Nov. 25, 1941. W. H. RICHARDS 2,263,593

PHOTOGRAPHIC PRINT WASHER

Filed May 8, 1939 2 Sheets-Sheet 1

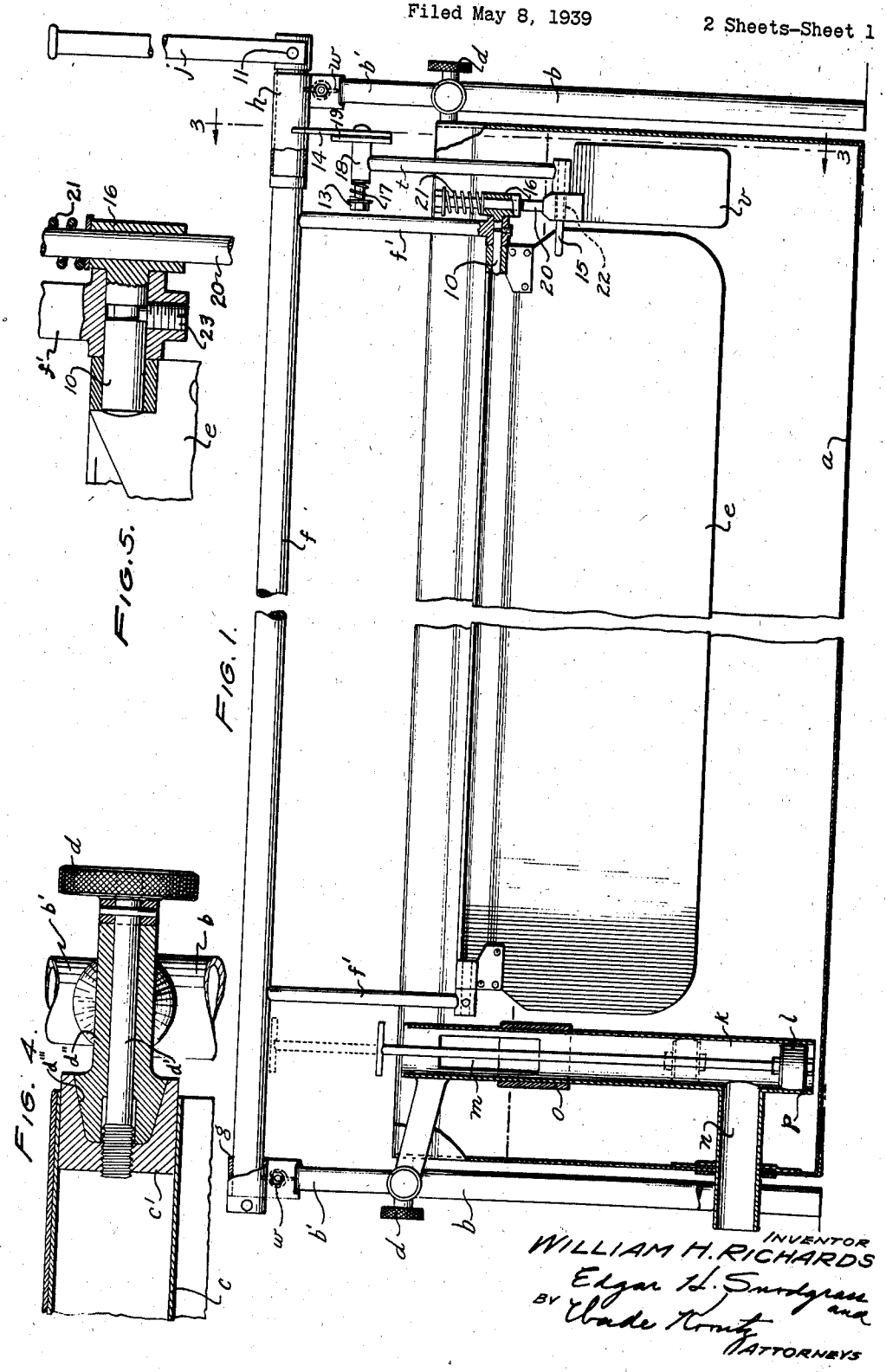


FIG. 1.

