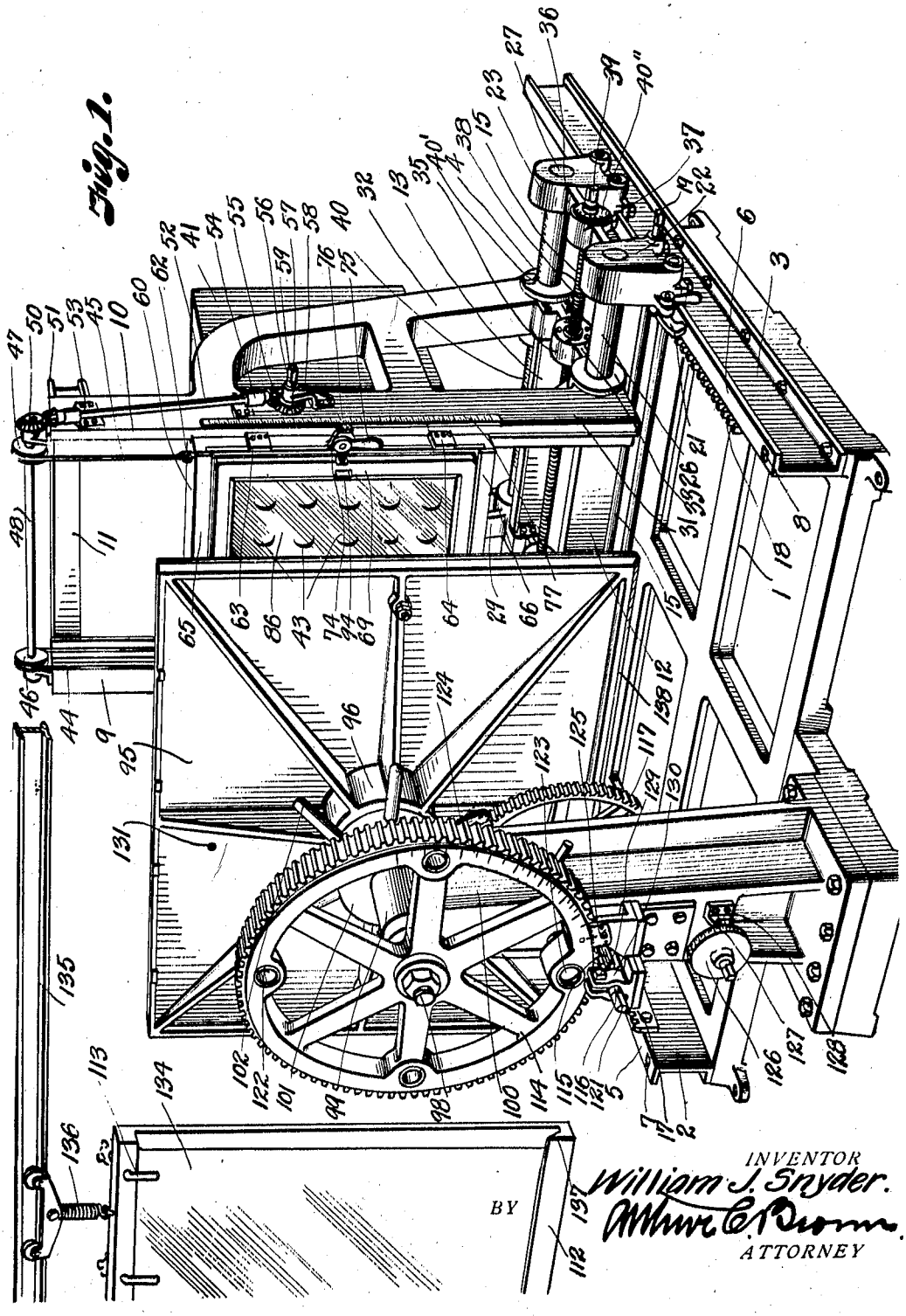
Dec. 9, 1930. W. J. SNYDER 1,784,206

PHOTOGRAPHIC PROCESS PRINTING MACHINE

Filed Oct. 22, 1924 5 Sheets-Sheet 1

Fig. 1.



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PHOTOGRAPHIC PROCESS PRINTING MACHINE

