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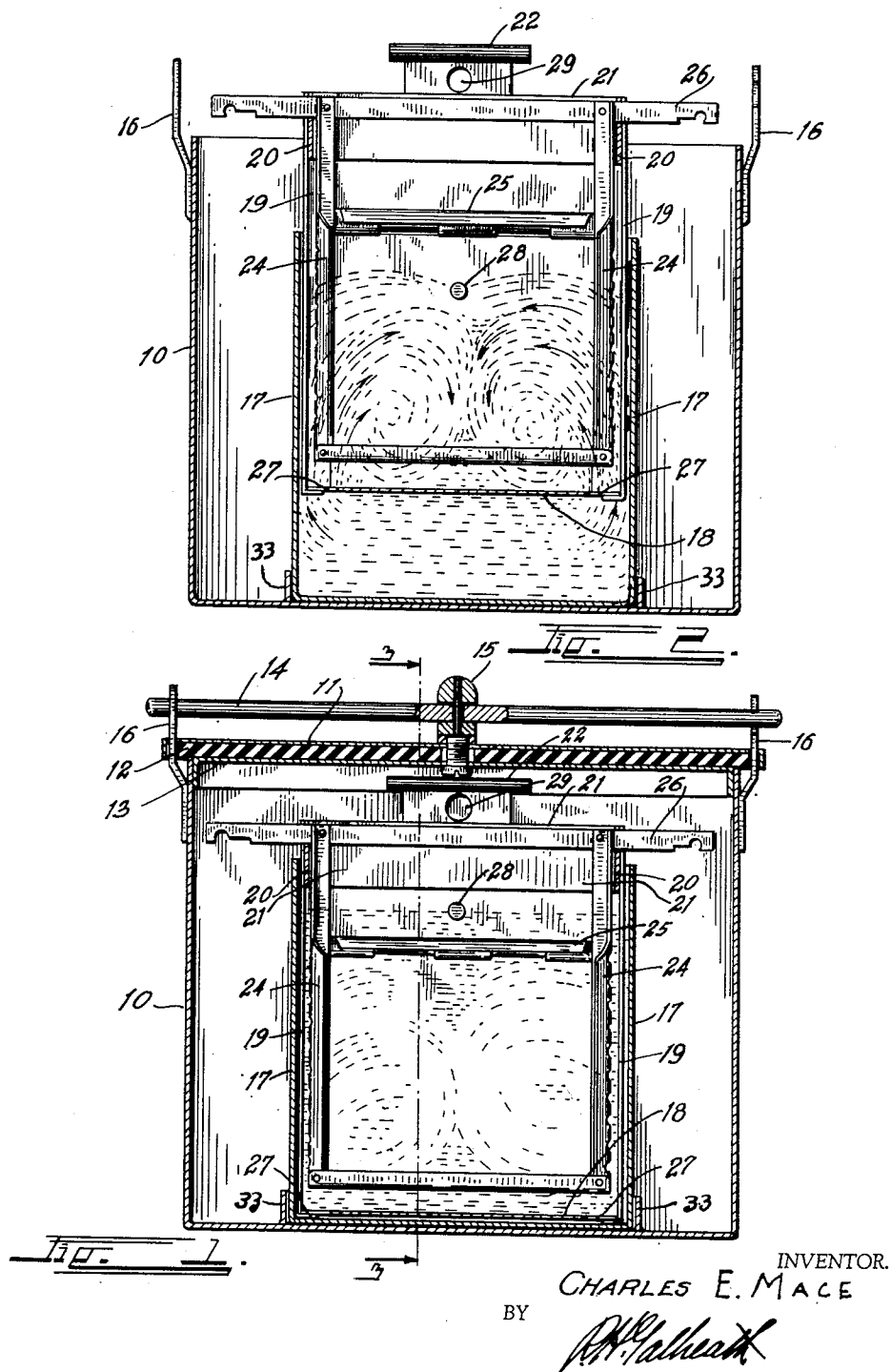
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PHOTOGRAPHIC DEVELOPING DEVICE

