Nov. 4, 1930. W. C. HUEBNER 1,780,677

HOLDING AND SUPPORTING DEVICE FOR PRINTING OR PRINT RECEIVING ELEMENTS AND THE LIKE

Filed Oct. 10, 1924 5 Sheets-Sheet 1

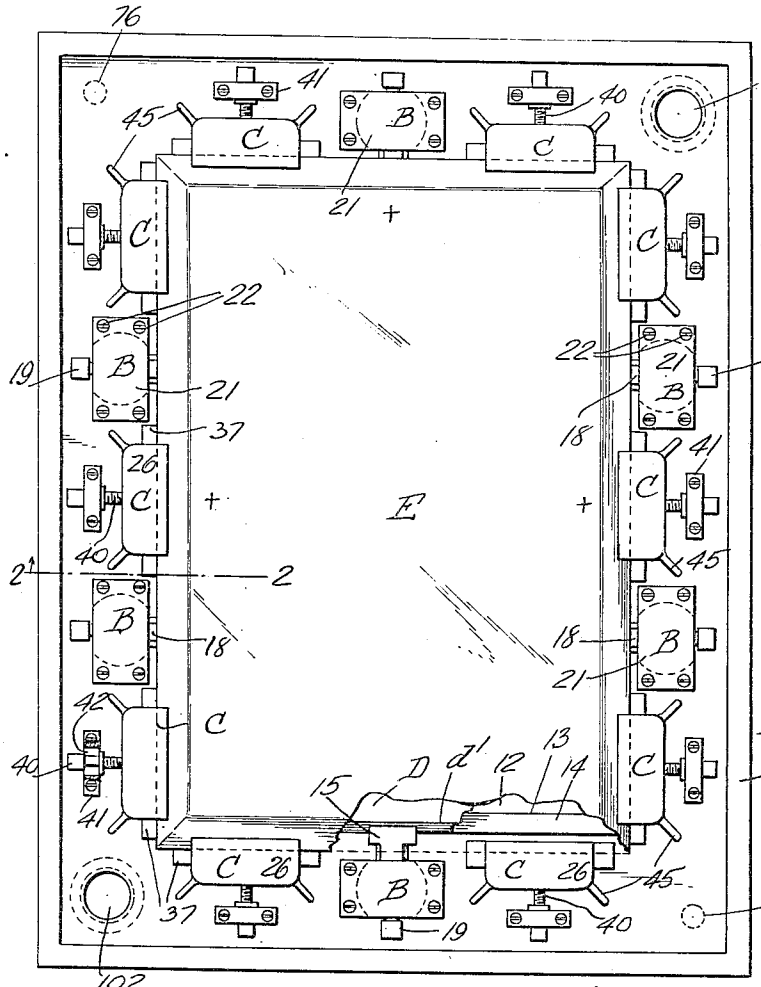


Fig. 1.

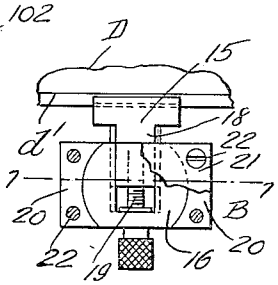


Fig. 6.

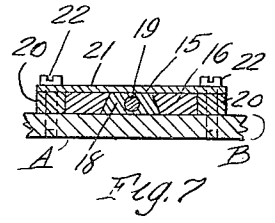


Fig. 7

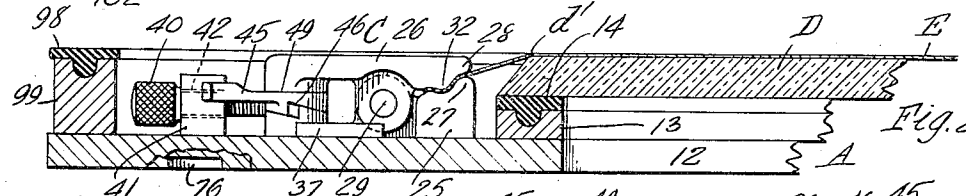


Fig. 2.

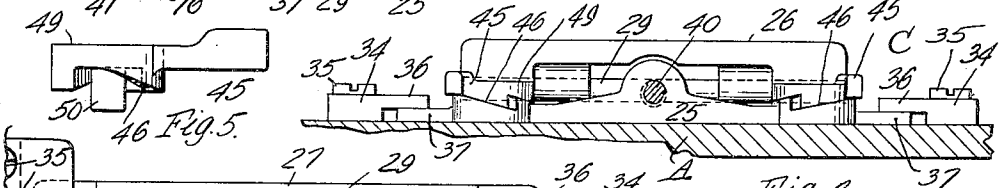


Fig. 3.

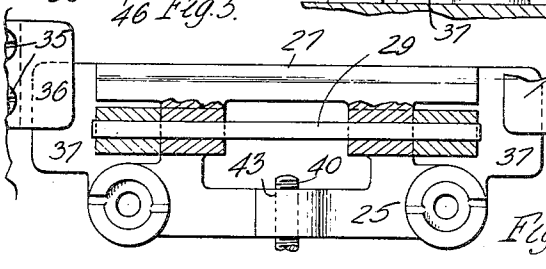


Fig. 4.



Fig. 5.

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HOLDING AND SUPPORTING DEVICE FOR PRINTING OR PRINT RECEIVING ELEMENTS AND THE LIKE

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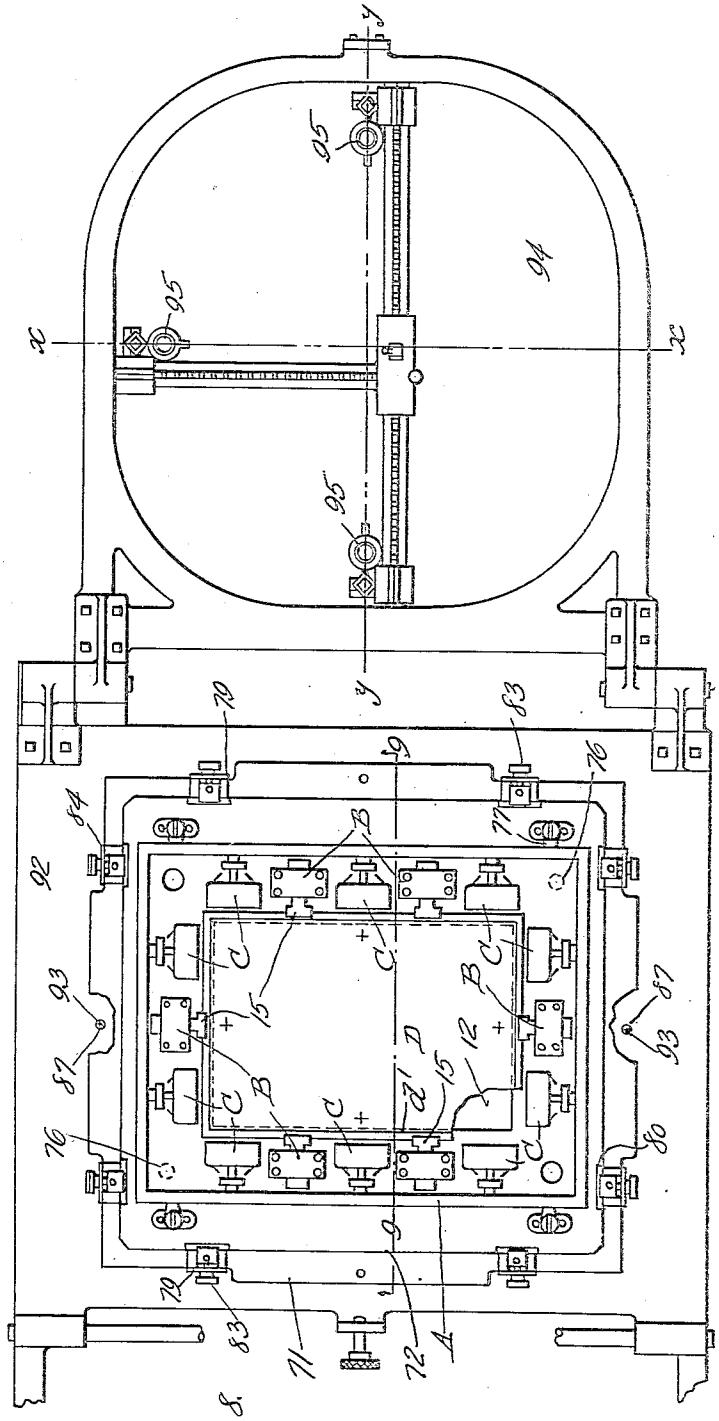


