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(54) PHOTOGRAPHIC PROJECTION VIEWER

(71) We, EASTMAN KODAK COMPANY, a Company organized under the Laws of the State of New Jersey, United States of America of 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:—

The present invention relates to photographic projection viewers.

In accordance with the present invention there is provided a photographic projection viewer having an optical axis along which a selected one of a plurality of images carried by a photographic medium may be front projected onto a screen optically aligned with the axis, comprising:—

a housing module having a viewing opening and an image entry opening, and including light filter means optically aligned with the axis and arranged intermediate the screen and the viewing opening, and an image reflecting system comprising at least one reflecting member and the screen optically aligned with the axis and arranged in the optical axis between the image entry opening and the filter means;

a base module having an open top which is positioned relative to the image entry opening, when the modules are detachably secured as a unit, and including a projection lens system optically aligned with the axis and the image entry opening and having a focal plane in and through which a selected form of the medium is movable, and an illuminating system optically aligned with the axis for illuminating the selected image carried by the medium, and means arranged to support the photographic medium with the selected image in the focal plane and so that the medium is movable to position other images in turn in the selected plane; and

mounting means associated with each of the housing and the base modules and interacting to secure the modules releasably together as a unit with the projection and reflecting systems in optical alignment.

The mounting means may comprise a pair of feet spaced from and parallel to each other, extending from a bottom surface of the housing module and arranged to engage a bottom surface of the base module, the feet being joined from the ends adjacent to the bottom surface of the housing module by a flat section which is arranged to form a part of the bottom wall of the base module when the modules are in an assembled relation, and lug members carried by the base module for engaging the flat section to orient the housing and base modules relative to each other.

The housing module may be provided with a bottom wall comprising a number of angularly disposed surfaces, one of which is provided with the image entry opening, and the base module is provided with spaced, parallel side walls having contoured edges for engaging the bottom wall of the housing module to support the latter in an optically aligned relationship with the base module.

The base module may comprise an illumination section in which the illumination system is arranged, a projection section arranged to be disposed between the housing module and the illumination section and in which the projection lens system is arranged, and means associated with the housing module and each of the sections for interconnecting and maintaining the same in an assembled relation as a unit.

The base module may comprise spaced, side walls having edges for engaging and supporting the housing module, a front wall and a bottom wall, the edges of the side wall being at an angle to the horizontal for maintaining the viewing opening at an angle to the vertical, and the said feet being arranged to extend into the base module and to position the flat section of the hous-

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ing module in coextensive relation with the bottom wall.

The lug members carried by the base module may be arranged along and extend from the inner portion of the side walls and the bottom wall to engage the flat section and maintain the housing and base modules in an assembled relation without lateral movement.

The projection may comprise spaced side walls, a front wall and an intermediate wall extending from the front wall, the latter wall supporting the projection lens system.

The supporting and moving means for the medium may be supported on the base module for movement in the focal plane and in both x and y directions so as to position relative to the optical axis a selected image on a microfiche having images arranged in x and y directions.

The supporting and moving means for the medium may be mounted on the intermediate wall for moving the medium in at least one direction to position successive images for projection.

The housing module may have a bottom wall provided with the image entry opening, the optical path passing through a generally cylindrical sleeve which extends from the bottom wall of the housing module and cooperates with the projection lens system in the base module, sealing means being arranged between the sleeve and the projection lens system to seal the housing module against ingress of dust through the sleeve.

In the accompanying drawings:—

Fig. 1 is a side elevation of a viewer constructed in accordance with one embodiment of the invention and in which the viewing module is shown in section;

Fig. 2 is a front elevation of the projection module of the viewer shown in Fig. 1;

Fig. 3 is a vertical section taken substantially along the line 3—3 in Fig. 2;

Fig. 4 is a vertical section through a part of the projection module showing an alternative form of illumination arrangement with a reflector member which effectively comprises the condenser lens system for illuminating the photographic medium;

Fig. 5 is a vertical section through a part of the projection module of another embodiment in which a condenser lens system is used with a low wattage lamp that is in direct alignment with the condenser lens system;

