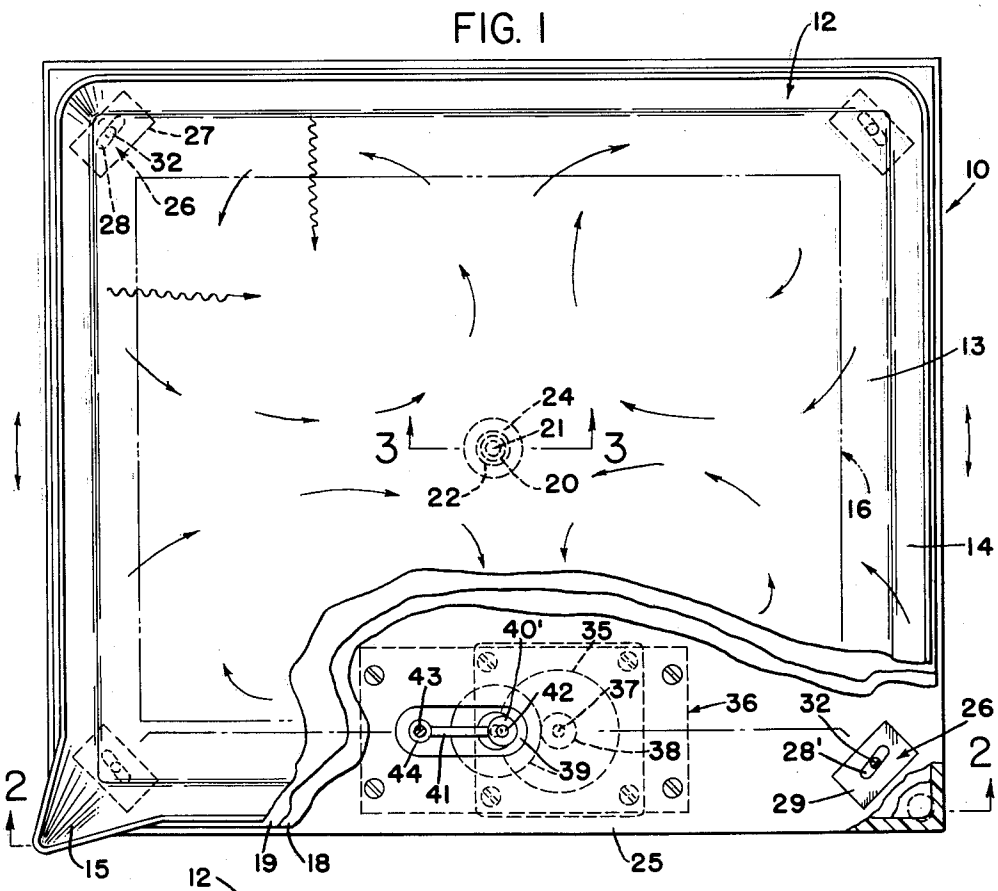
March 28, 1961 W. L. CHAMBERS 2,976,792

PHOTOGRAPHIC DEVELOPING TABLE

Filed March 7, 1958

FIG. 1



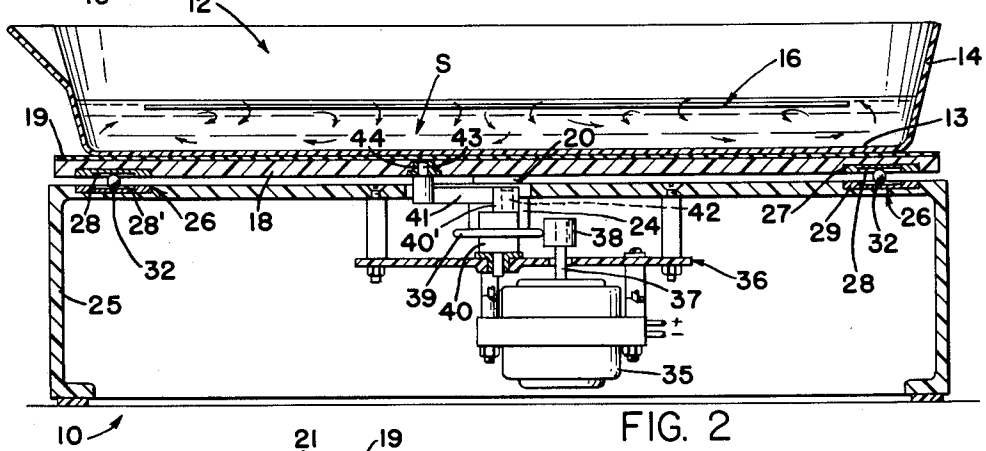


FIG. 2

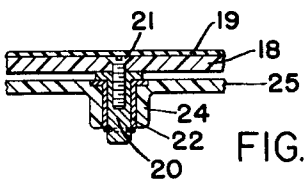


FIG. 3

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PHOTOGRAPHIC DEVELOPING TABLE