Fig. 8.

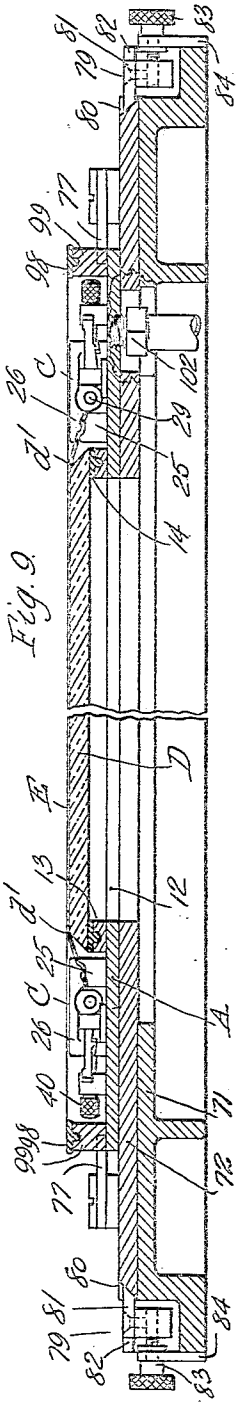


Fig. 9.

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HOLDING AND SUPPORTING DEVICE FOR PRINTING OR PRINT RECEIVING ELEMENTS AND THE LIKE

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Fig. 10.

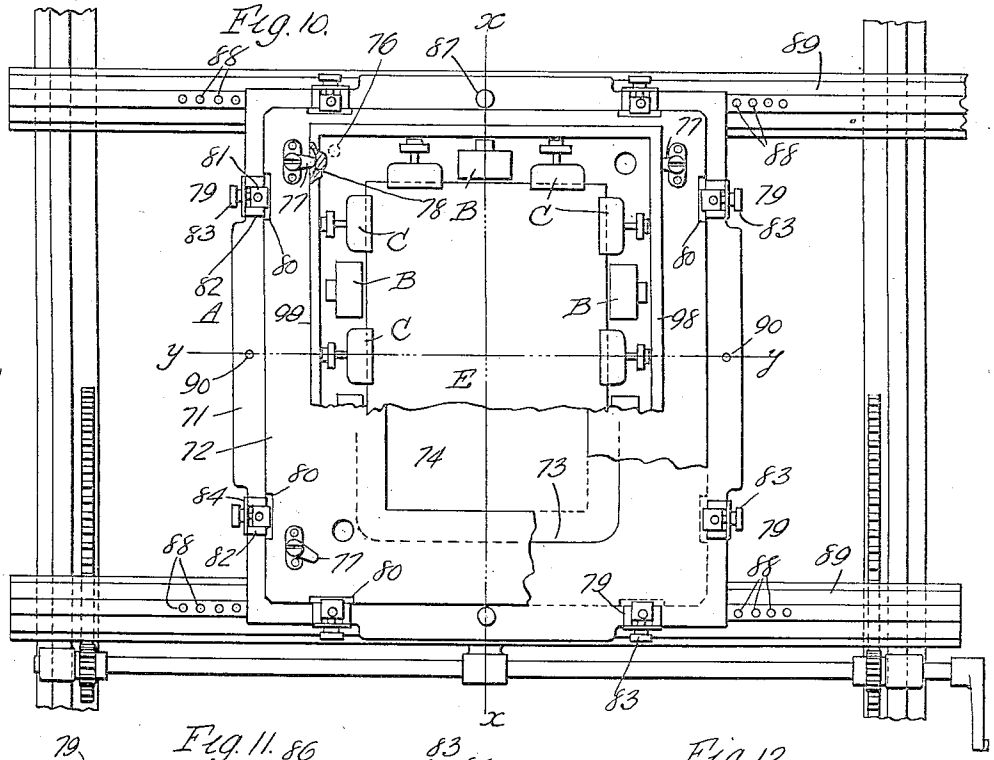



Fig. 11.

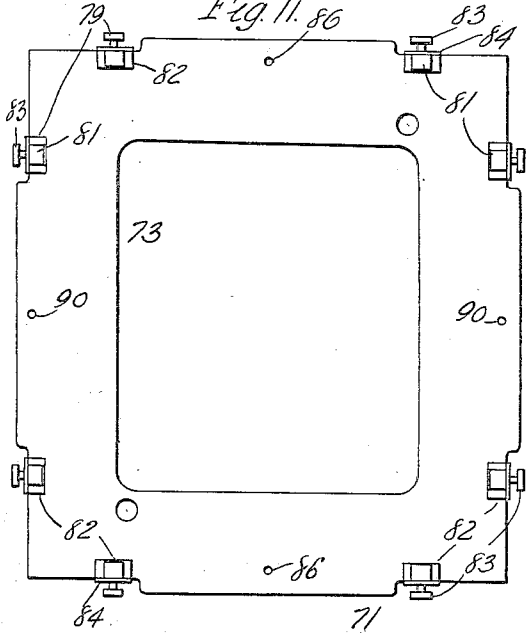
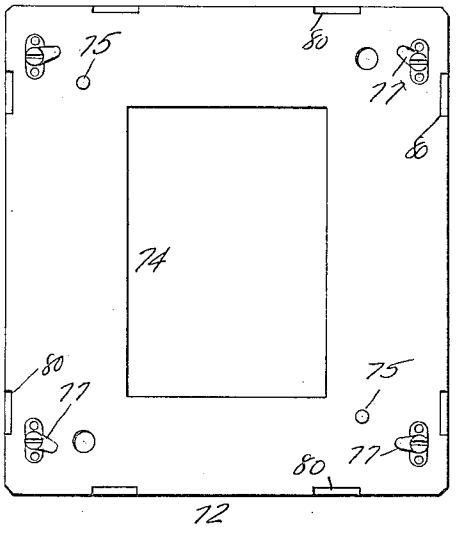



Fig. 12.




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HOLDING AND SUPPORTING DEVICE FOR PRINTING OR PRINT RECEIVING ELEMENTS AND THE LIKE

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Fig. 13.