Fig. 6 is a side elevation of a viewer constructed in accordance with another preferred embodiment of the invention and in which a viewing module is shown in section;

Fig. 7 is a partial perspective view showing the manner in which a viewing module and a projection module are secured for assembling as a unit;

Fig. 8 is a section taken substantially along the line 8—8 in Fig. 3 showing in detail an arrangement for moving a microfiche in both an X and Y direction to position a selected image relative to the optical path of a projection system;

Fig. 9 is a front elevation showing another embodiment of a carrier for the photographic medium that is usable in the embodiments in Figs. 1 and 6; and

Figs. 10 and 11 are schematic views showing the relative positions of the projection lens and screen for increasing the rejection of ambient light by the screen.

With reference to Figs. 1—3, a viewer 25 comprises an image projection module 30 and a viewing module 10 mounted on the projection module. In this embodiment of the invention the projection module 30 comprises an illumination section 31 and a photographic medium handling and projecting section 26.

The illumination section 31 is provided with windows or louvres 33, which permit air to circulate around a lamp 11 which is mounted on a bracket 27 that is secured in position on a bottom wall 28 of the section 31. A condenser lens system 12 is mounted in the section 31 with a mirror 12^1 arranged between the condenser lenses, as shown in Fig. 3. Side walls 55 of the section 31 extend from a front wall 54 and are coextensive (when assembled) with the side walls 29 (Fig. 7) of the section 26. Each of the walls 29 and 55 is provided with a projecting lug 56 and 57, respectively, (see Fig. 7) the purpose of which will be described hereinafter.

The section 26 is provided with a plate 58 which extends from the front wall 59 as shown in Fig. 3. A projection lens system generally designated by the numeral 13 and defining an optical path 22 is contained in a mount 23 that is fixed to the plate 58. The lens system 13 is movable axially in the mount 23 by means of a shaft 37 and a lever 32 mounted on the front wall 59. The shaft 37 carries an eccentric pin 36 which engages the projection lens system 13 for moving it axially with respect to its mount to focus an image projected along the optical path on a screen 16 in the viewing module.

Spaced rails 46 and 49 are formed integral with or mounted on the underside of the plate 58 and slideably support a platen 38 which is associated with a carrier generally designated by the numeral 18, which carries a photographic medium, such as a microfiche 34. The platen 38 includes a pair of spaced, upright extensions 47 and 48 which have complementary tongues and grooves for slideably engaging

the rails 46 and 49, respectively. A knob 19 is rotatably mounted in the front wall 63 of the platen 38 and carries integral therewith a roller 21 which engages the microfiche 34 for moving it back and forth relative to the optical path. A cable 42 is wrapped around (1½ times) a small drum 40 mounted on the shaft 39 which carries a knob 20 at each end thereof as seen in Fig. 2. The cable 42 also engages a pulley 41 mounted on the carrier 18 and has both of its ends attached at 43 to spring 44 which is contained in and attached at its upper end to a sleeve 45. With this arrangement, the cable 42 is maintained taut. The spring 44 allows the cable 42 to slip on the drum 40 if knobs 20 are turned more than is required to move the platen 38 to either of the extreme positions in the Y direction. The movement of the microfiche 34 in the X and Y directions is accomplished by knobs 19 and 20, respectively, so as to position any one of the images in relation to the optical path 22 for projection onto the screen 16. Such movement though could be accomplished in other ways well known in the art.

The viewing module 10 (Fig. 1) has a bottom wall 60 in contact with the side walls 29 of the section 26, and is provided with a cylindrical sleeve 61 which provides an image entry opening 62 into the viewing module 10. The sleeve 61 extends from the bottom wall 60 toward the mount 23 of the projection lens system 13. The extension of the sleeve 61 is such that when the viewing module 10 is in assembled relation to the projection module 30 (sections 26 and 31), a soft rubber washer 14 on the mount 23 is slightly compressed so that a seal is effected between the sleeve 61 and the mount 23 to prevent entry of dust and dirt into the viewing module.

