United States Patent

[11] **3,634,009**

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[54] **METHOD AND PINNING DEVICES FOR ACCURATELY REGISTERING ART MASTERS IN A VACUUM FRAME UNIT AND A PHOTOCOMPOSITION UNIT**
7 Claims, 8 Drawing Figs.

[52] **U.S. Cl.** **355/93,** 355/73, 355/76, 355/128
[51] **Int. Cl.** **G03d 3/08**
[50] **Field of Search** 355/91, 72–76, 122, 128, 130

[56] **References Cited**

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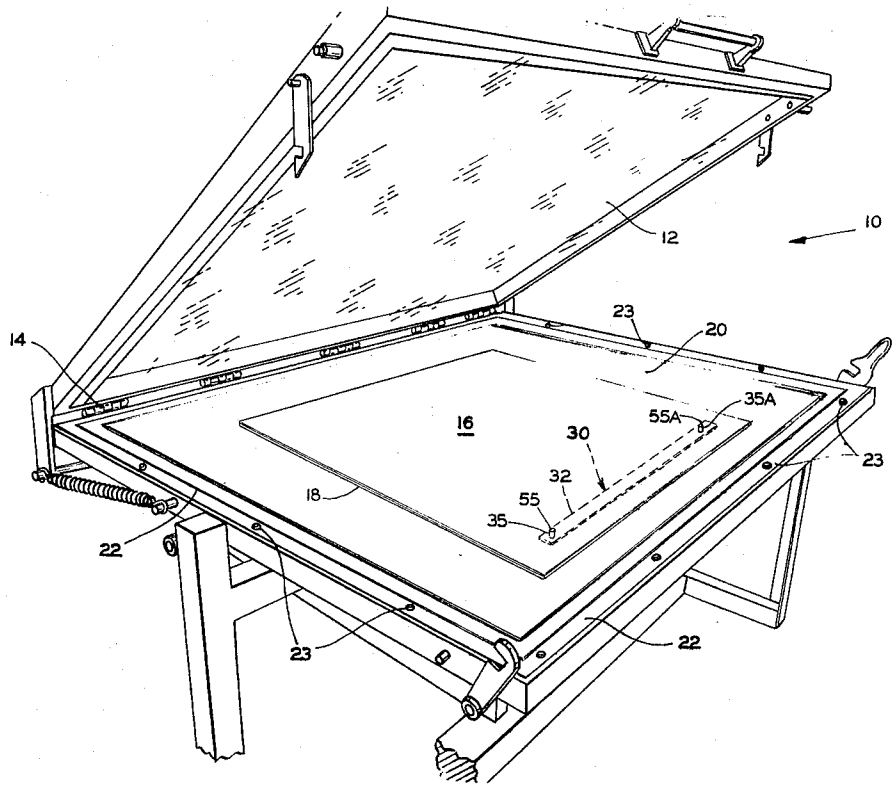
ABSTRACT: Method and pinning devices for accurately registering art masters in operative relation in vacuum frame and photocomposition units for use in conjunction one with the other and in which the vacuum frame unit includes an improvement in the provision of a metal strip cemented to an underside of a resilient rubber mat of the vacuum frame unit, together with two locating pins projecting from the strip and through the rubber mat. The locating pins are spring loaded and sealed in cylinders brazed to the strip and project through openings formed in a baseplate of the vacuum frame unit, while the spring loaded pins in the cylinders are arranged so as to project through the mat and through holes accurately punched in a corresponding relation in photosensitive sheets of film of art masters to effectively locate the sheets of film in extremely accurate relation one to the other on the mat so as to facilitate repeated accuracy in the development of such art work.



