Aug. 10, 1948. C. W. ROWLAND 2,446,958

FILM-DEVELOPING HOLDER

Filed March 31, 1945 2 Sheets-Sheet 1

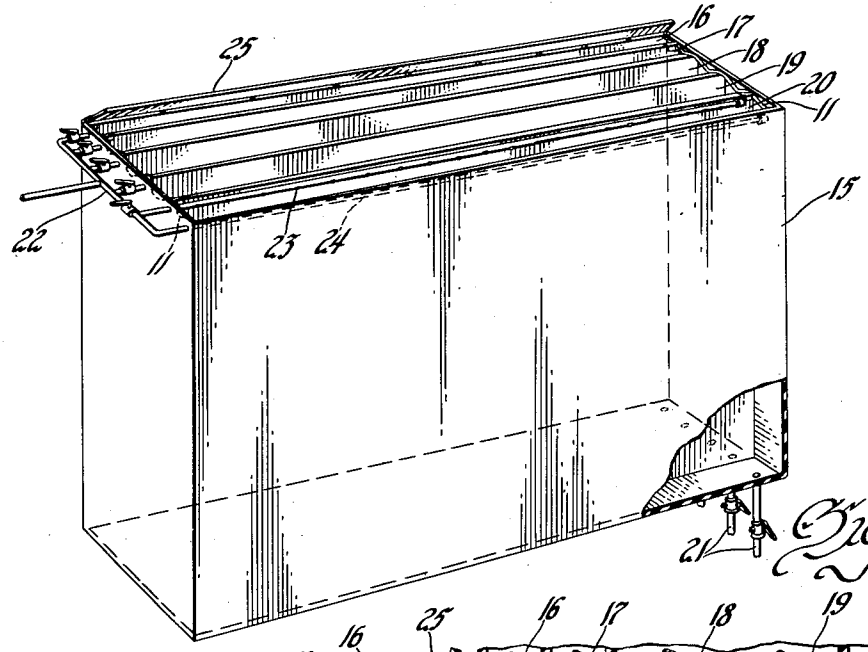
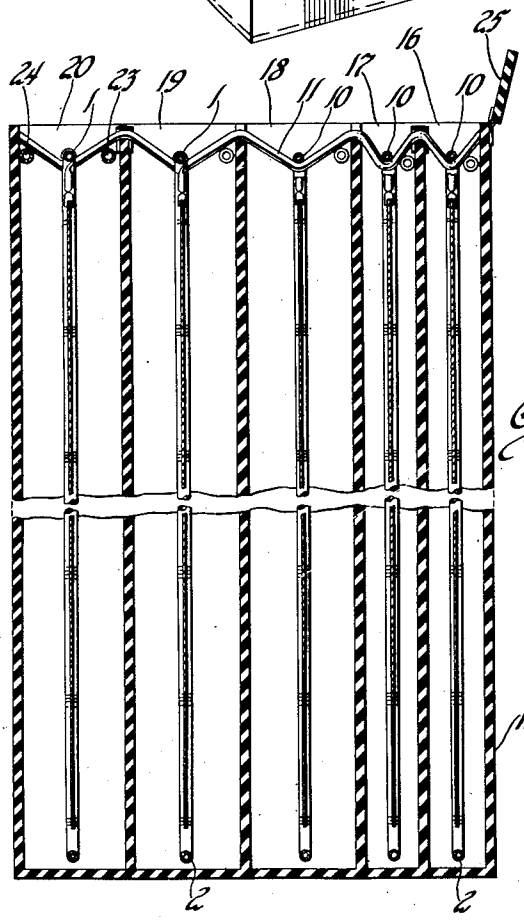


