United States Patent

[11] 3,604,332

[72] Inventor **Robert W. Mitchell**
707 Myrtle Rd., Saint Joseph, Mich. 49085

[21] Appl. No. **805,390**
[22] Filed **Nov. 29, 1968**
[23] **Continuation-in-part of Ser. No. 689,590, Dec. 11, 1967.**
[45] Patented **Sept. 14, 1971**
[73] Assignee **Heath Co.**
Benton Harbor, Mich.

[54] **PHOTOGRAPHIC MATERIAL PROCESSING APPARATUS**
23 Claims, 14 Drawing Figs.

[52] **U.S. Cl.** **95/95**
[51] **Int. Cl.** **G03d 13/04**
[50] **Field of Search** 95/89, 95, 99

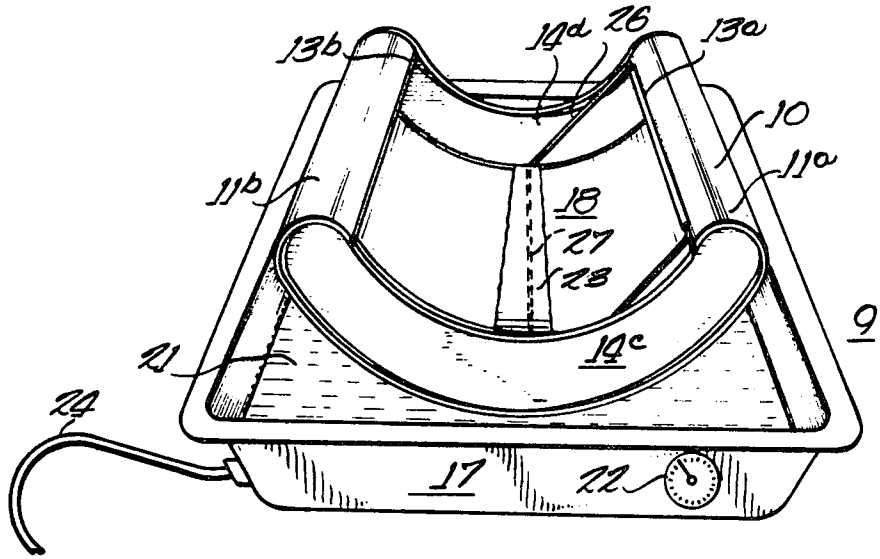
[56] **References Cited**

UNITED STATES PATENTS

406,269	7/1889	Dalrymple	95/99
1,591,167	7/1926	Lewis	95/99
2,336,509	12/1943	Smith	95/95
2,877,700	3/1959	Keller	95/97

Primary Examiner—John M. Horan
Attorney—Pendleton, Neuman, Williams & Anderson

ABSTRACT: Processing apparatus including a vessel with an arcuate bottom for use in processing sensitized material such as film or photographic paper, the vessel having uniquely curved walls which, when the vessel is agitated, impart to the liquid within the vessel flow patterns particularly effective for the above purpose, the vessel also possessing other unique features which facilitate handling and the pouring of liquids from the vessel and temperature control of chemicals within the tray, and insure more complete chemical contact while conserving the chemicals used, thereby making the vessel particularly useful in a multistep process such as color print processing.



