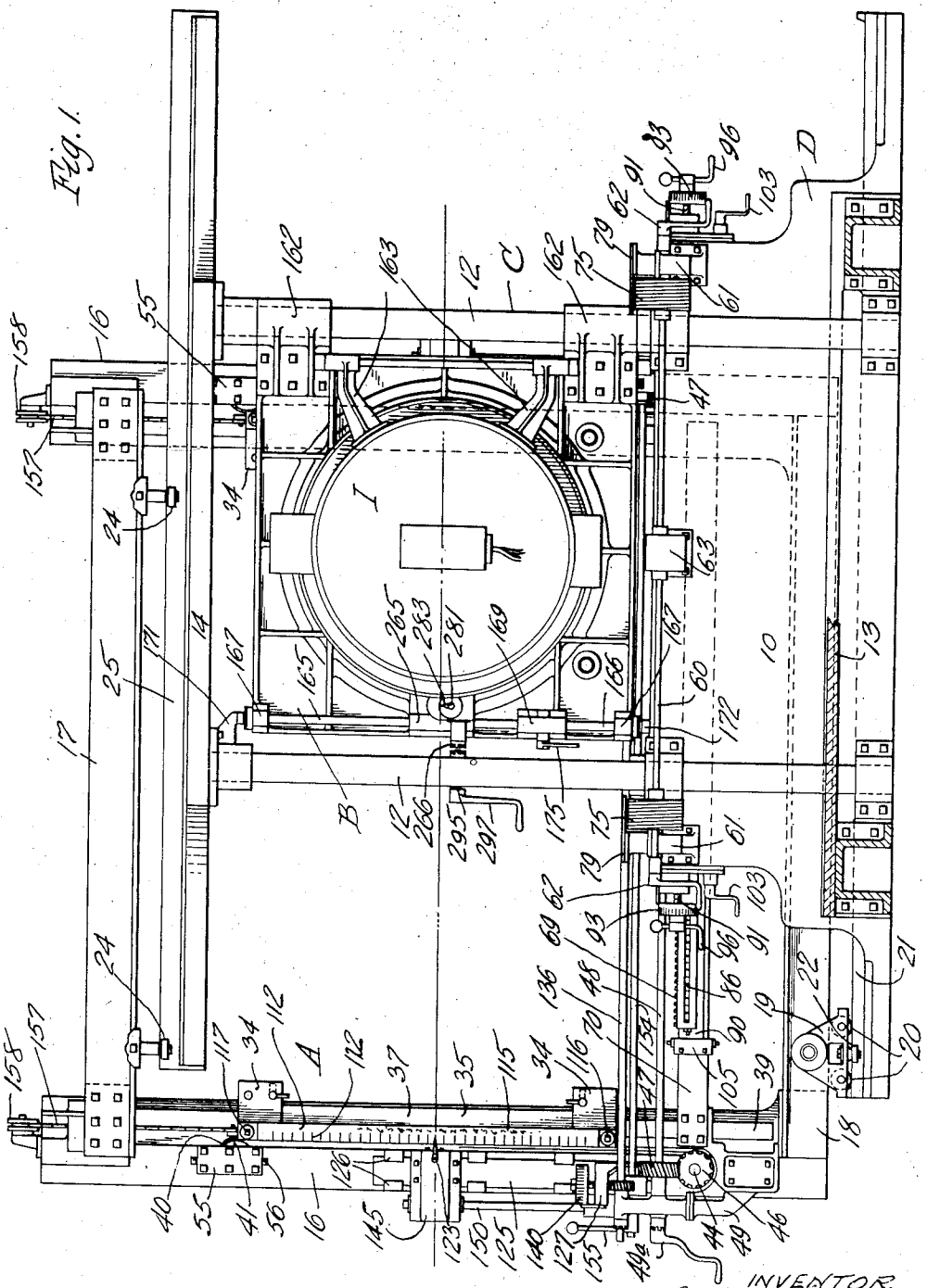
June 9, 1931. W. C. HUEBNER 1,809,274

PHOTOGRAPHIC PRINTING APPARATUS

Filed Nov. 23, 1927 11 Sheets-Sheet 1

Fig. 1.



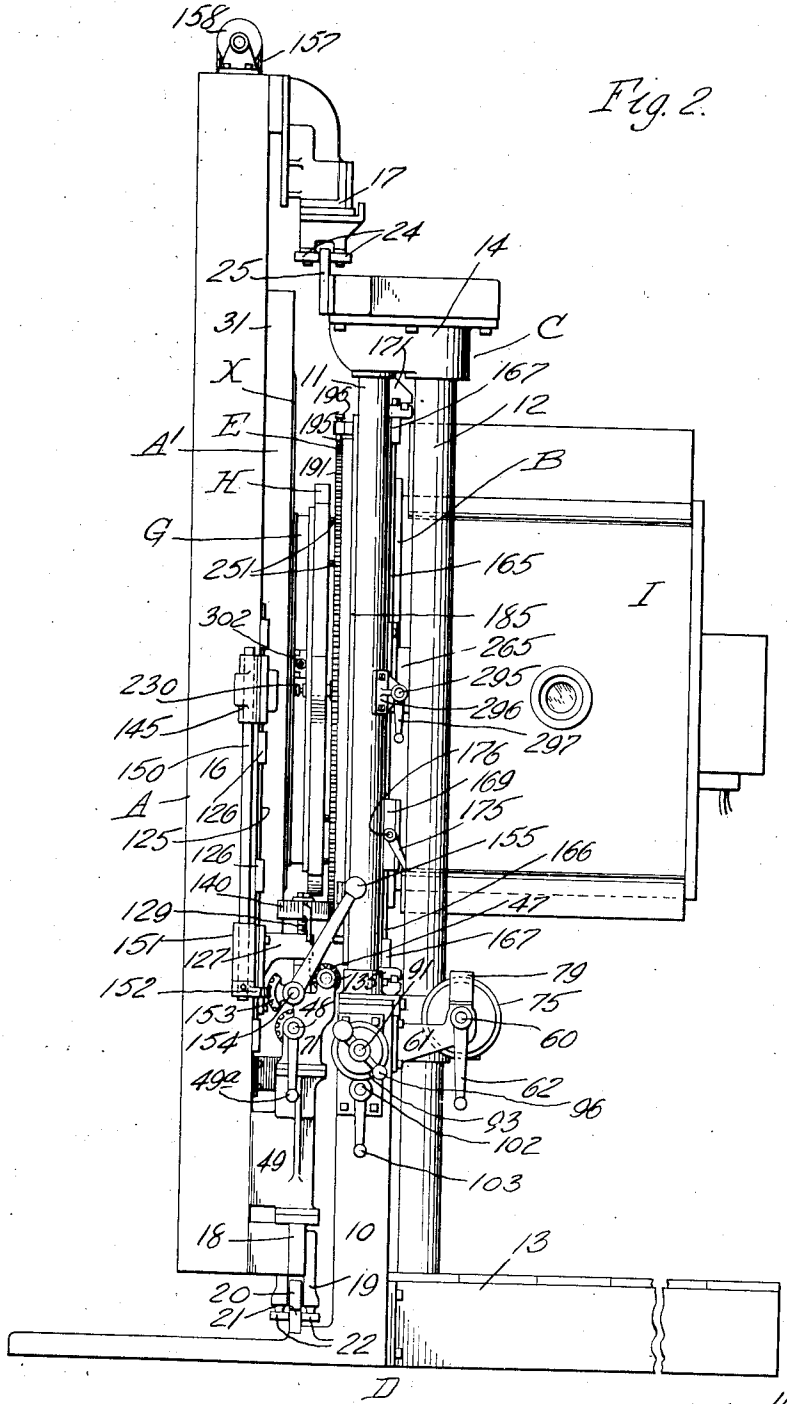
INVENTOR.
William C. Huebner
by Parker & Prochnow
ATTORNEYS.

June 9, 1931. W. C. HUEBNER 1,809,274

PHOTOGRAPHIC PRINTING APPARATUS

Filed Nov. 23, 1927 11 Sheets-Sheet 2

Fig. 2.



INVENTOR
William C. Huebner
by Parker & Prochnow
ATTORNEYS.

June 9, 1931. W. C. HUEBNER 1,809,274

PHOTOGRAPHIC PRINTING APPARATUS

Filed Nov. 23, 1927 11 Sheets-Sheet 3

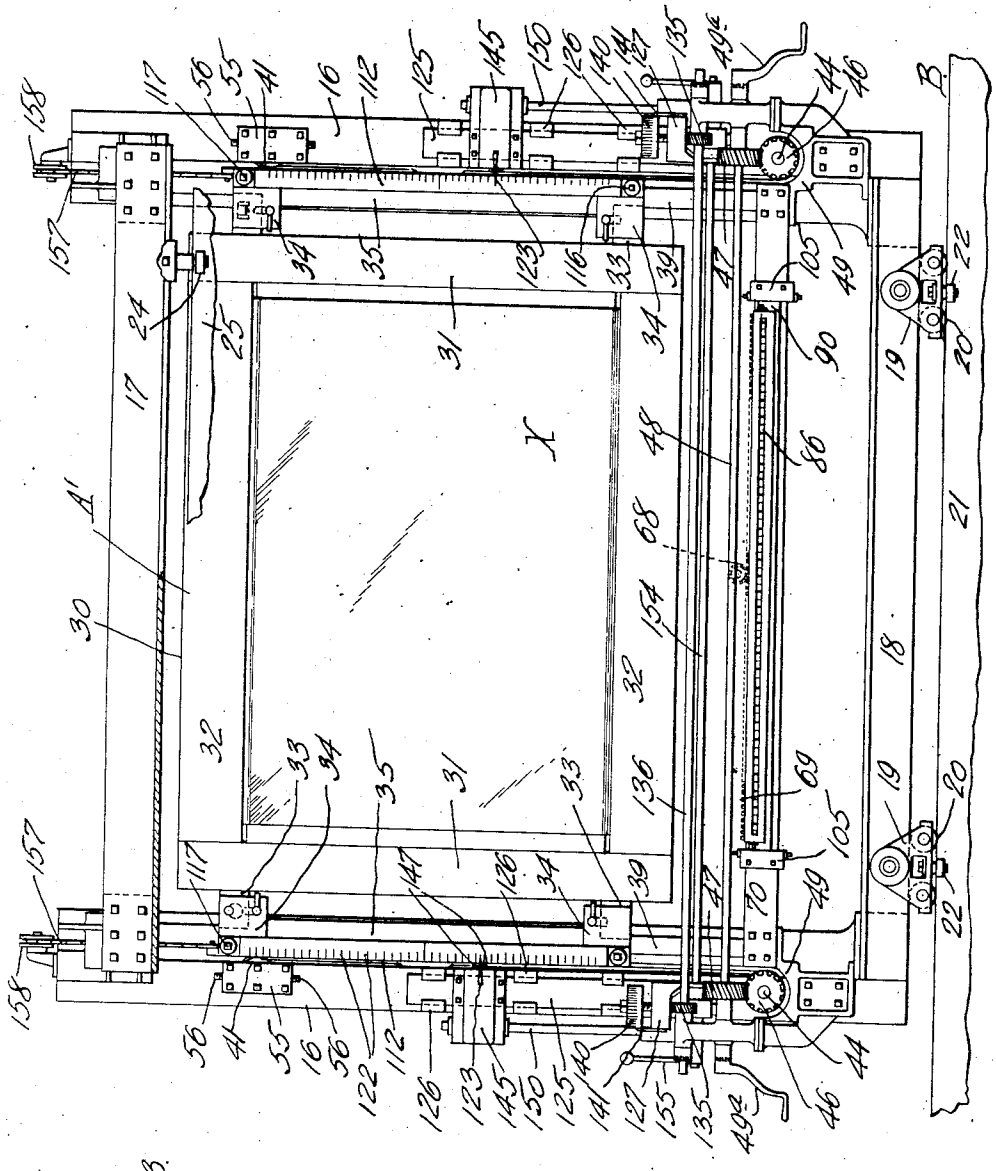


Fig. 3.

INVENTOR.
William C. Huebner
by Parker & Prochnow
ATTORNEYS.

