Aug. 24, 1948. D. C. BROWN ET AL 2,447,684

APPARATUS FOR PROCESSING PHOTOGRAPHIC ARTICLES

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FIG. 1.

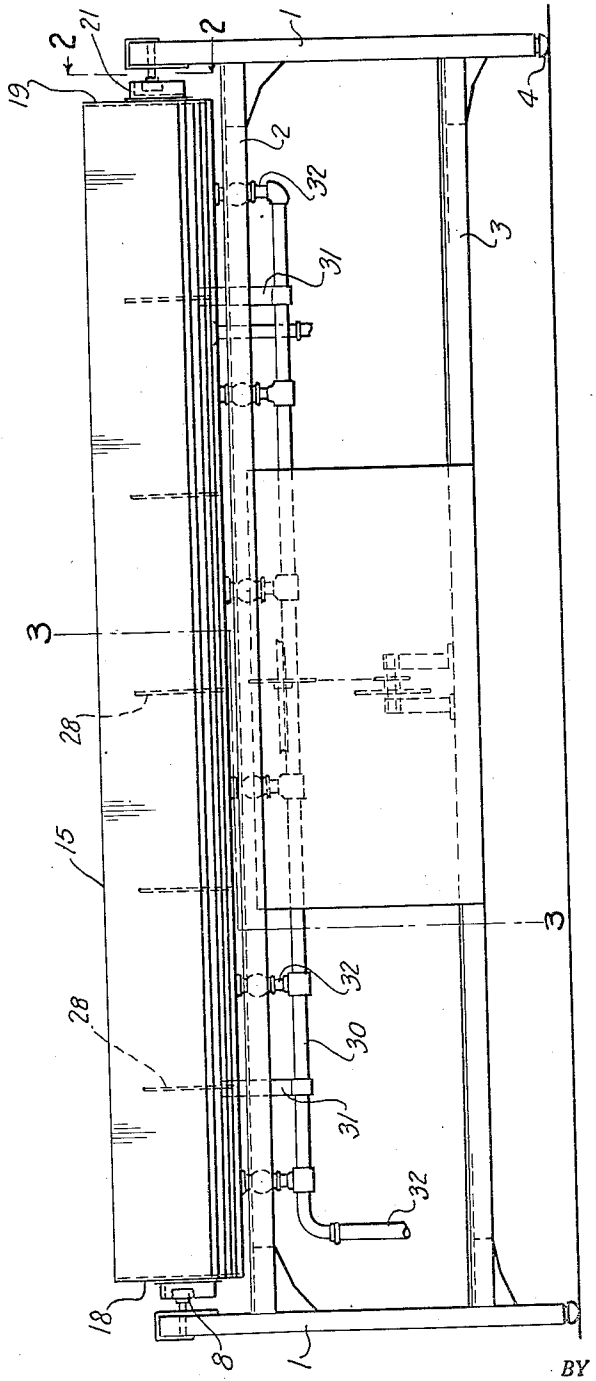


FIG. 11.

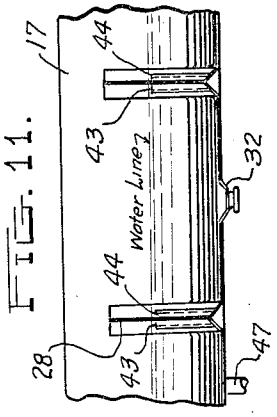
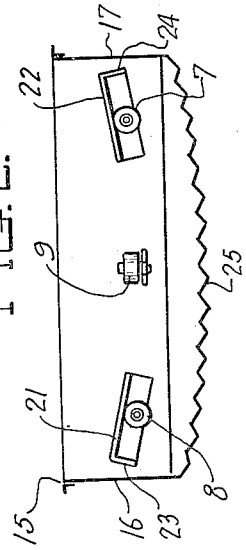


FIG. 2.



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FIG. 3.

