

July 9, 1940.

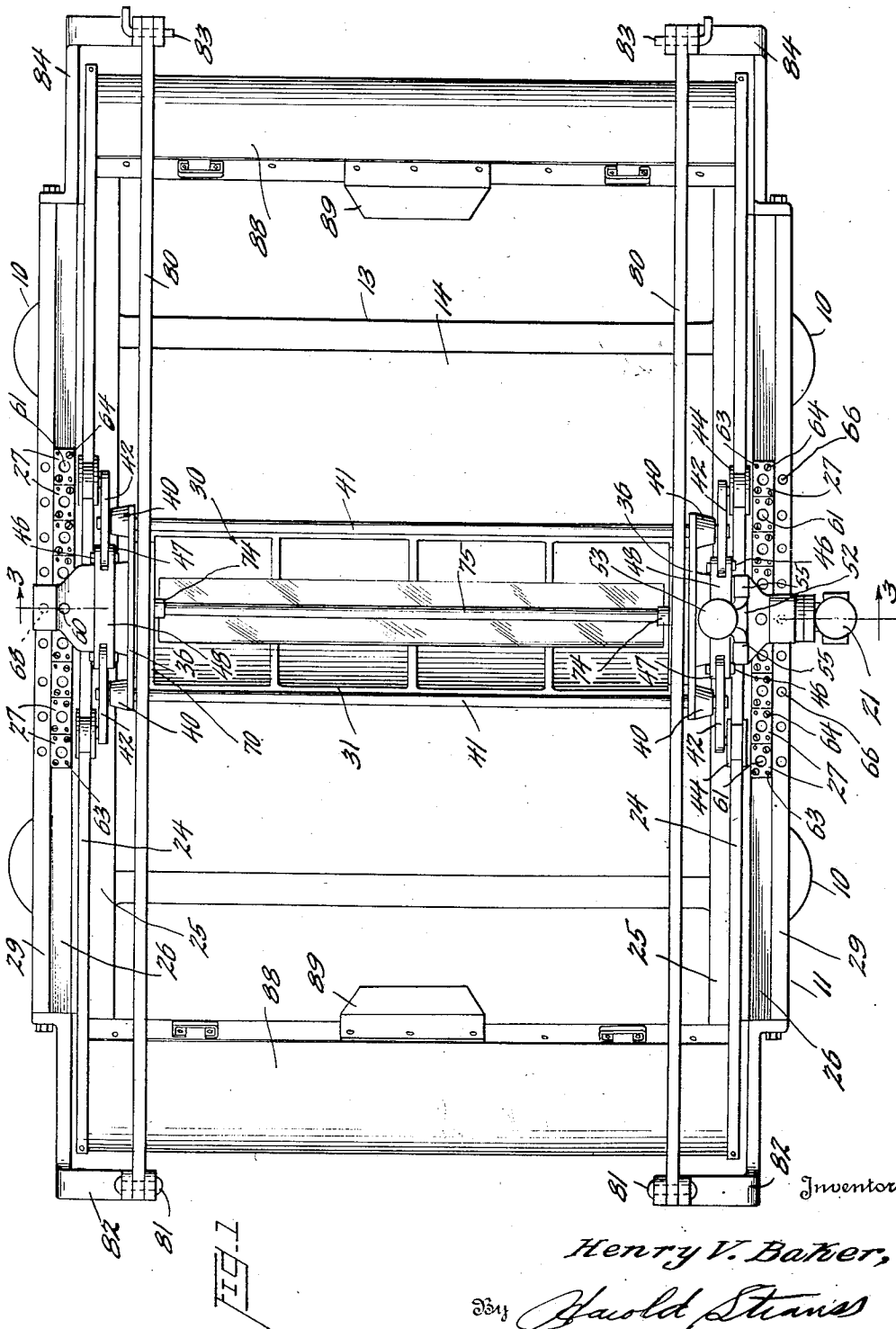
H. V. BAKER

2,207,449

PHOTOPRINTING APPARATUS

Filed May 22, 1939

3 Sheets-Sheet 1



Attorney

July 9, 1940.