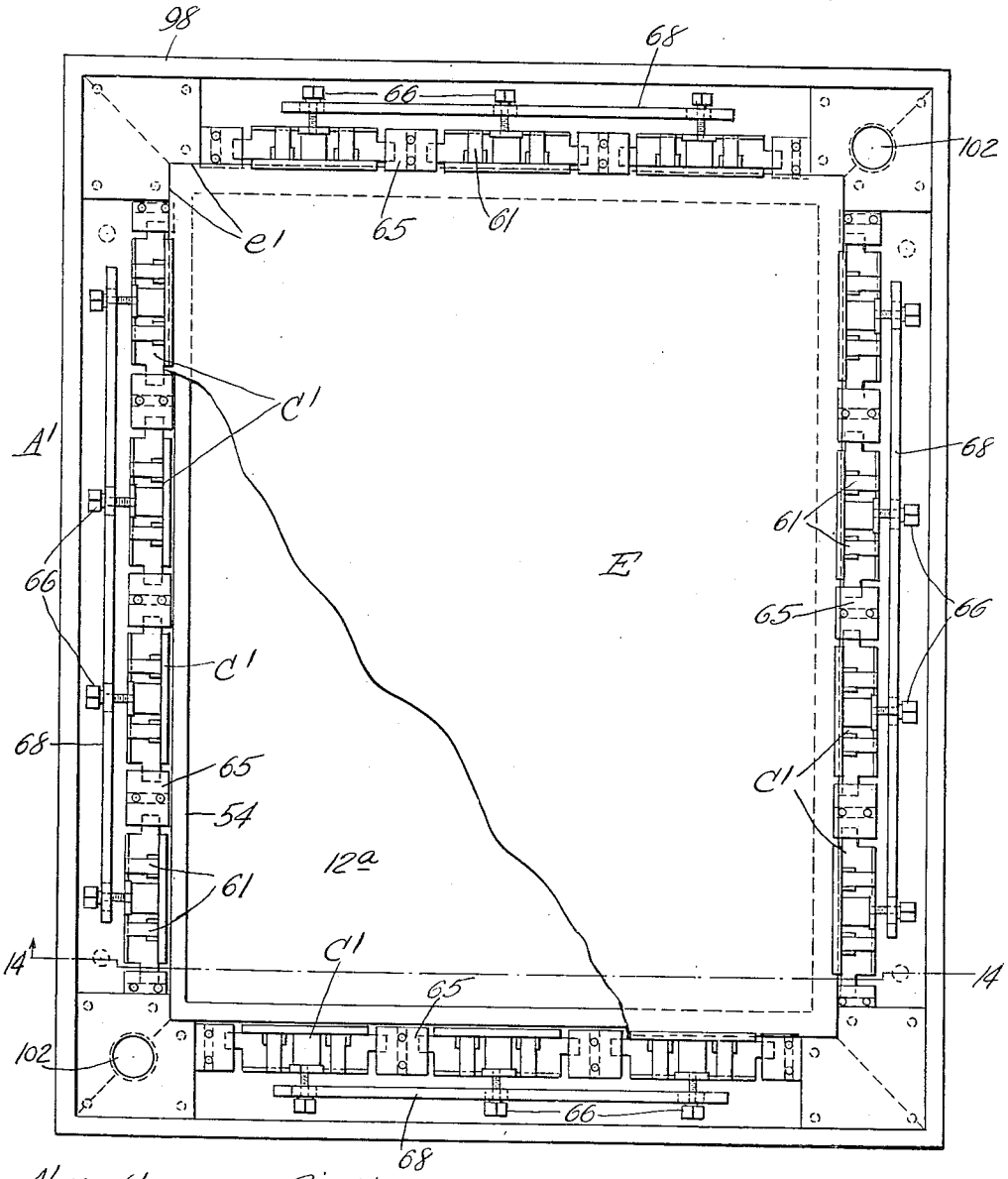
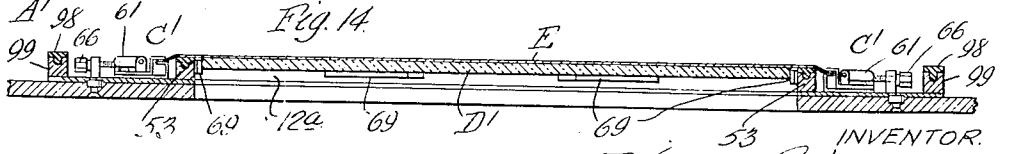



Fig. 14.




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HOLDING AND SUPPORTING DEVICE FOR PRINTING OR PRINT RECEIVING ELEMENTS AND THE LIKE

Filed Oct. 10, 1924 5 Sheets-Sheet 5

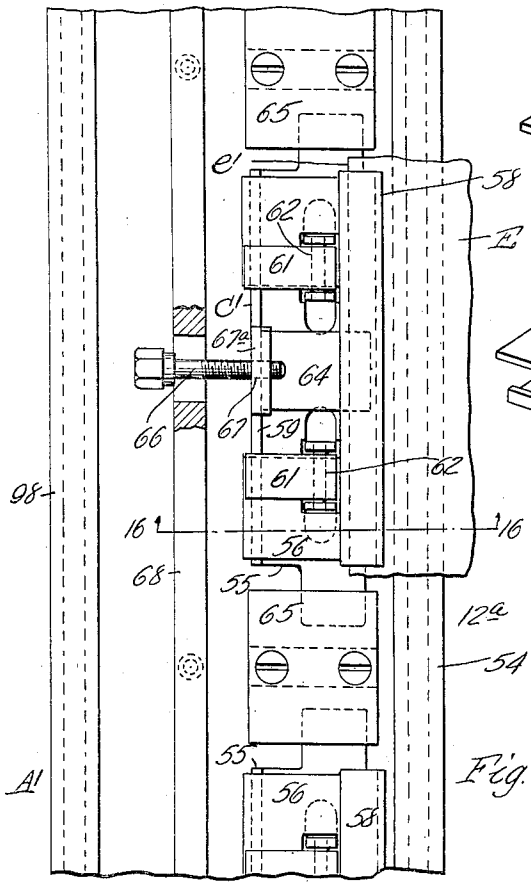



Fig. 15.

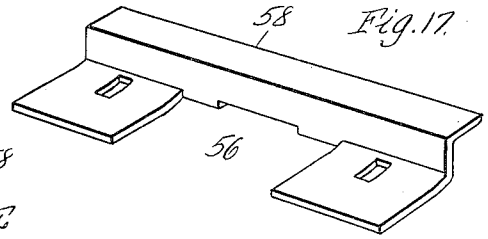



Fig. 17.

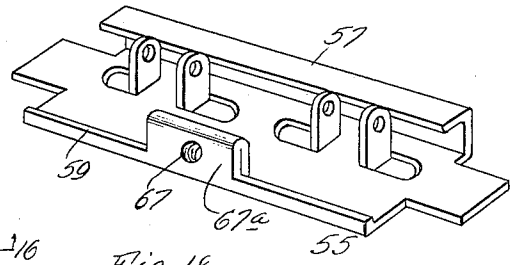



Fig. 18.

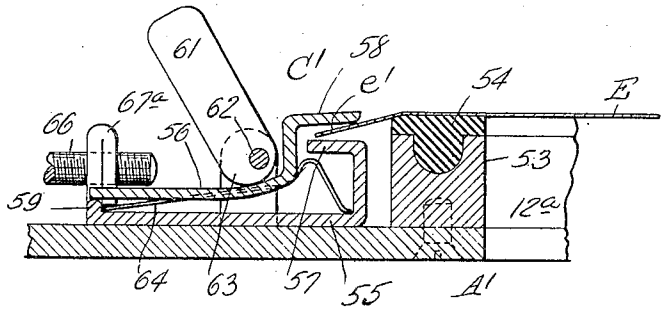



Fig. 16.

