United States Patent [19]

Jelinek

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[54] **FRAME FOR PROCESSING PHOTOGRAPHIC CUT SHEET FILM**

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[21] Appl. No.: **325,215**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 205,062, Dec. 6, 1973, abandoned.

[52] **U.S. Cl.** **95/100,** 95/98

[51] **Int. Cl.** **G03d 13/08**

[58] **Field of Search** 95/95, 96, 97, 98, 99, 100

[56] **References Cited**

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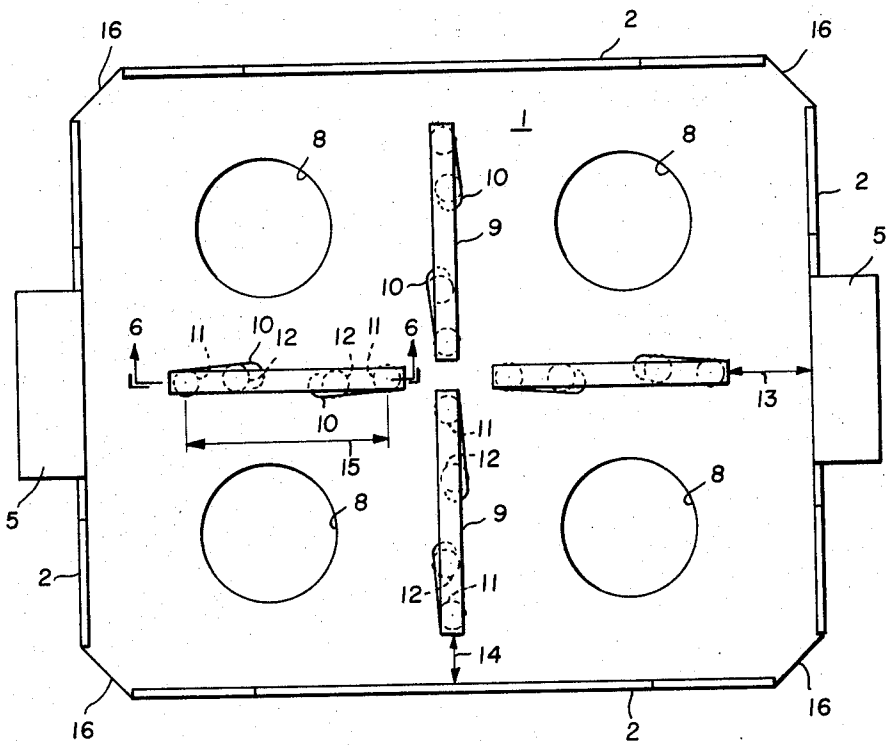
Primary Examiner—John M. Horan

Attorney, Agent, or Firm—Schlesinger, Fitzsimmons & Schlesinger

[57] **ABSTRACT**

For developing and washing cut sheet film a frame is provided having a generally planar base and four side walls that are separated from one another at their corners. Partitions divide the frame into compartments, one for each sheet to be processed. The base has a plurality of apertures, one for each compartment; and the compartments are slightly wider and longer than the film sheets to permit some very limited movement of the sheets in the compartments; but the walls and the partitions are of a height to retain the film during processing. In use, the frame with the film sheets therein is dipped in a conventional tray containing developer, or water or other processing liquid and moved primarily laterally to cause the liquid to flow into and out of the corners of the frame and between compartments and under and over the sheets therein.

