

Dec. 19, 1950

J. D. MAXWELL

2,534,784

PHOTOMECHANICAL PRINTING FRAME

Filed Jan. 11, 1949

4 Sheets-Sheet 1

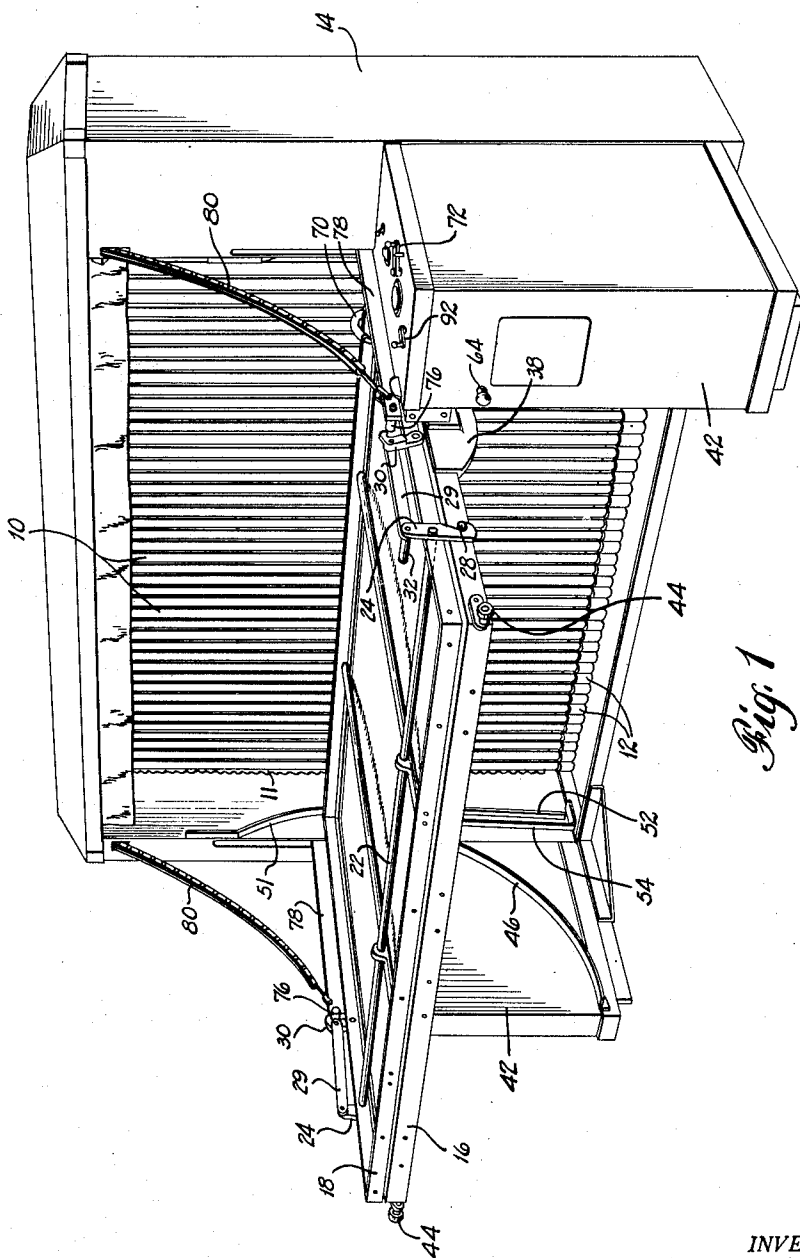