Fig. 1



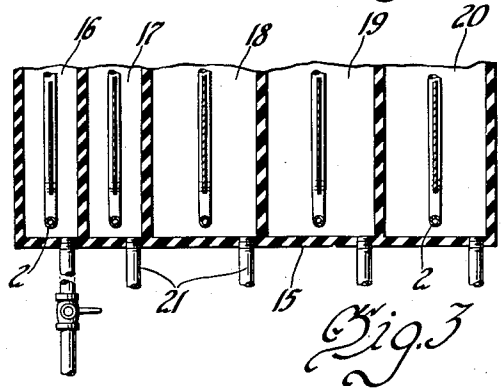


Fig. 3

Fig. 2

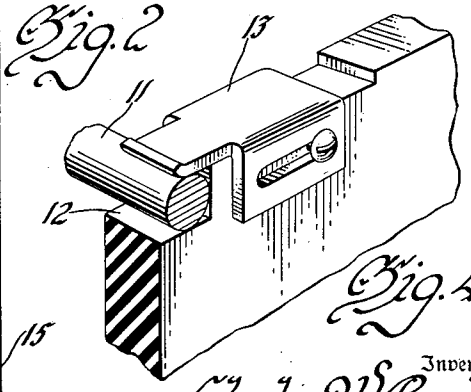


Fig. 4

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FILM-DEVELOPING HOLDER

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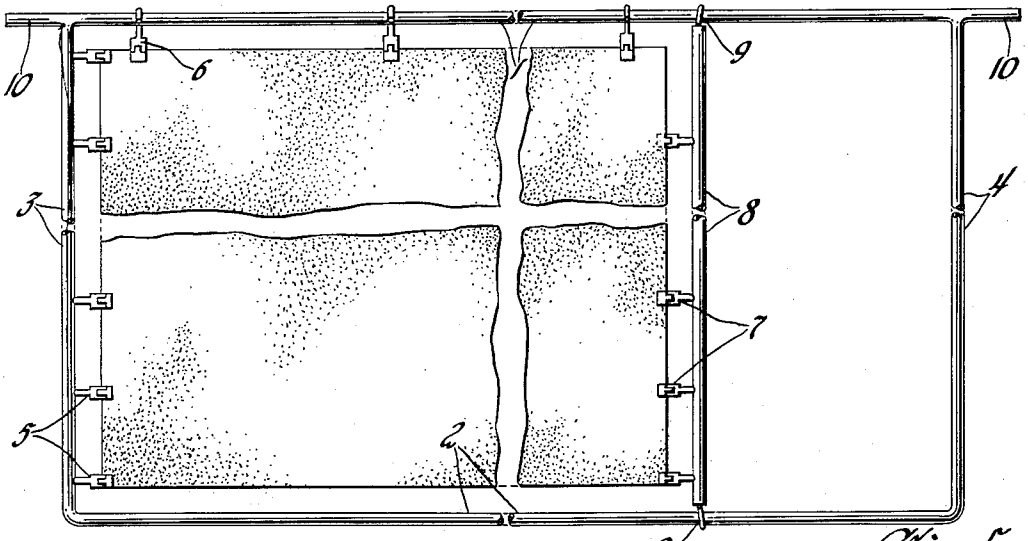