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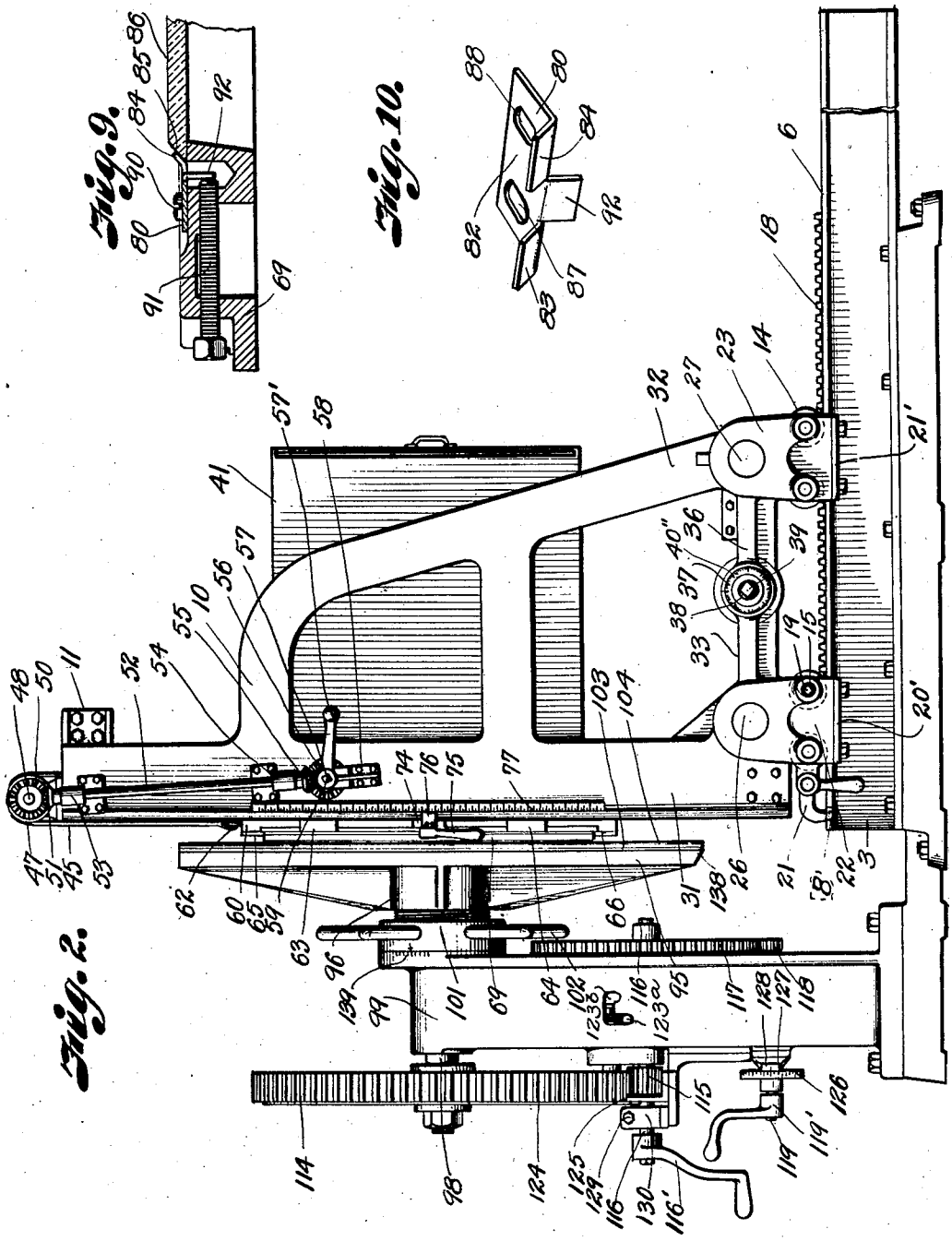


Fig. 2.

Fig. 9.

Fig. 10.

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PHOTOGRAPHIC PROCESS PRINTING MACHINE

