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Martinez

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[54] **GENERAL ARRANGEMENT FOR PROJECTOR**

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[22] Filed: **Feb. 11, 1970**

[21] Appl. No.: **10,346**

Related U.S. Application Data

[63] Continuation of Ser. No. 715,621, March 25, 1968, Pat. No. 3,520,599.

[52] **U.S. Cl.** **353/52,** 353/68

[51] **Int. Cl.** **G03b 21/16,** G03b 21/00

[58] **Field of Search** 353/95, 57, 58, 59, 353/60, 61, 52, 68; 240/47

[56] **References Cited**

UNITED STATES PATENTS

3,176,581	4/1965	Golden	353/119
3,593,019	7/1971	Martinez	353/26
2,971,435	2/1961	Singleterry	353/95
1,879,600	9/1952	Burchett	353/57
2,587,123	2/1952	Dunning	353/95
3,124,039	3/1964	Anderson	353/95

FOREIGN PATENTS OR APPLICATIONS

1,199,664	12/1959	France	353/61
229,243	6/1924	Great Britain	353/95
683,131	10/1939	Germany	353/57

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[57] **ABSTRACT**

A projector having a molded plastic outer case which is supported by a curved steel stand which also serves as an elevating device and carrying handle. The projector can be tilted simply by sliding it up on the curved stand and locking it with two knobs. An electric lamp is mounted at a center location within the case and a pair of heat dissipating baffle plates are positioned on opposite sides of the lamp. A cover is positioned over the lamp and baffle plates to direct the cooling air rising adjacent the lamp toward the rear of the projector. A film advance mechanism is housed in the case and includes an arm which engages the film sprocket holes only during the advancing operation.

15 Claims, 9 Drawing Figures

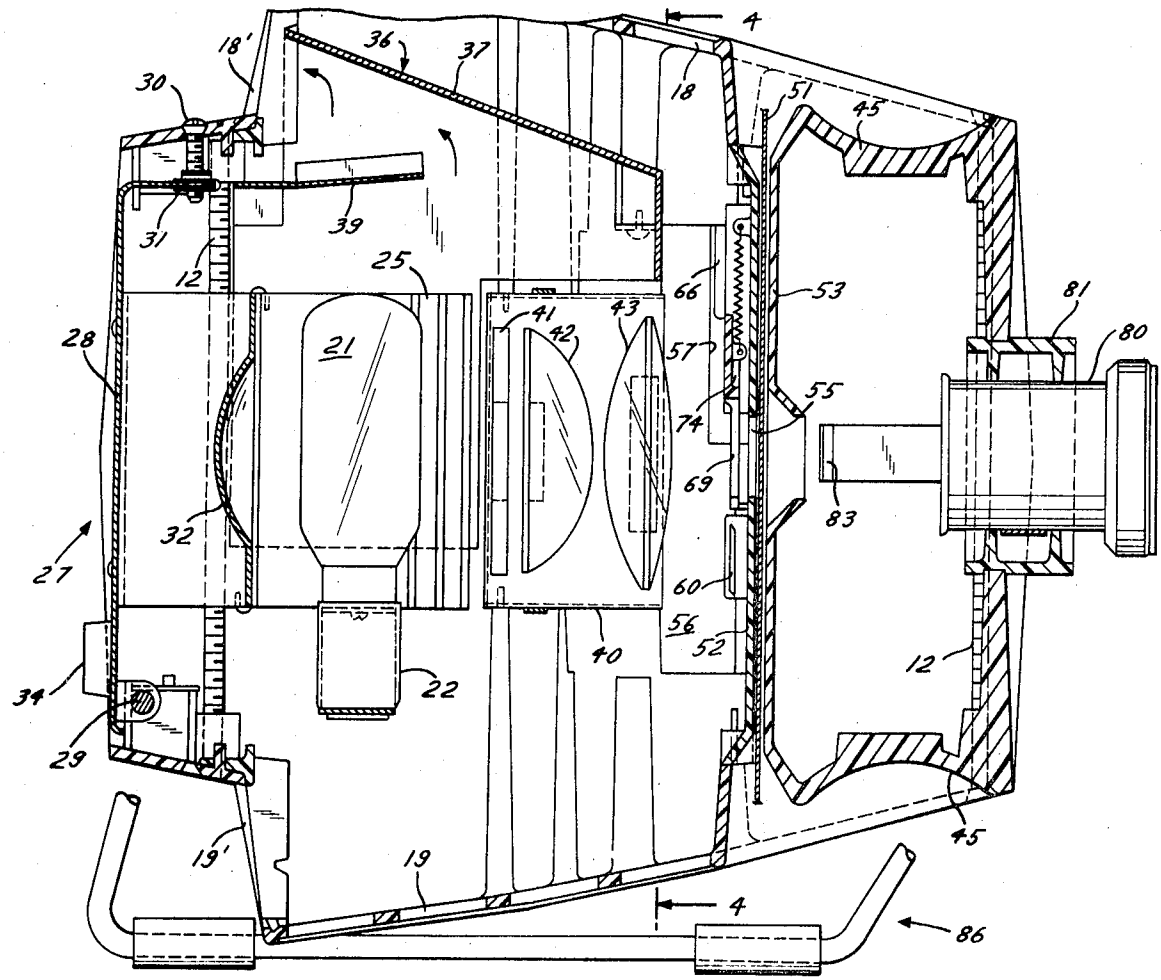
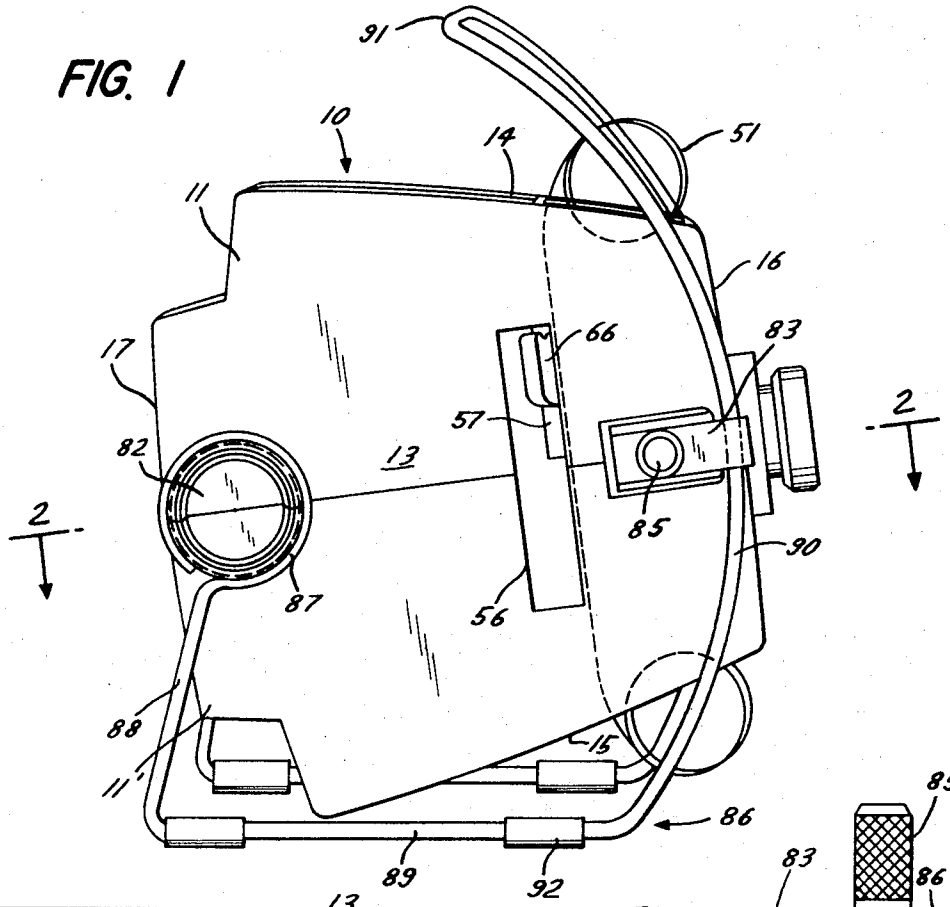