Filed July 6, 1940

2 Sheets-Sheet 1



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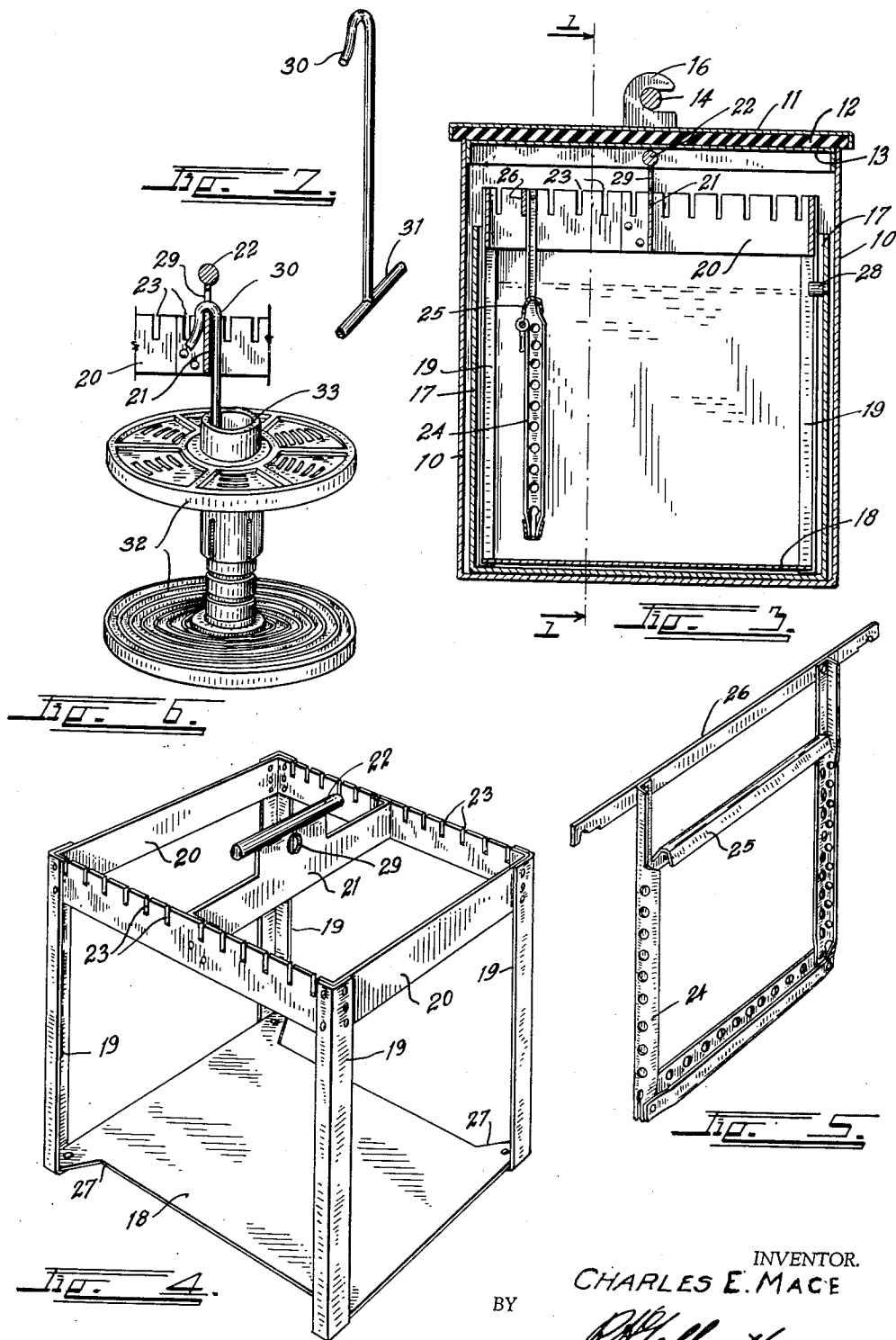
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PHOTOGRAPHIC DEVELOPING DEVICE

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8 Claims. (Cl. 95—90)

This invention relates to a photographic film developing tank and more particularly to an improvement over the tank illustrated in applicant's copending application, Serial No. 305,239, filed November 20, 1939.