PATENTED SEP 14 1971

3,604,332

SHEET 1 OF 3

Fig. 1

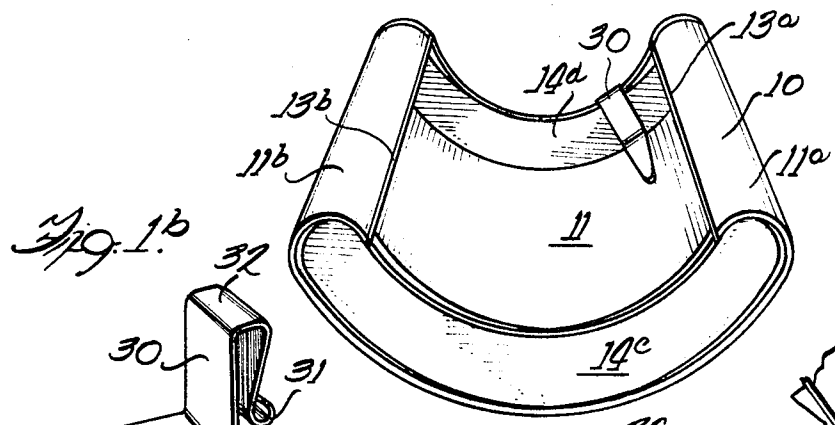


Fig. 1a

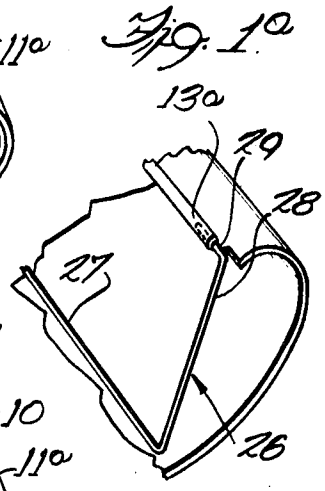


Fig. 1b

Fig. 2

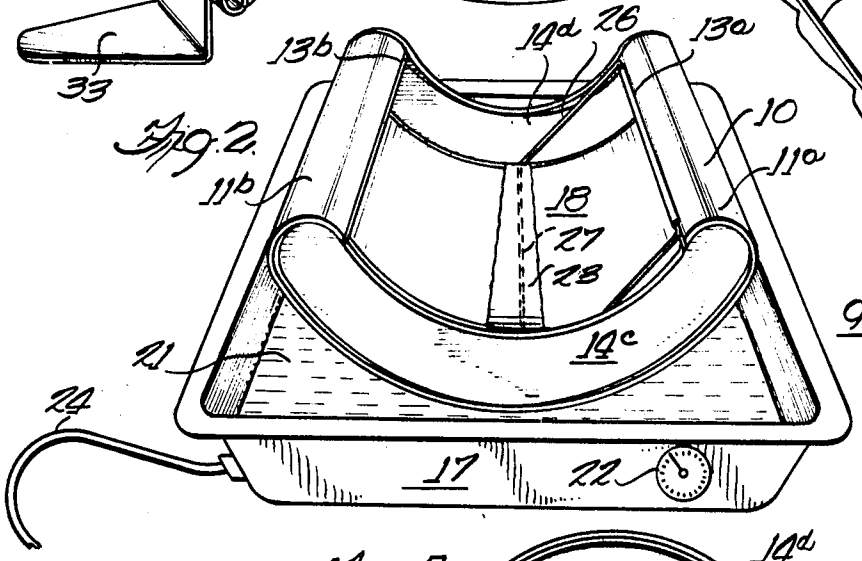


Fig. 4

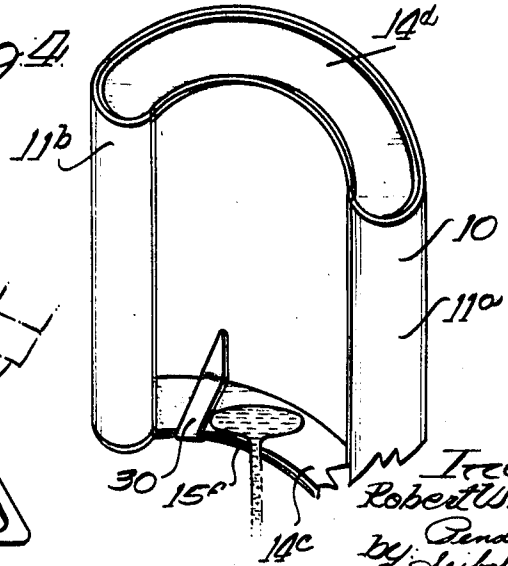
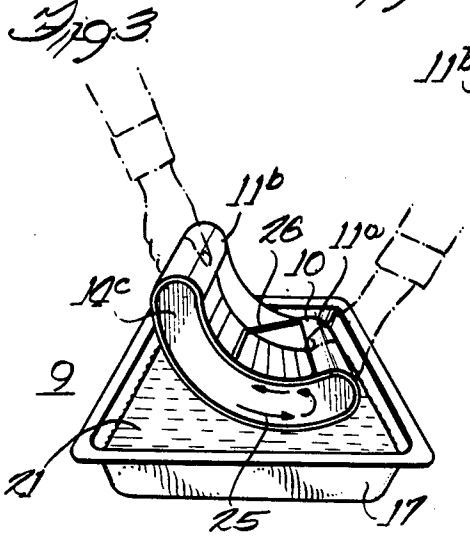