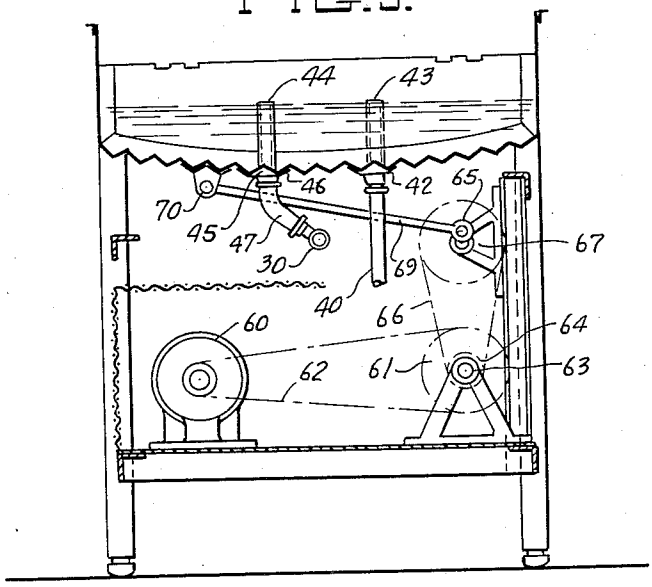
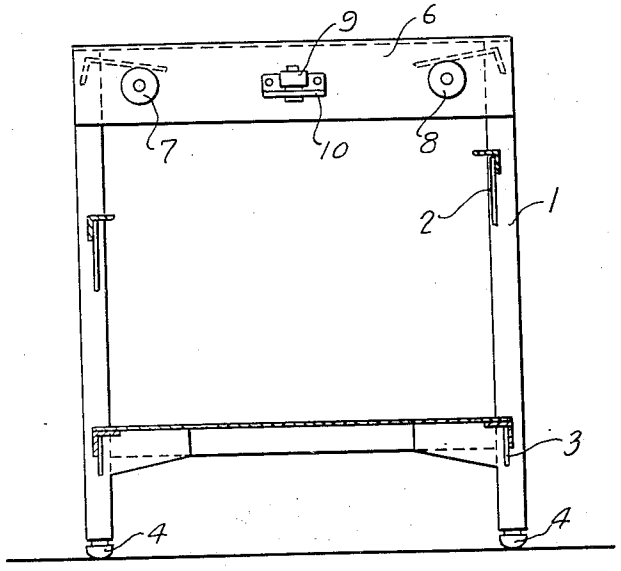


FIG. 4.



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FIG. 5.

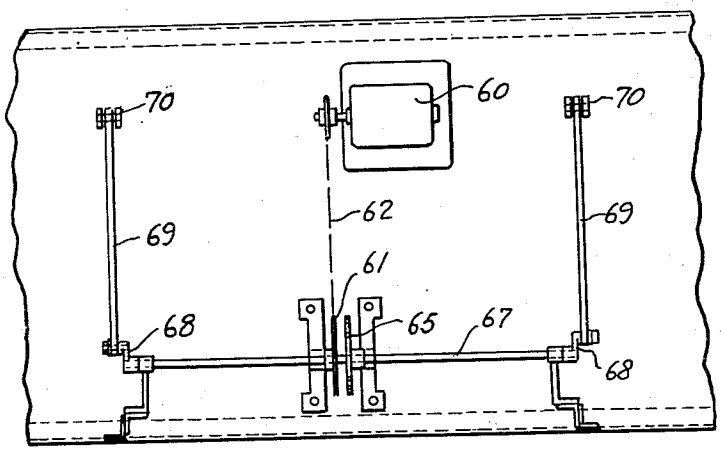


FIG. 6.

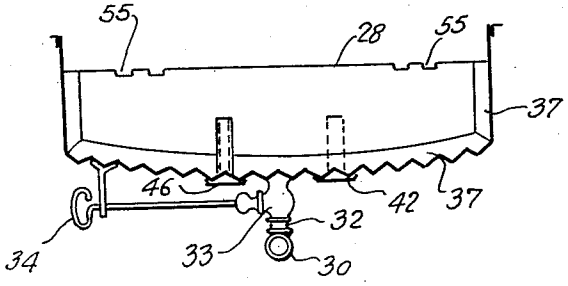
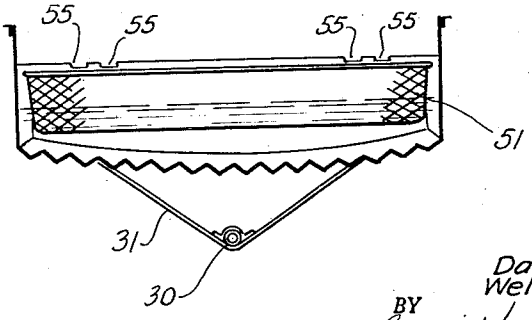


FIG. 7.