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7 Claims. (Cl. 95—99)

The present invention relates to the treating and processing of photographic paper and film. More particularly, the invention relates to improved means for circulating various chemical solutions, as used for photographic developing, fixing, printing etc., over the sensitized surface of photographic papers or films.

The apparatus of the invention is primarily intended for use by the amateur photographer who develops and prints his own photographs. The purpose of the invention is to provide improved means whereby the amateur photographer, with a minimum of technical knowledge and experience, can develop and print photographs having a quality heretofore obtainable only by the use of expensive professional-type equipment.

Assuming that the photograph negative has been made on a proper film with a correct amount of exposure, the amateur photographer most often goes astray during one of the several operations which require immersion and washing of the film or paper in various chemical solutions. The reaction between the sensitized film surface and the chemical solution requires that there be substantial agitation and movement of the solution relative to the sensitized surface. Further, such agitation must be substantially constant or unvarying and must result in uniform treatment of the entire surface area of the film. Otherwise, the density, contrast or grain of the resultant photograph will vary and be non-uniform.

It is therefore an object of the present invention to provide an improved means for contacting and treating the sensitized surface of photographic papers or films with chemical solutions. More particularly, it is an object to provide improved apparatus for constantly circulating a chemical solution in a container over the sensitized surface of a photographic film or paper immersed in the solution, for uniform treatment of the entire surface area of the film.

These and other objects of the invention, as well as the advantages thereof over prior art apparatus and techniques, will be apparent from the following detailed description taken with the attached drawing.

In the drawing:

Fig. 1 is a view of a conventional solution tray supported on apparatus according to the invention;

Fig. 2 is a section taken substantially on line 2—2 of Fig. 1; and

Fig. 3 is an enlarged section taken substantially on line 3—3 of Fig. 1.

A form of apparatus according to the invention is indicated generally at **10**. The apparatus may be used with a container or tray indicated at **12**. The tray **12** as shown is a conventional type having a rectangular bottom **13**, sloped sides **14** and a pouring lip **15**. The tray **12** is partly filled with a suitable chemical solution S and a sheet of material **16**, such as photographic paper or film, is immersed therein.

The apparatus **10** includes a preferably rectangular table **18** having a non-skid solution resistant covering **19**. As best shown in Fig. 3, the midpoint or center of the

table **18** has a stud **20** depending therefrom and attached thereto as by a screw **21**. The stud **20** is formed of a suitable wear-resistant material and is journaled in a hub bearing **22**. The bearing **22** is pressed in a bore extending vertically through a hub **24** located at the center of a table support **25**.

Referring to Fig. 2, the support **25** is a preferably rectangular box-like structure. In addition to the rotatable table mounting provided by stud **20** and bearing **22**, each corner of the table **18** is permitted limited movement substantially circumferentially of stud **20** by bearing means indicated at **26**. Each bearing means includes an upper plate **27** attached to the under side of the table **18** substantially transversely of an imaginary line extending diagonally of the table through the center bushing **20**. Each plate **27** has a groove or race **28** extending circumferentially of said stud **20**. A lower plate **29** similar to plate **27** and also having a groove or race **28'** is attached to the upper surface of the support **25**. The opposed plates **27** and **29** rollably engage a ball or bearing **32** between them, within a substantially arcuate raceway defined by the upper and lower respective grooves **28** and **28'** which extend circumferentially of the stud **20**.

The table **18** is pivotally oscillated relative to the support **25** at any desired frequency by a suitable drive means including a conventional high torque fractional horse power electric motor **35**, fastened by brackets **36** to the underside of the support. The output shaft **37** of the motor preferably is fitted with a bushing or frictional drive roller **38**. The roller **38** engages a larger roller **39** mounted around a hub **40** journaled at its lower end in plate **36**. The upper end of the hub **40** eccentrically engages one end **40'** of a crank arm **41**, as by an offset pin **42**. The other end of the crank arm **41** has a pin **43** extending upwardly and journaled within a crank bushing **44** on the under surface of the table **18**.

