

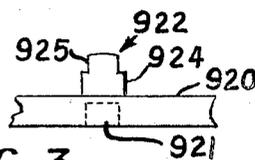
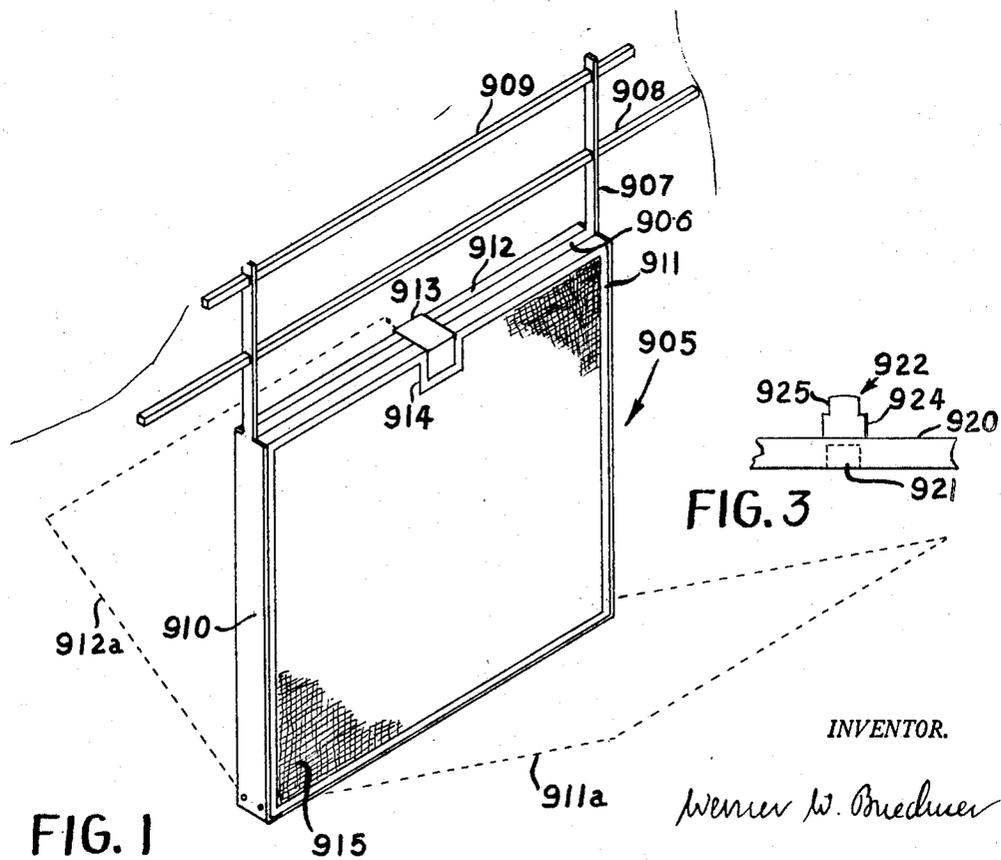
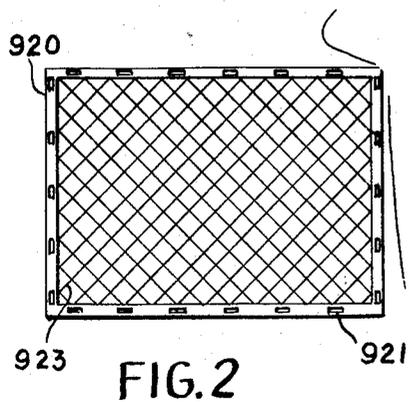
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3,503,319

CARRIER FOR THE WET TREATMENT OF PHOTOGRAPHIC MATERIALS

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CARRIER FOR THE WET TREATMENT OF PHOTOGRAPHIC MATERIALS

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Continuation-in-part of application Ser. No. 649,059, June 26, 1967. This application Nov. 24, 1967, Ser. No. 695,815

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2 Claims

ABSTRACT OF THE DISCLOSURE

A photographic sheet material holder for processing sheet material having at least two compartments in which each compartment is provided with a narrow bottom, narrow vertical end members, and two perforate vertical major side members. One of the major side members forms a common wall for two adjacent compartments while the outer major side member of each compartment is pivotally mounted to permit opening and closing of the compartment. The holder also has a locking device for maintaining the major side members in the closed position and support arms for suspending the holder in a processing tank.

