

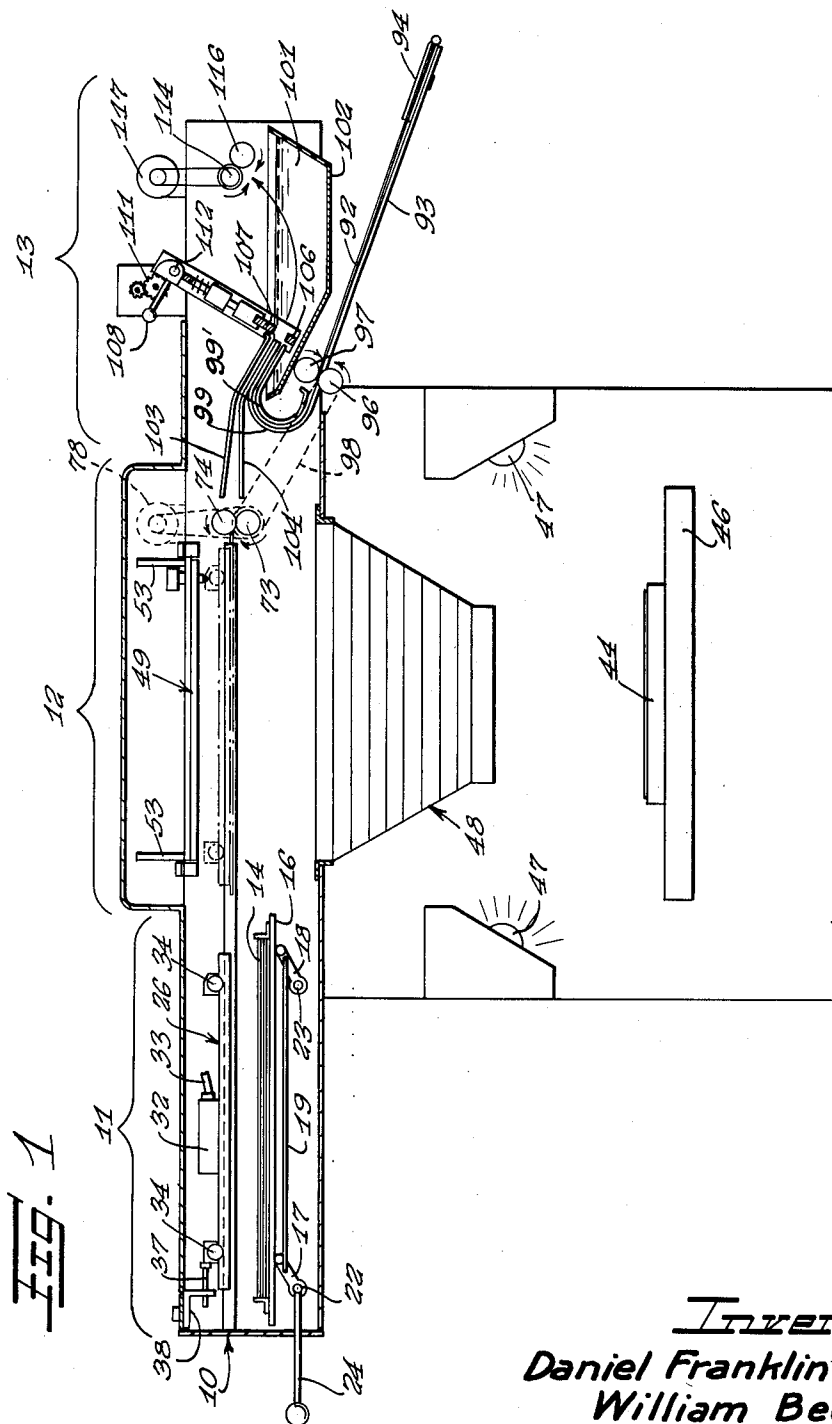
June 26, 1962

D. F. KELLER ET AL
PHOTOGRAPHIC APPARATUS

3,040,642

Filed June 12, 1959

5 Sheets-Sheet 1



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