FIG. 1



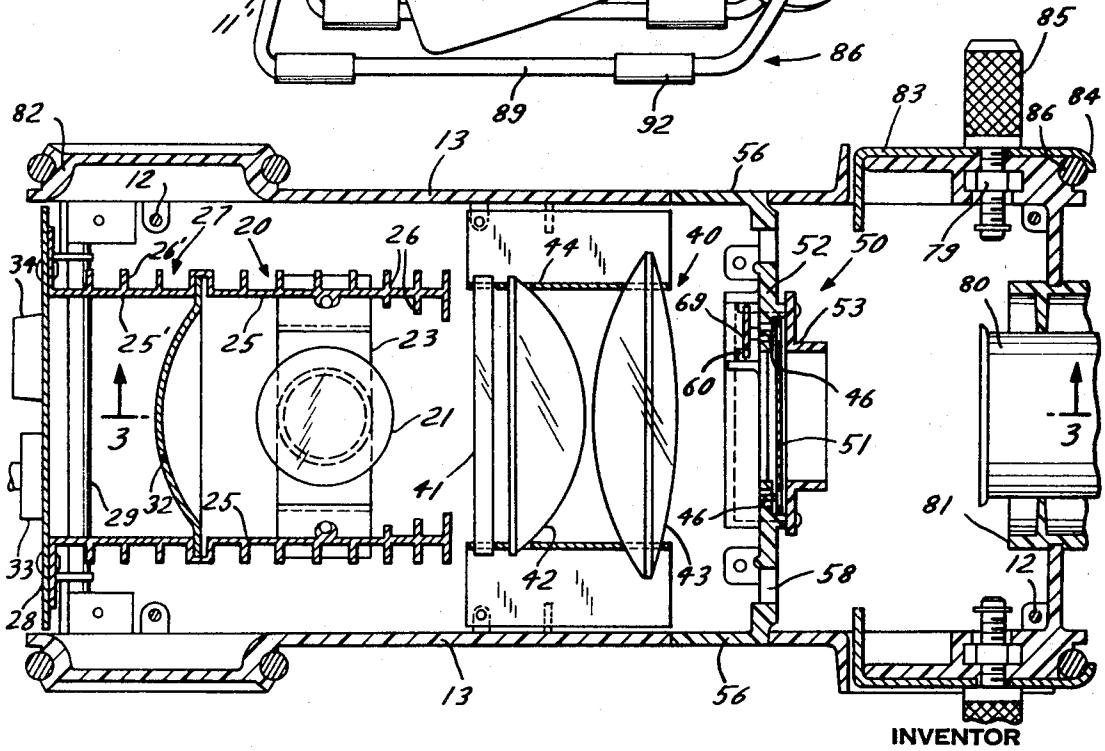


FIG. 2

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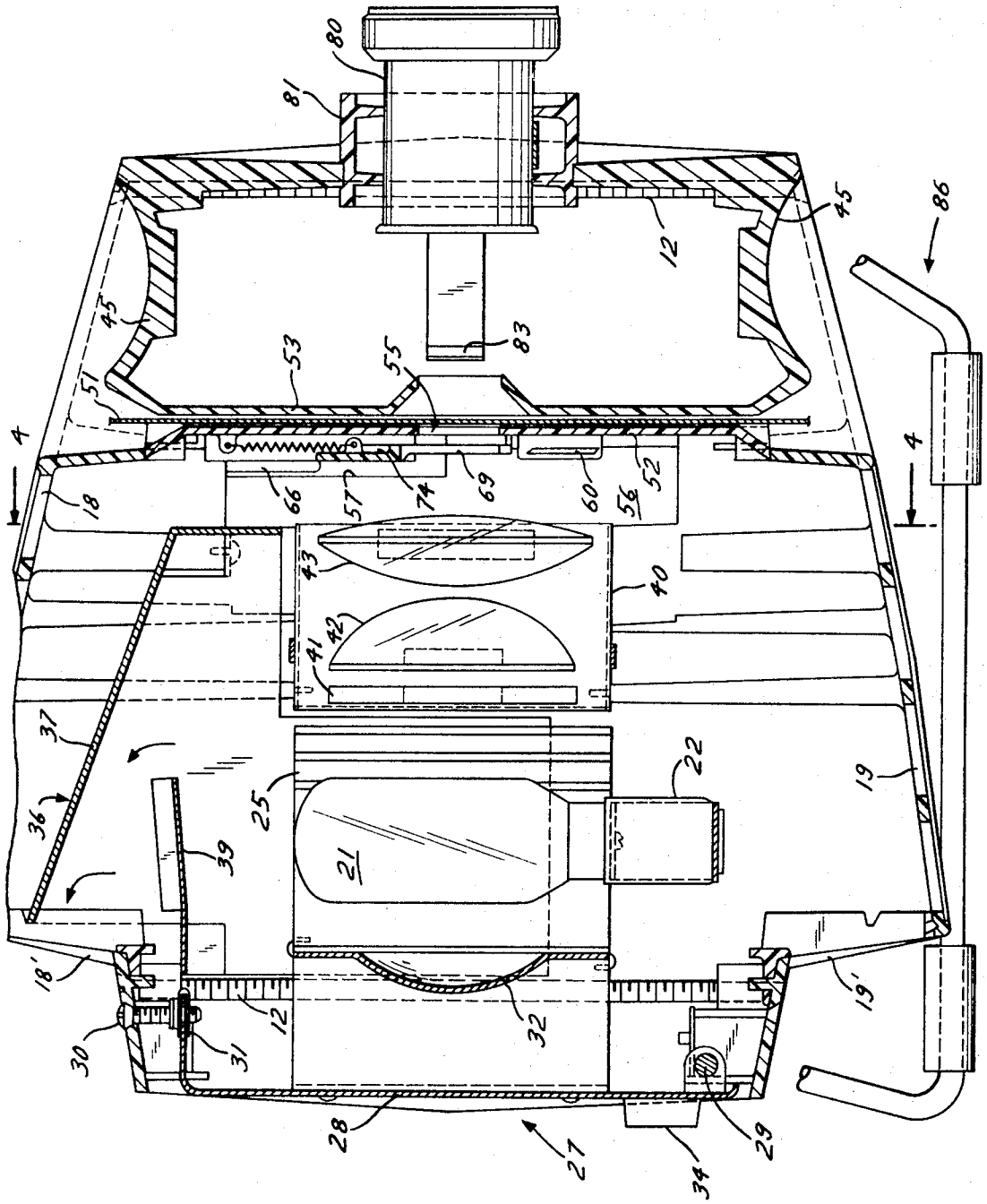