Fig. 1

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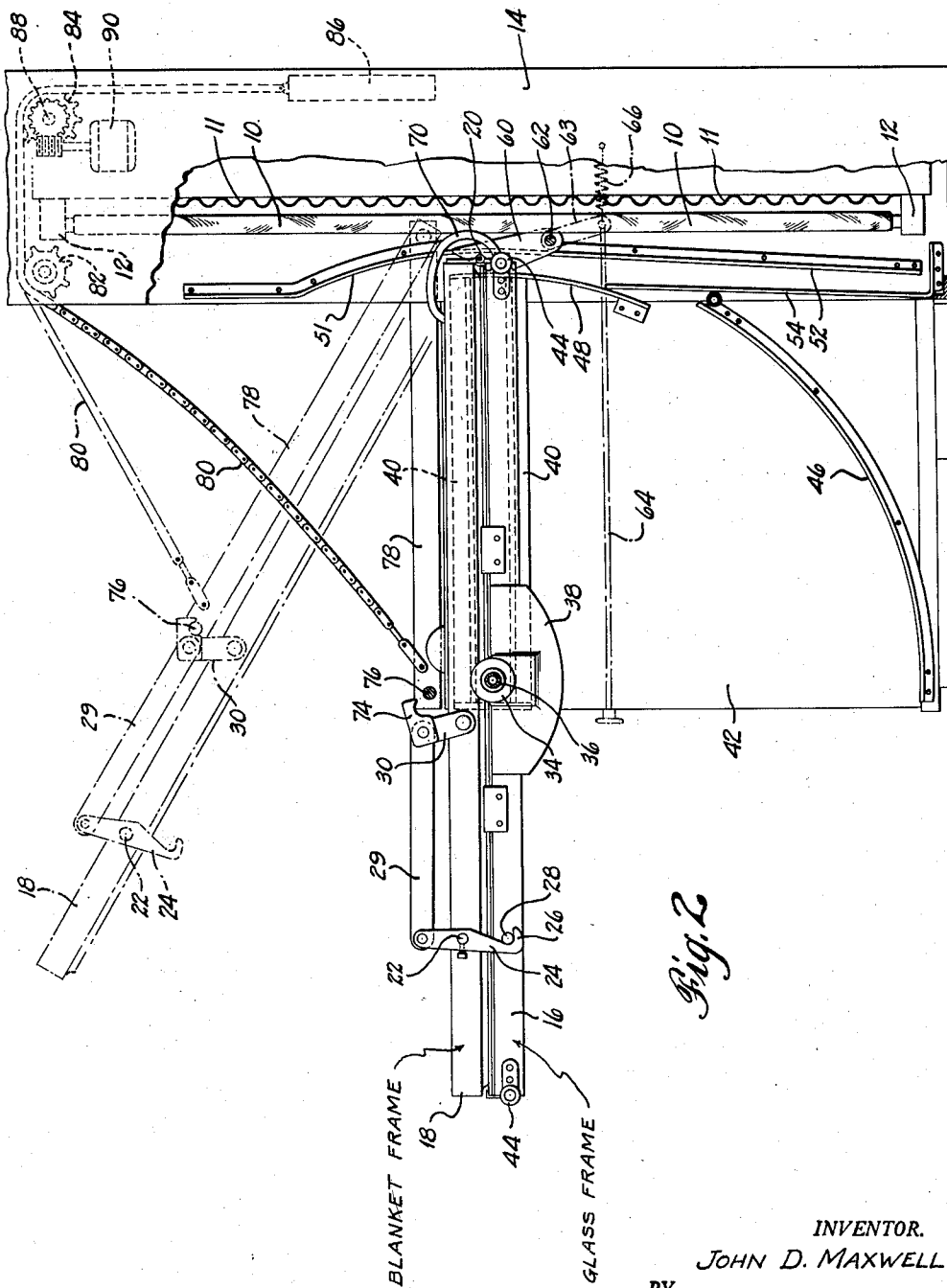