Fig. 3



Inventor
Robert W. Mitchell
By Gendleton, Newman
Seibold & Williams
Attys

Fig. 5

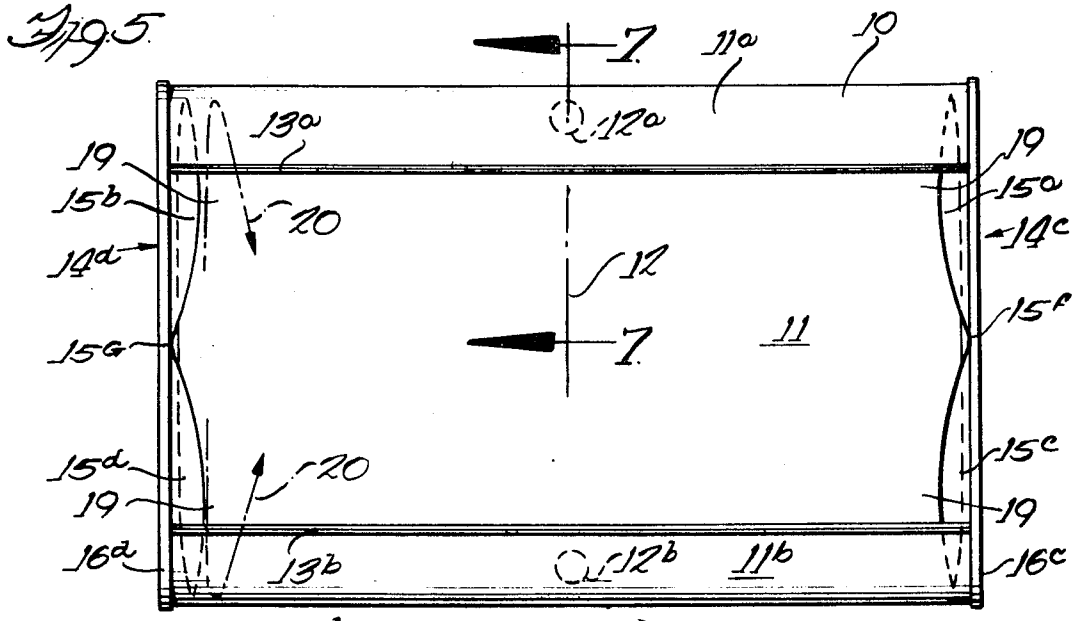


Fig. 6

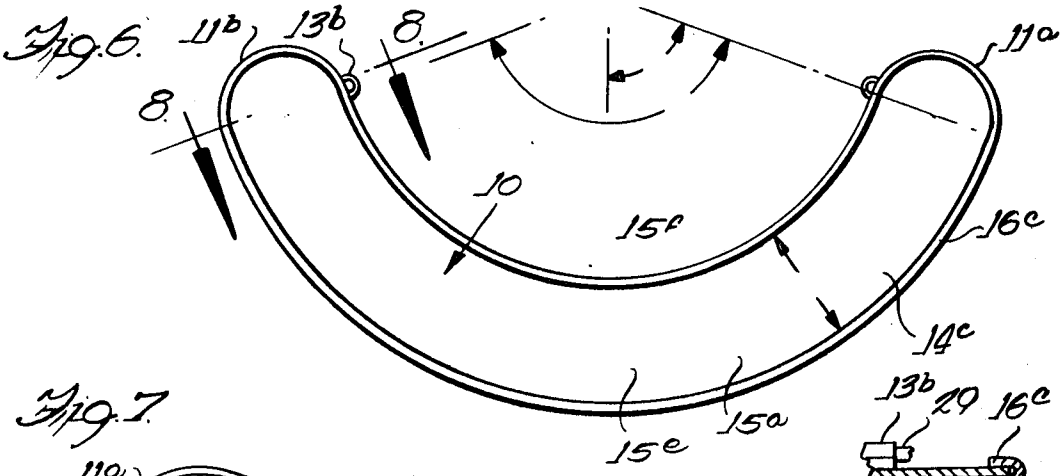


Fig. 7

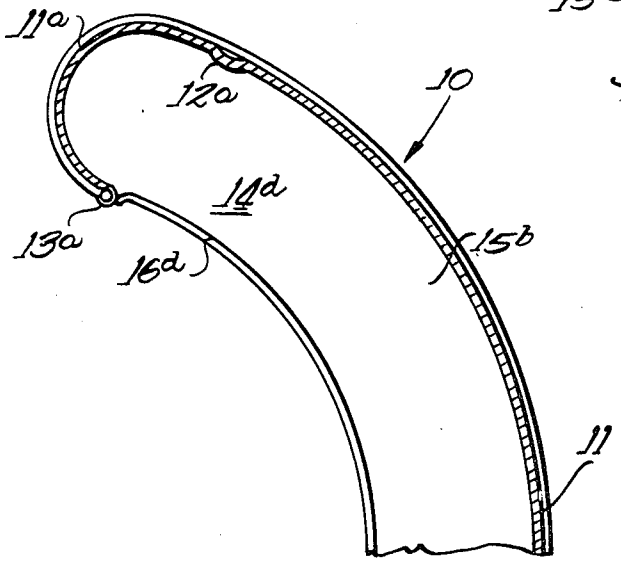
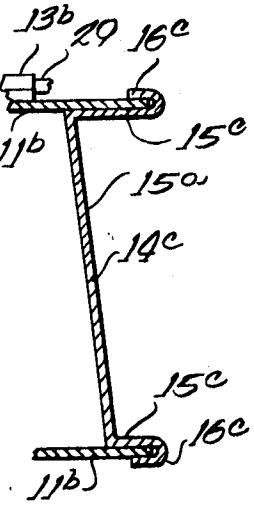


Fig. 8



Inventor
Robert W. Mitchell
Pendleton, Numan
by Seibold & Williams
Atty's

10572-2

Fig. 9.

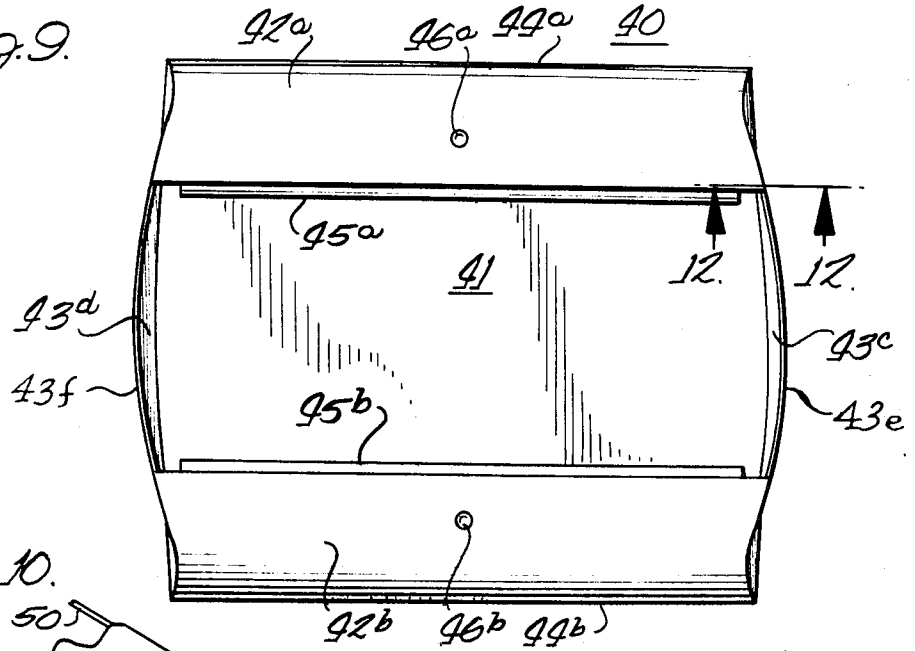


Fig. 10.

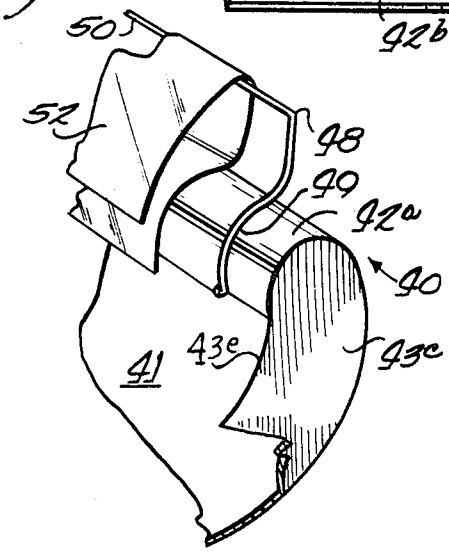


Fig. 11.

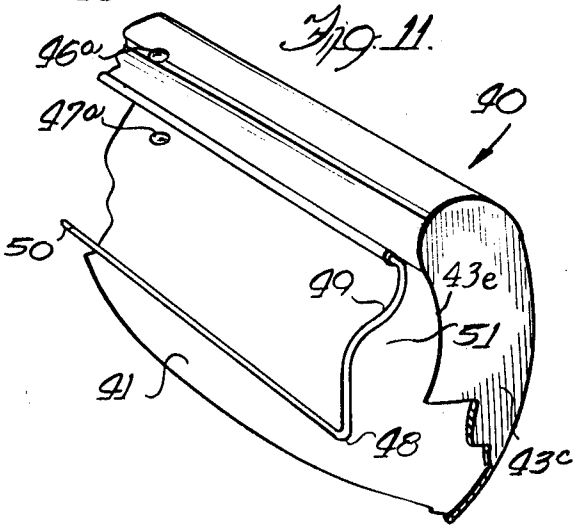
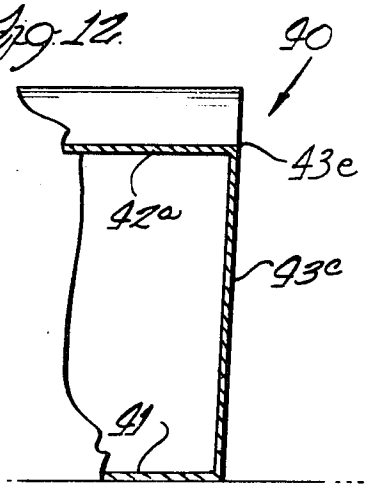


Fig. 12.