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FIG. 8.

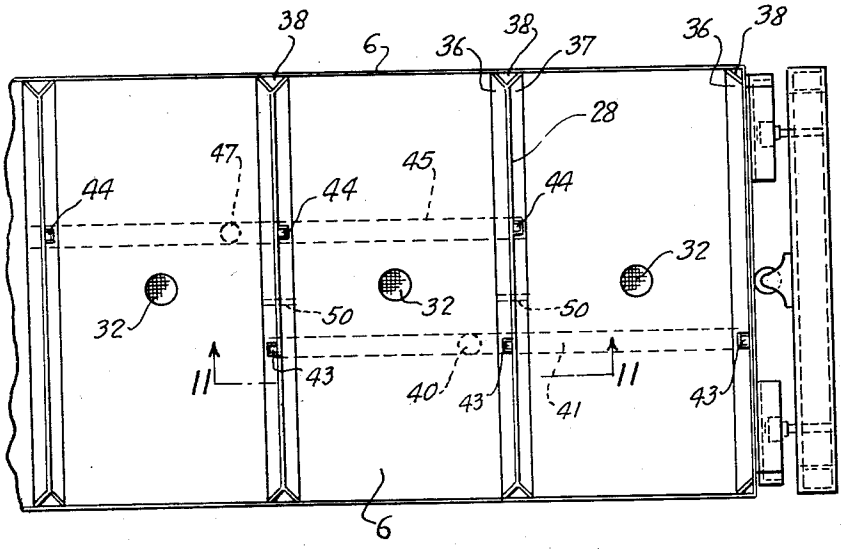


FIG. 9.

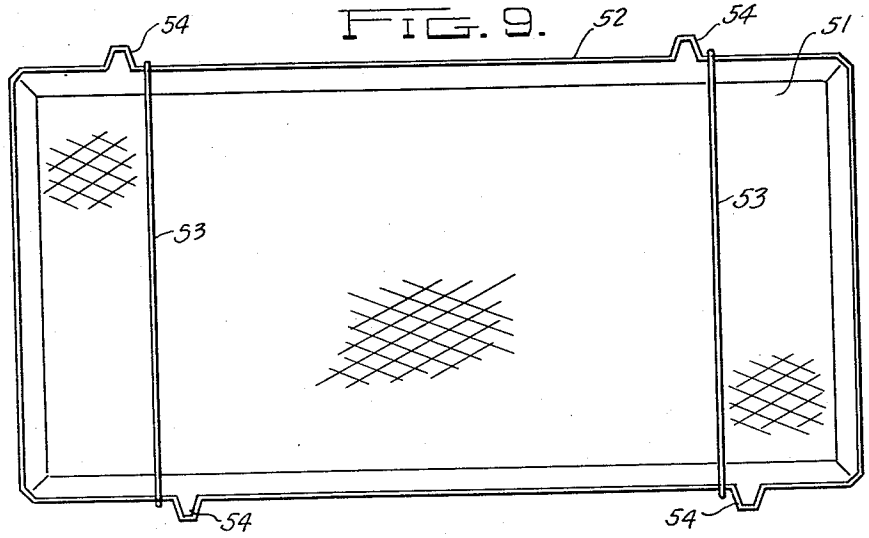
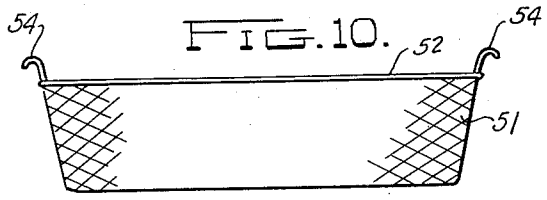


FIG. 10.



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UNITED STATES PATENT OFFICE

2,447,684

APPARATUS FOR PROCESSING PHOTOGRAPHIC ARTICLES

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Application July 26, 1945, Serial No. 607,178

2 Claims. (Cl. 95—89)

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This invention has to do with an apparatus for processing sensitized photographic articles and more particularly to the developing of photographic prints. Still further, the invention relates to the provision of an improved apparatus for developing prints on a commercial basis.