FIG. 5.

FIG. 4.

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FIG. 3.

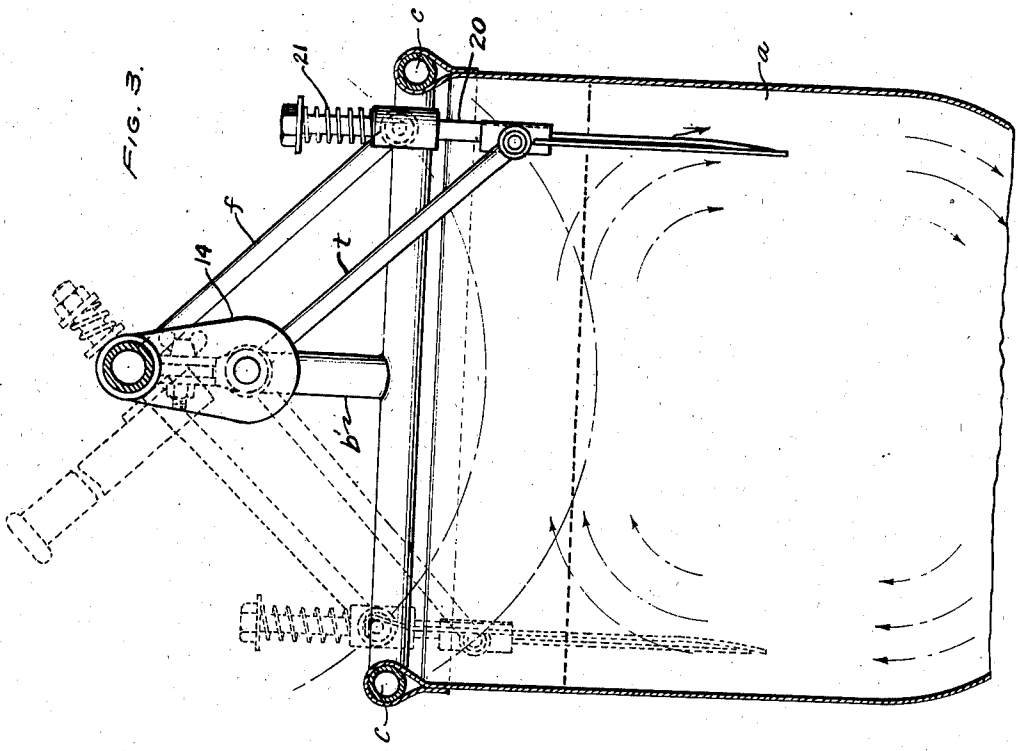
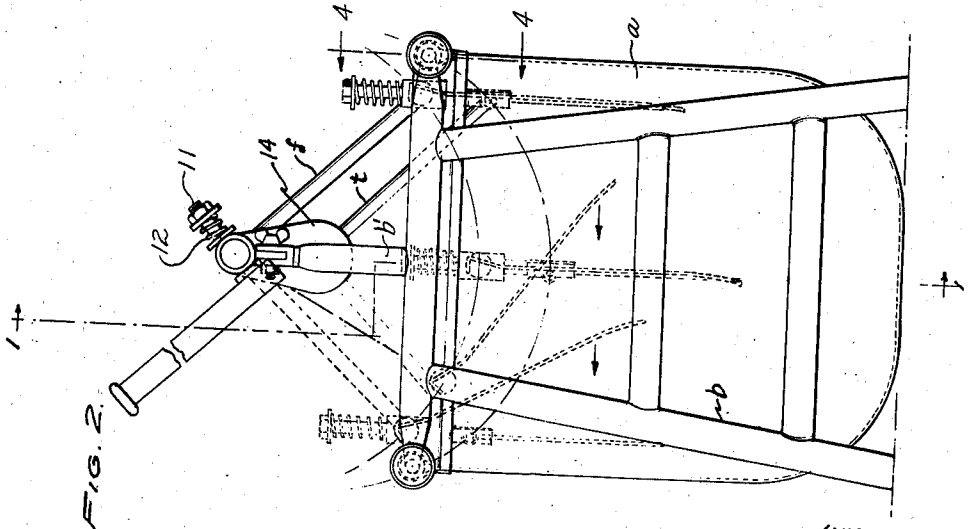


FIG. 2.