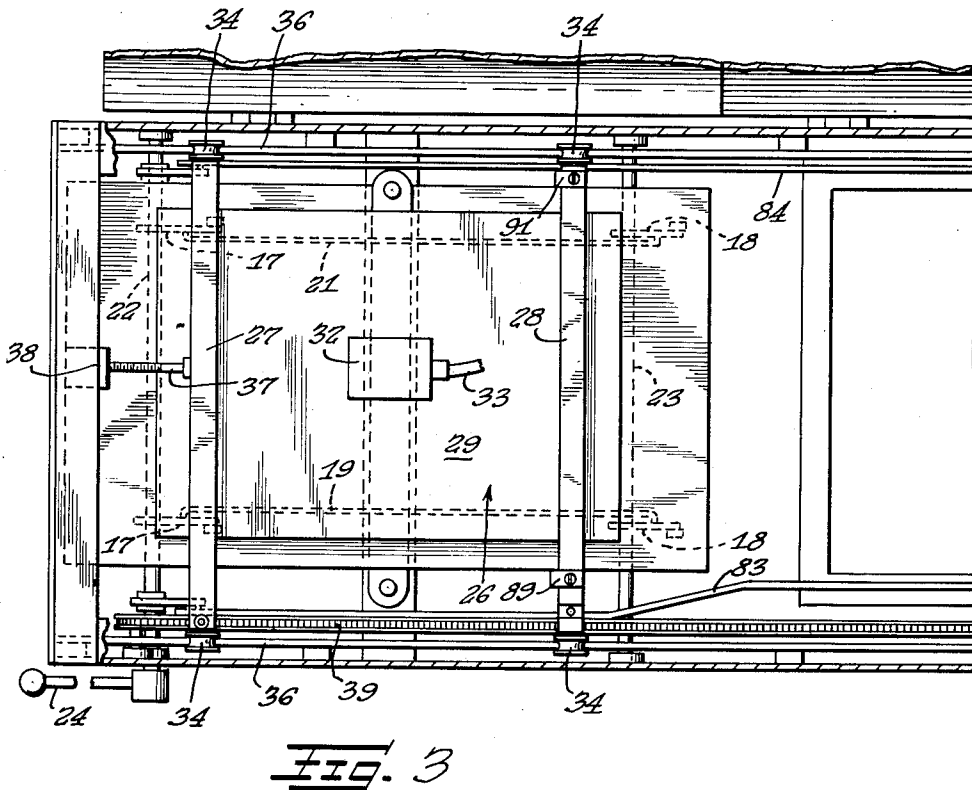
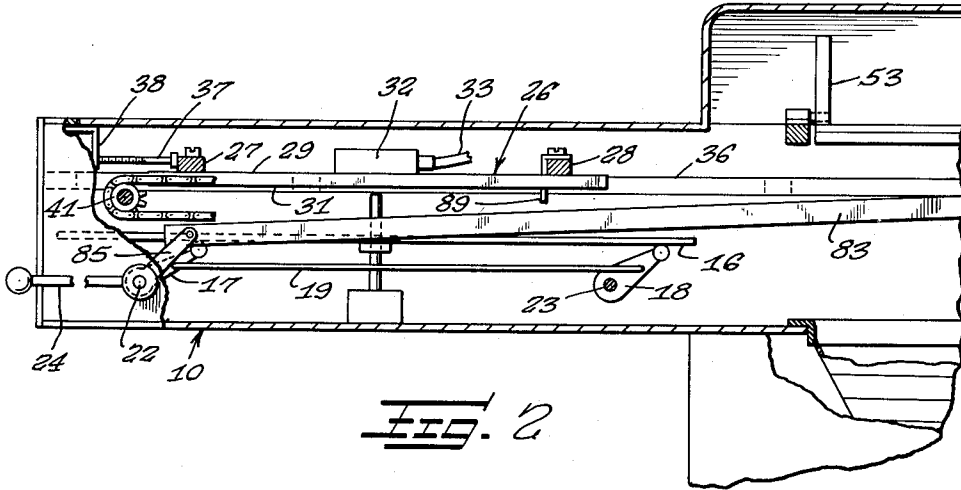
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Filed June 12, 1959