Fig. 5

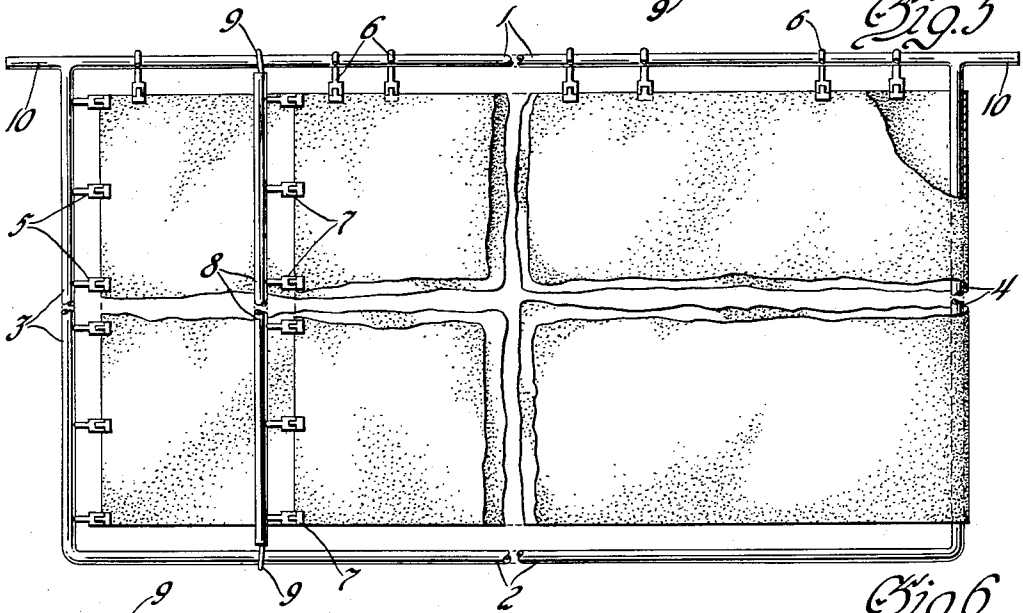

Fig. 6

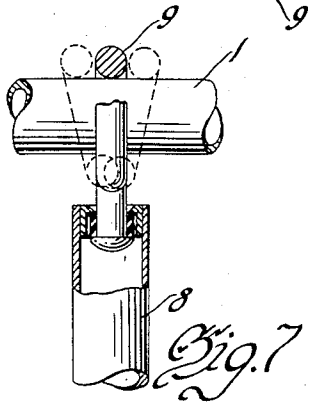

Fig. 7

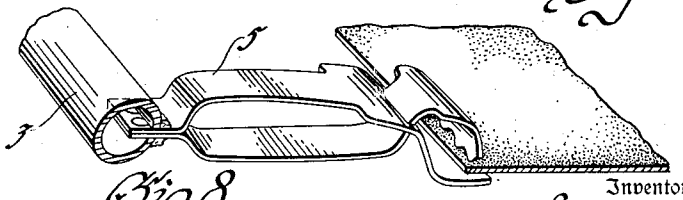

Fig. 8

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UNITED STATES PATENT OFFICE

2,446,958

FILM-DEVELOPING HOLDER

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Application March 31, 1945, Serial No. 585,845

3 Claims. (Cl. 95—100)

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This invention relates to photographic film developing apparatus. It is concerned more especially with the handling of unusually large size flexible sheet film on the order of from four to five feet in width and up to about fifteen feet in length for use with a certain specially constructed camera which probably is the largest ever built and in commercial use. The large flexible sheet is awkward to handle in the darkroom during the process of developing the film by ordinary methods and requires careful technique to avoid scratching the film surface or tearing of the sheet.

It is an object of the present invention to provide improved equipment to facilitate the film developing operation and enable the flexible sheet to be more easily handled with little likelihood of costly damage and marring of the film.

Another object of the invention is to provide a film supporting lightweight frame having adjustable elements to fit a range of different film sizes and a cooperating tank for removable reception of the frame in vertical hanging position and the maintenance of the film in spaced relation in all directions from the tank walls and submerged within the film treating liquid contained by the tank.

Other objects and advantages will become apparent during the course of the following specification having reference to the accompanying drawings wherein Figure 1 is a perspective view of a film developing tank arranged with a series of narrow subdivisions, each for the vertical reception of a film sheet suspended vertically in a frame which spreads the sheet out flat; Figure 2 is a transverse section of the tank on a larger scale; Figure 3 is a fragment of a transverse section taken near one end of the tank adjacent its valve controlled drains; Figure 4 is a perspective view of a detail of construction; Figures 5 and 6 are side elevations of the lightweight frame showing two different sizes of film sheet suspended therein; Figure 7 is a fragmentary view, partly in section, of a releasable lock for positioning a frame spreader bar and Figure 8 shows in perspective one form of film clip for detachably securing the film in the frame.

In the drawing the removable frame is illustrated as consisting of a rectangular structure formed of stainless steel tubing bent and welded together to afford a pair of vertically spaced top and bottom rails or bars 1 and 2 and a pair of vertically disposed end bars 3 and 4 joining the top and bottom bars. One marginal side edge of the film sheet to be supported is clamped or gripped by a series of spring clips 5 of conventional design

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which are welded or otherwise secured fixedly to the vertical end bar 3. Another group of similar clips 6 grip the top margin of the film sheet and are mounted on hooks for detachable slidable mounting on the top frame rail 1. A third series of clips 7 engage the opposite vertical margin of the film sheet and are fixedly secured to a spreader bar 8 having its opposite ends slidably mounted on the top and bottom bars 1 and 2. By this means the film sheet can be easily and quickly mounted in the supporting frame by the attachment along three of its marginal edges with variation in film size being accommodated by the adjustable top series of clips 6 in required number and by the adjustable setting of the spreader bar 8.

At opposite ends of the spreader bar 8 there are loosely swiveled the terminal eyes 9, and the sloppy connection enables each eye to be tilted or cocked to either side, as shown in dotted lines in Figure 7, from the full line erect position aligned with the axis of the spreader bar 8. In its full line position the tube embracing eye allows the spreader bar to be readily moved longitudinally of the bars 1 and 2, while in the cocked position all clearance is taken up for a tight camming or clutching grip which latches the spreader bar in any position to which it may be adjusted along the length of the frame. The swivel connection also enables the spreader bar to be rotated about its axis so that the film clamps carried thereby can be on either side. Thus in Figure 5 the film engaging clamps 7 face toward the end rail 3 when a relatively short length film is mounted in the frame and in Figure 6 are directed toward the rail 4 when the film to be treated is relatively longer and has an intermediate portion looped around the bar 4 with the emulsion side outermost. As will be noted in Figure 5 the rail embracing eyes 9 at opposite ends of the spreader bar 8 are tilted toward the right to resist displacement of the bar toward the left, while in Figure 6 the rail clutching eyes are tilted toward the left to resist right-hand movement of the spreader bar.