June 9, 1931. W. C. HUEBNER 1,809,274

PHOTOGRAPHIC PRINTING APPARATUS

Filed Nov. 23, 1927 11 Sheets-Sheet 4

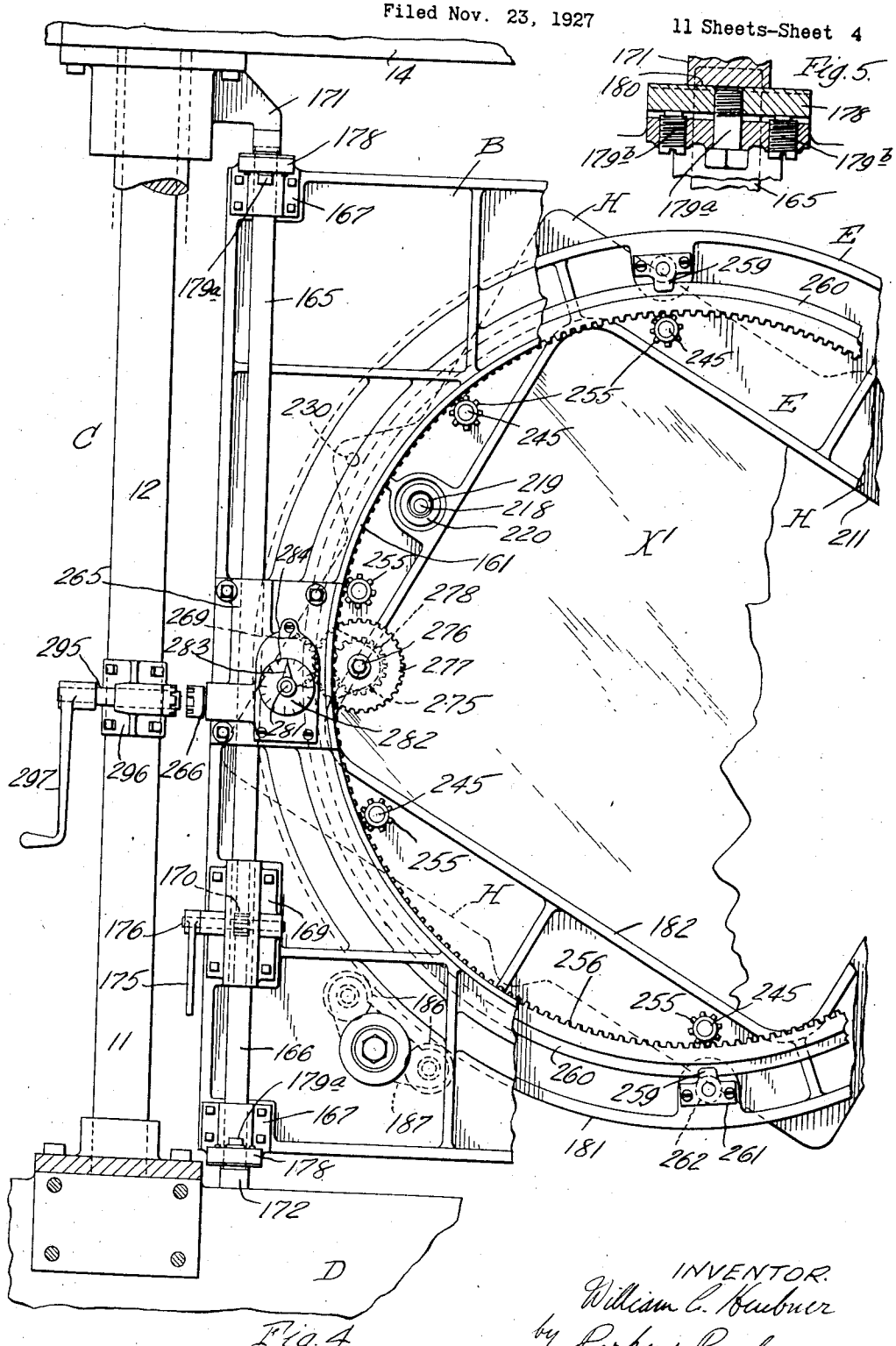


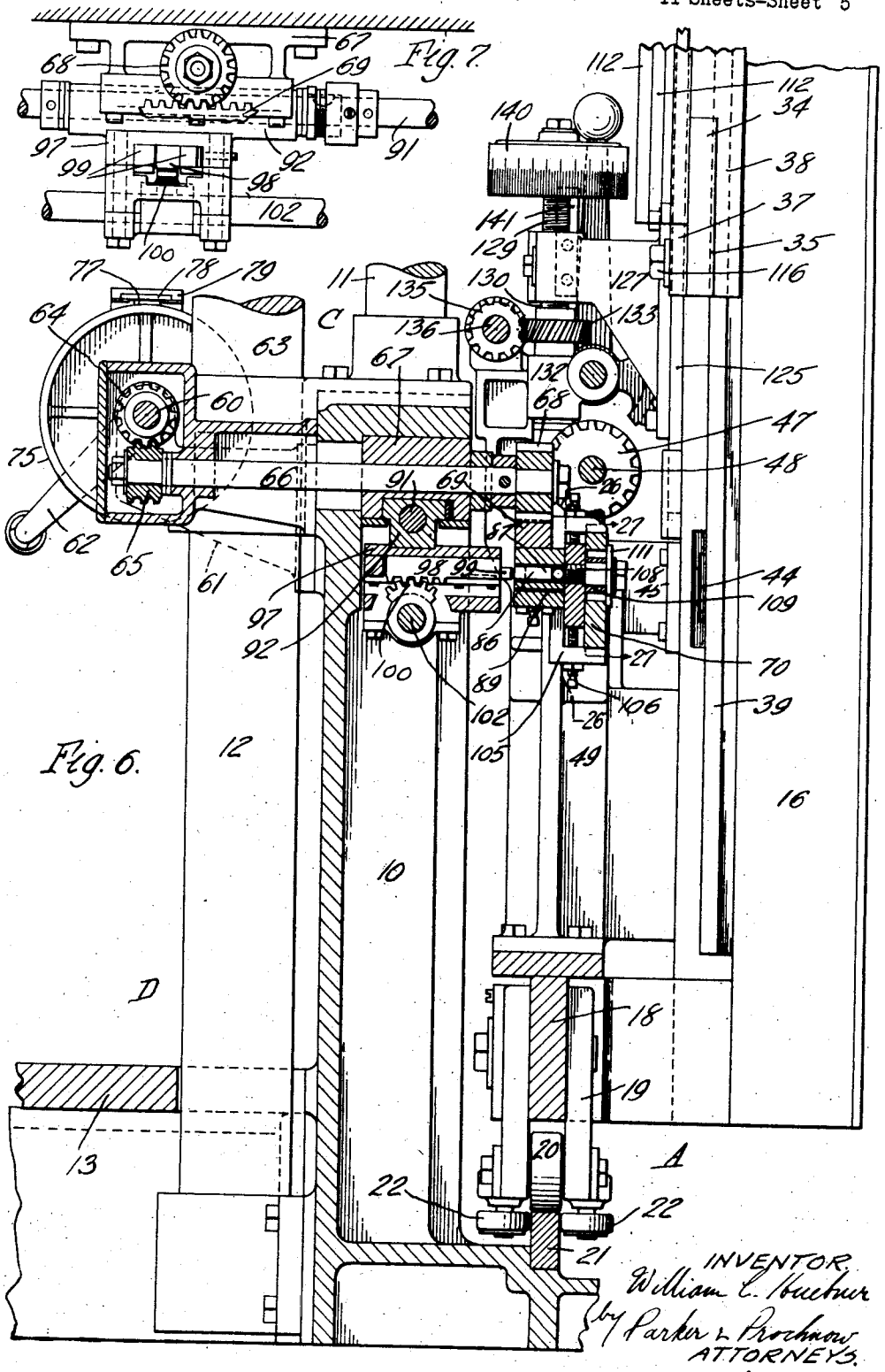
Fig. 4.

INVENTOR.
William C. Huebner
by Parker & Prochnow
ATTORNEYS.

June 9, 1931. W. C. HUEBNER 1,809,274

PHOTOGRAPHIC PRINTING APPARATUS

Filed Nov. 23, 1927 11 Sheets-Sheet 5



June 9, 1931. W. C. HUEBNER 1,809,274

PHOTOGRAPHIC PRINTING APPARATUS

Filed Nov. 23, 1927 11 Sheets-Sheet 6

Fig. 8.

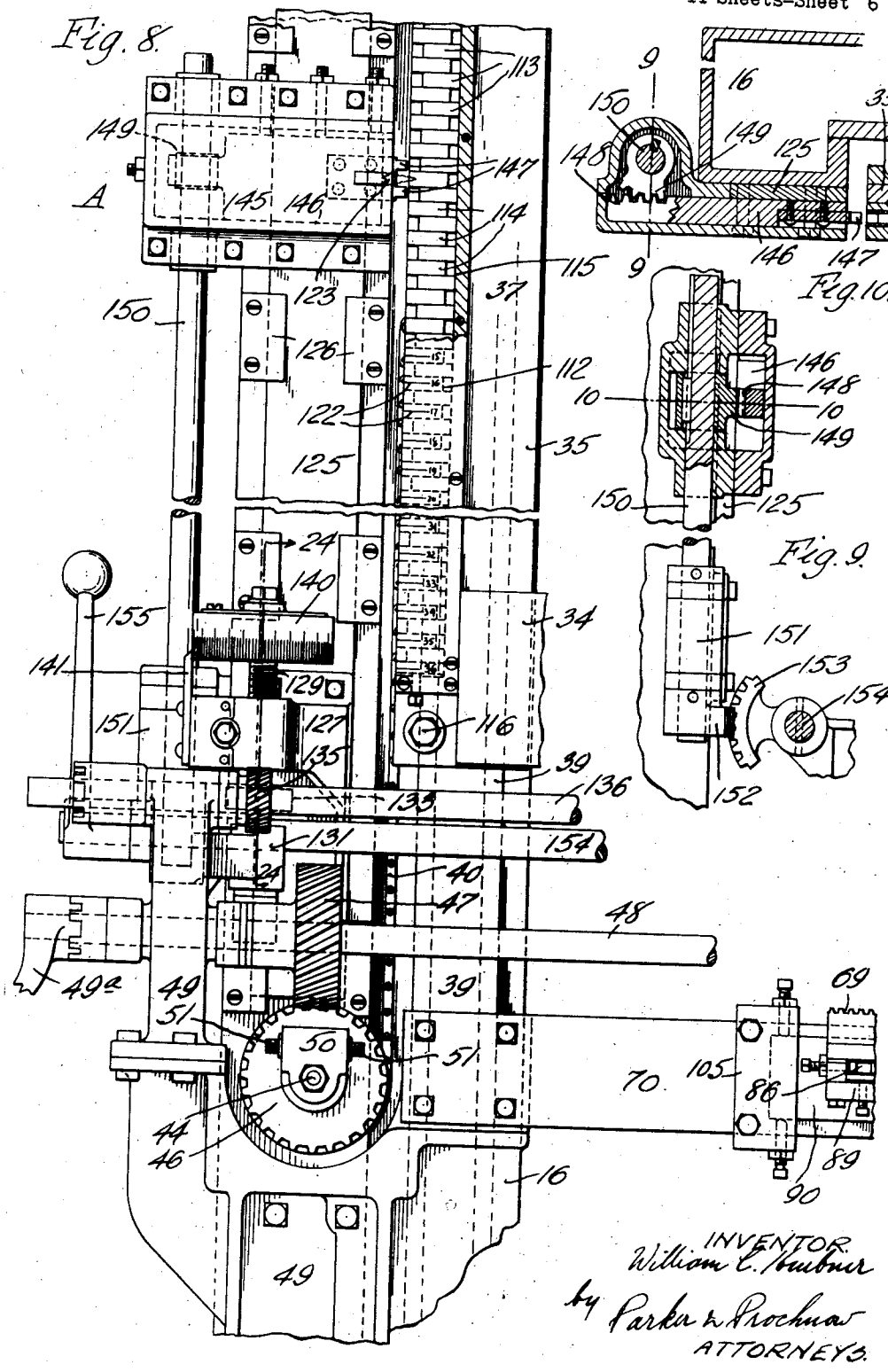


Fig. 10.

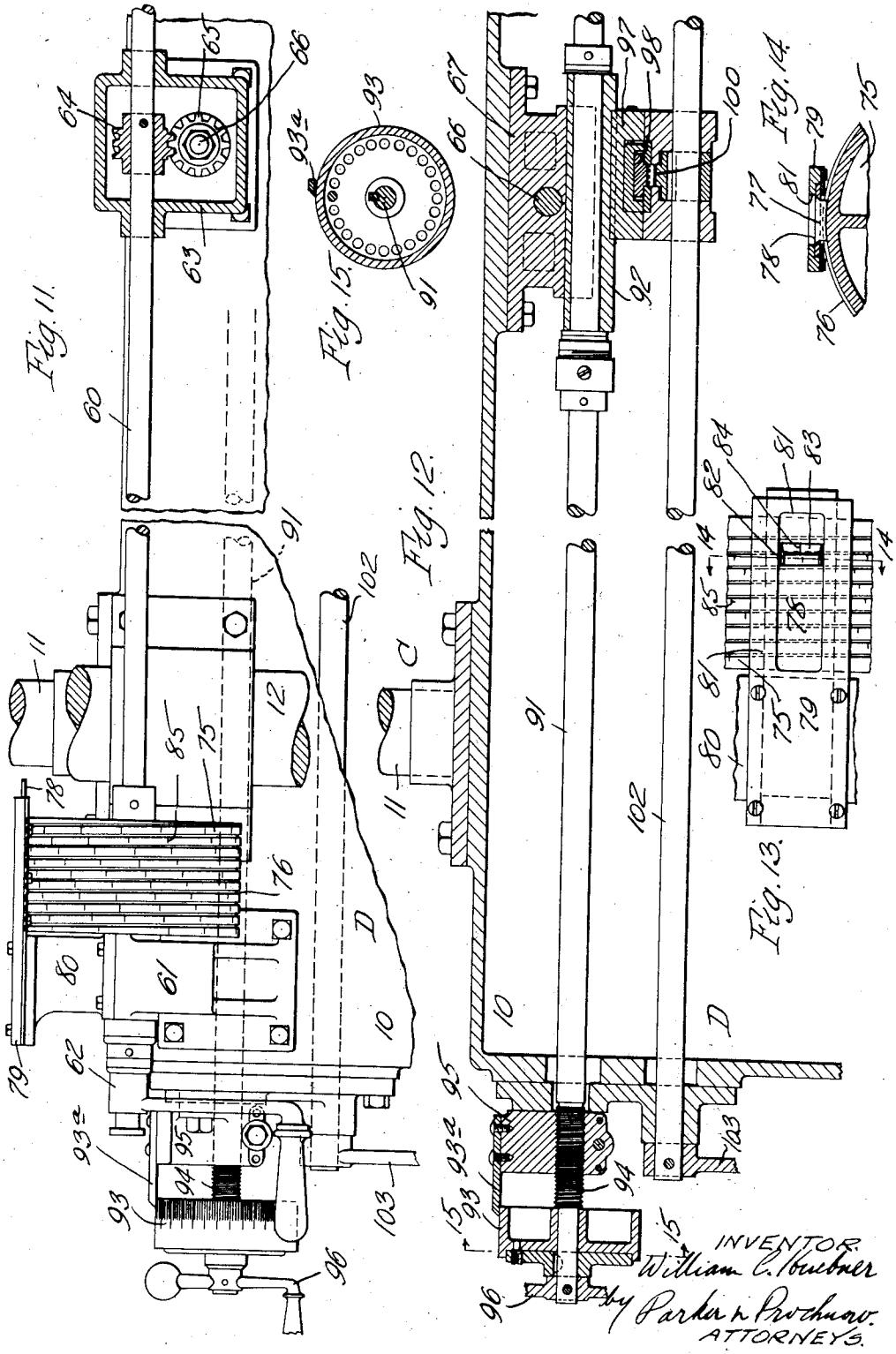
Fig. 9.