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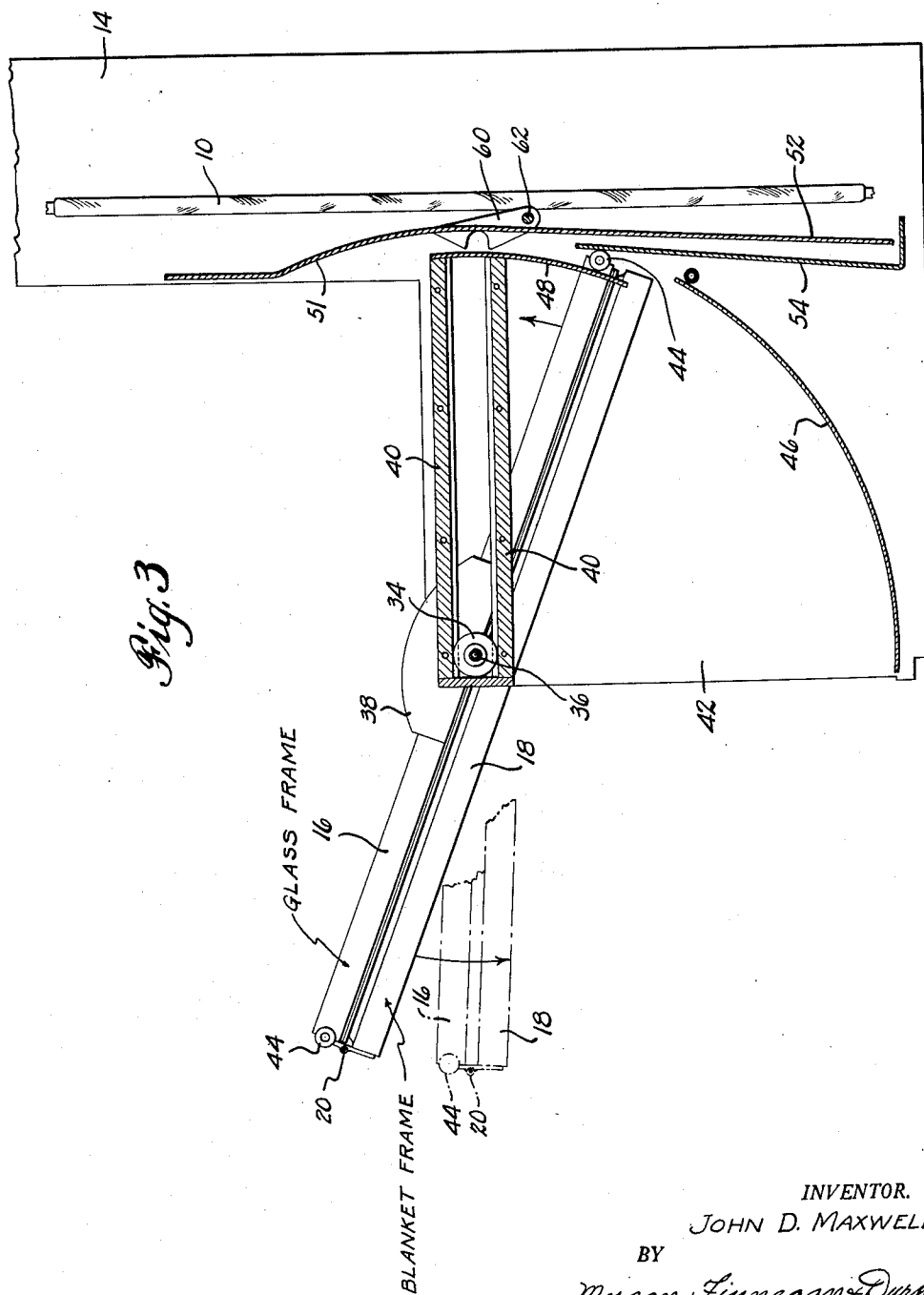
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Fig. 3