1 Claim, 6 Drawing Figures



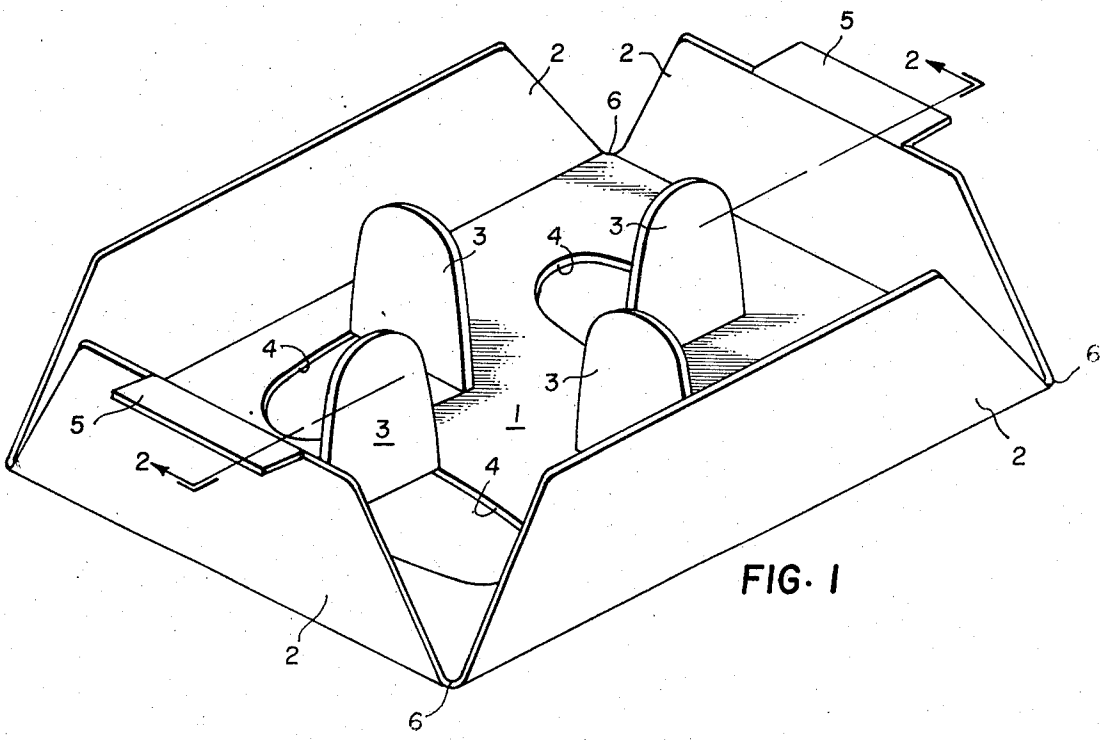


FIG. 1

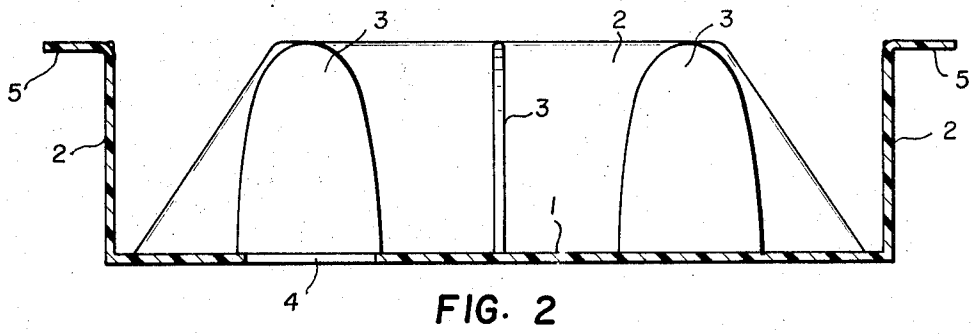