The microfiche image that is aligned with the optical path 22 and projected into the viewing module 10 via the opening 62 is reflected by a mirror 15 onto a front surface reflecting screen 16. A viewing opening 35 in the front wall 63 of the viewing module 10 permits an observer to view the image projected onto the front surface screen 16. The screen 16 is preferably of the type disclosed in U.S. Patent Specification 3,408,132 and has a high brightness gain-on-axis of approximately 40 times.

The viewing module 10 is provided with side walls 86 and a top wall 87 which, together with the bottom wall 60, extend beyond a filter 17 and terminate at the front wall 63. The portions of the walls 60, 63, 86 and 87 which extend beyond the filter 17 form a shroud 88. The interior surfaces of the walls forming the viewing module 10, including those of the shroud 88, are preferably blackened to reduce light reflection.

The filter 17, as shown in Fig. 1, is preferably planar and is mounted in the viewing module 10 between the opening 35 and the front surface screen 16. The image in a microfiche 34 that is positioned on the optical path 22 is projected onto the screen 16 via the projection lens system 13, the opening 62, and the mirror 15.

The filter 17 is preferably an 80C blue filter combined with a neutral density filter whose density factor will depend on the light source and the brightness gain of the screen. The filter elements are preferably mounted on a support sheet of transparent acetate for mechanical strength and rigidity or can be combined as integral parts of a suitably formulated plastic sheet. Such a light filter structure corrects for the colour temperature of the light source and thereby enhances the image contrast, as well as the luminance of the image. An 80B blue filter can also be used. 80B and 80C designate Wratten (Registered Trade Mark) filters of the light balancing type. The density factor of the neutral density filter will preferably range from about .4 to zero. In the latter case no density filter will be required because of the low light output.

If the light source is an incandescent lamp, such as an automobile lamp rated at 12.8 volts, and is operated at its rated voltage, the life of the lamp will be about 100 hours. If this same lamp is operated at a reduced voltage of about 11.2 volts, the filament produces a colour temperature of about 2800°K and its life is increased to about 500 hours. With an 80C filter, the colour temperature of the lamp can be effectively raised to that of a 4000°K light source on the basis of the black-body locus. As the gain of the screen increases, or if the light output and/or lens speed is increased, a neutral density component will be required whose density factor will also increase to about .4 or more in accordance with the other factors. The luminance of the image in clear areas should be approximately 120 foot lamberts for comfortable viewing.

At the extreme viewing angles of about ± 7½ degrees (horizontally and about ± 2¼ degrees (vertically) as determined or limited by the opening 35, the effective brightness gain of a typical screen is about 30 times. Even higher gain could be accomplished if ideal light distribution could be achieved. The theoretical gain for ideal distribution for these angles is 159 times. The screen curvature is such that at a viewing distance of about 21 inches there is no lack of uniformity of brightness (not hot spotting) over the entire screen. By way of example, the radius of curvature of the screen is

about 17¼ inches and the lens-to-screen distance is about 14⅝ inches.

With the use of a low wattage lamp, for example a 12 watt lamp, a condenser system 12, 12¹ as shown in Fig. 3, a f/3.5 projection lens and a screen 16 as described and with no filter in a such a system, it was found that a brightness of 1200 foot lamberts was obtainable with an open gate, i.e., with no film present in the system. This is obviously too high for comfortable viewing by an observer. By comparison, a white sheet of paper in a well-illuminated office might reflect a brightness of 100—120 foot lamberts. In this instance therefor the filter 17 is necessary and its inclusion serves other useful purposes as described above.

With respect to Fig. 4, a much simpler illumination system is disclosed. In this arrangement the condenser lens 12 and the reflector 12¹ (Fig. 3) are replaced by a pressed aluminium, ellipsodial mirror 65 having a reflected surface that must be formed with extreme accuracy. In this embodiment the lamp 11 (Fig. 1) can be replaced with a smaller lamp 66 and a separate reflector 67.