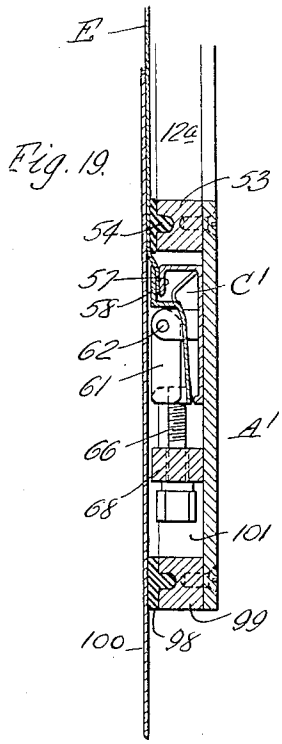



Fig. 19.

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Patented Nov. 4, 1930

1,780,677

# UNITED STATES PATENT OFFICE

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## HOLDING AND SUPPORTING DEVICE FOR PRINTING OR PRINT-RECEIVING ELEMENTS AND THE LIKE

Application filed October 10, 1924. Serial No. 742,919.

This invention relates to holding and supporting means or devices upon which printing or print receiving elements are mounted and supported to adapt them for use in photo-composing and other mechanical photographic printing apparatus. The invention relates particularly to a portable holder or support on which flexible sheets, films or the like are adapted to be mounted and drawn taut and having means whereby an image on such sheet may be accurately positioned in predetermined location and registered as to size by the stretching of the sheet or film on the holder or frame. The holder is particularly adapted for use in connection with the process outlined in my copending application for Letters Patent, entitled Process of preparing and registering printing sheets or films, filed July 31, 1924, Serial No. 729,277.

In the production of the printing plates, for instance for poster work, the use of glass plates or lithographic stones is very expensive, and further, in the case of large posters the job must be done in sections, that is, a number of separate plates are used, each bearing a different portion of the final picture, and these portions must not only register accurately with the original image, or with a layout sheet or the like, but the abutting edges of the sections must register accurately with each other.

As is well known, there are many disadvantages in the use of glass for this purpose. The surfaces of the glass plates are sometimes not flat but wavy, and at other times the opposite faces of the plates are not parallel; again there are variations in the thickness of a series of glass plates for one color job, or for the different sections of a large subject. These imperfections in the glass add to the difficulties in registration of the images on the press plates, and also prevent perfect contact between the glass plates and the press plates or print-receiving surfaces. Further, it is difficult to handle large plates of glass in quantity production during the various operations of the exposure and development and the other finishing operations; many plates are broken in handling them, and due to uneven pressure as a result of the uneven surfaces or varying thickness before mentioned. Finally, the expense attendant upon the use of glass plates is very great, as large quantities of glass are accumulated, resulting in a large unproductive investment, and expense and inconvenience in the storage of the glass which requires considerable space and appliances for the handling and the protection of the stock.

Devices heretofore used for supporting the glass or other rigid printing or print receiving elements have included a plate holder having devices for adjustably positioning and securing the plate thereon, and a supporting member on which said holder is removably secured, said member being adapted to be placed in the printing apparatus to enable the printing element to be placed in predetermined position for use on the printing apparatus so as to produce printing press plates therefrom by either contact or projection methods. The supporting member with the holder in place thereon was adapted to be secured on the printing apparatus in predetermined position, as by inter-engaging parts on the member and the machine, said member parts also being adapted to cooperate with parts on an image positioning or registering apparatus or device for positioning the images on the plate in accordance with a required layout sheet or other data so that by providing a plurality of the supporting members and holders, one printing element could be arranged on a holder on one supporting member, and the whole placed on the registering device to position the printing element, while another similar element previously registered in a like manner, was being used in the printing apparatus. These devices however have been relatively expensive for the reason that in addition to the necessity of providing one or more plate holders for each size of plate used, a plurality of supporting members having different sized openings are required each adapted to be used with only one size of holder. These supports, in addition to their expense, are relatively heavy and cumbersome and are difficult to handle, and their use consumes much time and entails the use of special equipment to move them about from the

image positioning or registering device to the printing apparatus, or elsewhere, and the frequent changing of the holders on the apparatus prevents the expeditious production of work.

It has long been recognized that flexible photographic films, or sheets of sensitized paper, fabric or other suitable flexible, transparent or other material are desirable from various standpoints for use in the place of the usual expensive glass plates before mentioned, especially in the production of the relatively large photographic images required in commercial photo-lithography and other printing arts, for use as printing elements in the production of photo-printing press plates. Up to the present time, however, no satisfactory means or devices have been produced whereby such films or sheets can be positioned as required and held firmly and stretched smoothly without wrinkles or undulations so that the image bearing surface will lie in a true plane. An uneven film or sheet results in the production of a hazy and misregistered image, due to improper focus in the case of projection apparatus, as parts of the sensitized surface would be out of the focal plane of the projected image, while in contact work it is impossible to obtain perfect contact and perfect impressions over the entire area.

Furthermore, the use of such films or sheets for multicolor or other work requiring a number of images that must all register exactly as to dimensions and position one with another and with the original or with a master copy, layout or other registering device or guide, has not heretofore been considered feasible owing to the characteristic tendency of the materials of which the films or sheets were made to shrink and expand or otherwise change condition either generally or locally, which would cause misregister of the prints made from the sheets, hence nullifying the otherwise desirable qualities of such films or sheets.

Objects of the invention are to provide a holder of improved construction including a frame provided with means for securing a photographic film or other flexible sensitized sheet, or an image bearing sheet by its edges on the frame and whereby it may be stretched or drawn taut and smooth over the frame opening; also to provide a holder having means whereby a flexible image bearing film or sheet may be arranged on the holder in definite relation to an image bearing glass plate or other rigid member secured on the frame beneath and in contact with the sheet, and whereby its image may be registered both as to size and position with said underlying image, or so that the image on the sheet may be accurately brought to predetermined position by the use of suitable image positioning means or devices by manipulating the securing and stretching means or devices.

Another object is to construct a portable holder of this sort having a plurality of sheet gripping and stretching devices adjustably mounted on the holder frame and which are capable of independent adjustment relatively to said frame to permit variable tension to be applied to different areas of the sheet or film, thereby permitting the same to be stretched, either locally or generally, as desired; also to provide the frame or holder with adjustable means whereby a glass or other rigid plate may be adjustably secured in or over the opening of the frame so as to act as a back support for the film or sheet when said sheet bears an image from which it is desired to take an impression or reproduction, or to permit a glass or the like plate bearing an image to be adjusted to and secured in predetermined position so that a flexible film or sheet bearing an image may be arranged above the plate and stretched and adjusted to position its image in predetermined relation to the image on the glass plate.

