N. W. CARKHUFF.

APPARATUS FOR HOLDING FLEXIBLE SHEETS.

APPLICATION FILED SEPT. 19, 1907.

902,940. **Patented Nov. 3, 1908.**

2 SHEETS—SHEET 1.

Fig. 2.

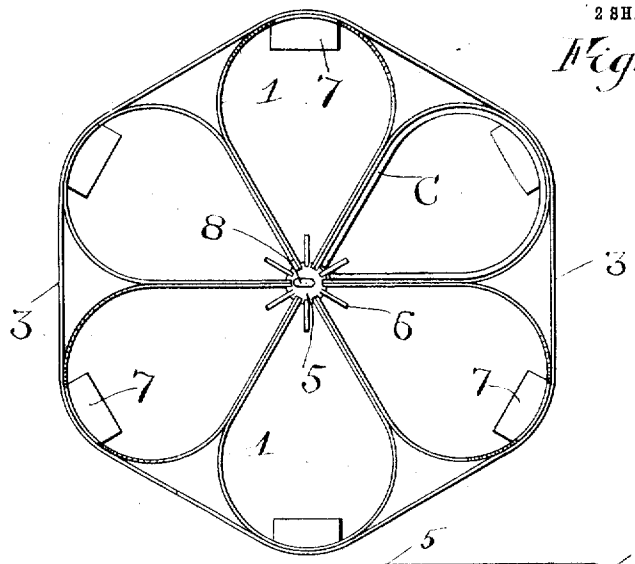
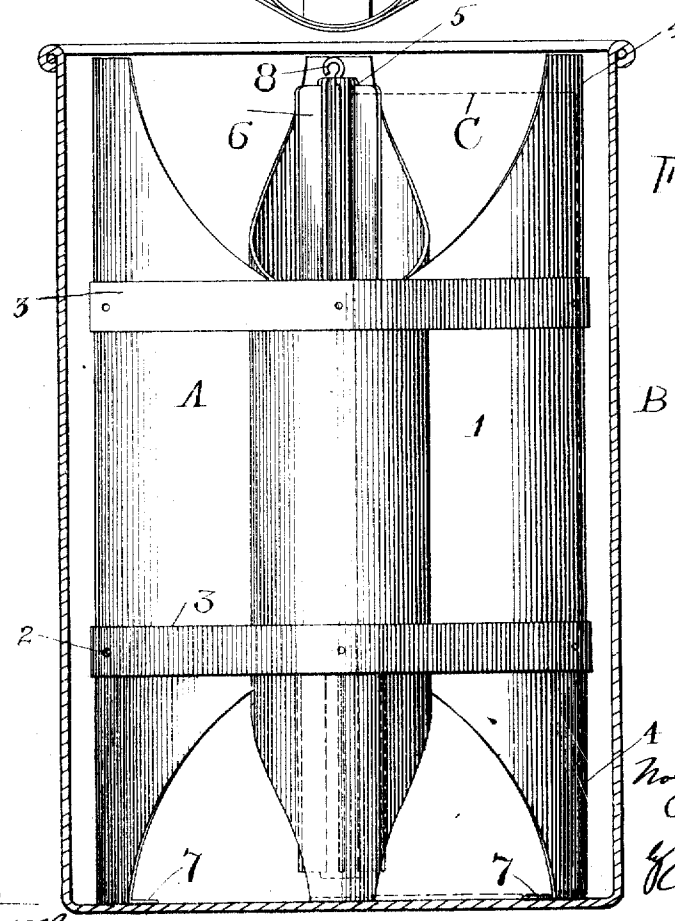


Fig. 1.



Witnesses

C. Ketchum

Russell B. Griffith

Inventor

Norman W. Carkhuff

by Church, Flick & Church

his Attorneys.

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2 SHEETS—SHEET 2.

Fig. 4.