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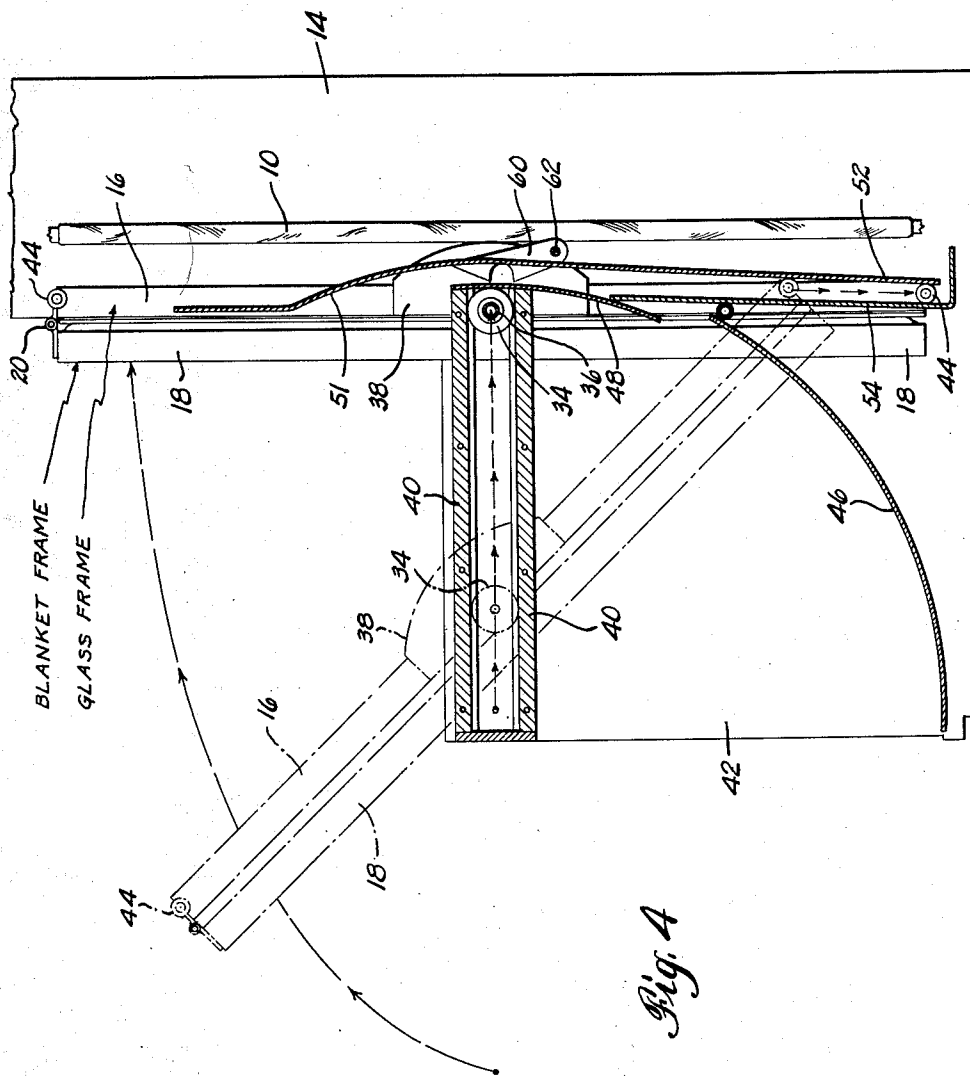
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4 Sheets-Sheet 4