FIG. 2

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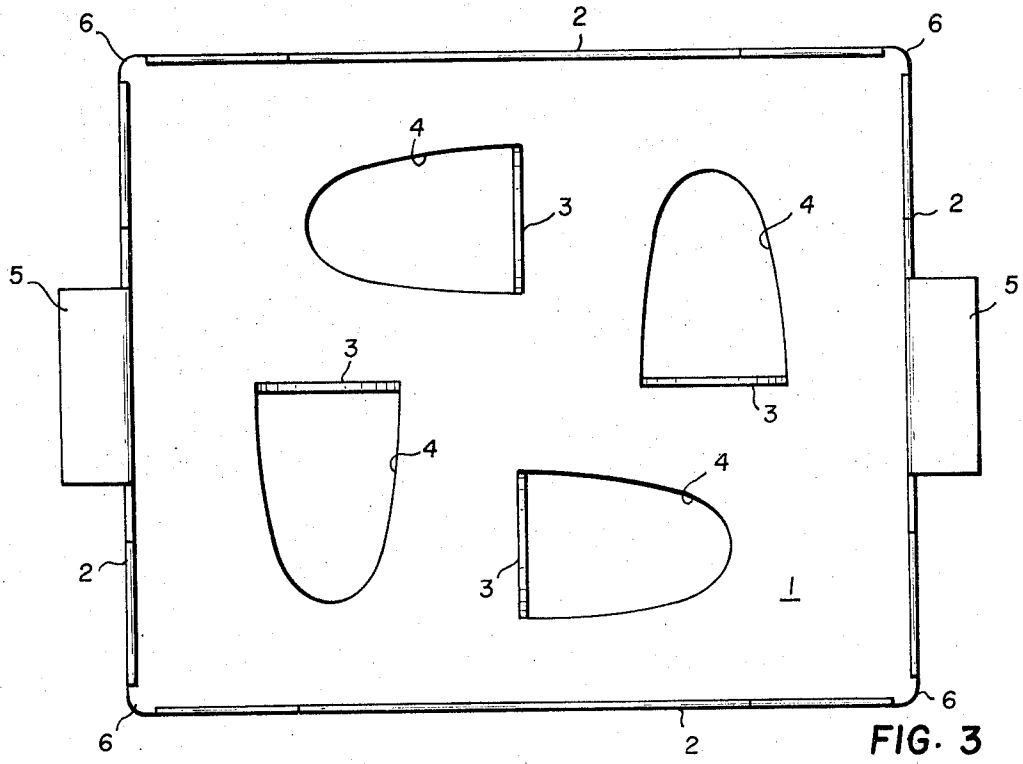


