Oct. 26, 1948. N. W. O'CLAIR 2,452,389

SELF-CONTAINED PORTABLE FILM DEVELOPING APPARATUS

Filed Feb. 21, 1946 2 Sheets-Sheet 1

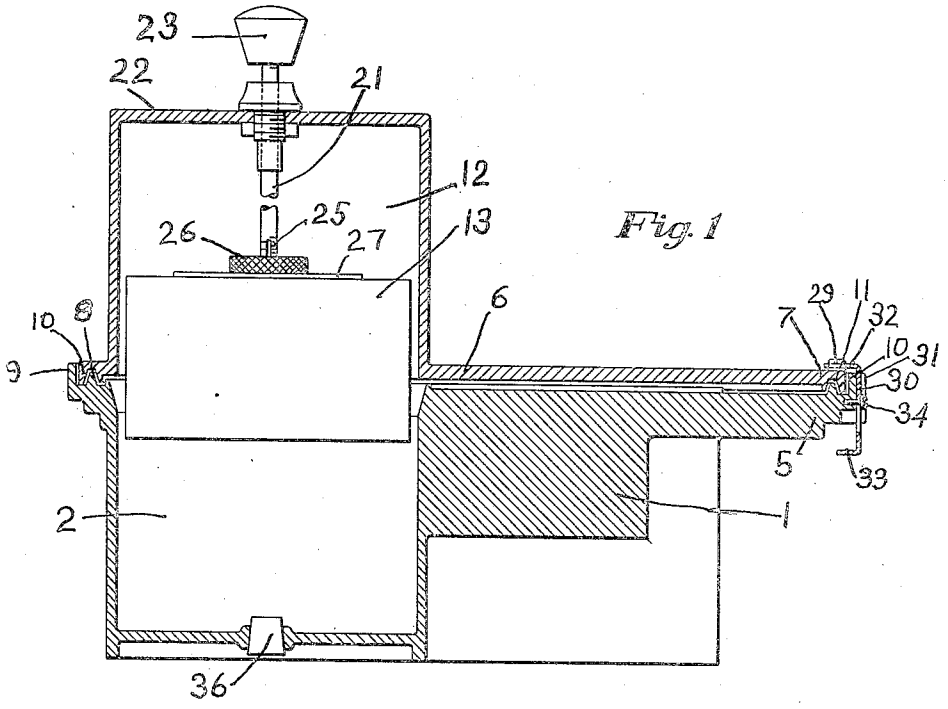


Fig. 1

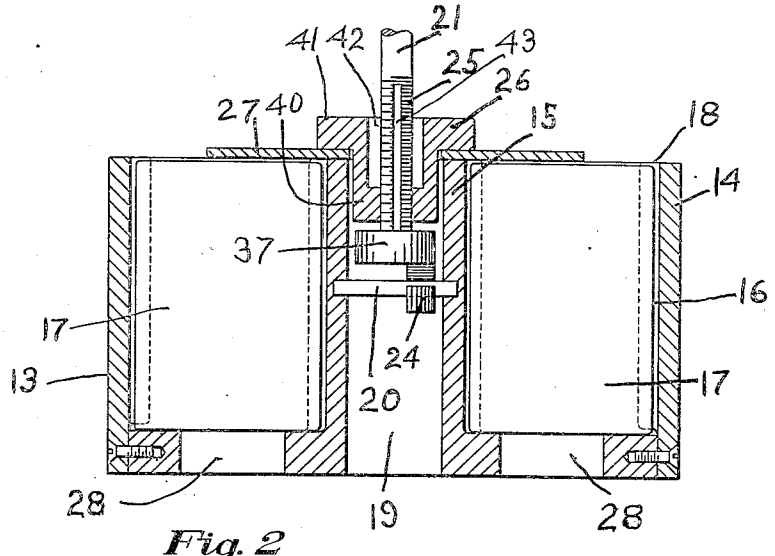


Fig. 2

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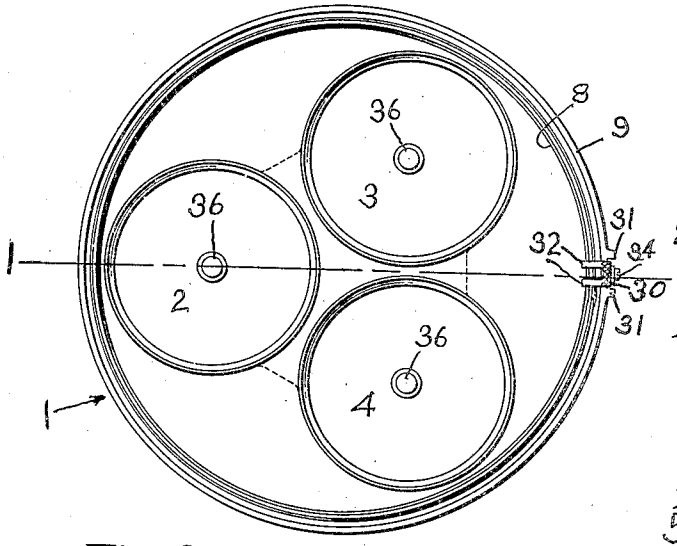


