

[54] **OVERHEAD RAIL SUPPORTING
STRUCTURE FOR PHOTOGRAPHIC
APPARATUS**

[75] Inventors: **Joseph H. Wally, Jr.; Samuel E. Wilson**, both of Shawnee, Mission, Kans.

[73] Assignee: **Western Blue Print Co., Kansas City, Mo.**

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[58] Field of Search **355/18, 55, 56, 58**

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Primary Examiner—**Samuel S. Matthews**

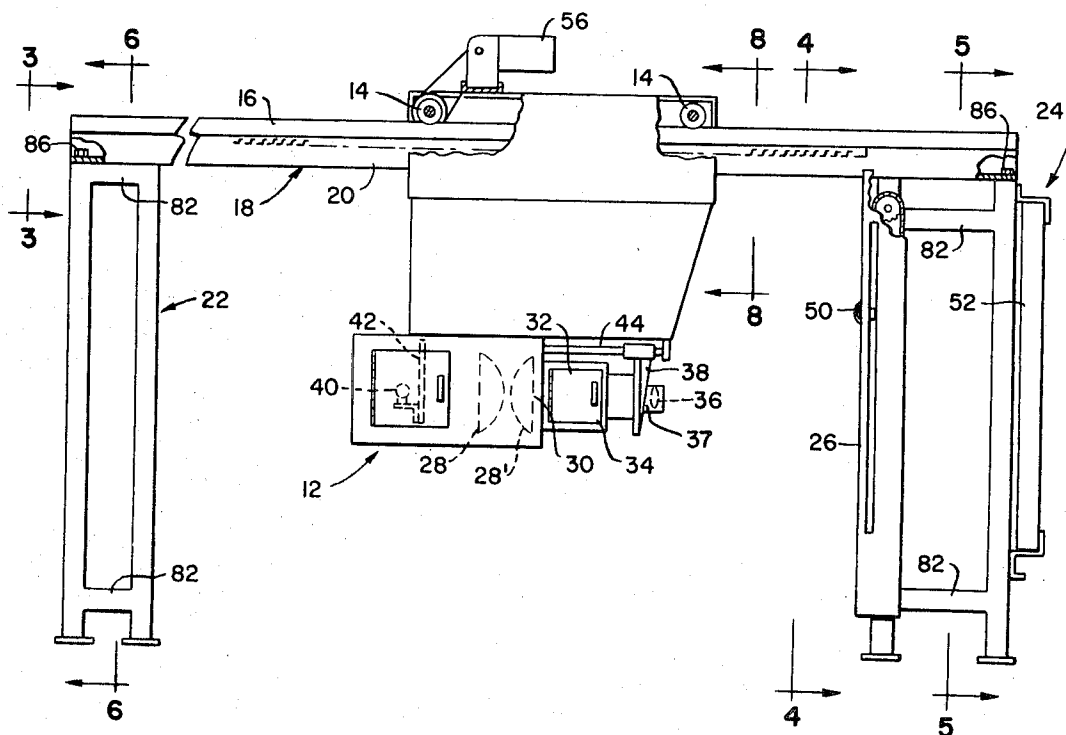
Assistant Examiner—**Richard A. Wintercorn**

Attorney—**Johnson, Diener, Emrich, Verbeck & Wagner**

[57] **ABSTRACT**

In photographic apparatus, spatial adjustments of its optical head to a subject holder obtain along overhead rails which are supported on a long spanning member embodying interfitted channel members of folded heavy gauge sheet metal. Said spanning member rests at its opposed ends on two piers each comprising four spaced posts joined by cross beams adjacent their top and base. The composite structure affords a rigid and stable support for the head such that its film platen and lenses remain coaxially aligned with the subject holder through said spatial adjustments.