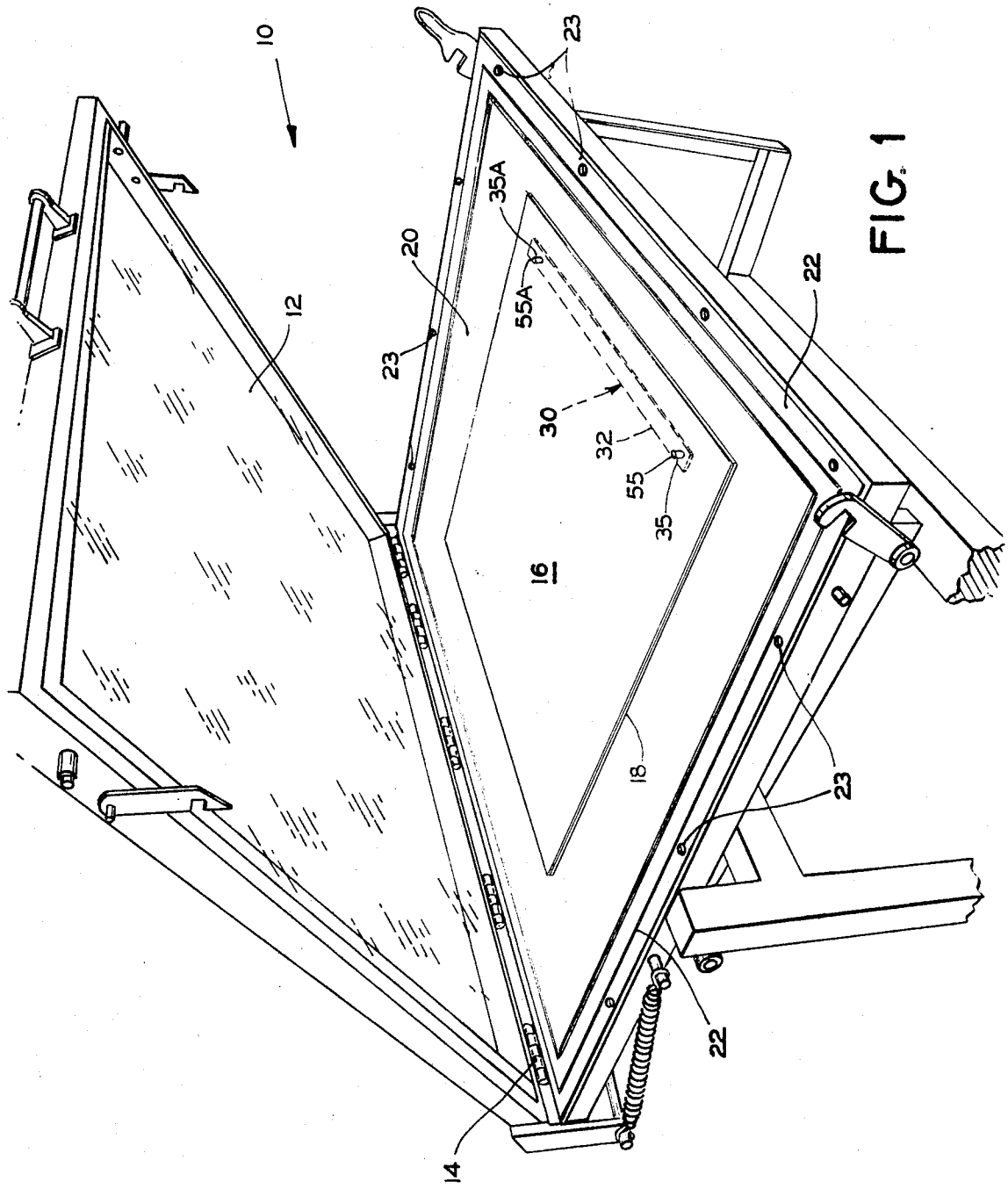


FIG. 1

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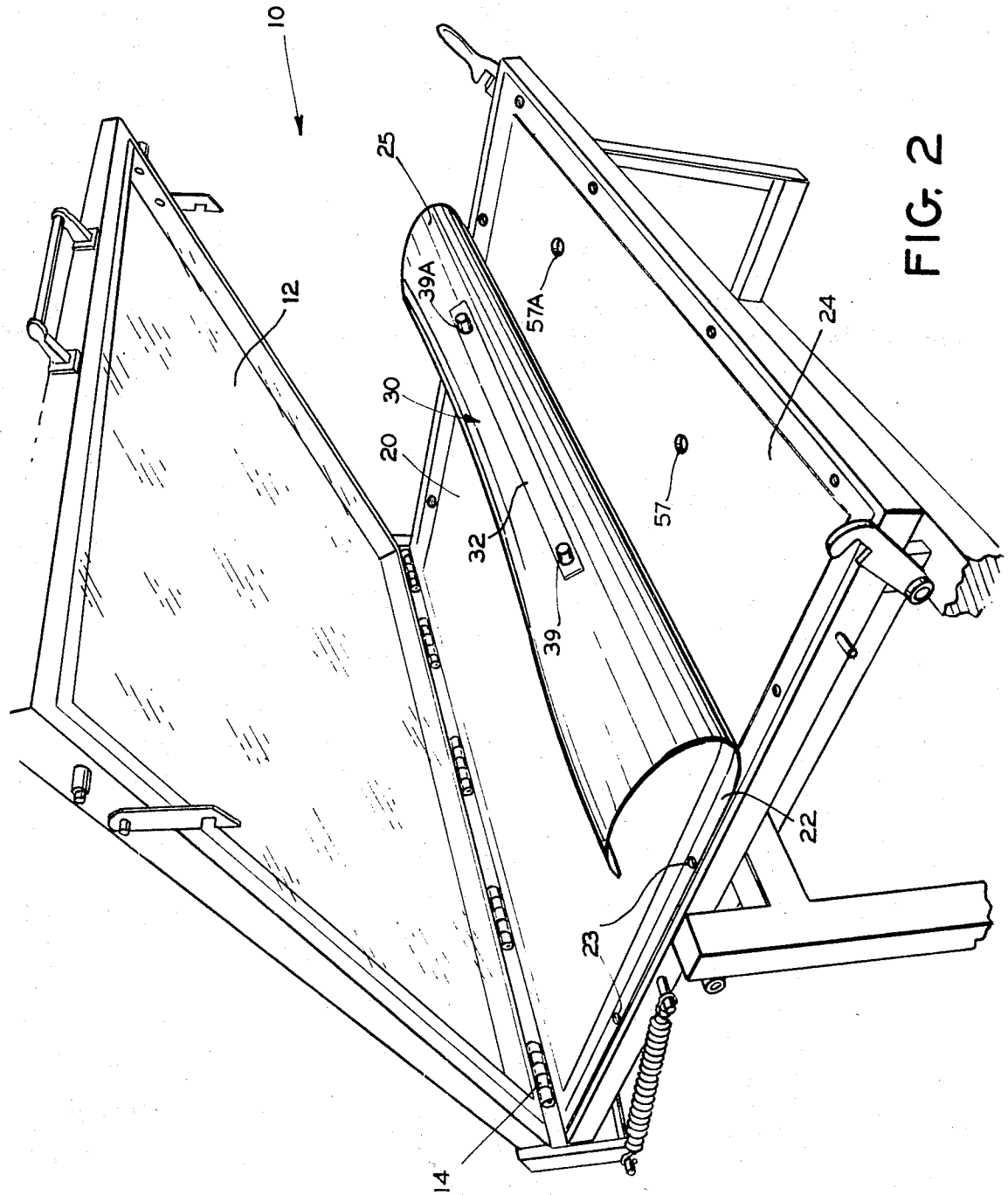