5 Sheets-Sheet 2



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PHOTOGRAPHIC APPARATUS

Filed June 12, 1959

5 Sheets-Sheet 3

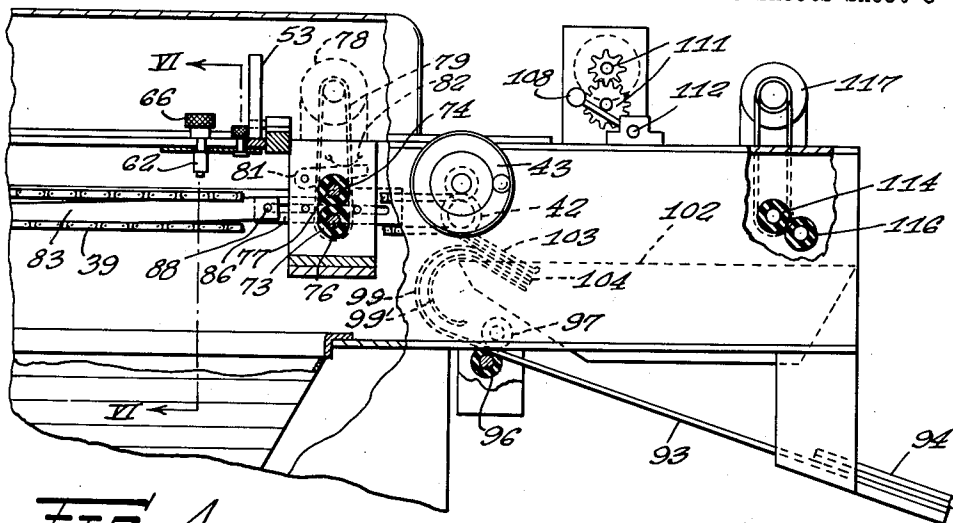


FIG. 4