FIG. 3

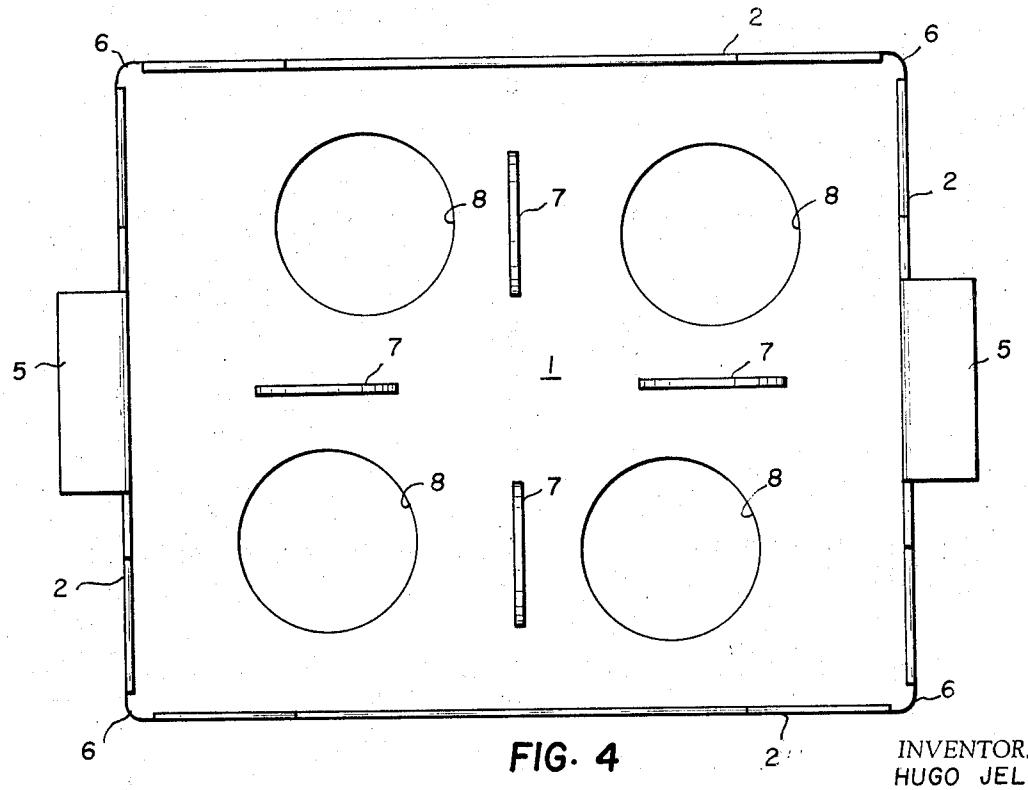


FIG. 4

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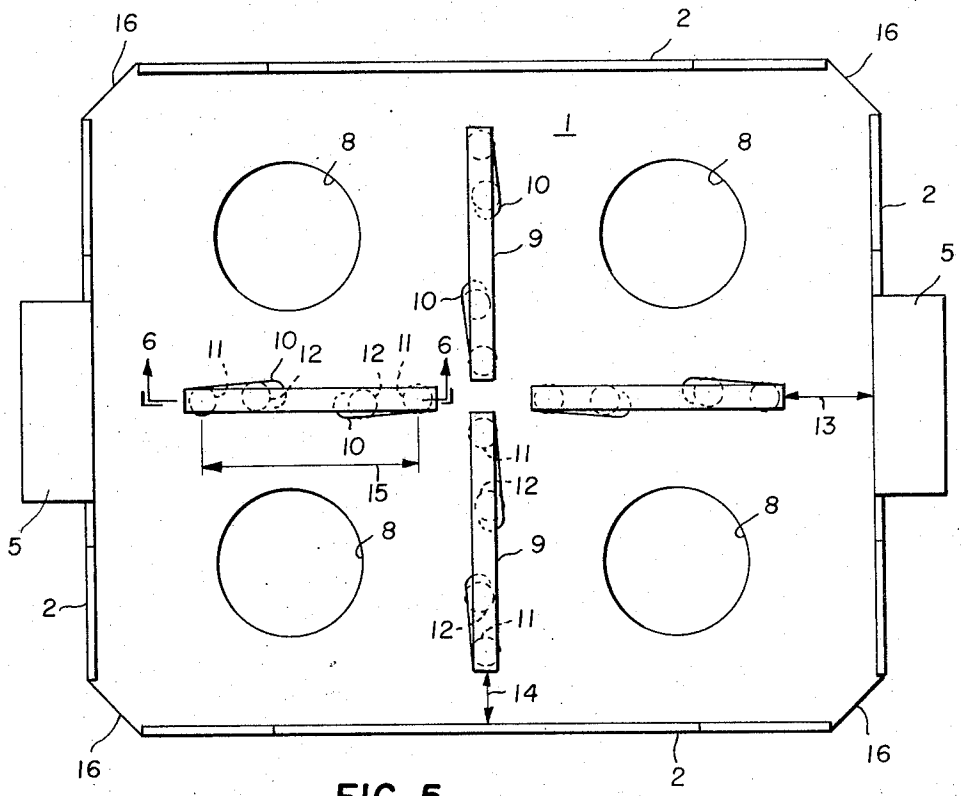


FIG. 5

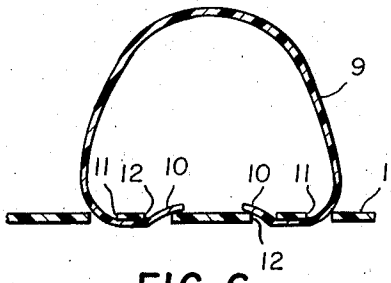


FIG. 6

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FRAME FOR PROCESSING PHOTOGRAPHIC CUT SHEET FILM

This application is a continuation-in-part of my application Ser. No. 205,062, filed Dec. 6, 1971, and now abandoned.