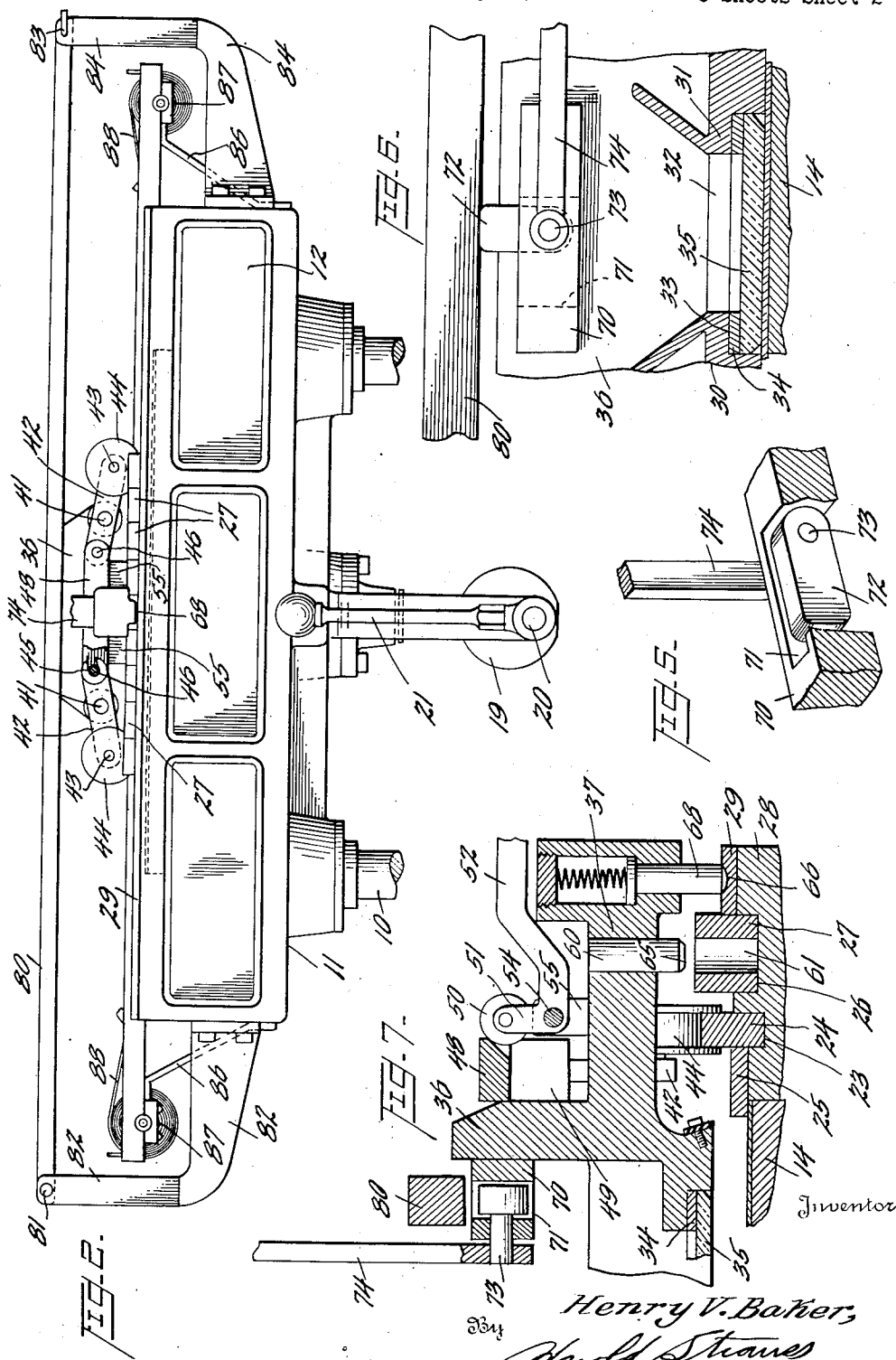
H. V. BAKER

2,207,449

PHOTOPRINTING APPARATUS

Filed May 22, 1939

3 Sheets-Sheet 2



July 9, 1940.