FIG. 2

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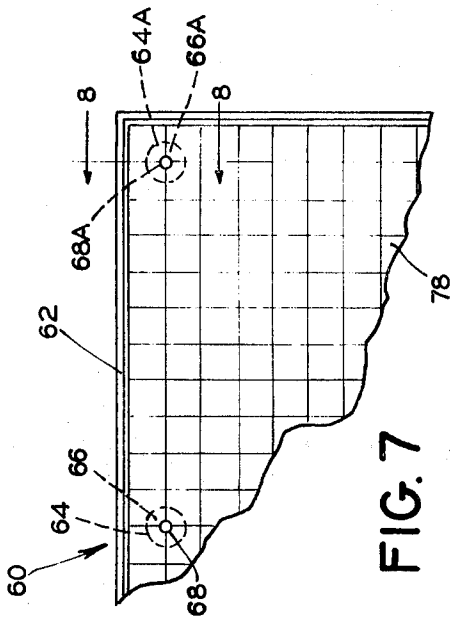

FIG. 7

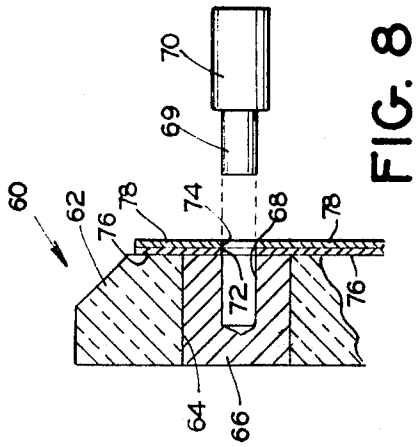

FIG. 8

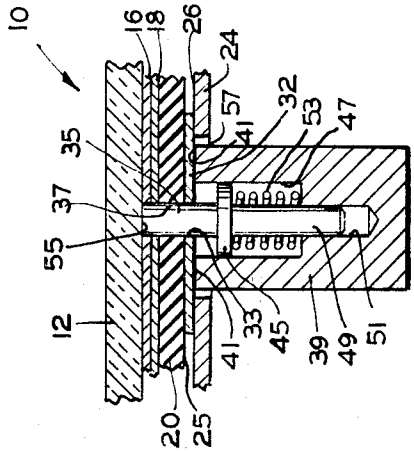

FIG. 5

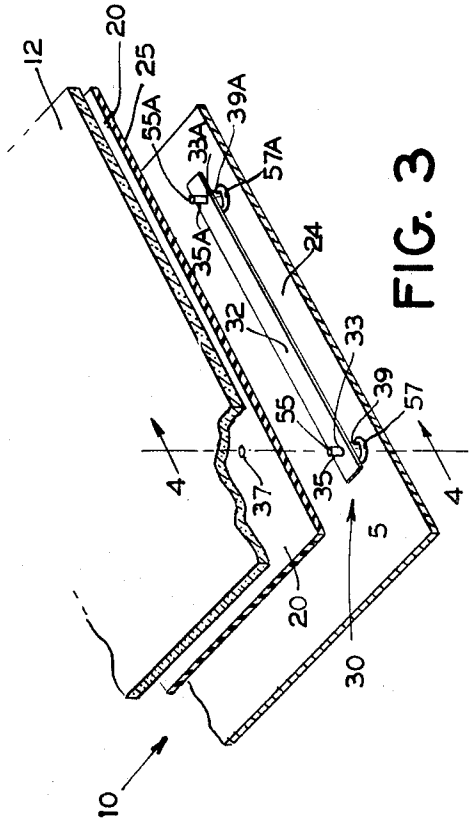

FIG. 3

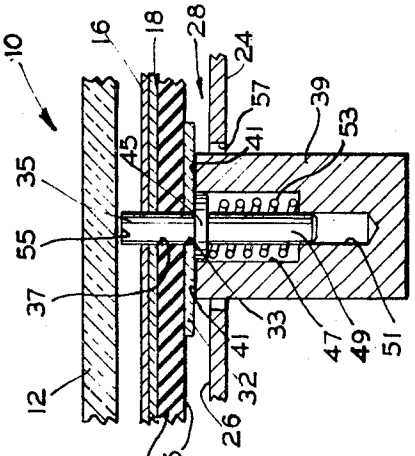

FIG. 4

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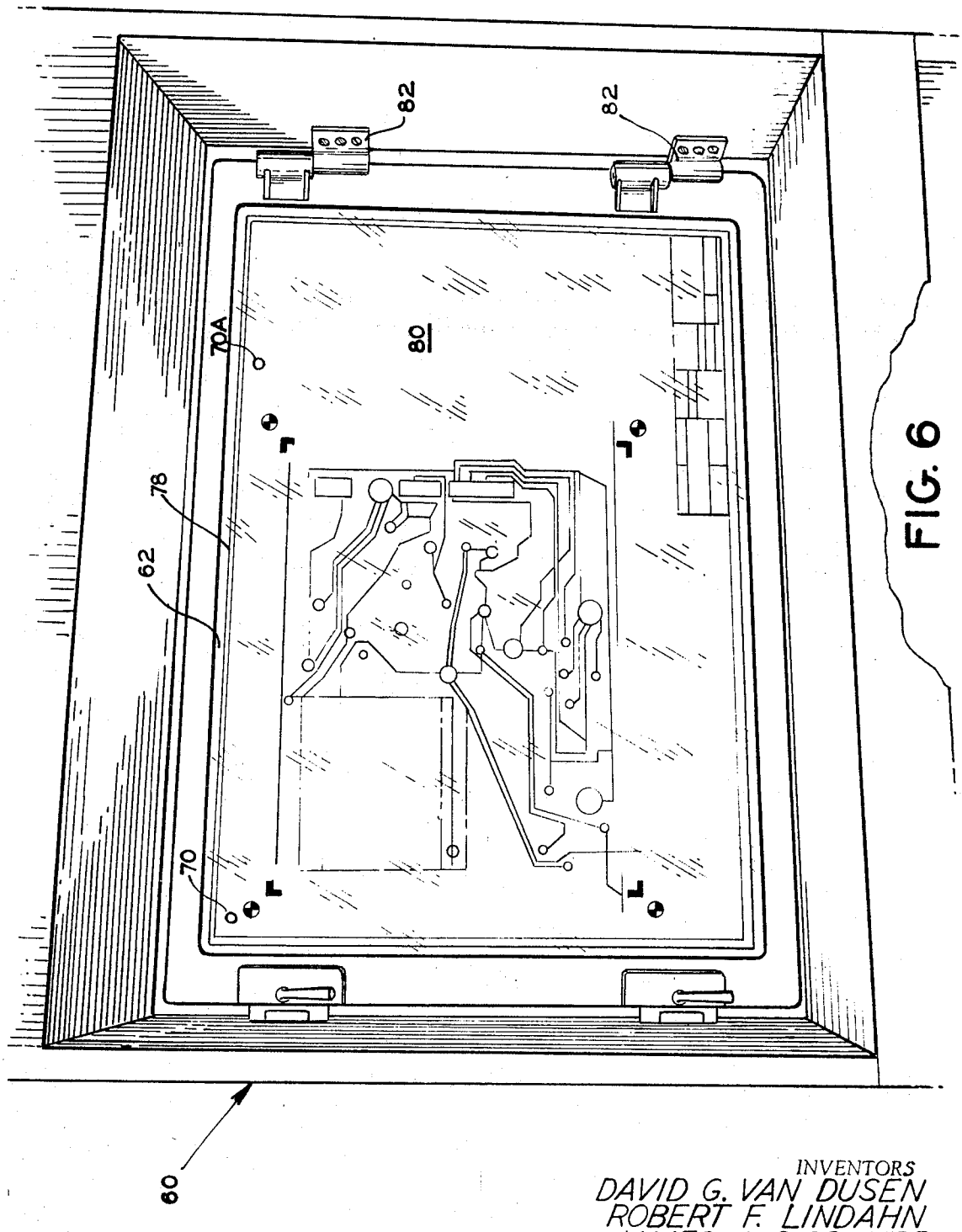

FIG. 6

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METHOD AND PINNING DEVICES FOR ACCURATELY REGISTERING ART MASTERS IN A VACUUM FRAME UNIT AND A PHOTOCOMPOSITION UNIT

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention resides in part in a recognition of a problem heretofore encountered in effecting accurate registration of art masters in a photo composition unit and thereafter in a vacuum frame unit in the printing of circuit board geometry so as to improve— registration accuracy in both devices which are operated in conjunction one with the other and to thereby provide repeatable accuracy in the development of such art work for use in producing multilayer printed circuit boards.

2. Description of the Prior Art

Heretofore a common practice has been to use gum tape to mount such art work on the conventional photo composition unit screen and in the vacuum frame unit with more or less success in the registration accuracies effected in both units, but without assurance of repeatable accuracy.

While no prior art references have been found for positioning such art work in a photo composition unit and in a vacuum frame unit in the specific manner of the present invention, there has been noted a U.S. Pat. No. 2,500,782 granted Mar. 14, 1950 to Carl H. Wiklund which illustrates an ordinary photographic printing frame for accurately holding a sensitized sheet of material or both negatives and sensitized sheets of material during printing operations. Moreover, in a U.S. Pat. No. 3,242,605 granted Mar. 29, 1960 to Johann O. Kleinschmidt, there are shown pins and apertures for mounting transparencies.

Furthermore, U.S. Pat. No. 2,571,764 granted Oct. 16, 1951 to Louis S. Rodger et al.; U.S. Pat. No. 3,235,990 granted Feb. 22, 1966 to Walter Back and U.S. Pat. No. 3,341,960 granted Sept. 19, 1967 to Peter Florjancic et al. relate generally to the problem of mounting photographic transparencies.