As is well known to those versed in the art the prints are subjected to a developing solution and are then subjected to what is called a shortstop solution which stops further development. It has been proposed that the prints be handled in batches with the prints being moved from one batch to another and that the liquid of the baths, whether the same be a developing solution or shortstop solution or a water bath, be more or less agitated.

The principal object of this invention is to provide an improved apparatus for the handling of work pieces through the desired series of baths. In accordance with the invention, a rather elongated tank is divided into the requisite number of compartments or divisions for containing the solutions or water baths and one of the primary objects of the invention is to provide an improved arrangement for causing movement of the liquid constituting the baths. To this end, a bodily movement is given to the tank and it is so mounted that it may be given such bodily movement. Usually, the operator or operators work along the side of the elongated tank and the movement given to the tank in accordance with this invention provides for a minimum of lateral displacement of the tank so as to minimize interference with the operators. Further objects of the invention include a tank division structure whereby the tank is divided into compartments or sections and wherein the structure of the tank is such that portions thereof are employed for conducting liquid to and from some of the tanks. The partition or division structure is also arranged to receive baskets for containing batches of prints and the baskets and supports therefor are so arranged that adjoining baskets do not interfere with each other.

While a minimum of lateral movement is given to the tank for causing movement of the solution and water baths, an adequate movement or agitation of the liquids is provided, and in this connection the bottom of the tank is preferably formed with a roughened or corrugated structure which has a controlling action upon the liquids.

Other objects will become apparent as the following detailed description is followed in conjunction with the accompanying drawings which

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show one form of apparatus for carrying out the invention.

Fig. 1 is a side elevational view of an apparatus constructed in accordance with the invention.

Fig. 2 is a view partly in section taken substantially on line 2—2 of Fig. 1 showing the tank mounting.

Fig. 3 is a sectional view taken substantially on the offset section line 3—3 of Fig. 1 showing some of the tank structure and driving mechanism therefor.

Fig. 4 is a view looking at the inside end portion of the frame structure and illustrating the mounting means for the tank.

Fig. 5 is a plan view illustrating the operating mechanism for the tank.

Fig. 6 is a sectional view taken through the tank showing some of the tank structure.

Fig. 7 is a sectional view similar to Fig. 6, showing a basket in the tank.

Fig. 8 is a top plan view of a part of the tank structure showing some of the liquid conduits.

Fig. 9 is an enlarged plan view of one of the baskets for holding prints.

Fig. 10 is an end view of the basket.

Fig. 11 is a sectional view taken substantially on line 11—11 of Fig. 8 showing some of the detailed structure.

It will be seen by reference to Fig. 1 that the frame or support for the apparatus comprises and supporting frames 1 and lengthwise frame members 2 and 3. The end supports are provided with ground engaging feet 4 which are preferably adjustable so that the frame structure may be placed in a level condition. The end frame structure, as will be appreciated by reference to Fig. 4, comprises vertical supports as illustrated.

The tank is mounted upon and carried by the end frame structures 1 and for this purpose each end frame member is provided with supporting rollers. As shown in Fig. 4, the end frame member has a cross frame piece 6 which carries spaced rollers 7 and 8 mounted on horizontal axes with the axes extending lengthwise of the frame. These rollers are freely mounted so they can rotate or oscillate on their axes. Each end frame structure 1 is also provided with means for engaging the end of the tank so as to hold it against endwise displacement and this takes the form of an engaging device, shown in Fig. 4 as being in the form of a roller 9 mounted on a bracket 10.

The tank is generally illustrated at 15 having side walls 16 and 17, as shown in Fig. 2, and end walls 18 and 19. Fastened to the end walls are two brackets illustrated in Fig. 2 at 21 and 22.

These brackets are disposed in an inclined manner and rest upon the rollers 7 and 8. Actually the brackets may be of angle construction with one web welded to the end of the tank and with one web serving as a support or track and resting upon a roller. The brackets incline downwardly toward the center line of the tank and it will be appreciated that when the tank is placed upon the rollers in this fashion that the tank will gravitate to a normal central position. The outer portions of the brackets may be closed, as at 23 and 24, for safety purposes, thus preventing the tank from rolling laterally far enough for a bracket to slip off its supporting rollers. The roller 9 engages the end of the tank, it being understood that there is one such roller at each end. As will be noted by reference to Fig. 2 the supporting rollers 7 and 8 and brackets are positioned in proximity to the opposite side walls of the tank. The thrust roller 9 may be positioned substantially centrally of the tank although this member may be otherwise positioned and may take various forms other than a roller.