This application is a continuation-in-part of my copending application Ser. No. 649,059, filed June 26, 1967 now Patent No. 3,405,628 and entitled Carrier for Photographic Materials.

This invention relates to novel carrier means for the wet treatment of photographic materials and more specifically to carriers for the wet treatment of photographic sheet materials.

In the tank development of photographic sheet materials, and especially of photographic color printing and enlarging paper, where the sheets are inserted into the tanks in essentially vertical orientation, it is often not possible to prevent that the sheets touch each other or the walls of the tank with the result of undertreatment of parts of the surface of the sheet material. To overcome this problem, treating baskets are often used in this type of operation. The treating baskets are divided by netting material into a number of compartments for the reception of the sheets. To achieve the highest possible treating capacity in a tank of given size, it is desirable to make the compartments as narrow as possible, with the result that it is often difficult, if not impossible, to remove the sheets from the compartments after completion of the treatment, particularly, if smaller than full size sheets are used.

It is therefore an object of the present invention to provide improved carrier means for the wet treatment of photographic sheet materials in liquid treating media.

It is another object of the invention to provide carrier means for photographic sheets, which permit ready insertion and removal of the sheets.

It is still another object of the invention to provide carrier means for photographic sheet materials, which are particularly adapted for use in very narrow upright treating vessels, e.g. of the kind described and claimed in my copending application Ser. No. 342,198, now Patent No. 3,362,315.

Other objects will become apparent from the following description of the invention and from the attached drawings.

The objects of the present invention are achieved by a basket-type carrier having at least one narrow compartment for the reception of at least one sheet of photographic material, wherein each compartment is formed

of a bottom portion, two narrow end wall portions, preferably a top portion and two major perforate side wall members, and wherein at least one of the side wall members in each of the compartments is adapted to be removed or pivotally opened, so as to facilitate insertion into and removal of the sheet from the compartments of the carrier.

The narrow end wall portions are preferably also perforated, the same as the bottom portion. The major side wall members are preferably formed of netting material of the conventional or specifically adapted type or made up of criss-crossing funicular or filamentary materials.

For use in narrow or tightly fitted tanks or vessels, the carriers of the invention may be provided with guide means, e.g. of the type disclosed in my Patent 3,236,649 and in my copending application Ser. No. 649,059. For equipment providing automatic reciprocating mechanical agitation, the roller type guide means are most preferred.

The preferred carrier of the present invention is especially useful for and adapted for the wet treatment of limp photographic sheet materials, and particularly of paper backed sheet materials, though any of the embodiments of the carrier taught herein is equally useful for the treatment of other photographic sheet materials.

The various embodiments of the carrier may be designed, as stated, with or without the said guide means. As is readily apparent, the guide means provide the greatest advantages, if the carrier is to be used in the narrow upright treating and wash vessels mentioned herein, particularly if the thickness of the carrier is only slightly less than the width of the treating or wash vessels, in which the carrier is to be used. Vertical ribs provided along the vertical ends of the carrier, adapted to slideably engage in corresponding grooves provided in the vertical end walls of the tank or upright treating and/or wash vessels, in which the carrier is to be used, were found to be excellently suited to serve as guide means. Instead of ribs, at least one and preferably a multiplicity of protrusion-like guides provided on each of the vertical ends of the carrier may be used with similarly good advantage. Alternatively, the vertical grooves may be provided in the vertical edges of the carrier and the said vertical ribs or the protrusions or other suitable guides may be provided in the end walls of the tanks or upright vessels, such that they engage slideably in the said grooves in the carrier when it is inserted in the tanks or vessels.