FIG. 3

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FIG. 4

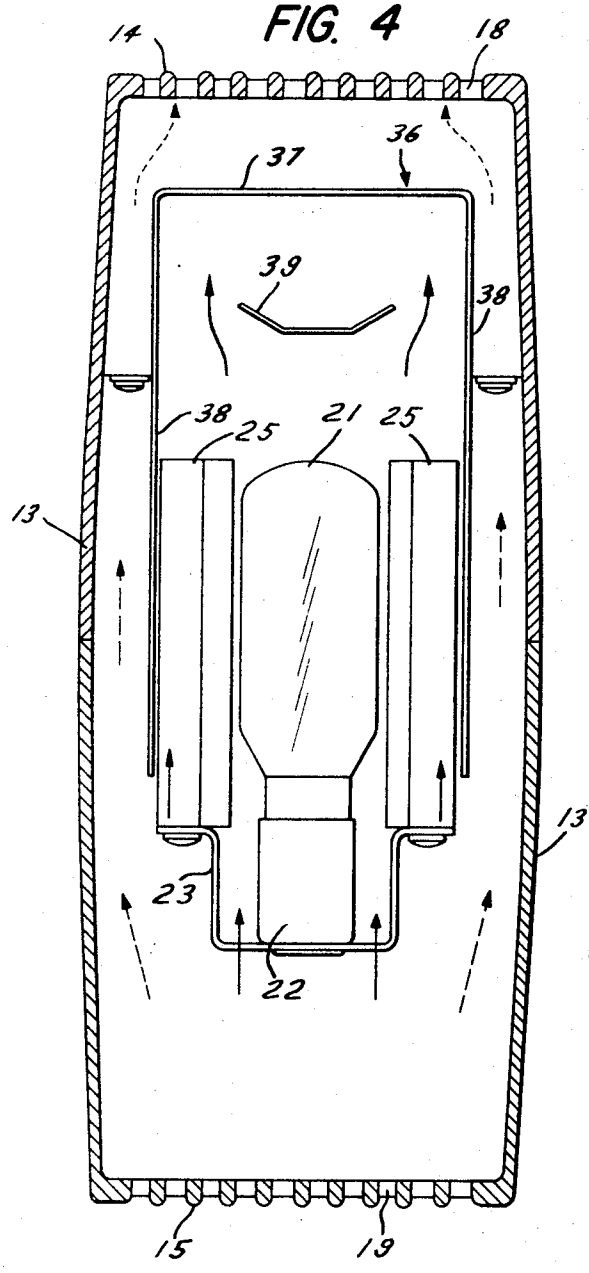


FIG. 7

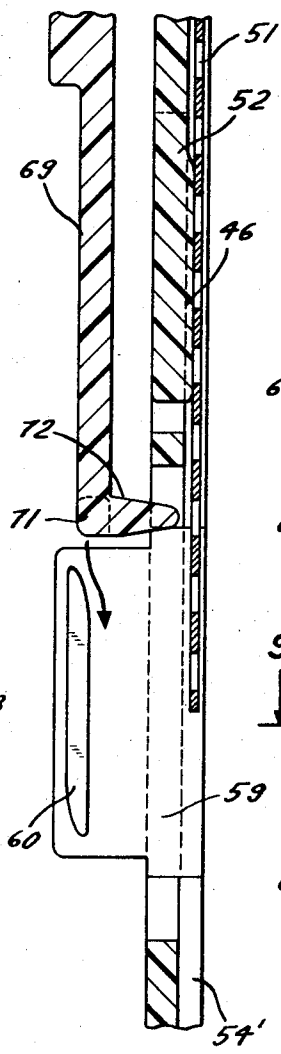


FIG. 8

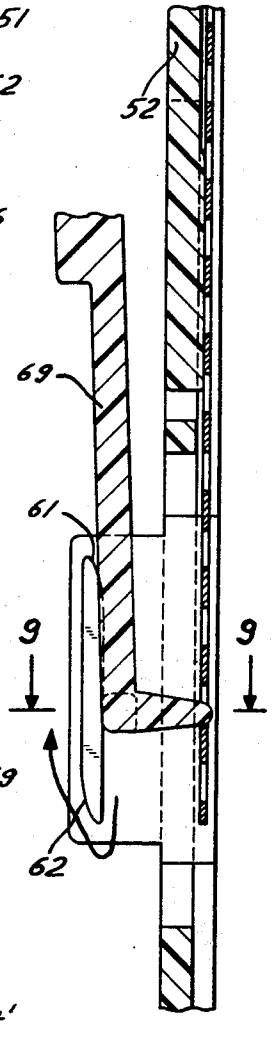
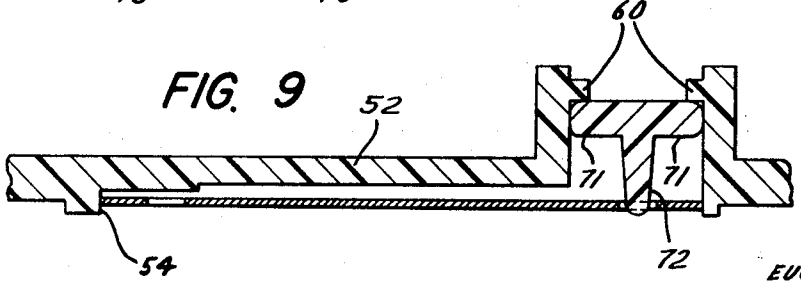


FIG. 9



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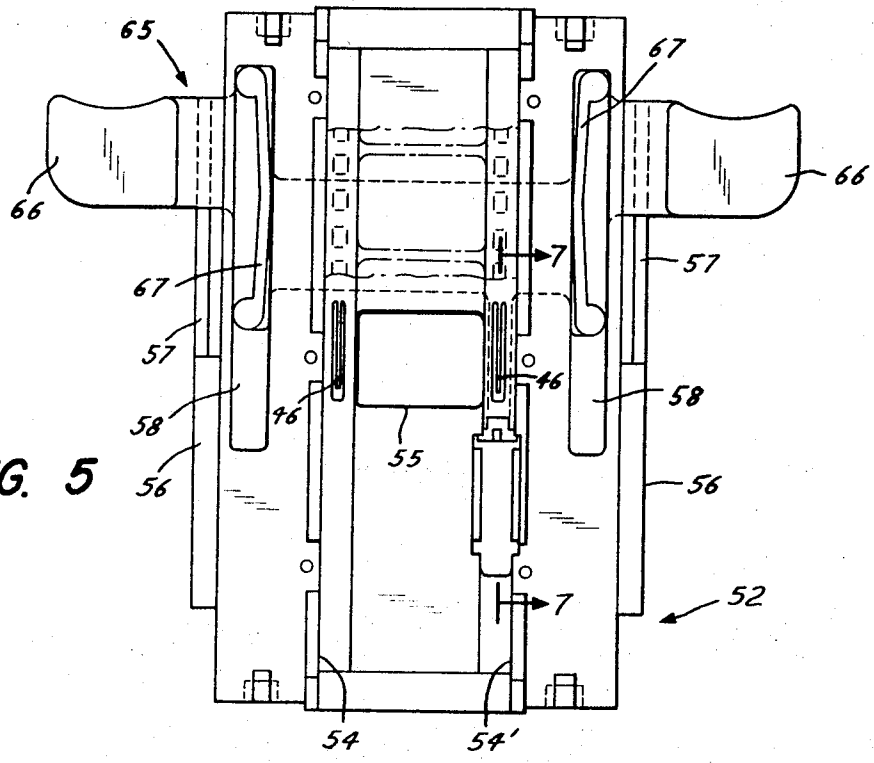