The principal object of the invention is to provide a tank of this character which will require no mechanical moving or stirring devices and which will produce an entirely uniform distribution of the developer over the emulsion surface so as to prevent the formation of streaks, spots, fogged areas, etc.

If comparatively large negative emulsions are held vertical and exposed to a continuously quiescent developing solution, the unexposed silver salts will become loosened so as to gravitate downwardly over the emulsion surface, creating streaked and mottled effects. If the developing solution is subjected to a continuous mechanical agitation of any kind, either through the medium of paddles, pumps, shakers, or other similar devices, the solution will tend to form paths of flow across the emulsion. These paths of flow have varying degrees of movement so that the degree of development in each path will be different from the degree of development in the other paths to produce an uneven varying effect in the finished negative.

The principal object of the present invention is to eliminate all of the above objections to present methods of development. A long series of tests of the invention with various types of negatives has proven that absolutely uniform and satisfying results can be obtained on all negatives.

Other objects of the invention are: to so construct the device that it can be made light-tight when unattended to avoid accidental exposures; to simplify the operation of such a device so that it may be used by anyone with equal perfection; to provide a developing tank of this character which can be used for plates, cut films and rolled films with equal ease and equal results.

Other objects and advantages reside in the detail construction of the invention, which is designed for simplicity, economy, and efficiency. These will become more apparent from the following description.

In the following detailed description of the invention reference is had to the accompanying drawings which form a part hereof. Like numerals refer to like parts in all views of the drawings and throughout the description.

In the drawings:

Fig. 1 is a longitudinal section through the

improved film developing device, taken on the line 1—1, Fig. 3.

Fig. 2 is a similar, longitudinal section with the lid removed illustrating the action of the developer.

Fig. 3 is a cross section, taken on the line 3—3, Fig. 1.

Fig. 4 is a detail, perspective view of a film supporting rack as used in the invention.

Fig. 5 is a similar view illustrating the type of developing frame employed in the invention.

Fig. 6 is a detail, perspective view illustrating the mechanism for supporting roll films in the device.

Fig. 7 is a detail view of the roll film reel bracket hook.

The present invention takes advantage of the good points of both the quiescent method and mechanical agitation method. It allows the solution to remain quiescent for sufficient intervals to allow uniform developing action and it provides complete agitation at intervals sufficient to remove the loosened salts but not sufficient to create current paths.

The improved developing device is enclosed in an outer housing 10 having a sealed bottom and an open top. The top may be sealed by means of a light proof lid 11 which is constructed with an inner sealing sheet 12 of rubber or similar material, clamped in place by means of a flanged bottom plate 13, the flange of which slides snugly into the open top of the housing 10. The lid may be clamped in place by means of a spring bar 14 pivotally mounted by means of a pivot post 15 at the middle of the lid, which detachably engages hooked brackets 16 at the ends of the housing. To position the rod in the brackets, it is necessary to spring the rod downwardly at its extremities so that the lid is tightly forced against the housing to keep it light proof.

A developing tank 17 is positioned within the housing 10. It is guided to its proper position therein by means of guide flanges 33 on the bottom of the housing. A film rack, as illustrated in Fig. 4, is designed to slide snugly into the developing tank 17. The film rack consists of a bottom plate 18, corner posts 19, top frame 20. A cross member 21 extends across the top frame 20 and carries a handle member 22 by means of which it may be readily lifted from, or placed in, the developing tank 17. The two opposite side members of the top frame 20 are provided with a series of spaced notches 23 for supporting standard film and plate holders therein.

