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Lindahl

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[54] **REGISTER MARK PUNCH SYSTEM AND METHOD**

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[52] **U.S. Cl.** ..... **33/184.5,** 95/1 R, 96/41, 355/79, 355/132

[51] **Int. Cl.** **B41b 1/00,** G03b 27/02

[58] **Field of Search** ..... 95/1 R, 1.1; 355/32, 40, 355/88, 113, 72, 77, 78, 79, 132; 33/184.5; 101/DIG. 12, 401.1

[56] **References Cited**

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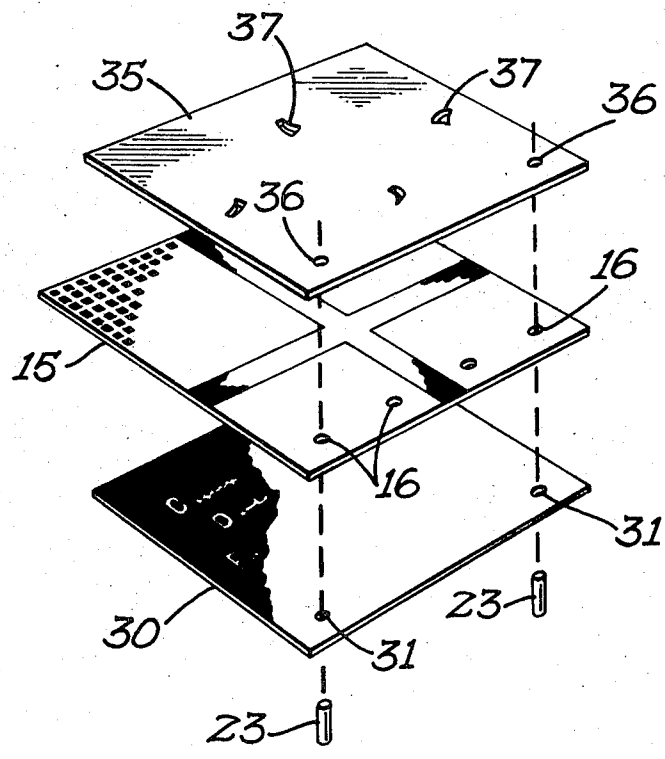
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[57] **ABSTRACT**

A system and method for providing accurate register marks on film used for making printing plates. The system comprises a positive grid and a negative grid each having a plurality of graduated lines and each having a set of registered pin holes, and a punch board including a pair of registered pins adapted to receive the pin holes in the positive and negative grids, and punch means mounted on the board in spaced relation to the pins for punching registered pin holes in film negatives. The method comprises the steps of aligning an image bearing film negative with selected graduated lines of the positive grid, and attaching it to the grid. The positive grid is then mounted through its pin holes on the punch board pins thus putting the film negative in proper alignment with the punches. The film negative is punched and removed from the positive grid, after which it is placed on the pins after being stripped if desired. The negative grid is placed over the film negative on the pins and a pre-punched mask is placed over the negative grid. Holes are cut in the mask to expose portions of the graduated lines on the negative grid so that with double printing the graduated lines will appear as register marks in proper alignment on the film to be exposed.