Filed Oct. 22, 1924 5 Sheets-Sheet 3

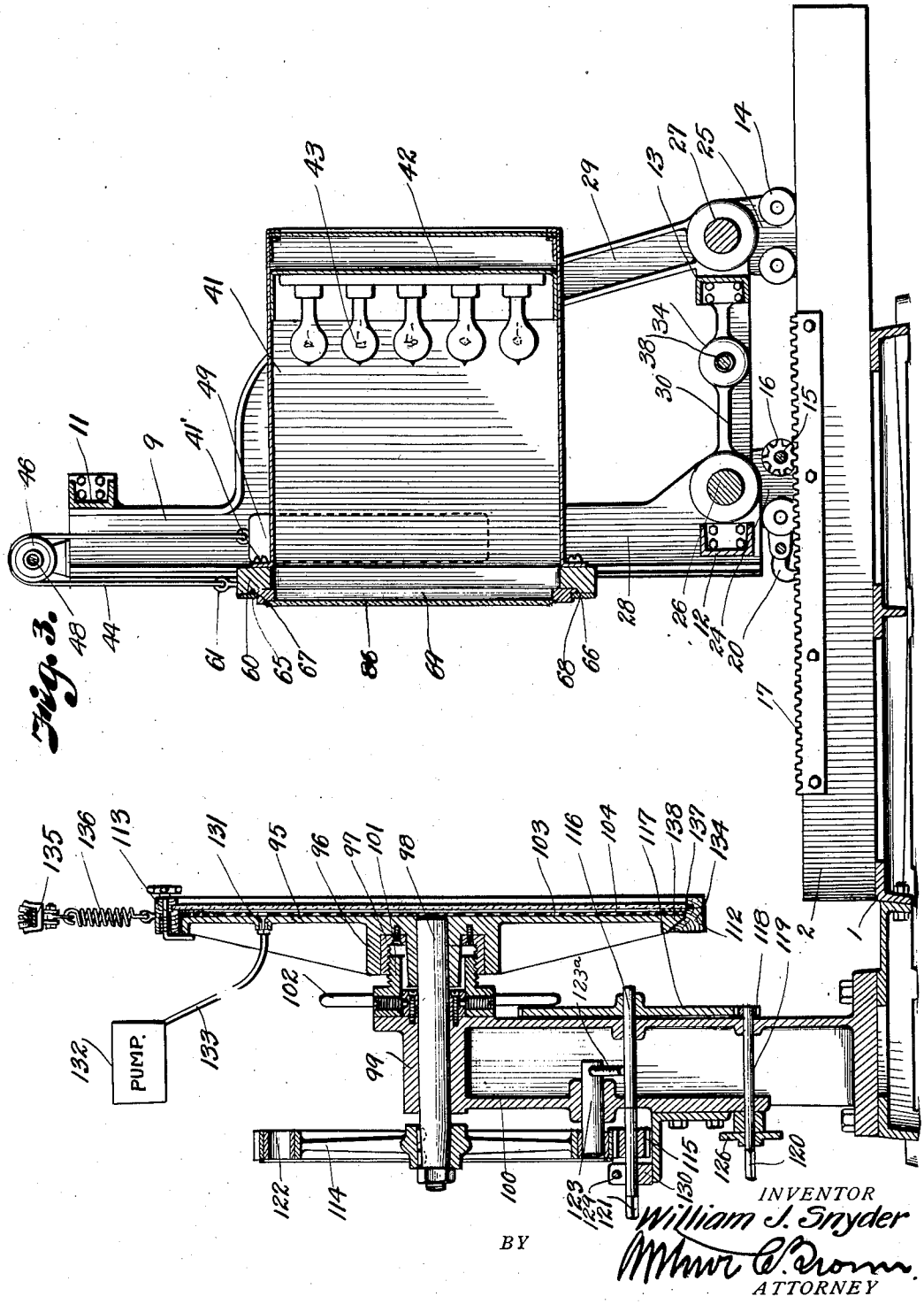


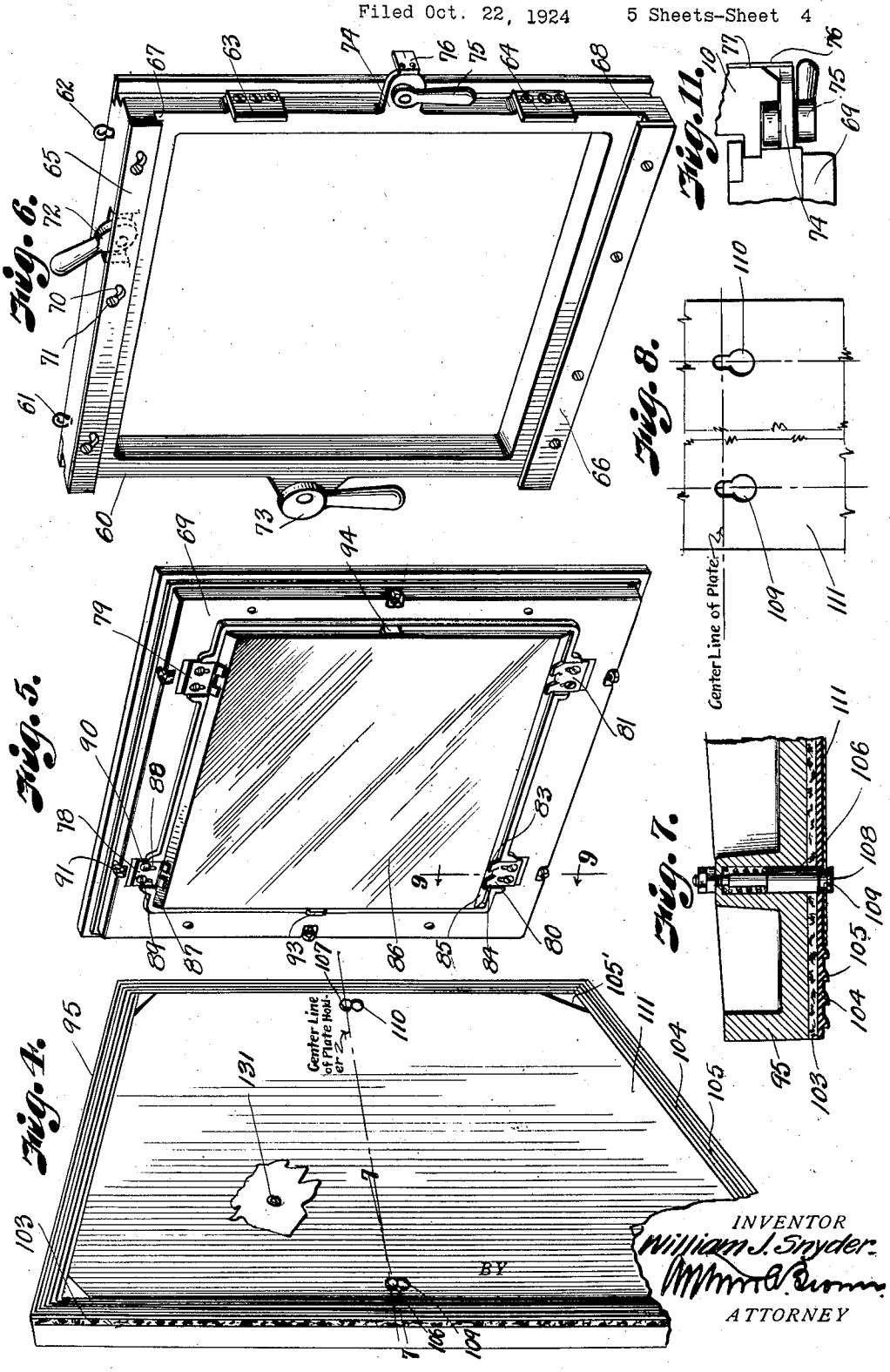
Fig. 3.