In Fig. 5, a small lamp 68, such as a flashlight lamp, is arranged in line with the lenses 12 comprising the condenser lens system. With this arrangement, the lamp 68 can be energized with approximately 4½ volts as derived from three dry cell batteries which can be mounted inside section 31. A reflector 69 is used and serves the same purpose as reflector 67 (Fig. 4). These reflectors 67 and 69 may be nearly double the light incident on the screen 16.

With reference to Fig. 6, a viewing module 10¹ is disclosed as being shortened, when compared with the embodiment described in Fig. 1, by moving the projection lens system 13 and the condenser lens system 12 together with the microfiche moving mechanism to the left, as viewed in Fig. 6. This change necessitates making an appropriate change in the reflecting angle of the mirror 15. The angle is increased from 11 degrees, as shown in Fig. 1, to 14 degrees, as shown in Fig. 6. The increase in the reflecting screen 16 and the mirror 15, and the combination of the shift of the mirror 15 and the optical path 22 (systems 12 and 13) allows the filter 17 also to be moved to the left. In this embodiment, the filter is curved, at least at the upper end to permit shortening of the shroud 88. Other features relating to such a viewer are disclosed and claimed in Patent Application No. 12275/72 (Serial No.). With these changes in the viewing module, just described the opening 35 can also be increased to provide more vertical freedom of eye position. An increase of 3 degrees in the reflecting angle improves the rejection of ambient light because the brightest portions of the ambient light reflected from the screen are directed 6 degrees farther away from the opening 35 so that it is absorbed, for the most part, by the black interior walls of the viewing module 10¹.

Figs. 10 and 11 show diagrammatically the optical location of the screen 16, the projection lens system 13, and the film plane F relative to one another. It is well-known that if a line (N—2) is passed through the nodal point N of the projection lens system 13 parallel to the film plane F and is extended to intersect with a line (S—1) which lies in the plane of the screen 16, the lines which are parallel on the photographic medium will form images on the screen which will appear to meet at this same distant intersection point. In Fig. 10 the film plane is chosen to be perpendicular to the line joining S and N. This represents the embodiment disclosed in Fig. 1 and the lines N—2 and S—1 make an angle of 11 degrees and meet at a point which is at a great distance from the screen. The amount of image "keystone" (i.e. relative tapering distortion on the screen of parallel lines on the medium) on the screen, which this angle represents, is less than 3 degrees slope of edge lines relative to the vertical centre line of the screen, or about a $^{9}/_{16}$ of an inch narrower image at the top of a screen about 6 inches high relative to the width of the image at the bottom of such a screen. This amount of "keytone" is considered to be acceptable and allows the projection lens 13 to be used on-axis. With a 14-degree off-axis angle, as shown in Fig. 11, the film plane F is at 93 degrees to the line S—N and, as a result the lines N—S and S—1 will again form an angle of 11 degrees relative to each other. The amount of image "keystone" will be exactly the same. For the correct focal plane, however, it is necessary for the lens to have about 2 degrees greater half angle coverage.

With the shortening of the viewing module 10¹, the sections 26 and 31 can be combined into a single module 70, as shown in Fig. 6, which is separable from the module 10¹. In this case, the side walls 71 of the module 70 are continuous and the edges 73 thereof, which support the housing module 10¹, have a contour complementary to that of the bottom wall 71 of the viewing module. In this arrangement, the microfiche platen 38 is also mounted for movement in a manner similar to that described above, so that the microfiche 34 can be moved in both X and Y directions, either by rotation of suitable knobs or by rotation of a single knob, for movement in one direction and manually slideable for movement in the other direction. As in the embodiment of Figs. 1 to 3, the viewing module 10¹ is pro-

vided with a sleeve 61 which engages the washer 14 on mount 23 so as to provide a seal between the viewing module 10^1 and the projection module 70.