INVENTOR.
William C. Huebner
by Parker & Prochnow
ATTORNEYS.

June 9, 1931. W. C. HUEBNER 1,809,274

PHOTOGRAPHIC PRINTING APPARATUS

Filed Nov. 23, 1927 11 Sheets-Sheet 7



June 9, 1931. W. C. HUEBNER 1,809,274

PHOTOGRAPHIC PRINTING APPARATUS

Filed Nov. 23, 1927 11 Sheets-Sheet 8

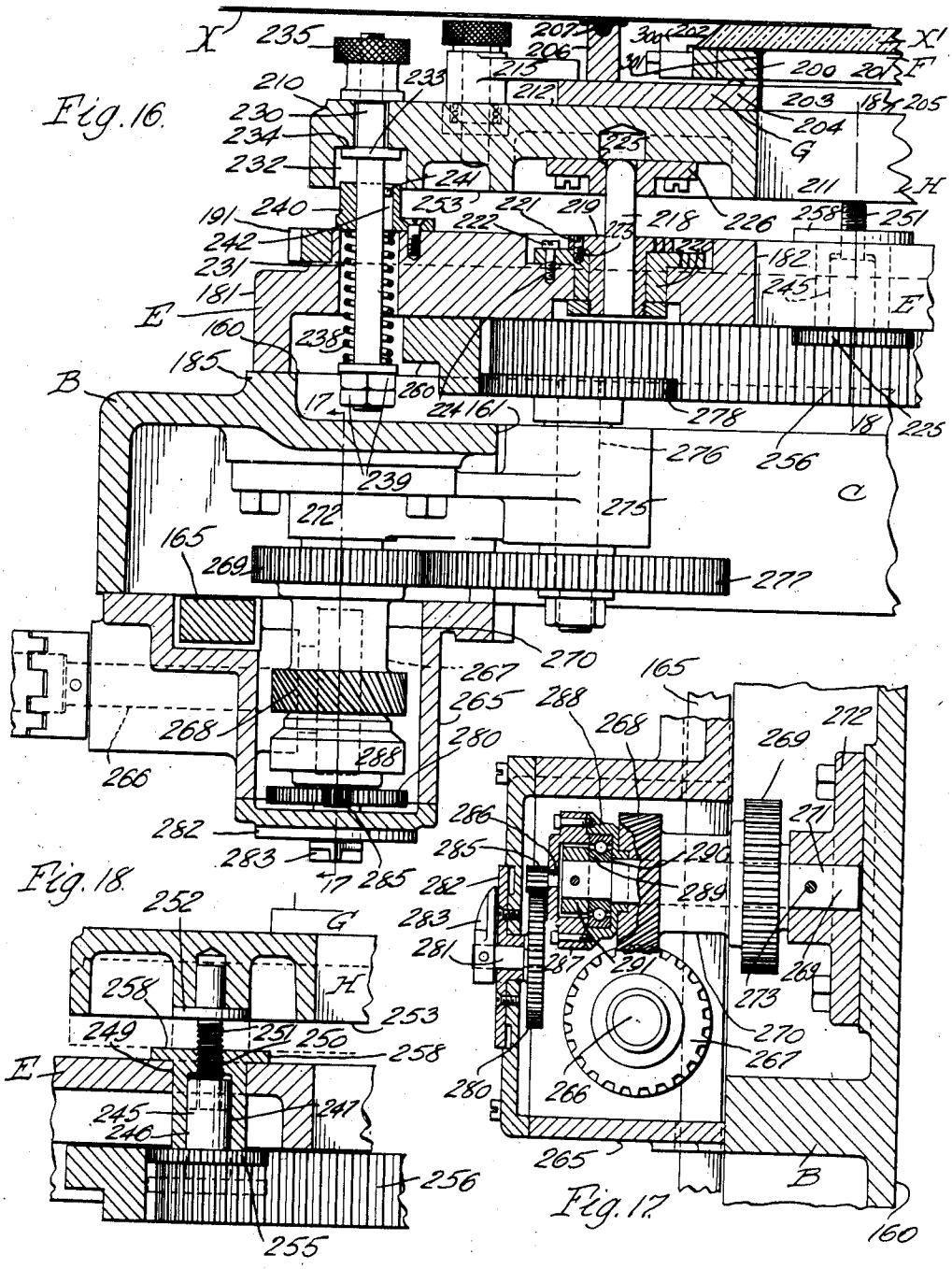


Fig. 16.

Fig. 18.

Fig. 17.

INVENTOR.
William C. Huebner
by Parker & Prochnow
ATTORNEYS.

June 9, 1931. W. C. HUEBNER 1,809,274

PHOTOGRAPHIC PRINTING APPARATUS

Filed Nov. 23, 1927 11 Sheets-Sheet 9

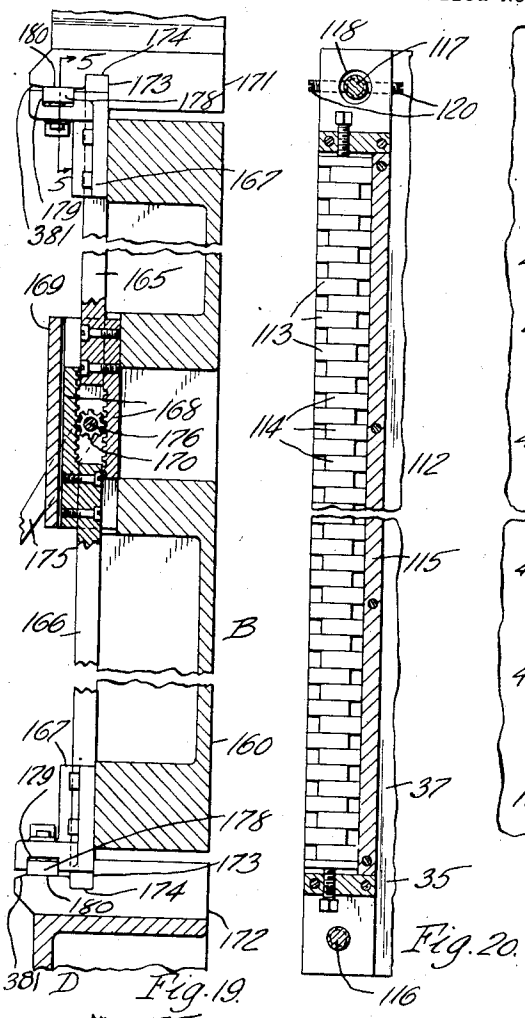


Fig. 19.

Fig. 20.

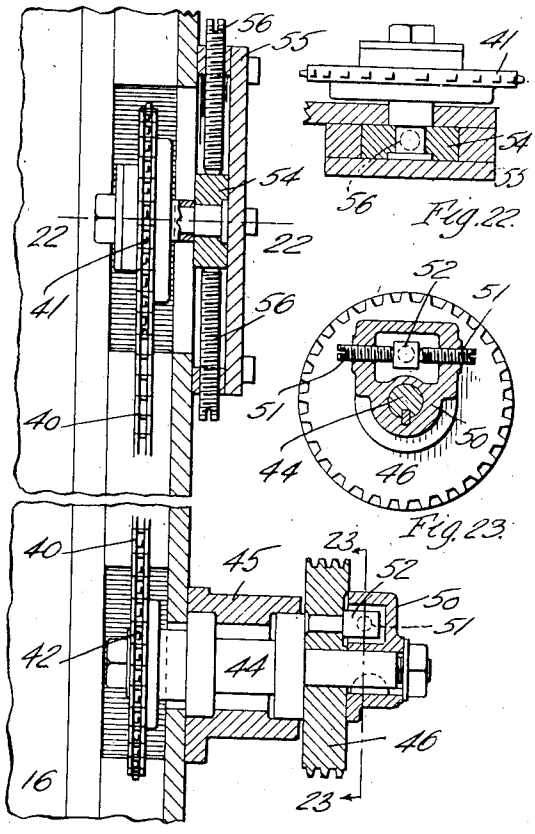


Fig. 21.

Fig. 22.

Fig. 23.

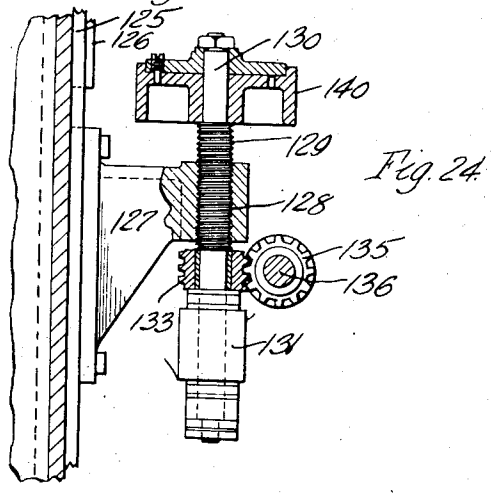


Fig. 24.

INVENTOR.
William C. Huebner
by Parker & Prochnow
ATTORNEYS.

June 9, 1931. W. C. HUEBNER 1,809,274

PHOTOGRAPHIC PRINTING APPARATUS

Filed Nov. 23, 1927 11 Sheets-Sheet 10

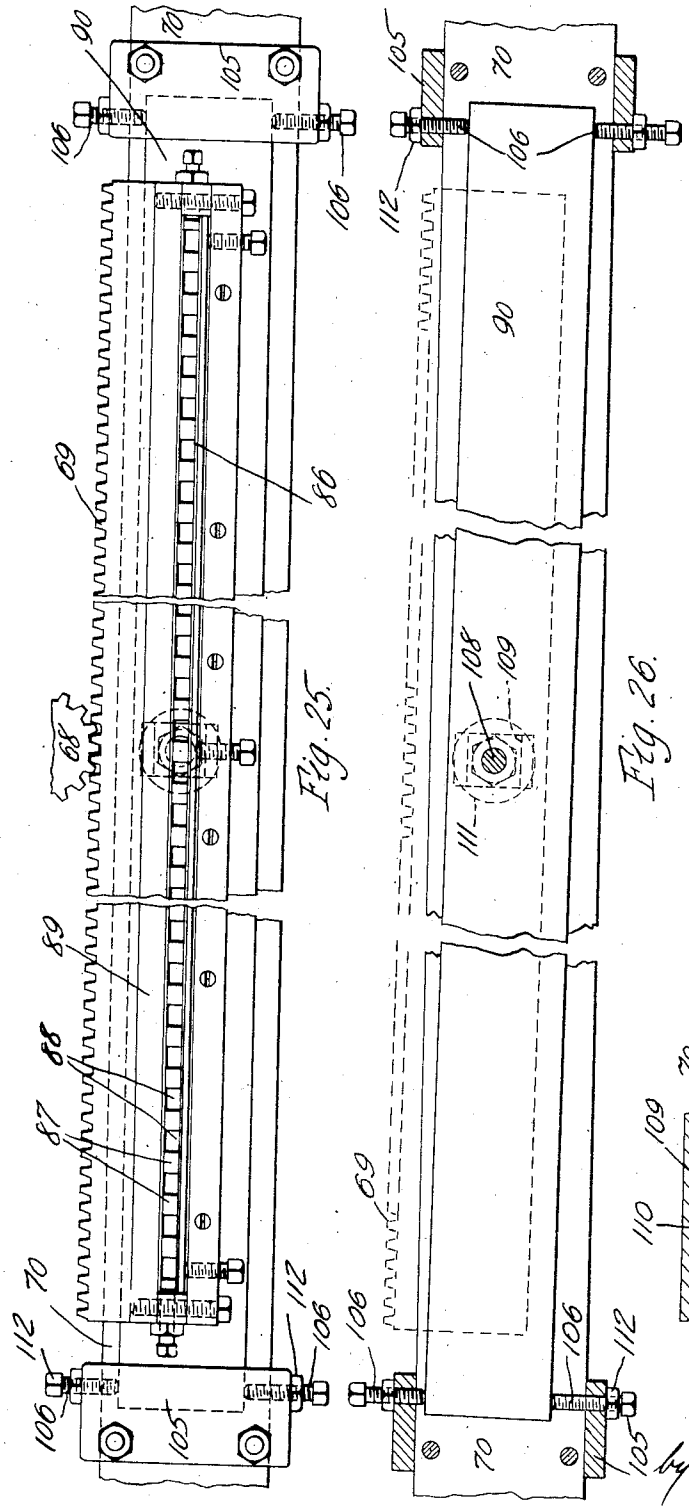


Fig. 25.

Fig. 26.

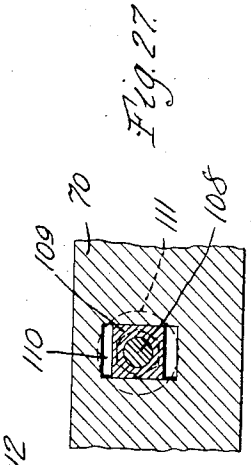


Fig. 27.