The carriers of the present invention are advantageously provided with auxiliary agitating support means adapted to permit automatic mechanical actuation of the carrier while it is contained in the tanks or in the treating or washing vessels. The cross-bar type of agitation support was found to be particularly beneficial, though any of the other types of agitation support described hereinafter or derived therefrom, may likewise be used with great benefit, if the mechanical agitating means are suitably adjusted to the design and construction of the agitation support used in a particular carrier.

The agitation support may directly serve as the means, by which the carrier is forwarded from step to step or from vessel to vessel, respectively, by hand or by automatic forwarding means. It was however found to be more advantageous and convenient, to provide in the carrier of the invention a separate and independent forwarding support, if automatic forwarding is desired. The cross-bar type forwarding support which is advantageously mounted above the agitation support, was found to be most readily adapted to be used with suitable mechanical forwarding means provided in or at the bath in which the multistep treatment is advantageously carried out.

Further embodiments and modifications of the carrier

of the present invention are described in the following detailed description of the invention and in the accompanying drawings, wherein

FIG. 1 illustrates an isometric view of the pivotable multisheet carrier of the invention.

FIG. 2 depicts a top plan view of a stacking unit and FIG. 3 an enlarged side elevational view of a fragment of a frame member of said stacking unit.

The meaning of terms and definitions used herein is essentially similar to the meaning and definition of the terms explained in my copending application Ser. No. 649,059 and in my Patents 3,236,649 and 3,349,689.

The most preferred embodiment of the carrier of the present invention comprises two or more basic supporting units having a major perforate side wall member and a pocket-like indentation. The supporting units are combined to form a composite carrier capable of holding any desired number of sheets of photographic material up to ten or twenty or more sheets as desired. The units in the composite carrier may also with advantage be pivotally mounted and connected to each other by suitable hinge means, so as to permit the pivotal opening of the carrier for the convenient insertion and/or removal of the sheet from the carrier, or the units may be adapted to be stacked so as to form the composite carrier, held together by suitable holding means.

The most preferred carrier of the invention comprises at least one compartment having a narrow bottom, narrow end members and two opposite major side members made from a funicular material, from netting or from other perforated material so that the major side members comprise openings for the passage of treating fluid through said openings. The said openings are preferably provided over the entire area of the said major side members. At least one of the major side members of each compartment of the carrier is removable or adapted to be opened pivotally, for loading and unloading. The carrier comprises furthermore means for holding the compartments in closed position during treatment.

The major side members are usually at least slightly larger than the largest sheet to be treated in the carrier. The said perforate, netted or funicular structures forming the major side members are preferably set into or part of a frame member, formed by said narrow end members, a bottom and preferably a top member closing the compartment off to the top and preventing the sheets from sliding out of the compartments during treatment and agitation. In this manner the side member and the frame member together form a pocket for the reception of the sheet of photographic material. Each of said pockets may in itself form the compartment of the carrier, when it is closed or when several units are united by stacking. For removal of the sheet after completion of the treatment, the frame members are either pivoted away from each other or the basic stacking units are taken apart for removal of the sheets.

In the case of the pivotable embodiment of the carrier, clamp means, locking screws, locking pins or the like may be used to maintain the carrier in closed position during the treatment. In the case of the stacking units, an outer supporting structure is preferably used, into which the stock of basic units is set, and which comprises preferably also a handle or agitation support. The outer supporting structure may be basically a basket made from wire, slats, bars or the like and having a size to fit readily into the tank with which it is to be used. Inside the supporting structure is provided preferably a spring loaded perforate wall slidably over the length of the supporting basket, which holds and presses the stack of stacking units together, when they are contained therein, without interfering with the circulation of the treating liquid through the perforate major side members.

The parts making up the frame member of each compartment of the carrier, and particularly the bottom and end members extending vertically in operating position of

the carrier, are preferably also perforated or provided with suitable apertures, so as to permit ready passage of the treating solution therethrough.