With respect to the viewer shown in either Fig. 1 or Fig. 6, the platen 38 which carries the microfiche 34 may be replaced by a plate 75 which supports a pair of spaced spindles 76 and 77, as shown in Fig. 9. A suitable gate 78 is provided so that a film strip 79 of 8, 16 or 35mm width can be moved relative to the optical path 22 of the viewing apparatus. In this embodiment, the film strip 79 is carried by a reel 80 which is rotatably mounted on the spindle 76. The film strip is threaded under a guide roller 81, under the gate member 78, around another guide roller 82, and to a reel 83 on the spindle 77. A suitable knob or driving mechanism may be associated with either or both of the spindles 76 and 77 so that the film strip 79 can be moved relative to an aperture 84 in the plate 75 and the aperture 85 in the gate member 78. Such a carrier unit for the photographic medium can be readily adapted to the projection module 30 disclosed in Fig. 1 or the module 70 disclosed in Fig. 6, or it may form part of a separate interchangeable projection module.

The mounting means for securing the viewing module 10 in an assembled relation to the projection module 30, which includes sections 26 and 31, comprises a pair of spaced feet 90 which are attached to or formed integral with the bottom wall 60 of viewing module 10. The feet 90 are spaced from one another and are joined by a plate 91 which, when in an assembled relation, provides an extension and continuation of the bottom wall 28 of the illumination section 31. Projecting lugs 56 on each of the side walls 55 (see Fig. 7) engage the surface 93 of the plate 91, as shown in Fig. 3, with the side walls 55 abutting the edge of the plate 91. Suitable screws 94 draw the section 31 against the feet 90 so that the lugs 56 actually bear against the plate 91. Lugs 57 extending from the side walls 29 also engage the surface 93 of the plate 91. In an assembled relation, the side walls 29 and 55 are coextensive with the edges 95 and 96 thereof forming an opening through which the platen 38 can be moved. The edge 97 of the wall 29 aligns with the end of the plate 91 and a notch 100 engages an extension 99 to prevent any lateral movement of the walls 29. Also, the portion of each lug 56 extending beyond the edge 101 engages the wall 29 to prevent any lateral movement of the walls 55. The section 26 is maintained in position by screws 102 which secure the section to an extending lug 103 and by screws 104 which secure the plate 58 to an extending lug 106.

With reference to Fig. 6, the mounting means comprises the edge contour of the side walls 71 on the projection module 70. The several angularly disposed edges 73—1—2—3 of each of the side walls 71 form a nook or cradle in which the viewing module 10^1 is supported, the edges 73 conforming to the contour formed by the bottom wall 60 and rear wall 74 of the module 10^1. In addition, suitable lugs 107 are provided on the walls 71 and the bottom wall 60 so that the viewing module 10^1 and the projection 70 can be securely joined by suitable means, such as screws 108. When either of the above-described embodiments (Fig. 1 and Fig. 6) are assembled, the cylindrical sleeve 61 is brought into engagement with the washer 14 to provide the necessary seal between the viewing module 10 or 10^1 and the projection module 30 (section 26) or the single module 70.

It can be readily appreciated that the modular structure of the viewing apparatus described hereinabove is such that various types of projection modules and film handling mechanisms can be combined and/or interchanged and easily assembled as a complete unit. Such modular structures also permit the viewing apparatus to be used with various forms of photographic media, for example, microfilm rolls, cassettes and slides. In each instance, high image contrast can be obtained with low wattage light sources so that the need for blowers or glass platens to control the heat and, hence, the film flatness, may be avoided. Also, with the use of low wattage light sources, the power source can be chosen from any one of flashlight batteries, 12-volt car batteries, or 110-volt light power sources. With the use of a low voltage source, the viewing apparatus may be completely independent and portable.

WHAT WE CLAIM IS:—

1. A photoraphic projection viewer having an optical axis along which a selected one of a plurality of images carried by a photographic medium may be front projected onto a screen optically aligned with the axis, comprising:

a housing module having a viewing opening and an image entry opening, and including light filter means optically aligned with the axis and arranged intermediate the screen and the viewing opening, and an image reflecting system comprising at least one reflecting member and the screen optically aligned with the axis and arranged in the optical axis between the image entry opening and the filter means;

a base module having an open top which is positioned relative to the image entry opening, when the modules are detachably secured as a unit, and including a projection lens system optically aligned with

vided with a sleeve 61 which engages the washer 14 on mount 23 so as to provide a seal between the viewing module 10^1 and the projection module 70.