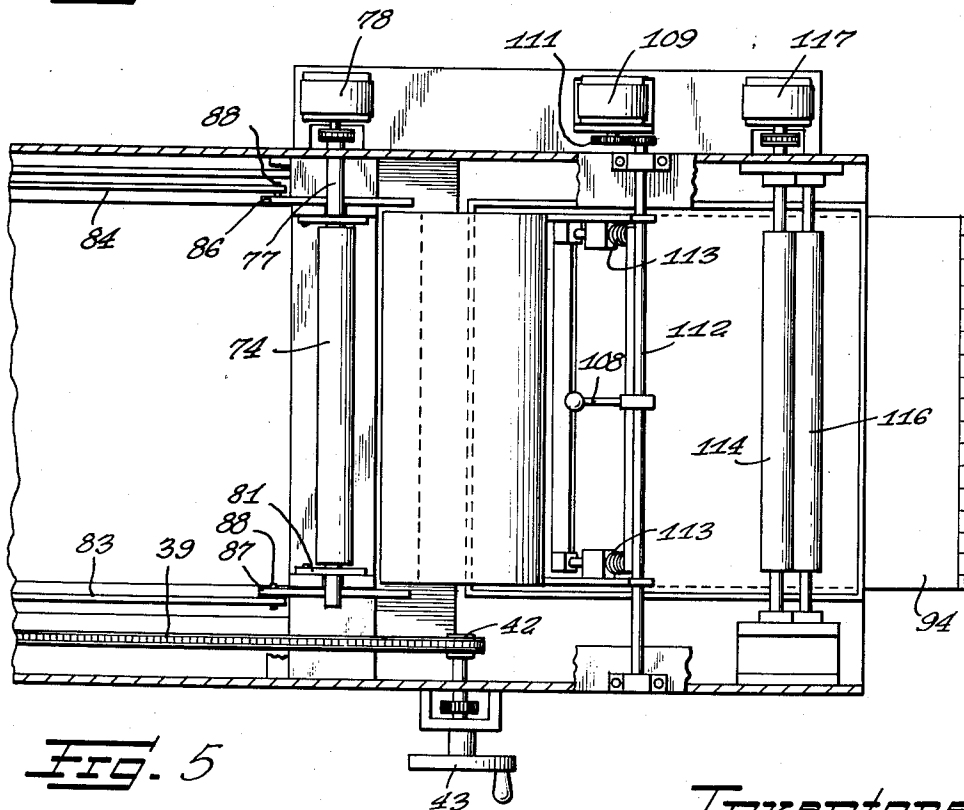


FIG. 5

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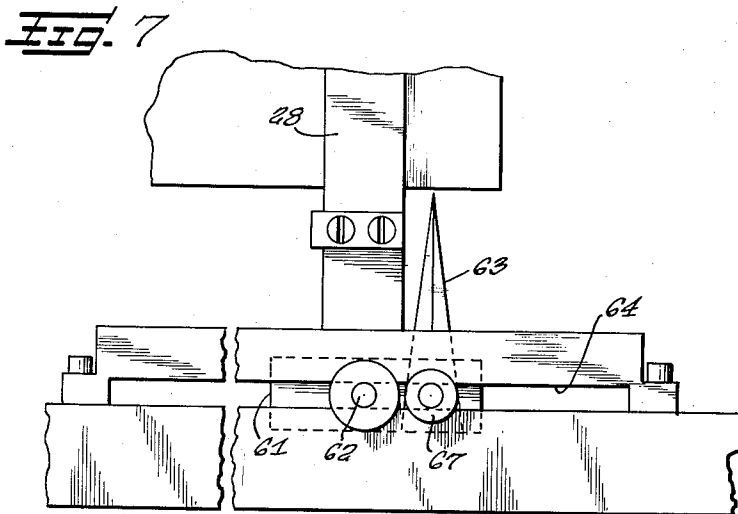
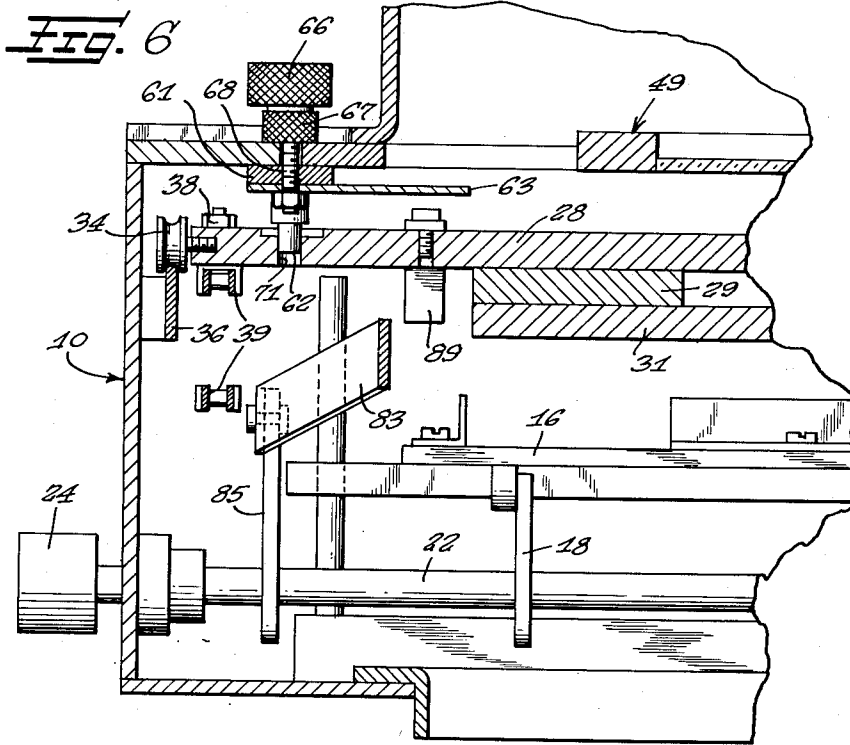
June 26, 1962

