

[54] **PHOTOGRAPHIC SUPPORT SYSTEM**

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[51] Int. Cl.**H04n 5/24, H04n 7/18**

[58] Field of Search...**178/7.2, 7.8, 7.81, 7.9, DIG. 1, 178/DIG. 35, DIG. 30; 95/86; 352/243**

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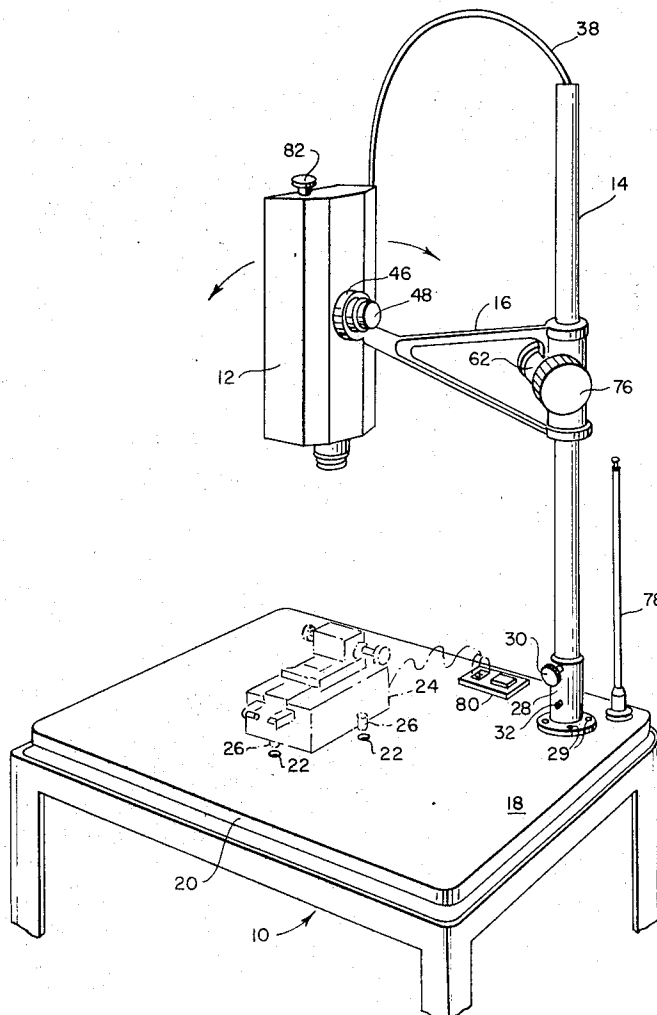
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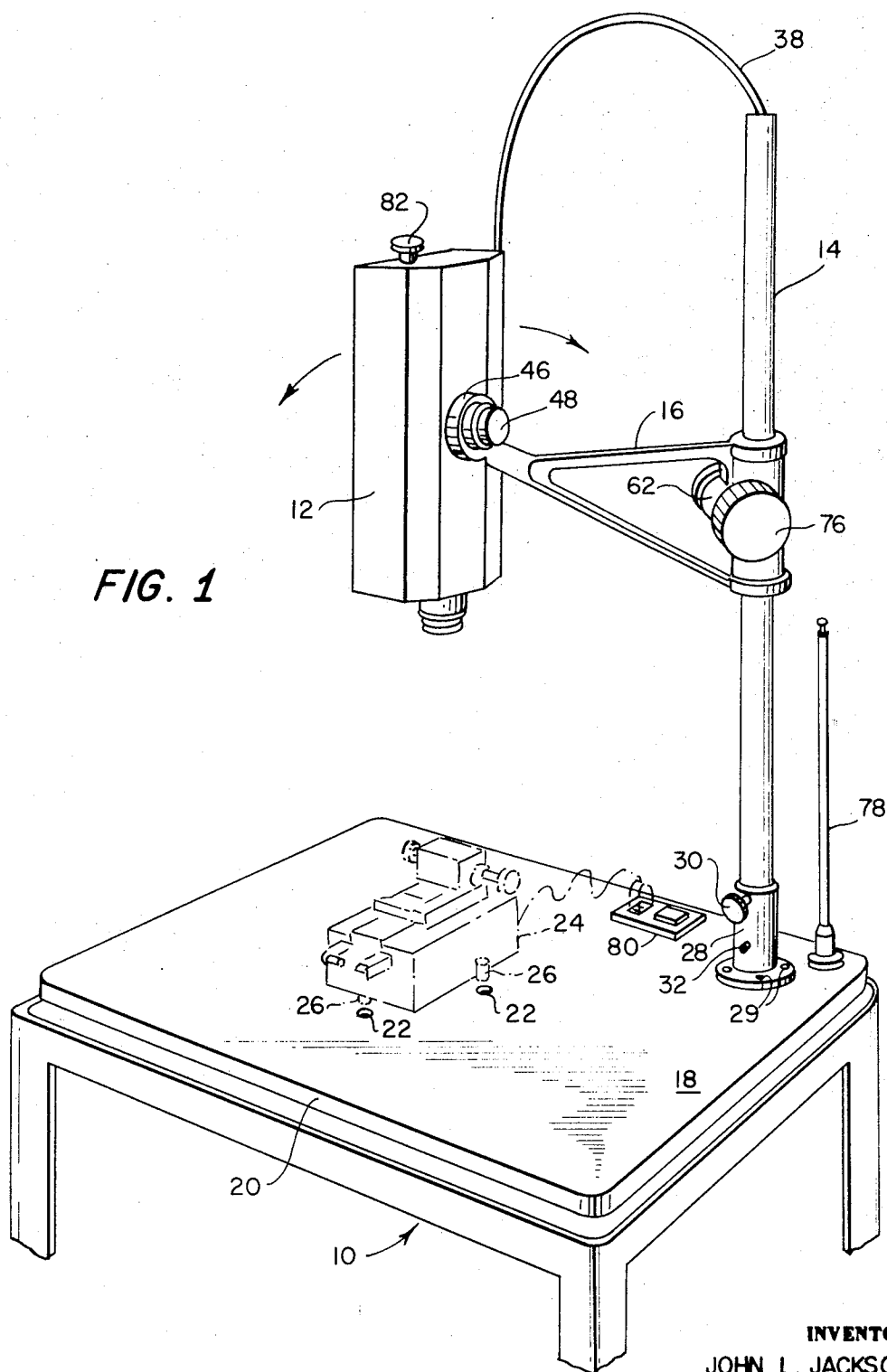
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ABSTRACT