With respect to the viewer shown in either Fig. 1 or Fig. 6, the platen 38 which carries the microfiche 34 may be replaced by a plate 75 which supports a pair of spaced spindles 76 and 77, as shown in Fig. 9. A suitable gate 78 is provided so that a film strip 79 of 8, 16 or 35mm width can be moved relative to the optical path 22 of the viewing apparatus. In this embodiment, the film strip 79 is carried by a reel 80 which is rotatably mounted on the spindle 76. The film strip is threaded under a guide roller 81, under the gate member 78, around another guide roller 82, and to a reel 83 on the spindle 77. A suitable knob or driving mechanism may be associated with either or both of the spindles 76 and 77 so that the film strip 79 can be moved relative to an aperture 84 in the plate 75 and the aperture 85 in the gate member 78. Such a carrier unit for the photographic medium can be readily adapted to the projection module 30 disclosed in Fig. 1 or the module 70 disclosed in Fig. 6, or it may form part of a separate interchangeable projection module.

The mounting means for securing the viewing module 10 in an assembled relation to the projection module 30, which includes sections 26 and 31, comprises a pair of spaced feet 90 which are attached to or formed integral with the bottom wall 60 of viewing module 10. The feet 90 are spaced from one another and are joined by a plate 91 which, when in an assembled relation, provides an extension and continuation of the bottom wall 28 of the illumination section 31. Projecting lugs 56 on each of the side walls 55 (see Fig. 7) engage the surface 93 of the plate 91, as shown in Fig. 3, with the side walls 55 abutting the edge of the plate 91. Suitable screws 94 draw the section 31 against the feet 90 so that the lugs 56 actually bear against the plate 91. Lugs 57 extending from the side walls 29 also engage the surface 93 of the plate 91. In an assembled relation, the side walls 29 and 55 are coextensive with the edges 95 and 96 thereof forming an opening through which the platen 38 can be moved. The edge 97 of the wall 29 aligns with the end of the plate 91 and a notch 100 engages an extension 99 to prevent any lateral movement of the walls 29. Also, the portion of each lug 56 extending beyond the edge 101 engages the wall 29 to prevent any lateral movement of the walls 55. The section 26 is maintained in position by screws 102 which secure the section to an extending lug 103 and by screws 104 which secure the plate 58 to an extending lug 106.

With reference to Fig. 6, the mounting means comprises the edge contour of the side walls 71 on the projection module 70. The several angularly disposed edges 73—1—2—3 of each of the side walls 71 form a nook or cradle in which the viewing module 10^1 is supported, the edges 73 conforming to the contour formed by the bottom wall 60 and rear wall 74 of the module 10^1. In addition, suitable lugs 107 are provided on the walls 71 and the bottom wall 60 so that the viewing module 10^1 and the projection 70 can be securely joined by suitable means, such as screws 108. When either of the above-described embodiments (Fig. 1 and Fig. 6) are assembled, the cylindrical sleeve 61 is brought into engagement with the washer 14 to provide the necessary seal between the viewing module 10 or 10^1 and the projection module 30 (section 26) or the single module 70.

It can be readily appreciated that the modular structure of the viewing apparatus described hereinabove is such that various types of projection modules and film handling mechanisms can be combined and/or interchanged and easily assembled as a complete unit. Such modular structures also permit the viewing apparatus to be used with various forms of photographic media, for example, microfilm rolls, cassettes and slides. In each instance, high image contrast can be obtained with low wattage light sources so that the need for blowers or glass platens to control the heat and, hence, the film flatness, may be avoided. Also, with the use of low wattage light sources, the power source can be chosen from any one of flashlight batteries, 12-volt car batteries, or 110-volt light power sources. With the use of a low voltage source, the viewing apparatus may be completely independent and portable.