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PHOTOMECHANICAL PRINTING FRAME

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6 Claims. (Cl. 95-73)

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The present invention relates to a novel and improved photomechanical printing frame particularly for use in preparing large printing plates.

Objects and advantages of the invention will be set forth in part hereinafter and in part will be obvious herefrom, or may be learned by practice with the invention, the same being realized and attained by means of the instrumentalities and combinations pointed out in the appended claims.

The invention consists in the novel parts, constructions, arrangements, combinations and improvements herein shown and described.

The accompanying drawings, referred to herein and constituting a part hereof, illustrate one embodiment of the invention, and together with the description, serve to explain the principles of the invention.

Of the drawings:

Figure 1 is a general perspective view of a printing frame illustrative of the present invention;

Figure 2 is a vertical sectional view, with parts omitted and others broken away and showing, in full lines, the printing frame in closed position, and, in broken lines, the blanket frame lifted for loading;

Figure 3 is a schematic sectional view showing the printing frame as it is moved from loading position to an inspection position, and a fragmentary detail in broken lines, showing the frame in inspection position;

Figure 4 is a similar schematic view showing, in broken lines, the printing frame as it is moved to exposure position, and in full lines, the printing frame in exposure position.

The present invention has for its object the provision of a novel and improved photomechanical printing frame particularly adapted for use in making large rotogravure and offset printing plates. A further object is the provision of a printing frame which may be easily loaded, turned for inspection and thereafter moved to exposure position, and which is relatively compact. Still another object is the provision of an improved printing frame which is balanced and requires little effort to move it to its several positions, and which has power means for lifting one of the frame members when the frame is to be loaded or unloaded.

In accordance with the preferred and illustrative embodiment of the invention, the light source is a bank of closely adjacent tubular lamps, such as fluorescent lamps, extending over

the whole area of the printing frame so that at a distance of a few inches from the bank of lamps the illumination provided is substantially uniform. The bank of tubular lamps are preferably parallel to each other and the sockets are mounted at the ends of the vertical lamps in an upright housing. The printing frame proper comprises a pair of frames hinged to each other along a long edge, one frame being the glass carrying frame, while the other frame is the blanket carrying frame, which frames can be brought together and clamped in light pressure contact with each other to press a sensitized member (such as carbon tissue or an offset plate) into contact with a positive transparency or negative to be printed. The printing frame is usually a vacuum frame as otherwise it is difficult to obtain good contact over the whole area when extremely large work is to be handled, such as a full sheet which may be as large as 52" x 72".

At a central point of each side edge of the frame is provided a roller which runs on a trackway extending horizontally from the bank of lamps and permits the frame to be moved towards and from the bank of lamps and to be swung so that its glass-side or blanket-side may be uppermost or its glass side may be parallel to the bank of lamps.

Locking means are provided for firmly holding the frame in a horizontal position, as when the hinged blanket frame is to be raised for loading or unloading, and positive guiding means are provided for preventing movement of the frame towards the lamp bank while it is being rotated from loading to inspection position, and permitting swinging movement of the frame from inspection position towards the lamp bank, and swinging movement of the frame from exposure position to unloading position.

Power means provide for raising the large heavy blanket frame when the apparatus is to be loaded or unloaded and for holding the blanket frame in raised position, and means are also provided for engaging the power means with the blanket frame as the blanket frame is unlocked from the glass frame.

Referring now in detail to the accompanying drawings which show a typical and illustrative preferred embodiment of the invention:

The light source comprises a large number of parallel vertical fluorescent light tubes 10, closely spaced together and arranged in a plane to provide a bank of lamps, the tubes being so closely spaced that at a few inches distance from the lights they produce a uniform intensity of light.

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Each of the lamps is longer than the height of the printing frame and the bank of lamps is wider than the width of the frame so that uniform light intensity may be had over the entire printing frame. Lamps 10 are close to a corrugated or diffuse reflecting surface 11 supported parallel to them and are provided with suitable sockets 12 at their ends and these sockets and the necessary starters, ballasts and wiring are mounted within the upright casing 14 which forms a support for the various parts of the apparatus.

The printing frame proper comprises a pair of sturdy rectangular frames 16 and 18 of the same general size which are hinged together along one of their longer adjacent edges by means of hinges 20. Frame 16 is the glass frame and is provided with a single sheet of heavy transparent glass securely held in the frame, while frame 18 is provided with a vacuum blanket, the glass and blanket being so relatively positioned that they contact with each other when the frames are in closed or printing position.

Locking means are provided for securing the frames 16 and 18 together. As embodied, a shaft 22 is journaled in the frame 18 and extends from one side edge of the frame to the other. At either end, shaft 22 is secured to a latch member 24 having a hook portion 26 to engage with a pin 28 carried by the glass frame. Each latch member 24 is connected to a bar 29 which extends parallel to the frame 18 and is supported at its forward end by means of a short link 30 pivoted on the frame 18. One latch 24 is conveniently provided with a handle 32 at the point where it is pivoted to the bar 29.