2 Claims, 6 Drawing Figures



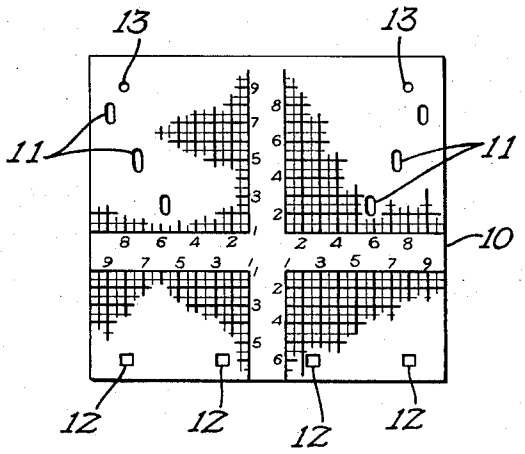


Fig 1

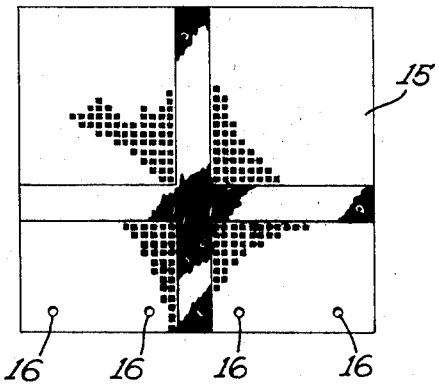


Fig 2

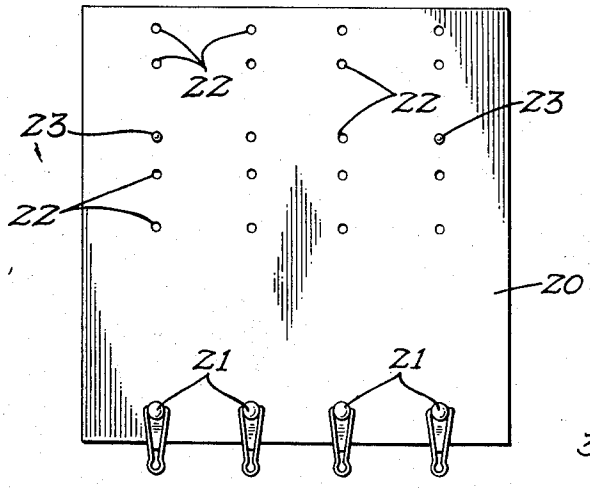


Fig 3

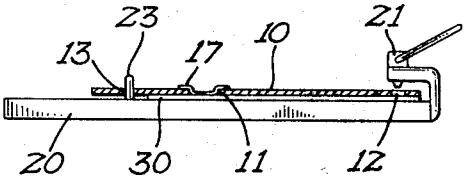


Fig 4

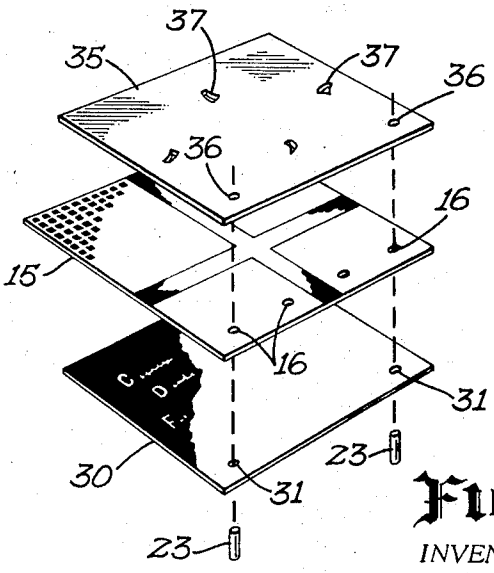


Fig 5

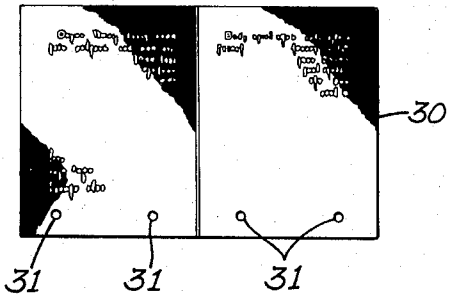


Fig 6

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REGISTER MARK PUNCH SYSTEM AND METHOD

BACKGROUND OF THE INVENTION

The use of register marks or center-line marks in lithography and related fields is well-known to those skilled in the art. Particularly when the printing process is to include a plurality of colors, it is known that less than accurate register or center-line marks will cause significant errors in the final printing from printing plates made with a film carrying misaligned marks. In general, the register marks or center-lines are placed on the work by an individual using drafting tools such as T-squares and triangles. The slight errors which can result from different pencil angles, slight miscalculation in the placement of the T-square or triangle, etc., result in highly undesirable printing errors. Various punch systems have been devised in an attempt to achieve proper alignment for providing accurate register marks. However, no system is known to the inventor which provides the simplicity of operation and accuracy of applicant's system and method.