Fig. 3

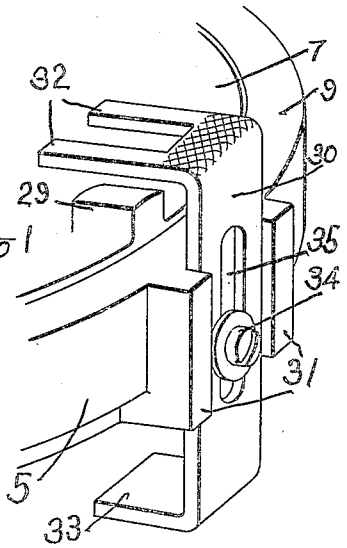


Fig. 5

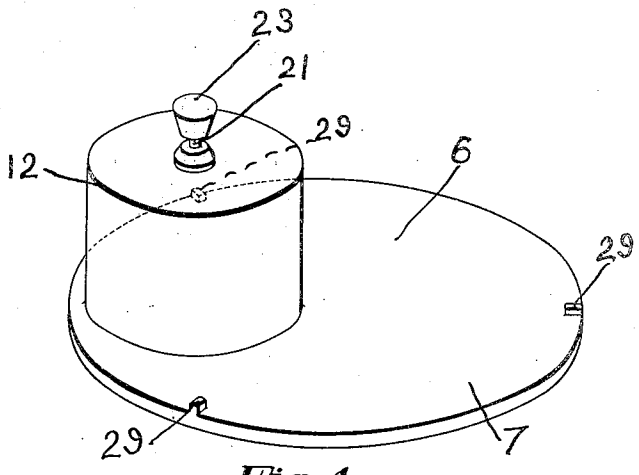


Fig. 4

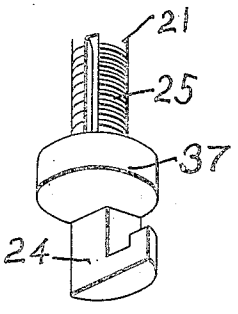


Fig. 6

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SELF-CONTAINED PORTABLE FILM DEVELOPING APPARATUS

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Application February 21, 1946, Serial No. 649,273

10 Claims. (Cl. 95—90.5)

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This invention relates to film developing apparatus and it has for one of its objects to provide a self-contained portable film developing apparatus which is simple in construction and inexpensive to manufacture, and by means of which films can be developed and fixed without removing them from the apparatus.

The device comprises a portable light-tight unit having a body section provided with a plurality of compartments to receive the different solutions usually used in developing films, and also provided with a circular rim section, said unit further including a cover section which fits the rim of the body section with a light-tight joint and which is provided with a downwardly opening film-receiving chamber which can be brought into register with the various compartments by turning the cover on the rim. The device further includes a film holder for supporting films in the film-receiving chamber of the cover, together with means operable from the outside of the cover for lowering the film holder into any compartment of the body section with which the film-receiving chamber is in register.

Assuming that the body section has three compartments, one of which contains the developing solution, another of which contains the short-stop solution, and the third of which contains a hypo or fixing bath, and that films to be developed have been loaded into the film carrier, which is located in the film-receiving chamber of the cover, the device is used by turning the cover on the rim of the body section so as to bring the film-receiving chamber into register with the compartment containing the developing solution, after which the film support is lowered into the said compartment thereby to immerse the films in the developing solution. When the films have been subjected to the action of the developer for a sufficient length of time, the film carrier is raised into the film-receiving chamber and the cover is again turned on the rim to bring the film-receiving chamber into register with the compartment containing the short-stop solution, after which the said carrier with the films therein is immersed in said compartment thereby to arrest any further action of the developing solution.

After the film-carrier has been again raised into the film-receiving chamber of the cover, the latter is turned again to bring said chamber into register with the compartment containing the hypo solution, after which the film carrier is again lowered into said compartment so as to immerse the film in said solution.

All these operations are carried out successively

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within the light-tight unit, and after the films have been treated to the hypo solution, the cover may be removed and the developed films subjected to the usual washing operation.

In order to give an understanding of my invention, I have illustrated in the drawings a selected embodiment thereof which will now be described.

In the drawings:

Fig. 1 is a vertical section through a film developing apparatus embodying my invention, said section being an enlarged section taken on the line 1—1, Fig. 3.

Fig. 2 is an enlarged sectional view through the film carrier.

Fig. 3 is a plan view of the body section with the cover removed.

Fig. 4 is a perspective view of the cover section.

Fig. 5 is a fragmentary perspective view showing means for positioning the cover for various operations, and locking the cover in its adjusted position.

Fig. 6 is a fragmentary perspective view of the manually operated rod by which the film carrier is raised and lowered.

As stated above, the portable unit comprises a body section 1 which is formed with a plurality of compartments to receive different solutions used in developing films, three such compartments, 2, 3, and 4, being herein illustrated.