Means are provided for pivotally and slidably supporting the frames 16, 18 and for this purpose rollers 34 are rotatably mounted, one at either end of the glass frame 16, the two rollers 34 preferably being axially aligned, and each securely mounted on a stud 36 projecting from a plate 38 welded to an end of the frame 16 so that the rollers are located substantially symmetrically with respect to the mass of the frames 16 and 18 thereby allowing the frame to be substantially balanced and to be moved easily from one position to another.

Horizontally extending trackways are provided for the rollers 34 and comprise the upper and lower rails 40 firmly mounted on the side members 42 of the apparatus and extending parallel to each other and perpendicular to the lamp bank at more or less the center of its height. One such pair of rails 40 is provided at each end of the frame and the rails are long enough so that the frames 16 and 18 may be swung without hitting the bank of lamps or may be moved close to the bank, always about the stud 36 as a center of rotational movement.

For controlling the rotational movement and the sliding motion of the frames 16 and 18, frame 16 is provided with small rollers 44 near each of its corners, mounted on studs parallel to studs 36 and rollers 44 cooperate with circular track members mounted on the side members 42. Tracks 46 each comprise angle strips secured to their respective side members 42 and curved to form an arc centered on the stud 36 in its rearmost position as shown in Figure 3 so as to hold the frames with the roller 44 engaging the concave surface of the track 46.

A short arcuate track 48 is formed at the forward ends of tracks 40 so as to be engaged on their convex side by roller 44. In the simple rota-

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tion of the frames about stud 36 in the position shown in Figure 3 the rollers 44 (at the ends of frame 16) are controlled or engaged part of the time by track 46 and part of the time by track 48.

Similar tracks 46 and 48 are provided at the other end of the frames which are mirror duplicates of those shown, and are mounted on the inner side of the other side member 42.

A third track 50 comprises an upper curved section 51, also centered on the same center as track 46, but merging into a lower straight and slightly inclined portion 52, the inclination being such as to accommodate the offset of rollers 34 and 44 as the frames 16 and 18 are moved to vertical position, as shown in full lines in Figure 4.

To control the sliding or swinging movement of the frames 16, 18, a guide strip 54 is mounted so as to be normally almost parallel to the track 52 and anchored at its lower end only to the side member 42, leaving the upper straight portion as a flexible switch permitting clockwise movement only of the frames 16, 18. Normally the upper end of track 54 engages track member 48, as shown in Figures 2 and 4, and may be displaced by either roller 44 as shown in Figure 3, as the frames are swung in a counterclockwise direction. However, as the frames are swung in a clockwise direction, the track 54 forces sliding movement of the frames so that the frames are moved glass-side towards the lamp bank and into a vertical position for exposure.

Locking means are provided for holding the frames in a horizontal position, either side up, and comprise the pivoted latch members 60, engageable with rollers 44, and pivoted by rod 62 and may be swung by arm 63 which is actuated by pull rod 64 and is returned to normal locking position by means of spring 66.

The normal operation of the frame comprises the following steps:

In the position shown by Figure 2 the frames are horizontal with the blanket frame 18 uppermost. It is lifted for positioning the transparency and sensitized material. The blanket frame is lowered, clamped by latches 24 and then rotated in a counterclockwise direction to the positions shown in Figure 3 and latched in horizontal position for inspection. Latches 60 are then released and the frames are rotated clockwise causing the rollers 44 to move downwardly between tracks 54 and 52 and causing the frames 16, 18 to swing forward as shown in Figure 4 to the full-line position shown which is the exposure position.

After the exposure has been completed, the frames are rotated from a vertical position to a horizontal position where they are held by latches 60 by counterclockwise rotation of the frames, positioning the blanket frame 18 uppermost so that it may be lifted to remove the exposed sensitized plate or material and the negative or transparency.