The aforenoted prior art references fail to suggest the improved method and structural arrangement of the pinning devices of the present invention, particularly in the provision in the vacuum frame unit of a flexible mat having a metal strip cemented to an underside of the mat and including two locating pins projecting from the metal strip and through the resilient rubber material of the mat. The locating pins are spring-loaded and sealed in cylinders brazed to one side of the strip. The cylinders in turn are held by the resilient mat in a projecting relation so as to resiliently extend through openings formed in a baseplate of the vacuum frame with the spring-loaded pins at the opposite side of the strip being arranged to project through the mat, as well as through accurately punched holes formed in positive and negative sheets of film to hold the sheets of film in accurate registration one with the other, during a contact printing operation effected in the vacuum frame unit. Moreover, the accurately punched holes formed in the printed positive sheets of film cooperate with the pinning devices provided in the photo composition unit in the development of the composite art work effected thereon by a design layout on a transparent sheet of film with repeatable accuracy.

The aforenoted patents fail to show a true recognition of the problem to which the present invention is directed, particularly in the novel method and idea of means for effecting extreme accuracy in the locating of the sheets of art work and film provided —by the novel method and pinning means of the present invention in the photo composition and vacuum frame units so as to provide improvement in the totality of effect with respect to the speed, efficiency and accuracy of operation. Thus a person having the disclosures of the cited patents before him, and who is not aware of the present invention, could not be informed of the method and idea of means herein provided for solving the problem to which the present inventions are directed.

There is no suggestion in the prior art of the desirability of associating the several steps of the method nor of the several elements of the pinning devices in the photo composition unit and vacuum frame unit in the manner of the present invention for the purpose specified, much less any suggestion as to how such association could be made if it were considered desirable.

SUMMARY OF THE INVENTION

A feature of the subject invention includes the provision in a vacuum frame unit of a flexible mat having a metal strip cemented to an underside of the mat and including two locating pins spring-loaded and sealed in cylinders brazed to the strip with the locating pins projecting in spaced relation through the mat, while the cylinders in which the spring-loaded pins are mounted project through openings in the baseplate of the vacuum frame unit.