As shown, the table drive is located adjacent one edge thereof. This position will provide a high or maximum extent of solution circulation. However, if desired the table drive elements could be moved nearer to the center bushing **20** to provide a lesser extent of solution circulation.

Referring to Fig. 1, the circular arrows represent generally one movement of solution S within the tray **12** in response to the driving action of the crank arm **41**. Within each corner quadrant of the tray, the solution flow is generally spiral. Each spiral or vortex extends into the center area of the tray, generally above the bushing **20**. Referring to the upper left hand corner quadrant of tray **12**, the wriggled arrows indicate additional currents set in motion by the crank arm **41** and which are substantially linear and extend from either side of each corner and through the spiral or vortex current in each quadrant.

The circulation or movement of the solution S in a rectangular tray **12** may be regarded as taking place substantially in, or as being generally localized within, the four quadrants of the tray; each quadrant including a combination of spiral and linear currents. Along the boundaries of each quadrant and at their apex, above bushing **20**, the individual currents meet. It may thus be seen that the flow of solution S over the surface of the sheet **16** will be uniform. Further the rate of agitation will be constant varying only in the extent of time and thus a successive number of sheets **16** can be immersed in the tray **12** and each will receive the same uniform treatment and contact with solution S.

What is claimed is:

1. Apparatus for treating a sheet of photographic paper immersed in a chemical solution comprising, a rectangular container for said solution, a rectangular table having a top surface for supporting said container, a support underlying said table having means rotatably supporting said

table at its center, bearing means between said table and said support at each corner of said table, each said bearing means being movable substantially arcuately of said means rotatably supporting said table, and means mounted on said support for imparting pivotally oscillating movement to said table.

2. Apparatus for treating a sheet of photographic paper immersed in a chemical solution comprising, a rectangular container for said solution, a rectangular table having a top surface for supporting said container, a support underlying said table having means rotatably supporting said table at its center, bearing means between said table and said support at each corner of said table, said bearing means being movable substantially arcuately of said means rotatably supporting said table to permit a limited pivotally oscillatory movement of said table about its center, and means mounted on said support for imparting pivotally oscillating movement to said table.

3. Apparatus for circulating a chemical solution in a rectangular container over the sensitized surface of a sheet of photographic paper, comprising, a rectangular table mounted on a support by corner bearing means, said bearing means being movable only substantially transversely of a diagonal of said table, and means for pivotally oscillating said table about its center whereby circulation of a liquid within said container is generally localized within the four quadrants of the container, each quadrant generating a combination of spiral and linear currents.

4. Apparatus for circulating a chemical solution in a rectangular container over the sensitized surface of a sheet of photographic paper, comprising, a rectangular table rotatably connected at its center to a support, bearing means between said table and support at each corner of said table, said bearing means being movable only circumferentially of the center of said table and drive means attached to said support for imparting motion to said table, whereby circulation of a liquid within said container is generally localized within the four quadrants of the container, each quadrant generating a combination of spiral and linear currents.

5. Apparatus for circulating a chemical solution in a rectangular container over the sensitized surface of a sheet of photographic paper, comprising, a table for supporting said container, a support underlying said table, means rotatably connecting said table with said support at the center of said table, a bearing race at each corner of said table extending substantially circumferentially of its center, bearing races on said support opposed to and aligned with each bearing race on said table, a bearing movable within each aligned pair of opposed bearing races, said bearings carrying said table, and drive means attached to said support for imparting pivotally oscillatory motion to said table.

6. Apparatus for circulating a chemical solution in a rectangular container over the sensitized surface of a sheet of photographic paper, comprising, a rectangular table for supporting said container, a support underlying said table, means rotatably connecting said table with said support at the center of said table, a bearing race at each corner of said table extending substantially circumferentially of its center, bearing races on said support opposed to and aligned with each bearing race on said table, a ball bearing movable within each pair of opposed bearing races, said bearings carrying said table, and drive means attached to said support for imparting pivotally oscillatory motion to said table.

7. Apparatus for use in treating a sheet of photographic material immersed in a rectangular container of chemical solution, comprising, a rectangular table having a surface adapted for supporting a container, a stud depending from the center of said table, a bearing race at each corner of said table extending substantially circumferentially of said stud, a support underlying said table having a bore journaled on said stud, a bearing race on said support aligned with each race on said table, a bearing between each pair of so opposed races supporting said table, and means mounted on said support for pivotally oscillating said table.

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