A camera support system is provided which permits transmitting a correct left-to-right and rightside-up image of visual matter held by registration means on a horizontally extending support surface. A camera mounting bracket and a unique mounting means which connects the bracket to a vertically extending rod permit easy adjustment of the elevation of the camera with respect to the horizontal support surface. In a predetermined embodiment, the rod includes a vertically extending slot and the mounting means includes a drive roller including a projection that protrudes into the slot with the sides of the projection frictionally engaging the sides of the slot.

10 Claims, 9 Drawing Figures





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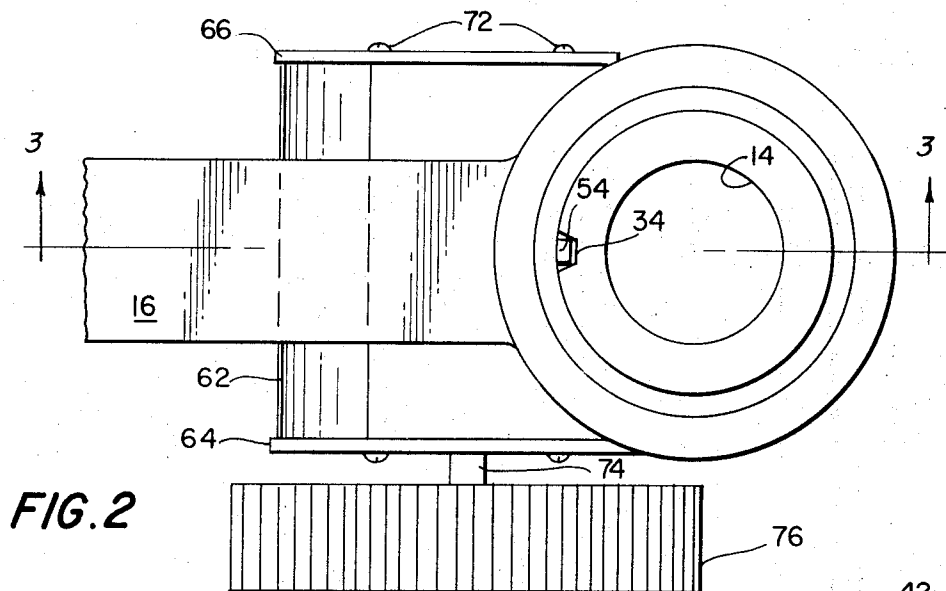