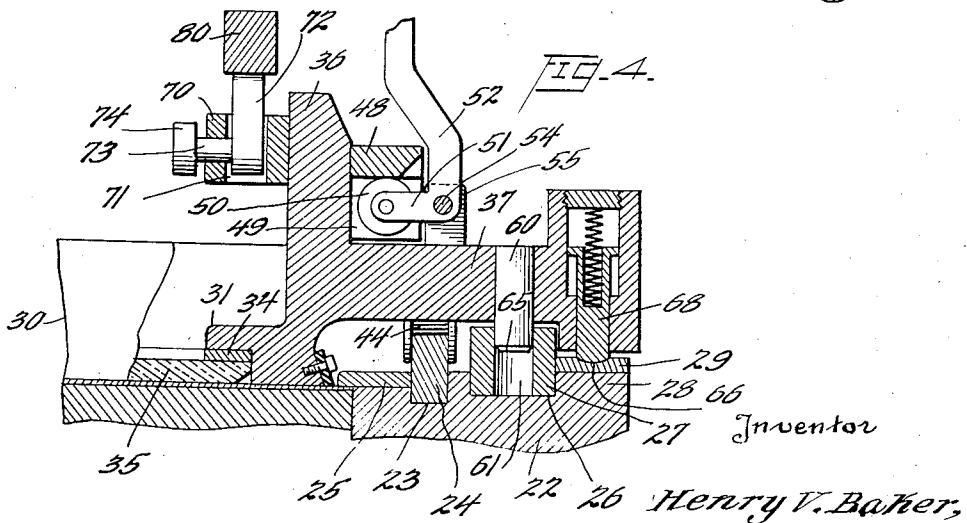
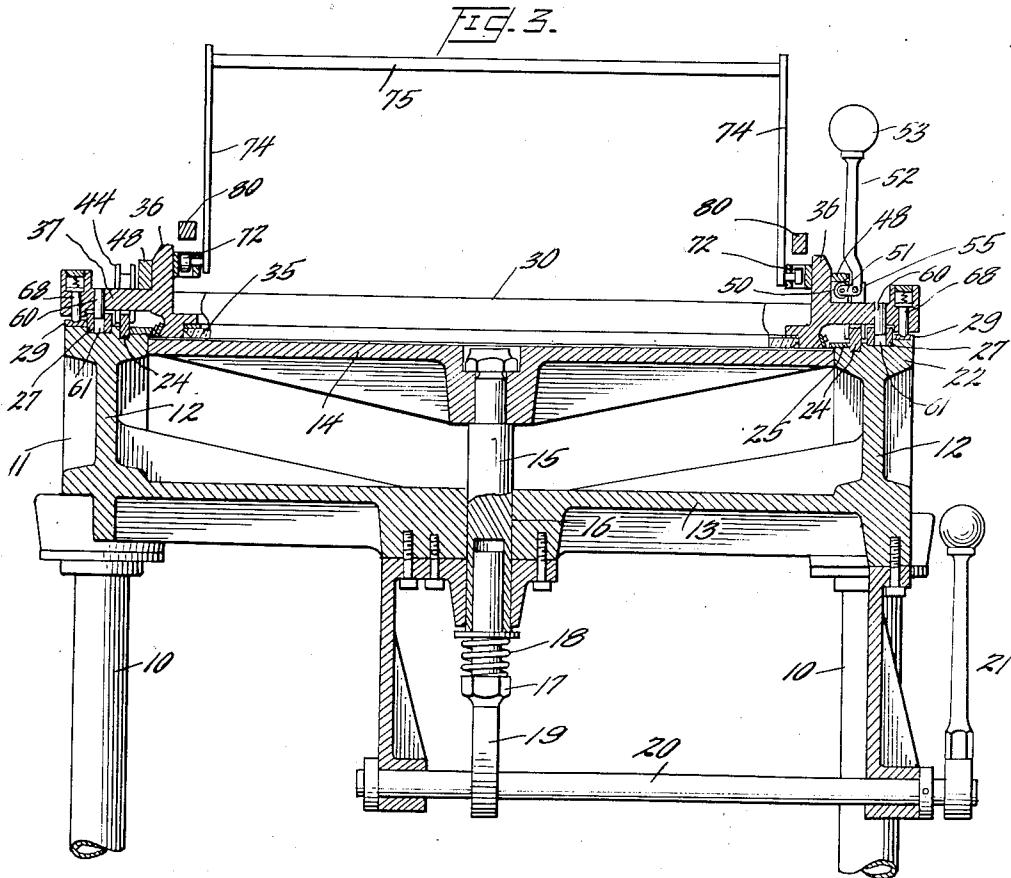
H. V. BAKER