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PHOTOGRAPHIC PRINT WASHER

William H. Richards, Dayton, Ohio

Application May 8, 1939, Serial No. 272,443

21 Claims. (Cl. 259—101)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

The invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment to me of any royalty thereon.

This device relates to a lightweight collapsible washer for photographic prints. Although the washer may be permanently installed in a photographic laboratory or dark room, it is primarily intended for field use where compactness and lightness in weight are of major importance. When the apparatus is to be transported by airplane, it is especially important that the weight, as well as the size when collapsed for shipment, be kept to a minimum.

In the preferred form of the invention, the tank proper is made of watertight fabric at least partially supported by a collapsible framework. Novel means are provided for maintaining the washing liquid at a desired level and for emptying the tank. Novel agitating means are also provided for causing circulation of the washing liquid. Other novel features will become apparent from the following description.

In the drawings:

Figure 1 is a longitudinal cross-sectional view taken generally along the lines 1—1 of Figure 2 but showing the agitating blade in its intermediate position;

Figure 2 is an end elevation of the device, looking from the right in Figure 1, showing the blade in raised position in solid lines and in different positions in its path of movement in dotted lines;

Figure 3 is a cross-section taken generally along the lines 3—3 of Figure 1 but showing the agitator blade in solid lines in one extreme position and in dotted lines in its other extreme position;

Figure 4 is a cross-section along the lines 4—4 of Figure 1 showing in detail the connection for fastening the framework together; and

Figure 5 is a detail of the connection of the agitating blade and the auxiliary blade to the carrying means.

Referring to the drawings, the tank supporting frame is made up of end frames *b* to which are detachably connected side rails *c*. The side rails are quickly detachably connected to the end frames by means of thumb screws *d* shown in detail in Figure 4. Each thumb screw *d* has a shank *d'* threaded to engage a plug *c'* integral with side rails *c*. A sleeve *d''*, fixed to end frame *b*, has a beveled portion *d'''* which fits a corresponding recess in *c'*. Thumb screw *d* draws *d''* into firm engagement with *c'*.

Tank *a* is made of watertight fabric and is connected to side rails *c* in any convenient manner as shown in Figure 3. The tank is proportioned, if desired, so that the bottom part rests upon the ground or the support upon which the end frames rest. This arrangement takes most of the weight of the tank off the framework and assists materially in reducing the size and weight of the framework.

In order to produce a circulatory rolling action of the washing fluid in a vertical plane as illustrated by arrows in Fig. 3, agitating blade *e* is mounted by suitable mechanism to be held in a vertical position, in the preferred form of the invention, during its movement from left to right as shown in Figs. 2 and 3, and to "feather" during return movement from right to left. This offers a minimum of resistance to return movement of the blade and the smallest possible amount of interference with the rolling circulatory action of the washing fluid. The feathering action of the agitating blade is illustrated by dotted lines in Fig. 2. The novel parts and arrangement thereof for producing the desired result will now be described.

Shaft *f* is rotatably mounted in bearings *g* and *h* carried by members *b'* which in turn are integral with end frames *b*. Bearings *g* and *h* are detachably connected to members *b'* by wing nuts *w*. Agitating blade *e* is freely pivotally carried by shaft *f* through members *f'* and stub bearing shafts 10 rotatably mounted in the lower end of *f'*, but held against lateral movement by member 23 as shown in Fig. 5. Blade *e* is held in vertical or constantly facing position while being moved from left to right as shown in Fig. 3 by pin 15 integral with arm *t*. As shown in Fig. 1, arm *t* is pivotally mounted on bearing pin 13. Pin 13, offset with respect to bearing *h*, is carried by bracket 14 which in turn is rigidly attached to bearing *h*. A spring 17 maintains the flange 19 of bearing 18 in frictional engagement with bracket 14 to produce a drag on arm *t*, thus tending to make it follow arm *f'*. This drag is necessary for the following reasons: The bearings operate in a corrosive fluid and are necessarily made with a loose fit. When the arms *f'* and *t* reach a "dead center" position, i. e. with bearings *h*, 18, 19 and pin 15 in a vertical plane, it sometimes happens that, due to the looseness of the bearings, arm *t* tends to lead arm *f'* with the result that the apparatus becomes jammed. Friction member 19 producing a drag on arm *t* tends to alleviate this situation. To produce sufficient drag on arm *t* to positively prevent jamming, auxiliary paddle *v* is provided. This paddle is pivotally connected to arm *t* by having pin 15 fit