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PHOTOGRAPHIC PROCESS PRINTING MACHINE

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Fig. 12.

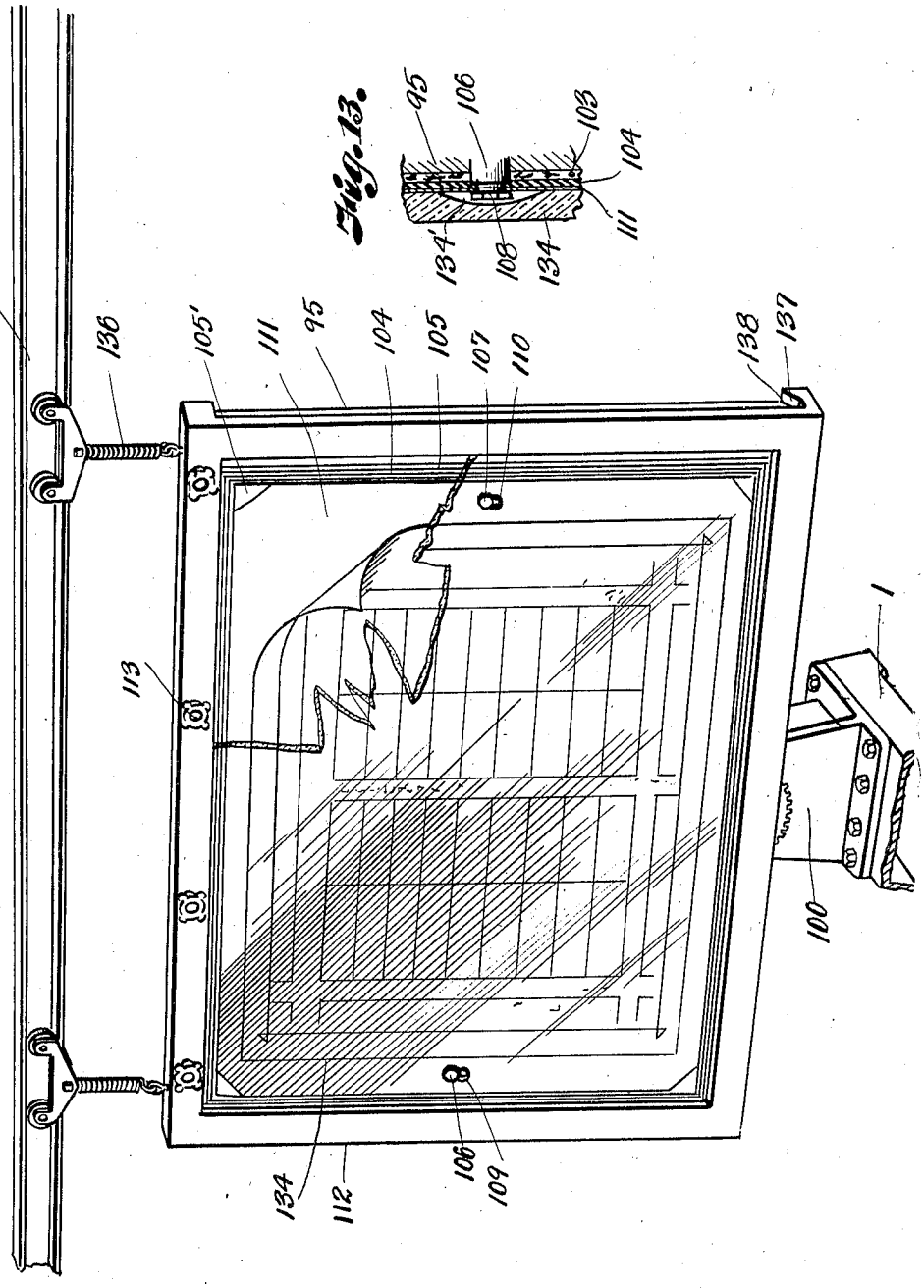


Fig. 13.

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UNITED STATES PATENT OFFICE

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PHOTOGRAPHIC PROCESS PRINTING MACHINE

Application filed October 22, 1924. Serial No. 745,102.

This invention relates to the photo-lithographic and similar process methods of producing photographically on sensitized surfaces, such as metal press plates, paper, cloth, glass, film, etc., the desired designs, printed matter, maps, photographs, etc., according to predetermined position, relation to each other, or number of similar or dissimilar subjects that may be wanted on such single sensitized surface for the purpose of printing lithographically, or reproducing photographically, duplicates of the original drawing, sketch, map, printed matter, photograph or image.

