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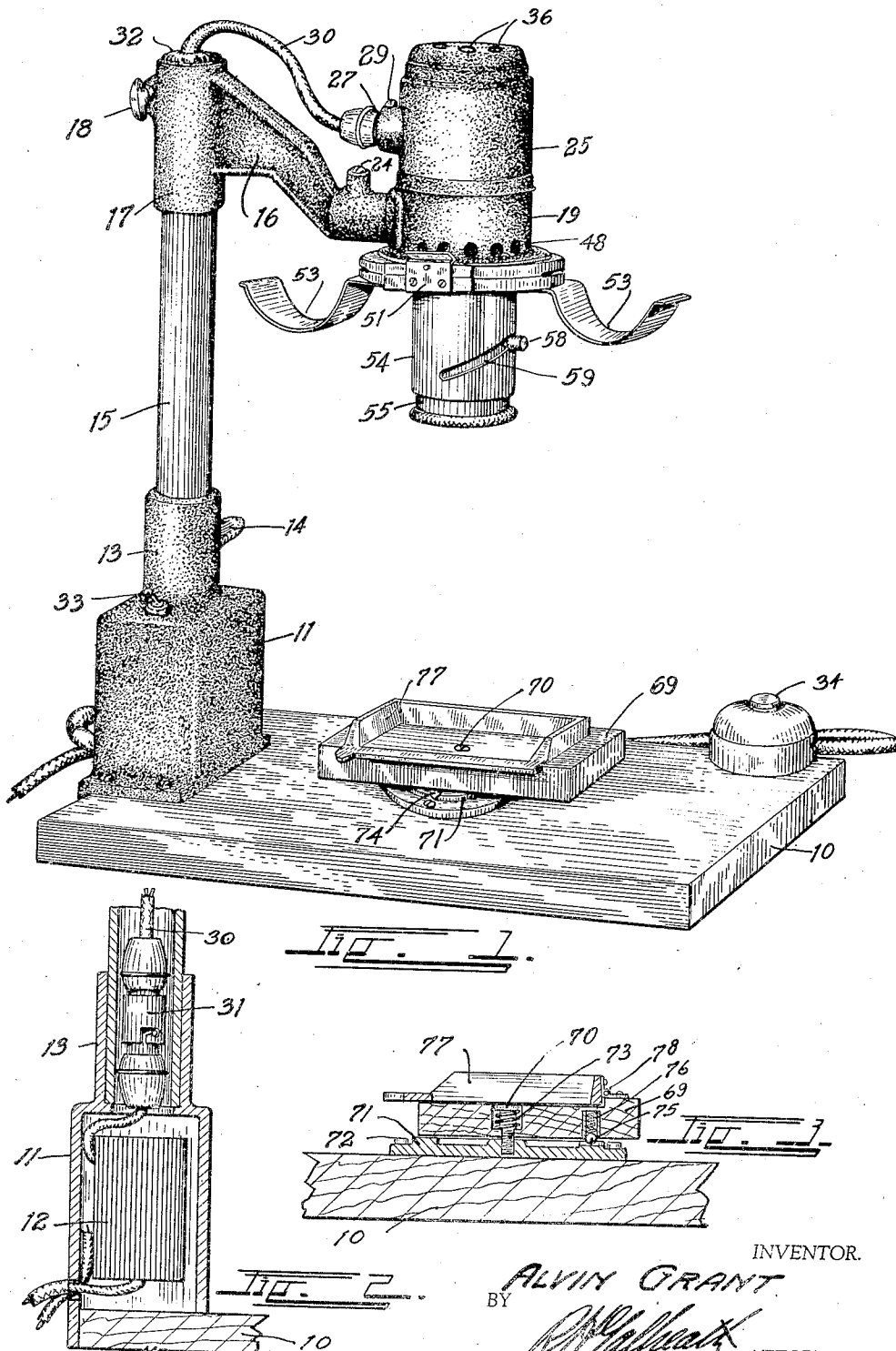
A. GRANT