Inventor
Robert W. Mitchell
by: Pendleton, Neuman
Seibold & Williams
Attys

PHOTOGRAPHIC MATERIAL PROCESSING APPARATUS

This application is a continuation-in-part of application Ser. No. 689,590, filed Dec. 11, 1967.

BACKGROUND OF THE INVENTION

The field of the invention relates to improvements in processing trays and apparatus, particularly apparatus which may effectively be used in the processing of color prints. As is well known in the art, the developing of color sensitized material is a rather complicated multistep process requiring a rather long time, a substantial number of chemicals and often expensive equipment. A few of the problems encountered by those attempting to develop color prints are: the necessity of maintaining the print and the chemicals used thereon at constant temperature during processing; the necessity of constant agitation of the chemicals over the print during processing; the requirement of a substantial amount of equipment due to the numerous successive chemical treatments of the print; the expense of the chemicals; and the often inferior quality of the final prints due to insufficient washing of the print between successive additions of chemicals.

The commercial prior art in the field of developing apparatus for color print processing has comprised primarily large and expensive motor driven apparatus utilizing rotating drums or the like. Various patents exist on simpler tray apparatus such as U.S. Pat. No. 2,192,940 issued to Hinsdale Smith on Mar. 12, 1940, but these have never effectively solved the problems set forth above. The Smith patent shows a tray with a slightly rounded bottom, straight sidewalls, end walls curved upwardly and outwardly to form handles and a stopper in one of the end walls. This tray would be ineffective in the color developing process where rapid successive applications of chemicals to the print require efficient chemical utilization, intimate paper-chemical contact and a means for draining the tray that is more efficient than the plug provided. Smith discloses a tray in which the wet print is "more or less sealed in place" (p. 2, Col. 1, line 8), which would thereby make the washing of both the front and back of the print inconvenient. Finally, the flow pattern of water within the Smith tray upon rocking would not be effective to wash the print as thoroughly as is desired in the color developing process.

SUMMARY

It is a primary object of the present invention to provide an improved means for developing sensitized material such as film, paper or the like.

More specifically, it is an object of the present invention to provide an improved means for developing color as well as black and white prints.

A further object of this invention is to provide a means for developing color sensitized material with a small amount of inexpensive equipment. In this connection, it is an object to provide a developing vessel which requires use of only a small amount of developing chemical and which can be drained quickly between successive additions of chemicals, thereby allowing one vessel to do the work of many trays.

A still further object of this invention is to provide a developing vessel which facilitates rapid and complete washing of the print. In this connection, it is an object to provide a vessel which facilitates washing both sides of the print without print handling.

Another object is to provide means for developing sensitized material at a substantially constant temperature.

Still another object of this invention is to provide means to facilitate holding the vessel level in a darkened room.

A further object is to provide improved means of the character indicated which is simple in form, easy to manufacture and efficient in operation.

Other objects and advantages will become apparent as the description proceeds.

In one form of the present invention, a photographic material developing apparatus is provided including a thermal stabilizing base and a print supporting arcuate vessel. The arcuate vessel is provided with an arcuately curved bottom portion; the sides of the bottom portion are additionally curved in a semicircle to form sidewalls of the vessel. The centerline of the sidewalls is denoted by a dimple indentation. Two opposed end walls generally shaped to correspond to the arcuate curvature of the bottom are provided with the extremities thereof curved inward, the curvature of the end walls being more pronounced at the radially inward portion of the end wall than at the bottom. The central portions of the end walls are shaped slightly outward to form pouring funnels.

The edges of each end wall include a flange extending generally normal to the longitudinal axis of the bottom curvature, the ends of the flange being connected to the curved bottom and sidewalls at all points where they coincide. The resulting connection of the flange and the curved bottom and sidewalls lies in a plane generally normal to the curved bottom of the vessel, and the connection acts as a base for the vessel when placed on its end. A thermal stabilizing base tray is provided which contains water maintained at a constant temperature, the arcuate vessel being adapted to float therein.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view of a processing vessel constructed in accordance with the teachings of the present invention;

FIG. 1*a* is a sectional view of a print removing device constructed in accordance with the teachings of the present invention, attached to the developing vessel, the end wall of the vessel removed for clarity;

FIG. 1*b* is a perspective view of another embodiment of a print removing device constructed in accordance with the teachings of the present invention;

FIG. 2 is a perspective view of the processing apparatus including the vessel of FIG. 1 with a piece of sensitized paper positioned in the processing vessel, developing chemical added to the vessel, and a thermal stabilizing base tray containing water;

FIG. 3 is a view of the device of FIG. 2 showing agitation of the processing vessel in the thermal stabilizing base tray of water;

FIG. 4 is a perspective view of the device of FIG. 1 standing on its end in the draining position;

FIG. 5 is a plan view of a processing vessel constructed in accordance with the teachings of the present invention;

FIG. 6 is an end elevational view of the device shown in FIG. 5 taken from the right as viewed in FIG. 5;

FIg. 7 is a sectional view taken substantially along line 7—7 in FIG. 5;

FIG. 8 is a sectional view taken substantially along line 8—8 in FIG. 6;

FIG. 9 is a plan view of a second embodiment of a processing vessel constructed in accordance with the teachings of the present invention;

