

[54] ELEVATION MECHANISM  
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248/397; 353/119; 108/146, 6, 7, 8, 9

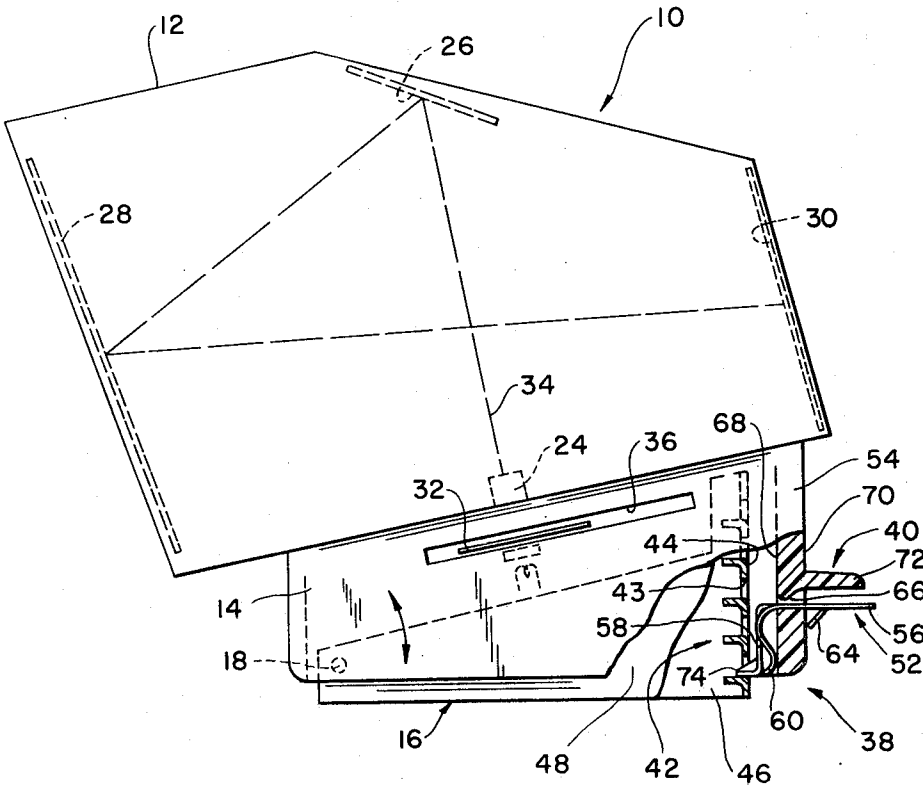
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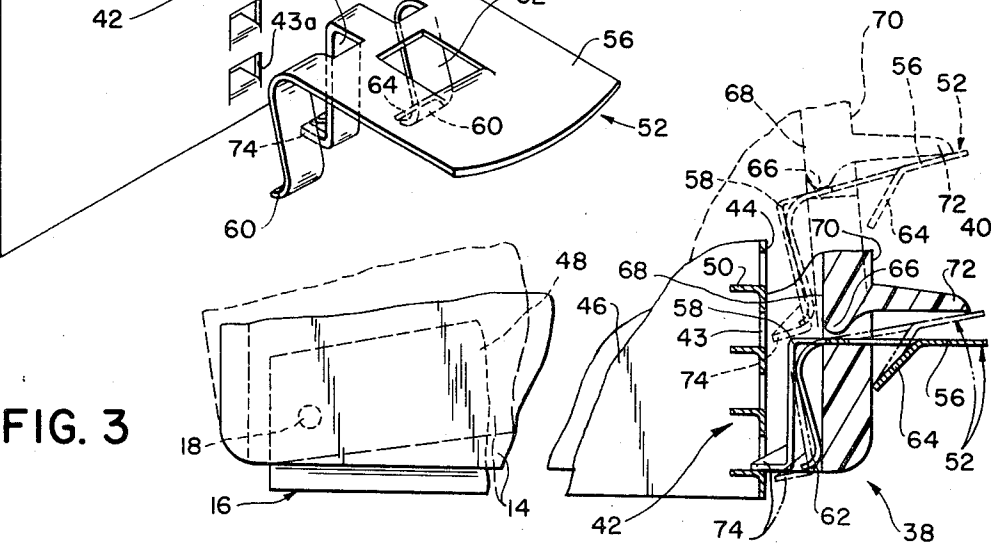
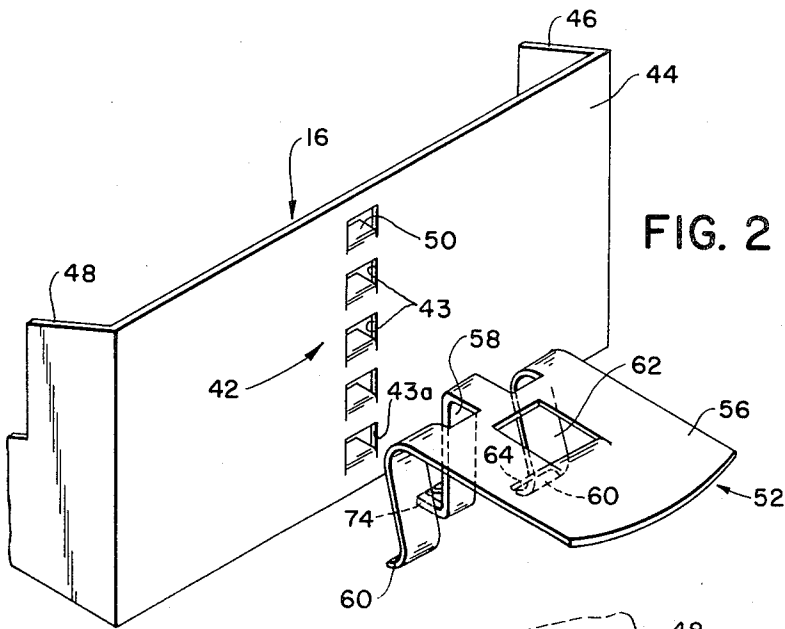
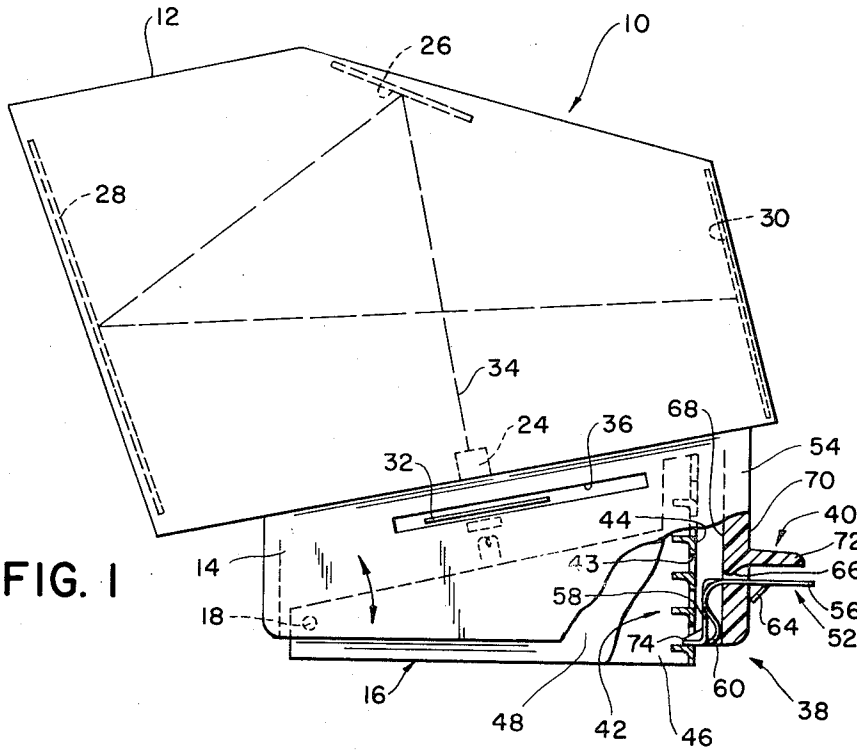
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[57]                      **ABSTRACT**  
An elevation mechanism for varying the angle of a main housing relative to a base pivoted to the housing is disclosed. At the front of the base is provided a series of vertically disposed openings or indentations into one of which a detent finger supported by the front of the housing is adapted to be inserted. The finger preferably comprises a part of an operational member having spring members and a operating surface whereby pressure applied to the operating surface will compress the spring members and retract the finger to permit rotation of the housing relative to the base. When pressure is withdrawn from the operating surface the spring members urge the finger into an opening in the base to establish the desired angle of the base relative to the housing.

