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H. SMITH, JR

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DEVICE FOR DEVELOPING PHOTOGRAPHIC FILMS

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Fig. 1

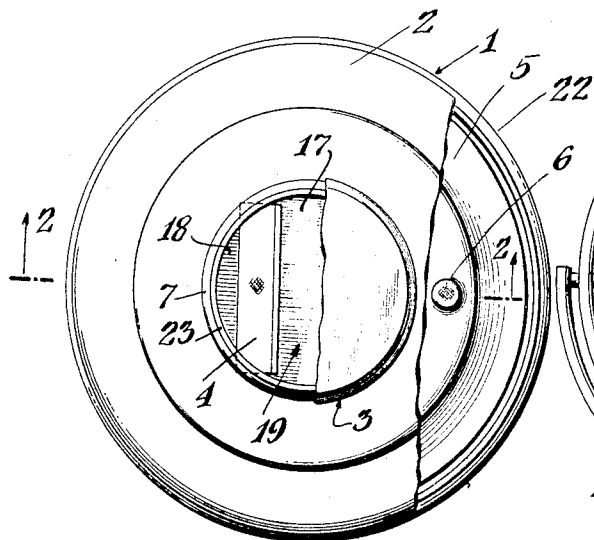


Fig. 4

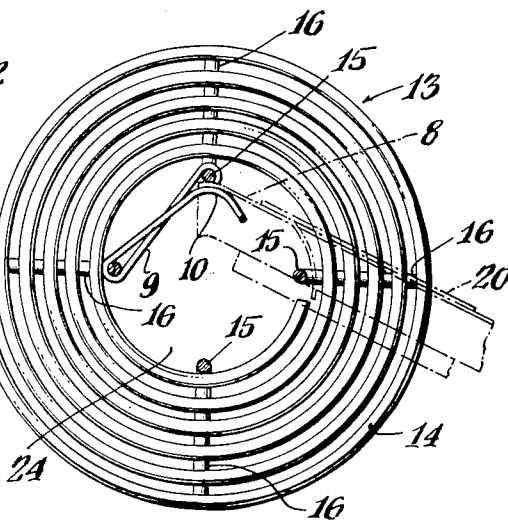


Fig. 2

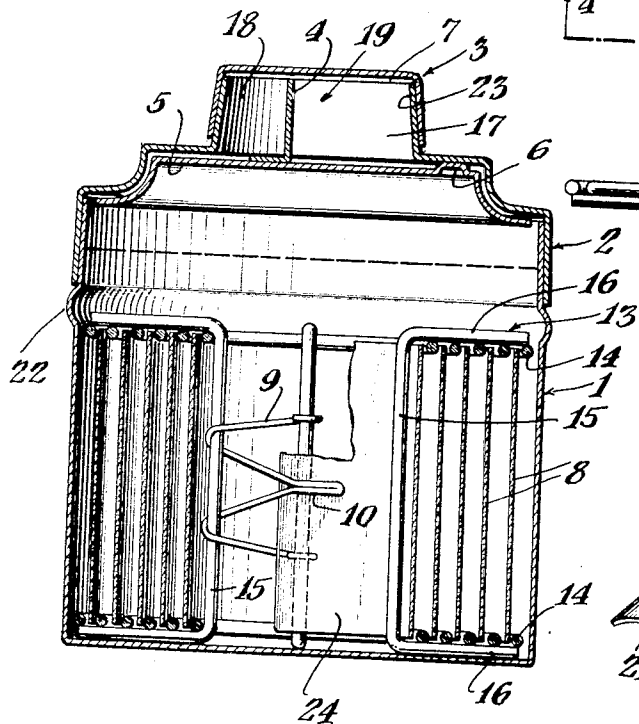


Fig. 3

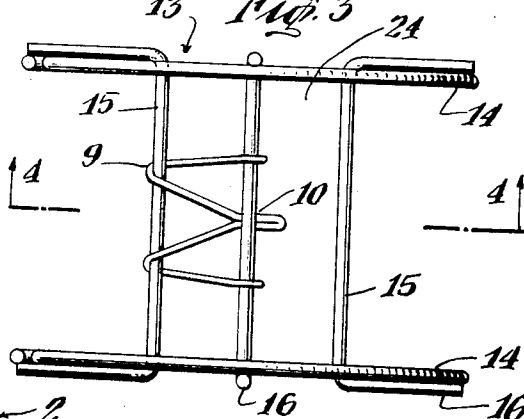
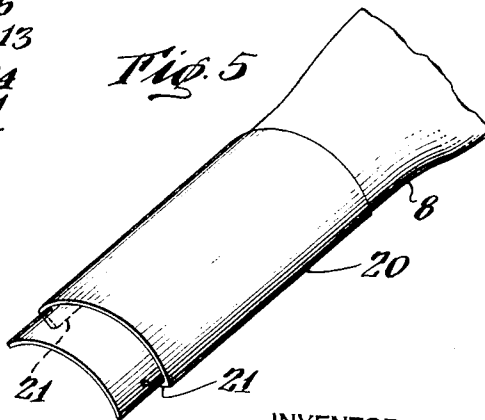


Fig. 5



INVENTOR
Hinsdale Smith, Jr.
BY
Austin & d'Ally
ATTORNEYS

UNITED STATES PATENT OFFICE

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DEVICE FOR DEVELOPING PHOTOGRAPHIC FILMS

Hinsdale Smith, Jr., New York, N. Y.

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17 Claims. (Cl. 95—90.5)

This invention relates to a new and improved device for developing, fixing, washing, and treating photographic films, generally herein referred to as developing.

5 The invention consists of an apparatus for developing photographic films through which liquid will readily flow and come into intimate contact with all parts of the film and at the same time provide an apparatus which is im-

10 pervious to light. The invention further consists of such an apparatus having a reel comprised of spiral end members so spaced as to grip opposite edges of the film to be developed and so hold them

15 that they conform to the spirals of the end members with successive convolutions of the film separated by the material forming the spirals so as to prevent chafing of the film while being treated.

20 The invention further consists of a reel in a developing apparatus for photographic films, which has an open core formed by legs which space the end members of the reel and to which one end of the film may be detachably secured.

25 The invention further consists of a loader to facilitate the winding of the film about the open core. Although the novel features which are believed to be characteristic of this invention will be particularly pointed out in the claims ap-

30 pended hereto, the invention itself, as to its objects and advantages, and the manner in which it may be employed may be better understood by referring to the following description taken