FIG. 10 is a partial perspective view of the device of FIG. 9 including a third embodiment of a print removing device constructed in accordance with the teachings of the present invention, a print disposed thereon;

FIG. 11 is a partial perspective view of the device of FIG. 9 including the print removing device of FIG. 10 at rest on the bottom of the processing vessel; and

FIG. 12 is a sectional view taken substantially along line 12—12 in FIG. 9.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings, a processing apparatus 9 including an arcuate vessel 10 is shown in FIGS. 1 and 2 and 3 which is constructed in accordance with teachings of the present invention. The arcuate vessel 10 includes an arcuately curved bottom portion 11 made of stainless steel or any other

substance which readily conducts heat and is not corroded by photographic chemicals. The arcuate curvature of the bottom of the preferred embodiment, as shown in FIG. 6, is such that the bottom describes an arc of 140° on the perimeter of a circle whose circumference is approximately three times the standard print width, and whose radius is approximately 2.5 times the radial height of an end wall 14*c* or 14*d*. However, it is to be understood that other arcuate extension of greater or lesser included angle could be used so long as agitation of the vessel during washing of the sensitized material, as described below, would result in the unique water flow pattern where water is thrown from the sides of the vessel towards the center of the vessel in a generally figure-eight pattern. Experiment has disclosed arcuate extension of between 105° and 180° to be most effective for generating the desired flow pattern, although arcuate extension as small as 60° may also be used with somewhat reduced agitation.

The side edges of the arcuate bottom 11 are relatively sharply curved to form sidewalls 11*a* and 11*b* of the processing tray. In the exemplary device the sharp curvature of the end portions of the sidewalls 11*a* and 11*b* approximates a semicircle with a diameter equal to the radial height of end walls 14*c* and 14*d* of the vessel 10, but it is apparent that any other curvature which would perform the functions of reducing splashing and, in cooperation with the end walls 14*c* and 14*d*, turning liquid within the vessel back upon itself in a generally figure-eight pattern during agitation of the vessel 10 would suffice. The edges 13*a* and 13*b* of the curved metal sidewalls 11*a* and 11*b* (FIG. 5) are curved back upon themselves to form a safe noncutting edge. This treatment of the edges 13*a* and 13*b* is clearly illustrated in FIG. 7.

The centerline 12 of the arcuate bottom 11 and sidewalls 11*a* and 11*b* include two dimples 12*a* and 12*b* formed therein (FIGS. 5 and 7). The function of the indentations 12*a* and 12*b* is to enable one gripping the vessel 10 as diagrammatically shown in FIG. 3 during processing in a dark room to immediately discern where the transverse centerline 12 is located so that the developing vessel may be held level during agitation in the base tray 17 filled with water at constant temperature.

The bottom 11 and integral sidewalls 11*a* and 11*b* are preferably formed from a single rectangular piece of sheet steel or the like. The single sheet is supported in the illustrated arcuate configuration by end members 14*c* and 14*d* which are in generally parallel opposed relationship and complete the developing vessel 10. The end members 14*c* and 14*d* include end walls 15*a* and 15*b*, transverse flanges 15*c* and 15*d* and sealing lips 16*c* and 16*d*. The bight portions of sealing lips 16*c* and 16*d* each lie in a single plane and these planes effectively define the parallel spaced end surfaces of the processing vessel 10. Because of the planar nature of these extremities of the end members 14*c* and 14*d* and the arcuate shape thereof, the vessel 10 will rest on either planar end surface as shown in FIG. 4.

The transverse flanges 15*c* and 15 *d* are not uniform in size around the periphery of the end members 14*c* and 14*d* whereby the end walls 15*a* and 15*b* are not parallel to the end planes defined by the bights of sealing lips 16*c* and 16*d* but are contoured to attain the several unique functional characteristics already discussed herein. As shown in FIG. 8, the orientation of the end wall 15*a* (and end wall 15*b* as well) adjacent each sidewall 11*a* and 11 *b* is at a substantial acute angle to the end plane with the upper extension of the flange 15*c* being substantially greater than the lower extension thereof. Thus, liquid traveling along the bottom 11 toward the sidewall 11*a* during washing or violent agitation is urged inwardly toward the centerline 12 as the liquid is thrown around the sidewall 11*a* and cascaded downwardly and inwardly over and under the sensitive paper 18 resting on the vessel bottom 11.

The general pattern of liquid flow under these conditions is illustrated by the arrow 25 in FIG. 3. The fluid flow in the corners 19 of vessel 10 is diagrammatically illustrated in FIG. 5 by arrows 20.

In contrast to the substantial acute angle between the end wall 15*a* and the end plane of the member 14*c* adjacent the sidewalls 11*a* and 11*b*, at the center of the end wall, in the area designated 15*e* (FIG. 6), the end wall 15*a* is substantially parallel to the plane of the end member 14*c* as defined by the bight of sealing lips 16*c*. If desired, the end wall 15*a* may actually slope outwardly slightly at the center 15*e* so that the upper flange 15*c* would be slightly narrower than the lower flange 15*c*. The shaping of the end walls 15*a* and 15*b* as described, provides for efficient and automatic drainage of the processing vessel when it is placed on either of its end planes as shown in FIG. 4. The liquids within the vessel 10 thus flow freely from the effective pouring spouts 15*f* and 15*g*.

The end walls are not necessarily made of metal or the same heat conducting material as the curved bottom 11. Any material which is chemically inert and has suitable strength may be substituted therefor. Where temperature considerations are not critical, the entire vessel may be made of molded plastic. Any suitable means for connecting the end members 14*c* and 14*d* to the curved bottom 11 may be used, the only requirement being that the connection be fluid tight. For example, if both the end members and bottom are metal, a can sealer may be used. An epoxy cement or similar adhesive can be employed with various materials.