2,135,074

PHOTOGRAPHIC ENLARGER

Filed June 21, 1937

2 Sheets-Sheet 1



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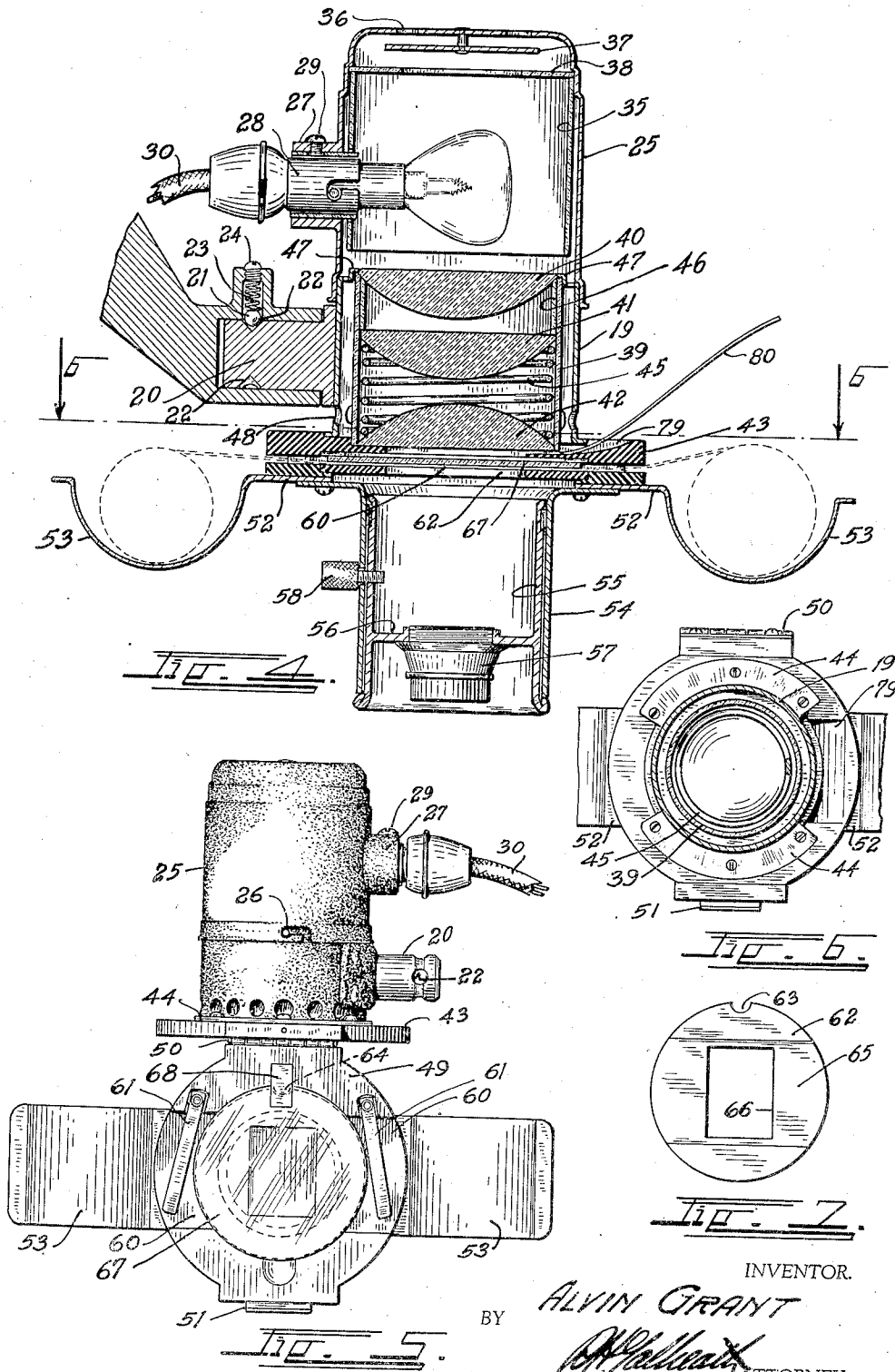
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2 Sheets-Sheet 2



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PHOTOGRAPHIC ENLARGER

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4 Claims. (Cl. 88—24)

This invention relates to a photographic enlarging machine and has for its principal object the provision of a highly efficient device for use on the modern miniature camera films for rapidly producing enlarged prints of said films.