D. F. KELLER ET AL
PHOTOGRAPHIC APPARATUS

3,040,642

Filed June 12, 1959

5 Sheets-Sheet 4



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June 26, 1962

D. F. KELLER ET AL
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3,040,642

Filed June 12, 1959

5 Sheets-Sheet 5

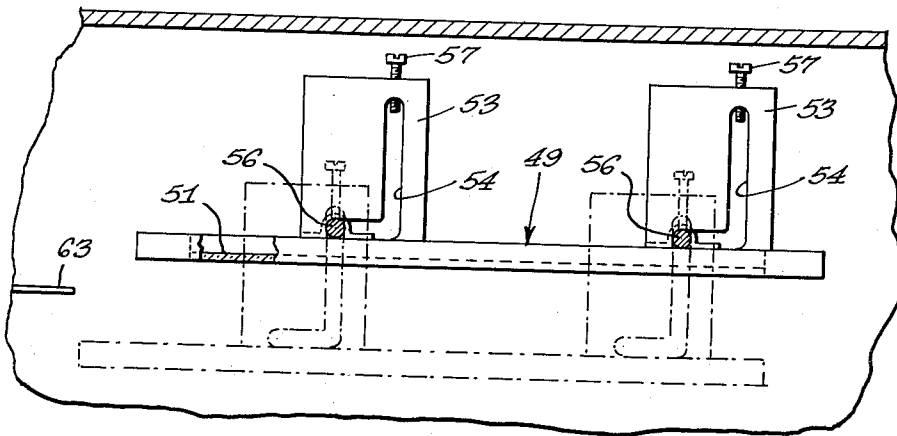
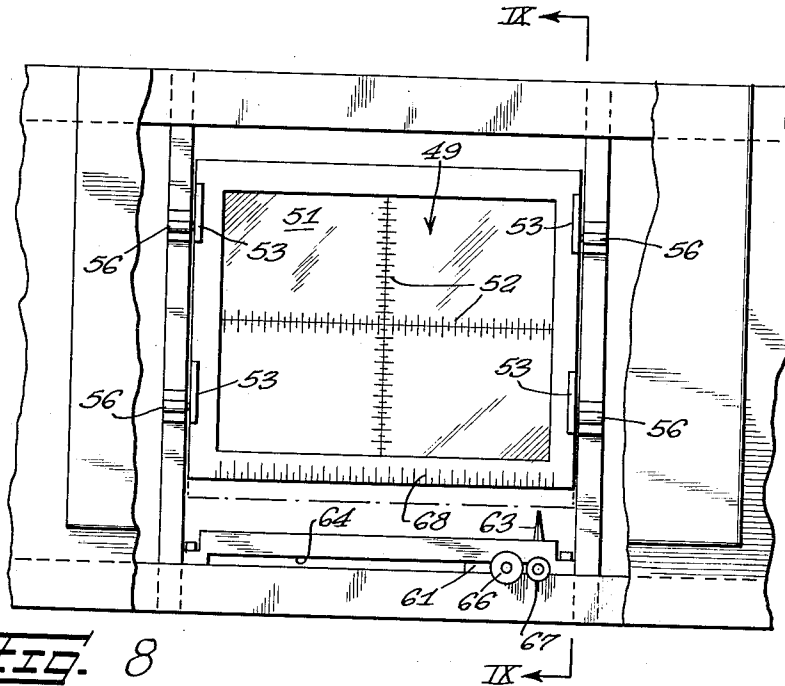


FIG. 9

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3,040,642

PHOTOGRAPHIC APPARATUS

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Filed June 12, 1959, Ser. No. 819,852
4 Claims. (Cl. 95—14)

The present invention relates to an improved method and apparatus for making printing plates and, more particularly, to a photographic assembly particularly designed to manufacture printing plates as a continuous photographic operation directly within a camera type device.

Modern printing presses allow very little variation of printing plate positioning. It is accordingly important that the printing surfaces on the plate be properly aligned with respect to margins and the like before such plates are secured to the printing press. The proper alignment of said plates is frequently a time consuming and expensive operation.