FIG. 2

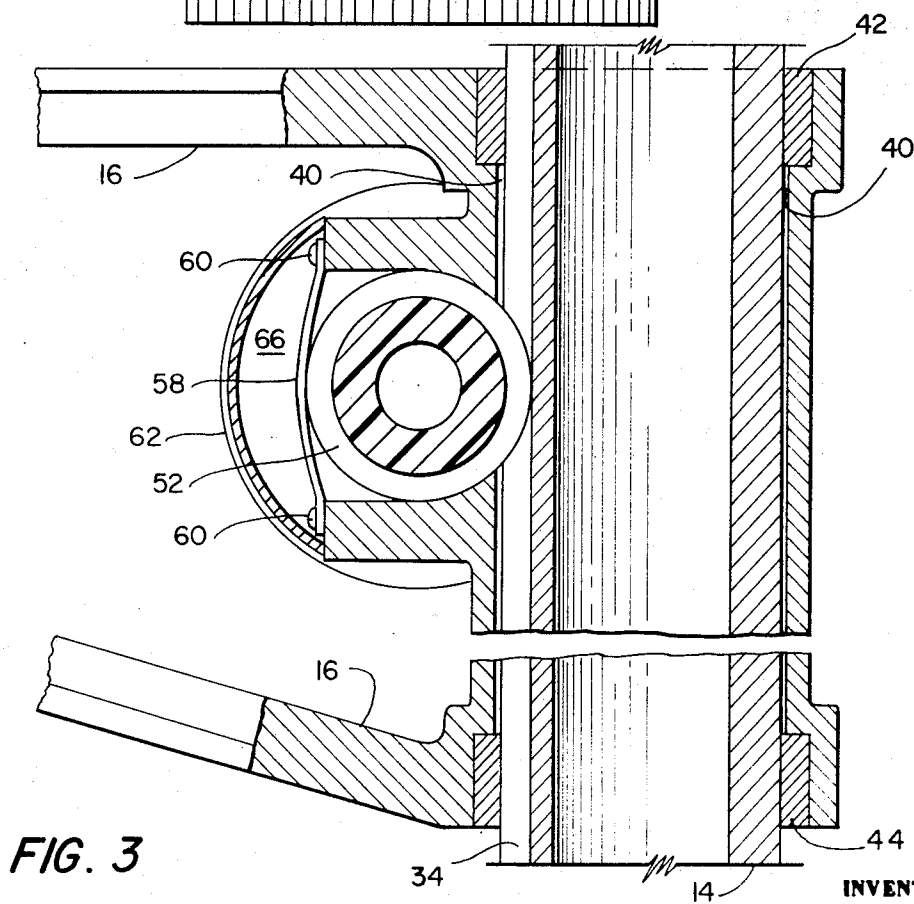


FIG. 3

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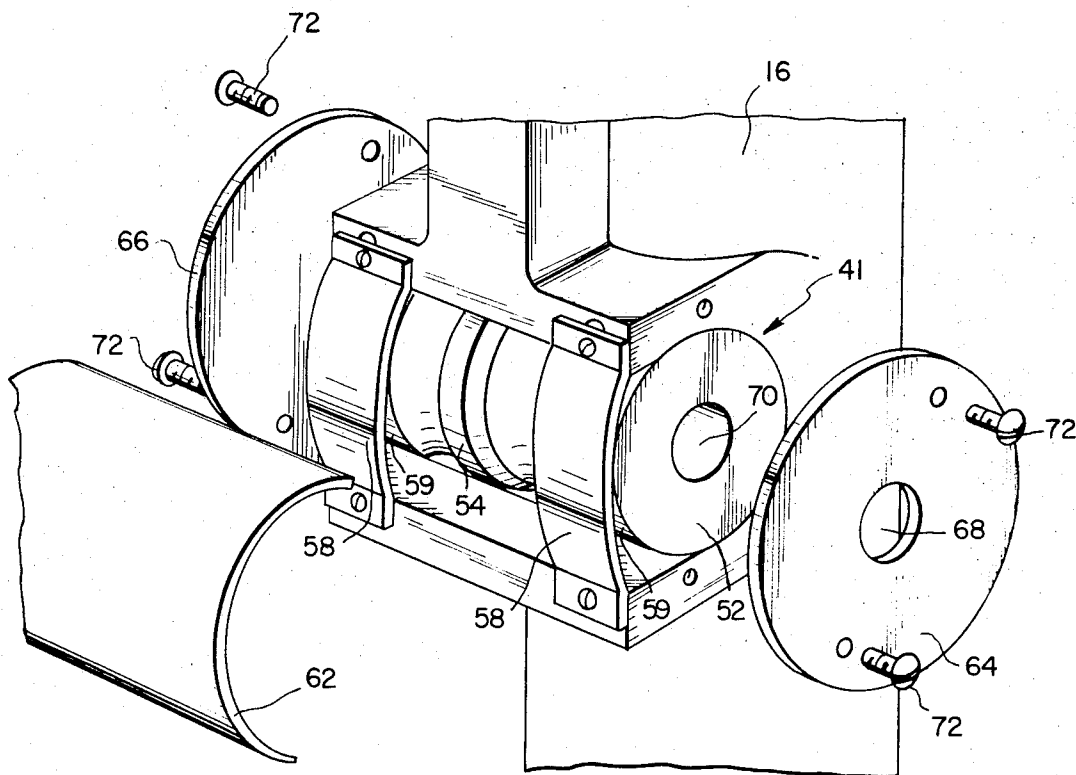