35 in connection with the accompanying drawing forming a part thereof and in which like numerals are employed to designate like parts. Fig. 1 is a top plan view of the tank with certain portions thereof broken away to show

40 the interior construction. Fig. 2 is a vertical cross-section of the developing apparatus taken along the line 2—2 of Figure 1.

Fig. 3 is a vertical cross-sectional view of the 45 developing reel showing a clip for attaching the film.

Fig. 4 is a detailed view of the reel taken along the line 4—4 of Figure 3.

Fig. 5 is a perspective view of the loader for the 50 film showing the film therein.

This invention comprises broadly a tank 1, having a cover 2 and a cover closure 3 therefor. A developing reel 13 is adapted to fit within this tank. This reel comprises broadly two spiral

made of wire having bent foot-portions 16 adapted to lie outside of the spiral coils but attached thereto, and a clip 9 affixed to one or more of the legs to fasten a photographic film thereto. A film loader 20 having a bent or curved back-portion with lips 21 at the opposite edges thereof is adapted to form a guide for the film when introducing it into the reel. The chord of the arc of the loader is approximately equal to the distance between the end members of the reel.

5 In operation the film 8 is inserted in the loader 20 which in turn is inserted between the members 14 of the reel 13 so as to slide the film under the clip 9. It is of course to be understood that this operation may be performed without the use of the loader by simply bending the film so as to reduce its width on the chord of its arc to slightly less than the space between the end members of the reel. When the film has been secured under the clip at the point 10 on the inside of one of the legs 15 the film may be wound upon the reel. The distance between the surface of the spirals of the reel is less than the width of the film and therefore as the film is fed onto the reel and assumes a flat position due to its resiliency, it will spread out so as to extend into the space provided between the spirals. The resilience of the film and its tendency to coil aided by the spirals of the reel will cause the film to wind itself upon the reel with the convolutions of the film separated from each other so as to prevent chafing and allow a free flow of liquor around all parts of the film.