2,207,449

PHOTOPRINTING APPARATUS

Filed May 22, 1939

3 Sheets-Sheet 3



Inventor
Henry V. Baker,
By *Harold Steiner*
Attorney

UNITED STATES PATENT OFFICE

2,207,449

PHOTOPRINTING APPARATUS

Henry V. Baker, Baltimore, Md.

Application May 22, 1939, Serial No. 275,076

9 Claims. (Cl. 95—73)

This invention relates to photo-printing apparatus for use in photo-engraving work and, more particularly, to improvements in such apparatus whereby the transparent negative may be accurately and successively positioned at a plurality of spaced stations above a photo-sensitive metal plate for printing a plurality of identical positives on the plate, each exactly spaced from the other by a predetermined amount, so that the reproductions printed from the plate, after processing, can be automatically severed from each other with the impression properly positioned on each unit portion.

The apparatus further permits the successive exposure of a plurality of negatives onto the same or different plates and in exact registry so that multicolor impressions can later be made.

It is a general object of the present invention to provide novel and improved photo-printing mechanism designed to provide simplicity of operation, positive and accurate positioning of the negative, and close contact between the negative and sensitized plate without the use of the customary vacuum-pressure arrangements.

An important feature of the invention consists in the provision of a negative carrier mounted for movement on tracks supported by a bed, on which the carrier may be simply elevated above a table for movement over the surface of the photo-sensitive plate on the table without damaging the plate and in which the elevation of the carrier, and its subsequent lowering, result in accurately positioning the carrier at its next adjacent position.

Another feature of the invention comprises the use of cooperating pins and holes on the carrier and bed for providing the final accurate relative location of the parts in their various positive positions, together with means for automatically locating the parts coarsely to provide automatic cooperation of the interlocking pins and holes when the carrier is lowered onto the table.

A still further object of the invention consists in the provision of rails overlying the carriage and supported by the table for cooperation with cams on the carriage for providing resilient pressure to effect close contact between the negative on the bottom of the carriage and the photo-sensitive plate mounted for vertical adjustment on a table carried by the bed.

Other and further features and objects of the invention, including simplicity of construction, cheapness, sturdiness and ease of operation by unskilled labor, will be more apparent to those skilled in the art by a consideration of the accom-

panying drawings and following specification, wherein is disclosed a single exemplary embodiment thereof, with the understanding that various modifications may be made therein as fall within the scope of the appended claims, without departing from the spirit of the invention.

In said drawings:

Fig. 1 is a plan view of a device constructed according to the present invention,

Fig. 2 is a side elevation thereof,

Fig. 3 is a central vertical section taken on line 3—3 of Fig. 1,

Fig. 4 is a fragmentary view on a larger scale of the carriage elevating and positioning mechanism shown at the upper right in Fig. 3,

Fig. 5 is a perspective view of a pressure cam and its mounting blocks,

Fig. 6 is a fragmentary vertical longitudinal section through the carriage showing a pressure cam in operation, and

Fig. 7 is a view similar to Fig. 4 but showing the carriage elevated for shifting.