FIG. 4

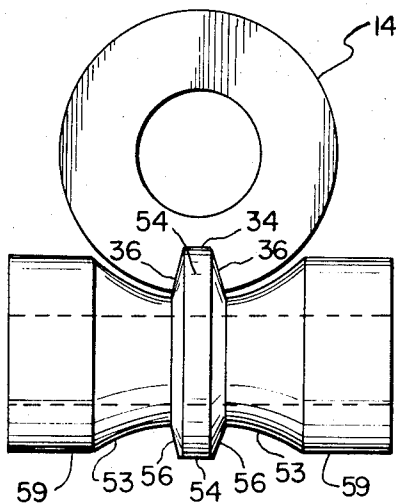
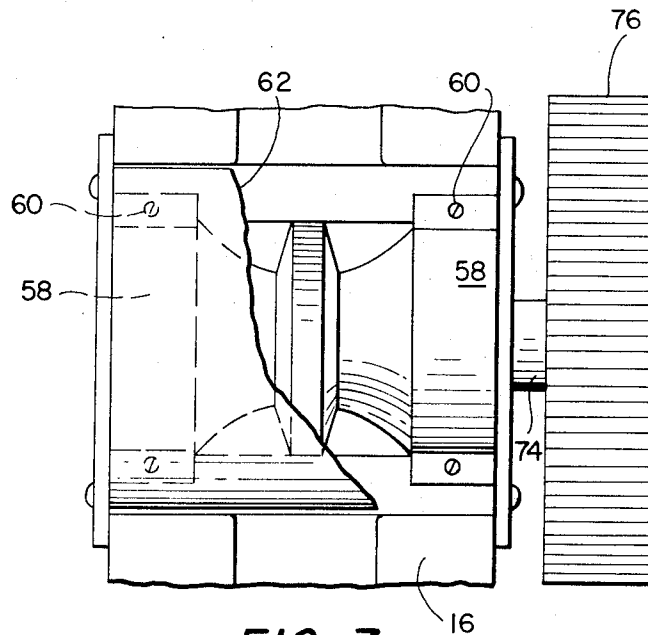
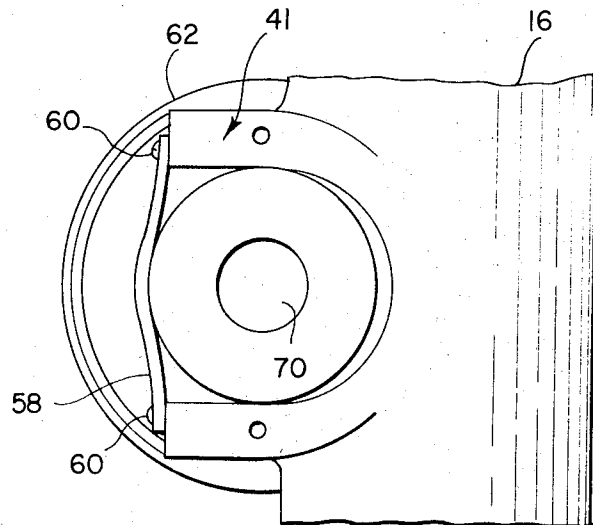


FIG. 5

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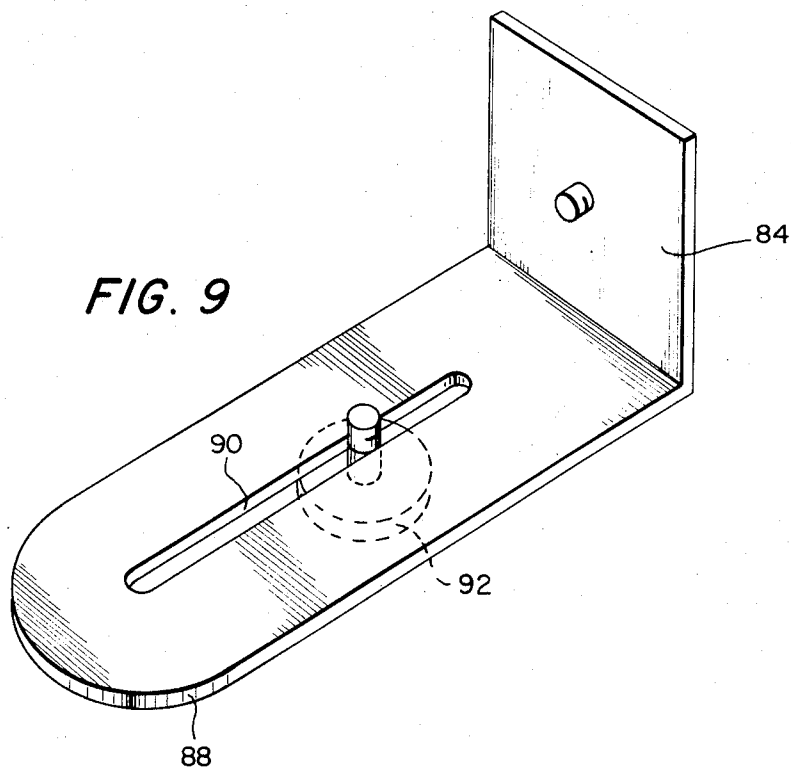
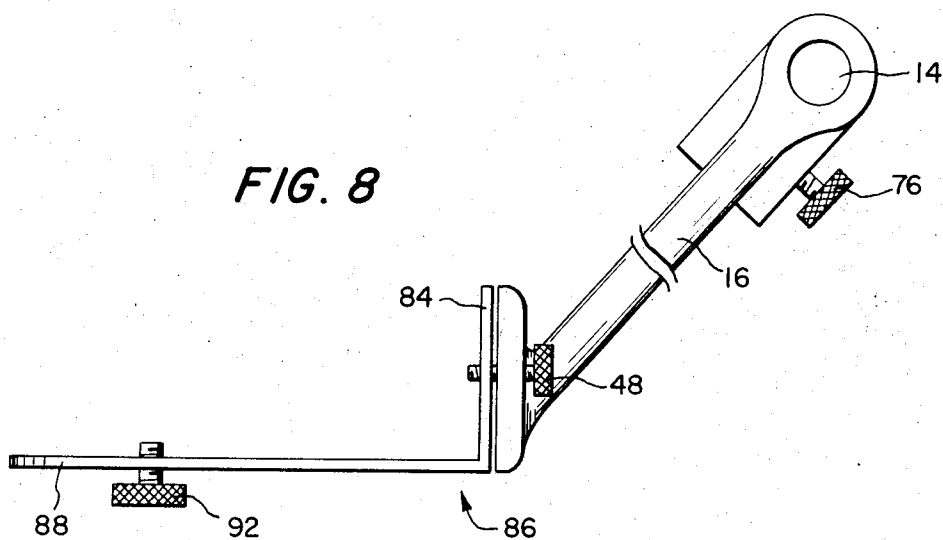