The tank structure, in addition to the side and end walls, as above described, has a bottom wall 25 which is preferably of a roughened or corrugated formation, as illustrated, with the corrugated formations running lengthwise. The tank structure is divided into a suitable number of compartments or sections by partitions 26, and as shown in Fig. 1, there are six divisions of the tank. Mounted on the underside of the tank is a drain pipe 30, which may be fastened to the tank by suitable brackets 31 and which connects to a flexible hose 32 and which may be led to a suitable receptacle or sewer for waste products. The drain pipe 30 is connected to each of the tank divisions as illustrated at 32 and each outlet is valve controlled by a valve 33 operable by a handle 34 as will be seen by reference to Fig. 6.

In those divisions or compartments where the prints are given a water wash, it is desirable to maintain a fresh water condition and, to this end, means are provided for flowing fresh water into those tanks, maintaining a certain level therein, and constantly discharging water from the tanks. In the structure shown in the drawings, three compartments are thus provided with water circulating means and this means is built into the tank structure. As shown in Fig. 8 and in Fig. 11, each partition takes the form of a metal plate with a base and edge structure of reenforced design. The edge structure comprises edge strips 36 and 37 disposed angularly with respect to each other thereby providing a closed space 38. The outer edges of the strip are welded to the tank walls and the division plates 28 are welded to the apex or point of intersection of the strips 36 and 38. There is a conduit 40 (Fig. 3), part of which may be a flexible hose, for conducting fresh water to the three compartments illustrated in Fig. 8 and a manifold is provided, as shown at 41, by a plate 42 secured over and disposed in sealed relationship with one of the recessed portions of the corrugated tank bottom. This manifold is, of course, closed at its ends and it connects into the spaces 38 at the base of two of the intervening partitions and the end of the tank, as shown in Fig. 8. Connecting into the spaces 38 are risers 43 which extend upwardly into the three compartments as illustrated in Fig. 11. Thus, fresh water supplied through the conduit 40 enters the manifold 41 and flows through the several risers 43 into the three tanks illustrated in Fig. 8.

There are similar risers in the three tanks shown at 44, which connect into a manifold 45 formed by a covering plate 46 on the bottom of one of the recesses of the corrugated form shown in Fig. 3 and the manifold 45 is connected to the waste pipe 30 by a suitable conduit 47. Thus, water entering any one of the compartments through a riser 43 displaces used water through the outlet riser 44 so that a continuous flow of water through the compartment is provided. A good transfer of liquid is afforded because the risers 43 and 44 are on opposite sides of the compartment. In this manner the entire compartment is unobstructed. It will, of course, be understood that where a portion of one of the passages 38 is used, both for the supply of fresh water and for the discharge of waste water, that the passage 38 is divided or separated as by means of partitions 50.

The work is to be placed in baskets or other removable foraminous containers and a basket structure is shown in Figs. 9 and 10. The basket is generally illustrated at 51 with an upper edging 52 and cross braces 53 by which they may be handled and extending from the upper edge of each basket are overhanging brackets or supporting hooks 54. The upper edge of each partition is provided with notches 55, there being four notches in each partition as shown in Fig. 7. It will be noted by reference to Fig. 9, that the brackets 54 on one side of the basket are offset with respect to the baskets on the opposite side and each of the several baskets are of the same construction. There are four recesses 55 in each partition for receiving the brackets 54. With this offset arrangement the baskets may be reversed end for end without changing the relative positions of the brackets. Therefore, there can be no interference of the brackets of one basket with the brackets of the next adjoining basket.

The mechanism for moving the tank to promote movement of the liquid is arranged for providing lateral movement of the tank on the supporting rollers 7 and 8. One form of mechanism is illustrated in Figs. 3 and 5 where it will be seen that there is a suitable driving motor 60 for driving a sprocket 61 by means of a suitable belt or chain 62, the sprocket 61 being mounted on shaft 63, while another sprocket 64 operates a sprocket 65 through a suitable belt or chain 66 to thus revolve a crank shaft 67. This structure is principally for the reduction of speed. The crank shaft has crank throws 68 connected to which are pitmans or connecting rods 69 which connect to the tank as at 70. The extent of the throw of the crank is calculated with respect to the extent of lateral movement permitted by the brackets 21 and 22.