Other objects of the invention are: to provide an enlarging machine in which an automobile globe may be efficiently employed for the light source; to provide efficient means for cooling the condensing lenses and the lamp housing to prevent undue heating thereof; to provide an enlarger which can be rotated in a horizontal plane about its supporting standard so that the image may be projected downward upon a base board or beyond the edges of said board upon the floor to produce enlargements of any desired size; to provide a machine of this character in which the lamp housing and projector may be rotated in a vertical plane about its supporting standard so that the image may be projected upwardly, downwardly, or horizontally so that it may be used to project slides upon the wall or ceiling of a room; to provide a film support in an enlarging machine which may be rotated so that the position of the image can be turned or inverted without removing the film; to provide a combined supporting standard and transformer housing which will eliminate the number of parts necessary and produce an ornamental appearance; to provide a demountable standard by means of which the entire upper structure can be quickly and easily demounted for packing and transporting; and to provide a highly efficient, rotatable paper mask frame for holding the printing paper which will allow the latter to be rapidly and quickly changed to produce enlargements in commercial quantities.

The invention is more particularly designed as an improvement over the machine illustrated and described in applicant's Patent No. 2,001,026.

Other objects and advantages reside in the detail construction of the invention, which is designed for simplicity, economy, and efficiency. These will become more apparent from the following description.

In the following detailed description of the invention reference is had to the accompanying drawings which form a part hereof. Like numerals refer to like parts in all views of the drawings and throughout the description.

In the drawings:—

Fig. 1 is a perspective view of the enlarging machine.

Fig. 2 is a detail vertical section through the base of the supporting standard.

Fig. 3 is a detail section through the printing paper frame.

Fig. 4 is a vertical enlarged section through the projecting mechanism.

Fig. 5 is a slide elevation of the projecting mechanism with the film plate in the open position.

Fig. 6 is the detail section through the bracket pivot.

Fig. 7 is a detail view of a film masking plate as employed in the enlarger.

The enlarger employs a base board 10, at one extremity of which a transformer housing 11 is secured to enclose a suitable transformer 12. A suitable toggle switch 33 may be used to control the supply of current to the transformer 12. This current may also be controlled by means of a press button 34 on the base board 10 when the device is being used for rapid printing.

On top of the transformer housing is a socket 13, provided with a locking screw 14, for receiving and locking in place a tubular standard 15. A bracket 16 projects from the standard 15. The bracket is provided with a split sleeve 17 which is clamped about the standard 15 by means of a clamp screw 18.

The projector portion of the device consists of a cylindrical lens housing 19 provided with a stud 20 which fits into the extremity of the bracket 16. The stud 20 is rotatable within the bracket and is held at 90° positions of rotation by means of a locking ball 21 which enters 90° spaced receiving sockets 22 in the stud. The ball is constantly pressed against the stud by means of a compression spring 23, the pressure in which is regulated by means of a set screw 24. This construction allows the lens housing 19 to be rotated and gives a click to indicate to the operator when the housing is accurately in any of the desired horizontal or vertical positions.

A lamp housing 25 fits telescopically over the lens housing 19 and is locked thereon by means of a suitable bayonet joint 26. The lamp housing is provided with a sleeve 27 for slidably receiving a lamp receptacle 28 of the automobile type. The socket may be locked at any desired degree of extension by means of a set screw 29. A single conductor cord 30 leads from the receptacle 28 downwardly through the standard 15 to a connector 31 therewithin. The connector 31 is detachably connected to the feed wires from the transformer 21. The cord is insulated from the standard at its upper extremity by means of an insulating cap bushing 23.