A second embodiment of vessel 40 is disclosed in FIG. 9, having a cylindrical or arcuate bottom 41 which tapers inwardly along its opposite ends as it curves to form sidewalls 42*a* and 42*b*. The end portions of the sidewalls 42*a* and 42*b* curve back upon themselves to define a semicircle having a diameter approximately equal to the radial height of end walls 43*c* and 43*d*, in the same manner as discussed above with reference to vessel 10 and FIGS. 1—3. In vessel 40, however, the end edges of the cylindrical bottom 41, taper to a nadir slightly above the lines 44*a* and 44*b* where the vessel reaches its maximum width, and then begins to taper outwardly at the distal portions of the bottom as it curves back upon itself to form the semicircular end portions of the sidewalls 42*a* and 42*b*. The ends of sidewalls 42*a* and 42*b* are again curved back upon themselves to form safe noncutting edges 45*a* and 45*b* (FIG. 9).

As shown in FIGS. 9 and 11, vessel 40 has both thumb indentations 46*a* and 46*b* and finger protuberances 47*a* and 47*b* disposed on the centerline of the arcuate bottom 41, to facilitate proper gripping of the vessel in a dark room.

End walls 43*c* and 43*d* of vessel 40 are shaped to conform to the taper of bottom 41, and consequently describe portions of conic sections, which in the preferred embodiment are welded directly to the bottom 41 and sidewalls 42*a* and 42*b*. FIG. 12 illustrates the orientation of end wall 43*c* with respect to bottom 41 and sidewall 42*a* at line 12—12 in FIG. 9, and discloses that each radial of end wall 43*c* is disposed at a substantial acute angle to the axis or directrix of bottom 41. The angular disposition of the end walls, cooperates with the tapered bottom 41 to cause liquid travelling along the bottom 41 towards the sidewalls 42*a* or 42*b* during washing of a print, to be cascaded downwardly and inwardly in a generally figure-eight pattern over and under the print. This angular disposition of the end walls also facilitates emptying the vessel when this embodiment is positioned as shown in FIG. 4. The inner circumferential edges 43*e* and 43*f* each lie in a single plane and define a supporting plane for the vessel when it is on end for drainage. This allows the vessel 40 to rest on either end edge 43*e* or 43*f* in such a manner that the vessel is tilted opening downward, the angle between the plane of the edges and the directrix of the bottom being between 70° and 80° so that complete draining of the vessel, including the corners thereof, is facilitated.

The preferred operational sequence in processing sensitized material using the processing apparatus 9 including vessel 10 will be described hereafter; however, it is understood that vessel 40 may be used alternatively. However, various changes and modifications may be made therein without departing from the spirit and scope of the disclosure as defined in the appended claims.

The sensitized material, such as exposed print **18** in FIG. **2** is first soaked in a tray of water such as base tray **17**. After reasonably saturation, the exposed print **18** is removed from the tray of water and placed face up in the bottom of vessel **10**. Next, the curved vessel **10** containing the print is floated in the base tray **17** which is filled with water **21** as shown in FIG. **2**. The water **21** is at the predetermined processing temperature when placed in tray **17** and thus tempers the metal bottom **11** and the contents of tray **10**. In one embodiment of the invention the temperature of the water is maintained by a hose connection **24** to the tray **17** and the continuous addition of water at the desired temperature to base tray **17**. A thermometer **22** is included for monitoring purposes. In another embodiment, a thermostatically controlled heater is incorporated in the base tray **17**. However, under most conditions, the thermal inertia of the system, including the body of water **21** will be sufficient to maintain the desired temperature during processing.

A very small amount of the properly diluted processing chemical is poured onto the face of the print in the vessel **10** and the vessel is gently agitated so that the print is uniformly immersed in the long narrow puddle (note the puddle of solution **23** in FIG. **2**), which inertially remains substantially stationary with respect to the temperature control tray **17** in that it always remains at the lowest point in the vessel. This agitation entails gentle rocking of the vessel **10** in the base **17** by alternately lifting one side of the vessel and then the other. Agitation may also be accomplished merely by pressing downwardly periodically on one side and permitting gravity to perform the rocking operation although greater care is then required to avoid possible inundation. As the vessel is always floating on the water as shown in FIG. **3**, an even gentle motion is attained. The motion ensures that a small amount of developing chemical, usually only about 2 ounces for an 8×10 print, will make even contact over the whole face of the print while maintaining the print and chemical at the constant temperature of the water in the base tray **17** by heat transfer through the bottom of the vessel **10**. The gentle motion also ensures that the vessel **10** will not be submerged into the pan of water on which it floats, thereby prematurely diluting the chemical therein. Though this part of the developing operation is usually carried on in the dark, the dimples in the sidewalls **11***a* and **11***b* on the centerline **12** of the vessel **10** enable one to grasp the vessel in its center and thereby easily hold it level.

After a proper predetermined time, the vessel **10** is lifted from tempering tray **17** and the developing chemical **23** is drained therefrom. Depending upon the quality of the work being done, the chemical **23** may either be disposed of or preserved for reuse. If the chemical is to be reused, the vessel **10** is removed from base **17** and placed on its end so that the chemical is drained from the funnel shaped end wall **14***c* or **14***d* at point **15***e* over funnel spout **15***f* or **15***g* into a reagent bottle. If the chemical **23** is not preserved for reuse, it is desirable to immediately add water to the vessel **10** and stand the vessel on end wall **14***c* or **14***d* so that the diluted chemical flows directly into a drain. In either event, the wet print adheres to the curved bottom **11** of the vessel **10**, even though the vessel is turned on its end wall **14***c* or **14***d*.

The drained vessel **10** with print **18** in place is then dipped into the second larger tray of water or another source of tempered water and an amount of water much larger than the amount of developer just drained is picked up. If the ratio of fresh water in the tray **17** to chemical in the developing vessel is sufficiently large so that the wash water will not become overly tainted by the chemical, the vessel need not be drained, but instead may be submerged in the tray **17** immediately after the processing agitation.

The processing vessel **10** is then placed on a flat surface and rocked for the washing operation. In this washing operation, the agitation is substantially more violent than during processing. The curved end walls **15***a* and **15***b* and sidewalls **11***a* and **11***b* of the vessel **10** cause the water to be cascaded back and forth over and under the print. The wash water is thrown from the corners **19** of the vessel towards the center **12** of the vessel **10** and this wave action thoroughly washes the face and back of the print. As the water cascades from the corners **19** towards the center **12** of the vessel, the water is forced under the print causing the print to undulate during further agitation. After the face and back of the print are thoroughly washed the vessel **10** is again placed on its end member **14***c* or **14***d*, drained, and then floated in the base tray **17** filled with water **21** at constant temperature.