WHAT WE CLAIM IS:—

1. A photoraphic projection viewer having an optical axis along which a selected one of a plurality of images carried by a photographic medium may be front projected onto a screen optically aligned with the axis, comprising:

a housing module having a viewing opening and an image entry opening, and including light filter means optically aligned with the axis and arranged intermediate the screen and the viewing opening, and an image reflecting system comprising at least one reflecting member and the screen optically aligned with the axis and arranged in the optical axis between the image entry opening and the filter means;

a base module having an open top which is positioned relative to the image entry opening, when the modules are detachably secured as a unit, and including a projection lens system optically aligned with

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the axis and the image entry opening and having a focal plane in and through which a selected form of the medium is movable, and an illuminating system optically aligned with the axis for illuminating the selected image carried by the medium, means arranged to support the photographic medium with the selected image in the focal plane and so that the medium is movable to position other images in turn in the selected plane; and

mounting means associated with each of the housing and the base modules and interacting to secure the modules releasably together as a unit with the projection and reflecting systems in optical alignment.

2. A viewer as claimed in Claim 1, wherein said mounting means comprises a pair of feet spaced from and parallel to each other, extending from a bottom surface of the housing module and arranged to engage a bottom surface of the base module, the feet being joined from the ends adjacent to the bottom surface of the housing module by a flat section which is arranged to form a part of the bottom wall of the base module when the modules are in an assembled relation, and lug members carried by the base module for engaging the flat section to orient the housing and base modules relative to each other.

3. A viewer as claimed in Claim 1, wherein the housing module is provided with a bottom wall comprising a number of angularly disposed surfaces, one of which is provided with the image entry opening, and the base module is provided with spaced, parallel side walls having corresponding angularly contoured edges for engaging the bottom wall of the housing module to support the latter in an optically aligned relationship with the base module.

4. A viewer as claimed in Claim 1, wherein the illuminating system comprises a light source and an ellipsoidal reflector arranged between the light source and the medium for directing light at the selected image on the medium positioned in the focal plane.

5. A viewer as claimed in Claim 2, wherein the base module comprises an illumination section in which the illumination system is arranged, a projection section arranged to be disposed between the housing module and the illumination section and in which the projection lens system is arranged, and means associated with the housing module and each of the sections for interconnecting and maintaining the same in the assembled relation as a unit.

6. A viewer as claimed in Claim 2, wherein the base module comprise spaced, side walls having edges for engaging and supporting the housing module, a front wall and a bottom wall, the edges of the side wall being at an angle to the horizontal for maintaining the viewing opening at an angle to the vertical, and the said feet being arranged to extend into the base module and to position the flat section of the housing module in coextensive relation with the bottom wall.

7. A viewer as claimed in Claim 6, wherein the lug members carried by the base module are arranged along and extend from the inner portion of the side walls and the bottom wall to engage the flat section and maintain the housing and base modules in an assembled relation without lateral movement.

8. A viewer as claimed in Claim 5, wherein the projection section comprise spaced side walls, a front wall and an intermediate wall extending from the front wall, the latter wall supporting thep rojection lens system.

9. A viewer as claimed in Claim 1, wherein the supporting and moving means for the medium is supported on the base module for movement in the focal plane and in both x and y directions so as to position relative to the optical axis a selected image on a microfiche having images arranged in x and y directions.

10. A viewer as claimed in Claim 8, wherein the supporting and moving means for the medium is mounted on the intermediate wall for moving the medium in at least one direction to position successive images for projection.

11. A viewer as claimed in any preceding claim, wherein the housing module has a bottom wall provided with the image entry opening, the optical path passing through a generally cylindrical sleeve which extends from the bottom wall of the housing module and co-operates with the projection lens system in the base module, sealing means being arranged between the sleeve and the projection lens system to seal the housing module against ingress of dust through the sleeve.

12. A projection viewer substantially as described herein with reference to and as shown in Figures 1 to 3 and 7 and 8, Figure 4, Figure 5, Figure 6 or Figure 9 of the accompanying drawings.

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