SUMMARY OF THE INVENTION

Briefly described, the apparatus of the system of this invention comprises a positive and a negative grid, used in combination with registered pins mounted on a board in predetermined spaced relation from punches. The positive grid has a transparent surface and a plurality of opaque graduated lines. In the preferred embodiment numbers are provided on the grid to aid in alignment. The positive grid has at least one pair of registered pin holes. Preferably, the positive grid also carries a plurality of slots for tape connection to an image bearing film negative. Also, the positive grid has cut-outs through which punch means can pass to punch the film negative which is attached to the positive grid. The negative grid is preferably a film negative of the above-described positive grid, that is, it has an opaque surface carrying a plurality of transparent graduated lines. The negative grid also carries at least a pair of registered pin holes in alignment with the pin holes in the positive grid. The negative grid need not carry the tape slots or the cut-outs. A board is provided having at least a pair of pins in register with the pin holes in the two grids. Punch means are mounted on the board in predetermined spaced relation with the pins for punching further pin holes in register with the pins.

Briefly described, the method of this invention comprises aligning a film negative with the graduated lines on the positive grid such that the pin holes are not covered but that the cut-outs are. The positive grid pin holes are then placed on the board pins and registered holes are punched by the punches through the cut-outs into the film negative. The film negative is then removed from the positive grid and its pin holes are placed on the board pins or another set of registered pins, for example, on a light table. The negative grid is placed over the film negative and at this point a visual check can be made, as the film negative should be in the same alignment with the negative grid as it was with the positive grid. The film negative may be stripped as desired before the negative grid is placed over it. A mask is then prepared by punching registered pin holes in it and placing it over the negative grid and the film negative on the pins. The mask is then cut to provide slots which include centerline marks made by the graduated lines on the negative grid. Through the process of double printing, the centerline or register marks are placed on the film being exposed in accurate alignment.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a top plan view of the positive grid of this invention;

FIG. 2 is a top plan view of the negative grid of this invention;

FIG. 3 is a top plane view of the punch board of this invention;

FIG. 4 is a side view of the apparatus of FIG. 3 having mounted thereon the film negative attached to the positive grid of FIG. 1;

FIG. 5 is an exploded view of the alignment of the film negative, the negative grid and a mask apparatus indicating how the three are mounted on preregistered pins; and

FIG. 6 is a view of a film negative properly punched for accurate crossover.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In the following description and throughout this entire specification and claims, the word "register" when not applied to register marks means that the items in register are in predetermined spaced relationship.

Referring now to FIG. 1, there is shown a positive grid **10** having a transparent surface and a plurality of graduated lines with numbers indicating in this preferred embodiment the dimensions of the graduated lines. That is, between the lines marked, for example, "8" there is a distance of 8 inches. Also shown in grid **10** are a plurality of tape slots **11** adapted to be used to connect grid **10** to a film negative. Grid **10** also has a pair of registered pin holes **13** and a plurality of punched cut-outs **12.**

Referring now to FIG. **2,** there is shown a negative grid **15** having an opaque surface with a plurality of transparent graduated lines, the graduated lines being numbered as are the lines of grid **10.** Grid **15** also has a plurality of registered pin holes **16.**

Referring now to FIG. **3,** there is shown a punch board **20** having mounted thereon a plurality of punches **21.** Board **20** has a plurality of registered pin holes **22** adapted to receive pins such as pins **23** in preregistered position. Punches **21** are in predetermined spaced relation to pin holes **22** and thus pins **23** for punching registered pin holes in film.