The arrangement is such that the spring-loaded pins project through the mat and into accurately punched holes formed in a negative film sheet and a positive printout film sheet so as to effectively locate the sheets in extremely accurate relation one to the other on the resilient mat. Moreover, the cylinders are so arranged that as a glass cover of the vacuum frame unit is drawn down tightly against the resilient mat and the spring-loaded pins contact printing is effected —between the sheets of negative and positive film accurately held in position on the vacuum frame mat by the two resilient spring-loaded pins and optically exposed through the glass cover in a conventional manner, while at the same time the cylinders brazed to the strip cemented to the underside of the resilient mat may be forced through the openings in the baseplate of the vacuum frame upon the sheets being clamped between the glass cover and the resilient mat of the vacuum frame to effect the contact printing operation.

A further novel feature of the invention includes the provision of locating pins in a photocomposition unit projecting from a glass screen of the photocomposition unit and in an identical spaced relation to that of the locating pins of the vacuum frame unit so that the pinning devices of the vacuum frame and photocomposition units may be used in conjunction one with the other to accurately position sheets of photographic film and transparent art work paper on the screen of the photocomposition unit, as well as sheets of film on the resilient mat of the vacuum frame unit in the transferring of operations accurately between the photo composition and vacuum frame units.

A further feature of the invention resides in a novel method of locating the pinning devices in the photocomposition unit in relation to the pinning devices in the vacuum frame device. The method may include the steps of providing a pair of bushings in the glass screen of the photocomposition unit for receiving a pair of locating pins, and in which the pair of bushings are so arranged as to receive the locating pins for effecting an accurate registration on the glass screen of the photocomposition unit of sheets of transparent layout drawing paper bearing art work and photosensitive film from which there may be developed a negative to be used in the vacuum frame unit to produce by contact printing a plurality of sheets of positive film bearing art work common to all of the layers of a multilayer printed circuit board. There is subsequently added to separate sheets of positive film in the photocomposition unit art work individual to each separate layer and appearing on separate transparent sheets of drafting paper.

In order to assure absolute accuracy in the relationship of the art work subsequently added to the positive sheets of film to that of the art work as a whole for each of the separate layers of the multilayer circuit board, a fixture may be utilized to form both the bushings and the holes in the sheets of film and transparent drafting paper with extreme accuracy.

This fixture may include a metal strip and a pair of pins arranged in a predetermined spaced relation and projecting from opposite —end portions of the strip. This strip may in

turn be utilized as such a forming fixture and may also provide the pinning strip which may be subsequently cemented by a suitable adhesive material to the underside of the flexible vacuum frame mat so as to provide the pinning device for the vacuum frame unit.

In the later mode of operation, such fixture or pinning device serves to accurately secure the sheet of negative film developed from a photosensitive sheet of the photocomposition unit in a predetermined relation to a sheet of positive film in a contact printing operation effected in the vacuum frame unit, and which relationship may accurately correspond to that effected in the initial processing of the photosensitive sheet of film or subsequent processing of such sheet of positive film in the photo composition unit through the corresponding pinning device of the last-mentioned unit.

The present invention resides in a concept which simplifies the accurate registration of art masters in a photocomposition unit and subsequently in a vacuum frame unit so as to reduce the time expended and avoid the tedious procedures heretofore necessary in the fitting of the photosensitive film and sheet of art work in the photocomposition unit and thereafter in the positioning of the sheet of negative film developed therefrom in the vacuum frame unit for the contact printing of a plurality of sheets of positive film therefrom, while at the same time raising the percent of accuracy and certainty in the positioning of the several sheets in the respective units so as to effect a condition which is more sure to produce the —desired result not only with greater certainty, but with less expenditure of time and money than in the prior methods and devices.

These and other objects and features of the invention are pointed out in the following description in the terms of the embodiment thereof which is shown in the accompanying drawings. It is to be understood, however, that the drawings are for the purpose of illustration only and are not a definition of the limits of the invention, reference being had to the appended claims for this purpose.

DESCRIPTION OF THE DRAWINGS

In the drawings, in which corresponding numerals indicate corresponding parts:

FIG. **1** is a perspective view of a vacuum frame unit illustrating the pinning device of the present invention in an assembled relation on a flexible vacuum frame mat and shown in accurate registration relation with photosensitive sheets of negative and positive film preparatory to a contact printing operation upon a transparent glass cover plate, shown in a raised position, ready to be lowered into an effective contact printing position at which the photosensitive sheets of film are compressed between the glass cover plate and the mat of the vacuum frame unit.

FIG. **2** is a perspective view of the vacuum frame unit of FIG. **1** showing the flexible vacuum frame mat partially rolled back so as to expose to view a metal strip embodying the locating pins of the present invention cemented to an underside of the mat and with openings formed in the baseplate of the vacuum frame unit in a cooperative relation with cylinders of the spring-loaded pins projecting from the underside of the metal strip.

FIG. **3** is a fragmentary exploded perspective view of the pinning device of FIG. **1** shown in cooperative relation with elements of the vacuum frame unit.

FIG. **4** is an enlarged fragmentary sectional view taken along the lines **4—4** of FIG. **3** and looking in the direction of the arrows so as to show the cooperating elements of one of the locating pin assemblies provided in the vacuum frame unit of the present invention.

FIG. **5** illustrates the operation of the locating pin assembly of FIG. **4** upon the transparent glass cover plate of the vacuum frame unit being drawn down tightly against a free end of the spring-loaded pin and resilient mat for effecting a contact printing operation with sheets of negative and positive film being accurately held in position on the vacuum frame mat by the resilient spring-loaded pin, while the cylinder bearing the spring-loaded pin projects through the baseplate of the vacuum frame unit with the sheets effective in the printing operation being clamped between the glass cover plate and the resilient mat of the vacuum frame unit.