INVENTOR.
William C. Huebner
by Parker & Prochnow
ATTORNEYS.

June 9, 1931. W. C. HUEBNER 1,809,274

PHOTOGRAPHIC PRINTING APPARATUS

Filed Nov. 23, 1927 11 Sheets-Sheet 11

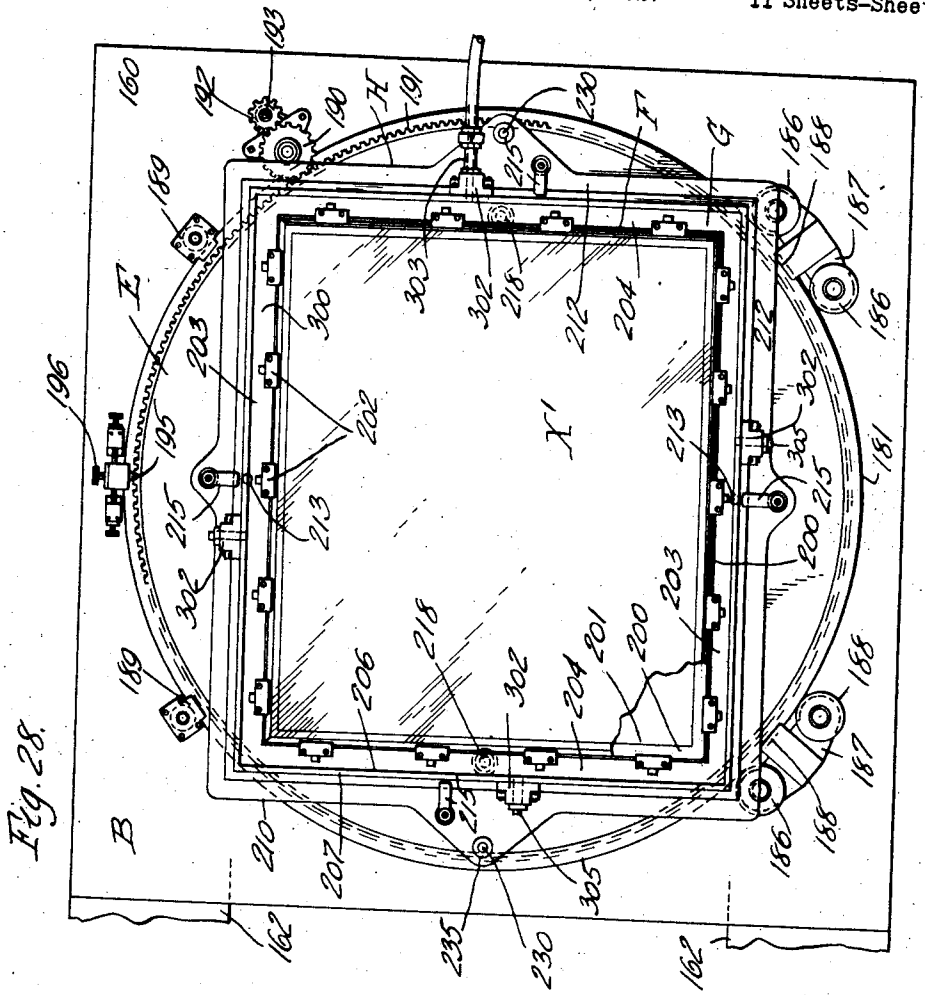


Fig. 28.

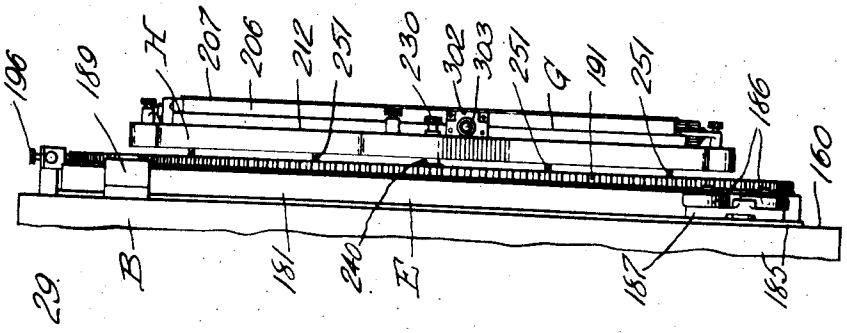


Fig. 29.

INVENTOR.
William C. Huebner
by Parker & Prochnow
ATTORNEYS.

Patented June 9, 1931

1,809,274

UNITED STATES PATENT OFFICE

WILLIAM C. HUEBNER, OF BUFFALO, NEW YORK, ASSIGNOR TO HUEBNER-BLEISTEIN PATENTS COMPANY, OF BUFFALO, NEW YORK

PHOTOGRAPHIC PRINTING APPARATUS

Application filed November 23, 1927. Serial No. 235,379.

This invention relates to improvements in photographic printing or composing apparatus which is employed for photographing any desired number of like or different original prints in any required predetermined and registered position and relative arrangement directly upon the sensitized surfaces of sheet metal or other press plates which are afterwards suitably finished and used in mechanical printing presses for printing in one or several colors. Such apparatus is used for various purposes, such as for repeating prints from the same transparent printing plate or negative in different arrangement, for composing a number of different subjects in predetermined arrangement on a press plate, or for producing a plurality of press plates of a given subject to be used in multicolor presses for printing the different colors.

Such apparatus usually comprises a support or holder for the sensitized press plate, a support or holder for holding the negative or positive printing plate (hereinafter called the printing plate) in contact with the sensitized surface of said press plate, means for causing an intimate uniform contact of the sensitized surface with the printing plate, means for effecting light action upon the sensitized surface through the printing plate for producing the prints, adjusting means for causing a relative movement between the sensitized plate and printing plate parallel with the sensitized surface to enable prints to be made in desired predetermined locations on the sensitized plate, and means for effecting a relative movement between the surfaces of the plates towards and from each other for placing said surfaces into and out of contact, and for providing clearance between the same during said relative parallel movements therebetween.

In the particular type of apparatus now being considered the relative parallel movement between the sensitized and printing surfaces is effected by mounting the support or holder for the sensitized surface upon a carriage movable in one direction, and moving the holder itself relative to said carriage in a direction perpendicular to the other direction of movement in a plane parallel with said surface so that different portions of the press plate can be located opposite the image on the printing plate, and some of the objects of the invention are to provide a carriage for this purpose of improved and simplified construction; also to provide improved means for adjusting and controlling the movements thereof with expedition and extreme accuracy; also to provide means for mounting the metal plate holder on said carriage and to provide improved adjusting and controlling means for shifting said means to move said plate holder in said plane in a direction perpendicular to said other movement and to effect such movement with extreme accuracy and dispatch.

Other objects are to construct apparatus of the character described having improved means for supporting the printing plate; to provide improved and simplified means for accurately and quickly controlling and adjusting the position thereof relative to the sensitized sheet metal plate; to provide novel means for moving said printing plate toward and from said sensitized surface; also to arrange the various adjusting and controlling devices of the machine so as to be more readily accessible for operation than have been such means on photoprinting or composing apparatus heretofore known; and also to improve such apparatus, generally in the other respects hereinafter set forth.

In the drawings:

Fig. 1 is a front elevation of my improved photographic printing or composing apparatus, embodying the various novel features of the invention.

Fig. 2 is an elevation of the left hand end thereof.

Fig. 3 is a front elevation of the sheet metal plate holder and the travelling carriage on which the same is mounted, adjusted and controlled.

Fig. 4 is a face view on an enlarged scale, of a portion of the swinging frame, rotary adjustable head, and intermediate supporting element upon which the printing plate and its holder are arranged.

Fig. 5 is a fragmentary vertical section on

an enlarged scale on line 5—5, Fig. 19, of the lock member for the swinging frame.

Fig. 6 is a transverse, vertical section, on an enlarged scale, of the lower portion of the metal plate carriage and the adjusting and positioning or controlling means therefor.

Fig. 7 is a rear face view of a part of the coarse and fine adjusting mechanism, and the means for locking the carriage to the fine adjusting mechanism.

Fig. 8 is a face view of a part of one end of the plate carriage, showing the movable plate support, the coarse and fine adjusting mechanism therefor, and also the lock mechanism for connecting the fine adjusting mechanism to the plate support, for effecting a final, accurate adjustment thereof.

Fig. 9 is a vertical section of said lock mechanism, partly on line 9—9, Fig. 10.

Fig. 10 is a horizontal section thereof, on line 10—10, Fig. 9.

Fig. 11 is a fragmentary face view, partly in section, of the coarse and fine adjusting and positioning mechanism for the plate carriage.

Fig. 12 is a sectional elevation thereof.

Fig. 13 is a fragmentary plan view of the rotary drum or indicator of the coarse adjusting mechanism for the plate carriage.

Fig. 14 is a transverse vertical section thereof on line 14—14, Fig. 13.

Fig. 15 is a transverse section of the micrometer scale or indicator of the fine adjusting mechanism for the plate carriage, on line 15—15, Fig. 12.

Fig. 16 is a fragmentary, horizontal section, on an enlarged scale, of the adjusting or clearance mechanism for moving the printing plate into and out of contact with the sensitized surface of the metal plate.

Fig. 17 is a transverse vertical section thereof, on line 17—17, Fig. 16.

Fig. 18 is a transverse section thereof, on line 18—18, Fig. 16.

Fig. 19 is a transverse vertical section of the lock mechanism for securing the swinging frame in operative position.

Fig. 20 is a similar view of the vertical coarse adjustment scale for the sensitized metal plate support or holder.

Fig. 21 is a similar view of the mechanism for effecting the vertical movements of said plate support.

Figs. 22 and 23 are a horizontal and a vertical section respectively thereof on lines 22—22 and 23—23, Fig. 21.

Fig. 24 is a transverse vertical section of the fine adjusting mechanism for the metal plate support, on line 24—24, Fig. 8.

Fig. 25 is a front elevation, partly broken away, of the horizontal coarse adjustment scale for the sheet metal plate carriage.

Fig. 26 is a longitudinal, vertical section thereof, on line 26—26, Fig. 6.

Fig. 27 is a similar view on line 27—27, Fig. 6.

Fig. 28 is a face view of the swinging frame, rotatable head, auxiliary printing plate support and printing plate holder, with a printing plate in position thereon, as seen from the rear of the machine when said parts are in operative position.

Fig. 29 is an end view thereof.

The invention is illustrated in connection with a photo composing or painting apparatus of the vertical type in which the printing and print-receiving surfaces are disposed in parallel vertical planes.

The apparatus shown in the drawings comprises generally, an upright, horizontally movable plate carriage A on which the sheet metal plate X, mounted on a holder A′ is supported, so that the sensitized surface of the plate is disposed in a vertical plane somewhat forwardly of the various parts of the holder A′. This holder is independently movable on the carriage A in a direction perpendicular to the movements of said carriage. Arranged opposite to and in front of the plate carriage is a vertically swinging frame B hinged on a stationary main frame C which includes a base D. On the swing frame B is secured the rotary head E upon which a transparent printing plate X′, either positive or negative is supported in a vertical plane, by means of a negative holder F which is removably secured to a gasket member G, in turn removably secured on an intermediate negative supporting member H detachably positioned on the rotary head E before mentioned.

The swing frame, together with the parts F, G, H and E carrying the printing plate X′, is adapted to swing on the frame C into and out of a plane in which the surface of said printing plate is parallel with the surface of the print-receiving surface, and the negative holder and supplementary negative support are also separately movable relatively to the swing frame towards and from said sensitized surface in planes parallel therewith, by novel means, for the purpose of permitting clearance between the printing and print-receiving surfaces during the movements of the carriage to different desired positions, and for allowing for variations in the thickness of different printing plates.

Finally precision registering and adjusting means are provided for accurately adjusting and indicating the horizontal travel of the plate carriage A as a whole, similar means being also provided for adjusting and indicating the vertical travel of the plate holder A′ on said carriage so that any part of the sensitized plate can be accurately positioned relative to the printing plate. A light chamber or hood I is hinged on the swing frame and encloses a suitable source of illumination at the back of said printing plate X′ for making the exposures of its image upon

the sensitized surface of the metal plate X.

The stationary frame C of the machine can be of any suitable construction, that shown comprising the base D, before mentioned, which is provided with a transverse, upwardly extending housing 10 which is open towards the rear of the machine and from which arises a pair of fixed spaced columns 11. Another pair of fixed columns 12 are disposed adjacent and in front of the columns 11, and forwardly of the housing 10, and which terminate at their lower ends at the platform 13 extending forwardly from the housing. The upper ends of the columns 11 and 12 are rigidly connected by a transverse cross beam 14.

The plate carriage A is preferably in the form of an open, rectangular frame comprising upright, spaced and hollow side columns 16 rigidly connected at their upper ends by a horizontal cross bar 17 and at their lower ends by a similar bar 18. Depending from this bar 18 is a pair of caster trucks 19 each having a pair of vertically disposed, transversely rotatable rollers 20 adapted to travel on a fixed track or rail 21 secured on the base D, and in addition there are provided guide rollers 22 engaging the opposite vertical faces of the track 21 for maintaining the rollers 20 in position on the track and causing the carriage to travel in a straight path thereon. Similar guide rollers 24 depending from the top rail 17 and engaging opposite sides of a horizontal guide rail 25 fixed to the cross beam 14 of the stationary main frame cooperate to hold the carriage in correct position during its travel. The plate holder A′ can be of any suitable construction enabling the sheet metal plate X to be detachably secured and stretched taut thereon. The holder shown includes spaced vertical side bars 31 and top and bottom horizontal bars 32. The particular construction of the plate holder A′ will not be described in detail as it is intended to cover the same in a separate application for Letters Patent.