The primary object of the invention is to provide a machine or apparatus capable of having placed therein photographic negatives or positives from which prints may be made on sensitized surfaces, such as metal press plates, blue-print or process paper, film, etc., and to position, space or align such prints on the sensitized surface according to a predetermined plan, the sensitized press plate, or paper, etc., being held in position in a novel holder constituting part of the invention. It is also the object of the invention to provide a combination holder or apparatus on which may be placed a sensitized metal press plate in accurate alignment upon which images from negatives or positives placed in the proper part of the machine and brought into close contact with the sensitized surface, may be printed as above mentioned. The plate holder may be converted into a vacuum printing frame base and means is provided for the adjustment of the frame and glass to the holder by novel means to provide a metal press plate holder or vacuum printing frame, capable of being rotated through a vertical plane, to receive the sensitized press plate in a registered position. The vacuum printing frame formed by the combination of the plate holder, the frame and the glass cover is capable of being used for numerous purposes in process printing.

The invention is designed to facilitate and improve present methods of "making up" lithographic printing plates by providing means for fixing the sensitized plates to a holder in a registered position in alignment parallel to the gripper edge of the plate, and in relation to the vertical and horizontal centers of the negative or positive from which the print is to be made, when said positive or negative is correctly placed in that part of the machine designed to receive it. The holder is designed to permit photographing in a radial or angular direction on the sensitized plate or other surface, from a negative or positive, by providing means to rotate the holder through a vertical plane of 360 degrees and to fix it rigidly and accurately in a predetermined position in relation to any fractional part of the circle, and means is provided to move the sensitized plate or other sensitized material into close contact with the negative or positive from which the print is to be made without materially affecting the registered alignment of said plate or surface.

The invention consists in certain novel parts and combinations of parts, all of which will be specifically referred to hereinafter, reference being had to the accompanying drawings, in which

Fig. 1 is a perspective view of the complete machine, a part of the frame and glass and hangers of the vacuum printing frame being shown in the "off" position.

Fig. 2 is a side elevational view of the machine, the frame, glass and hangers for vacuum printing frame are not shown.

Fig. 3 is a vertical, longitudinal, sectional view through the machine, showing the plate holder with the frame and glass in position as a vacuum printing frame.

Fig. 4 is a perspective view of the press plate holder, or vacuum frame back wall.

Fig. 5 is a similar view of the negative chase and glass negative.

Fig. 6 is a perspective view of the negative chase holder.

Fig. 7 is a sectional view on the line 7—7 of Fig. 4.

Fig. 8 is a fragmentary diagrammatic view of the press plate illustrating the holes through which the positioning pins project, and fix the plate to the holder.

Fig. 9 is a sectional view on the line 9—9 of Fig. 5.

Fig. 10 is a perspective view of one of the negative clamps.

Fig. 11 is a view showing the locking lever for locking the chase holder and light box in fixed position, vertically upon the carriage.

Fig. 12 shows the plate holder apparatus arranged as a vacuum printing frame and the overhead track for moving the frame and covering glass aside when the apparatus is used to make contact prints from glass negatives or positives, and

Figure 13 is a sectional view through one of the side rails of the printing frame showing a positioning pin in elevation.

The machine is illustrated as comprising a skeleton base 1 having side rails 2 and 3 in the form of channels. The channels constitute rails for a movable carriage, generically referred to by the reference numeral 4.

The upper outwardly disposed flanges 5 and 6 of the channels 2 and 3 are provided with openings 7 and 8 to receive the toes of dogs or detents on the carriage to hold the carriage in fixed position as will be hereinafter apparent. The carriage 4 has two standards or side members 9 and 10 which are connected together at their upper ends by a cross bar 11 and at their lower ends by the channel shaped cross bars 12 and 13. The carriage is provided with rollers 14 which ride upon the flanges 5 and 6 of the rails 2 and 3. The carriage is adapted to be moved along the rails by rotating the pinion shaft 15, mounted in the carriage and carrying pinions 16, one for each rack 17 and 18. The pinions engage the teeth of the racks 17 and 18 so that when the shaft 15 is turned, the carriage will be moved longitudinally of the base frame.

The shaft 15 may be turned by a crank (not shown) adapted to engage the polygonal end 19 of the shaft 15 and the carriage carriers two pivoted dogs or detents 20 and 21, the toes of which may engage the openings 7 and 8, and in the flanges 5 and 6, Fig. 1 to hold the carriage in fixed position. The carriage 4 has a base and a superstructure. The base of the carriage consists of the blocks 22, 23, 24 and 25.

The blocks 22 and 24 are connected by a cross bar 26 preferably round, and a similar round cross bar or roll 27 connects the blocks 23 and 25. The superstructure includes the side members 9 and 10 and the cross bars 11, 12 and 13. The side members 9 and 10 are slidably mounted on the bars or rods 26 and 27. The member 9, has two legs 28 and 29 connected at their lower ends by a web 30. The legs 31 and 32 for the member 10 being connected at their lower ends by a web 33. The web 30 has a collar 34 and an aligning threaded collar 35 is carried by the web 33. The blocks 22 and 23 are connected with a web 36 with a collar 37 and there is a screw or worm rod 38 passing through the collars 34, 37 and threaded collar 35.