FIG. **6** is a perspective plan view of a photocomposition unit illustrating the locating pins for accurately registering therein a sheet of photosensitive film in relation to a transparent sheet of drafting paper bearing art masters for exposure on the sheet of film.

FIG. **7** is a fragmentary view illustrating holes formed in the photocomposition unit screen of FIG. **6** for receiving locating pins in an identical spaced relation to that of the locating pins of the pinning device of the vacuum frame unit of FIGS. **1–5**.

FIG. **8** is a fragmentary sectional view —taken along the lines **8—8** of FIG. **7** and looking in the direction of the arrows illustrating the bushing mounted in the glass screen of the photocomposition unit and the locating pin to be received therein.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings of FIGS. **1** and **2**, there is indicated generally by the numeral **10** a vacuum frame unit which may be of a conventional type having a transparent glass cover plate **12** which is hinged at **14**. The cover plate **12** may be pivotally positioned by the operator in a conventional manner into a closed position in relation to the vacuum frame unit **10** to effect a contact printing operation between a sheet of negative film **16** and a sheet of positive film **18** which, as best shown in FIG. **4**, rest on a flexible mat **20**.

The flexible mat **20** is formed of a resilient rubber material having a sealing edge portion **22** affixed by a suitable adhesive cement and rivets **23** to a baseplate **24** around the perimeter of the mat **20**, as best shown in FIG. **1**. Moreover, between an inner surface **25** of the mat **20** and an inner surface **26** of the baseplate **24** there is provided, as shown —by FIG. **4**, a space **28** to which there may be applied a vacuum pressure in a conventional manner tending to draw the mat **20** toward the adjacent inner surface **26** of the baseplate **24** during a contact printing operation between the photosensitive sheets **16** and **18**, as shown by FIG. **5**.

IMPROVED VACUUM FRAME UNIT

The present invention resides in an improvement in the aforenoted structure in that there is provided a novel pinning assembly indicated generally by the numeral **30** and arranged to accurately locate the sheet of negative film **16** and the sheet of positive film **18** of the vacuum frame mat **20** in an extremely accurate relation one to the other.

The pinning assembly **30**, as illustrated by FIGS. **1**, **2** and **3**, includes a metal strip **32** cemented to the underside surface **25** of the vacuum frame mat **20** by a suitable adhesive material or cement. The mat **20** is formed of a resilient rubber material and two locating pins **35** and **35A** are carried in spaced relation at opposite end portions of the strip **32**. The pins **35** and **35A** slidably project in close fitting relation through suitable holes **33** and **33A**, respectively, formed in the opposite end portions of the strip **32**. The locating pins **35** and **35A** pass in turn through punched holes **37** and **37A** accurately formed in the mat **20** and arranged so that the locating pins **35** and **35A** fit in a tight slidable relation therein and through corresponding holes formed in the sheet of negative film **16** and the sheet of positive film **18** so as to locate the sheets **16** and **18** in accurate registration one with the other on the mat **20**.

The two locating pins **35** and **35A** are spring-loaded and sealed in two cylinders **39** and **39A** while the metal strip **32** is brazed to both cylinders **39** and **39A** at **41**, as best shown in FIG. **4**. The assembly of the locating pin **35A** and cylinder **39A** is identical to that of the assembly of the locating pin **35** and cylinder **39**. The several parts of the assembly of pin **35** have been indicated by like numerals in the assembly of the other pin **35A** with the suffix A affixed thereto. The detail

description of the operation of the one assembly of the pin **35** is deemed sufficient for an understanding of the operation of the assembly of the other pin **35A** which is identical thereto.

As shown in FIGS. **4** and **5**, the locating pin **35** is slidably mounted in the hole **33** formed in the strip **32**. There is also provided a flange portion **45** projecting from the pin **35** and slidably mounted in a bore **47** formed in the cylinder **39**, while an inner end portion **49** of the pin **35** is arranged to be slidably received in a recess **51** formed in a bottom portion of the bore **47** of the cylinder **39**. A spring **53** is positioned in the bore **47** and has an end bearing on the bottom portion of the bore **47** in the cylinder **39**, while an opposite end of the spring **53** bears on the flange portion **45** of the pin **35** so as to resiliently bias the locating pin **35** outwardly in relation to the cylinder **39**.

It will be seen from FIGS. **4** and **5** that the inner end of the cylinder **39** is brazed at **41** to the underside of the strip **32** which has an opposite side affixed to the underside of the vacuum frame mat **20**. Thus upon the glass cover **12** being pivoted downwardly by the operator so as to operably contact free end portions **55** and **55A** of the respective pins **35** and **35A**, the pins **35** and **35A** will be biased inwardly in opposition to the biasing force of the springs **53** and **53A** in the cylinders **39** and **39A**.

Moreover, it will be further seen from FIG. **5** that as the vacuum frame mat **20** is drawn down tightly toward the adjacent inner surface **26** of the baseplate **24**, the cylinders **39** and **39A** will in turn be forced in opposition to the biasing force of the resilient mat **20** outwardly through suitable openings **57** and **57A** formed in the baseplate **24** of the vacuum frame unit **10**.

Thus as the photographic sheets of positive and negative film **16** and **18** are optically exposed to light passing through the glass cover plate **12** and compressed by the glass cover plate **12** between the vacuum frame mat **20** during a contact printing operation, the locating pins **35** and **35A** will be biased inwardly into the cylinders **39** and **39A**, respectively, and will effectively retain the sheets **16** and **18** in an extremely accurate relation one to the other on the resilient mat **20**, as shown by FIG. **5**.

PHOTOCOMPOSITION UNIT

Referring now to the drawings of FIGS. **6**, **7** and **8**, the improved photocomposition unit is indicated in FIG. **6** by the numeral **60** and includes, as best shown by FIGS. **7** and **8**, a glass screen **62** in which there are drilled in a predetermined proper location two holes **64** and **64A** in which are cemented two metal plugs **66** and **66A**, respectively.