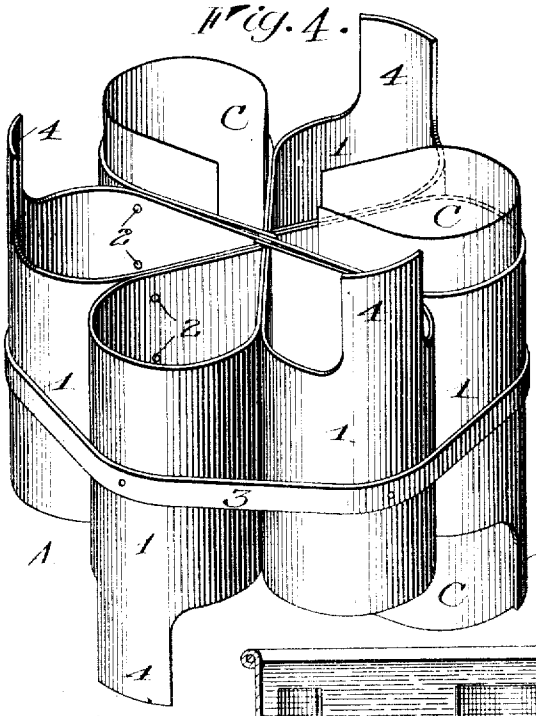
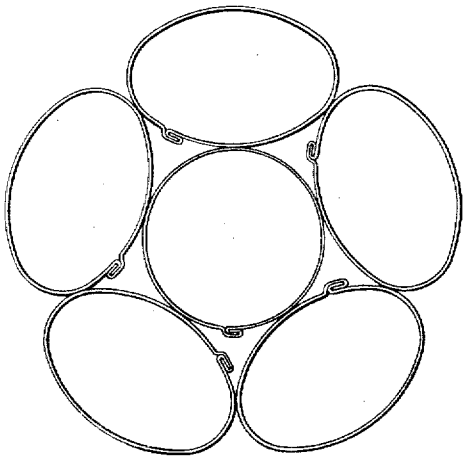


Fig. 3.



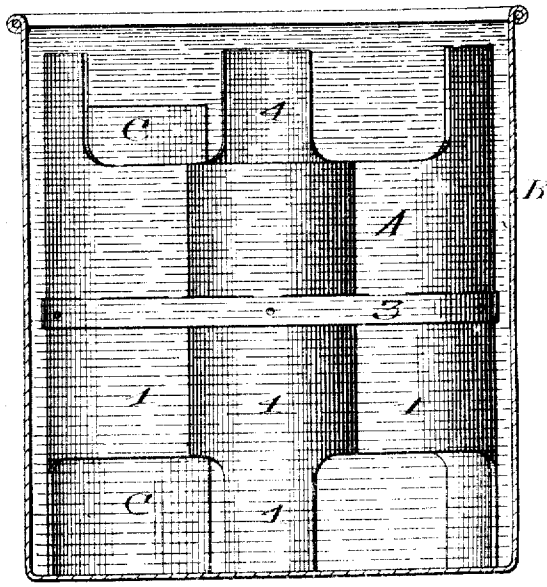


Fig. 5.

Inventor

Norman W. Carkhuff

Witnesses

C. Ketcham

Russell B. Griffith

By Thurlow Rick

his Attorneys

UNITED STATES PATENT OFFICE.

NORMAN W. CARKHUFF, OF ROCHESTER, NEW YORK, ASSIGNOR TO EASTMAN KODAK CO., OF ROCHESTER, NEW YORK, A CORPORATION OF NEW YORK.

APPARATUS FOR HOLDING FLEXIBLE SHEETS.

No. 902,940. Specification of Letters Patent. Patented Nov. 3, 1908.

Application filed September 19, 1907. Serial No. 393,597.

To all whom it may concern:

Be it known that I, NORMAN W. CARKHUFF, of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Apparatus for Holding Flexible Sheets; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of the specification, and to the reference-numerals marked thereon.

My present invention relates to devices for holding flexible sheets in such manner as to protect the surfaces thereof from abrasions and other injuries and at the same time to dispose them in a position in which their surfaces will be readily accessible for treatment in a fluid or liquid bath, and it has for its object to provide a simple and inexpensive device of this character which can be utilized for these purposes and which will be particularly adapted for use in connection with the manipulation of photographic films during the progress of the developing, toning or other processes performed thereon.

A further object of my invention is to provide accommodations for the simultaneous treatment of a plurality of films, each of which may be handled independently of the rest and hence, without liability of injuring their delicate sensitized surfaces. To these and other ends the invention consists in certain improvements and combinations of parts all as will be hereinafter more fully described, the novel features being pointed out in the claims at the end of the specification.