Suitable switching and timing means are provided for starting the exposure and controlling the length of exposure preferably allowing the lights 10 to be energized only when the frames are in exposure position and automatically starting the exposure when the frames 16 and 18 are moved to their vertical position. These means may be of conventional construction and are not shown.

The backing blanket in the frame 18 is preferably a vacuum blanket and is connected to a suitable vacuum pump (not shown) by means of flexible tubing 70 connected to the blanket and to a rigid tube not shown but carried by frame

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16 and which communicates with a gland coaxial with one of the studs 36 which is drilled to provide a vacuum passageway and thence to a flexible tube (not shown) which is connected to a control valve in one of the side members 42, controlled by valve lever 72, so that, with the frames in adjacent position, vacuum may be established between them to press the sensitized material into close contact with the transparency supported against the glass of frame 16.

For raising and lowering the heavy frame 18 from closed to open position, while the frames 16 and 18 are in loading or horizontal position with the blanket frame 18 uppermost, power means are provided which are preferably engageable with the frame as the frame locking latch 24 is moved to unlocking position. As embodied, each pivoted link 30 is formed with a hook portion 74 engageable with a pin 76 extending laterally from a long pivoted arm 78, pivoted on the main part of the machine. Arms 78 are parallel to each other and closely adjacent the side edges of the frame 18 and normally rest in a horizontal position. Each arm 78 is connected to its chain 80 which passes over an idler sprocket 82 and a driven sprocket 84 mounted above the bank of lamps 10 and is connected at its other end to a small weight 86. Sprockets 84 are fast on shaft 88 and driven by self-locking worm gearing from motor 90 under control of a manual switch 92 for driving the motor 90 in either direction.

With the frames 16, 18 in the position shown in Figures 1 and 2, unlatching of frame 18, by movement of the latches 24 causes the frame 18 to be engaged with the motor actuated lifting bars 78 through hooks 74 and pins 76 so that thereafter the frame 18 may be raised or lowered under control of the motor switch 92.

A complete cycle of operation of the embodied form of the invention may be summarized as follows.

In loading position, with the blanket frame 18 up and glass frame 16 horizontal, and latch 60 moved to unlocked position, manual switch 92 is moved to frame raising position; motor 90 is energized, causing chain 80 to be lifted, moving bar 78 upwardly about its pivot and raising blanket frame 18 through latch 30. When the glass frame 18 has been sufficiently raised, switch 92 is moved to its open, central position stopping motor 90 in its raised frame position. When the negative or transparency and sensitized material have been properly positioned, switch 92 is reversed to lower the frame 18. Then, handle 32 is pulled to lock frames 16 and 18 together through latch 24 and to simultaneously release latch 30. Vacuum valve 72 is then opened to apply suction to the blanket and when vacuum has been established, lock 60 is released and the frames 16 and 18 may be rotated counterclockwise 180° to bring the glass frame 16 uppermost for inspection of the work. In this position, the frames are again locked by lock 60. If the work appears satisfactory, the frames are unlocked from lock 60 and may then be revolved clockwise 90° to position the glass frame 16 vertically and adjacent the lamp bank for exposure.

When the exposure has been completed, the timer has shut off the lamp bank, and the frames may be rotated counterclockwise to bring the glass frame 16 uppermost and locked in horizontal position by lock 60. If the sensitized material looks satisfactory, the frames are unlocked and may be rotated 180° in a clockwise direction.

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If underexposed, the frame may be moved 90° in a clockwise direction to exposure position.

When the blanket frame 18 is in upper position, the vacuum is released and the blanket bled to atmosphere through valve 72. The frames are then unlatched by movement of latch 24, simultaneously connecting the blanket frame 18 to bar 78 and motor 90. When the blanket frame has been raised under control of switch 92, the frame may be unloaded.