The worm has a polygonal end 39 to receive a crank (not shown) so it may be engaged to turn the worm and since the legs 28, 29, 31 and 32 are transversely movable on the rods or bars 26 and 27, it will be apparent that the super-structure of the carriage can be adjusted transversely of the base and in order to insure an exact positioning of the superstructure on the base, I prefer to calibrate one of the rods 26 or 27, so I have shown the rod 27 calibrated as at 40 and I have shown a pointer 40′ on the leg 32 so that the operator may know the extent of shifting movement of the super-structure of the carriage, micrometer adjustment being made on calibrated dial 40″.

The super-structure carries a vertically adjustable light box 41 which is disclosed as a rectangular hollow structure constructed to permit no harmful actinic light to escape and provided with a light panel 42 therein, carrying lamps 43 which may be longitudinally adjusted toward the open end of the light box for the purpose of focusing the lights with respect to the negative or screen through which the light is to be projected to act upon the sensitized surface of the printing plate, paper or film, or upon the sensitized surface of the plate, paper or film in the vacuum frame as the case may be.

The light box is connected by screws 41′ to the rectangular chase holder 60 to which cables 44 and 45 are connected by means of eye bolts 61 and 62. The cables pass over pulleys 46 and 47 carried by a shaft 48 mounted in bearings upon the top of the super-structure and the ends of the cables 44 and 45 distant from the ends connected to the chase holder are provided with counter-balance weights 49 which slide within the superstructure and within the side members 9 and 10.

The shaft 48 carries a mitre gear 50 at one end which meshes with a mitre gear 51 on a shaft 52 in bearings 53 and 54 on side member 10. The shaft 52 is provided with a mitre gear 55 which meshes with a mitre gear 56 on shaft 57 in bracket bearing 58 so that when the polygonal end 59 of shaft 57 is engaged by a crank 57′ and the shaft is turned, a turning movement will be imparted to the shaft 52 to turn the shaft 48 and thereby raise or lower the chase holder and the light box. The chase holder is provided with stop members 63 and 64 on one vertical rail, the top and bottom rails being provided with overlapping bars 65 and 66 to provide grooves 67 and 68 to receive the upper and lower edges of the negative chase or holder 69.

The lower bar 66 is preferably fastened rigidly to the chase holder 60 while the bar 65 has slots 70 set in angles through which

pins 71 project into the chase holder so that the bar 65 can be raised and lowered (see Fig. 6). When the negative chase is placed into the chase holder, it may be locked to the chase holder by the cams 72 and 73, the former locking the lower edge of the negative chase 69 in the groove 68 and the cam 73 locking one side edge of the negative chase against the stops 63 and 64.

On one side of the chase holder is a bracket 74 with a locking lever 75 which will hold the chase holder and light box in fixed vertical position to prevent accidental movement after the adjustment has been made. This is best shown in detail in Fig. 11. The bracket also carries a pointer 76 which co-operates with the vertical calibrated scale 77 on the side member 10 so that the proper vertical adjustment of the chase holder may be made. The negative chase or holder 69 carries a plurality of engaging plates 78, 79, 80, and 81. One of these plates 78 is shown in detail in Fig. 10. It consists of a flat portion 82 with outstanding lips 83 and 84 to engage over the beveled edge 85 of the plate glass 86. The flat portion 82 is provided with elongated slots 87 and 88 through which headed pins 89 and 90 project. The plate therefore has longitudinal movement and it is urged against beveled plate glass edge engaging positions by a screw 91 which extends through the negative chase and which bears against the inwardly disposed lip 92 on the flat portion 82. This is clearly shown in Fig. 9.

After all of the plates 78, 79, 80 and 81 are adjusted against the beveled edges of the glass, the glass will be held fast to the negative chase and in order to provide against sidewise movement of the negative, I provide the side stop lugs 93 and 94 (see Fig. 5). The glass plate containing the matter to be reproduced is adjusted so that the register marks provided thereon are exactly parallel to the two bearing edges of the chase 69.

The press-plate holder 95 has a hub 96 with a threaded bushing 97 therein, the hub being mounted on a shaft 98 in a bearing 99 carried by the standard 100. The threaded bushing 97 is engaged by a threaded collar 101 rotatably mounted on the standard and provided with spokes or hand holds 102 whereby the threaded collar may be turned to shift the shaft 98 longitudinally in its bearings to move it into binding contact with the plate glass negative or positive after the carriage has been moved up to the plate. This is a final adjustment for the purpose of insuring intimate contact between the negative and the printing plate so that the photographed objects will be sharply defined upon the plate.

The plate holder 95, a reinforced casting, is provided on its face with a yielding material such as cork indicated at 103 and a rubber mat 104 is faced on the cork, the facing being provided with a corrugated raised border 105 as clearly shown in Fig. 4, and thin flexible metal plates 105′ under the corrugated border at each corner under which the corners of the press plate are inserted.