FIG. 5

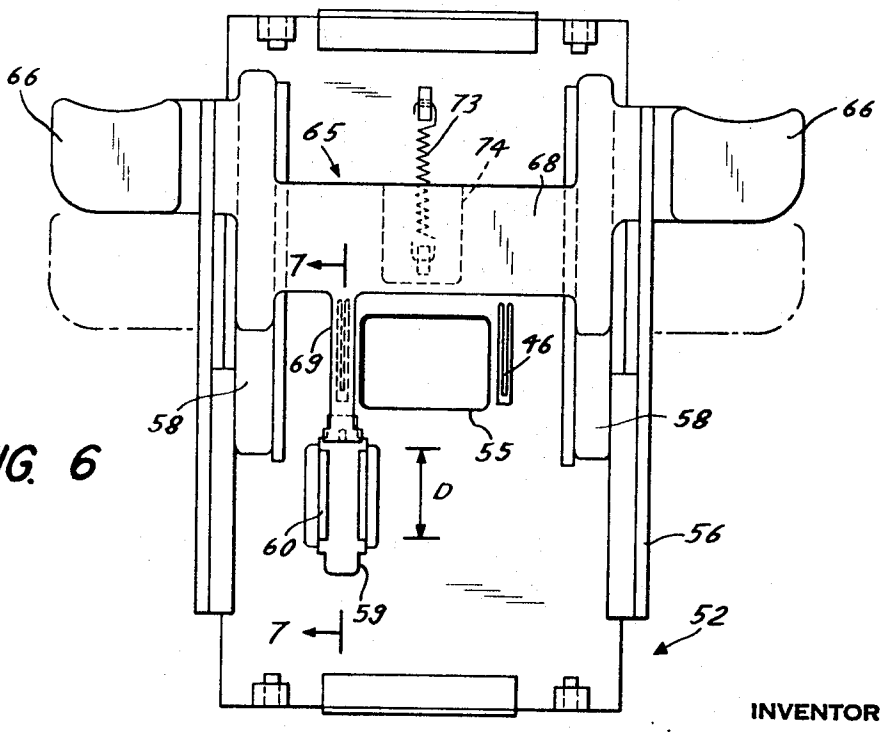


FIG. 6

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GENERAL ARRANGEMENT FOR PROJECTOR

This application is division of, application Ser. No. 715,621, filed Mar. 25, 1968, for "Projector", now U.S. Pat. No. 3,520,599.

BACKGROUND AND SUMMARY OF THE INVENTION

This invention relates to a simple, safe and silent projector for individual and small group instruction. In the illustrated embodiment, the projector is adapted for use with conventional filmstrips of the type commonly used by educational institutions as a supplement to regular teaching methods. The potential for this system has never been fully realized since conventional projectors are complex, expensive, and dangerous when operated by small children.

In a broad sense, this invention relates to a filmstrip projector having a molded plastic case enclosing the projection apparatus. A stand for adjustably supporting the case between a horizontal and an inclined position is attached to each side by means of an integral cylindrical ear adjacent the rear of the case and a clamping means at the front of the case. The stand comprises a pair of rods positioned on opposite sides of the case, each rod being rotatably mounted about the cylindrical ear. The stand also includes a segment forming an arc of a circle about the cylindrical ear and which is releasably secured by the clamping means to the front of the case. By releasing the clamping means, the inclination of the projector relative to the stand may be easily varied by merely rotating the projector about the axes of the two cylindrical ears.

The case of the projector generally comprises a pair of substantially parallel side walls, upper and bottom walls having air vents therein, and front and rear walls. An electric lamp is mounted at a center location within the case, and a pair of parallel baffle plates are mounted on opposite sides of the lamp. An inverted U-shaped cover is positioned above the lamp and baffle plates, the cover having an inclined upper transverse surface for deflecting the air rising adjacent the lamp to the vent holes at the rear of the case upper wall.

The projector also includes a film advance mechanism which incorporates two closely spaced parallel plates defining a passageway for the filmstrip through the projector. One of the plates has an aperture opening to the area occupied by the sprocket holes of the film and which extends in the direction of film advance. A cam is positioned on one side of this plate adjacent the aperture and also extends in the direction of film advance. An advancing slider is mounted on the plate for translation between a rear and forward position, the slider having an elongated extension with a cam follower at the end thereof which is adapted to engage the cam when the slider is translated between the rear and the forward positions. A transverse arm is also positioned at the end of the extension such that when the cam follower engages the cam, the arm is projected through the aperture and into engagement with the sprocket holes of the film. Upon continued translation, the film is advanced a distance corresponding to the length of the cam.

It is an object of the present invention to provide a projector which is so simple in design that it may be easily operated by a child, and thus may be used individually or in a small group without the necessity of a teacher being present. It is a further object to provide

a projector which may be easily and quickly "set-up," and wherein the body of the projector is supported by a curved steel stand that doubles as an elevating device and carrying handle. The projector can be tilted up to 30° elevation simply by sliding it up the steel stand and locking it with two knobs. Thus, the use of books and other makeshift props under the projector is eliminated.

It is also an object of this invention to provide a projector which incorporates a frame advance mechanism which is completely free of the film when it is not being actuated. Thus, a child could pull as hard as possible on the film up or down, and the film will slide freely, undamaged in either direction.