through opening 22. Paddle *v* is mounted for a slight amount of sliding movement in bushing 16 by means of shaft 20 integral with paddle *v*. As shown in Fig. 1, bushing 16 is integral with bearing 10, which in turn is pivotally mounted in arm *f'*. Spring 21 keeps the shaft 20 elevated with the parts in bearing relationship yet allows sliding movement within the limits of the play in the bearing parts. This arrangement facilitates passing through "dead center" position without jamming.

The tank is provided with a tube *k* which serves to either maintain the fluid at a desired level or to empty the tank. The fluid level is maintained by having a plunger *l* in the down position as shown in solid lines in Figure 1 and adjusting sleeve *o* on tube *k* over elongated opening *m* to the desired water level. When it is desired to empty the tank, plunger *l* is raised to the dotted line position in Fig. 1, allowing the liquid to syphon from the tank through openings *p* and *n*.

The tank may be readily disassembled by manipulation of thumb screws *d* and wing nuts *w*. As will be apparent from Figs. 1, 2 and 3, handle *j* may be folded down along shaft *f* when the device is not in use.

Changes may be made in the apparatus which come within the scope of the invention and it is intended to be limited only by the following claims:

I claim:

1. For use in a tank, an agitator for producing a circulatory motion of fluid, said agitator comprising pivotally mounted agitator blade carrying means, an agitator blade pivotally carried by said carrying means, an arm mounted to pivot about an axis eccentric to the mounting of said pivotally mounted agitator carrying means for pivoting said arm in response to pivotal movement of said blade carrying means, said arm having means thereon for engaging said agitator blade to hold it in a facing position substantially parallel with respect to a given plane during movement in one direction, said blade being free to "feather" during return movement in the opposite direction and means for producing a drag on said arm.

2. A device as recited in claim 1 in which said drag producing means comprises an auxiliary blade mounted for pivotal and limited sliding movement on said agitator blade carrying means, said auxiliary blade being also pivotally connected to said arm.

3. For use in a tank, an agitator for producing a rotary movement of fluid, said agitator comprising a shaft rotatably mounted on said tank, hanger means depending from said shaft, bearing openings in the lower portions of said hanger means, a pin pivotally received in each of said bearing openings, an agitator blade pivotally mounted on said pins, an arm mounted to oscillate about an axis eccentric with respect to the axis of said shaft, means connecting said arm and hanger means to produce movement of said arm in response to movement of said hanger means, said arm having a projecting portion for engaging said blade in such a manner that it is held in a substantially constantly facing position with respect to a given plane when moved in one direction and is free to "feather" when moved in the opposite direction.

4. A device as recited in claim 3 in which said connecting means comprises a link pivotally connected at one end to said hanger means and at the other end to said arm.

5. A device as recited in claim 3 in which said connecting means comprises a link, a bushing integral with one of said pins, said link being mounted for limited sliding movement in said bushing and being pivotally connected to said projecting portion of said arm.

6. A device as recited in claim 3 which said arm has drag producing means thereon.

7. In combination, a tank in which photographic prints may be washed, an agitator mounted in said tank for producing a circulatory rolling motion of the washing fluid comprising a pivotally mounted agitator blade carrying means, an agitator blade freely pivotally mounted on said carrying means, means engaging said blade to maintain it parallel to a side of said tank while being moved in one direction, said means being disengaged from said blade to allow it to "feather" while being moved in the opposite direction.

8. A device as recited in claim 7 and further including drag producing means associated with said blade engaging means.

9. A device as recited in claim 7 and further including a drag producing paddle pivotally connected to said blade carrying means and to said blade engaging means.