The present invention relates to a frame for holding cut photographic sheet film for processing.

For many years photo-sheet-film (also called cut film) negatives and transparencies have been processed horizontally in hand-held open trays, or vertically in individual chromiumplated holders or frames of sizes between 2¼ inches × 2¼ inches and 8 inches × 10 inches. The horizontally held open trays have been used only for positive processing of photopictures on paper. The vertical frames were employed for developing negatives in vertical developing tanks.

In the horizontal processing the film to be developed has been held at the corner or any other convenient place. However, the soft emulsion can easily be damaged by the hand or fingers. The movement of the sheet film negative, or transparency, hereinafter referred to as film, manually cannot produce the regular and irregular movement necessary to obtain even development throughout the emulsion. Furthermore, in the horizontal processing of multiple amounts of film by hand, so-called "shuffling" is employed, that is, movement of every sheet in a pack from top to bottom with the result that the development is even more uneven, and the films are often damaged. For these reasons color material could not be processed in multiples.

In processing multiple sheet film in vertical holders or frames bulky vertical tanks are required; and the movement of the tanks has to be confined primarily to vertical movement with just some slight lateral movement in both directions. However, the limited movement and pressure of the liquids causes irregularities in densities in the emulsion, which results in many cases in apparent smudges on the positives made later from the developed film.

In both mentioned methods, the films therefore did not receive sufficient regular and irregular motion, which is very necessary to produce even development and density. Furthermore, the danger of serious damage by mounting the films in vertical frames before development and in dismounting them after has been great. Still further, the danger of serious damage in transporting the frames to as many as ten different vertical tanks for color processing has also been great. Contaminating the hands with droplets of chemicals during transport of the film from one bath to the other and unconsciously allowing the chemicals to drop on the films, causes spots. Moreover, with both prior methods, the amount of chemicals used, was extensive. Still further, drying of the required metal frames for renewed use has been difficult and lengthy. If a single droplet of developer remained hidden in a frame's groove, the film could get stuck in the groove and be damaged or ruined altogether. Additionally, the cost of rust-free holders and tanks is very high. Furthermore, the negative could easily fall out of a frame during mounting or development or manipulation, and be ruined. Moreover, those holders, which have clips in the frames to hold them tight, leave distinctive marks on the process films, and in many instances damage the image. Only when highly mechanized, extremely extensive and sophisticated equipment has been used, could

the mentioned deficiencies of prior processing and equipment be prevented.

A primary object of this invention is to provide a frame and a method for processing cut film which will reduce very materially, and substantially obviate, the possibility of damage and smudging of film during processing.

Another object of the invention is to provide a developing frame which will materially shorten the time required for developing cut film.

A further object of the invention is to provide a processing frame with which cut film can be processed without touching the film by hand or by any other means.

Another object of the invention is to provide a frame for the purpose described with which cut film may not only be developed but washed and in less time than previously.

Another object of the invention is to provide a frame for processing cut film with which the film may be transferred from one step in the developing process to another without touching the film.

Other objects of the invention will be apparent hereinafter from the specification and from the recital of the appended claims particularly when read in conjunction with the accompanying drawings.

In the drawings:

FIG. 1 is a perspective view of a frame made according to one embodiment of this invention;

FIG. 2 is a sectional view taken on the line 2—2 of FIG. 1 looking in the direction of the arrows;

FIG. 3 is a plan view of the frame shown in FIG. 1;

FIG. 4 is a plan view of a modified form of frame;

FIG. 5 is a plan view of still another modification of the invention; and

FIG. 6 is a fragmentary section on the line 6—6 of FIG. 5 looking in the direction of the arrows.