Still another object is to provide a support for the plate holder mentioned, whereby a relatively large number of the holders of the same or of different sizes, may be used without the necessity of providing a separate complete support for each size of plate holder, and so that the usual large and expensive glass support for the printing or other element may be dispensed with; also to construct said plate holder support so that the image or images on the flexible film or sheet, or on the rigid glass plates on the holders can be placed in predetermined register with a master or zero position which has been located or preregistered on a photographic printing apparatus, so that after the image on the sheet or plate has been positioned on the holder, the holder with the sheet or plate thereon, or both a sheet and a plate thereon, can be removed from the image positioning device and placed in corresponding position on the printing apparatus with the assurance that the image or images will coincide or register with said master position. A further object is to construct such a support of two members having means whereby, when one of the members is placed on the other member it may be adjusted relatively thereto to occupy a definite predetermined location thereon and will be removably secured thereto so as to form a single portable unit; also to so construct such units that one of them may be arranged on a photographic printing or the like apparatus, and another like unit may be arranged on an image positioning or registering apparatus or device, so that any number of the holders may be placed on one or the other unit and, when so placed, will always occupy the same relative position on either unit, thus enabling image bearing

films, sheets or plates to be accurately registered in predetermined position on the image positioning device, and then by removing the holders only and placing them on the other unit on the printing apparatus the image on the sheet or plate will be in exactly the same relative, predetermined location.

A further object of the invention is to provide holders for the purpose described with improved means for enabling said holders to be used on photographic printing apparatus wherein suction is used for the purpose of withdrawing air from between the surface of the image bearing sheet or the plate on the holder and the print receiving surface on which it is desired to produce an impression of said image, for the purpose of obtaining close contact between said surfaces; and also to improve portable holders for photographic printing or other like elements, and to improve the supporting means or devices for such holders in the other respects hereinafter specified and claimed.

In the accompanying drawings:

Fig. 1 is a face view of a holder embodying my invention on which flexible sheets, films or the like are adapted to be stretched and secured, and glass or other rigid plates secured so that images thereon may be positioned on the holder in predetermined position.

Fig. 2 is a transverse sectional elevation thereof on an enlarged scale on line 2—2, Fig. 1, showing one of the sheet gripping devices or clips thereof.

Fig. 3 is an end view of the clip shown in Fig. 2.

Fig. 4 is a sectional plan view of the clip.

Fig. 5 is a side view of one of the pressure devices for the clips.

Fig. 6 is a sectional plan view of one of the plate securing devices or clips of the holder.

Fig. 7 is a cross section thereof on line 7—7, Fig. 6.

Fig. 8 is a plan or face view showing a holder as illustrated in Fig. 1 arranged on its support and positioned on an image positioning device.

Fig. 9 is a sectional elevation of the holder and its support on line 9—9, Fig. 8, and on an enlarged scale.

Fig. 10 is an elevation showing the holder on its support arranged on a part of a photographic printing apparatus.

Figs. 11 and 12 are face views of the primary and secondary members respectively of the holder support.

Fig. 13 is a face view of a holder of slightly modified form, showing a portion of a flexible sheet secured thereon.

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

Fig. 15 is a fragmentary face view, on an enlarged scale of a portion of the holder shown in Fig. 13.

Fig. 16 is a transverse section thereof on line 16—16 Fig. 15.

Figs. 17 and 18 are perspective views of the two jaw members of the sheet gripping device or clip shown in Figs. 13 and 16.

Fig. 19 is a sectional elevation showing a holder of the construction shown in Fig. 13 arranged in relation to a print receiving surface for making a contact print from an image on the flexible sheet.

In the embodiment of the invention shown in Figs. 1–12, a holder is provided having means whereby a rigid glass or other transparent plate, or photographic image bearing element, and also a flexible image bearing or other photographic film or sheet may both be secured on the holder, the rigid plate being adjustably positioned on the holder and the flexible film or sheet bearing on the face thereof and adapted to be stretched taut and smooth, and whereby an image on a flexible sheet may be registered, both as to size and position on the holder. Said holder comprises a frame A, a plurality of adjustable securing devices B for the glass or rigid plate D, and a plurality of gripping devices or clips C adapted to grip the edge portions of a flexible sheet or film E so as to stretch or draw the same taut over and in contact with the glass plate. The frame A is preferably made rectangular with a rectangular central opening or aperture 12, the dimensions of which are somewhat less than those of the plate or film to be used on the holder. The frame A is formed with a flange or ledge 13 on one face, as its upper face and surrounding said aperture. The ledge is preferably provided with a rubber or other gasket 14 adapted to form a yielding support on which the plate D may rest so as to be supported adjacent its edges across the aperture 12. The edges of the plate are preferably beveled as shown and form with the top surface a corner $d'$ extending around the plate adjacent the edges of the opening 12, and the plate securing devices B engage the beveled edges and hold the plate firmly down in place on the gasket 14. The plate securing devices B are secured on the frame at intervals around the aperture 12, the number of devices depending on the size of the holder. Each device B includes a movable jaw or member 15 slidably adjustable in a swivelled block 16, and having a beveled edge adapted to engage the beveled edge of the plate. As shown the jaw has a dove-tailed shank 18 engaging in a guideway in the block 16, and an adjusting screw 19, journaled in the block, engages in a threaded hole in the shank 18, so that by turning the screw the jaw can be moved toward and from the plate D. The swivel block 16 has segmental circular edges engaging complementary curved faces on plates

20 removably secured on the frame. The plates 20 and block 16 are flush, and a retaining plate 21 secured by screws 22 which pass through the plate 21 and plates 20 into the frame A maintains the block in place. In addition to the transverse adjustment of the jaws 15 in the swivel block 16 the latter can turn to a limited extent on the frame A, thus permitting the beveled edges of the jaws to be automatically alined with and squarely engage the beveled edges of the plate D, even should the plate for any reason be required to be positioned in a slightly angular relation to the aperture 12.

The securing and stretching devices C for the flexible film or sheet E are adjustably mounted on the frame A in spaced relation, preferably between, or alternating with the device B, and are adapted to grip the edge portions of the sheet so that when the sheet is placed over the plate D and its edges secured in the devices C, the sheet can be stretched taut and smooth over the plate D by adjusting said devices, which draw the edge portions of the sheet down over the corners *d'* of the plate. Each clip C, see Figs. 1–5 and 9, includes two members or plates 25, 26 having gripping jaws 27, 28 respectively. The members are pivotally connected, as by a hinge pin 29, to permit one of the jaws 28 to move to and from the other jaw 27. The jaws 27, 28 are preferably provided with complementary corrugations 32 extending parallel with the edges of the flexible sheet E, so that when the edge portion of the sheet is gripped between the jaws, the edge of the sheet will be forced into the groove and held firmly. The member 25 has a flat bottom face adapted to bear and have a limited sliding movement on the face of the frame A. These movements are permitted by means of fixed retaining members 34, see Figs. 3 and 4, a pair of which are provided for each gripping device. The retainers 34 comprise blocks secured to the frame A by screws or the like 35 and having lateral extensions 36 adapted to overhang and engage lugs 37 extending laterally from the ends of the member 25. The retainers permit the member 25 to have considerable movement toward and from the frame aperture 12 and also a limited sidewise movement or play. The clips C are adjusted preferably by screws 40 swivelled in slots 42 in stationary bearings 41 secured on the frame A outwardly beyond the clips C, each screw engaging in a threaded hole in the lower member 25 of an adjacent clip C, so that by turning the screw the clip can be moved toward or from the edge of the aperture 12. The slot 42 is large enough to permit the screw 40 to have a sufficient lateral movement, to allow the clip C to be adjusted laterally to a slight degree, so that when the clips at the ends, for instance of the sheet are adjusted the clips at the sides may move with the film during such adjustment. The movable jaw of each clip is actuated preferably by one or more levers 45, see Figs. 2, 3 and 5, each having a cam face 46 engaging a complementary cam face formed on the clip member 25. Each lever is further provided with a flat top face 49 disposed beneath and engaging the outer end of the movable jaw member 26 and with a pivot stud 50 seated in a hole in member 25. By turning the lever its cam face 46 will ride on the stationary cam face and the flat face 49 will move up or down, depending on the direction of rotation of the lever, and so raise the outer end of the member 26 and force the jaw 28 towards the jaw 27, or allow said outer end, which is preferably weighted, to drop and swing the jaw 28 away from the jaw 27 to release the edge of the film. In the construction shown, a pair of the levers 45, one right hand, and one left hand, is provided at opposite ends of each clip C. The weighted ends of the jaws permit the gripping jaws to remain open when the levers are turned to open position.

