusted, and said portions being disposed laterally relative to one another whereby one is adapted to engage one wall of said groove at all times, and the other is adapted to engage the opposite wall of said groove at all times to prevent uncontrolled pivotal movement of said member relative to said support.

6. An elevating device of the type described comprising in combination a support, a member to be elevated pivoted to said support, an elevating screw adjustably mounted on said support so that the threads thereof are not exposed to view or damage and acting along a line spaced laterally of the axis of said pivot point, said screw provided with a groove extending substantially transversely thereof, an elevating bracket attached to said pivoted member and including a portion extending in a plane parallel to the plane of movement of said member and projecting laterally into said groove, that portion of the bracket engaging said groove being curved to

permit a free pivotal movement of said member and bracket relative to said screw as the latter is adjusted, and whereby each face of said portion is adapted to engage opposite walls of said groove at all times to prevent uncontrollable pivotal movement of said member relative to said support.

7. An elevating device of the type described comprising in combination a support, a member to be elevated pivoted to said support, a stud fixed to and extending from said support and having a threaded portion, an internally threaded elevating screw in threaded engagement with the threaded portion of said stud and acting along a line laterally disposed from the axis of said pivot point, said screw provided with a groove extending substantially transversely thereof, an elevating bracket attached to said pivoted member and including a portion extending in a plane parallel to the plane of movement of said member and projecting laterally into said groove, that portion of the bracket engaging said groove being curved to permit a free pivotal movement of said member and bracket relative to said screw as the latter is adjusted, and whereby each face of said portion is adapted to engage opposite walls of said groove at all times to prevent uncontrollable pivotal movement of said member relative to said support.

HOWARD C. WELLMAN.
NORMAN H. UNTERBORN.