When the film has been wound upon the reel, 35 the reel and film may be placed in the tank 1 for the purpose of developing and the top 2 may then be placed on the tank. The operation up to this point may be carried out in a dark room to prevent exposure of the film but from this point forth, due to the light trap 5 arranged in the tank cover, and more particularly hereinafter described, the remainder of the process can be carried out in the light. The developing fluid may now be introduced into 45 the tank through the divided opening 19 and preferably through the larger portion 17 thereof. In this way the air within the tank has a free egress through the portion 18 of the opening. When sufficient liquor has been introduced 50 on the tank, the top closure 3 may be placed on the tank and the tank shaken or inverted to hasten development by increasing circulation of the solution.

When the reel and film have been in the de- 55

veloping solution for a sufficient length of time they may be removed from the tank and placed in a fixing solution, but preferably the developing solution is either poured out and replaced by the fixing bath or forced out by the introduction of the fixing solution. When the film has been fixed, the cover may be removed and running water freely introduced. It can be seen from the foregoing disclosure that this invention obviates the dark room except for the preliminary step of securing the film to the reel, and thus greatly facilitates and expedites development.

A light trap is formed by the plate 5 which may be secured as shown to the tank cover at the points 6. Attached to this trap is a plate 4 at right angles to the plate 5 which divides the opening 19 into two openings 17 and 18 preferably of unequal size, and permits liquor to be introduced into the developing tank while the tank is in the light. This trap further, due to plate 4 which divides the opening 19 greatly facilitates the introduction of fluid into the tank. The fluid going into the tank necessarily forces the air therefrom and, without some provision for removing the air, this operation would be greatly hindered by the commonly experienced regurgitation caused by escaping air. This invention has overcome that obstacle by a simple and efficacious expedient which in addition allows the introduction of a second fluid while the tank is full. The circulation thus set up will tend to remove the first solution before a large part of the second one escapes. Thus the simple trap not only permits developing in the light where it can be carried on much more quickly and efficiently than in the old dark room but with a minimum waste of material.

The reel comprises two spirals 14, preferably of wire, having a concentric core and spaced apart by legs 15, which due to their feet portions 16 may perform in addition to the function of holding the coils in spaced relation, the function of constraining the film within the space between the end members and at the same time prevent contact of the film with the bottom or top of the tank. Thus, when fluid is introduced into the tank it has free circulation about the film.

The open core 24 of the reel, provided by the legs which join the end members together, allows the maximum freedom of circulation of fluid and at the same time provides a point of attachment for the end of the film. To facilitate placing the film on the reel the film, preferably, should be bent with the concave side of the film toward the core, and the present device with the open core permits this.

In the preferred embodiment of applicant's device the spiral end members are made of round wire, thus, when the film is inserted between the spirals there is but one point of tangency between the film and the spiral, and in this way a minimum of the surface of the film is contacted.

To facilitate the loading of the reel a curved metal plate 20 having lips 21 may be used. The distance between the lips of this loading plate is designed to be slightly less than the distance between the end members of the reel, thus, when the film is inserted into the loader it conforms to the curve of the loader plate and is readily inserted between the end members of the reel into the clip on the core thereof.

The walls 23 of the annulus 7 have been so

shaped as to form a truncated cone and the top closure 3 is adapted to conform to the shape thereof, thus, when the top closure is placed on the cover a wedging action is obtained which causes a tight fit therebetween. This is very desirable in that the tank is designed to be shaken and inverted and it is important that there be no leakage therefrom.

The tank itself may be provided with a bead 22 having an inclined wall adapted to engage the lip of the cover and limit the telescoping action of the two members. This bead also acts as a light trap.

It is obvious that the device herein generally referred to as a developing apparatus may be used for other purposes in connection with treating photographic films and that it is not intended to limit it solely to this purpose. It is further obvious that alterations in details may be made to the specific form of the invention as herein shown and described without departing from the spirit and intent of the invention or the scope of the claims.