As will be seen upon referring to Figs. 2 and 9 the gripping faces of the jaws 27, 28 are inclined with reference to the face of the frame A and are disposed below or back of the outer face of the glass plate D, so that when the clips are manipulated to tighten the sheet E, the edge portions of the sheet will be drawn down against the corners *d'* of the plate D, and the sheet may be drawn taut and smooth over and down upon the surface of the plate, and as each gripping device is independently adjustable, they can be manipulated to apply greater or less tension to different portions of the sheet as may be required to effect the desired result.

While the described construction produces a practical and desirable holder, other constructions adapted for the purpose may be used. For instance, in Figs. 13–19, a holder is shown comprising a frame A', having a central aperture $12^a$ and a plurality of film gripping and stretching devices C' which are of different construction from that previously described. In this holder, instead of providing a rigid glass or other plate on which the film E is stretched and supported, the frame A' is provided with a ledge 53 projecting upwardly around the edges of the opening $12^a$ and a yielding strip 54 is secured around the top edge of the ledge to form a compressible elevated rim on which the edge portions of the sheet E' are adapted to bear directly, and over which the sheet may be stretched taut and smooth over the opening $12^a$ by means of the gripping devices C'. The clips C' are arranged in spaced relation on the frame A' and each device includes a pair of gripping members 55, 56 having jaws 57, 58 respectively. The rear edge of the upper member 56 is adapted

to bear on a shoulder 59 of the lower member 55, while the jaw 58 is adapted to be forced towards the jaw 57 to grip the edges *e'* of the film or sheet by means of one or more levers 61 pivoted at 62 on lugs or ears extending upwardly from the member 55, and having eccentric portions 63 adapted, when the levers are swung downwardly, to depress the member 56 against the action of a leaf spring 64 therebeneath. When the levers are raised as shown in Fig. 16 the jaw 58 is permitted to move away from the jaw 57 and release the film or permit the film to be inserted in the clip. These clips C' are releasably retained on the frame A' by retainers 65, and are adjusted by screws 66 working in threaded holes 67 in the lugs $67^a$ on member 55 and retained from endwise movement in slots in fixed blocks or strips 68 on the frame, as in the first construction.

Both forms of holders described are adapted and intended to be used for mounting a flexible photographic transparent sheet or film thereon and stretching the same taut and smooth over the frame opening and may be advantageously used in carrying out the process outlined in said application for Letters Patent Serial No. 729,277. The first holder described, being provided with the plate securing devices B, is also adapted to support a glass or other rigid transparent member, whereby in addition to the use of a glass plate to support the film as a printing element, either by contact or projection methods, a glass plate having an image thereon may be used, so that an image on a flexible film or sheet may be stretched and registered with relation to an image on the glass plate beneath, the image of which has first been accurately positioned by means of an image positioning device. By this arrangement, an image on the film or sheet may be positioned alongside or in definite predetermined relation to a different image on the glass plate so that the two images may be simultaneously exposed and a combination image printed or projected from the two elements. This construction is also adapted for contact printing in apparatus requiring a rigid back support for preventing the flexible film or sheet from flexing or giving during the printing.

In the second construction the holder is adapted to support the flexible film or sheet directly on the ledge 53, so that the film, if bearing an image, may be stretched and the image positioned and brought to size according to any predetermined layout or other image by the use of an image positioning or registering device. This construction also makes it possible to mount a sensitized flexible sheet or photographic film on the holder so that the same is taut and smooth without wrinkles or undulations, thus providing a holder which will enable large light sensitive sheets or films to be successfully used in a camera, to receive a projected image, as the sensitive surface will lie perfectly flat in the plane of the projected image. In addition, a rigid glass or other transparent image bearing plate D' may be arranged beneath the film by the use of quoins 69, Fig. 14, or other suitable securing means, and an image on the film registered therewith as to size after which the plate may be removed from the back by loosening the quoins, so that the holder may be used in a camera or photographic printing apparatus and other images of like or different size made from the image on the film in predetermined like positions relatively to a master image or pre-registered image position. In both the holders A, A' the clips B, C and C', and other parts of the holders are arranged below, or back of the image bearing or other surface, or at least do not project forwardly beyond the surface, so that when this surface is brought into contact with a larger sensitized or other surface, the latter surface will not be injured or perfect contact prevented between the surfaces by projecting parts on the holders, see Fig. 19.

A portable support is provided, in accordance with the invention, whereon the holders of either construction described may be mounted or supported so as to occupy a definite predetermined position either on a photographic printing apparatus or on an image positioning device or the like. Said support preferably comprises two members, a primary member 71 and a secondary member 72, both of which are in the form of rectangular plates having central apertures 73, 74 respectively. The secondary member is provided with suitable means whereby a holder A or A' may be placed thereon in a predetermined position, as by means of dowels or studs 75 on the face of the member which fit snugly in holes or seats 76 in the back of the holder, and be there removably secured, as by means of fingers or latches 77 pivoted on the member 72 and adapted to swing into recesses 78 in the side edges of the holder. The primary member 71 is provided with adjustable securing devices 79 cooperating with parts on the secondary member 72 for detachably securing said member on the face of the member 71 and effecting a limited adjustment of the member 72 relatively to the other member. For this purpose notches having beveled faces 80, see Figs. 9 and 12, are formed on the edges of the secondary member, which are adapted to be engaged by adjustable jaws 81 on the primary member 71. These jaws 81, see Figs. 8, 10 and 11, are slidably arranged adjacent the edges of the member 71 so as to move in and out in guideways 82 on the member 71. Each jaw is moved by an adjusting screw 83 swivelled in a plate 84

and having a threaded end engaging in a threaded hole in the jaw 81. The free ends of the jaws are bevelled and adapted to engage the beveled faces 80 and hold the member 72 firmly on the face of member 71. In the case of the holder A′ these devices 79 not only act as securing means for the member 72 but also enable an exact predetermined registration of images on the sheets or films on the holder to be had. For example, when an image on such a sheet has been registered as to size by visual registration with an image on a plate secured by the quoins as described, this image may be still unregistered as to predetermined position, as the plate can only be approximately positioned in the frame aperture. When therefore the support 71 with the holder A′ and stretched film or sheet thereon is placed on the printing apparatus and it is found that the image is not exactly in predetermined position, the devices 79 may be manipulated to move the member 72 relatively to the member 71, over the face of that member until the image has been brought to its exact predetermined location.