Referring now to the drawings, and first to the embodiment of the invention shown in FIGS. 1 to 3 inclusive, there is shown a frame for processing black and white and color sheet film photographic negatives and sheet film transparencies either singly or a plurality at the same time. This frame may be plastic or made of any rust-free material. It is generally rectangular in shape in plan view, and has a base 1 and four side walls 2 perpendicular to the base. The side walls have beveled ends at the corners of the frame; and their upper edges are rounded to prevent scratching the film. Beveling enables the liquid chemical or water to enter and flow out of the frame freely at the corners. Two of the shorter walls have integral handles 5 for easy manipulation of the frame during processing.

Partitions 3 of semi-oval shape are provided within the walls of the frame of the same height as the walls. These partitions are spaced from the side walls, and are arranged in pairs at right angles to one another to form four separate compartments in the frame illustrated. The spacing of the partitions from the side walls is to allow sufficient liquid to pass easily from one compartment to another.

The compartments, no matter how many of them there are, are always larger in area than the area of the film. For instance, if the film is 4 inches × 5 inches in area, each compartment will be 4½ inches × 5½ inches in size to enable the film to move freely in each compartment and enable the chemical to flow from the bot-

tom over the top of the film and from one compartment to another.

A semi-oval opening **4** is provided in the base of each compartment and extending from one of the partitions, that defines the compartment, about two-thirds of the length of the compartment. These semi-oval openings can be formed by striking up the partitions from the base of the frame. The openings **4** enable the liquid to penetrate easily into each compartment when the frame is immersed in a conventional developing or washing tray, and these openings allow the liquid to spread evenly from under the film to its sides and over the top emulsion layer, due to alternate pressure and suction when slight vertical movement of the frame is provided.

In order to process sheet film in a frame made according to this invention, the film has to be pre-wet because when the film is soaked it will drop to the bottom of the frame. The film can be soaked for one and a half to two minutes. Then the water or other wetting liquid is drained out of the frame and the frame with the film in it is carried to the developing tank. The frame is then manipulated by grasping the handles **5** and is moved sidewise in the tray of developing liquid so as to spread the developing liquid evenly over and under the film. The motion sidewise in all directions results in regularity in the image developed on the film. Furthermore, this method of developing film shortens the developing time. The more the negative is moved, the faster the development works; and it has been found in practice that the developing time may be reduced as much as 15 percent to 20 percent using a frame made according to the present invention. The length of developing time depends on the manufacturer's recommendation with respect to hand-processing in a tray.

For processing color film, 10 to 12 steps are required. With the frame of this invention, the film can be transported from one step to another without touching the film. After development, the film is, of course, washed; and washing may be effected in the same frame in which the film was developed. The holes in the frame permit the liquid, whether developer or water, to jet faster to the sheet film. They also permit draining of the developing liquid or water from the frame faster. Furthermore, when the frame is lifted a little, the pressure or suction, makes the developing liquid or water, go underneath the film, and up on top of it. The walls of the tray prevent the film from floating out of the frame.

Instead of oval-shaped openings in the base of the frame, circular openings may be employed as shown in FIG. **4** at **8.** In this case the partitions **7** are preferably rectangular pieces perpendicular to the base **1** of the frame and adhered thereto in any suitable manner. For a tray of the size shown, the round openings are preferably 2½ inches in diameter, and are located reasonably centrally of each compartment.

When processing smaller or larger films in frames, all the measurements of the frame will be in proportion to the size of the film sheets to be processed except for the height of the frame which will ordinarily be constant, regardless of the size of the sheets, in practice — 3 inches. This is due to the amount and level of the chemical or water in the standard tray with which the frame will be used. However, it is to be understood that when other than standard trays are used, the height of the walls **2** and partitions **4** will be modified to be equal approximately to the height of the walls of the tray with which the frame is to be used.

Of course, the amount of liquid chemicals employed will depend upon the number of film sheets processed simultaneously — for instance, one third ounce of developer, or more, for each 4 × 5 inch film sheet. The liquid level must be at least one inch above the base plate **1.** On the other hand, the depth of liquid in the frame must not exceed 2½ inches so the film sheets cannot float over the partitions from one compartment to the other or over the walls of the frame during vigorous washing.