18 Claims, 9 Drawing Figures



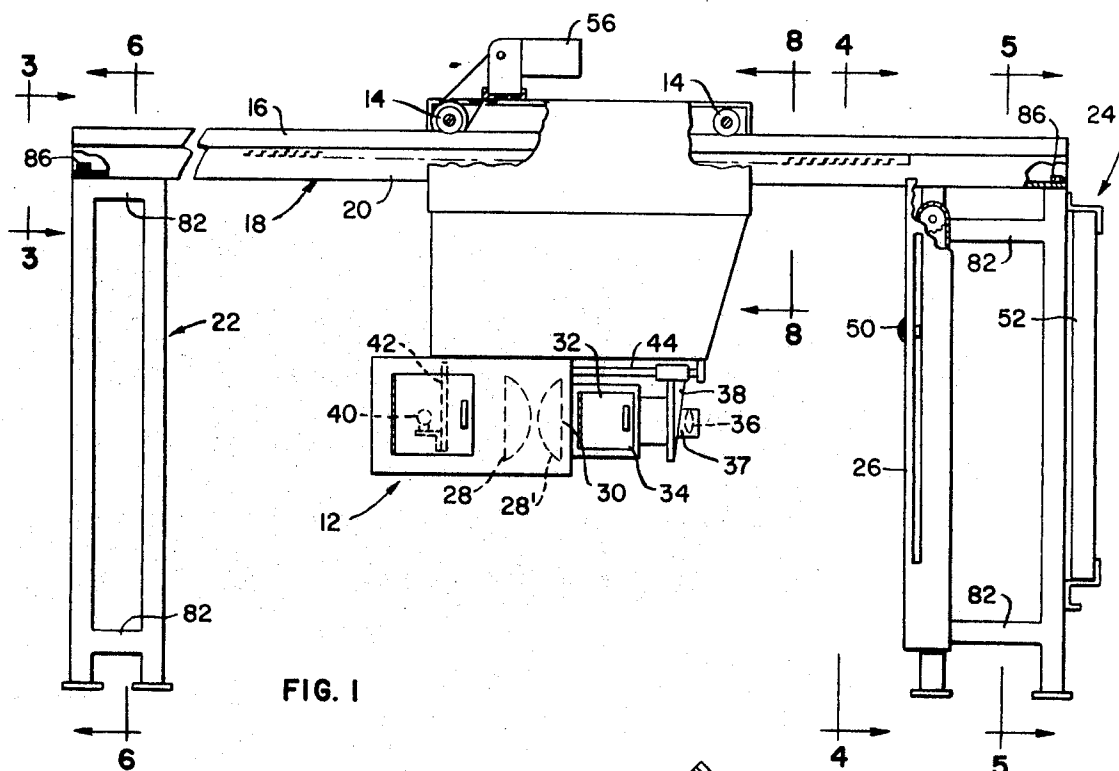


FIG. 1

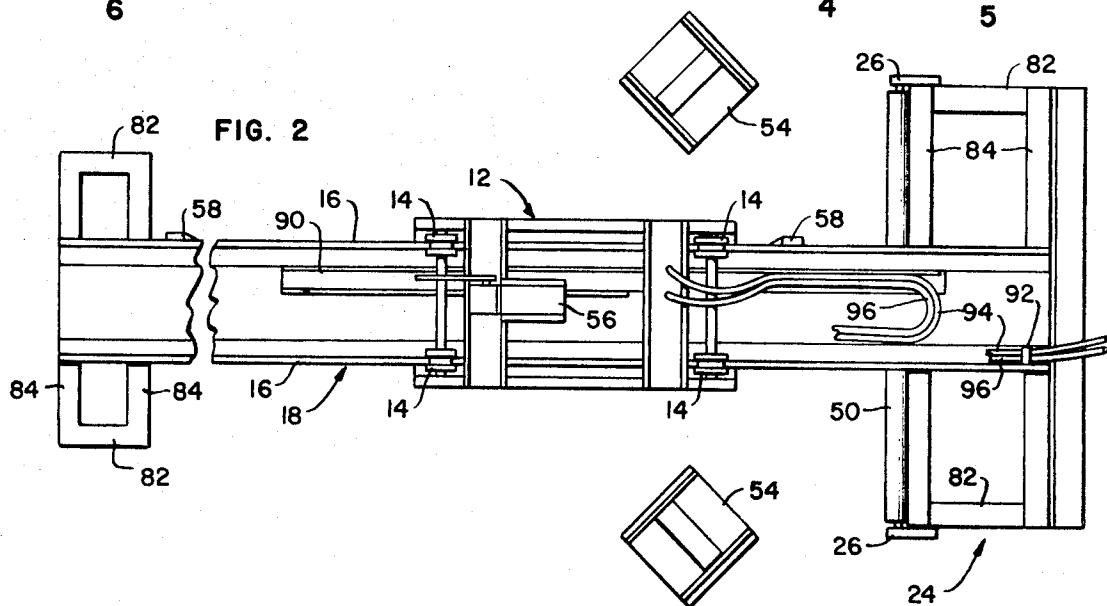


FIG. 2

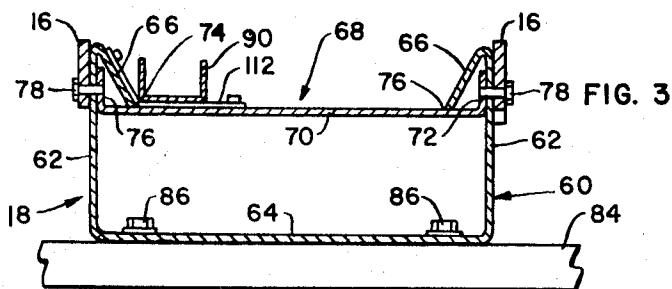
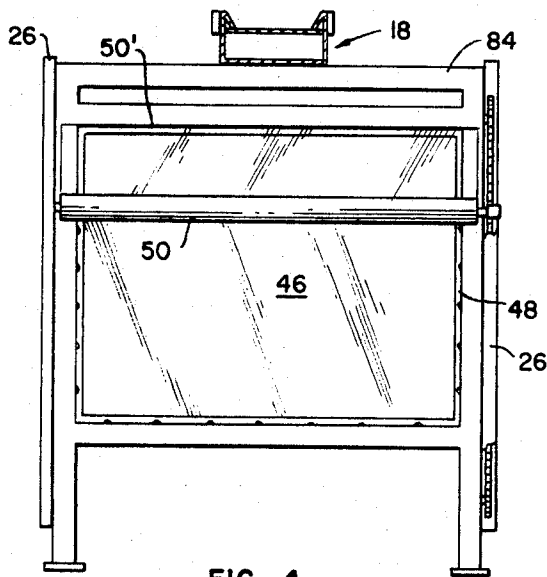
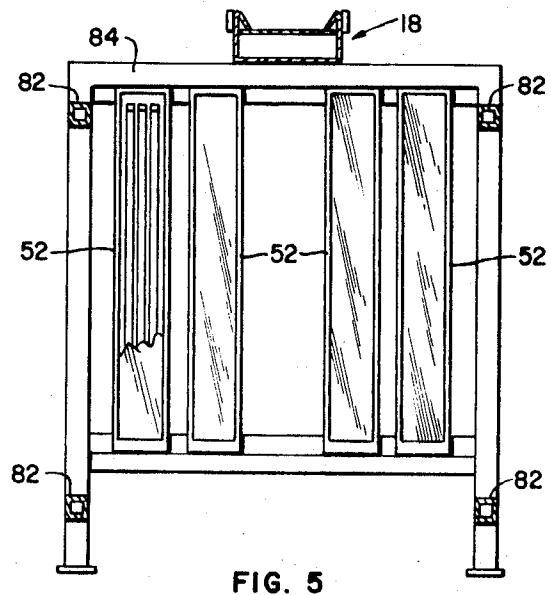
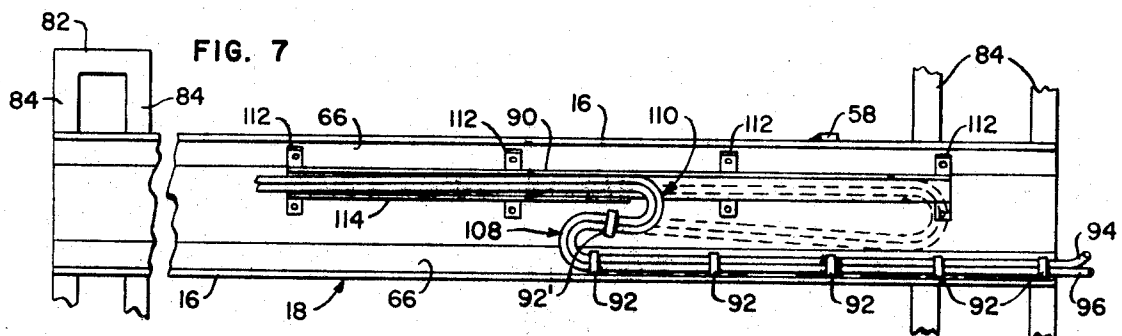
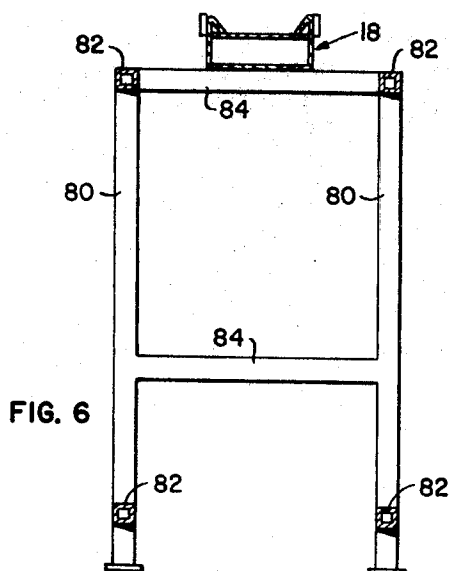
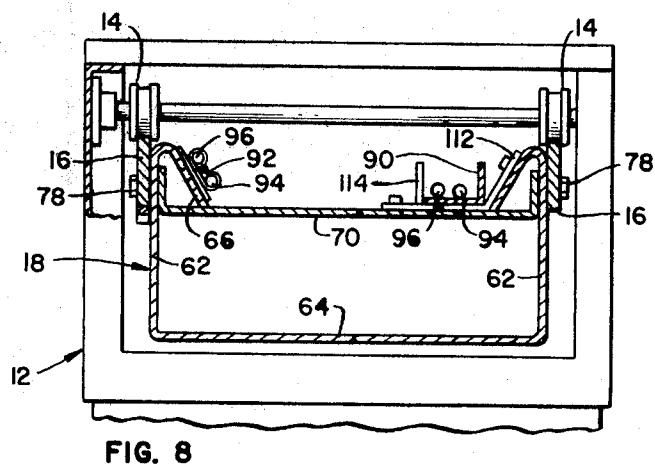
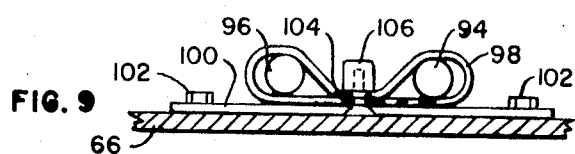


FIG. 3

INVENTORS
 JOSEPH H. WALLY Jr.
 SAMUEL E. WILSON
 BY *Johnson, Diener, Emrich,
 Verbeek & Wagner*
 ATTORNEYS



OVERHEAD RAIL SUPPORTING STRUCTURE FOR PHOTOGRAPHIC APPARATUS

This invention relates to photographic apparatus used in making copies of large-size graphic sheet material. More particularly, the invention comprises novel structure for supporting components including the film platen and optics which are adjustably related to the subject holder to accommodate different magnification and reduction factors in the use of the apparatus.