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PHOTOGRAPHIC SUPPORT SYSTEM

FIELD OF THE INVENTION

This invention relates in general to photographic support structures. More particularly, the invention relates to television systems such as lecture illustrating systems and accessories to be used in connection with classroom lectures for producing images of visual matter on one or more standard television viewing screens.

BACKGROUND OF THE INVENTION

The use of television in the classroom has been predicted to have a dramatic effect in improving the quality of education. However, because of the cost, complexity of operation, and other problems associated with existing classroom television systems, the use of television as a classroom visual aid has lagged expectations.

The most common approach to the use of television in the classroom has involved simply mounting a television camera on a conventional photographic copy stand. In this system, the vertical rod used to support the television camera effectively prevents the teacher or lecturer from access to the side of the stand support surface on which the rod is mounted. Thus, the teacher is forced to view the visual matter being projected from a perspective which is undesirable.

The instructor does not view the material being projected from the correct left-to-right and rightside-up relationship. Thus, it has not been possible to simultaneously project written words or symbols at the time the words or symbols are being formed by the instructor.

Existing television cameras and system components for multimedia use have tended to be complex in operation and have frequently involved focusing on a projected image. Thus, these prior art systems have required additional equipment and projectors for obtaining the projected image.

There has been a continuing search for a projection system which permits the display of opaque, transparent, macro and microscopic images, small three-dimensional objects, and a teacher's own written lessons. Such a multimedia system is highly desirable because it permits continuing use of previously available classroom audio-visual materials, and yet eliminates the need for opaque, overhead, filmstrip, and micro projectors.

The present invention provides a multimedia camera system which is easy to operate. A frame is provided including a horizontally extending support surface having registration means for holding visual matter in a correct left-to-right and rightside-up relationship with respect to a person positioned at one point along the edge of the support surface. A television camera is positioned above the registration means for transmitting a correct left-to-right and rightside-up image of visual matter held by the registration means. A vertically extending rod is fixed to the frame and spaced from the point along the edge of said support to permit unobstructed access to visual matter held by the registration means for a person positioned at the point. The camera is held by a horizontally extending mounting bracket including at one end a tubular opening through which the rod extends, and at the other end, camera holding means for

supporting the camera. Mounting means connect the rod and the bracket for holding the bracket at a fixed elevation and for permitting vertical movement of the bracket relative to the surface upon the application of external force to the bracket.

The invention also provides a support system for holding an item of photographic equipment above a support surface. This support system comprises a vertically extending rod connected in a fixed relationship to the support surface. The rod includes a vertically-extending slot. A horizontally extending mounting bracket, provided for holding the item of photographic equipment, includes at one end a tubular opening through which the rod extends, and at the other end, holding means for supporting the item. The mounting bracket slideably engages the rod. Mounting means connect the rod and the bracket for holding the bracket at a fixed elevation and for permitting vertical movement of the bracket relative to the surface upon the application of an external force to said bracket. The mounting means include a drive roller mounted on the bracket below the top of the tubular opening and formed of a low friction material. The drive roller includes a projection that protrudes into the slot with the moment of inertia of the mounting bracket and the camera holding the sides of the projection in frictional contact with the slotted surface of the rod.

Unlike a conventional television camera on a photographic copy stand, the invention permits all materials to be handled in a normal left-to-right and rightside-up manner. Access to the material being projected is made possible through the use of a special side mount on the television camera and a unique camera mounting bracket.

For convenient precision alignment of various visual material handling devices, in preferred embodiments of the invention, registration pins are provided at the base of each visual material handling device that match registration holes on the support surface and perfect alignment with the camera results. The invention provides a simple, inexpensive, easy-to-operate system that permits projection of anything the eye can see, and replaces the need for separate overhead, filmstrip, slide, micro and opaque projectors.