10. A device as recited in claim 7 in which said blade engaging means comprises an arm mounted to pivot about an axis eccentric to the mounting of said blade carrying means and friction producing means associated with the pivotal mounting of said arm to produce a drag on said arm.

11. An agitator for producing a circulatory motion of fluid comprising a support, agitator-blade-carrying means pivotally mounted on said support, an agitator blade pivotally carried by said carrying means and means pivotally mounted on said support and so correlated with said agitator blade that the blade is held in a constantly facing position with respect to a given plane when moved in one direction and is free to "feather" when moved in the opposite direction.

12. An agitator for producing a circulatory motion of fluid comprising agitator-blade-carrying means adapted to be pivotally mounted, an agitator blade pivotally carried by said carrying means, an arm adapted to be pivotally and eccentrically mounted with respect to the mounting of said agitator-blade-carrying means, and means on said arm for engaging said blade in such a manner that the blade is held in a constantly facing position with respect to a given plane when moved in one direction and is free to "feather" when moved in the opposite direction.

13. An agitator for producing a circulatory motion of fluid comprising a support, agitator-blade-carrying means pivotally mounted on said support, an agitator blade pivotally carried by said carrying means and means for maintaining said blade in a constantly facing position when moved in one direction with respect to a given plane, said blade being free to "feather" when moved in the opposite direction.

14. In combination, a tank, agitator blade supporting means pivotally mounted on said tank, an agitator blade pivotally carried by said supporting means, means mounted on said tank to pivot about an axis eccentric to the supporting-means pivot including means engaging said blade at a point eccentric to the pivotal mounting thereof for holding said blade in constantly facing position with respect to a given plane when

moved in one direction, said blade being free to "feather" when moved in the opposite direction.

15. In combination, a tank, an agitator blade supporting means pivotally mounted on said tank, an agitator blade pivotally mounted on said supporting means, means mounted on said tank to pivot about an axis eccentric to the pivotal mounting of said supporting means including means engaging said blade at a point eccentric to the pivotal mounting of said blade, and force transmitting means pivotally connected at one end to said blade supporting means and at the other end to said blade engaging means, whereby said blade will be held in a constantly facing position with respect to a given plane when moved in one direction, said blade being free to "feather" when moved in the opposite direction.

16. A device as recited in claim 15 and further including a drag producing blade integral with said force transmitting means.

17. In a collapsible tank formed of side rail members and end frame members and having a tank member of flexible collapsible material suspended from and at least partially supported by the side rails; means for quickly detachably connecting an end of one of said side rail members to one of said end frame members comprising a tapered projecting sleeve carried by one of said members and receivable in a correspondingly tapered recess provided in the other of said members and means for holding said members together with said tapered projecting sleeve in said tapered recess.

18. In a collapsible tank formed of side rail members and end frame members and having a tank member of flexible collapsible material suspended from and at least partially supported by the side rail members; means for quickly detachably connecting an end of one of said side rail members to one of said end frame members comprising; a plug carried by one of said members and having a tapered recess therein, a sleeve carried by the other of said members and having a tapered portion corresponding to said tapered recess, and means for fastening said members together with said tapered portions in interfitting engagement.

19. A device as recited in claim 18 in which said fastening means comprises a thumb screw receivable in said sleeve and screw threaded into said plug.

20. In combination, a tank, agitator blade supporting arms pivotally carried by said tank, bearing openings in said arms, bearing pins rotatably received in said openings, an agitator blade pivotally mounted on said bearing pins, an arm mounted on said tank to pivot about an axis eccentric to the pivotal mounting of said supporting arms, a pin projecting from said arm and adapted to engage one side of said blade, means connected to one of said bearing pins and pivotally connected to said projecting pin whereby pivotation of said supporting arms in one direction results in a swinging movement of said blade in a constantly facing position with respect to a given plane, said blade being free to "feather" upon pivotation of said arms in the opposite or blade returning direction.

21. A device as recited in claim 20 in which said one bearing pin has a bearing housing integral therewith and normal thereto and in which said bearing-pin and projecting-pin connecting-means includes a shaft received in said bearing housing for limited sliding movement.

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