The support 71—72 is further provided with suitable means for removably securing it in predetermined position on either a printing apparatus or an image positioning device. Preferably the member 71 is formed with holes 86 adjacent its opposite ends or upper and lower edges adapted to receive dowel pins or locking screws 87 while the photographic printing apparatus, a portion of which is shown in Fig. 10, may have a plurality of accurately spaced holes 88 formed in upper and lower cross bars 89 on which the support 71—72 is to be placed. The screws 87 are adapted to engage in opposite selected holes, and when screwed tight, securely hold the support in the desired position. The holes 88 are arranged at equal distances apart, preferably in two directions from a central or base line position, indicated by the dot and dash line *x*—*x*. Holes 90 similar to the holes 88 are also arranged at the opposite side edges of the member 71 on a horizontal center line *y*—*y* so that the support 71—72 may be turned at right angles and secured to the bars 89 as before.

One form of a suitable image positioning device is shown in Fig. 8. This device is constructed and operates as disclosed in Letters Patent 1,452,078 granted to me April 17, 1923. The device is provided with a stand or table 92 on which the support 71—72 is adapted to be supported, and a pair of holes 93, corresponding in position to the holes 88 on the printing apparatus, is adapted to receive the screws or pins 87, thus enabling the holder to be positioned in exactly corresponding positions on the two machines. The images or subjects on the sheets E, E′ or plates D, D′ can be accurately positioned according to the predetermined location therefor by swinging the registering frame 94 over in front of the holder A or A′ on the stand and adjusting the clips B and C until the image or images is or are in correct position as determined by the reticules or sighting devices 95, which are movable along lines corresponding to position lines *x*—*x* and *y*—*y*. Registering means of various other constructions could also be used for accurately placing the images in predetermined positions.

The construction of the holder support in two parts 71, 72 enables a multiplicity of different sized holders A or A′ to be used while only requiring two of the primary members 71 and a small number of secondary members 72 for use with a photographic printing machine and a separate image positioning device, for the reason that the different secondary members, while having uniform outer dimensions can be formed with different sizes of openings 74 and each of these secondary members can accommodate several different sizes of holders as any holder of a size such that the dowels 75 can be located on its rear face to register with the complementary dowel holes, can be secured on the same secondary member as long as its aperture is equal to or less than the aperture 74 of that particular secondary member. By this arrangement a great saving in cost of equipment results, and in addition, the holders described enables the use of paper, or other flexible films or sheets in the place of glass in the preparation of press plates and results in still further reducing operating costs to a marked degree.

The provision of the rubber or resilient gaskets 14 around the aperture 12 of frame A, together with a similar gasket 98 on a ledge or flange 99 extending around the outer edge of the frame A or A′, adapts the holder for use in apparatus wherein suction or vacuum is used to obtain contact between the flexible sheet or other element on the holder and a print receiving or other contacting surface, as for instance the sheet metal press plate shown at 100, Fig. 19. The press plate 100 extends beyond the edges of the sheet E and is engaged by the gasket 98, thus forming a sealed vacuum chamber 101 around the sheet and its securing devices. A suitable nipple or connection 102 is provided for attaching a suction hose or the like to the holder frame A, A′ to withdraw the air from the chamber 101 and from between the contacting surfaces of sheet E and plate 100.

I claim as my invention:

1. A holder for a flexible photographic sheet or film comprising a portable frame having an opening for the passage of light, a support on which said frame is removably secured, a plurality of sheet gripping and

tightening devices for said sheet movably mounted on said frame at the several sides of said opening to move independently toward and from the opening in a plane parallel with that of said sheet and each having means for independent attachment to the sheet, adjusting means for said devices adapted to bodily move and hold said devices independently of each other relatively to said frame whereby said devices can be moved to and held at different distances from said openings so as to apply varying tension to different portions of the several edges of said sheet to draw it taut and smooth over said frame opening.

2. A portable holder for a flexible image bearing sheet or film comprising a frame having an opening for the passage of light, a plurality of sheet securing and tightening devices for said sheet movably mounted on said frame at each of the several sides of said opening to move bodily toward and from the opening in a plane parallel with that of said sheet and each having means for attaching the sheet thereto, independent adjusting means for each of said devices, whereby each device may be separately adjusted so that variable tension may be applied to said sheet at different portions of its several edges as required to draw said sheet taut and smooth over said frame opening, and means carried by said holder arranged to bear against the underside of and hold said tensioned sheet so that said securing devices and adjusting means do not project beyond the plane of the outer surface of said sheet.

3. A portable holder for a flexible image bearing sheet or film comprising a frame having an opening, a plurality of sheet gripping and stretching devices slidably mounted on said frame at the sides of said opening to move independently both laterally and toward and from said opening, and means for independently adjusting said devices to stretch said sheet evenly over said frame opening, each of said devices comprising a pair of members having jaws adapted to grip an edge of the sheet, and a locking lever having a cam portion adapted to engage one of said members to force and hold its jaw portion into gripping relation with the other jaw.

4. A portable holder for a flexible sheet or film comprising a frame having an opening, a plurality of sheet gripping and stretching devices movably mounted on said frame at the sides of said opening to move independently both laterally and toward and from said opening, and means for independently adjusting said devices to stretch said sheet evenly over said frame opening, each of said devices comprising a pair of members having jaws adapted to grip an edge of the sheet, a locking lever connected to one of said members and having a cam portion adapted to engage the other member to force and hold its jaw into gripping relation with the other jaw, and a weighted part on said other member adapted when said locking lever is released to cause said jaws to open to release the edge of said sheet.

5. A portable holder for a flexible sheet or film comprising a frame having an opening for the passage of light, a plurality of sheet gripping and stretching devices movably mounted on said frame at the sides of said opening, and means for independently adjusting said devices toward and from said opening to stretch said sheet locally and evenly over said frame opening, and means for permitting independent lateral movements of said devices during said adjustments, each of said devices comprising a pair of members having jaws adapted to grip an edge of the sheet, one of said members being movable toward and from the other, and a locking device adapted to engage said movable member to force and hold its jaw in gripping relation to said other jaw, and means adapted, when said locking device is released to positively open said jaws to release the edge of said sheet and to retain the jaws open as long as said locking device is in released position.

6. A portable holder for a flexible image bearing sheet or film comprising a frame having an opening for the passage of light, a plurality of sheet gripping and stretching devices slidably mounted on said frame at the several sides of said opening to move independently both laterally and toward and from said opening, and means for independently adjusting said devices to stretch said sheet evenly over said frame opening, each of said devices comprising a pair of members, a rocking connection between said members, each of said members having a jaw at one side of said connection and a locking device at the opposite side of said connection arranged to engage said members and rock one member to force and hold its jaw into gripping relation with said other jaw.

7. A portable holder for a flexible photographic sheet or film comprising a frame having an opening, a plurality of sheet gripping and tightening devices for said sheet movably mounted on said frame at the sides of said opening to move toward and from the opening and each having jaws for gripping the sheet, adjusting means for said devices adapted to move said devices independently relatively to said frame to apply tension to said sheet to draw it taut and smooth over said frame opening, said adjusting means comprising a screw for each device, an abutment on said frame having a slot in which said screw is held from endwise movement but which permits limited lateral movements of the screw, said screw having a threaded engagement with said gripping device to move the same by turning said screw.

8. A portable holder for a flexible image bearing sheet or film comprising a frame

having an opening for the passage of light, means forming a raised bearing extending continuously around said opening and on which the edge portions of said sheet may bear, and a plurality of independently adjustable sheet gripping and stretching devices movably mounted on said frame at each of the several sides of said opening and adapted for attachment to the edges of said sheet at points outwardly beyond said bearing, said devices being adapted to apply tension to said sheet to pull said edge portions over said bearing and stretch the sheet across said frame opening.