The operation of the system and method of this invention will now be described with reference to FIGS. **4, 5** and **6** of the drawings, as well as the above-described FIGS. **1, 2** and **3.**

To commence the operation, a film negative **30** which is to be used to make printing plates is aligned with positive grid **10.** The vertical and horizontal graduated lines on grid **10** enable accurate visual alignment and centering of the film negative on the grid. For example, a film negative **30** carrying a picture which is 6 by 8 inches can be aligned by easing the vertical and horizontal graduated lines marked "8" on the grid to achieve an accurate alignment. After alignment, tape **17** is placed preferably over two of slots **11** as shown in FIG. **4,** to hold film negative **30** in alignment with grid **10.**

Then as also shown in FIG. 4 pin holes 13 of grid 10 are placed over pins 23 on board 20 such that cut-outs 12 are directly under punches 21. Note that film negative 30 has been mounted to grid 10 such that pin holes 13 are not covered by film negative 30 but that cut-outs 12 are covered by film negative 30. Pins 23 have been placed in the desired pin holes 22 to insure that cut-outs 12 fall under punches 21. When film negative 30 and grid 10 have been placed in alignment on board 20, as shown in FIG. 4, at least two of punches 21 are operated to pass through cut-outs 12 and punch registered pin holes 31 in film negative 30, as shown in FIG. 5. Film negative 30 is then removed from board 20 and grid 10. It is stripped as desired and its registered pin holes 31 are then placed over a set of registered pins 23 which may still be on board 20 or may be on another device, preferably a light table (not shown). Negative grid 15 is then mounted over film 30 on pins 23 by its registered pin holes 16. Because of the accuracy of the preregistered punches 21 with respect to pins 23 on board 20, when grid 15 is mounted on pins 23 its alignment with film negative 30 should be the same as the alignment of grid 10 when it was connected to film negative 30.

A mask 35, shown in FIG. 5, which may comprise a well known piece of orange paper, is then punched with a set of registered pin holes 36. This can be simply accomplished by holding mask 35 under punches 21 and operating the punches. When mask 35 is in position, a plurality of slots 37 are cut to expose portions of the graduated lines on negative grid 15. These cross-hatched graduated lines will then act as the register marks or center-lines for film negative 30 when film negative 30 is double contacted.

The above-described system and method of operation can be used to provide accurate crossovers. When crossovers are needed, a pair of registered pin holes 31 can be punched on each side of film negative 30 as shown in FIG. 6. Then, the film negative may be cut down the center and the cross-over printing performed, such as combining pages 6 and 7 and 2 and 3 to become 6 – 3 and 2 – 7 in a pamphlet, for example. Because of the accuracy of the pin holes 31, reregistration of the cut film negative 30 will result in accurate alignment despite an inaccurate cutter, by allowing pin holes 31 to be the determining registration factor.

From the above, it will be apparent that the system and method of this invention provide a solution to the problems raised in achieving accurate registration marks on film to be used to make printing plates. The system and method of this invention save time and thus great expense, while increasing accuracy.

I claim:

1. The method of mounting a printing assembly for providing register marks on a film used in making printing plates comprising the steps of:

A. aligning a film with a positive grid having a plurality of graduated lines, registered pin holes, and registered punch cut-outs;

B. attaching the film to the positive grid so the pin holes are open and the film is under the cut-outs;

C. mounting the positive grid pin holes on registered pins in spaced relation to punches;

D. operating the punches to punch registered holes in the film;

E. removing the film from the positive grid;

F. mounting the film pin holes on registered pins;

G. mounting a negative grid having a plurality of graduated lines and registered pin holes over the film on the registered pins;

H. punching registered holes in a mask and mounting the mask over the negative grid on the registered pins;

I. cutting apertures in the mask to expose the desired center lines on the negative grid.

2. The method of claim 1 wherein the step of operating the punches comprises the step of punching two registered holes on each page of a double page film and the step of mounting the film comprises the step of providing two registered pins for each page cut from a double page film.

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