In the drawings: Figure 1 is a central vertical section through a liquid-containing receptacle showing a stand or holder embodying my invention in side elevation. Fig. 2 is a top plan view of the stand or holder removed, Fig. 3 is a top plan view of a holder showing a modified form and arrangement of the chambers. Fig. 4 is a perspective view of another modification, and Fig. 5 is a side elevation of the modification shown in Fig. 4 inclosed within a receptacle.

Similar reference numerals in the several figures indicate similar parts.

Though obviously applicable in many similar instances where flexible sheets are handled under substantially the same conditions, as before mentioned, my invention is particularly useful for the purposes of the photographer in developing or fixing photographic films in a liquid bath, especially when they come to hand in separate sheets as individual exposures either cut from a continuous strip before development or drawn from a film pack. When these sheets are treated by placing them together, one flat upon another in a tray of solution, the operator, in handling one or more of them, is apt to scratch or disturb the delicate coatings, which are in a softened state, upon the surfaces of the others and, too, as they lie closely together, a free access of the solution to the surfaces of all is rendered difficult. To obviate these and other disadvantages I provide within a suitable receptacle of sufficient depth, a stand or holder having a plurality of vertical chambers capable of supporting edgewise and out of contact with each other a number of films or other sheets placed therein in a partially rolled or doubled position and held in place by the expansive force of their own elasticity or by contact with the receptacle, the upper and lower ends of the chambers being so disposed as to permit a free circulation of the chemical or other agent employed and also allow the upper ends of the sheets to project in a manner convenient for effecting their withdrawal.

Referring now to the drawings wherein is shown a practical embodiment of my invention A represents generally the stand and B the receptacle which latter is shown to be of proportions which will readily accommodate the stand and at the same time require the minimum quantity of liquid besides meeting other requirements hereinafter pointed out, but it will be understood that other forms, more convenient to the operation for particular applications of the invention may be utilized to advantage, I prefer to construct the stand of a series of tubes 1 which may be formed by bending sheet metal blanks into the bowed forms shown in Fig. 2 with one semi-circular or curved and two straight or plane sides, the edges meeting at an angle. They are preferably assembled, as shown, in circular arrangement with their curved sides outward and their plane sides adjacent and radiating from a common center, a suitable securing means being employed, such as the

rivets 2 and a circumferential strap or band 3. The said meeting or adjacent edges are secured in any suitable manner to a central core piece 5 provided with radially extending plates 6 forming flange abutments projecting within the tubes to bisect the angle of their straight sides. Upon one, and to render the stand reversible, preferably both ends, of each tube is provided, a projecting portion 4 whereby the stand as a whole is provided with a plurality of supporting members or legs. At the extremities of these legs are arranged abutments 7 formed in the presnt instance by turning over a flange thereon.

The object of the legs is to support the stand with the lower ends of the tubes well above the bottom of the receptacle, a space being formed thereby through which the body of liquid may circulate in free communication with all the chambers within the tubes. The latter are preferably of a length less than that of the sheet to be treated so that when the sheet C is within a chamber, as shown, with its lower edge resting upon the abutment 7, the upper edge will project above the top of the stand in order that it may be readily grasped by the operator. The level of the liquid and consequently the top of the receptacle should be sufficiently high, however, to submerge the entire sheet or film, and an eye 8 is preferably provided on the end of the core piece by which the stand may be conveniently lifted bodily from the receptacle 6 if desired the films being prevented from slipping out during the operation by the said abutments 7. The sheets being inserted in a rolled position, their adjacent or vertical edges sometimes have a tendency to curl or be otherwise deflected inwardly against each other. This action results in the case of photographic films, particularly in allowing the sensitive surfaces to become in some measure scratched and besides the proper erect position of the sheet is destroyed. It is therefore the function of the radial abutments 6 to form a solid support for the said edges whereby they are in a measure secured in their position with their parts out of contact.

The modification shown in Figs. 4 and 5 is of much simpler design, the core piece and related parts, as well as the abutments 7 being dispensed with while one end only of each tube is provided with a projecting portion 4 which by alternate arrangement of the tubes in assembling, extend in opposite directions, whereby the stand is rendered operative in either of two inverted positions and at the same time necessitating but one form of blank, the alternate tubes being reversed as before mentioned when put together. The sheets need not necessarily rest upon abutments as, if of a material sufficiently stiff or thick to be not too readily softened by the liquid, their expansive elasticity will be capable of supporting them at any desired elevation by pressure against the side walls of the chambers.