9. A portable holder for a flexible image bearing sheet or film comprising a frame having an opening for the passage of light, means forming a raised bearing extending continuously around said opening and on which the edge portions of said sheet may bear, a plurality of sheet gripping and stretching devices independently movably mounted on said frame at the several sides of said opening, and means for providing independent adjustments of said devices both laterally and toward and from said opening, said devices having gripping jaws adapted to releasably engage the edges of said sheet outwardly beyond said bearing and pull said edge portions against said bearing and stretch said sheet across said frame opening by applying tension to said sheet by adjusting said devices.

10. A portable frame for a flexible image bearing sheet or film comprising a frame having an opening, a rigid transparent plate supported on said frame and crossing said opening with its edges disposed adjacent the edges of said opening, a plurality of movable sheet stretching devices on said frame at each of the several sides of said opening and adapted for quick attachment to and detachment from the edges of said sheet outwardly beyond the edges of said plate, and means for moving each of said devices independently away from the edges of said opening to apply tension independently to different portions of said sheet and draw its edge portions against the edge corners of said plate and stretch said film over said opening.

11. A portable frame for a flexible image bearing sheet or film, comprising a frame having an opening for the passage of light, a rigid transparent plate supported on said frame and crossing said opening with its edges disposed adjacent the edges of said opening, a plurality of movable sheet stretching devices on said frame at each of the several sides of said opening and adapted for attachment to the edges of said sheet outwardly beyond the edges of said plate, means for moving said devices independently to apply tension independently to different portions of said sheet and draw its edge portions against the edge corners of said plate and stretch said film over said opening, and independently operable means for adjusting said rigid plate on said frame.

12. A portable holder of the character described comprising a frame having an opening therein, a rigid transparent plate crossing said opening and having its edges disposed adjacent the edges of said opening, adjustable devices on said frame each adapted to engage an edge of said plate to adjustably position the same in relation to said opening, a plurality of adjustable devices on said frame at each of the several sides of said opening adapted to engage the edges of a sheet or film arranged over said plate, and means for independently applying tension to said last mentioned devices to draw said sheet taut and adjustably position the same over said opening and said plate.

13. A portable holder of the character described comprising a frame having an opening therein, a rigid transparent plate arranged over said opening and having its edges disposed adjacent the edges of said opening, a plurality of adjusting devices on said frame at the sides of said opening adapted to adjustably secure said plate on said frame in predetermined location over said frame opening, each of said devices comprising a jaw adapted to move towards and from said plate and to engage an edge thereof, a guide for said jaw, a bearing in which said guide is arranged to have a limited rotating movement in the plane of said plate, and means for actuating said jaw.

14. A portable holder of the character described comprising a frame having an opening therein, a rigid transparent plate arranged over said opening and having its edges disposed adjacent the edges of said opening, a plurality of adjusting devices on said frame at the sides of said opening adapted to adjustably secure said plate on said frame in predetermined location over said frame opening, each of said devices comprising a jaw adapted to move towards and from said plate and to engage an edge thereof, a guide for said jaw, a bearing in which said guide is arranged to have a limited rotating movement in the plane of said plate, an adjusting screw in said guide arranged to rotate without endwise movement relatively thereto and engaging a threaded hole in said jaw for moving the same to and from an edge of said plate.

15. The combination of a portable holder for a flexible image bearing sheet or film comprising a frame having an opening, a plurality of sheet securing devices movably mounted on said frame at the sides of said opening, adjusting means adapted to move said devices relatively to said frame and apply tension to said sheet to draw the same taut and smooth over said opening and place said image into predetermined register, a support for said holder, and means for detach-

ably securing the holder on the support and adjusting the holder relatively to the support to place said registered image in predetermined location.

16. The combination of a portable holder for a flexible image bearing sheet or film comprising a frame having an opening, a plurality of sheet securing devices movably mounted on said frame at the sides of said opening, adjusting means adapted to move said devices relatively to said frame and apply tension to said sheet to draw the same taut and smooth over said opening and place said image into predetermined register, a support for said holder comprising two substantially flat superposed members having central apertures which register substantially with each other and with said frame opening, means for detachably securing said holder on one of said members, means for detachably securing said member on the other member, and means for adjusting one of said members relatively to said other member to place said registered image in predetermined location.

17. The combination of a portable holder for a flexible image bearing sheet or film comprising a frame having an opening, a plurality of sheet securing devices movably mounted on said frame at the sides of said opening, adjusting means adapted to move said devices relatively to said frame and apply tension to said sheet to draw the same taut and smooth over said opening and place said image into predetermined register, a support for said holder, and means for detachably securing the holder on the support and adjusting the holder relatively to the support to place said registered image in predetermined location, said support being adapted to be secured in predetermined location on a photographic printing apparatus or in a like location on an image positioning or the like device.

18. The combination of a portable holder for a flexible image bearing sheet or film comprising a frame having an opening, a plurality of sheet securing devices movably mounted on said frame at the sides of said opening, adjusting means adapted to move said devices relatively to said frame and apply tension to said sheet to draw the same taut and smooth over said opening, a support for said holder on which the same is adapted to be detachably secured, said support being adapted to be secured in predetermined location on an image positioning or the like device so that by adjusting said securing devices on said holder said sheet may be stretched to place said image into predetermined register by means of said image positioning device.

19. The combination of a portable holder for a flexible image bearing sheet or film comprising a frame having an opening, a plurality of sheet securing devices movably mounted on said frame at the sides of said opening, adjusting means adapted to move said devices relatively to said frame and apply tension to said sheet to draw the same taut and smooth over said opening, a support for said holder on which the same is adapted to be detachably secured, said support being adapted to be secured in predetermined location on an image positioning or the like device so that by adjusting said securing devices on said holder said sheet may be stretched to place said image into predetermined register by means of said image positioning device, said support being further adapted to be removed from said positioning device and secured in a corresponding position on a photographic printing apparatus, and adjusting means on said support adapted to move said registered image on said holder into register with a predetermined image position on said apparatus.

20. A portable holder for a flexible sheet or film, comprising a frame having an opening across which said sheet extends, a plurality of individual and independently movable sheet gripping and stretching devices mounted on said frame at the several sides of said opening for gripping the corresponding edges of said sheet, and means for independently adjusting each of said devices away from said opening to stretch the sheet evenly thereover, means permitting individual lateral adjustments of said devices for effecting lateral adjustment of said sheet, and means on said frame engaging and retaining said devices thereon and which, when lateral adjustments of one or more devices at a side of said sheet are made permits other devices at said side to move with said sheet and relatively to said frame during such adjustments and without upsetting the first mentioned adjustments of said devices.

21. A portable holder for a flexible sheet or film, comprising a frame having an opening across which said sheet extends, a plurality of individual and independently movable sheet gripping and stretching devices mounted on said frame at the several sides of said opening for gripping the corresponding edges of said sheet, and means for independently adjusting each of said devices away from said opening to stretch the sheet evenly thereover, and means on said frame engaging and retaining said devices thereon and which, when said devices at one edge of said sheet are adjusted to stretch said sheet in one direction, permits the devices at those edges of the sheet which extend in that direction, to move laterally with said sheet and relatively to said frame without upsetting adjustments of said last mentioned devices made for stretching said sheet in a crosswise direction.

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