In recent years, considerable demand has been created for apparatus capable of producing multi-copies of graphic material for both industrial and governmental purposes. Many of the original drawings are several feet long and correspondingly wide and, depending on a specific need, the required copies may be to the same scale or on either a magnified or a reduced scale. In addition, with the growing use of printed circuitry there has also developed a need for a camera capable of reducing large scale drawn circuits to miniature size on production line basis but to tolerances sufficiently close that the lines remain absolutely undistorted and to a precise size. The structure of such apparatus must be scaled large enough to handle the copy material and the components needed in photographing such large sized drawings. The apparatus also must be capable of doing so without introducing distortion into the projected image. The design and arrangement of optics in the apparatus are important in order to avoid possible optical image distortion. It is also important that the components not be subject to vibration, sag or other sources of geometric distortion. In working with large scaled drawings the latter can be a particular problem. The present invention, therefore, is particularly concerned with the elimination of geometric distortion and the overcoming thereof represents a principal object of the invention.

One photographic apparatus useful for such purposes is disclosed in copending application, Ser. No. 836,317 of Joseph H. Wally, Jr., filed June 25, 1969,, now U.S. Pat. No. 3,639,054 and owned by our assignee. The photographic apparatus there described embodies an optical head which contains a film platen and objective lenses spaced forwardly thereof. The optical head also includes a pair of condenser lenses and a projector light source disposed behind the film platen so that the apparatus is useful both as a camera and as a projector. With the projector light source dark the film may be mounted on the platen and the apparatus used as a camera by exposing the film through the objective to reproduce an image of copy material supported on the subject holder. After the film has been developed it may be relocated on the platen and the apparatus used as a projector by energizing the light source to project an image of the film onto the subject holder. By locating light sensitive paper on the subject holder copies of the film image may be conveniently reproduced thereby. Within the optical head the projector light source and objective lenses are axially adjustable relative to the film platen to maximize focusing for different spatial settings of the optical head relative to the subject holder. Because both the film and the developed negative can be located in the same position on the film platen and the same optical components are utilized in both the camera and projector modes the problems of optical distortion can be minimized.

In said copending application, the optical head is itself supported from overhead rails for movement horizontally as a unit toward and away from the subject holder in order to space the film platen for different degrees of magnification and reduction, thus permitting copies to be reproduced to the same or different scale as required. The overhead rails along which the optical head moves are described as comprising a pair of parallel spaced channel means which are united by end plates welded to the opposed ends of the channel beams and reinforced by intervening spaced bracing rods so as to form a unitized rigid box-like structure. One end of the thus constituted rail supporting structure is secured to the subject holder of the apparatus and the end plate of the other end of the structure is bolted to a horizontal cross beam which is fixed between a pair of vertical columns and is braced by pieces inclined between the cross beams and vertical columns.

The present invention improves upon said rail supporting structure and embraces a novel construction therefor which facilitates manufacturing as well as on-site set-up and assembling of the apparatus at the user's location. It also provides a supporting structure for the optical head which is less subject to sway or deflection under the weight of particular large sized photographic apparatus and so that geometric distortion is less a problem when working with the larger sized copy material.

The subject holder is mounted vertically as a part of the rail supporting structure and to one side of the working area through which the optical head moves in its spatial adjustments. The optical head moves freely on overhead rails allowing the floor area to remain clear and uncluttered which is particularly important to an operator who must work in a dimly lit room in which the apparatus is normally utilized.

For the successful utilization of the apparatus sufficient mass as well as rigidity must be built into the rail supporting structure in order to contain the bulk and weight of the optical head over the length of the supporting stand which is needed to accommodate the travel of the optical head toward and away from the subject holder in order to permit it a useful range of magnification and reduction factors. In addition, adequate support must be provided for the supporting span so as to minimize the possibility of the span being subject to sway or deflection either from external factors or consequent to the load of the optical head as it travels along the supporting rails. Thus in one commercial form of the invention wherein the apparatus supports copy material as large as 58 × 120 inches and reduces it on film having a nominal image size of 10 × 16 inches, the optical head weighs in the order of 1,500 pounds and the span of the overhead rails along which it moves is in the order of 30 feet.

In such apparatus accuracy in copy reproduction depends on the path of movement of the optical head being held constant and in a straight line at right angles to the subject holder. Only under this circumstance will the film platen remain vertical and parallel to the subject holder plane and the axial alignment of components of the optical head unchanged with respect to the subject holder.

Thus a first and principal object of the invention and/or feature thereof is the provision of novel supporting structure which facilitates rigidly locating and precisely retaining the optical head and thereby coaxial alignment of its film platen and subject holder of such apparatus in their related adjustments.

A second important object of the present invention is the construction of rail supporting structure so characterized which also is practical and efficient to manufacture, as well as convenient to transport and set up at the user's location.

In the accomplishment of these objects the invention embodies a structure which comprises a long single spanning member so designed as to resist the weight of the optical head and which rests at its opposed ends on separately constructed piers.

A feature of the invention is that the piers on which the spanning member rests comprise four spaced vertical posts united by cross beams adjacent their top and base. The four posts are widely spaced to provide an extremely stable footing, but are not so widely spaced that the strength of their two cross beams on which the spanning member is rested is taxed by the weight thereof. In accordance with the invention, both the cross beams and posts are assembled and welded at right angles such that they produce an open frame which may be considered as a rectangular parallelepipedal structure. The two piers have pairs of longer cross beams which receive the ends of the spanning member and have shorter cross beams which are disposed parallel to the axis of the spanning member and equidistantly from opposed sides thereof, thus uniformly distributing the weight of the spanning member and its load between the four posts while providing resistance to sway and/or deflection of the spanning member under its load.