DESCRIPTION OF THE DRAWINGS

Of the drawings:

FIG. 1 is a perspective view of one embodiment of the multimedia system of this invention;

FIG. 2 is a plan view of a portion of the embodiment of FIG. 1 and illustrates the mounting bracket and the means for mounting the bracket on the vertical rod;

FIG. 3 is an elevation view taken along line 3—3 of FIG. 2;

FIG. 4 is an exploded perspective view of the mounting means that connect the vertical rod and the mounting bracket in the embodiment of FIG. 1;

FIG. 5 is a plan view showing the frictionally engaged relationship of the drive roller and the vertical rod of the embodiment of FIG. 1;

FIG. 6 is a side elevation illustrating the mounting means of the embodiment of FIG. 1 with one end disk removed;

FIG. 7 is an elevation view illustrating the mounting means of the embodiment of FIG. 1 with a portion of the cover plate broken away;

FIG. 8 is a plan view illustrating the embodiment of FIG. 1 having a right angle bracket attached thereto; and

FIG. 9 is a perspective view of the right angle bracket shown in FIG. 8.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT OF THE INVENTION

With reference to FIG. 1, a multimedia camera system is there illustrated comprising a frame generally 10; a television camera 12; and a vertically-extending rod 14 and a mounting bracket 16 for supporting the television camera above the frame.

Frame 10 includes a horizontally extending support surface 18 that includes registration means for holding visual matter in a correct left-to-right and rightside-up relationship with respect to a person positioned along the front edge 20 of support surface 18. As here embodied, the registration means comprise a plurality of holes 22 extending into the top surface of support surface 18.

In accordance with the invention, a television camera is positioned above the registration means on support surface 18 for transmitting a correct left-to-right and rightside-up image of visual matter held by one of a plurality of visual material handling devices that are adapted to engage the registration means. As here embodied, television camera 12 is positioned directly above a filmstrip winding mechanism 24 which has a plurality of registration pins 26 that are inserted into holes 22 to seat the winding mechanism on the support surface. It will be obvious that registration pins, such as pins 26, can be mounted on the bottom of a variety of visual matter handling devices so that the pins match the registration holes on the support surface. Thus, visual matter can be easily aligned with the axis of camera 12.

In accordance with the invention, a vertically-extending rod is fixed to the frame and positioned spaced from the front edge of the support surface to permit unobstructed access to the visual matter held by the registration means for a person positioned at the front edge of the support surface.

As here embodied, rod 14 is mounted on frame 10 by a column base 28 that is fixed to support surface 18 by screws 29 or the like. The top portion of column base 28 comprises a tubular member having an inside diameter that permits insertion of rod 14 to provide a loose frictional fit. A pair of set screws 30 and 32 are provided to fix the position of rod 14 with respect to column base 28 and support surface 18. Set screw 32 engages a slot (not shown) that is milled into the outside wall surface of rod 14 and limits vertical movement of rod 14 but does not restrict rotation of the rod. Locking set screw 30 can engage the outer wall surface of rod 14 and limits rotational movement of the rod when it engages the rod.

A vertically-extending slot 34, illustrated in FIGS. 2 and 5, extends the length of rod 14. The sidewalls 36 of slot 34 diverge as they extend outwardly and would form a V-shaped slot if extended inwardly.

The interior of rod 14 is hollow (as illustrated in FIG. 5) to provide a convenient conduit for leadwire 38 which extends to the camera as shown in FIG. 1.

In accordance with the invention, a horizontally extending camera mounting bracket is provided. At one

end of the mounting bracket, a tubular opening is provided with the inside wall surface of the opening slideably engaging the outside surface of rod 14. At the other end of the mounting bracket, a camera holding means is provided for supporting the television camera.

As here embodied, and as illustrated in FIG. 1, mounting bracket 16 extends at a right angle to the axis of rod 14 and includes a tubular opening 40, as illustrated in FIG. 3, through which rod 14 extends.

A pair of seating rings (not numbered) are provided in the mounting bracket at the top and bottom of the tubular opening to permit seating a top bushing 42 and a bottom bushing 44 made of a low friction material such as nylon, polytetrafluoroethylene, or acetal resins, for example, Delrin sold by E. I. DuPont de Nemours & Co. The bushings frictionally engage the upright rod 14, provide a smooth sliding action, and prevent metal-to-metal contact.

Mounting bracket 16 further includes an integral housing, generally 41, for holding mounting means as described below. Housing 41 can be a semicircular slot as shown in FIGS. 4 and 6. Preferably, housing 41 extends horizontally on each side of the axis of tubular opening 40 and the interior of the housing communicates with the interior of opening 40 to permit the mounting means to contact rod 14.

Camera holding means are provided at the other end of mounting bracket 16 which engage a female threaded opening (not shown) on the side of the television camera. As here embodied, and as illustrated in FIG. 1, the camera holding means includes a planar disc 46 that is an integral part of mounting bracket 16 and an adjusting set screw 48 that extends through a circular opening in disc 46 and engages a threaded female opening in the side of the camera. The plane of the exterior face of disc 46 is aligned perpendicular to support surface 20 and parallel to the axis of rod 14. This permits rotating camera 12 about the axis of set screw 48 to transmit pictures of items positioned in front of, behind, or above the support surface.