It is still another object to provide a projector wherein the outer walls stay cool during operation without the need for a cooling fan. A double wall construction is utilized to dissipate the heat of the lamp by the normal convection currents which pass the walls on each side of the lamp. The elimination of the cooling fan thus avoids the danger from rapidly turning blades. Also, the operation is absolutely silent which is a necessity when the projector is used in close proximity of a student.

These and other objects and advantages of the present invention will readily become apparent to one skilled in the art from the following detailed description.

Brief Description of the Drawings

FIG. 1 is a perspective view showing the projector case and its associated stand;

FIG. 2 is a horizontal sectional view taken along the line 2—2 of FIG. 1;

FIG. 3 is a vertical sectional view taken along the line 3—3 of FIG. 2;

FIG. 4 is a vertical sectional view taken along the line 4—4 of FIG. 2;

FIG. 5 is a fragmentary front view of the back plate and its associated advancing slider;

FIG. 6 is a fragmentary rear view of the back plate and its associated advancing slider;

FIG. 7 is an enlarged sectional view taken along the lines 7—7 of FIG. 6;

FIG. 8 is a view similar to FIG. 7 showing the cam follower engaged during the film advance operation; and

FIG. 9 is a view taken along the line 9—9 of FIG. 8.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings, a projector incorporating the features of the present invention is designated generally at **10**. The outer case of the projector comprises an upper section **11** and a lower section **11'** which are joined by suitable bolts **12** to form an enclosure for the projection apparatus. The case may be described as a somewhat rectangular box having two parallel side walls **13**, and upper wall **14**, a bottom wall **15**, a front end **16**, and a rear end **17**.

As will become apparent from the following description, the two case sections **11** and **11'** are themselves identical in configuration, a fact which greatly contributes to cost reduction and simplicity of design. The case is preferably formed from a molded high impact thermoplastic material, such as the acrylonitrile - butadiene - styrene thermoplastic resin Cycolac, produced by the Marbon Chemical Division of Borg-Warner Cor-

poration. The case is suitably shaped to provide means for attaching the various internal projector components. The upper wall **14** is provided with a plurality of air vents **18** and **18'** (not FIGS. 3 and 4) while the lower wall **15** has similar vents **19** and **19'**.

Viewing FIG. **2**, it will be seen that the internal projection apparatus includes as essential elements an electric lamp assembly **20**, a rear access door assembly **27**, a lens condenser assembly **40**, a film guide and advance mechanism **50**, and a forward focusing lens **80**.

The lamp assembly **20** includes a standard projector lamp **21** having a bayonet base for mounting in a conventional socket **22**. The socket is connected to an appropriate electrical wire (not shown), and is suitably mounted in the case by means of a strap **23**.

A pair of baffle plates **25** are mounted on opposite sides of the lamp in generally parallel and spaced relation to the side walls **13**. The plates **25**, which may be formed from extruded aluminum, include a plurality of vertically extending transverse ribs **26** which are designed to facilitate heat dissipation and which may be positioned either on one or both sides of the plate.

Access to the lamp **21** for replacement is provided by the rear access door assembly **27**. As seen in FIG. **3**, the assembly **27** includes a back **28** which pivots about the hinge pin **29**. The back **28** is releasably secured at its upper end to the case by a Nylon screw **30** which engages a sheet metal nut **31** clipped to the back. Thus, upon withdrawal of the screw **30**, the back **28** swings to a generally horizontal position for easy access to the lamp.

The back **28** also retains a pair of rear baffle plates **25'** which are designed for alignment with the baffle plates **25** when the back is closed. The baffle plates **25'** may include transverse ribs **26'** for dissipating heat in a manner similar to the ribs **26**. A back reflector **32**, which preferably has a chromed surface, is secured to the forward end of the plates **25'** and is designed to reflect the light from the lamp **21** through the lens condenser assembly. The back **28** may also include an aperture **33** for an electric cord, as well as a switch **34**.

A cover **36**, having a generally inverted U-shape in cross section, is positioned above the lamp **21** and baffle plates **25** for the purpose of directing the flow of cooling air. The cover **36**, which may be made from sheet metal, includes an upper transverse surface **37** and two parallel depending side edges **38** (FIG. **4**) which are generally aligned in a direction parallel to the baffle plates **25**. In the embodiment shown, the edges **38** extend downwardly to a point adjacent the bottom of the plates **25** to overlie and substantially enclose the entire lamp assembly. It should be understood, however, that the side edges **38** could be designed to extend only to the top portion of the baffle plates **25**, or to any intermediate position therealong without impairment of the cooling effect. If the side edges **38** extend only to the top of the plates, the edges may also be designed to lie in the same plane as the plates rather than lying outside of this plane as shown in FIG. **4**.

Positioned immediately above the lamp **21** is a light deflector **39** which is suitably mounted to the upper section **11** of the case. The deflector **39** serves to prevent the bright light of the lamp from being reflected through the openings **18'** by the transverse surface **37**.

Viewing FIG. **4**, it will be apparent that there exist in the present design two independent air passages for dissipating the heat generated by the lamp. In the first and primary passage (designated by the solid arrows in FIGS. **3** and **4**), the air which initially enters through the lower air vents **19** and **19'** passes immediately adjacent to the lamp **21** within the area defined by the side edges **38** of the cover, the back reflector **32** and the condenser lens assembly **40**. The air is warmed by contact with these surfaces (as well as the baffle plates **25**) and continues to rise until it reaches the transverse surface **37** which is inclined toward the rear of the case to direct the flow through the upper vents **18'** (note FIG. **3**). By this arrangement, the warm air is directed away from the film as well as the areas which come in contact with the operator's hands. It will be noted that if the side edges **38** extend only to the top of the plates **25**, the plates themselves will serve as the boundary for the primary passage.