What is claimed is:

1. A device for developing photographic films, comprising in combination a container having a removable cover therefor with an opening therein, a closure for said opening, an open core reel adapted to fit within said container and removable therefrom, fastening means on said reel adapted to secure the end of a photographic film to the inside thereof, a light trap attached to said container cover and subjacent thereto adapted to render said container light impervious.

2. A device for developing photographic films comprising a body portion open at one end, a cover therefor having an opening therein, said opening being substantially round and having a dividing wall therein, a plate attached to said cover and disposed beneath said opening adapted to render said container light impervious when said cover is placed thereon.

3. In a device for developing photographic films a tank and tank cover, said tank cover having an opening therein divided by a partition wall, a plate disposed beneath the opening and attached to the cover, said partition dividing the opening into two sections and being in substantial contact with said plate.

4. In a device for developing photographic films, a tank, a cover therefor having an opening therein, a truncated cone shaped annulus surrounding said opening, a closure member adapted to fit over said annulus to seal the container whereby said device may be shaken to expedite developing without loss of liquor.

5. In combination with a tank for developing photographic films, a reel adapted to fit within said tank and have a photographic film wound thereon, said reel comprising spaced spirals joined by U-shaped leg members which form an open core to which one end of the film may be secured.

6. The combination of a reel, adapted to have a photographic film wound thereon for use in developing photographic films, with a loader, said loader comprising an arcuate metal strip having bent lip portions, said loader adapted to retain a photographic film therein to facilitate the attachment of said film to the reel.

7. In a photographic developing apparatus having a tank portion, the combination of an open core reel for use in holding photographic film when being developed, with a tank cover

having an opening therein provided with a light trap.

8. A cover for a tank for use in developing photographic films, said cover having a single divided opening therein and a light trap therefor subjacent to said cover adapted to render said tank light impervious when the cover is placed thereon.

9. A reel for use in developing photographic films, said reel comprising end members formed by wire spirals, said members being held in spaced relation by a plurality of leg members of substantially small cross section whereby substantially unimpeded circulation of developing liquor is affected.

10. A reel for use in developing photographic films, and adapted to be inserted in a developing tank, said reel comprising two wire spirals spaced apart by wire legs having foot portions adapted to lie outside of the spirals and in contact therewith whereby to prevent contact of said wire spirals with the developing tank and insure free circulation of liquor when introduced into said developing tank.

11. A reel for use in developing photographic films, comprising spiral end members spaced apart by a plurality of leg members of substantially small cross section forming an open core for said reel.

12. A reel for use in developing photographic films, comprising end members spaced apart by leg members forming an open core to which is attached a clip for detachably fastening a photographic film on the inside of said core.

13. The combination of a light trap for use in a photographic film developing apparatus with a reel, said reel having end members joined by

U-shaped members the bars of which form an open core in said reel.

14. The combination of a reel with a light trap for use in a photographic film developing apparatus, said reel having end members spaced apart by U-shaped leg members, forming an open core whereby developing solutions may be introduced into the developing apparatus while said apparatus is exposed to normal light.

15. A loader for use in a photographic film developing apparatus, said loader comprising an arcuate body portion having lip portions on two edges.

16. A tank having a single light-impervious divided opening permitting the introduction and removal of solutions and simultaneously allowing free ingress and egress of air.

17. A tank for developing photographic films comprising a cylindrical tank portion closed at one end and a cover therefor adapted to snugly fit thereover to seal said tank, an opening in said cover having a plate extending subjacent to said cover and of substantially the same diameter as said cover, a second plate extending at right angles to said first plate and passing through said opening in said cover with the ends of said second plate approaching the periphery of said opening at two points to form a cord therein, an annulus surrounding said opening and extending away from the cover an amount substantially greater than the height of said cord, an open core reel adapted to fit within said developing tank and have a photographic film wound thereon, said device being light impervious when the cover is placed thereon thereby permitting the development of photographic films under normal light conditions.

HINSDALE SMITH, JR.