In the operation of the apparatus, suitable liquids or solutions for treating photographic prints are placed in some compartments and for purposes of illustration the so-called shortstop solution may be placed in the compartment positioned at the left, as Fig. 1 is viewed, while the next two compartments may contain fixing solutions. The three compartments at the right hand end of the tank, as Fig. 1 is viewed, may be supplied with suitable washing liquids or water. Each compartment will be provided with a basket and the prints are placed therein, the level of the liquid being above the bottom of the baskets as shown in Fig. 7. The baskets are progressively shifted from one compartment to another in that after the prints have been in the first compartment for the requisite time period, that basket with

the prints therein is shifted to the second compartment and then the third compartment, and so on, through all of the compartments. Each compartment may contain a basket with prints therein and as the basket at the right hand end of the tank, as Fig. 1 is viewed, is removed, the remaining five baskets may be shifted, with another basket containing new work placed in the compartment of the left hand end of the tank. Of course, the time period that a batch of work is maintained in a certain compartment may not necessarily be the same time period that the same work is maintained in another compartment.

As the work is moved progressively through the several baths the liquid of the baths is subjected to movement or agitation by the movement bodily of the tank. The tank is given an oscillatory movement in the sense that the point of connection **10** oscillates. As the tank is moved, for example, from left to right as Fig. 2 is viewed, the right hand side defined by the wall **17** is elevated as the inclined bracket **22** rides on the roller **7**. At the same time the left hand side defined by the wall **16** is lowered as the bracket **21** rides in a somewhat downward direction on the roller **8**. The tank is in a central position as shown in Fig. 2. Then as the movement is reversed, the left hand side of the tank is elevated and the right hand end of the tank is lowered. The rate of oscillation may be selected to provide the desired liquid agitation and the rate may be about three complete cycles per minute. This action washes the liquid back and forth and causes it to contact with the surfaces of the work and to flow in between work pieces which lie in face to face relationship.

Now, it will be observed that the effective range of lateral movement at the top of the edge of the tank is minimized over what it would be if the tank were mounted on a pivot and be given an ordinary or pivotal swinging action. Considering Fig. 2; as the tank is moved to the right, the upper edge of wall **17** is slightly elevated and yet it has a component of movement to the left due to the lowering of the opposite side of the tank. Thus, an attendant or operator working alongside the tank is not confronted with the difficulty of having the tank moving toward and away from the attendant or operator a substantial distance.

Moreover, this action gives the liquid a sort of rolling action and the corrugated form of the bottom breaks up the flow and reduces the tendency of the water to pile up along the edges of the tank when there is a reversal of movement.

We claim:

1. An apparatus for the treating of work pieces such as photographic prints comprising, an elongated tank having end walls and divided transversely into compartments for containing liquid constituting baths for the work pieces, a support adjacent each end wall, means mounting the tank on the supports including cooperating transversely extending track devices and rollers, some of which are on the ends of the tank and some of which are on the supports and means for oscillating the tank transversely with the rollers functioning on the track devices to agitate the liquid of the baths, there being two track devices at each end of the tank with the track devices spaced laterally from the longitudinal center of the tank and both inclined downwardly toward the center of the tank so that in a stroke of oscillatory movement the leading side edge of the tank is elevated and the trailing side edge of the tank is lowered.

2. An apparatus for treating work pieces such as photographic prints comprising, an elongated tank, the bottom of the tank being corrugated lengthwise, a plurality of partitions in the tank each constituted by a plate and by spaced edge members secured to the inside of the tank with the edge members providing passageways therebetween, means for supplying liquid, means for draining liquid, a plate secured to the underside of the tank over at least one concavity of corrugation and providing a manifold for the supplied liquid, a second plate secured over at least one of the concavities of the corrugated bottom of the tank and providing a manifold for waste liquid, said manifolds connecting into passageways formed by the edge portions of the partitions and risers extending upwardly into the compartments adjacent the partitions and connecting into the passages formed by the partitions for conveying liquid into and out of the compartments.

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