In the secondary cooling system (designated by the broken arrows), a portion of the air entering through the lower vents **19** and **19'** passes along the wall formed by the outside surface of the side edges **38** to the upper vents **18**. This current of air serves to insulate the side walls **13** of the case from the warm elements of the projector such that the side walls **13** remain cool and may be touched without danger of burning.

The lens-condenser assembly **40** includes a heat filter **41**, a meniscus condenser **42**, and a bi-convex condenser **43** which are aligned in the direction of light projection. A suitable frame **44** is designed to retain the three elements of this assembly within the case.

The film **51** is designed to be inserted through a passageway in the film advance assembly **50** defined by a back plate **52** and a front plate **53**, (note FIGS. **2–3**). The two plates may be molded from a high strength, heat resistant plastic material such as the polyamide resin Zytel, which is sold by DuPont. They are mounted in the case by a conventional structure which has not been illustrated in detail herein. To facilitate retention of the film **51** adjacent the outer ends of the passageway, a semi-circular recess **45** may be formed in the case, (note FIG. **3**).

As seen in FIGS. **5–6**, the film passageway across the back plate **52** includes a vertical channel defined by the edge abutments **54** and **54'** which guide the film **51** past a rectangular opening **55**. The opening **55** serves to frame the light emanating from the lamp **21** such that when the individual film image is aligned with the opening, the projected picture will be properly "framed" on the screen. The channel may also incorporate a finger **46** on either side of the opening **55** (see also FIG. **2**) projecting into said channel to reduce the amount of transverse clearance in the passageway at the point of projection and thereby prevent inadvertent changes of focusing, and also to prevent the film from moving longitudinally while arms **72** are not in the sprocket holes.

The back plate **52** further includes a transversely directed side arm **56** positioned along each vertical edge, the arms having a cut-out **57** in the upper portion thereof. A vertical slot **58** is positioned in the body of the plate **52** on each side of the opening **55**, and an aperture **59** is positioned below the opening **55** such that it opens to the area of the sprocket holes of the film **51**. A cam **60** is positioned on the side of the plate **52** opposite the film **51** and in general alignment with the aperture **59** but in spaced relation thereto, see FIGS. **7–9**. The cam **60** is bifurcated (FIG. **9**) and includes a forward camming surface **61** and a rear camming surface **62**.

When the back plate 52 is mounted in the case, it will be seen in FIGS. 1 and 3 that the side arms 56 are positioned in appropriate slots in the case side wall 13 such that the arms are substantially flush with the outer surfaces of the walls. This structure gives rise to a pleasing appearance as well as increased rigidity.

An advancing slider member 65 is associated with the back plate 52 to complete the film advance mechanism. The member 65 includes oppositely extending finger engaging surfaces 66 which are designed to pass through the cut-outs 57, such that the member is retained to the plate 52. The member 65 is also retained by two longitudinal shoulders 67 which are designed to be received in the slots 58 of the plate. The mid-portion of the member comprises a cross bar 68 from which a longitudinal extension 69 projects toward the aperture 59 and cam 60. The lower end of the extension 69 is generally T-shaped in cross section, the two outer extemities of the upper portion (as seen in FIG. 9) being a cam follower 71 and the remaining portion being a transverse arm 72 which is directed toward the aperture 59.

During the film advance operation, the member 65 is translated between a rear (rest) and forward (actuated) position, (note FIG. 6). The member is controlled and guided during this translation by the interaction between the surfaces 66 and cut-outs 67, as well as between the shoulders 67 and slots 58. It will be seen that the shoulders 67 limit the extent of the translation in both directions by engaging the ends of the slots 58.

As the member advances to the forward position, the cam follower 71 of the extension 69 engages the forward camming surface 61. This in turn causes the transverse arm 72 to pass through the opening 59 and engage the sprocket holes of the film 51, (note FIGS. 7–8). Upon continued translation, the follower 71 advances the film until the bottom end of the cam 60 is reached, at which point the arm 72 releases the film and withdraws through the aperture 59.

The member 65 and plate 52 may have an interconnecting spring 73 to automatically return the member to its rear position. In the illustrated embodiment, the member includes a groove 74 along the back surface of the cross bar 68 to provide a clearance for the spring 73.

Upon translation of the member from its forward to its rear position, the follower 71 engages the rear camming surface 62 such that the arm 72 will be completely removed from the aperture 59 during the return movement. The inherent resilience of the extension 69 provides sufficient flexibility to permit the required transverse movement of the arm 72.

It will be apparent that by properly determing the length of the cam 60 (designated D in FIG. 6), the film 51 can be made to sequentially advance a predetermined distance. By design, this distance will correspond to the distance between the individual frames on the film 51 such that upon actuation of the member 65, the film will advance to the next picture frame without further adjustment. It will also be seen that the cross bar 68 is designed to cover the aperture 55 during the advancing operation such that the new frame will not be projected on the screen until the member is released.

It will now be appreciated that the advance mechanism engages the film only during the advancing operation. At all other times the film is completely free of the mechanism and may be fed through the assembly and framed merely by inserting and adjusting the film from above. Also, this feature protects the film from damage should it be given a sudden pull in either direction, as might be done by a child.

A conventional focusing lens 80 is supported by a housing 81 which is suitably secured in the case. The interconnection between the lens and housing, as shown for example in FIG. 3, provides a simple, push-pull focusing system.