Near the top of the frame and at opposite sides thereof are the outward projections or hangers 10—10, preferably formed as continuations of the top rail 1. By means of the hangers 10 each frame is arranged to be vertically suspended in spaced relation to the tank walls from V-shaped or self-centering shoulders or seats at the opposite end walls of the tank. For convenience the self-centering seats at each end may consist of a wire or rod 11 preformed to zigzag shape with each corrugation of a size to span the corresponding tank compartment with the lower bends

centered within the tanks and the upper bends resting on the partition walls. As shown in Figure 4 the upper edge of each partition wall is provided with a locating notch or groove 12 to receive the bridging wire 11 and detachable retention of the wire is effected by means of an overhanging lip on a slider 13 mounted on the partition wall.

As best seen in Figure 2, the treatment tank 15 is divided by a series of partitions into a group of individual narrow compartments 16, 17, 18, 19 and 20. In the order named the compartment 16 may contain developer solution, the compartment 17 provides for a clear water rinse as well as a temperature control, the compartment 18 affords an acetic stop bath, the compartment 19 contains the hypo fixing solution while the compartment 20 is for a water spray wash as well as temperature control. Each of the compartments has a valved outlet or drain 21 at its bottom as well as a valved water supply inlet near the top. The several valved inlets may be joined to a common manifold 22, as shown in Figure 1, leading from hot and cold water supply pipes, not shown. As will be obvious the selective control of the various valves will enable water of the desired temperature to be introduced into each of the tanks. In the case of the tank 20 the valved inlet includes a pair of branch pipes 23 and 24 which extend throughout the length of the tank near the two side walls and are suitably perforated for spraying action. Circulation of water through the clear water rinse tank 17 and through the water spray wash tank 20 is contemplated and the partition walls between adjoining tanks enables a transfer of heat so that temperature control of both the developer and the hypo can be obtained by the flow of water of proper temperature through the neighboring rinse tanks and may be raised or lowered as desired.

Over the top of the developer tank 16 there is provided an air-tight hinged cover 25 which is for the purpose of protecting the developing solution against deterioration. When closed it will also reduce the likelihood of rinse water being splashed over and dripped into the developer tank. In its open position it is tilted backward slightly and acts as a drip drain when the frame and negative are lifted for inspection or removal.

In use in the darkroom the exposed film sheet is opened out and suspended in the frame by means of the clips with the spreader bar properly positioned to hold the flexible sheet taut and is thereafter handled by means of the supporting frame which is placed in the developer tank and then successively in the other tanks, remaining at each station for the required length of time for effective treatment and thereafter being allowed to dry when the negative is removed from the frame ready for printing.

I claim:

1. For protectively holding stretched out a photographic film sheet to facilitate handling during the development process, a light-weight frame comprising top and bottom rails and a pair of vertical end rails fixedly joined in rectangular outline, a vertical spreader rail having slider members swivelly and rockably mounted at opposite ends and selectively clutchable with said top and bottom rails of the rectangular frame in any position of relative adjustment in the space between said end rails, inwardly facing clips fixedly secured on one only of the vertical end rails to engage a side edge of a film sheet, cooperating clips fixed on the spreader rail to engage the opposite edge of the sheet in both positions of swivelled adjustment of the spreader bar either facing toward or away from the first mentioned clips dependent on whether the sheet is shorter or longer, respectively, than the frame space and weight supporting clips for the intermediate sheet portion engageable with the top edge of the sheet and with the top rail to prevent sheet sag.

2. A film holder including a vertically disposed shiftable and rotatable spreader rail, clutch eyes swivelly and rockably mounted at opposite ends of said rail, top and bottom guide rails for releasable clutching engagement by said eyes, a pair of end rails joining the top and bottom rails and sheet edge engaging clips on the spreader rail and on one only of said end rails, the other of said end rails enabling a sheet longer than the space between the end rails and held at its opposite edges by said cooperating clips to be looped about said end rail, and the swivel mounting of the clutch eyes enabling the spreader rail to be adjustably rotated about its axis to present the clips carried thereby either facing toward or away from the end rail clips as the length of the film sheets dictates with the rockable mounting of said clutch eyes enabling clutching engagement with the top and bottom rails in either direction of selective slidable adjustment.

3. In a film holder of the character described having a pair of vertical rails and a pair of horizontal rails all fixedly joined together into a rectangular frame of given size, a shiftable and rotatable spreader rail extending across the frame space between the rails of one of said pairs of frame rails and terminal eyes loosely swiveled and rockably mounted at the opposite ends of said spreader rail for releasable clutching and guiding engagement with the last mentioned frame rails.

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