The apparatus, which may be mounted on a suitable frame or support 10, comprises a bed casting 11, including side members 12 and a base spider 13.

A table 14, likewise a casting, fits closely between the side members 12 and is vertically adjustable therein. Its top surface is an exact plane for the support of the photo-sensitive metal plate adapted to be attached thereto in any well-known manner.

Elevation of the table permits adjustment of the plate for close contact with the negative and is accomplished by mounting the table on a central post 15, guided for vertical movement in the opening 16 in the central boss of the spider 13. An extension of the post 15, reduced in diameter, carries the cam follower 17 also forming a head to receive the helical spring 18 serving to urge the table to a downward position at all times. The follower 17 bears on an eccentric or cam 19 mounted on cross shaft 20, carried in suitable bearings depending from the bed, and rotatable by a lever 21 at one side of the machine.

The side members 12 of the bed are provided with broad top flanges 22 longitudinally grooved as at 23, Fig. 4, to receive the track members 24. Inside of each track member a strip 25 overhangs the inner edge of the flange to provide a vertical limit stop for the table 14. A second and parallel groove 26 provides accommodation for a plurality of metal blocks 27, which will be described in detail later. The elevated outer portion 28 of the flange receives a strip 29 of hardened metal.

A carriage 30 preferably cast as one piece, includes a central bridge portion 31 appropriately reinforced for rigidity and having the central transverse slot 32, the under surface of which is rabbeted as at 33 to receive the gasket 34 and the glass negative plate 35 from which the positives are printed. Any well-known means may be used to retain the positive plate in position in the carriage.

As seen in Figs. 3 and 4, the carriage is equipped with vertical end flanges 36, from which extend the blocks 37 overlying the flanges of the side members of the bed. At either end of each side flange 36 is an outwardly disposed boss 40 and the bosses on opposite flanges are drilled in alignment to receive shafts 41, each extending at the ends slightly beyond the respective bosses, and having rigidly attached thereto the levers 42, lying in planes parallel to and just within the track members. The ends of these levers, which are disposed away from the carriage, are each provided with an outwardly disposed pivot 43 on which is journaled a double-flanged wheel 44, arranged to straddle and run on the tracks 24, whereby the carriage may be moved along the bed to position the negative anywhere within the length of the photo-sensitive plate mounted on the table.

The inner end of each lever 42 is reinforced and forked as at 45 to fit over pin 46 extending between the furcations 47, one at each end of a block 48 movable vertically alongside of the outer face of the corresponding flange 36. The block 48 at the left of Fig. 3 is complete as described but that at the right is provided with a central cutout 49 open at the bottom only to accommodate the roller 50 pivoted between the forks 51 of the bell crank lever 52, having an appropriate handle 53, best seen in Fig. 3. Journals 54 extending from the apex of the crank, have bearings in the blocks 55 secured to the extension 37 of the carriage frame.

With the blocks 48 down to their lowest point, as shown in Figs. 2 and 4, the lower face of the central portion of the carriage and likewise the lower face of the negative is down sufficiently far to contact with the photo-sensitive plate when its table is elevated. Upon throwing down the handle 53, however, block 48 on the right is raised, rotating the levers 42, pressing the rollers 44 in engagement with the rails and raising the carriage which now hangs supported by the pivot rods 41 for these levers. Even though the block 48 on one side only is positively elevated, both pairs of levers are rotated because of the cross-connections therebetween by the rods 41.

The means for positively locating the carriage in its various positions along the track comprises a pin 60, mounted in each extension block 37 of the frame, and extending below the surface thereof a distance somewhat less than the amount of elevation imparted to the carriage by operation of the lever 53. These pins cooperate respectively with holes 61 one in each of the blocks 27 previously described as mounted in the grooves 26.