The holder, however, is secured to the carriage A, see Figs. 1, 3 and 8, by means of laterally extending lugs 33, a pair of which projects from each of the uprights 31 and are formed to be removably connected to corresponding lugs 34. These lugs are rigidly attached to the upper and lower ends of vertically movable slides 35, one of which is mounted on each of the uprights 16 of the plate carriage A so as to permit vertical movements of the sensitized surface, which movements, together with the horizontal movements of the plate carriage as a whole, enables any desired portion of the sensitized surface to be positioned opposite the printing plate or any selected part thereof. Suitable supporting and locking means are provided for attaching the holders A′ to the lugs 34 in such a manner that a plurality of different holders can be secured in exactly the same position on the carriage.

The slides 35, before mentioned, can be of any suitable construction, each slide as shown, comprising a flat plate 37 from which extend rearwardly a pair of oppositely disposed side members 38 formed to engage over a vertical T-shaped guide rail or strip 39 secured to the upright 16, see Fig. 6. Between the top and bottom of the slide the two free ends of a sprocket chain 40 are secured thereto, said chain passing upwardly and then downwardly within the hollow side columns 16 over a sprocket 41, and thence over a similar sprocket 42 at the lower end of the upright, Fig. 21. This lower sprocket is rotatably mounted on a shaft 44 projecting outwardly through the front wall of the column 16 and journalled in suitable ball bearings in a housing 45 fixed to the upright 16. The extreme front end of the shaft 44 is reduced in diameter and a spiral gear 46 loosely journalled thereon is arranged to mesh with another spiral gear 47 fixed to a transverse horizontal shaft 48, journalled at its opposite ends in upright extensions of brackets 49 fixed to the uprights 16. A corresponding spiral gear 47 on the other end of the shaft causes like movements of the slide at that side of the machine, the rotation of the shaft being effected by a crank handle 49*a* at either end thereof. As it is absolutely necessary that the top, bottom and side rails of the plate holder A′ be maintained in true horizontal and vertical alinement, it is necessary to provide means for individual, initial rotary adjustment of the sprocket wheels 42 relative to their spiral gears 46, so that the holder A′ can be tilted to a limited extent in a vertical plane for levelling it.

The means shown for this purpose, see Figs. 21 and 23, includes an adjustable member 50 keyed to the reduced outer end of the shaft 44 and which is provided with a pair of alined adjusting screws 51 extending inwardly from opposite sides thereof, and engaging opposite faces of a stud 52 fixed to and projecting from the front face of the spiral gear 46. The spiral gear 46 being in mesh with the other gear 47, cannot rotate except when the shaft 48 is turned. Therefore, by appropriate adjustments of the screws 51, the shaft 44 and the sprocket 42 thereon can be given slight rotary adjustments in either direction, relative to the sprockets, thus effecting slight corresponding movements of the sprocket chain 40. In this way, either sprocket chain can be separately shifted to raise or lower the adjacent end of the plate holder A′ to tilt said holder, as may be necessary.

The upper sprocket 41 is preferably journalled in a vertically adjustable slide 54 (see Figs. 21 and 22) movable in a guide 55 fixed to the column 16 for tightening the sprocket chain 40 as desired, said slide 54 being moved

up and down by means of adjusting screws 56 having threaded connection with said guide.

The horizontal movements of the plate carriage A are effected through a drive mechanism which includes a horizontal, transverse shaft 60 journalled at its opposite ends in fixed brackets 61 secured to the front of the upright housing 10, said shaft being provided at either end with a suitable crank 62 for turning it. Between its ends this shaft passes through and is journalled in a casing 63 also secured on the housing 10 and is therein provided with a fixed spiral gear 64. This gear meshes with another spiral gear 65 secured on the front end of a rearwardly extending horizontal shaft 66 journalled in said casing and in a bearing block 67 rigidly secured at the rear of said housing 10. The shaft 66, rearwardly beyond the bearing block 67 is provided with a spur pinion 68 meshing with a horizontal rack 69 adjustably mounted on a horizontal rail 70 fixed at its opposite ends to the brackets 49, before mentioned, of the carriage A. By turning either crank 62 in one direction or another, the carriage may be moved in opposite directions in a plane parallel with the sensitized surface. The coarse registering means for indicating said travel of the carriage A and for effecting a final fine precision adjustment thereof are constructed substantially as described in my application, Serial No. 120,179, filed July 7, 1926, and now Patent 1,668,592, dated May 8, 1928 and entitled Precision registering and adjusting mechanisms for photographic printing and other machines, now Patent 1,668,592, granted May 8, 1928.

The indicating means shown for registering the coarse adjustment or travel of the carriage, as above described, in units of measure, such as one inch, includes two scale drums 75, one of which is rigidly secured at each end of the shaft 60. Each drum, see Figs. 11 and 13, is provided with a spiral, peripheral groove 76 disposed concentrically of the axis of said shaft 60 and into which depends a tongue 77 formed on a slide 78 arranged to move in a direction lengthwise of the shaft 60 in a horizontal guide 79 fixed to an upwardly projecting part 80 of the adjacent bracket 61. As shown, the guide has an opening 81 of such length as to include substantially the entire width of the grooved portion of the drum 75. The slide 78 is formed with a sight opening 82 provided with a bevelled edge 83 at one side thereof on which is a graduation or index mark 84 extending adjacent the side of the groove 76. When the shaft 60 is turned in one direction or another, the tongue 77, due to its engagement in the groove 76, causes the slide 78 to move endwise in its guide. At equidistant intervals around the drum 75, there are graduations 85, each space thereof corresponding to said unit of measure of travel of the carriage, so that as the shaft rotates, the index mark 84 will be brought opposite successive graduations 85, thus indicating the distance travelled by the carriage in inches.

The adjusting and indicating means for the horizontal carriage further includes a horizontally disposed scale or part 86 preferably associated with the rack 69 and having a plurality of accurately spaced parts, corresponding to said unit of measure, or a major fraction thereof, and a fine adjusting mechanism which can be coupled or locked to said scale after the coarse adjustment of the carriage has been made, to effect a final fine movement of the carriage, and register this movement in small fractions of the unit of measure, such as in one thousandths of an inch.

The scale 86, as in said Patent 1,668,592, comprises a plurality of separate blocks 87 and 88 arranged in staggered relation to form the substantial equivalent of a rack bar. These blocks are what are known as "Johansson" blocks, the dimensions of which are extremely accurate so that they can be used as standards of measurement. In the present instance the horizontal width of each block is one half inch. The blocks are suitably clamped in a holder or support 89 rigidly secured to a substantially horizontal supporting bar or plate 90, the rack bar 69 also being supported by this plate 90, as by rigidly securing said bar on the top face of the scale holder 89.

The fine adjusting mechanism above mentioned is preferably mounted on the housing 10 of the main frame A and comprises a horizontal, transverse shaft 91 journalled in a slide 92, which slide is arranged to have a limited endwise movement in a plane substantially parallel with the path of movement of the carriage A, in the fixed bearing block 67 before mentioned, through lengthwise movement of the shaft 91, which shaft is provided with collars or parts engaging opposite ends of said slide 92 to prevent relative lengthwise movements between said shaft and slide. The shaft extends outwardly through the opposite end walls of the housing 10, each end having a reduced portion on which is fixed a drum or dial 93. The periphery of the dial is provided with one hundred equally spaced graduations. Between each drum and the adjacent end wall of the housing 10, the shaft has a finely threaded portion 94 formed with a predetermined number of threads per inch, for example ten. Fixed to the housing 10 and surrounding the threaded portion of the shaft is a nut or part 95 having a threaded hole in which the shaft screw 94 turns to cause endwise movement of the shaft and of the slide 92. The extreme outer ends of the shaft are provided with cranks or handles 96 for turning it. Thus each revolution

of the shaft causes the slide 92 to travel one-tenth of an inch and such travel is indicated by the dial 93 as its periphery passes beneath a pointer 93a fixed on the nut 95 or other stationary part, while fractions of each revolution are indicated in thousandths of an inch.

Depending from the slide 92 is a longitudinally extending guide 97 within which is arranged a slide or bolt 98, the rear end of which extends adjacent to the scale 86 where it is provided with a pair of spaced fingers 99 adapted, when the slide 98 is moved rearwardly, to closely embrace any one of the forwardly projecting blocks 87 of said scale. Any suitable means may be employed for actuating the slide 98, such as a gear sector 100 journalled in the lower portion of the part 97, and which is secured on a shaft 102 arranged parallel with and below the shaft 91 and journalled at its ends in the ends of the housing 10 and having at each end, outwardly beyond said housing, a crank 103 for turning it. By rocking the shaft 102 in one direction or another, the fingers 99 of the bolt 98 can be moved into or out of engagement with the scale as described.

When it is desired to adjust the carriage A, the shaft 91 and slide 92 are first moved to the extreme left or zero position, as in Figs. 11 and 12, and the shaft 60 operated to shift the carriage along the track 21 by means of the pinion 68 and rack bar 69. The travel of the carriage will be registered in inches by means of the drums 75 on said shaft 60 and when the desired number of whole units or inches has been travelled, the shaft 102 is actuated to couple the slide or bolt 98 of the fine adjusting mechanism with the scale bar 86, the blocks of which are so positioned relatively thereto that by stopping the carriage A exactly at the inch graduations on the drums 75, the blocks 87 of the scale and the fingers 99 of the slide 98 will coincide. By now rotating the shaft 91, an endwise movement will be imparted to the slide 92 carrying with it the other slide 98 and moving the carriage until the desired graduation of the drum 93 indicates that the desired fractional part of the unit of measure has been reached.

In this manner the horizontal carriage can be adjusted with accuracy and dispatch and by locating the actuating handles or cranks and the dials for the coarse and fine adjusting mechanisms at opposite ends of the housing, these parts are easily accessible from either end of the machine.

It is necessary that the pitch line of the rack bar 69 be disposed in absolutely parallel relation with the top face of the carriage track 20 to prevent binding or slackness between said rack and its driving pinion 68 in the movements of the carriage. For this purpose the horizontal plate 90 to which the rack bar and the scale 86 are secured is adjustably mounted so as to move relatively to the stationary cross bar 70 of the carriage. As shown, the rear face of the plate 90 rests directly against the front face of the cross bar 70 and its opposite ends are embraced by U-shaped clips 105. These clips are rigidly secured to the bar 70 and are each provided with a pair of oppositely disposed adjusting screws 106 extending towards and engaging the upper and lower edges of the bar 90. Substantially midway of its length, said bar 90 is apertured and tapped to receive the threaded end of a stud 108 which is journalled in and projects forwardly from a rectangular slide block 109 arranged so as to have a limited vertical movement in an aperture 110 in the fixed bar 70. The portion of the stud which is disposed in the block 109 is shouldered so as to bear against the rear face of the bar 90, and the rear end of the stud is provided with a head adapted to bear on a friction disk or plate 111 in such a manner that by turning the stud inwardly, the block 109 will be frictionally held from moving in the aperture 110. When it is desired to adjust the rack 69 to effect the parallelism before mentioned, the stud is loosened slightly and then by appropriate adjustments of the adjusting screws 106 on each end of the bar 70, this bar, together with the scale and rack supported thereby may be tilted on the stud 108 to the required degree, after which the stud is again tightened and the adjusting screws 106 held from turning by tightening the lock nuts 112 arranged thereon and which bear against the clips 105. By arranging the stud 108 in the vertically slidable block 109, the rack and scale as a whole can also be moved up and down vertically to permit the pitch line of the rack to be disposed at the proper elevation with relation to the pinion 68.

The vertical slides 35 for the plate holder A′ are each provided with a coarse adjustment scale 112, Figs. 3 and 20, similar to the horizontal scale 86 just described, for indicating the vertical travel, in inches, of the plate holder. Each scale includes a set of blocks 113, 114 arranged in staggered relation in a holder 115 which is pivotally secured at its lower end on the slide by a stud or bolt 116, and at its upper end, see Fig. 20 by a similar stud 117 which is fixed to the slide and passes loosely through a hole 118 in the scale. The scale has a pair of oppositely disposed adjusting screws 120 which engage opposite faces of the stud 117 so that by appropriately adjusting these screws, the scale may be given a slight lateral adjustment for alining it in true vertical relation to the horizontal scale 86. The front face of the scale is provided with graduations 122, and a fixed pointer 123 on the column 16 cooperating with the graduations indicates the travel, in inches, of the plate holder A′ as effected by

the sprocket chain 40 through the medium of the spiral gears 46 and 47 of the shaft 48.

A fine adjusting mechanism similar in construction and operation to the fine adjusting and registering mechanism for the horizontal movements of the carriage A and means for coupling this fine adjusting mechanism with and locking it to the vertical scale 112 are provided for effecting and indicating the final precise movement of the plate holder A'.

In the construction shown, this fine adjusting and registering mechanism includes a pair of vertical slides 125, one of which is arranged so slide up and down in suitable fixed guides 126 on each of the upright columns 16. Each slide is provided with a fixed, forwardly projecting bracket 127 having a vertically threaded aperture 128 in which turns a fine screw threaded portion 129 of a short vertical shaft 130. This shaft is journalled and prevented from endwise movement in a bearing sleeve 131 formed on the fixed bracket 49, before mentioned. A spiral gear 133 fixed to the shaft 130 is arranged to mesh with a corresponding spiral gear 135 fixed to a horizontal, transverse shaft 136 journalled at its opposite ends in the brackets 49, each end of the shaft being provided with means for engagement with a crank for turning it, the cranks 49a of the shaft 48 being detachable and available for this purpose. The upper end of the shaft 130 is provided with a scale or drum 140 graduated on its periphery in one hundred equal divisions so that when the shaft rotates the graduations will cooperate with a pointer 141 fixed to the bracket 127. The screw threaded portion 129 of the shaft 130 is also formed with ten threads to the inch so that when the shaft rotates, the bracket 127 will move lengthwise of the shaft and carry the slide 125 up and down therewith.