The projector is supported by a curved stand 86 which doubles as an elevating device and carrying handle. The stand may be made from a single piece of chrome-plated steel rod which is suitably formed or bent into the desired final shape. The stand 86 is joined to the case of the projector by a connecting structure which includes a cylindrical ear 82 positioned on each side wall 13 adjacent the rear of the projector, and a clamp 83 positioned on each side wall adjacent the front of the projector. The clamp 83 includes a lip 84 for engaging the stand, and is releasably connected to the case by means of a threaded knob 85 which engages a nut 79 permanently secured in the case.

A portion of the stand 86 is positioned on each side of the projector, the two portions being identical in shape and joined by a connecting segment across the top of the projector. The free end of the stand on each side of the case is formed into the shape of a cylindrical loop 87 which is adapted to be rotatably mounted on and retained by the ear 82.

Adjacent the loop 87 is a vertical segment 88 extending downwardly a sufficient distance to lift the case from the supporting structure or table. Next is a horizontal segment 89 which extends for a distance comparable to the overall length of the projector and which is designed to rest upon the supporting table. The opposite end of the horizontal segment 89 is joined to an arcuate segment 90 which is formed into a section of a circle having a center which corresponds to the center of the cylindrical loop 87. The arcuate segment 90 extends above the projector and is joined to the arcuate segment of the opposite side of the case by a connecting segment 91 which also serves as a carrying handle for the projector.

As will be seen in FIG. 2, the lip 84 of the clamp presses the arcuate segment 90 of the stand against the body of the case to lock the stand in position when the knob 85 is tightened. When the knob 85 is loosened, the clamp releases the stand for rotation about the axes of the cylindrical ears 82. By this arrangement, the inclination projector may easily be adjusted anywhere between the horizontal and an angle of approximately 30°. If desired, a rubber feet 92 may be positioned on the horizontal segment 89 of the stand to increase the frictional contact between the stand and its supporting table.

While a specific embodiment of this invention has been disclosed in considerable detail herein, it should be understood that the scope of the invention is to be determined by that of the following claims only.

What is claimed is:

1. A projector comprising, an outer case having a pair of opposed side walls, opposed upper and bottom walls, a front wall and a rear end, means for supporting an electric lamp within the case and adjacent the rear end of the case, first air deflecting means to cause a first flow of air into the case through the bottom wall,

up and around opposite sides of the lamp and adjacent the side walls and upwardly out of the case through the upper wall, said first air deflecting means being located between the lamp and said side walls and spaced from said side walls, second air deflecting means to cause a second flow of air from around the upper end of the lamp, rearwardly out of the case at the rear end of the case, means in the case and spaced rearwardly of the front wall of the case, and disposed forwardly of the lamp, to form a passageway disposed transversely of the case and passing through a pair of said opposed walls of said case, and formed with a film framing opening, for film to pass through the case and past said film framing opening, to frame light emanating from the lamp and passing through a frame of the film at said framing opening, to project an image of said frame forwardly.

2. The combination of claim **1**, and a stand, means on the stand for supporting the case on a supporting surface, at various adjusted angles about a horizontal transverse pivotal axis through which a line perpendicular to the center of said framing opening, passes.

3. The combination of claim **2**, and lens means in the casing and coaxial with said line.

4. The combination of claim **3**, said lens means comprising a condensing lens assembly disposed between said passageway and lamp support means.

5. The combination of claim **4** and a focusing lens assembly disposed forwardly of said passageway forming means and passing through said front wall.

6. The combination of claim **2**, said case comprising upper and lower symmetrically disposed case sections having mutually contacting edges in the plane of said line and transverse pivotal axis.

7. The combination of claim **1**, and means for manually advancing the film in said passageway, one film at a time.

8. The combination of claim **1**, said advancing means including a manually engageable actuator member projecting from said case.

9. The combination of claim **8**, said passageway forming means comprising a plate, said side walls of said case having registering slots at said edges, to receive parts of said plate, said actuating member being slidably mounted on said plate.

10. The combination of claim **1**, said case having a rear opening at its rear end, and means to mount said lamp support means on the case for movement through said rear opening without disconnecting said lamp support means from the case, to permit replacement of the lamp.

11. The combination of claim **10**, said lamp support means having means to close the rear opening of said case, when said lamp support means is moved into said case.

12. A projector comprising an outer case having a pair of side walls, an upper wall, a bottom wall, a front wall and a rear end, means for supporting an electric lamp within the case adjacent the rear end of said case, means to form a passageway through the case and spaced rearwardly of the front wall, said passageway having a film framing opening, means to feed film through said passageway one frame at a time, past said film framing opening to frame light emanating from the lamp and passing through the framed frame of the film, to project an image of said frame forwardly, said passageway forming means providing said passageway through said upper and bottom walls of said case and between said side walls, means on the stand for supporting the case on a horizontal supporting surface, for pivotal movement to various adjusted angles about a transverse horizontal pivotal axis through which a line perpendicular to the center of the framing opening, passes, condensing lens means in the casing and between said passageway and the lamp support means, said condensing lens means being coaxial with the center of said framing opening and perpendicular to said opening said case comprising upper and lower case sections having mutually contacting edges in a plane passing through the axis of said condensing lens means and said center of said framing opening and of said pivotal axis.

13. The combination of claim **12**, said case having an opening at its rear end, means to mount said lamp support means on the case for movement through said rear opening without disconnecting said support means from the case, to permit replacement of the lamp, said lamp support means having means to close said rear opening of said case, when said support means is moved into the case.

14. The combination of claim **16**, and a focusing lens assembly disposed forwardly of said passageway forming means and passing through said front wall of said case.

15. The combination of claim **12**, said pair of opposed walls through which said passageway passes being the upper and bottom walls of said case.

* * * * *