6 Claims, 3 Drawing Figures





## ELEVATION MECHANISM

## BACKGROUND OF THE INVENTION

## 1. Field of the Invention

This invention relates to an elevation mechanism for adjusting the elevation of a housing member relative to a base member and more particularly relates to such an elevation mechanism for use in apparatus such as motion picture or image projectors, microfilm readers or the like.

## 2. Description of the Prior Art

Elevation mechanisms for substantially portable apparatus such as motion picture or slide projectors, microfilm readers and the like have generally had a number of disadvantages. In one type of known elevation mechanism utilizing a rack and pinion system, although a fairly wide range of elevation angle was provided, the rack and pinion system comprised a large number of parts and therefore contributed to undesirable complexity and expense of the elevation mechanism. In addition, this type of elevation mechanism occupied a substantial amount of space in the apparatus which could be efficiently used for other purposes or eliminated to make the apparatus more compact. In another type of known elevation mechanism utilizing a screw and knob assembly the elevation mechanism comprises a minimum number of parts but is disadvantageous in that only a limited elevation angle is provided. In another known mechanism a U shaped bar is pivoted to the base of the apparatus and although of simple and inexpensive construction such mechanism permits the adjustment of the apparatus to only a single angle of elevation. Although these mechanisms were suited for the specific apparatus for which they were designed there is clearly a need for a simple and inexpensive elevation mechanism which provides a substantial choice in the angle of elevation to which the apparatus may be set. Such an elevation mechanism should also comprise a minimum number of parts and occupy a minimum amount of space in the apparatus. It is also desirable that such a mechanism provide a positive control of the elevation angle at which the apparatus is set.

## SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide an elevation mechanism for apparatus which comprises relatively few parts but which permits adjustment of the apparatus through a substantial angle of elevation.

It is a further object of the present invention to provide an elevation mechanism for substantially portable apparatus such as film projectors and microfilm readers which is economical in manufacture, occupies a minimum amount of space in the apparatus and provides positive control of the angle of elevation to which the apparatus may be set.

According to the present invention there is provided an elevation mechanism for apparatus such as motion picture film an slide projectors, microfilm readers and the like comprising an operating member having a detent finger mounted on a rotatable main housing of the apparatus in cooperation with surface indentations on a base member to which the housing is pivoted. According to the one aspect of the invention the operating member includes an angled detent finger flanked by spring members unitarily projecting downwardly from a manually operable member protruding through a slot

in the housing. The base of the apparatus is provided with a series vertically disposed openings or indentations into one of which the detent finger is adapted to project. According to another aspect of the invention a protruberance on the housing is spaced a slight distance from the manually operable member and upon movement of the manually operable member toward the protruberance the detent finger is moved out of engagement with the indentation in the base to permit adjustment of the housing to another angle.

The invention and its objects and advantages will become more apparent in the detailed description of the preferred embodiment presented below.

## BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects and advantages of the present invention will become apparent to one skilled in the art from the following detailed description read in conjunction with the attached drawings wherein like reference numeral indicate like elements and wherein:

FIG. 1 is a partially sectional elevational view of the elevation mechanism of the present invention as used in a microfilm reader;

FIG. 2 is an exploded perspective view of the mechanism of FIG. 1;

FIG. 3 is a partially sectional elevational view showing the operation of the mechanism of FIG. 1.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the Figures there is shown a preferred embodiment of the elevation mechanism of the present invention as used in apparatus such as a microfilm reader. As shown in FIG. 1 microfilm reader 10 comprises upper housing 12 mounted on lower housing 14 which in turn is pivotally mounted on base 16 as at bearing 18. The basic components of the projection system of the reader 10 are shown schematically and include light source 20, condenser lens 22, projection lens 24, mirror 26, front projection screen 28 and a viewing opening at the front of housing 12 including ambient light filter 30. A strip or sheet of microfilm containing a plurality of microimages is positioned relative to the optic axis formed by condenser lens 22 and projection lens 24 by means of a carriage 32 suitably mounted for movement relative to projection axis 34 in slot 36 of lower housing 14 of reader 10.

Elevation mechanism 38 includes detent means 40 on lower housing 14 and cooperating detent means 42 on base 16. As shown, detent means 42 includes a series of detent openings 43 in front wall 44 of base 16 which is also provided with side walls 46 and 48 intersecting with front wall 44. Detent openings 43 in wall 44 are vertically aligned and have horizontal lands 50 projecting rearwardly from openings 43.

Detent means 40 provided on housing 14 includes an operational member 52 supported on front wall 54 of lower housing 14. Member 52 includes horizontally disposed manually operable portion 56, angled detent finger 58 and spring members 60 and 62 flanking detent finger 58. Members 60 and 62 and finger 58 are preferably unitary with portion 56 and depend downwardly therefrom. Member 52 is also provided with a retaining element 64 also preferably unitary with portion 56.