The printing plate holder carries spring actuated positioning pins 106 and 107 with set-screws 108 (see Fig. 7) to be received in the keyhole slots 109 and 110 of the sensitized plate 111, which is fixed in position by screwing in the set-screws, 108, in pins 106 and 107. The sensitized press plate or other surface to be photographically printed upon is fixed to the holder in the same manner, or by other practical methods. The plate holder becomes the back wall for a vacuum printing frame by the placing of frame and glass 134, Fig. 1, on the plate holder 95 as shown in Fig. 3, the frame 112 fitting over the edge of the plate holder 95 and fastened by the J-bolts 113. The shaft 98 carries a gear 114 which meshes with a pinion 115 on the counter-shaft 116 carried by the standard 100. The counter-shaft 116 carries a gear 117 which meshes with a pinion 118 on the pinion shaft 119 carried by the standard, the shaft 119 being provided with a polygonal end 120 corresponding to the polygonal end 121 on shaft 116 so both of the shafts can be turned by suitable cranks 116′ and 119′.

The gear 114 is provided with a plurality of openings 122 to be engaged by a sliding detent 123 in the form of a bolt in standard 100. The bolt is provided with a handle 123*a* which extends through a slot 123*b* in the standard. These openings 122 are shown as ninety degrees (90°) apart so that the plate holder 95 can be adjusted and held in fixed position by the bolt at different points ninety degrees (90°) about the circle, which represent the most used operating positions.

The rotative adjustment of the plate can be determined accurately from a calibrated scale 124 on gear 114 through the medium of the pointer 125, and the shaft 119 carries a disk 126 with a calibrated scale 127 on its periphery co-operating with the fixed pointer 128. The rough adjustment will be made by turning the shaft 116 and a fine micrometer adjustment will be made by turning the shaft 119 and when the final adjustment is made the screw 129 in the bearing clamp 130 in which shaft 116 is located, may be screwed up so that the shaft 116 cannot turn, then the plate holder will be held rigid.

The back of the plate holder 95 is provided with an opening 131 communicating with an exhauster 132 through the medium of a conduit 133. The purpose of the exhauster is to provide means for obtaining a vacuum in the frame when the apparatus is in use as a vacuum printing frame.

The frame 112 is supported on a rail 135 by spring hangers 136, the frame 112 being adapted to be clamped upon the plate holder

95 by means of the dove-tailed portion 137 on the lower part of the frame 112, fitting over bevel edge 138 on face plate 95, the glass 134 in the frame being forced against the corrugated raised border on mat 104 by J-bolts 113, thus sealing the interior of the frame against the ready admittance of air.

When the parts are properly assembled and it is desired to "make up" a lithographic press plate, the metal press plate is prepared and sensitized by well understood methods, then attached to the plate holder 95 as heretofore described. The negative or positive, on plate glass, is then placed in the chase and adjusted as before explained, the chase is then placed into the chase holder 69, Fig. 5, and is locked into position by the clamps 72 and 73. The superstructure or carriage is at the rear limit of the track or channels for convenience in placing the chase into the holder. It may now be moved forward until detents 20 and 21 engage in slots 7 and 8 in the channels 2 and 3, Fig. 1, thus locking the carriage against recession when pressure is applied to the face of the negative or positive glass, the plates 20′ and 21′, Fig. 2, holding the super-structure against any material backward tilting. The face of the negative is now about one-fourth inch from the surface of the sensitized press plate and it is assumed that the negative is exactly aligned with the vertical and horizontal centers of the machine with reference to the several calibrated dials and scales, and that the sensitized press plate is fixed in the plate holder so that the vertical and horizontal centers of the surface of the plate are in exact alignment with the vertical and horizontal centers of the negative in the chase. The threaded collar 101, Fig. 3 is turned by hand holds 102; the plate holder with the sensitized press plate fixed to it is moved on shaft 98 into contact with the negative, the degree of pressure required for perfect contact being left to the operator and will be indicated in practice by the calibrated scale and pointer 139, Fig. 2. The negative in the super-structure or carriage having been moved to the desired area of the sensitized press plate and when proper contact between the press plate and the negative is obtained, the proper exposure is made. When duplicate prints from the same negative are desired, the pressure is released between the press plate and negative, and by the means heretofore described, the negative is moved to the next predetermined position, pressure contact being again obtained and another exposure is made, and so on for the required number of prints desired on that plate.

When it is desired to use the holder apparatus as a vacuum printing frame, the sensitized press plate is fixed to the plate holder as before described, (blue-print or process paper, films or other suitable sensitized surfaces may be fixed to the mat 104, Fig. 4, with adhesive tape or other means) the negative or positive original matter, on transparent or translucent material, that it is desired to reproduce is fixed to the sensitized surface of the press plate, paper or film by the use of adhesive tape, or like substance, in the desired position and the frame containing the covering glass is rolled into position and clamped to the plate holder as already described, and as shown in Fig. 12. The exhaust pump is operated to obtain sufficient vacuum, and thereby cause contact between the sensitized surface and the negative or positive. The whole is now ready for exposure to light. The exposure is made by moving the super-structure or carriage carrying the light box to the required distance, and moving the light panel and lights to the front of the light box in order to eliminate shadows and obtain an even illumination over the entire surface to be exposed to the light. When the exposure has been made, the frame is released and moved aside by the means provided, thus the invention provides a convenient vacuum printing frame as well as a rotatable holder for press plates to be photographically printed on from negatives or positives on plate glass, movable at the will of the operator to any area of the sensitized surface, and also permitting the image or design to be printed at any angle or on any part or the whole of a circular area of the sensitized surface of the plate.