For coupling the slide 125 to the scale 112, the following mechanism is preferably employed.

Fixed to and movable with each slide 125, approximately on the horizontal center of adjustment of the plate holder A' is a casing or housing 145 in which is arranged a horizontally movable slide or bolt 146 having at its inner end a pair of fingers 147 adapted, when the slide is moved inwardly, to closely embrace that one of the blocks 114 of the scale 112, which at the time is alined therewith. The other end of the slide 146 is provided with rack teeth 148 which mesh with a gear sector 149 slidably keyed to the upper end of a vertical shaft 150. This shaft is journalled at its upper end in the casing 145 and is journalled at its lower end in the bracket 151 fixed to the upright column 16, and below the bracket 161, the shaft is provided with a forwardly projecting gear sector 152 meshing with a corresponding sector 153 fixed to a horizontal rock shaft 154 also journalled at its opposite ends in the carriage bracket 49. The opposite ends of the shaft are provided with levers 155 for rocking it. Thus by rocking the shaft 154, the vertical shafts 150 are turned so as to simultaneously move both bolts or slides 146 into and out of engagement with the corresponding scales 112, so that after the coarse adjustment of the plate holder has been effected, and the fine adjusting mechanism coupled to the scales 112, as just described, the actuation of the shaft 136 will cause both slides 125 to move up or down, and the plate holder raised or lowered. By keying the gear sector 149 to the shaft 150, this sector can remain in mesh with the rack teeth 148 of the bolt 146, while moving relatively to the shaft 150 during the travel of the slide 125.

As shown, the graduations 122 of the scales 112 read in opposite directions, or up and down from zero, which is midway of the ends of the scale, and when the slides 35, 125 are in their initial position, said zero graduation is approximately on the horizontal axis of the plate holder A' and coincident with the pointer 123. To effect an adjustment of the sensitized plate A, the shaft 48 is rotated to raise or lower the plate holder A' through the simultaneous movement of the slides 35 until the desired number of inches of travel are indicated by the scale 122 and pointer 123. Then, if it is desired to shift the carriage an additional, fractional part of an inch, the lock mechanism is actuated to couple the slides or bolts 146 to the scales 112, and by next rotating the shaft 136, the vertical slides 125 are moved, shifting with them the slides 35. This movement is continued until the scale drums 140, in cooperation with the pointers 141, indicate that the required distance has been travelled. The limit of endwise movement of the shaft 130 and therefore of each slide 125 is substantially one inch, so that by first moving the scale drum 140 to either its upper or lower position before coupling the slide 125 to the scale 112, the plate holder can be adjusted up or down a fraction of an inch when the mechanisms are coupled as described.

Preferably the slides 35 and the plate A' supported thereby are counterbalanced by a weight disposed within each of the hollow carriage uprights 16, each weight being attached to one end of a chain or cable 157 which passes over a guide sheave 158 at the top of the column and has its other end secured to the upper end of the adjacent slide 35.

The swing frame B is substantially like the swing frames shown in the various patents for photographic printing apparatus taken out by me, and comprises a substantially rectangular plate having a flat, vertical face 160 which, in the operative position of the frame is disposed opposite and in parallel relation to the sensitized surface of the

sheet metal plate X. The swing frame B is suitably reinforced by ribs and flanges and is formed with a central, circular aperture 161 around which the open end of the lamp housing I fits. Suitable hinges 162 pivotally connect the swing frame with and support it on one of the stationary uprights 12 of the main frame, the lamp housing I being in turn pivotally secured on these hinges by supplemental hinges 163 so that it may swing independently of the swing frame for permitting access to the lamp or source of illumination therein.

Suitable stop and lock means are provided for arresting the swing frame when it is moved to its operative position parallel with the plate carriage and for locking it in such position. The mechanism shown for this purpose comprises a pair of vertical oppositely movable, sliding bolts 165, 166, disposed with their respective upper and lower ends slidably engaging in guides 167 on the back of the swing frame B adjacent its free end. The inner ends of these bolts extend adjacent one another into a housing 169 fixed on the swing frame, and are therein provided with racks 168 which mesh with a pinion 170 journalled in said housing; see Fig. 19. Stationary stop blocks 171, 172 fixed to the upper member 25 and base housing 10 respectively of the main frame and having vertical stop faces 173 are disposed so that when the frame is swung to its closed position, the rear faces of the bolts 165, 166 will strike these stop faces and arrest the movement of the swing frame. The stop faces 173 each terminate in a recess 174 into which the outer ends of the bolts can be projected, by suitable means, as by turning a crank or lever 175 which is fixed to the shaft 176 of the pinion 170 outside the housing 169. The engagement of the ends of the bolts in the recesses 174 enables the swing frame to be properly positioned in the exact plane required, and prevents forward and rearward movements thereof.

In order to prevent sagging of the swing frame, such as would cause inaccurate positioning of the image on the printing plate X′, the frame is provided with guide and stop blocks 178, see Figs. 5 and 19, one of which is adjustably positioned for vertical movement in a recess 179 in a forwardly extending portion of each of the bolt guides 167, as by means of an adjusting stud 179*a* and locking screws 179*b*. The stop blocks 171, 172 are provided with forwardly extending projections each having a horizontal face 180 against which the face of the corresponding stop block is adapted to abut. The faces 180 of the stop blocks 171, 172 terminate in the inclined cam faces 181, so positioned that when the swing frame is moved to its closed position, the blocks 178 engage one or the other of the inclined faces 381 and the blocks are guided to and rest on the face 180, thus supporting the swing frame in its exact location. By appropriate adjustments of the blocks 178 the correct position of the swing frame is assured.

The rotary or index head E before mentioned, is in the form of a substantially flat plate having an outer circular peripheral edge portion 181 and a central rectangular aperture 182. The head is detachably secured against and bears on a finished circular track or rib 185 formed on the front face of the swing frame B, Fig. 16, so as to rotate about its axis on said head to effect desired angular adjustments of the printing plate. For rotatably supporting the swing frame, rollers 186 journalled in rockers 187 pivotally mounted on the swing frame are positioned to engage the circular edge 181 of the index head at opposite sides and below the center thereof. The index head E, see Fig. 28 is held against the track 185 of the swing frame by overhanging fingers or portions 188 on said rockers and similar fingers formed on guide blocks 189 which engage over the outer face of the head. The index head is rotated, see Fig. 28, by a pinion 190 journalled on the swing frame at one side of the head, and which meshes with a circular rack or external gear ring 191 formed on or adjacent the periphery of said head E. The gear 190 is turned by means of a pinion 192 having a stud shaft 193 formed for the reception of a suitable crank, not shown. When the index head has been rotated to the desired position, it is held therein by means of a suitable dog 195 which is movable into and out of engagement with the teeth of the gear ring 191 by a screw 196 on the swing frame, and which is adjustable tangentially relative to said head to provide a fine, accurate adjustment thereof.

The printing plate holder F, see Figs. 16 and 28, is substantially of usual construction and comprises a rectangular flat frame 200 having side and end members surrounding a central rectangular opening 201. The frame 200 is provided with adjustable clips 202 for engaging the bevelled edges of the printing plate X′ to position and hold the same in desired location thereof.

The gasket member G also comprises a rectangular frame including flat side and end bars 203, 204, bounding a rectangular opening 205. To the rearwardly directed faces of the frame bars there is secured a continuous flange or wall 206, the outer edge of which is provided with a rubber or other yielding gasket 207, which in the operative or printing position of the machine is intended to closely engage the face of the sheet metal plate X. The holder E is disposed within the flange 206 and is rigidly but releasably secured on the rear face of the gasket frame, by suitable leveling and holding means, not

shown, to enable the face of the printing plate to be placed in the plane of the face of the gasket, whereby it will engage the sensitized surface during exposures of the image.

The gasket frame G, as previously stated, is removably mounted on an intermediate printing plate supporting member H, which is also rectangular and preferably comprises a cast plate 210 having an opening 211 and a substantially flat rear face 212. A pair of dowels or studs 213 projecting from the face 212 are adapted to enter corresponding holes in the gasket frame for positioning this frame on said member H. The gasket frame G is releasably held in this position by rotatable fingers 215 pivoted on the member H, Figs. 16 and 28.

The rectangular openings 182, 211, 205 and 201 are of substantially the same size and are all alined to permit the passage of light through the printing plate to the sensitized surface.

The member H is accurately and detachably positioned on the rotary index head E by suitable means, such as a pair of studs or dowels 218, Fig. 16. As shown in Fig. 28, one of the dowels is disposed at each side of the opening 182, and to enable the studs to be accurately positioned on the major axis thereof, each stud is adjustably secured in an eccentric bushing 219, which is rotatable in an eccentrically disposed hole in another bushing 220, which in turn is rotatably disposed in a hole in the head E. The bushings are provided with adjusting screws 221, 222 respectively adapted to extend through any one of a plurality of radially disposed holes in flanges of the respective bushings and engage in threaded holes 223, 224. By appropriate rotation of the two bushings, the dowels 218 can be very accurately positioned, after which the bushings are held stationary by the screws 221 and 222. The dowels when adjusted are received in closely fitting holes 225 formed in wear plates 226 fixed to the member H.

For releasably holding the member H on the dowels 218, locking pins 230 are used, which extend rearwardly through holes 231 in the index head E and through apertures 232 in the member H. Each pin 230 is rigidly but releasably secured in the aperture 232, as by a fixed collar 233 on the pin which is drawn against a shoulder 234 in said aperture by a lock nut 235 which engages the threaded outer end of the pin and bears against the rear face 212 of said member H.

In the construction shown, means are provided for yieldingly forcing the member H away from the sheet metal plate towards the rear face of the index head E to provide clearance between the plates during adjustments of the sheet metal plate carriage A or the plate holder A', and mechanism of novel construction is also provided for forcing the member H, gasket frame G and printing plate holder F, as a unit in an opposite direction, or away from said face in opposition to the action of said yielding means, and for accurately placing said printing plate face X' in the plane of and in contact with the sensitized surface of the metal plate X.

The yielding means referred to preferably comprises an expansion coil spring or the like 238, see Fig. 16, surrounding each pin 230 within the hole 231 and bearing at one end against adjustable tensioning nuts 239 threaded on the front end of the pin, and at its rear end against a guide bushing 240 surrounding the pin 230 and which is fixed to the rear face of the rotary index head. In the retracted position of the member H and parts supported thereby, the guide bushing 240 enters the aperture 232. The pin 230 has a fixed stud 241 which engages and slides in a slot 242 in the bushing 240 to prevent rotation of the pin and possible loosening of the lock nut 235.

The novel printing plate clearance mechanism includes a plurality of rearwardly projecting studs 245 disposed in spaced relation on the index head E, and preferably in a circle concentric with the axis of rotation thereof. These studs are adapted to have endwise movement relative to said index head, and for this purpose each stud 245, see Figs. 16 and 18, has a cylindrical body portion 246 slidingly arranged in a corresponding aperture 247 in a guide member or bushing 248 stationarily secured in a hole 249 extending through the head E. The aperture 247 terminates at its rear end in a reduced threaded portion 250, and the rearwardly projecting portion 251 of the stud 245 is threaded to extend through and turn in said portion 250 for imparting lengthwise movements to said stud. The extreme rear end of the stud bears against a flat face 252 of a hardened disk secured in the member H with said face 252 disposed substantially in the plane of the front face 253 of said member.

It will be seen that if all of the studs 245 are simultaneously rotated, for instance, in a direction to retract their threaded portions 250, the member H will follow the studs and move away from the printing plane, due to the action of the springs 238, while a reverse rotation of the studs will move said member toward the printing plane against the action of said springs.

The means provided for effecting such simultaneous rotation of the studs 245 includes a gear pinion 255 fixed to the rear end of the body portion 246 of each stud, these pinions all being disposed so as to mesh with a circular, internal gear ring 256 mounted on the rear face of the index head E concentric with its axis and which is adapted to have independent rotation relative to said head. The teeth of said ring are of such width that

the pinions 255 will remain in mesh therewith during the endwise movements of the studs 245.

The gear ring 256 can be rotatably supported on the rotary head E in any suitable manner, as by fingers or projections 259 engaging over a peripheral flange 260 on said ring, said fingers being formed on blocks 261, secured to the head. Each block 261 is provided with a pivoted roller 262 which bears against the circular edge of said flange 260, thus providing an anti-friction support on which the ring can turn freely.

The mechanism for causing the rotation of said gearing 256 and simultaneous actuation of the pinions 255, preferably includes means for accurately indicating in small fractions of an inch or other unit of measure, the forward and rearward movement of the printing plate as effected by the endwise movement of the studs 245, Figs. 4, and 16–18.

This mechanism is preferably arranged at the front of the swing frame B where it is readily accessible for actuation, and includes a casing or housing 265 fixed to the swing frame, preferably adjacent the left hand stationary post 12 of the main frame C. Journalled in one side of the casing is a transverse, horizontal shaft 266, and secured thereon, interiorly of said casing is a spiral gear 267 meshing with a corresponding gear 268. The gear, together with a spur pinion 269 is formed respectively on the front and rear ends of a sleeve 270, journalled to rotate about a fixed horizontal shaft 271 extending through the open rear end of said casing into a hole in a supporting bracket or member 272 fixed to the face of the swing frame B. The shaft is rigidly secured in said supporting member by a pin or key 273.