Referring to FIG. 1 the carrier 905 comprises rectangular frame 906, to the top edge of which are joined vertical extensions 907 with cross bar 908 joined thereto, serving as the agitating support and crossbar 909 serving as the forwarding support. The inside of frame 906 defines an opening slightly larger than the standard sheet, for which the carrier is designed. Across the opening, mounted in the vertical center plane of the frame, is provided a screen of netting (not shown), dividing the prisma defined by the inside surfaces of the frame into two equal portions. To the bottom edges of vertical members 910 of the frame which serve as the guide means are pivotally mounted frames 911 and 912, one each to each side of frame 906. Frames 911 and 912 are of similar size and shape as frame 906, so as to form a sandwich when frames 911 and 912 are pivoted up toward the central frame 906. Pivotable frames 911 and 912 are covered on their outsides with netting material 915, so that the carrier comprises, when it is closed, two narrow prismatic compartments, with all the major surfaces made from netting material. The carrier is held in closed position by removable U-clamp 913 set in the center of the carrier, so as to engage with widened portions 914 provided in the center of the upper vertical members forming frames 911 and 912.

For the use of the carrier, the clamp 913 is removed and frames 911 and 912 are pivoted downwardly. One sheet or two sheets back to back of photographic material are inserted into each compartment, whereafter the carrier is closed and the clamp is slipped onto the top edge of the carrier to ready the carrier for the insertion into a treating solution. Broken lines 911a and 912a show the position of the frames 911 and 912 when the carrier is partially opened.

This embodiment of the carrier may be used with advantage in the narrow vertical vessel with or without a reservoir. For most economical operation, the inside of the main body of the vessel is only slightly wider than the width of the carrier. The vertical frame members 910 serve thus as the guide means. Frame members 910 and the bottom of the frame 906 are advantageously perforated, so as to permit the passage of treating liquid during agitation and to improve the circulation of the treating liquid within the compartments.

The carrier may have a thickness as low as one half inch or even less, though if it is to be used for the simultaneous treatment of up to four sheets i.e. two in each compartment back to back, it is preferably made wider viz up to one inch or more. The pivotable construction of the frames 911 and 912 permits the extremely thin design of the compartments, overcoming the inconvenience of removing the treated sheets through the narrow slots at the top of the closed narrow compartments. The netting does normally not interfere with the uniformity and accuracy of the treatment, if sufficiently rigorous mechanical agitation is maintained during the treatment. The carrier may also be modified by providing only one of the pivotable frames, so as to form a single compartment and permit a still narrower construction of the carrier.

The carrier is made advantageously from plastic material with plastic netting, the plastics being selected for inertness to the treating solutions and for mechanical strength. Polyolefines such as polyethylene or polypropylene and high impact addition homopolymers or copolymers, including nettings from these materials, were found to be excellently suited for the construction of the carrier. Instead of using a tightly woven netting material, the pattern of widely spaced filamentary material, from the same or different plastics as the frame, may also be used. The frames and other parts may also be made from corrosion resistant metals, particularly from better grade stainless steel stocks.

If desired, two or more of the pocket type carriers may be combined, or more advantageously, a modification of the carrier is used for this purpose in which the narrow compartments in the carrier are formed by the stacking of basic units, which do not have the agitating and forwarding supports. This sandwich, formed by stacking the basic units of this embodiment of the carrier, may be simply inserted and secured in a suitable rack, which is provided at the top with an agitating and/or forwarding support and, if desired and necessary, with suitable guide means. The carrier pack thus obtained is used in wider vessels and may be used with equal benefit in the standard developing tanks. The carrier pack offers the advantage, that a larger number of sheets may be simultaneously treated in a given quantity of solution then is possible with the commercially available developing baskets without imposing inconvenience in the insertion and removal of the sheets into and from the individual pockets, making up the carrier pack as would be the case in the said developing baskets, if they would be simply made narrower. Thus, larger numbers of sheets may be treated simultaneously in a tank or vessel of a given size, and if the novel carrier pack of the present invention is used.

The preferred basic unit of the modified carrier pack comprises a frame, covered on one side with netting and provided with stacking means, which assure a predetermined narrow spacing and the formation of individual compartments or pockets of a uniform size for the retention of the sheets of photographic material. The individual basic units are preferably made without agitating supports and guide means. They are, however, conveniently used with a modified unit, having at least one cross bar, as described hereinbefore, which is stacked advantageously in the center of the pack, so as to adapt the carrier pack for the use with automatic mechanical agitating and/or forwarding equipment. Alternatively, the pack made up of the units may be used in combination with a rack, which carries the agitating support, guide means and/or forwarding supports as needed or desired.