Prior to mounting the pinning assembly **30** on the underside of the mat **20**, the pinning assembly **30** may be utilized as a template or fixture to determine with extreme accuracy the location of precision holes or bushings **68** and **68A** in turn formed in the respective metal plugs **66** and **66A** in positions corresponding precisely to the location of the locating pins **35** and **35A** on the mat **20** of the vacuum frame unit **10**.

The precision holes or bushings **68** and **68A** are in turn utilized to receive stem portions **69** of locating pins **70** and **70A**, respectively. The pins **70** and **70A** serve to position a sheet **76** of transparent drafting film bearing the art master and a sheet **78** of photosensitive film, as shown by FIGS. **6**, **7** and **8**, with extreme accuracy relative one to the other on the glass screen **62**.

Thus the stem portion **69** of the locating pins **70** and **70A** are received in prepunched holes **72** and **74** formed in the respective sheets **76** and **78** so as to accurately position these prepunched sheets on the photocomposition unit screen **62**.

The pinning assembly **30** prior to being mounted on the underside of the mat **20** may also serve as a template or fixture to determine with extreme accuracy the precise location of the holes **72** in the transparent sheet of paper **76** and the precise location of the holes **74** in the sheet of film **78**, as best shown by FIG. **8**.

The locating pins **70** and **70A** of FIGS. **6–8** serve to accurately position the prepunched sheets **76** and **78** repeatedly on the glass screen **62** of the photocomposition unit **60** which may be of a conventional type having a glass cover plate **80** which, as best shown by FIG. **6**, is hinged at **82** and may be closed by the operator to the position shown.

OPERATION

The locating pins **70** and **70A** of the composition unit **60** of FIGS. **6–8** and the locating pins **35** and **35A** of the vacuum frame unit **10** of FIGS. **1–5** work in conjunction with each other so that the locating pins **70** and **70A** utilize the precisely punched locating holes **74** in the photosensitive sheet of film **78** and like precisely punched locating holes **72** in the transparent layout drafting paper **76** of FIG. **8** of the composition unit **60** of FIG. **6**; while the locating pins **35** and **35A** utilize like precisely punched locating holes in the negative film sheet **16** developed from the sheet of film **78** and a photosensitive positive sheet of film **18** of FIGS. **4** and **5** of the vacuum frame unit **10** of FIG. **1** so as to improve the registration accuracies in the transferring of operations accurately between the photo composition unit **60** and the vacuum frame unit **10** in the development of the art work or geometry of the layout plan on the positive sheet **18** for each layer of a multilayer printed circuit board.

The two index pins **70** and **70A** of FIGS. **6** and **8** are used to accurately position a transparent sheet of paper **76** bearing an initial layout drawing or art master and a photosensitive sheet of photographic film **78** on the glass screen **62** of FIGS. **6** and **8**. Pads and other common symbols in the layout drawing of the printed circuit board art work appearing on the transparent sheet of paper **76** are now exposed optically in a conventional manner on the back of the glass screen **62** and onto the photosensitive sheet **78**.

The position of the pads and common symbols are determined from the layout drawing on the transparent sheet **76** so that after the same have been located on the sheet of film **78**, the film **78** is removed from the photocomposition unit **60** and processed in a conventional manner so as to develop á negative on a separate sheet **16** of film which in turn is utilized in the vacuum frame unit **10** to produce a desired number of sheets of positive film **18** corresponding to the number of layers required for the multilayer circuit board.

These separate sheets **18** of film (positives) are then used to prepare the individual art work or geometry for each layer of a multilayer printed circuit board.

This contact printing operation is effected in the vacuum frame unit **10** of FIG. **1** by the individual (negative) sheet of film **16** being properly located in the vacuum frame unit **10** by the locating pins **35** and **35A**, as shown by FIG. **1**, while a sheet **18** of photosensitive (positive) film is also located on the locating pins **35** and **35A**, as shown by FIGS. **4** and **5**. A separate (positive) sheet **18** is now made from the negative sheet of film **16** for each layer of the printed circuit board art work.

Individual sheets of photosensitive (positive) film **78** corresponding to the printout of the positive sheet **18**, with the common symbols or pads exposed, may now be separately positioned on the index pins **70** and **70A**, as indicated in FIGS. **6** and **8** at **78**, and conductor lines which vary with each layer of the multilayer printed circuit board are now added for each layer separately to complete the multilayer printed circuit board art work.

The conductor lines for each layer are determined from a layout drawing made on a transparent sheet of drafting paper **76** which is mounted on the pins **70** and **70A** of the photocomposition unit **60** and exposed optically on to the back of the glass screen **62** and on to the photosensitive sheet **78** in much the same manner as that used to produce the pads or symbols on the sheet **78**, as heretofore explained.

Since common index pins are used to position the sheets of art work for each layer separately, the registration of all layers

of the art work for the multilayer printed circuit board will be in exact coincidence. This is necessary so that all of the pads and other common symbols, as well as the conductor lines on each layer of the multilayer printed circuit board which may be prepared therefrom line up when assembled and drilled as a completed printed board unit.

The use of the index pins **70** and **70A** in the photocomposition unit **60** and the index pins **35** and **35A** in the vacuum frame unit **10** thus assure an exact location of the pads, common symbols and conductor lines on each individual layer of the multilayer printed circuit board in relation one to the other and further enables the processing of the art work of the printed circuit boards to be effected more rapidly.

While the invention has been illustrated and described as applied to several embodiments, various changes in the form and relative arrangements of the parts, which will now appear obvious to those skilled in the art may be made without departing from the scope of the invention. Reference is, therefore, to be had to the appended claims for a definition of the limits of the invention.