A type of holder which has been found very

satisfactory is illustrated in detail in Fig. 5. It consists of a perforated negative frame 24 having a hinged top member 25 for holding cut films or plates in place in the holder. The holder is secured to, and supported from, a cross bar 26, the extremities of which are received in the notches 23 when the holder is in place in the frame.

One of the principal features of this invention, from which its unusual efficient action is obtained is the bottom plate 18. This plate is a solid imperforate plate extending over the entire bottom of the frame between the corner posts 19. The two opposite side edges of this bottom plate (which are directly below the notched sides of the upper frame 20) are cut back or inset, as indicated at 27. The developing tank 17 carries an internal projection or stop pin 28 against which the end of the bottom plate 18 strikes as the frame is lifted in the tank. This pin is positioned approximately at the proper solution line in the tank.

A hole 29 is formed in the cross member 21 for receiving a hooked hanger 30. The hanger is formed with a T-shaped bottom member 31, by means of which any suitable film developing reel may be suspended on the hanger. A typical reel for this purpose is indicated at 32. Such a reel is usually formed from Bakelite and has a hollow shaft 33 through which the hook of the hanger 30 is passed before being hooked into the hole 29. This construction enables roll film as well as cut film or plates to be developed in the tank.

Operation

Let us assume that cut films or plates are to be developed. The operator fills the tank 17 with developing solution approximately up to the level indicated by the stop pin 28. The lights are extinguished and the films or plates are now placed in their holders and the holders are placed in the notches 23 of the developing frame. The frame is now lowered in the developing tank until it strikes the stop pin 28. The operator passes the pin by tilting the frame forwardly to allow the bottom plate to swing inwardly over the pin. The pin 28 indicates to the operator that the frame has reached the solution level in the tank and, after passing the pin, the operator releases the frame allowing it to settle to the bottom of the tank. The bottom plate 18 acts as a piston against the solution and the weight of the frame forces the solution against the sides of the tank at each end of the film holders causing it to swirl upwardly and inwardly along the films or plates as indicated by the flow lines in Fig. 2. The agitation can be increased by forcing the frame downwardly thereby violently squirting the solution through the cut-away sides. The two streams are so equal and counter-act each other so evenly that the frame may be pushed downwardly as violently as desired without causing the tank to overflow.

The device is not further disturbed until a time interval has been passed. It has been found that approximately three minutes is the proper interval. The operator then grasps the handle 22, pulls the frame upwardly in the tank allowing the solution to flow from the plate 18 through the cut-away sides 27. When the plate 18 again strikes the stop pin 28, the operator releases the frame allowing it to settle for a second period of agitation. This is repeated throughout the full time of development, usually from 10 to 15 minutes.

If the operation is carried out in a completely dark room, the lid 11 need not be used but if it is desired to have light between the periods of operation, the lid is put in place after each agitation. All of the steps of the process can be easily carried out in the dark. The notches 23 can be readily located and the stock pin prevents accidental withdrawal of the frame from the tank. The above has given the most perfect results in uniform development that it has been possible to obtain by any developer or method, even exceeding tray development, the only method up to the present for even approaching perfect results.

The film holder of Fig. 5 and the film reel of Fig. 6, in themselves, form no part in the present invention.

It is customary in modern tray development to violently agitate the developing solution immediately before the negatives are placed therein, to prevent specks of dust, etc. from attaching themselves to the emulsion. With this apparatus it is impossible to place the negatives in the solution except when the latter is in a state of agitation. It has also been found that the development period is shortened very greatly over the time required in the usual tank developer.

While a specific form of the improvement has been described and illustrated herein, it is desired to be understood that the same may be varied, within the scope of the appended claims without departing from the spirit of the invention.

Having thus described the invention, what is claimed and desired secured by Letters Patent is:

1. A photographic developing device comprising: a polygonal, open-topped tank; a frame occupying substantially the entire area of said tank and being vertically slidable therein; a bottom plate in said frame, the two opposite side edges of said bottom plate being set back from the walls of said tank to allow the solution to flow by the bottom plate as the frame descends in the tank; and means for suspending photographic negatives in said frame so that the negatives will extend laterally of said tank from one cut back edge to the other.