An embodiment of the stacking unit is illustrated in FIGS. 2 and 3 of the accompanying drawings. Rectangular frame 920 has inside dimensions somewhat larger than the standard sheet. Around one side of the members making up the frame are spaced indentures 921. On the other side of the frame, directly opposite indentures 921 are provided in equal spaced protrusions 922. The dimensions of indentures 921 are made thus, that the free outer ends of protrusions 922 can be inserted to a predetermined depth. The frame 920 is covered on the side, carrying the indentures, with a pattern of filamentary material 923. The protrusions are comprising the lower, wider base portion 924 and the other narrow portion 925. The depth of insertion is determined by the height of the base portion 924, which serves as the seating for the neighboring frame, when the thinner portion 925 of the protrusion is inserted in the indenture 921 of the next unit in the stack.

All the units making up one pack are constructed in identical manner and of identical dimensions with the exception of one of the end units, which lack the protrusions and which form the terminating unit on one of the ends of the pack.

For the use of the pack, one of the units is laid down with the protrusion side up, one sheet or two sheets, back to back, of photographic material are inserted into each of the units and additional units are placed on top of each other with the protrusions engaging in the indentures of the following unit, with the insertion of one or two sheets of photographic material into the units, until the pack is completed. The last unit used is the above said terminal unit, which has no protrusions and which is placed onto the top of the pack, such that its indentures engage in the protrusions of the preceding unit. The pack is then inserted in a suitable rack, having a cross bar or handle or

other suitable agitating and/or forwarding supports, and the completed pack is clamped together by help of suitable clamps (not shown) and inserted in a treating solution for the treatment of the sheets contained in the pack. If space is of no concern in the treating vessel, the terminal unit may be omitted and a regular unit may be inserted at the end of the pack with the protrusions left unoccupied at this end of the pack.

If desired, a perforated bottom may be joined to the thicker spacer sections 924 of protrusions 922, so as to provide a more substantial support for the sheets. This expedient is of particular benefit, if thin, flexible and soft paper-backed sheets are treated. In this case it may be of further advantage, if perforated side wall sections are provided in similar manner.

The carriers described hereinbefore are designed as plane structures, holding the sheet or sheets in an essentially plane configuration and maintaining this configuration, while the sheet or sheets are contained on the carrier and treated. The terminology "plane sheet" or "plane carrier" as used herein includes also curved embodiments of the carrier, which are particularly useful in curved treating and/or wash vessels. Examples of such curved vessels are described and illustrated in my co-pending applications Ser. No. 342,198 now Patent No. 3,362,315 and Ser. No. 342,030 now Patent No. 3,373,774.

The curved modifications of the carrier may be principally constructed as a direct modification of the carriers described and illustrated herein, except that the backrest or frame structure has a pronounced curvature, which is preferably part of a cylinder as is illustrated in FIG. 41 of my French Patent 1,492,766.

As can be readily seen, the curved design of the carrier of the invention offers the advantage, that a limp sheet, when inserted on the concave side of the carrier, has a tendency of expanding into the curvative when the sheet expands upon wetting, thus increasing its tendency to cling to the backrest.

I claim:

1. A carrier for the wet treatment of photographic sheet material, which carrier comprises at least two compartments, each compartment having a narrow bottom, narrow vertical end members and two opposite perforate vertical major side members, said major side members comprising filamentary netting material, whereby said compartments are arranged side by side with one each of their major side members being in common to two neighbouring compartments; hinge means for pivotally opening and closing the outer major side member of each compartment, means for maintaining the pivotal major side member in closed position during the treatment, wherein said major side members of netting material are unobstructed over their entire surface.

2. The carrier of claim 1, which comprises a narrow top member and disposed above and spaced from said top member at least one cross bar extending over at least essentially the whole length of said compartments.

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