The centering and alignment of the printing plate is, of course, only one step in a large series of steps involved in making plates for offset printing presses. Heretofore many of the plate making processes involved hand operations and masking procedures requiring expensive labor skills. The present invention overcomes the difficulties inherent in any such hand operation by providing a photographic assembly which produces a printing plate directly within the camera in a pre-aligned condition in which it is ready to be received upon an offset printing press without any other than minor adjustments readily obtainable on any printing press.

An object of the present invention is to provide improved photographic assembly for the direct photographic manufacture of offset printing plates.

Another object of the invention is to provide an improved photographic assembly in which a printing plate is manufactured directly in the assembly without any hand finishing operations being required.

A still further object of the invention is to provide an improved photographic assembly with means for centering and aligning the printing area on a printing plate automatically.

A particular object of the present invention is to provide a camera apparatus having a movable vacuum back.

Yet another object of the invention is to provide vacuum type sheet form retaining means transportable between different stations of a photographic apparatus, and particularly to a pre-aligned adjustable exposure station.

Other objects and features of the present invention will become apparent to those skilled in the art from the following description of the attached sheets of drawing which illustrate one embodiment thereof.

In the drawings:

FIGURE 1 is a view in elevation, partly in cross-section illustrating the photographic assembly of the present invention;

FIGURE 2 is a view in elevation, partly broken away, to illustrate the paper supply station of the apparatus;

FIGURE 3 is a plan view of the paper supply station, with the cover open;

FIGURE 4 is a fragmentary view in elevation, partly broken away to illustrate the developing station of the apparatus;

FIGURE 5 is a plan view of the developing station;

FIGURE 6 is a cross-sectional view taken substantially along the lines VI—VI of FIGURE 4;

FIGURE 7 is a fragmentary plan view of the pointer and indexing assembly employed in the apparatus;

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FIGURE 8 is a fragmentary plan view of the focusing and indexing assembly of the apparatus; and

FIGURE 9 is a cross-sectional view taken substantially along the lines IX—IX of FIGURE 8.

As shown in the drawings:

In FIGURE 1, reference numeral 10 indicates generally a housing for the photographic assembly of the invention, the assembly being divided into three sections identified as a storage supply station 11, an exposure station 12, and a developing station 13. The storage supply station 11 is made light-tight and includes a supply of photographically sensitized sheet form members such as paper indicated at 14 supported on a vertically movable platform 16. A pair of opposed arms 17 and 18 connected by means of rods 19 and 21 (see FIGURE 3) and secured to their respective shafts 22 and 23 serve to raise and lower the platform 16 by the operation of a lever 24 secured to the shaft 22.

The individual sheets 14 are conveyed through the photographic assembly of the invention by means of a carrier 26 best illustrated in FIGURES 2 and 3 of the drawings. The carrier 26 includes a pair of opposed top rails 27 and 28 secured to a top plate 29. A lower plate 31 having a grooved face is joined to the upper plate 29 to provide a vacuum holder sometimes referred to herein as a vacuum back for transporting the individual sheets of paper 14 when a sheet is brought into contact with the lower plate 31. Affixed to the top plate 29 is a vacuum box 32 which is connected by means of a flexible tube 33 to a suitable source of reduced pressure such as a pump.

The carrier 26 is moved through the assembly by the means of rollers 34 which ride on rails 36 (FIGURE 3) spaced inwardly from the side walls of the housing 10.

The carrier assembly 26 is positioned automatically in proper relation to the stack of sheets 14 by the provision of a stop 37 which is threaded into an angle bracket 38. The stop 37 is adjustable so the degree of overlap by which the edge of the sheet form member leads the vacuum back may be pre-set.

The carrier assembly 26 is detachably secured, as by means of bolts 38 to a chain 39 extending between a sprocket 41 located in the vicinity of the paper supply station and a sprocket 42 located in the vicinity of the developing station 13. The hand crank 43 is provided to drive the carrier from the supply station 11 to the exposure station 12 but it is contemplated that other mechanical means can be substituted for this purpose.