Although I have shown in Fig. 3 tubes of a shape contributing slightly greater capacity to the chambers which they form, I prefer the type I have described and shown in Figs. 1, 2, 4 and 5 which conform more nearly to the shape naturally assumed by a flexible sheet when its sides are pinched or doubled, and therefore, expedite its insertion. The chambers themselves are in all forms preferably of uniform cross-sectional area with substantially smooth and continuous walls that will not damage the softened sheets by retarding their passage when being inserted or withdrawn.

By the arrangement afforded through my improvements, each sheet is held separate and free to be withdrawn individually without disturbing those remaining while completely exposed upon at least one of its sides to the action of the liquid agent. When the device is used for the development of photographic films, the latter are, of course, inserted with their delicately sensitized or coated surfaces innermost where they are perfectly protected insuring perfect chemical action and an unblemished negative.

I claim as my invention:

1. An apparatus for holding flexible sheets comprising a stand provided with a plurality of tubular chambers open at both ends and a supporting leg on the stand extending beyond the ends of said chambers.

2. An apparatus for holding flexible sheets comprising a stand provided with a plurality of tubular chambers open at both ends having continuous walls and of uniform cross sectional area and a supporting leg on the stand projecting beyond the ends of the chambers.

3. An apparatus for holding flexible sheets comprising a substantially circular stand composed of a plurality of tubular units open at both ends having their adjacent sides extending radially from a common center, means for securing said units together and a supporting leg on the stand extending beyond their ends.

4. An apparatus for supporting flexible sheets embodying a tubular holder, open at both ends and included between a curved and two plane converging walls.

5. In an apparatus for treating flexible sheets with liquid baths, the combination with a receptacle, of a stand located therein having a plurality of tubular chambers open at both ends and means for supporting said stand with the lower ends of the chambers above the bottom of the receptacle.

6. In an apparatus for treating flexible sheets with liquid baths, the combination with a receptacle, of a stand located therein having a plurality of tubular chambers open

at both ends and means for supporting said stand with the lower ends of the chambers above the bottom of the receptacle and the upper ends thereof below the top of the receptacle.

7. An apparatus for supporting flexible sheets embodying a tubular holder forming a chamber adapted to receive the sheet when in a curled position, the walls of said chamber being continuous and the chamber of uniform cross sectional area.

8. An apparatus for supporting flexible sheets embodying a tubular holder open at both ends and included between a semi-circular and two plane converging walls formed by a curved sheet of relatively stiff material having an extension thereon forming a supporting member at one end of the holder.

9. An apparatus for supporting flexible sheets embodying a tubular holder forming a chamber adapted to receive the sheet when in a curled position and provided with an abutment projecting within the chamber to separate the adjacent edges of the sheet.

10. An apparatus for supporting flexible sheets embodying a tubular holder forming a chamber of uniform cross sectional area adapted to receive the sheet when in a curled position, the walls of said chamber being continuous and a longitudinally extending abutment on the holder projecting within the chamber to separate the adjacent edges of the sheet.

11. An apparatus for holding flexible sheets embodying a tubular holder forming a chamber having two converging walls, and adapted to receive the sheet in a curled position, an abutment being provided on the holder projecting within the chamber at the intersection of the said walls to separate the ends of the sheet.

12. An apparatus for holding flexible sheets comprising a substantially circular stand composed of a central core piece surrounded by a plurality of tubular units forming chambers, each chamber having two converging walls, and radially projecting abutments on the core piece extending between the converging walls of each chamber at their point of intersection.

13. An apparatus for supporting flexible sheets comprising a tubular holder, open at both ends, forming a chamber of uniform cross sectional area adapted to receive the sheet when in a curled position, a supporting extension on one end of the holder and an abutment on the extension upon which the lower edge of the sheet is adapted to rest.

14. In a photographic developing apparatus, the combination with a liquid receptacle, of a cage fitting therein having a plurality of pockets each adapted to contain a sheet of sensitized material and to retain the latter in a curled position as distinguished from its normal flat condition.

NORMAN W. CARKHUFF.

Witnesses:
M. B. LAIDLAW,
RUSSELL B. GRIFFITH.