Complete control over the position the image or design is to be given on the sensitized surface of the press plate or other material is afforded by this invention; the press plate holder may be adjusted to any position about the axis of the shaft 98 and the negative or positive in the chase holder may be adjusted vertically or laterally as heretofore described, so that there are really three variables included in the relative positioning adjustment between the press plate and the negative.

The improvements of this invention include a design of construction that is capable of accurate manufacture without prohibitive cost, accuracy and simplicity of operation, a holder apparatus for sensitized press plates, rotatable at will, which may be converted into a vacuum printing frame quickly and conveniently, which will receive the light for exposing the sensitized surfaces contained therein from the same lights used when using the machine as a photo-litho composing or printing machine, thus affording to the user of the invention a combination photo-lithographic composing or printing machine and process printing vacuum printing frame.

While I have specifically described in detail the various elements which make up the illustrated embodiment of my invention, I do not wish to be limited to the exact details

of construction shown but reserve the right to make such changes in form, proportion and minor details of construction as properly come within the scope of the appended claims.

What I claim and desire to secure by Letters Patent is:

1. A photographic process printing machine comprising two main members, one of the members consisting of a light box, and a negative holder carried by the light box, the other main member consisting of a sensitized sheet holder having a plurality of portions registerable individually with the negative holder, means for moving the light box horizontally and vertically to a selected position with respect to the sensitized sheet holder, means for rotating the sensitized sheet holder, said sheet holder being rotatable to position a selected portion in registry with the moved light box and negative holder, and means for locking the rotatable member in adjusted position.

2. A photographic process printing machine, comprising a light box having a source of light therein, a negative holder carried by the light box, a sensitized sheet holder for cooperation with the negative holder and the light box, means for rotating the sensitized sheet holder about its axis, said means comprising a high speed mechanism and a low speed mechanism.

3. A photographic process printing machine, comprising a light box having a source of light therein, a negative holder carried by the light box, a sensitized sheet holder for cooperation with the negative holder and the light box, means for rotating the sensitized sheet holder about its axis, said means comprising a high speed mechanism and a low speed mechanism, and means for adjusting the sensitized sheet holder longitudinally of its axis.

4. A photographic process printing machine comprising a negative holder movable in a limited plane, a sensitized sheet holder substantially co-extensive with said plane and rotatable on the axis of said plane, means for moving the negative holder to a selected position in its plane, means including a perforate gear for rotating the sensitized sheet holder about its axis through uniform parts of the circle to position a selected portion of the sensitized sheet holder with respect to the moved negative holder, means for holding the sensitized sheet holder in adjusted position including a pin slidable in said gear perforations and means for projecting light through the negative holder.

5. A photographic process printing machine comprising a negative holder and a rotative sensitized material holder, the sensitized material holder having a surface area in excess of that of the negative holder, and means for effecting rotative adjustment of the sensitized material holder over the face of the negative holder, including a shaft fixed axially to the holder, a gear wheel keyed to said shaft, and means for fixing the wheel in holder-adjusting position.

6. A photographic process printing machine, comprising a rotative sensitized material holder and a negative holder, the sensitized material holder having a surface area in excess of the negative holder, means for moving the negative holder, means for rotating the sensitized material holder, portions of the material holder being positionable by said rotation in relation with said moved negative holder, said rotating means including a wheel having circularly disposed graduations corresponding to said portions, and means for effecting adjustment of the negative holder across the surface of the sensitized material holder.

7. A photographic process printing machine comprising a frame, a carriage transversely movable over the frame, a negative holder vertically movable in the carriage, a sensitized sheet holder supported in parallel relation with the plane in which the negative holder moves and rotatable on its axis, and means for rotating the sensitized sheet holder to position a selected portion thereof in registry with the positioned negative holder including a gear wheel rotatable with the sensitized sheet holder and having openings adjacent its periphery aligned with vertical and horizontal bisectors of the sensitized sheet holder, and a pin slidable in the support for engagement with a selected one of said openings for fixing the rotatable sensitized sheet holder in selected relation to the negative holder.

8. A photographic process printing machine comprising two main members, one of the members consisting of a light box and a negative holder carried by the light box, the other main member consisting of a sensitized sheet holder having a plurality of portions registrable individually with the negative holder, means for moving the light box horizontally and vertically to a selected position with respect to the sensitized sheet holder, and means for rotating the sensitized sheet holder, said sheet holder being rotatable to position a selected portion in registry with the moved light box and negative holder.

In testimony whereof I affix my signature.

WILLIAM J. SNYDER.