It is a feature of the invention that the long spanning member itself is constructed by folding heavy gauge sheet metal stock into inner and outer channel members which are then interfitted and welded together in order to form a rigid non-yielding member which spans the separation of the two piers and supports the weight of the optical head without further reinforcement or underpinning. The inner channel member has a length corresponding to that of the outer member and its upturned side walls are welded to the inner surface of the upstanding side walls of the outer channel member at a height such that the under wall of the inner member is well spaced above the under wall of the outer channel member. In addition, the end portions of the side walls of the outer channel member are folded inwardly along their length and downwardly so as to abut the upper surface of the under wall of the inner channel member to which they are then welded.

In its preferred form, the under wall of the inner channel member is spaced at a height approximately two-thirds the height of the upturned side walls of the outer channel member and the downturned end portions thereof are inclined at approximately 30° thereto. The rails, in turn, are mounted along the length of the sidewall portions of the outer channel member immediately above the end wall of the inner channel member, the box-like structure formed by the underwalls of the two channel members and the side walls of the outer member providing a hollow structure

which resists sagging. The upturned side walls of the inner channel member and the angled downturned end portions of the outer channel member contribute thereto while also affording lateral resistance to retain the rails in a fixed parallel disposition.

Thus an important feature of the invention is that a rail supporting structure for the optical head is provided which both facilitates assembling and also dampens sources of geometric distortion in the projected image during use of the apparatus.

A further feature of the invention is that the rail supporting structure does not yield to the weight of the optical head and its straight line movement relative to the subject holder is assured. Therefore the film platen and optical components remain in the same aligned relation with the subject holder through the full extent of the spatial adjustments of the optical head relative to the subject holder.

A further feature of the invention is that an overhead rail supporting structure is provided for the optics of photographic apparatus which is not subject to deflection and so that distortion in the image produced in the film and/or projected back therefrom to the subject holder is virtually eliminated.

Still another feature is that in such apparatus in all positions and spatial settings of the film platen relative to the subject holder, the components retain their same coaxial and parallel alignment.

Many other objects, advantages and features of the invention will be at once apparent or will become so from a consideration of the detailed description of a preferred embodiment of the invention which now will be described.

Referring therefore now to the drawings wherein like parts are identified by like reference numerals:

FIG. 1 illustrates photographic apparatus in which the novel overhead rail supporting structure is employed for its optical head;

FIG. 2 illustrates a top plan view thereof;

FIG. 3 illustrates a view of the rail supporting structure partially fragmented, the view being considered taken from the left hand side of FIG. 1 as indicated by the arrows;

FIGS. 4 and 5 are sectional views taken along lines indicated by arrows 4—4 and 5—5 in FIG. 1 and show details in the structure of one of the supporting piers;

FIG. 6 is a sectional view taken along lines 6—6 indicated in FIG. 1 and illustrate details in construction of the second pier which supports the other end of the long spanning member;

FIG. 7 is a top plan view of the long spanning member, the optical head being omitted to permit illustrating details in the guide structure provided for the electrical and vacuum conduits;

FIG. 8 is a sectional view taken along lines 8—8 of FIG. 1 looking in the direction indicated by the arrows and shows details in the mounting of the rails to its supporting span member and also shows the optical head mounted for travel along said rails; and

FIG. 9 is an enlarged fragmented view illustrating one form of clamp employed in accordance with the invention to stationarily secure the electrical and air evacuating conduits which lead to the optical head.

Referring now more particularly to the several views, FIG. 1 illustrates photographic apparatus comprising a

camera-projector optical head 12 which is supported from parallel spaced overhead rails for movement toward and away from the subject holder 26 of the apparatus. The illustrated apparatus other than the rail supporting structure which comprises the present invention is disclosed and claimed in the aforementioned copending application, Ser. No. 836,317 to which reference may be had for an understanding of its construction and operation. However, for purposes of understanding the present invention, it will suffice to understand that optical head 12 is suspended by front and rear wheels 14 which roll along a pair of spaced parallel tracks or rails 16 secured on opposed sides of the overhead rigid supporting structure 18 which comprises the present invention and is afterwards more completely described. Said rigid supporting structure 18 comprises a long spanning member indicated generally at 20 to which the rails 16 are specifically mounted and which spanning member 18 has one end rested on a separately constituted pier 22 and has its opposite end rested on a second separate constituted pier 24. Pier 24 supports a vertically disposed subject holder 26 relative to which the optical head 12 moves via its wheels 14 along rails 16, 16. The optical head 12 contains a pair of plano-convex condenser lenses 28, 28' enclosed within a dust tight box-like enclosure and the optical axis of which is aligned with the center of the subject holder 26. The plano side of the first condenser 28' is adapted as a film platen 30 to which access is obtained through a door 32 in plenum 34 of the optical head in order to locate or remove the film or negative from said platen 30. 36 indicates an objective lens which is supported by lens board 38 and 40 represents a point source of light supported by light board 42 behind the condenser lenses 28, 28' and thereby the film platen 30. Lens board 38 and light board 42 are mounted on massive size rigid precisely related solid stainless steel precision rods comprising tubular ways 44 which accommodate axial adjustment of the spatial relation of the objective 36 and point source of light 40 relative to the film platen 30. It will be understood that each of said point source of light 40, film platen 30 and objective lenses 36 are coaxially aligned with the condenser lenses 28, 28' and thereby the subject holder 26 in the proper utilization of the invention.