In the exposure station 12, a sensitized paper sheet 14 transported by the carrier assembly 26 is exposed to produce a latent image on the sensitized face. As best seen in FIGURE 1, the copy 44 to be reproduced is supported on a vertically adjustable copy table 46 and is illuminated by spaced lights 47. A camera assembly, generally indicated at numeral 48 in the drawings includes a lens system which focuses the image on the sensitized paper sheet. In order to assure proper focusing and alignment of the sensitized sheet within the exposure station, we provide a focusing and indexing mechanism which is best seen in FIGURES 1, 7, 8 and 9 of the drawings. A ground glass screen assembly 49 is arranged to be selectively movable into and out of a plane common to the sensitized paper 14 and a ground glass screen 51 thereby to determine the focal plane of the camera assembly 48. This assembly includes a ground glass screen 51 having vertical and horizontal cross-hatching 52 engraved in the face thereof. The ground glass 51 is supported on brackets 53 having L-shaped slots 54 formed therein. Pins 56 mounted on a stationary portion of the photographic assembly permit the ground glass screen assembly 49 to be located in two positions, as illustrated in FIGURE 9.

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When the pins 56 are located at the base of the L-shaped slots 54, as illustrated in FIGURE 9, the ground glass screen assembly 49 is in a retracted position with respect to the image receiving plane of the camera assembly. When the ground glass screen assembly 49 is moved so that the pins 56 are located in the top of the L-shaped slots 54, a condition shown in the dashed lines of FIGURE 9, then the ground glass 51 is located in the plane of the image receiving plane of the camera assembly. Adjusting screws 57 are provided within the brackets 53 to adjust the position of the ground glass screen 51 into properly aligned relation. Thus, with the use of the ground glass screen all photographic adjustments relative to focusing etc., may be affected.

In order to insure that the sensitized paper, when it is exposed, will be in proper longitudinal registry with the image, we provide an adjustable indexing assembly of the type best shown in FIGURES 6 and 7 of the drawings. A block 61 carries a retractable detent 62 and a pointer 63. The block 61 is slidable along a longitudinally disposed slot 64, the length of which determines the extent of available adjustability and is selectively positionable along the slot by the movement of a knurled head 66 on the detent 62, and a knurled head 67 on the bolt 68 to which the pointer 63 is secured.

When the ground glass screen assembly 49 has been properly oriented within the focal plane of the camera assembly, the block 61 is moved laterally beyond the edge of the image focused on the ground glass screen 51 by an amount equal to the border or margin desired in the finished printing plate. A calibrated scale 68 on the ground glass screen assembly 49 is provided to facilitate the measurement of the marginal overlap. The block 61 is locked in adjusted position and the ground glass moved out of the way.

Then as the vacuum back carrier 26 moves into the exposure area 12, the detent 62 engages a slot 71 (FIGURE 6) on the cross-arm 28 and locates the sensitized paper sheet 14 in the same relative position as previously selected with the proper allowance for the margin as determined by the setting of the pointer 63. The sensitized paper sheet 14 is then exposed for an appropriate time interval dependent upon an electrically operated timer (not shown).

After exposure, the latent image on the sensitized paper is transferred to a press plate member which may conveniently comprise a sheet of sensitized aluminum foil in a developing station. The exposed paper is sent to the developing station by a pair of rubber covered feed rollers 73 and 74 mounted on shafts 76 and 77 respectively. A motor 78 drives the shafts 76 and 77 through a chain 79. The shafts 76 and 77 are vertically movable with respect to each other, and a pressure arm 81 biased by a spring 82 urges the shafts 76 and 77 together so that the rubber covered surfaces of the rollers abut.

When the paper is being moved from the supply station 12 into the exposure station 13, it is desirable that these rollers 73 and 74 be separated. For that purpose, we provide a pair of arms 83 and 84 which are connected by means of bell crank lever arms 85 to the shaft 22. Accordingly, when the lever 24 is moved downwardly to raise the platform 16 to a height where the vacuum carrier picks up a sheet of the sensitized paper, the arms 83 and 84 move a pair of slide cams 86 and 87 which are connected to the extremities of the arms 83 and 84 by means of pins 88. The slide cams 86 and 87, upon movement to the left as shown in FIGURE 4, serve to displace the shafts 76 and 77 sufficiently so that there is a substantial gap between the rollers 73 and 74.