As shown in FIGS. 1 and 3 portion 56 of member 52 projects through a slot 66 in wall 54. Spring members 60 and 62 substantially bear against inner surface 68 of

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wall 54 and the free end of retaining element 64 substantially bears against the outer surface 70 of wall 54, members 60 and 62 and element 64 thus securely holding member 52 on wall 54. Wall 54 is also provided with protruberance 72 extending substantially horizontally from surface 70 of wall 54. Protruberance 72 is spaced a small distance from portion 56 so that manual pressure may be applied between protruberance 72 and portion 56 to rotate detent member 58 out of engagement with detent openings 43 in wall 44 of base 16.

In operation, since member 52 is of springy material such as spring metal, plastic or the like, spring members 60 and 62 will bias detent finger 58 into engagement with a detent opening 43. The angle of elevation at which housing 12 is to be set for the convenience of an operator of reader 10 will determine the particular detent opening 43 with which detent finger 58 is engaged. As shown in FIG. 1, finger 58 is inserted into the lower most opening 43a and housing 12 is disposed at its lowest position. If the operator desires to change the angle of elevation of housing 12 he would apply manual pressure to portion 56 of member 52 in the direction of protruberance 72. This may be accomplished for example by grasping protruberance 72 and portion 56 between two fingers and squeezing. By pressing portion 56 towards protruberance 72 spring members 60 and 62 will tend to flatten against surface 68 of wall 54 and the lower end 74 of finger 58 will pivot out of engagement with opening 43a. The operator while maintaining squeezing pressure on portion 56 then lifts housing 12 to the desired angle for viewing and release pressures on portion 56 to permit members 60 and 62 to resume their normal configuration and to permit portion 74 of finger 58 to engage a new opening 43 above opening 43a. In such manner, the angle of viewing provided by housing 12 may be adjusted as desired simply, quickly and efficiently.

Due to the construction of member 52, if the operator should accidentally loosen the pressure on portion 56 thereof detent finger 58 will pivot into engagement with the nearest opening 43 thus preventing sudden jarring to the projection components of the reader 10.

Although elevation mechanism 38 has been shown and described as including an operating member 52 having a single detent finger 58 adapted to engage a single opening 43, it will be understood that member 52 may include a two or more detent fingers adapted to engage a like number of openings 43 for each angle of elevation. It will also be understood that the number of elevation angle setting openings and the vertical spacing between said openings may be varied and that such openings may be indentation molded or otherwise formed in plastic or the like. Other forms of detent means are also considered to be within the scope of the present invention.

The invention has been described in detail with particular reference to preferred embodiments thereof,

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but it will be understood that variations and modifications can be effected within the spirit and scope of the invention.

What is claimed is:

1. In a microfilm viewer including a base having a first wall and a housing pivotally connected to said base, said housing having a second wall spaced from said first wall, an elevation mechanism for adjusting the angle of elevation of said housing relative to said base and for thereby adjusting the angle of viewing of said viewer, comprising:

a means on said first wall for defining a plurality of detent bearing surfaces disposed vertically at different elevations;

b an operating member carried by said second wall of said housing, said operating member including:  
1 a substantially horizontal member having a manually manipulable portion extending through said second wall;

2 a downwardly extending angled detent member having a detent portion adapted to engage one of said detent bearing surfaces; and

3 downwardly extending spring member means having a portion adapted to engage said second wall, said spring member means urging said detent member into engagement with one of said detent bearing surfaces; and

c means on said second wall cooperating with said manually manipulable portion of said operating member for effecting manual manipulation of said operating member to selectively move said detent member into and out of engagement with a selected one of said detent bearing surfaces to thereby selectively adjust the angle of elevation of said housing relative to said base.

2. The elevation mechanism of claim 1 wherein said defining a plurality of bearing surfaces comprises means defining a plurality of vertically disposed openings in said first wall means.

3. The elevation mechanism of claim 1 wherein said defining a plurality of bearing surfaces comprises means defining a plurality of vertically disposed indentations in said first wall means.

4. The elevation mechanism of claim 1 wherein said means for effecting includes a protruberance on said second wall, spaced from said manipulable portion of said operating member.

5. The elevation mechanism of claim 1 wherein said spring member means includes first and second downwardly depending sinuously shaped spring elements respectively flanking said detent member.

6. The elevation mechanism of claim 1 wherein said operating member includes a retaining element depending from said horizontal member thereof and adapted to retain said operating member on said second wall.

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