The subject holder 26, as more particularly illustrated and described in the aforementioned copending application, preferably comprises a vertically disposed translucent member 46 having a vertically planar surface on its side facing the optical head 12 and surrounding said member 46 is a peripherally located continuous channel 48 connected to an air evacuating pump, not shown. At 50 is a roll of pliofilm or other suitable flexible transparent plastic sheet material having one end secured to the top of the subject holder as illustrated at 50' in FIG. 4. Sheet 50 is positioned and so dimensioned as to overlie the mentioned air evacuating channel 48 about the periphery of the translucent member 46 when it is fully unrolled. The sheet material to be copied or sensitive paper in which an image of copies to be printed is initially located within the area of the translucent member 46 defined by the air evacuating channel 48 and the pliofilm roll 46 is unrolled thereacross so as to be drawn tightly against the surface of the subject holder 26 with evacuation of air from the

mentioned channel 48. The unrolled pliofilm sheet thus tightly holds the copy material or sensitive paper against the flat vertical surface of the translucent member 36 during the photographing or projection-printing operation.

At 52 are a plurality of fluorescent bulbs supported on pier 24 behind the subject holder 26 through which its translucent member 46 may be back-lighted. At 54, as illustrated in FIG. 2, are a pair of stands supporting fluorescent light bulbs which may be directed to front light the surface of the subject holder 46.

Optical head 12, as thus far described, may be utilized as a camera with its point source of light 40 dark and as a projector with its light source 40 illuminated. In its use optical head 12 is moved toward or away from the subject holder in order to locate its film platen 30 at the proper spatial setting or distance from the surface of the subject holder 26 which will introduce a desired image reduction factor when the apparatus is used as a camera or a required magnification factor when it is used as in projection printing. Objective lens 36 is independently adjustable toward and away from the film by moving lens board 38 along ways 44. Such adjustment serves to sharpen the focus of the projected image at the spatial setting of the optical head 12. Simultaneously with the axial adjustment of the objective 36 the point source of light 40 moves relative to the film platen 30 on said ways 44 so as to provide optimum light convergence at the nodal point of the objection lens during projection. 56 represents a motor which is drivingly connected to the shaft of one pair of wheels 14 to effect movement of the optical head 12 along said rail 16. A second motor, not shown, is utilized to effect spatial adjustment of the objective 36 and point source of light 40 relative to the film platen 30 for sharpening focus at each of the spatial settings in which the optical head is located by operation of the motor 56.

The present invention is particularly concerned with the illustrated structure comprising the long spanning member 18 and the two piers 24 and 26 on which its opposed ends rest which structure serves to carry the weight of the optical head as it travels along said rails 16 and an important feature of the invention, as earlier mentioned, is that the path of the movement of the optical head does not change from a straight line. Rather, the rail supporting structure is so designed that the path of the film platen retains a parallel relation to the surface of the translucent member 46 of the subject holder and the point source of light 40, condenser lenses 28, 28' and objective lenses 36, as well as the film platen, do not vary from their initially determined coaxial aligned relation with the subject holder 26 through the full extent of travel of the optical head toward and away from the subject holder 26 within the limits permitted by stops 58.

Considering now FIG. 3 with FIGS. 1 and 2, it will be seen that in accordance with this invention rails 16 are bolted at spaced intervals to the outer side of the up-turned sidewalls 62 of the first or outer channel member indicated generally at 60 so that the upper edges thereof along which wheels 14 roll protrudes slightly thereabove. In accordance with this invention, outer channel member 60 comprises heavy gauge sheet metal stock which has been folded into the cross sectional shape illustrated by FIG. 3 and comprises a

planar or generally flat under wall portion 64 having opposed upturned sidewalls 62 along the length thereof. The outer ends of said sidewalls 62 are folded inwardly to define acutely angled portions 66. At 68 is a second channel member also folded from heavy gauge sheet metal stock into a generally channel shape in cross section having an under wall 70 and upturned side walls or flanges 72 on its opposed sides. As illustrated, the two channel members are of comparable length and channel member 70 is located within the outer channel member 60 with its under wall 70 spaced off the under wall 64 of the outer channel member, and engaging edge 74 of the inclined portion 66 along the full length thereof. The upturned side flange walls 72 of the inner channel member are welded at its two ends to the inner surface of the upturned side walls 62 of the outer channel member 60 and intermittently at points along junction 76. Edge 74 of the inclined portion 66 is in turn intermittently welded to the upper surface of the under wall 70 of the inner channel member. As illustrated in FIG. 3, bolts 78 by which rails 16 are mounted to the spanning member are preferably passed through both the side walls 62 of the outer channel member 60 and through flanges 72 of the inner channel member 68.