As the vacuum carrier is conveyed past the image receiving station 12, a pair of brackets 89 and 91 secured to the cross arm 28 are arranged to strike the slide cams 86 and 87 and thereby cause the rollers 73 and 74 to engage. Since the foil is to serve as the press plate pro-

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viding printing surface for the offset printing reproduction, there is shown a sensitized aluminum sheet press plate 92 received along a press plate support 93 and held thereon by a hinged cover 94. The aluminum foil press plate 92 is just long enough to be received in the nip between a pair of feed rollers 96 and 97 driven by means of a belt 98 from the rollers 73 and 74. Upon energization of the motor 78, the feed rollers 96 and 97 serve to feed the sensitized aluminum foil 92 between a pair of arcuate guides 99 and 99' beneath the surface of a developing liquid 101 located in a developing tank 102. At the same time, the exposed paper sheet is fed by means of the rollers 73 and 74 between a pair of angular guide channels 103 and 104 to the developing solution 101.

The leading edges of the exposed sheet and the sensitized aluminum foil press plate 92 are brought together with the exposed surfaces of the sheet facing the sensitized surface of the aluminum foil by a pair of jaws 106 and 107 which are cammed into closing relation by operation of a lever 108. The jaws 106 and 107 thereupon grip the paper sheet and the aluminum foil 92 and pull the sheets through the developing solution 101 by the action of a motor 109 and gears 111. The jaws pivot around the axis provided by the shaft 112 upon which the camming mechanism, including springs 113 is located.

The speed of the motor 109 and/or the gear ratios are adjusted so that the exposed sheet and the sensitized aluminum foil remain in the developing solution 101 for a time sufficient to wet the exposed sheet and develop the image thereon. The sheets are then delivered into the nip existing between a pair of squeegees or pressure rollers 114 and 116 driven by a motor 117 where the developed sheet is pressed against the sensitized aluminum foil. Upon emergence from between the rollers 114 and 116, the aluminum sheet with the image transferred thereon may be stripped from the paper sheet and ready, after further drying if necessary, to be used as a printing plate on an offset printing assembly.

It will of course be evident that various modifications can be made to the described embodiment without departing from the scope of the present invention.

We claim as our invention:

1. A camera-processor apparatus comprising, a storage station having platform means for receiving a stack of sheet form media adapted to receive an image, an exposure station adjacent said storage station having a camera assembly including a camera lens system to focus the image at a focal plane, a developing station adjacent said exposure station to develop the image on an exposed sheet form media, track means comprising rails extending in a plane from said storage station through said exposure station to said developing station, a movable carriage, said carriage having rollers supported on said track means and guided thereby for moving said carriage between said stations, a vacuum back on said carriage having a planar holding surface coextensive in area with the sheet form media and being disposed parallel to the plane of said track means, a flexible conduit connected to said vacuum back for connection to a source of vacuum bias, means for relatively moving said platform means and said vacuum back vertically to engage a single sheet of the sheet form media with said holding surface of said vacuum back, stop means between said track means and said carriage to align said sheet carried by said vacuum back in the focal plane of the exposure station, and drive means moving said carriage on said track means to successively move said vacuum back from said storage station to said exposure station and to said developing station.

2. A camera-processor apparatus as defined in claim 1 and further including a focusing screen movable into the focal plane of said camera assembly to facilitate the focusing of the camera lens system, said stop means being adjustably positionable to vary the alignment of said sheet on the vacuum back.

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3. A camera-processor apparatus as defined in claim 1, said developing station including means for removing said sheet from the vacuum back and for rendering the image on the sheet visible.

4. A camera-processor apparatus as defined in claim 1 in which said developing station includes a bath for developing the image on the exposed sheet and means for pulling said sheet through said bath.

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