This construction allows the standard 15 to

be lifted from its socket and the cord disconnected at the connector 31 so that the entire device may be laid flat upon the base board 10.

The lamp housing 25 is provided with an internal, heat insulating shell 35 and with ventilation openings 36 in its top. A baffle plate 37 and a baffle ring 38 prevent the light shining through the openings 36. The lens housing 19 is provided with an internal lens sleeve 39 of heat insulating material in which are three condensing lenses, designated upper, intermediate and a lower condensing lens 40, 41 and 42, respectively.

The lower condensing lens 42 is supported on a lens plate 43, preferably of Bakelite or similar material. The lens board 43 is rotatably attached to the housing 19 by means of a pair of arcuate attachment plates 44 which overlap a flanged lower extremity on the housing 19 and allow the plate 43 to be freely rotated thereon. The intermediate lens 41 is supported above the lens 42 by means of a coil spring 45, and the upper lens 40 is supported upon a supporting ring 46 upon the intermediate lens 41.

The entire assembly is constantly pressed against a perforated annular flange 47 in the upper face of the housing 19. The lower portion of the housing 19 is perforated as shown at 48. This allows a free flow of air through the perforations 38 upwardly about the lens sleeve 39, through the perforated flange 47, through the lamp housing, and through the discharge openings 36, thus keeping the entire structure air cooled at all times.

A hinged film plate 49 having the same contour as the lens plate 43 is hinged to the latter upon a suitable hinge 50. The other extremity of the plate 49 contains a spring clip 51 which snaps over the plate 43 to hold the two plates in parallel relation. A film supporting member 52 extends across the lower board terminating at its extremities in film pockets 53 for holding the rolls of film.

A flanged projection tube 54 is secured to and extends downwardly from the lower plate 49. The tube 54 slidably contains a lens tube 55 having an internal partition plate 56. A suitable projection lens assembly 57 is threaded into the plate 56 and is protected by the lower extremity of the tube 55. The tube may be adjusted to the desired focusing position and locked in place by means of a knurled clamp screw 58 which passes through a diagonal slot 59 in the tube 54.

A film channel 60 extends across the lower plate 49. Two spring arms 61 extend across the film channel therein to hold the film. The center of the plate 49 is cut away to the diameter of the tube 54. This opening is surrounded by a counter-sunk depression into which removable film masks 62 are inserted. A typical film mask is illustrated in Fig. 7. These masks are notched, as shown at 63, and the counterbore for receiving them is formed with a projection 64 fitting the notch so that the masks are always positioned in the proper position. Each mask is formed with a film channel 65 extending thereacross and each is provided with a mask opening 66 to accommodate the particular size of film for which that particular mask is intended.

The bottom of the film channel 65 in the mask aligns with the bottom of the film groove 60 in the plate 49 so that the film travels straight through the machine. At the point where the film crosses the light opening, a circular glass plate 67 is positioned. The plate 67 fits into counter-sunk arcuate side depressions in the plate 49 so that its upper face is flush with the upper face

of the plate. The glass plate is hinged by means of a piece of adhesive tape 68. Adhesive tape has been found to be the best substance for this purpose, as it attaches readily to the glass and Bakelite surfaces, and yet can be easily detached, should it be desired to remove the glass for cleaning.

A printing board 69 for supporting the paper upon which the enlargement is to be made is mounted over the base board 10. The printing board is pivoted upon a pivot bolt 70 extending through a base member 71 which in turn is attached to the board 10 by means of suitable attachment screws 72. A compression spring 73 acts against the head of the bolt 70 to constantly hold the printing board 69 downwardly against the base member. The base member is grooved at 90° positions, such as shown at 74, and a click ball 75 is forced downwardly from the bottom of the printing board by means of a spring 76 so that, as the frame is rotated, it will click into the notches 74 to definitely stop the frame at 90° positions. The upper face of the board is open on one side, and is surrounded by a raised edge on the other three sides. A rectangular mask frame 77 is hinged at 78 to the back of the board, and falls by gravity into the open face thereof to hold the paper sheet in place and provide a white border therearound.