As mentioned, both channel members 60 and 68 are folded into their illustrated shapes from heavy gauge sheet metal, the actual gauge of which will vary in accordance with the length of spanning member 18 and the weight of the optical head 12 which it is to support. In one commercial form of the invention where the member 18 has a span of approximately thirty feet and the optical head weighs in the order of 1500 pounds, the outer channel member 64 comprises 3/16 inch sheet metal and the inner channel member 3/8 inch sheet metal. In folding the sheet metal into the illustrated channel shape, it is important that the stock be rolled to avoid sharp corners and they are deliberately radiused with a radius inside diameter of one-fourth inch or even more. This results in increased strength and resistance to sag. In its preferred form, the upstanding side walls 62 of the outer channel member have a height roughly equal to one-half the width of its under wall 46 and the inner channel member 68 is positioned such that its under wall 70 is spaced roughly two-thirds the height of said side wall 62 of the outer member and the upturned side walls 72 of the inner channel member 68 extend the remaining one-third height. The downwardly turned end portions 66 are preferably so inclined that they approximate a 60° angle with respect to wall 70. Although the above proportions are to be preferred, they may be varied in accordance with the invention and in order to meet specific requirements. We have found, however that a spanning member so constructed will have adequate strength and rigidity to support a load in excess of 1,500 pounds as represented by the optical head 12 in all positions of spatial adjustments between the piers 22 and 24 without sag or deflection which would introduce geometric distortion into the projected image as obtains when the optical head is angled at even a small angle off parallel.

Piers adequate on which to rest the two end portions of spanning member 18 are identified generally at 22 and 24. Each said piers comprise four vertically extend-

ing posts 80 of generally square cross section and have rounded corners. These posts are united by cross beams adjacent their top and base which also are of generally cross section with rounded corners. Two of said posts of each pier are spaced along opposite sides of the spanning member 18 and are joined by shorter beams 82 which are welded to the respective posts at right angles thereto. The posts of each said pair further are united by longer cross beams 84 which are similarly welded to the respective posts at right angles thereto. Each said piers 22 and 24 thus generally comprise an open frame structure having the configuration of a rectangular parallelepipedon. We have found this configuration for the piers 22 and 24 to provide an extremely stable support for the spanning member 18 and its load represented by optical head 12 when the respective end portions thereof are rested on the two parallel spaced top cross beams 84' centered between the posts 80 and arrested in their assembled relation thereon by bolts 86. When thus assembled the shorter cross beams 82 extend generally parallel to the spanning member 18. The two ends of the spanning member 18 are thus effectively cradled between the four posts and preferably the extension of the longer cross beams 84 to either side of the spanning member equals at least the length of the shorter cross beam 82, such that the weight of the spanning member and its load are distributed therebetween. Thus, in the mentioned embodiment wherein the spanning member 18 has a span of about 30 feet and a width of 16 inches, the longer cross beams 84 of pier 22 were 54 inches long and the shorter beams 24 inches. In the instance of pier 24, the length of the longer cross beams 84 was increased to approximately 150 inches in order to accommodate mounting the subject holder 26 and also the back lighting members 52 as earlier described. The length of the shorter cross beams 82 was increased to 30 inches, both to compensate for the greater length or spacing of the posts to either side of the spanning member and also to accommodate location of the back lighting fixtures at a desired distance behind the translucent member 46 comprising the subject holder. In said embodiment the posts 80 and cross beams 82 and 84 of both piers are fabricated of a tubular steel having a gauge comparable to that of which the spanning member 18 is constructed, although it may be of heavier gauge. In the example, the posts and cross beams had a width on each side of approximately four inches. The above described spacing of the posts comprising the two piers was found to produce unitized structures which were sufficiently rigid and massive as to provide an extremely stable support for the spanning member. Generally speaking, the greater the spacing of the posts the more effective they are in balancing the spanning member against sway and vibration. There are, however, practical limits determined by the inherent capacity of the cross beams 84' to support the spanning member without bending or otherwise yielding to the weight thereof. The available floor space in the area where the apparatus is to be used is also a factor that needs to be considered.

Considering now FIG. 7 with FIGS. 2 and 3, means are illustrated in the form of a channel member 90 and spaced clamps 92 which function to guide and control the movement of conduits 94 and 96 during the afore-

mentioned movements of the optical head 12. For example, conduit 94 represents an electrical conduit through which the light source 40 and drive motor such as 56 of the optical head are connected to an external source of electrical power and 96 represents a conduit which connects shutter mechanism 37 and platen 30 of the optical head, both of which are preferably vacuum operated as described in the copending application, Ser. No. 836,317, to the air evacuating pump also externally located. As shown best in FIG. 7, both the electrical contact 94 and air evacuating conduit 96 is supported on one of the two inclined end portions 66 of the spanning member by said clamps 92 for a distance roughly equal to the distance that the optical head travels along rail 16 to its most remote position from the subject holder. Clamps 92 may be of any suitable construction but, as illustrated in FIG. 9, each of said clamps 92 comprises a continuous resilient loop 98 secured to a supporting base 100 which, in turn, is fastened to one of the inclined end portions 66 as by screws 102. Mounted on base 100 and protruding centrally through loop 98 dividing it into two sections is a threaded studded member 104 on which is received an internally threaded cap 106. As illustrated by said FIG. 9, conduits 94 and 96 extend through said loop 100 on opposite sides of stud 104 and so that when cap 106 is tightened on stud 104 the two conduits are secured in place and against movement. At 108 the conduits are looped back in the opposite direction toward the subject holder end of the spanning member 18 and secured in place by a clamp 92' a short distance beyond said loop 108. The two conduits are again reversely looped as at 110 in the opposite direction away from the subject holder and lead into channel member 90. As illustrated by FIG. 7, channel member 90 has spaced flanges 112 by which it is secured to the inclined end portions 66 of the standing member 18 along the opposite side thereof. Channel member 90, as illustrated by FIG. 2, extends the major length of the spanning member 18. However, its inner wall 114 terminates just beyond clamp 92'. Thus, as indicated by the full and dash lines, as the optical head moves toward the subject holder, the end portion of the conduit connected to the optical head are pushed therewith along channel member 90 and is guided by its inner wall 114 to a maximum position illustrated by the dash lines. As the optical head is moved in the opposite direction away from the subject holder to its most remote position therefrom the connected end portions of conduit are drawn into the channel member 90 to the maximum position illustrated by the solid lines. Thus, conduits 94 and 96 are caused to effectively follow the movement of the optical head and wall 114 acts in cooperation with clamps 92 to effectively keep the conduit in line and free of entanglement. Any other arrangement of the electrical and air evacuating conduits, however, may be utilized.