A small amount of the next chemical solution used in developing a print is then poured into the vessel **10** and the steps of the process described above are repeated. In like manner, the remaining chemicals needed to develop a print are added in sequence with intermediate washing. The use of particular chemicals for developing, fixing, bleaching and the like, forms no part of the invention and thus particular chemicals have not been specified. Any chemicals which would allow the desired process to be successfully completed my be used. This may include film processing in black and white or color.

As a last step, the print is removed from the vessel **10** and dried. After the developing process is completed and all fluids drained from vessel **10**, the wet developed print **18** has a tendency to adhere to the bottom **11** of vessel **10**. To assist in loosening the developed print **18**, a print removing bail **26** (FIG. **1***a*) is provided. Bail **26** comprises a lower piece adapted to rest longitudinally on the bottom **11** of the vessel. Transverse arms **28** are connected end to end with the lower piece **27**, said transverse arms connected at their opposite ends to short upper pieces **29**. Said transverse arms **28** may be either straight or curved as desired. The upper pieces **29** are parallel to said lower piece and adapted to be removably inserted in the cylindrical bead **13***a* or **13***b* formed by the curvature of the sidewalls **11***a*, **11***b*, back upon themselves to form a safe noncutting edge. In proper use, prior to insertion of the material to be developed, the ends of the short upper pieces **29** of the bail **26** are snapped into bead **13***a* or **13***b*, and lower piece **27** is rotated until it rests contiguously with the bottom **11** of the vessel **10**. In the preferred embodiment of the present invention bail **26** extends to the center of the bottom **11**; however, it is clear that the size of the bail may be greater or smaller if desired. After insertion of the print **18** to be developed, therefore, the lower piece **27** rests between the bottom **11** and the print **18** during all stages of the developing process. After completion of the last developing step, and final draining of all fluid from the tray, transverse arm **28** is grasped and bail **26** is rotated around the axis of bead **13***a* or **13***b*, so that the print **18** is raised from the bottom of the vessel and may be easily removed.

A second embodiment of a print removing tool is shown in FIG. **1***b*. Tool **30** comprises a handle **31**, a curved neck **32** adapted to releasably clasp an end wall **14***c* or **14***d*, and a loosening foot **33** adapted to rest flatly on the bottom **11** of vessel **10**. In proper use, tool **30** is clasped in position on either end wall **14***c* or **14***d* (FIG. **1**) prior to insertion of the material to be developed into the vessel **10**. The loosening foot **33** of tool **30**, therefore, rests between the bottom **11** and the print **18** during all stages of the developing process. After completion of the last developing step, and final draining of all fluid from the tray, handle **31** is grasped and moved radially away from the bottom **11** of vessel **10**, thereby raising a corner of the developed print **18** and allowing easy removal of the developed print from the processing vessel.

FIGS. **10** and **11** disclose a third embodiment of a print removing tool, which may also be used to support prints during draining. In FIG. **11**, a bail **48** having shaped arms **49** is shown with its lower portion **50** at rest on the bottom **41** of a developing vessel. It is preferred that the curved arms **49** be sufficiently long to permit the lower portion **50** to rest on about the middle axis of the bottom **41**. The curvature of the arms of this bail provides a space **51** between arm **49** and the edge **43***e* of end wall **43***c* to allow easy gripping of the bail when it is desired to rotate the bail to remove a print from the

bottom of the vessel, or when it is desired to raise the bail slightly during processing to ensure fluid flow beneath the print. FIG. **10** shows the bail **48**, including a print **52**, in the draining position. Arms **49** of the bail are curved to generally conform to a portion of sidewall **42***a*, so that when the bail is rotated to the draining position, it is firmly supported by sidewall **42***a*.

While several embodiments of the invention have been described in detail, it will be apparent that certain modifications and variations may be made without departing from the spirit of the invention. For example, in the first embodiment, the radius of the cylindrical bottom **11** is approximately 2.5 times the height of the end walls **14***c* and **14***d* and, consequently, about five times the radius of the sidewalls **11***a* and **11***b*. It has been discovered that this ratio provides the optimum cascade effect during the agitation concomitant to the washing operation with optimum wall height to minimize spilling. However, this ratio may be varied somewhat without losing the benefits of the invention, and specifically the height of the end wall may be made one-third of the bottom radius with equal cascading but somewhat increased susceptibility to spillage. These values may be varied from the stated ratio by as much as plus or minus 20 percent.

Furthermore, the size of the bottom **11**, of the first embodiment, and consequently, all of the dimensions of the apparatus **9**, is determined by the material to be processed. If 8×10 inch photographic prints are to be processed, it is desirable that the minimum dimension between the end walls **14***c* and **14***d* be somewhat in excess of 10 inches, and that the arcuate extension of bottom **11** be such that the print will cover approximately 120°. Thus, an 8×10 vessel would have a radius for the arcuate bottom of approximately 3.75 inches and an end wall height of approximately 1.2 to 1.5 inches. If 30×40 inch photographic prints are to be processed, it is desirable that the minimum dimension between the end walls **14***c* and **14***d* be somewhat in excess of 40 inches, and that the arcuate extension of bottom **11** be such that the print will cover approximately 120°. Thus a 30× 40 vessel would have a radius for the arcuate bottom of approximately 14.25 inches and an end wall height of approximately 4.75 to 5.7 inches. It is understood that these dimensions will vary in like manner for vessels adapted to be used with prints of other maximum sizes. The dimensions of the base tray **17** are preferably only slightly greater than those of the arcuate vessel **10**.