These blocks 27 are of precision manufacture and are accurately located and secured in their grooves by pins 63 and screws 64 with their holes in exact alignment and spaced from each other by the exact amount which it is desired to move the carriage in each step. It will be understood that the accuracy of positioning of these holes in respect to each other can be as required for the work in hand, so that when the carriage is moved from a position where its pins 60 cooper-

ate with one set of holes 61 to where they cooperate with the next set of holes, the distance moved will be exactly the same as that occurring when a corresponding adjustment is effected between any adjacent pair of holes.

In order that the operator may experience no difficulty in setting the carriage in position so that it can be lowered with the pins directly received in the corresponding holes without any fumbling, provision is made for automatically stopping the carriage with a coarse adjustment of the position thereof sufficient to permit the end taper of the pins, shown at 65, to produce the final alignment. This coarse adjusting means comprises a series of substantially semi-spherical depressions 66 in the upper surfaces of the strips 29, which depressions have the same spacing as the holes 61. A spring-pressed pin 68 is guided in each block 37 for vertical movement greater than the amount of lift imparted to the carriage and has a rounded lower end. When the carriage is in the elevated position and movement is imparted to it, these pins 68 move along the surface of the strip 29 and drop into the adjacent depressions 66, indicating to the operator that the carriage is in position for lowering and that the pins 61 are in alignment with a set of holes 62.

In operation the table is equipped with a suitable photo-sensitive plate and a proper negative plate is secured in the carriage. The carriage is set at one end of its travel and lowered to lock it in position. The table is elevated by operation of the lever 21, which raises the carriage free of any support by its rollers. Pressure is now applied to the carriage to insure positive and close contact between the negative and the sensitized plate, by making use of the following mechanism. Attached to the inner face of each carriage flange 36 is a block 70, best seen in Fig. 5. For operation in the recess 71 therein is journaled a cam 72 by means of pin 73 rigidly secured thereto and to the lower end of the vertical arm 74 of a bail 75, best shown in Fig. 3.

The cams 72 are each adapted to cooperate with one of a pair of spring rods 80, mounted above them and extending for the full length of the machine. As best seen in Figs. 1 and 2, one end of each rod is pivoted as at 81 to a bracket 82, extending from the machine frame while the opposite end of each rod 80 is attached by a removable pin 83 to a corresponding bracket 84 at the other end of the bed. When the bail is thrown down, the cams are lifted and the spring of the rods serves to exert downward pressure on the carriage. As seen in Fig. 3, the rods are supported a sufficient distance above the blocks 70 to permit the carriage to be lifted for shifting as previously explained.

As seen in Figs. 1 and 2, extensions of the tracks 24, properly braced as at 86, serve to support rollers 87 upon which are wound curtains 88, having clips 89 for attachment to the carriage for shutting off all light to the sensitized plate except that intentionally projected through the negative for photo-printing.

I claim as my invention:

1. Printing apparatus of the character described including in combination a horizontal bed mounting parallel guide rails on two edges thereof, a table vertically adjustable between said rails to support a sensitized plate, a carriage for supporting a negative above said plate, rollers on said rails disposed one for each corner

of the carriage, means adjacent each rail providing accurately longitudinally spaced vertical holes, a vertical pin at each rail end of said carriage to fit in any hole adjacent its rail, and means on said carriage for operation to elevate said carriage in respect to its rollers to withdraw the pins from the holes to permit movement of the carriage along the rails.

2. Printing apparatus of the character described including in combination a horizontal bed mounting parallel guide rails on two edges thereof, a table vertically adjustable between said rails to support a sensitized plate, a carriage for supporting a negative above said plate, rollers on said rails disposed one for each corner of the carriage, means adjacent each rail providing accurately longitudinally spaced vertical holes, a vertical pin at each rail end of said carriage to fit in any hole adjacent its rail, means on said carriage for operation to elevate said carriage in respect to its rollers to withdraw the pins from the holes to permit movement of the carriage along the rails, and means acting between the carriage, when lifted, and bed to automatically stop the carriage and position the same with the pins in substantial alignment with a set of said holes.