From the above description of the preferred embodiments of the invention, it will be appreciated that all of the recited objects, advantages and features of the invention have been demonstrated as obtainable in a highly convenient and entirely practical manner.

Having described our invention, we claim:

1. In photographic apparatus used to copy graphic sheet material, supporting structure for a pair of rails

along which a support containing a film platen moves relative to a subject holder, said structure comprising a single long spanning member and a pair of spaced piers on which the two opposite ends of the spanning member rest, the rails being affixed to opposed sides of the spanning member and said spanning member comprising a pair of interfitted channel members, the inner channel member having upturned sidewalls secured to the inside of the upturned sidewalls of the outer channel member, the underwall of the inner channel member being spaced off the underwall of the outer channel member, and the end portions of the outer channel member being turned inwardly and secured to the underwall of the inner channel member outwardly of its inturned sidewalls.

2. Supporting structure according to claim 1 wherein the two piers each comprise four vertically spaced posts united by cross beams adjacent their top and base, the ends of the single spanning member resting on two of the cross beams of each said piers so as to be effectively cradled between the four vertical posts effectively paired on either side of said spanning member.

3. Supporting structure according to claim 1 wherein the two piers comprise supporting frames having a rectangular parallelepipedal shape.

4. Supporting structure according to claim 3 wherein two sides of said rectangular parallelepipedal frames are disposed generally parallel to the sidewalls of the spanning member and are so spaced as to effectively resist swaying of the rail supporting spanning member on said piers.

5. Supporting structure according to claim 1 wherein both the inner and outer channel members of the spanning member comprise heavy gauge sheet metal folded into said shapes and welded together to constitute a rigid non-yielding integral structure.

6. Supporting structure according to claim 5 wherein the inturned sidewalls of the outer channel member meet with the underwall and the inwardly inclined end portions thereof comprise arcuate as opposed to sharply defined corners.

7. In photographic apparatus employing a film platen, an objective and a subject holder in spaced axial alignment, at least one of which is mounted for movement along overhead rails to spatially adjust the platen relative to the subject holder, the improvement wherein the rails are mounted on a rigid non-yielding structure comprising an elongated channel member and a pair of spaced rectangular parallelepipedal frames on which the respective ends of said channel member rests, the elongated channel member comprising an underwall having upstanding opposed integral sidewalls, the end portions of said sidewalls being turned inwardly and downwardly at acute angles with respect to said sidewalls and towards said underwall, and a second reinforcing member secured within said channel and spaced off said underwall, said second member being also secured to said inwardly and downwardly turned end portion of the channel member sidewalls.

8. The improvement of claim 7 wherein the second member disposed within the channel member is of channel shape and has a bottom wall in spaced relation off the underwall of the channel member and has opposed sides welded to the edges of the inwardly turned

end portions of the channel member, said second member having its edges disposed against and welded to the inner surfaces of the opposed sidewalls of the channel member.

9. The improvement according to claim 7 wherein said second member has opposed side flanges which are disposed against and welded to the inner surfaces of the opposed sidewalls of the channel member.

10. The improvement according to claim 7 wherein one of said rectangular parallelepipedal frames supports the subject holder.

11. The improvement according to claim 8 wherein the subject holder is translucent and the said rectangular parallelepipedal frame which supports it also has means spaced behind the subject holder for rear lighting the subject holder.

12. The improvement according to claim 7 wherein the platen and objective are supported within an optical head which moves along said rails.

13. The improvement according to claim 7 further including channel guide means extending lengthwise thereof for guiding electrical conduits which connect to the optical head and are pushed and pulled with the movement of the optical head toward and away from

the subject holder.

14. The improvement according to claim 1 wherein the upturned sidewalls of the inner channel member extend upwardly to adjacent the junction of the inclined end portions of the outer channel member with its side portions.

15. The improvement according to claim 14 wherein the rails are bolted to the upturned sidewalls of both the inner and outer channels at locations above the underwall of the inner channel member.

16. The improvement according to claim 1 wherein the underwall of the inner channel member is spaced off the underwall of the outer channel member a distance equal to approximately twice the remaining height of the sidewalls of said outer channel members.

17. Supporting structure according to claim 1 wherein the upturned sidewalls of the outer channel member approximate one-half the lateral dimension of the underwall thereof.

18. Supporting structure according to claim 1 wherein the inclined end portions are disposed at approximately thirty degrees with respect to the upturned sidewalls of said outer channel member.

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