The invention in its broader aspects is not limited to the specific mechanisms shown and described but departures may be made therefrom within the scope of the accompanying claims without departing from the principles of the invention and without sacrificing its chief advantages.

What is claimed is:

1. In a photomechanical printer wherein a series of tubular light sources are vertically aligned and a printing frame is provided for carrying a sensitized material and an image to be reproduced by exposure to said light sources, means for moving said printing frame from a horizontal loading position to an inverted horizontal inspection position and for moving said printing frame from a horizontal position to a vertical exposure position closely adjacent said light sources, comprising a pair of horizontal tracks, one at each side of said frame, said tracks extending from a point adjacent said light sources for a distance substantially one-half the length of said frame, a pair of pivotal supports, one projecting from the substantial center of each side of said frame, said supports being an axis of rotation for inverting said frame and said supports acting in conjunction with said tracks to form a transporting means for moving said frame to and from a proper vertical photomechanical printing position adjacent said light sources.

2. Apparatus according to claim 1 in which auxiliary track means cooperating with the ends of the frame are provided for controlling the direction of pivotal and sliding movements of the frame.

3. Apparatus according to claim 2 in which said auxiliary track means includes a pair of tracks, one at each side of said frame, concentric with the axis of said supports when the frame is in a horizontal position for rotating and inverting said frame, a pair of tracks tangential to said concentric tracks for positioning said frame adjacent said light sources, and means for selecting the operative pair of tracks.

4. Apparatus according to claim 1 in which means are provided cooperating with the frame for releasably locking the frame in either horizontal position.

5. In a photomechanical printer wherein a series of tubular light sources are vertically aligned and a printing frame is provided for carrying a sensitized material and an image to be reproduced by exposure to said light sources, means for moving said printing frame from a horizontal loading position to an inverted horizontal inspection position and for moving said printing frame from a horizontal position to a vertical exposure position adjacent said light sources, comprising a pair of supports, one projecting from substantially the center of each side of said frame, a pair of horizontal tracks, one at each side of said frame for carrying said supports, said horizontal tracks extending outwardly from a point adjacent said light source for a dis-

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tance substantially one-half the length of said frame, a pair of supporting guides adjacent each end of said frame, one of each pair at each side of said frame, a pair of arcuate guide tracks, one at each side of said frame adapted to receive one pair of said supporting guides to define an arc of rotation for inversion of said frame, a pair of generally vertical guide tracks, one at each side of said frame closely adjacent said light sources, said vertical tracks being adapted to receive said supporting guides and to define a path for bringing said frame into exposure position in close parallel proper printing proximity with said light sources, and means for selecting the operative guide tracks, said supports being horizontally movable to permit translatory movement of said frame when said vertical guide tracks are operative and being stationary when said arcuate guide tracks are operative.

6. In a photomechanical printer wherein a series of tubular light sources are vertically aligned and a heavy printing frame, including a glass frame and a blanket frame, is provided for carrying a sensitized material and an image to be reproduced by exposure to said light sources, means for moving said printing frame from a horizontal loading position with said blanket frame above said glass frame to an inverted horizontal inspection position and for moving said printing frame from a horizontal position to a vertical exposure position adjacent said light sources, comprising a pair of supports, one projecting from substantially the center of each side of said glass frame, a pair of horizontal tracks, one at each side of said frame for carrying said supports, said horizontal tracks extending outwardly from a point adjacent said light sources

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for a distance substantially one-half the length of said frame, a pair of arcuate guide tracks, one at each side of said frame adapted to receive said supporting guides to define an arc of rotation for inversion of said frame, a pair of generally vertical guide tracks, one at each end of said frame closely adjacent said light sources, said vertical guides being adapted to receive said supporting guides and define a path for bringing said frame into exposure position in close parallel proper printing proximity with said light sources, means for selecting the operative guide tracks and power means for opening said blanket frame from said glass frame during loading, said supports being horizontally movable to permit translatory movement of said frame when said vertical guide tracks are operative and being stationary when said arcuate guide tracks are operative.

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