With respect to the second embodiment **40**, it has been found that successful treatment of sensitized material may also be obtained by placing the print to be developed in the developing vessel so that its length extends around the cylindrical bottom **41** towards sidewalls **42***a* and **42***b* which actually optimizes the counter area covered by the vessel which is almost square. Since the dimensions of the vessel are determined by the material to be processed, appropriate changes in the dimensions of the vessel may, of course, be made in light of the above discussion. Where thermal considerations are not important such as in handling certain newer materials, it will be possible to mold the entire vessel in a durable moldable plastic material such as a polypropylene copolymer. The shapes of the bottom and sidewalls are generally portions of right circular cylinders smoothly joined together to provide the cascade figure-eight action described above.

In view of the foregoing, it will be seen that a new and improved photographic processing apparatus and method of processing sensitized material have been provided which are simple in form and simple and efficient in operation. While particular embodiments of the invention have been shown, it is to be understood that the invention is not limited thereto since many minor modifications may be made which would be in keeping with the spirit and intent of this invention; and it is, therefore, contemplated by the appended claims to cover any such modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. In processing apparatus for processing a sheet of sensitive material in fluids, the combination comprising a generally cylindrical bottom wall having a substantial radius of curvature, generally cylindrical sidewalls extending integrally and smoothly from said bottom and curved to overlie partially said bottom wall, said sidewalls having a curvature with the radius thereof substantially less then the curvature of said bottom wall and said bottom and sidewalls defining a fluid flow path which is smooth and free of inflections, and end wall members, one secured to the edges of said bottom and sidewalls at each end thereof to define a vessel, said bottom wall having a radius which is in the range between about 2.5 and about three times the radius of said sidewalls to provide smooth flow of fluid in said vessel when said vessel is rotated relative to its longitudinal axis.

2. The processing apparatus of claim **1** wherein said end wall members include end walls shaped to produce inwardly directed fluid flow therealong when said vessel is rocked on its arcuate bottom.

3. The processing apparatus of claim **1** wherein said bottom has surface deformations centrally located between said end wall members to provide a tactile indication of the center of the vessel.

4. In processing apparatus for processing a sheet of sensitive material in fluids, the combination comprising a generally cylindrical bottom, cylindrical sidewalls extending integrally from said bottom and partially overlying said bottom, and arcuate end wall members secured to the edges of said bottom and sidewalls to define a liquid-tight vessel, said end wall members being spaced apart a predetermined distance along the central length of said bottom and tapering inwardly along the edges of said bottom whereby said end wall members are spaced apart along distal portions of said bottom a distance substantially less than said predetermined distance, said end wall members being shaped to produce inwardly directed fluid flow therealong when said vessel is rocked on its arcuate bottom, said end wall members further defining end planes on which said vessel may rest, said end wall members being shaped to form funnel means to discharge said fluid chemicals toward the center of said arcuate end wall members when said vessel is resting on said end wall embers.

5. The processing apparatus of claim **4** wherein said end wall members include end wall means defining segments of conic sections, the inner arcuate edges thereof being such that when said vessel is rested thereon, said vessel is tilted from the vertical for complete draining.

6. The apparatus as recited in claim **4** wherein the arcuate curvature of the bottom describes an arc of between 60° and 180° on the circumference of a circle.

7. The apparatus as recited in claim **4** wherein the means associated with at least one of the end walls to facilitate pouring of liquid from the vessel comprises an outward curvature of the end wall near the upper edge thereof at approximately the midpoint between said sidewalls.

8. The apparatus as recited in claim **6** wherein the length of the arc of the bottom is substantially the width of the print to be processed therein plus 20°.

9. The apparatus as recited in claim **6** wherein the length of the arc of the bottom is substantially the length of the print to be processed therein plus 20°.

10. The apparatus as recited in claim **8** wherein the radius of the circle upon whose circumference the arc is described is approximately two to three times the height of the end wall of the vessel.

11. The apparatus recited in claim **10** wherein the said sidewalls are substantially semicylindrical and have a diameter substantially equal to the height of the end walls.

12. The apparatus as recited in claim **1** wherein said bottom and sidewalls are formed of a single substantially rectangular sheet of metal and the connection of each end wall to the arcuate bottom and sidewalls defines a plane generally perpendicular to the axis of the bottom of the vessel, said connection adapted to serve as a base for the vessel during draining.

13. The apparatus as recited in claim 12 wherein said end walls are made of a nonmetallic substance.

14. The apparatus as recited in claim 12, including a base comprising an open tray adapted to hold a tempering fluid and having dimensions corresponding to said vessel whereby said vessel rockably floatable therein.

15. The apparatus as recited in claim 14, including a means for mechanically positioning a developed print for easy removal from the bottom of the arcuate vessel.

16. The apparatus as recited in claim 15, wherein the means for mechanically positioning a developed print for easy removal from the bottom of the arcuate vessel is a metal bail removably attached and pivotally mounted on the vessel.

17. The apparatus as recited in claim 15, wherein the means for mechanically positioning a developed print for easy removal from the bottom of the arcuate vessel is a metal foot and clamp, said clamp removably attached to one end of the vessel, said foot disposed between the bottom of the vessel and the print to be removed.

18. The apparatus as recited in claim 4 wherein said bottom and sidewalls are formed of a single metal sheet and said end wall members define segments of conic sections which tiltingly support the vessel when placed on an end.

19. The processing apparatus of claim 1 wherein said end walls have a radial height between about one-third and about four-tenths of the bottom radius.

20. In processing apparatus for processing a sheet of sensitive material in fluids, the combination comprising a generally cylindrical bottom wall having a substantial radius of curvature, generally cylindrical sidewalls extending integrally and smoothly from said bottom and curved to overlie partially said bottom wall, said sidewalls having a curvature with the radius thereof substantially less than the curvature of said bottom wall and said bottom and side walls defining a fluid flow path which is smooth and free of inflections, and end wall members, one secured to the edges of said bottom and sidewalls at each end thereof to define a vessel, said bottom wall extending over an arc in the range between about 105° and about 180° to provide smooth flow of fluid in said vessel when said vessel is rotated relative to its longitudinal axis.

21. The processing apparatus of claim 20 wherein said bottom extends over an arc of about 140°.

22. The processing apparatus of claim 21 wherein said sidewalls are approximately semicylindrical.

23. The processing apparatus of claim 1 wherein said bottom wall comprises a sector of about one-third of a cylinder.