Formed on or secured to one side of the supporting member 272 and extending within the opening 161 of the swing frame B, there is a bearing 275 in which is journalled a longitudinal, horizontal stub shaft 276, on the front end of which is secured a gear wheel 277 arranged to mesh with the spur pinion 269 before mentioned. The rear end of said shaft is provided with a spur pinion 278 meshing with the gear ring 256.

It will be seen that by rotating the shaft 266, the gear ring 256 will be turned through the gear train described to simultaneously actuate all of the studs 245.

The clearance movement of the printing plate, through the mechanism described is preferably a predetermined, fixed distance, for example, one-half inch, the extreme forward position being located by the engagement of the body portions 246 of the studs with the bottoms of the apertures 247, while the rearward movement of the parts is limited, and the retracted position thereof is secured by means of a flat, forwardly projecting head 258 on each of the guide bushings 248 which is disposed so as to be engaged by the faces 252 on the member H.

The means shown for indicating this movement of the printing plate X′ towards and from the printing plane through the lengthwise movement of the studs 245, see Fig. 17, includes a gear 280 arranged in the casing 265 and adapted to be rotated by the movements of the spiral gear 268. This gear 280 is fixed to the inner end of a stud or short shaft 281 journalled in the hub of a dial 282 fixed to the front of the casing 265. The stud 281 has a finger or pointer 283 fixed to its front end and which is adapted to rotate past graduations 284 on the dial. For rotating the pointer 283, the gear 280 is disposed in mesh with a small pinion 285 fixed on a stud 286 rigidly secured on the axis of the shaft 270 in a cap or spider 287. This cap 287 surrounds the front end of the shaft 271 and is fixed to a bearing shell 288 which is attached to the spiral gear 268 and carries a ball bearing 289 rotatably embracing the front end of the shaft 271 and which is held against a shoulder 290 on said shaft as by a collar 291. Thus the pinion 285 turns with the gear 268 and the ratio of the gearing described is such that the pointer 283 makes one complete revolution for the full half inch of travel of the printing plate and, as the dial 282 is of ample size, relatively widely spaced and easily read graduations 284 can be used to accurately indicate small movements of the screw studs 245. The shaft 266 can be turned in any suitable manner, the means shown comprising a transverse, horizontal operating shaft 295 which is journalled and has a limited endwise movement in a bearing bracket 296 fixed to the upright post 12 adjacent the casing 265. The shaft 295 is alined with the shaft 266 and has a clutch member on one end adapted to engage a corresponding member on the adjacent end of said shaft 266, when the shaft 295 is moved to the right, Fig. 4, to couple the two shafts together. For rotating the connected shafts, the left hand end of the shaft 295 is provided with a crank handle 297. Any other suitable means can be employed for actuating the clearance mechanism.

For effecting the necessary close and intimate contact between the printing and sensitized surfaces, suction is made use of, in the present apparatus, hence the provision of the gasket strip 207 on the member G, which engages the surface of the sheet metal plate X around about the printing plate X′. Since the walls or flanges 206 of said member G are at a distance from the edges of the plate holder F, a chamber 300 is formed in which the suction can be maintained. The inner adjacent edges of the plate holder and gasket member are preferably covered by a strip of adhesive tape or other sealing member 301, Fig. 16 to prevent loss of suction.

The gasket member G is provided with suit-

able connections 302 for attachment to a hose or conduit 303 leading to the source of suction. There are preferably four of these connections, one for each side of the member. Each connection comprises a fitting secured to the outer side of the wall 206 and having a hole extending therethrough, which registers with a corresponding hole in said wall.

As shown in Fig. 28, a hose 303 is attached to one of the connections 302, while the other connections are each closed by a plug 305. By this arrangement, the hose can be attached to any one of the connections which happens to be positioned near the hose, in the various adjustments of the member G through the rotation of the index head.

By employing the pivotally mounted horizontal registering rack scale 86 and the vertical registering rack scale 113—114 and associated adjusting means, as previously described, I am enabled to positively insure that the two registering scales are exactly at right angles to each other, to thereby compensate for any inaccuracies that there may be in the machining or assembling of the parts of the machine and thus in turn insure absolutely accurate positioning, both horizontally and vertically, of the sensitized plate with respect to the printing plate.

I claim as my invention:

1. In a photographic printing apparatus, the combination with a holder adapted to carry a sensitized plate; of a support adapted to carry a printing plate, said support being movable to an operative position with respect to said holder; a member on which the printing plate is adapted to be detachably secured and held on said support, said member being movable relative to said support toward and from said holder to thereby place the printing plate into and out of contact with the sensitized plate; means for permitting such movement including resilient means for yieldingly moving said member towards said support for placing the printing and sensitized plates out of contact, and adjustable means for forcing said member towards said holder against the action of said resilient means for placing the plates into contact.

2. In a photographic printing apparatus, the combination with a holder adapted to carry a sensitized plate; of a support adapted to carry a printing plate, said support being movable to an operative position with respect to said holder; a member on which the printing plate is adapted to be detachably secured and held on said support, said member being movable relative to said support toward and from said holder to thereby place the printing plate into and out of contact with the sensitized plate; a sliding connection between said member and said support and including resilient means for yieldingly moving said member towards said support for placing the printing and sensitized plates out of contact, and adjustable means for forcing said member towards said holder against the action of said resilient means for placing the plates into contact.

3. In a photographic printing apparatus, the combination with a holder adapted to carry a sensitized plate; of a support adapted to carry a printing plate, said support being movable to an operative position with respect to said holder; a member on which the printing plate is adapted to be detachably secured and held on said support, said member being movable relative to said support toward and from said holder to thereby place the printing plate into and out of contact with the sensitized plate; means for permitting such movement including resilient means for yieldingly holding said member against said support with the printing plate out of contact with the sensitized plate, and mechanism for moving said member away from said support against the action of said resilent means for a predetermined distance to place the printing plate into contact with the sensitized plate.

4. In a photographic printing apparatus, the combination with a holder adapted to carry a sensitized plate; of a support adapted to carry a printing plate, said support being movable to an operative position with respect to said holder; a member on which the printing plate is adapted to be detachably secured and held on said support, said member being movable relative to said support toward and from said holder to thereby place the printing plate into and out of contact with the sensitized plate; means for permitting such movement including resilient means for yieldingly holding said member against said support with the printing plate out of contact with the sensitized plate, mechanism for moving said member away from said support to place the printing plate into contact with the sensitized plate, and stop means on said support for limiting the movement of said member in each direction after it has moved a predetermined distance.

5. In a photographic printing apparatus, the combination with a holder adapted to carry a sensitized plate; of a supporting member adapted to carry a printing plate, said supporting member being movable to an operative position with reference to said holder; an auxiliary member on which the printing plate is adapted to be detachably secured and held on said supporting member, the auxiliary member being movable relative to the supporting member toward and from said holder to thereby place the printing plate into and out of contact with the sensitized plate; resilient means for yieldingly holding said auxiliary member against said supporting member, adjustable parts on one of said members adapted to bear against said other member, and means for actuating

ts to force said auxiliary member
m said other member against the ac-
aid resilient means to place the print-
te into contact with the sensitized

n a photographic printing apparatus,
ombination with a holder adapted to
y a sensitized plate; of a supporting mem-
adapted to carry a printing plate, said
pporting member being movable to an
perative position with reference to said
holder; an auxiliary member on which the
printing plate is adapted to be detachably
secured and held on said supporting member,
the auxiliary member being movable relative
to the supporting member toward and from
said holder to thereby place the printing plate
into and out of contact with the sensitized
plate; resilient means for yieldingly hold-
ing said auxiliary member against said sup-
porting member, a plurality of spaced studs
each having screw threaded engagement with
one of said members and each disposed with
a part bearing against said other member,
and means for simultaneously rotating all of
said studs to cause a lengthwise movement
thereof to move said other member towards
said plate holder in opposition to the action
of said resilient means for placing the print-
ing plate into contact with the sensitized
plate.

7. In a photographic printing apparatus, the combination with a holder adapted to carry a sensitized plate; of a supporting member adapted to carry a printing plate, said supporting member being movable to an operative position with reference to said holder; an auxiliary member on which the printing plate is adapted to be detachably secured and held on said supporting member, the auxiliary member being movable relative to the supporting member toward and from said holder to thereby place the printing plate into and out of contact with the sensitized plate; resilient means for yieldingly holding said auxiliary member against said supporting member, adjustable parts on one of said members adapted to bear against said other member, and mechanism on said supporting member for actuating said parts to force said auxiliary member away from said supporting member against the action of said resilient means to move the printing plate towards the sensitized plate, said mechanism being arranged to move said auxiliary member a predetermined distance and having means for indicating with precision the travel of said member.

8. In a photographic printing apparatus, the combination with a holder adapted to carry a sensitized plate; of a support adapted to carry a printing plate, the support being movable to an operative position relative to said holder; an index head rotatably mounted on said support, a member on which the printing plate is adapted to be detachably secured and which is held on said index head so as to turn therewith for angularly adjusting said plate relative to the sensitized plate, a sliding connection between said index head and said member including resilient means for yieldingly holding said member against said head, and adjustable means on said index head for forcing said member away from said head against the action of said resilient means to place the printing plate into contact with the sensitized plate.

9. In a photographic printing apparatus, the combination with a holder adapted to carry a sensitized plate; of a support adapted to carry a printing plate, the support being movable to an operative position relative to said holder; an index head rotatably mounted on said support, a member on which the printing plate is adapted to be detachably secured and which is held on said index head so as to turn therewith for angularly adjusting the plate relative to the sensitized plate, a connection between said head and said member which permits said member to move relatively to said head toward and from said plate holder, a plurality of spaced adjustable parts on said head arranged to bear against said member, and means on said support for simultaneously adjusting said parts to move said member towards and from the plate holder to place the printing plate into and out of contact with the sensitized plate.

10. In a photographic printing apparatus, the combination with a holder adapted to carry a sensitized plate; of a support adapted to carry a printing plate, the support being movable to an operative position relative to said holder; an index head rotatably mounted on said support, a member on which the printing plate is adapted to be detachably secured and which is held on said index head so as to turn therewith for angularly adjusting the plate relative to the sensitized plate, a connection between said head and said member which permits said member to move relatively to said head toward and from said plate holder, a plurality of spaced studs each having screw threaded engagement in said index head and having a part bearing against said member, a rotatable part on said head engaging said studs for simultaneously turning the same to effect an endwise movement thereof relative to said index head to move said member towards and from said plate holder to place the printing plate into and out of contact with the sensitized plate, and mechanism on said support for actuating said rotatable part.

11. In a photographic printing apparatus, the combination with a holder adapted to carry a sensitized plate; of a support adapted to carry a printing plate, the support being movable to an operative position relative to said holder; an index head rotatably mounted

on said support, a member on which the printing plate is adapted to be detachably secured and which is held on said index head so as to turn therewith for angularly adjusting the plate relative to the sensitized plate, a connection between said head and said member which permits said member to move relatively to said head toward and from said plate holder, a plurality of studs spaced concentrically about the axis of and having threaded engagement in said index head, and each having a part bearing against said member, a part mounted on said head to rotate independently thereof and which engages said studs to simultaneously turn the same to effect an endwise movement thereof to move said member towards and from said plate holder to place the printing plate into and out of contact with the sensitized plate, and mechanism on said support for actuating said rotatable part.

12. In a photographic printing apparatus, the combination with a holder adapted to carry a sensitized plate; of a support adapted to carry a printing plate, the support being movable to an operative position relative to said holder; an index head rotatably mounted on said support, a member on which the printing plate is adapted to be detachably secured and which is held on said index head so as to turn therewith for angularly adjusting the plate relative to the sensitized plate, a connection between said head and said member which permits said member to move relatively to said head toward and from said plate holder, a plurality of spaced studs each having screw threaded engagement in said index head and having a part bearing against said member, a pinion on each of said studs, a gear ring mounted on said head to rotate independently thereof and which meshes with said pinions to drive the same and effect a simultaneous endwise movement of said studs to move said member towards and from said plate holder to place the printing plate into and out of contact with the sensitized plate, and means for rotating said gear ring.

13. In a photographic printing apparatus, the combination with a holder adapted to carry a sensitized plate; of a support adapted to carry a printing plate, the support being movable to an operative position relative to said holder; an index head rotatably mounted on said support, a member on which the printing plate is adapted to be detachably secured and which is held on said index head so as to turn therewith for angularly adjusting said plate relative to the sensitized plate, a connection between said head and said member which permits said member to move relatively to said head towards and from said plate holder, a plurality of spaced studs each having screw threaded engagement in said index head and having a part bearing against said member, a rotatable part on said head engaging said studs for simultane
ing the same to effect an endwise
thereof relative to said index heac
said member towards and from sa
holder to place the printing plate into
of contact with the sensitized pla
means for limiting the movement o
member in both directions, means for in
ing the travel of the printing plate tov
and from the sensitized plate, and mecha
for actuating said rotatable part.

14. In a photographic printing apparati
the combination with a holder adapted t
carry a sensitized plate; of a support adapted
to carry a printing plate, the support being
movable to an operative position relative to
said holder; an index head rotatably mounted
on said support, a member on which the printing plate is adapted to be detachably secured and which is held on said index head so as to turn therewith for angularly adjusting the plate relative to the sensitized plate, a connection between said head and said member which permits said member to move relatively to said head toward and from said plate holder, a plurality of spaced studs each having screw threaded engagement in said index head and having a part bearing against said member, a rotatable part on said head engaging said studs for simultaneously turning the same to effect an endwise movement thereof relative to said index head to move said member towards and from said plate holder to place the printing plate into and out of contact with the sensitized plate, stop means on said index head arranged to be engaged by said member as it moves in a direction away from said plate holder to limit its travel in that direction, and stop means on said head which is engaged by a part on each stud to arrest the movement thereof as the printing plate engages the sensitized plate, and mechanism for actuating said rotatable part.