In accordance with the invention, mounting means are provided to connect the rod and the mounting bracket for normally holding the bracket at a fixed elevation and for permitting vertical movement of the bracket relative to the support surface upon the application of external force to the bracket. The mounting means illustrated in FIGS. 1-7 is easily adjustable to the precise elevation desired with a minimum effort. The ease and smoothness of making vertical adjustments of the camera system are surprising in view of the low-cost, easily fabricated, components that make up the mounting means.

As best seen in FIGS. 3-7, the mounting means includes a drive roller 52 that is mounted on bracket 16 below the top edge of tubular opening 40. Drive roller 52 is formed of low friction material, such as nylon, polytetrafluoroethylene or an acetal resin, and includes a projection 54 (illustrated in FIG. 5) that protrudes into a slot 34 on the outside surface of rod 14.

On each side of projection 54, the drive roller includes curved surfaces 53 that have a radius of curvature that exceeds the radius of rod 14 so that only projection 52 contacts rod 14.

Slot 34 is positioned on the wall surface of rod 14 facing towards camera 12. Thus, the moment of inertia

of mounting bracket 16 and camera 12 tends to force projection 54 of drive roller 52 into frictional contact with the slotted surface of rod 14. As illustrated in FIG. 5, the projection 54 on drive roller 52 is preferably V-shaped, that is it has outwardly converging sidewall surfaces 56, that frictionally engage the sidewall surfaces 36 of slot 34.

Preferably, adjustment means are provided for varying the distance the tip of the projection protrudes into the slot in the rod to thus vary the amount of frictional force resisting movement of the drive roller relative to the rod. As here embodied, and as illustrated in FIGS. 4, 6 and 7, the adjustment means comprise a pair of spaced spring steel members 58 that are positioned adjoining a pair of enlarged end portions 59 of drive roller 52. A plurality of screws 60, as shown in FIG. 7, are provided that extend through openings in members 58 and are seated in threaded openings in bracket 16. The screws exert force on said steel members that are moved into contact with end portions 59. The force is thus transmitted to drive roller 52 and urges projection 54 of the drive roller towards the slot 34 of rod 14. Drive roller 52 may rotate during up and down movement of bracket 16 relative to rod 14. Members 58 contact end portions 59 but the end portions do not contact housing 41. The symmetrical solid of revolution configuration of drive roller 52 advantageously permits varying the portion of projection 54 that contacts slot 34 whenever one portion of the periphery of projection 54 becomes excessively worn.

As best illustrated in FIG. 4, in the assembled system the mounting means can be hidden from view by a cover plate 62, an end disc 64 and a second end disc 66. An opening 68 is provided in end disc 64 that is aligned with opening 70 in drive roller 52 when end disc 64 is attached to bracket 16 by screws 72. As illustrated in FIG. 7, the aligned openings 68 and 70 permit the insertion of the shank 74 of an adjusting knob generally 76 and the seating of the adjusting knob in a fixed vertical position with respect to mounting bracket 16. Shank 74 is preferably made of a metal that is milled and then pressed into opening 70. Shank 74 is secured to knob 76 by means of a set screw (not shown). Adjusting knob 76 when grasped by a person desiring to adjust the elevation of the television camera permits easy adjustment of the elevation of the television camera when an upward force is exerted on mounting bracket 16 to counteract the moment of inertia of the camera and the bracket.

In the embodiment illustrated in FIG. 1, an antenna 78 is attached to frame 10 for transmitting a television signal originated by the camera to monitors located within the immediate vicinity, such as within a classroom. In addition, a convenience electrical outlet 80 is provided that provides a convenient source of electrical power for illuminating display equipment, such as the filmstrip winding mechanism 24 illustrated in FIG. 1.

The television camera utilized in the system can be a commercially available vidicon tube type camera. Preferably, the focus control 82 is placed on top of the camera, and other controls that are occasionally needed to adjust the output signal are located inside the camera case and accessible to tuning tools which can be inserted through small access holes (not shown) in the case.

FIGS. 8 and 9 illustrate another embodiment of the camera holding means. With reference to FIG. 8, one leg 84 of a right angle bracket generally 86 is attached to mounting bracket 16 by set screw 48. The other leg 88 includes a slot 90 that permits mounting a conventional television or photographic camera (not shown) having a bottom screw mount for receiving a set screw 92. Thus, mounting bracket 16 can be easily adapted for use with conventional cameras having a bottom screw mount.

The present invention permits transmission of filmstrips, slides, opaque materials, transparent microscopic slides, three-dimensional objects, notes as they are written by an instructor, and small objects. The multimedia system is simple to use because the television camera can be easily manipulated on the stand for varying angles and degrees of magnification and elevational changes are particularly easy to make.

Unlike a conventional television camera mounted on a copy stand, all materials can be handled by an instructor in the normal left-to-right and rightside-up manner. For precision alignment of various material handling devices, registration pins on the base of each material handling device are provided to match registration holes on the support surface to perfectly align the camera and the visual matter to be transmitted.