The usual miniature picture is so small that it is not desirable. Users of miniature cameras therefor prefer to have these pictures enlarged. At present this enlarging is rather a tedious and an expensive proceeding. With this machine, however, enlargements can be made with rapidity equal to the making of the usual contact prints.

Let us assume that it is desired to produce enlargements to 3 x 4 inches. A 3 x 4 printing board is placed upon the plate 71. The film roll is inserted through the machine below the glass plate 69 and a perfect focus is obtained by means of the adjustment of the lens sleeve 55. However, if this type of work is regularly being done, the adjustment will already be set. The operator now slides his paper into the frame 69, drops the mask 77 thereon, presses the button 34 the required time interval, releases the button, lifts the mask, and removes the paper. He then slides the film to the next picture and repeats the operation until the entire length of film or the desired portions thereof are printed. Should he come upon a picture taken vertically, he can either turn the film plate of the projector 90° or turn the printing board 90° to properly position the picture on the paper.

For larger enlargement work, the base plate 71 can be removed, and the paper placed directly upon the base board 10. For still larger work, the paper may be placed upon the wall of the room or the floor thereof, since the machine is adaptable to projection to any point.

To more evenly distribute the light, it has been found advisable to frost the upper surface of the intermediate lens 41. To provide a safe light which may be used for safely adjusting the paper under the illuminated image, a curved slot 79 is formed in the upper plate 43 for the insertion of a flexible strip of red Celluloid or similar material 80. When the strip 80 is slid into the slot 79, it will slide completely over the light opening in the lens housing so as to cause a red light to be projected. Additional light either white or red can be provided for use on the work table by allowing the lower board 49 to hang in the open position of Fig. 5.

While a specific form of the improvement has been described and illustrated herein, it is desired to be understood that the same may be varied, within the scope of the appended claims, without departing from the spirit of the invention.

Having thus described the invention, what is claimed and desired secured by Letters Patent is:

1. In an enlarging machine, a condensing lens housing; a film supporting plate rotatably mounted below said housing so that it may be rotated about the axis thereof; a lens tube extending from said film plate and rotatable therewith; and a projection lens assembly mounted in said lens tube; there being a slot through said lens plate; and a flexible, red, transparent strip inserted through said slot to color the light passing through said plate.
2. In a photographic enlarger of the type having a vertical cylindrical lamp housing containing a light source, means for rotatably mounting a film supporting means and projection lenses thereon, comprising: a lens board; a second board hinged to said lens board so that it may be swung downwardly to allow a film to be inserted between said two boards; a lens tube secured to and projecting from said second board; projection lenses in said lens tube; and means for rotatably mounting both boards on the extremity of the lamp housing so that they may be freely rotated about the axis of said lamp housing.

3. In a photographic enlarger of the type having a vertical cylindrical lamp housing containing a light source, means for rotatably mounting a film supporting means and projection lenses thereon, comprising: a lens board; a second board hinged to said lens board so that it may be swung downwardly to allow a film to be inserted between said two boards; a lens tube secured to and projecting from said second board; projection lenses in said lens tube; a flange formed about one extremity of said lamp housing; and means for movably supporting said lens board on said flange so that it may rotate about the axis of said lamp housing.

4. In a photographic enlarger of the type having a cylindrical lamp housing containing a light source, means for rotatably mounting a film supporting means and projection lenses thereon, comprising: a lens board; a second board hinged to said lens board so that it may be swung downwardly to allow a film to be inserted between said two boards; a lens tube secured to and projecting from said second board; projection lenses in said lens tube; a flange formed about one extremity of said lamp housing; means for movably supporting said lens board on said flange so that it may rotate about the axis of said lamp housing; and a groove formed in the upper face of said lens board extending beneath said flange to allow an insert to be pushed beneath the flange and over said lens board.

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