15. In a photographic printing apparatus, the combination with a holder adapted to carry a sensitized plate; of a support adapted to carry a printing plate, the support being movable to an operative position relative to said holder; an index head rotatably mounted on said support, a member on which the printing plate is adapted to be detachably secured and which is held on said index head so as to turn therewith for angularly adjusting the plate relative to the sensitized plate, a connection between said head and said member which permits said member to move relatively to said head toward and from said plate holder, a plurality of spaced studs each having screw threaded engagement in said index head and having a part bearing against said member, a rotatable part on said head engaging said studs for simultaneously turning the same to effect an endwise movement thereof relative to said index head to move said mem-

ber towards and from said plate holder to place the printing plate into and out of contact with the sensitized plate, a stop face on said index head against which said member abuts to limit its movement away from said plate holder, stops on said head against which a part on each of said studs abuts to limit the movement of said member towards said holder coincident with the engagement of the printing and sensitized plates, mechanism for actuating said rotatable part, and means actuated by said mechanism for indicating the travel of said member towards and from said plate holder.

16. In a photographic printing apparatus, the combination with a holder adapted to carry a sensitized plate; of a support adapted to carry a printing plate, the support being movable to an operative position relative to said holder; an index head rotatably mounted on said support, a member on which the printing plate is adapted to be detachably secured and which is held on said index head so as to turn therewith for angularly adjusting the plate relative to the sensitized plate, a connection between said head and said member which permits said member to move relatively to said head toward and from said plate holder, a plurality of spaced studs each having screw threaded engagement in said index head and having a part bearing against said member, a pinion on each of said studs, a gear ring mounted on said head to rotate independently thereof, and which meshes with said pinions to drive the same and effect a simultaneous endwise movement of said studs to move said member towards and from said plate holder to place the printing plate into and out of contact with the sensitized plate, stop means for arresting the movement of said member when it has travelled a predetermined distance in either direction, mechanism on said support for engaging and rotating said gear ring, and means actuated by said mechanism for indicating the travel of said member.

17. In a photographic printing apparatus, the combination with a holder adapted to carry a sensitized plate; of a support adapted to carry a printing plate, the support being movable to an operative position relative to said holder; an index head rotatably mounted on said support, a member on which the printing plate is adapted to be detachably secured and which is held on said index head so as to turn therewith for angularly adjusting said plate relative to the sensitized plate, a connection between said head and said member which permits said member to move relatively to said head toward and from said plate holder, a plurality of spaced studs each having screw threaded engagement in said index head and having a part bearing against said member, a pinion on each of said studs, a gear ring mounted on said head to rotate independently thereof and which meshes with said pinions to drive the same and effect a simultaneous endwise movement of said studs to move said member towards and from said plate holder to place the printing plate into and out of contact with the sensitized plate, stop means for arresting the movement of said member when it has travelled a predetermined distance in either direction, gear mechanism on said support including a gear which meshes with and drives said gear ring, a fixed dial on said support and a pointer which is connected to and rotates with said gear mechanism and moves past said dial for indicating the travel of said member.

18. In a photographic printing apparatus, the combination with a holder adapted to carry a sensitized plate; of a support adapted to carry a printing plate, the support being movable to an operative position relative to said holder; an index head rotatably mounted on said support, a member on which the printing plate is adapted to be detachably secured and which is held on said index head so as to turn therewith for angularly adjusting the plate relative to the sensitized plate, a connection between said head and said member which permits said member to move relatively to said head toward and from said plate holder, a plurality of spaced studs each having screw threaded engagement in said index head and having a part bearing against said member, a pinion on each of said studs, a gear ring mounted on said head to rotate independently thereof and which meshes with said pinions to drive the same and effect a simultaneous endwise movement of said studs to move said member towards and from said plate holder to place the printing plate into and out of contact with the sensitized plate, means for rotating said gear ring, said gear ring and said endwise movable studs being adapted to be carried with said index head in the rotation thereof without movement relative thereto, whereby the adjustment of said printing plate as effected by said studs and gear ring will remain unchanged.

19. In a photographic printing apparatus, the combination of a base, a support for a sensitized plate, a support for a photographic printing plate, a carriage on which said first support is mounted and which is movable on said base relative to said second support for placing different portions of said sensitized plate opposite the printing plate, means for moving said carriage including a rack bar thereon, driving mechanism on said base including a pinion meshing with said rack bar, a drum having spirally disposed graduations on its periphery and which is rotatable in accordance with the rotation of said pinion, said drum being also movable lengthwise in either direction as it rotates, an indicator past which said graduations move in the travel of said drum to indicate, in units of measure,

the travel of said carriage, a scale connected to said rack bar and comprising a plurality of accurately spaced parts of like dimension and representing units of measure corresponding to said other units, a coupling member on said base which is arranged to be engaged with said scale, and mechanism adapted, when said coupling member is engaged with said scale to move said carriage fractional parts of said unit of measure.

20. In a photographic printing apparatus, the combination of a base, a support for a sensitized plate, a support for a photographic printing plate, a carriage on which said first support is mounted and which is movable on said base relative to said second support for placing different portions of said sensitized plate opposite the printing plate, means for moving said carriage including a rack bar thereon, driving mechanism on said base including a pinion meshing with said rack bar, a drum having spirally disposed graduations on its periphery and which is rotatable in accordance with the rotation of said pinion, said drum being also movable lengthwise in either direction as it rotates, an indicator past which said graduations move in the travel of said drum to indicate, in units of measure, the travel of said carriage, a scale connected to said rack bar and comprising a plurality of accurately spaced parts of like dimension and representing units of measure corresponding to said other units, a slide mounted on said base and which is adapted to have a limited endwise movement in either direction parallel with the plane of movement of said carriage, a coupling member mounted in said slide to move transversely thereof into and out of engagement with said scale, and mechanism adapted, when said coupling member is engaged with said scale, to effect an endwise movement of said slide to shift said carriage fractional parts of said unit of measure, and means for indicating such movement.

21. In a photographic printing apparatus the combination of a base, a support for a sensitized plate, a support for a photographic printing plate, a carriage on which said first support is mounted and which is movable on said base relative to said second support for placing different portions of said sensitized plate opposite the printing plate, means for moving said carriage including a rack bar thereon, driving mechanism on said base including a pinion meshing with said rack bar, a straight track on which said carriage travels, means for adjustably mounting said rack bar on said carriage for positioning the same in parallel relation to said track, said means including a plate on which said rack bar is rigidly secured, a pivot disposed on said carriage and extending and fitting into a hole in said plate between its ends, and adjusting devices on said carriage engaging the opposite ends of said plate and which are adapted to be manipulated to rock said plate and its rack bar about said pivot.

22. In a photographic printing apparatus the combination of a base, a support for a sensitized plate, a support for a photographic printing plate, a carriage on which said first support is mounted and which is movable on said base relative to said second support for placing different portions of said sensitized plate opposite the printing plate, means for moving said carriage including a rack bar thereon, driving mechanism on said base including a pinion meshing with said rack bar, a straight track on which said carriage travels, means for adjustably mounting said rack bar on said carriage for positioning the same in parallel relation to said track, said means including a plate on which said rack bar is rigidly secured, a pivot disposed on said carriage and extending and fitting into a hole in said plate between its ends, adjusting devices on said carriage engaging the opposite ends of said plate and which are adapted to be manipulated to rock said plate and its rack bar about said pivot, said pivot being mounted so as to have a limited movement in a direction perpendicular to said rack bar, whereby said rack bar can also move towards and from said driving pinion to correctly position said rack bar relative thereto.

23. In a photographic printing apparatus the combination of a base, a support for a sensitized plate, a support for a photographic printing plate, a carriage on which said first support is mounted and which is movable on said base relative to said second support for placing different portions of said sensitized plate opposite the printing plate, means for moving said carriage including a rack bar thereon, driving mechanism on said base including a pinion meshing with said rack bar, a straight track on which said carriage travels, means for adjustably mounting said rack bar on said carriage for positioning the same in parallel relation to said track, said means including a plate on which said rack bar is rigidly secured, a pivot disposed on said carriage and extending through and fitting a hole in said plate between its ends, adjusting devices on said carriage engaging the opposite ends of said plate and which are adapted to be manipulated to rock said plate and its rack bar about said pivot, said pivot being secured in a part arranged to have a limited sliding movement on said carriage in a direction perpendicular to said rack bar, whereby said rack bar can also move towards and from said driving pinion to correctly position said rack bar relative thereto.

24. In a machine of the character described, the combination with a support; of a carriage slidably mounted on said support to move back and forth in one direction; a registering scale rack associated with said car-

riage; means for adjusting the scale rack for alining the same with the line of movement of said carriage; devices cooperable with said rack for locking engagement therewith; and means for effecting adjustment of the carriage through said rack when locked with said devices.

25. In a machine of the character described, the combination with a base; of a carriage slidably mounted on said base to move back and forth in one direction; plate-holding means mounted on said carriage to move in a direction at right angles to said first named direction; a registering scale rack associated with said plate-holding means extending in the direction of line of movement thereof; means for angularly adjusting said registering scale rack whereby to accurately dispose the same parallel to the line of movement of said plate-holding means; devices cooperable with said rack for locking engagement therewith; and means for effecting adjustment of the carriage through said rack when locked with said devices.

26. In a machine of the character described, the combination with a base; of a carriage slidably mounted on said base in one direction; a registering scale rack associated with said carriage and extending parallel to the line of movement of said carriage; plate-holding means slidably mounted on said carriage to move in a direction at right angles to said first mentioned direction; a scale register rack associated with said plate-holding means and extending parallel to the line of movement thereof; means for angularly adjusting each of said register racks whereby to accurately dispose the same exactly at right angles to each other; devices cooperable with each of said racks for locking engagement therewith; and means for effecting adjustments of said carriage and plate holding means respectively when said devices are interlocked with the respective racks.

27. In a machine of the character described, the combination with a base; of a carriage slidably mounted to move in one direction thereon; opposed independent slides adapted to have a plate holder detachably secured thereto, said slides being slidably mounted on said carriage to move in a direction at right angles to the line of movement of the carriage; and common operated means mounted on and movable as an entirety with the carriage for moving said slides back and forth simultaneously and uniformly on said carriage.

28. In a machine of the character described, the combination with a base; of a carriage slidable on said base in one direction; opposed independent slides slidably mounted on said carriage to move in a direction at right angles to the line of movement of the carriage, said slides being adapted to detachably support a plate holder; means for effecting simultaneously slidable movement of said slides, said means including adjustable devices whereby the position of one slide with respect to the other may be adjusted to effect accurate positioning of the plate holder thereon with respect to the line of travel of said slides.

29. In a machine of the character described, the combination with a base; of a carriage slidably mounted on said base to move back and forth in one direction; opposed slides slidably mounted on said carriage to move in a direction at right angles thereto, said slides being adapted to have a plate holder detachably secured thereto; common operated means for effecting simultaneous and uniform movement of said slides, said means including a cable connection running to each slide; and means for adjustably varying the effective connection between each cable and the common operator therefor.

30. In a machine of the character described, the combination with a supporting frame; of means for supporting a press plate in operative position on said frame; a printing plate support; an auxiliary support mounted on said first named support; means for angularly adjusting said auxiliary support with reference to the first named support; a printing plate holder proper mounted on said auxiliary support and movable in unison therewith; a vacuum sealing frame on said auxiliary support; and means for adjusting said auxiliary support toward and from the first named plate holder whereby to effect sealed contact between said vacuum sealing frame and a plate mounted in said first named means.

31. In a machine of the character described, the combination with a frame; of a printing plate support hinged to said frame and adapted to swing to and from operative position; and cooperable centering and supporting means carried by said frame and the free end of the hinged support, said means being adjustable toward and from each other to vary the effective distance therebetween whereby the free end of the hinged support is accurately positioned and supported when the support is in operative position.

32. In a machine of the character described, the combination with a supporting frame; of means for supporting a press plate in operative position on said frame; a printing plate support; an auxiliary support mounted on said first named support; means for angularly adjusting said auxiliary support with reference to the first named support; a printing plate holder proper mounted on said auxiliary support and movable in unison therewith; and means for adjusting said auxiliary support toward and from the first named plate holder whereby to effect

contact or clearance between the press plate and printing plate.

33. In a machine of the character described, the combination with a supporting frame; of means for supporting a press plate in operative position on said frame; a printing plate support; a printing plate holder mounted on said support; vacuum sealing means carried by said support; means for angularly adjusting the printing plate holder with reference to the printing plate support; and devices for adjusting said vacuum sealing means toward and from the press plate whereby to effect sealed contact therewith.

34. In a photographic printing apparatus, the combination with a main frame; of a main carriage mounted on said main frame to move back and forth in one direction; a rack mounted on said carriage and arranged parallel to said line of movement; devices supported on said main frame adapted to interlock with said rack; means for adjusting said devices, while interlocked with said rack, parallel to said line of movement of the carriage; a sub-carriage slidably mounted on said main carriage to move back and forth in a direction at right angles to the first mentioned line of movement; a rack movable in unison with said sub-carriage and arranged parallel to the line of movement of the sub-carriage; devices mounted on the main carriage adapted to interlock with said sub-carriage rack; and means for adjusting said last named devices, while locked with the sub-carriage rack in a direction parallel to the line of movement of the sub-carriage.

WILLIAM C. HUEBNER.