While certain specific structures embodying the invention have been shown and described, it will be apparent to those skilled in the art that various modifications can be made without departing from the spirit and scope of the underlying invention.

What is claimed is:

1. A multimedia camera system comprising:

- a. a frame including a horizontally extending support surface, said support surface including registration means for holding visual matter in a correct left-to-right and rightside-up relationship with respect to a person positioned at one point along the edge of said support surface;
- b. a television camera positioned above said registration means on said support surface for transmitting a correct left-to-right and rightside-up image of visual matter held by said registration means;
- c. a vertically-extending rod fixed to said frame and spaced from said point along the edge of said support to permit unobstructed access to visual matter held by said registration means for a person positioned at said point, said vertically extending rod being spaced from a vertical plane connecting said point and said registration means;
- d. a horizontally extending camera mounting bracket including at one end a tubular opening through which said rod extends, and at the other end, camera holding means for supporting said camera, said camera holding means including a planar face of said bracket, said face aligned perpendicular to said support surface and parallel to the axis of said rod, and a set screw connecting said planar face and said camera to permit rotating said camera about the axis of said set screw and the transmission of a correct left-to-right and rightside-up image of an object positioned above said support surface and spaced further away along said vertical plane from said point than said registration means; and

- e. mounting means connecting said rod and said bracket for holding said bracket at a fixed elevation and permitting vertical movement of said bracket relative to said surface upon the application of external force to said bracket.
2. The camera system of claim 1 in which said rod includes a vertically-extending slot positioned to face said camera, and said mounting means includes a drive roller mounted on said bracket below the top of said tubular opening and formed of a low friction material, said drive roller including a projection that protrudes into said slot, with the moment of inertia of said mounting bracket and said camera holding said projection in frictional contact with the slotted surface of said rod.
3. The camera system of claim 2 in which said projection is V-shaped, and including adjustment means for varying the distance the tip of said V-shaped projection protrudes into said slot to vary the amount of frictional force resisting movement of said drive roller relative to said rod.
4. The camera system of claim 3 in which said adjustment means includes a pair of spaced spring steel members that each engage said drive roller, and screws that extend through said steel members and into threaded engagement with said bracket, said screws exerting on said steel members a force that urges said drive roller towards said slot.
5. The camera system of claim 1 in which said registration means comprise openings in the top of said support surface.
6. A support system for holding an item of photographic equipment above a support surface, said support system comprising:
- a vertically extending rod connected in a fixed relationship to said support surface, said rod including a vertically extending slot;
 - a horizontally extending mounting bracket for holding the item of photographic equipment, said bracket including at one end a tubular opening through which said rod extends, and at the other end, holding means for supporting the item, said mounting bracket slideably engaging said rod; and
 - mounting means connecting said rod and said bracket for holding said bracket at a fixed elevation and permitting vertical movement of said bracket relative to said surface upon the application of external force to said bracket, said mounting means including a drive roller mounted on said bracket below the top of said tubular opening and formed of a low friction material, said drive roller including a projection that protrudes into said slot with the moment of inertia of said mounting bracket and said camera holding the sides of said projection in frictional contact with the slotted surface of said rod.
7. The system of claim 6 in which said slot and said

- projection are each V-shaped and including a pair of spaced spring steel members that extend across said drive roller, and a plurality of screws that extend through said steel members and into threaded engagement with said bracket, said screws exerting on said steel members a force that urges said drive roller towards said slot.
8. A multimedia camera system comprising:
- a frame including a horizontally extending support surface, said support surface including registration means for holding visual matter in a correct left-to-right and rightside-up relationship with respect to a person positioned at one point along the edge of said support surface;
 - a television camera positioned above said registration means on said support surface for transmitting a correct left-to-right and rightside-up image of visual matter held by said registration means;
 - a vertically extending rod fixed to said frame and spaced from said point along the edge of said support to permit unobstructed access to visual matter held by said registration means for a person positioned at said point, said rod including a vertically-extending slot positioned to face said camera;
 - a horizontally extending camera mounting bracket including at one end a tubular opening through which said rod extends, and at the other end, camera holding means for supporting said camera; and
 - mounting means connecting said rod and said bracket for holding said bracket at a fixed elevation and permitting vertical movement of said bracket relative to said surface upon the application of external force to said bracket, said mounting means including a drive roller mounted on said bracket below the top of said tubular opening and formed of a low friction material, said drive roller including a projection that protrudes into said slot, with the moment of inertia of said mounting bracket and said camera holding said projection in frictional contact with the slotted surface of said rod.
9. The camera system of claim 8 in which said projection is V-shaped, and including adjustment means for varying the distance the tip of said V-shaped projection protrudes into said slot to vary the amount of frictional force resisting movement of said drive roller relative to said rod.
10. The camera system of claim 9 in which said adjustment means includes a pair of spaced spring steel members that each engage said drive roller, and screws that extend through said steel members and into threaded engagement with said bracket, said screws exerting on said steel members a force that urges said drive roller towards said slot.

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