What is claimed is:

1. In a device of a type including a resilient mat carried by a baseplate, and a transparent cover plate cooperatively arranged in relation to the mat; the improvement comprising a pinning device including a strip carried at an underside of the resilient mat, locating pins projecting from the strip and through the mat to accurately locate on another side of the resilient mat a plurality of sheets of photographic film in a precise registration one with another during a contact printing operation, the locating pins including a pair of pins projecting in a predetermined spaced relation from opposite end portions of the strip, spring means for biasing free end portions of the locating pins through the mat, the free end portions of the locating pins being operatively contacted at the other side of the mat by the cover plate and biased in opposition to the spring means into the resilient mat upon the cover plate being operatively positioned so as to clamp the sheets of film between the cover plate and resilient mat to effect the contact printing operation, cylinders for carrying the spring means the cylinders having end portions affixed to the strip carried at the underside of the resilient mat, the baseplate having apertures so arranged as to receive opposite end portions of the cylinders, and the cylinders being resiliently supported by the mat with the opposite end portions of the cylinders being adjustably positioned in the apertures of the baseplate during the contact printing operation, the contact printing operation being effected upon the cover plate being operatively positioned so as to clamp the sheets of film between the cover plate and resilient mat.

2. The combination comprising a contact printing device of a type including a resilient mat carried by a baseplate and a transparent cover plate cooperatively arranged in relation to the mat; and a photocomposition device of a type including a screen; the improvement comprising a pair of locating pins projecting from the mat of the contact printing device in a predetermined spaced relation to accurately locate on the resilient mat negative and positive sheets of photographic film in a precise registration one with the other during a contact printing operation, the contact printing operation being effected upon the cover plate being operatively positioned so as to clamp the sheets of film between the cover plate and resilient mat of the contact printing device to effect a print out operation on the positive sheet; and another pair of locating pins projecting from the screen of the photocomposition device in an identical predetermined spaced relation to accurately locate on the screen the positive printout sheet from the contact printing device in a precise registration with a transparent sheet having art work appearing thereon for transference to the positive printout sheet in the photocomposition device.

3. The improvement defined by claim **2** including spring means for biasing free end portions of the locating pins through the mat, the free end portions of the locating pins being operatively contacted at the other side of the mat by the cover plate and biased in opposition to the spring means into the resilient mat upon the cover plate being operatively positioned so as to clamp the sheets of film between the cover plate and resilient mat to effect the contact printing operation.

4. The improvement defined by claim **2** including spring means for biasing free end portions of the locating pins through the mat, the free end portions of the locating pins being operatively contacted at the other side of the mat by the cover plate and biased in opposition to the spring means into the resilient mat upon the cover plate being operatively positioned so as to clamp the sheets of film between the cover plate and resilient mat to effect the contact printing operation, cylinders for carrying the spring means, the cylinders having end portions affixed at the underside of the resilient mat, the baseplate having apertures so arranged as to receive opposite end portions of the cylinders, and the cylinders being resiliently supported by the mat with the opposite end portions of the cylinders being adjustably positioned in the apertures of the baseplate during the contact printing operation.

5. In a device of a type including a resilient mat carried by a baseplate, and a transparent cover plate cooperatively arranged in relation to the mat; the improvement comprising a pinning device including a strip carried at an underside of the resilient mat, locating pins projecting from the strip and through the mat to accurately locate on another side of the resilient mat a plurality of sheets of photographic film in a precise registration one with another during a contact printing operation, the contact printing operation being effected upon the cover plate being operatively positioned so as to clamp the sheets of film between the cover plate and resilient mat, the locating pins include a pair of pins projecting in a predetermined spaced relation from opposite end portions of the strip, spring means for biasing free end portion of the locating pins through the mat, the free end portions of the locating pins being operatively contacted at the other side of the mat by the cover plate and biased in opposition to the spring means into the resilient mat upon the cover plate being operatively positioned so as to clamp the sheets of film between the cover plate and resilient mat to effect the contact printing operation cylinders for carrying the spring means, the cylinders having end portions affixed to the strip carried at the underside of the resilient mat, the baseplate having apertures so arranged as to receive opposite end portions of the cylinders, and the cylinders being resiliently supported by the mat with the opposite end portions of the cylinders being adjustably positioned in the apertures of the baseplate during the contract printing operations.

6. A method of locating a pinning device in a photocomposition device in an identical predetermined relation to a pinning device in a contact printing device; comprising the steps of providing a pair of bushings in a screen of the photocomposition device for receiving a pair of pins for locating a sheet of photosensitive film on the screen in a predetermined relation to a sheet of transparent paper bearing a drawing for optical exposure to the sheet of photosensitive film, utilizing a template including a strip and a pair of pins arranged in a predetermined spaced relation and projecting from opposite end portions of the strip to locate the bushings in a predetermined relation, and thereafter affixing the strip of the template to the underside of a flexible mat of the contact printing device with the pair of pins projecting through the flexible mat to provide a pair of pins for locating on the mat of the contact printing device sheets of negative and positive photographic film in a predetermined relation one to the other and in a predetermined relation to the sheets of photosensitive film and transparent paper on the screen of the photocomposition device.

7. A method of locating a pinning device in a photocomposition device in an identical predetermined relation to a pinning device in a contact printing device; comprising the steps of providing a pair of bushings in a screen of the photocomposition device for receiving a pair of pins for locat-

ing a sheet of photosensitive film on the screen in a predetermined relation to a sheet of transparent film bearing a drawing for optical exposure to the sheet of photosensitive film, and affixing to a flexible mat of the contact printing device a pair of pins projecting through the flexible mat in an identical spaced relation to that of the locating pins received in the bushings in the screen of the photocomposition device so as to provide a pair of pins for locating on the mat of the contact printing device sheets of negative and positive photographic film in a predetermined relation one to the other and in a predetermined relation to the sheets of photosensitive film and transparent film on the screen of the photocomposition device.

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