3. Printing apparatus of the character described including in combination a horizontal bed mounting parallel guide rails on two edges thereof, a table vertically adjustable between said rails to support a sensitized plate, a carriage for supporting a negative above said plate, rollers on said rails disposed one for each corner of the carriage, means adjacent each rail providing accurately longitudinally spaced vertical holes, a vertical pin at each rail end of said carriage to fit in any hole adjacent its rail, means on said carriage for operation to elevate said carriage in respect to its roller to withdraw the pins from the holes, to permit movement of the carriage along the rails, spring rods removably supported from said bed above the said carriage and cam means operable between said rods and carriage to force the negative into close contact with the sensitized plate.

4. Carriage stepping mechanism for the purpose described, including in combination a bed mounting a pair of spaced rails, a pair of rollers on each rail, a carriage, means supporting said carriage from said rollers, means to elevate said carriage in respect to said rollers, a pin depending from said carriage, a plurality of accurately spaced holes aligned adjacent one of said rails, said pin being adapted to cooperate with any one of said holes when the carriage is in a lowered position to fix the carriage in respect to said bed, said pin being withdrawn by elevation of the carriage to permit movement of the carriage along the rails.

5. Carriage stepping mechanism for the purpose described, including in combination, a bed, guide means thereon, a carriage adapted for movement along said guide means, means providing a plurality of accurately and equally spaced station stops adjacent one of said guide means, a single means permanently fixed to said car-

riage to engage with any one of said stops to lock the carriage at the corresponding station, and means to elevate said carriage above said bed to disengage said single means from any stop to permit carriage movement under control of said guide means.

6. Carriage stepping mechanism for the purpose described, including in combination, a bed, guide means thereon, a carriage adapted for movement along said guide means, means providing a plurality of accurately and equally spaced station stops adjacent one of said guide means, a single means permanently fixed to said carriage to engage with any one of said stops to lock the carriage at the corresponding station, means to elevate said carriage above said bed to disengage said means from any stop to permit carriage movement, means providing a plurality of shallow depressions on said bed, one allotted to each carriage station and spring-pressed means on said carriage to always extend into the depressions successively as the carriage is moved to provide temporary stops, aligning the main stops and means for cooperative engagement when the carriage is lowered.

7. Carriage elevating mechanism for photo-engraving apparatus having a bed plate with parallel side rails, including, in combination, a carriage having parallel side flanges, a pair of spaced parallel rods each journaled in both flanges, a double-ended lever fixed to the outer end of each rod adjacent a flange, a roller on the outer end of each lever for cooperation with one of said rails, a block pivoted to the inner ends of the levers of the pair associated with each flange, a hand lever pivoted to said carriage adjacent one flange for movement in a plane at right angles to said rails and cam means on said lever to lift the associated block upon operation thereof to raise the carriage in respect to the rollers.

8. Apparatus of the type described, in combination, a stationary bed having spaced parallel rails, a table mounted for vertical movement between said rails and adapted to mount a photo-sensitive plate, negative supporting carriage mounted for movement on said rails to position said negative over various portions of said plate, means to elevate said carriage for free movement on said rails above said table, rough indexing means cooperating between bed and carriage when elevated, and accurate indexing and locking means cooperating between bed and carriage only when lowered.

9. In a device of the type described, in combination, a base including means to support a photo-sensitive plate, a carriage movable on said base over said plate and adapted to present a smaller negative over any portion of said plate, a spring rod mounted on said bed above and parallel to said plate and spaced therefrom to provide clearance for said carriage and a cam on said carriage operable to engage and flex said rod for any carriage position to insure close contact between the negative and plate.

HENRY V. BAKER.