For use, the exposed, dry film sheets are put into the compartments of the frame horizontally, emulsion side up, one sheet in each compartment. Then the frame, held and tilted at approximately 30°, is immersed, for 2 minutes, in a conventional slightly larger photo processing tray containing clear water. The film sheets soak up the water and sink to the bottom of each compartment. Then the frame is removed and immersed at approximately a 30° angle in a tray containing the developer; and for further processing is immersed in the same fashion in trays containing other chemicals. In each tray the frame, with the film sheets in it, is moved manually horizontally first in one direction and then in the other, always in the same manner, to achieve even development in every stage all over the emulsion and also at the backside of the film. After processing, the film sheets are taken out of the last solution and hung to dry.

In the embodiment of the invention shown in FIGS. **5** and **6,** the partitions are made from plastic straps or ribbons that are bent to oval shape and that have their ends **10** inserted through openings **11** in the bottom of the tray, and passed underneath the bottom and upward through openings **12** in the bottom of the tray to overlie the portion of the tray bottom between adjacent openings **12.** Otherwise, the tray is constructed and used in the same manner as the trays of FIGS. **1** to **4** inclusive. The plastic straps or ribbons are readily removable so that a single frame can handle different size film sheets.

The following are some examples of sizes of frames made for use according to the present invention:

Example 1

For processing a single 4 inches × 5 inches film sheet a frame having a base 4½ inches wide and 5½ inches long is employed. Since such a frame is to be used only for processing one single film sheet there is no partition but only a circular opening in the center. Otherwise, the frame is built as described above, namely, with side walls 3 inches high and beveled.

Example 2

For processing two film sheets simultaneously, the frame would be 5 × 7 inches in area. This frame has a base plate 11 × 7½ inches, two compartments, and one circular opening 2½ inches in diameter in each compartment preferably offset somewhat from center, and with one partition between each compartment. All the other features of construction remain the same.

Example 3

A frame for processing a single film sheet 8 × 10 inches. This frame will have a base plate 8 ¾ inches × 10 ¾inches. In this case there are four openings, 2½

inches in diameter instead of only one. The openings are placed in the center of each quarter of the base plate. All other features remain the same as mentioned above with reference to the 4 × 5 inch example.

The frames can be produced at very low cost from plastic materials. They are very light and easily transportable. The construction eliminates use of expensive metal film holders which must be chromium plated and rather strong and expensive, and which require bulky vertical tanks for development. No hand manipulation of the sheet film itself is required with the single or multiple film holders of the present invention. The amount of chemicals required for processing several sheet films is also materially reduced. The processing time is reduced by as much as 40 percent due to the more irregular frequent movement during development which is possible with the frame of the present invention. Because the processing is with the film horizontal much better results are achieved, and smudges and irregular densities are avoided. The frame of this invention permits shower rinsing of film for washing in between processing with different chemicals; and thus shortens the wash time considerably, a feature especially useful in color processing. Due to their simple form, frames made according to the present invention can very easily be cleaned and dried quickly immediately after use. Since frames made according to the present invention require much less space, they can be stored in conventional photo trays.

While the invention has been described in connection with several different embodiments thereof, it will be understood that it is capable of further modification, and this application is intended to cover any modifications of the invention, coming within the scope of the invention and the limits of the appended claims.

Having thus described my invention, what I claim is:

1. A frame for processing cut photographic film comprising

a generally planar, rectangular shaped base plate having at least two apertures therein,

four side walls extending from said base plate perpendicular thereto and defining a generally rectangular shaped container, and

a partition between each two apertures extending from said base plate perpendicular thereto of approximately the same height as said side walls but being separated from the side walls and defining with said side walls a plurality of rectangularly shaped compartments, one for each aperture,

said walls being beveled at their ends to provide openings between adjacent walls through which liquid can flwo into and out of the frame, and

said partitions being removable plastic ribbons whose ends are passed through openings in the base plate under the base plate and up through other openings in the base plate and rest on the base plate to secure them in position.

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