2. A photographic developing device comprising: a polygonal, open-topped tank; a frame occupying substantially the entire area of said tank and being vertically slidable therein; spaced-apart notches formed in opposite sides of the upper portion of said frame; negative holders suspended in said notches in spaced-apart relation in said frame; and a bottom plate in said frame, there being passages at each side of said bottom plate at the ends of said negative holders to allow the solution to flow past the bottom plate at the sides and inwardly between the negatives from each end thereof.

3. A photographic developing device comprising: a polygonal, open-topped tank; a frame occupying substantially the entire area of said tank and being vertically slidable therein; spaced-apart notches formed in opposite sides of the upper portion of said frame; negative holders suspended in said notches in spaced-apart relation in said frame; and an imperforate bottom plate in said frame, the opposite sides of said bottom plate, which are positioned below said notches, being cut back to allow the solution to swirl upwardly and inwardly over said plate between and parallel to said negative holders as the latter descends in said tank.

4. A photographic developing device compris-

ing: a polygonal, open-topped tank; a frame in said tank; a bottom plate in said frame occupying substantially the entire area of said tank, there being solution passages to allow the solution to flow by the bottom plate as the frame descends in the tank; means for suspending photographic negatives in said frame; and an inwardly extending projection in said tank positioned to be passed by the bottom plate when the latter is in one position and to be engaged when in another position to notify the operator when the bottom plate has been elevated substantially to the surface of the developing fluid in said tank.

5. In a photographic developing device, an open, rectangular, vertical-sided frame; spaced-apart notches in the upper edge of said frame at two opposite sides thereof; cross bars extending laterally across said frame and resting in said notches; negative holders suspended laterally of said frame from said cross bars; corner posts extending downward from said frame; and a bottom plate secured between the lower extremities of said corner posts, the side edges of said bottom plate at each extremity of said negative holders being cut-back to allow developing fluid to swirl upwardly at both ends of the negative holders and thence flow inwardly therebetween toward the middle of said frame.

6. A photographic developing device comprising: a polygonal, open-topped tank; a frame occupying substantially the entire area of said tank and being vertically slidable therein; a bottom plate in said frame, there being solution passages to allow the solution to flow by the bottom plate as the frame descends in the tank; means for suspending photographic negatives in said frame; and inwardly extending projection in said tank to be engaged by the bottom plate to notify the operator when the bottom plate has been elevated

substantially to the surface of the developing fluid in said tank, said projection being sufficiently short to be cleared by the bottom plate when the latter is tilted; and a handle member at the middle of the upper portion of said frame by means of which the latter may be lifted.

7. A photographic developing device comprising: a polygonal, open-topped tank; a frame occupying substantially the entire area of said tank and being vertically slidable therein; a bottom plate in said frame, there being solution passages to allow the solution to flow by the bottom plate as the frame descends in the tank; means for suspending photographic negatives in said frame; an inwardly extending projection in said tank to be passed by the bottom plate when the latter is in one position and to be engaged by the bottom plate when the latter is in another position to notify the operator when the bottom plate has been elevated substantially to the surface of the developing fluid in said tank; a cross member in said frame; a hanger detachably suspended from said cross member; and means for supporting a film reel on said hanger.

8. Means for uniformly developing a plurality of photographic negatives in a tank of developing solution comprising: a bottom plate of a size and contour to fit closely within the bottom of said tank, the opposite ends of said plate being closely spaced from said tank, the opposite sides of said plate being set back from the walls of said tank along their mid portions; and a frame for supporting a plurality of vertically suspended photographic negatives above said plate, said frame being fixedly secured to said bottom plate and arranged to maintain said negatives in parallel relation and parallel to the ends of said plate so that they will extend from one set-back side thereof to the opposite set-back side.

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