The compartment 2, for instance, may contain a developer solution, the compartment 3 may contain a short-stop solution, and the compartment 4 may contain a hypo or fixing solution.

The body section 1 is also formed with a circular rim section 5, and the compartments 2, 3, and 4 are arranged at equal distances from the center of said rim section.

The cover section is indicated generally at 6, and it is formed at its peripheral portion so as to fit the rim 5 of the body section 1 with a light-tight joint. As herein illustrated, the rim of the body section has two upstanding circular ribs 8 and 9 forming between them an annular groove, and the peripheral portion 7 of the cover is provided with a downwardly directed annular rib 10 adapted to fit into the groove between the ribs 8 and 9 of the body section, and is also provided with a downwardly open groove 11 adapted to receive the rib 8 of the body section, thereby making the light-tight joint above referred to.

The cover section 6 is formed with a film-receiving chamber 12 which is open at the bottom but closed at the top and sides. The cover section 6 is capable of turning on the body section 1 about its center as an axis, and the film-

receiving chamber 12 is so located that during the turning movement of the cover section on the body section, said chamber 12 will be brought successively into register with the various compartments 2, 3, and 4.

13 indicates a film carrier which is adapted to be received in the chamber 12 and to be immersed in each of the compartments 2, 3, and 4. This film carrier may have any suitable or usual construction, and it may be one which is designed to receive a plurality of cut films or it may be in a form to receive a roll of film. The film carrier herein illustrated, however, is one designed to support cut films, and it is formed with two concentric walls 14, 15, forming between them an annular film-receiving space 16 which is open at the top and in which the cut films 17 may be placed, said walls 14, 15 being provided with grooves 18 to receive the edges of the films. The inner wall 15 encircles a central opening 19, and constitutes a hollow hub member. 20 indicates a bar extending across the opening of said hub member. The film carrier is adapted to be supported and manipulated by a rod 21 which extends through the top 22 of the chamber 12 and is provided with a knob 23 on its outer end. This rod 21 has at its lower end a hook portion 24 which can be hooked onto or under the cross rod 20 as shown in Fig. 2.

The lower end of the supporting rod 21 is screw threaded as shown at 25, and mounted on said screw threaded portion is a clamping nut 26.

27 indicates a circular plate or cover member which partially covers the annular chamber 16 within the film carrier.

The undeveloped films will be loaded into the film carrier 13 in a dark room, and said carrier is then attached to the supporting rod 21, and the nut 26 is screwed down, thereby clamping the plate or cover 27 against the end of the film carrier and also clamping the hook 24 firmly against the bar 20. When the nut 26 is tightened, the film carrier is clamped rigidly to the rod 21.

The rod 21 then is raised to withdraw the carrier into the film receiving chamber 12 and the cover member with the undeveloped film in said chamber is then applied to the body section, the compartments 2, 3 and 4 having been previously supplied with the proper solutions.

As stated above, the loading of the films into the carrier, and the assembling of the top section with the base section, is done in a dark room, but after the unit has been closed then it may be removed from the dark room and the developing operations may be carried out in any location.

The operation of developing the film consists in first turning the cover section 6 on the body section 1 so as to bring the film-receiving chamber 12 into register with the compartment containing the developing solution, after which the operator depresses the knob 23 thereby lowering the film carrier 13 into the compartment 2 having the developer solution.

The film carrier 13 is provided with openings 28 so as to allow the developing solution to flow freely into the chamber 16 containing the films, and if desired, the operator may give the carrier 13 an up and down movement so as to produce a surging of the developer solution through the chamber 16.

When the developing has been continued for a sufficient length of time, the operator raises the carrier 13 into the chamber 12 and then turns the cover section 6 to bring said chamber

into register with the compartment 3 containing the short-stop solution. The film carrier 13 is then lowered into the compartment 3 so as to subject the films to the action of the short-stop solution, and the film carrier is then raised again into the chamber 12, and the cover section 6 is again turned to bring the said chamber 12 into register with the compartment 4 containing the hypo solution. The film carrier 13 is then lowered into the hypo solution for fixing the films. When the fixing operation has been concluded, the film carrier may then be raised again into the chamber 12, and the cover section 6 may be taken off from the body section and the films removed therefrom and washed. The washing of the films may be accomplished either while they are in the carrier 13 or after they have been taken out of the carrier.

I have illustrated herein a simple means for indicating when the cover section 6 is in a position with the chamber 12 registering with any one of the compartments 2, 3, or 4, and also means for locking the cover section in its adjusted position during the manipulation of the film carrier 13.

The cover section 6 is formed on its periphery with a plurality of positioning protuberances 29, there being one such protuberance for each compartment 2, 3, and 4. 30 indicates a stop member which is retained between two ribs 31 formed on the rim 5 of the body section, said stop member having at its upper end two inwardly directed fingers 32 adapted to embrace any one of the protuberances 29. The stop member 30 is also shown as having its lower end in-turned as shown at 33, and it is retained in position by a clamping screw 34 which extends through a slot 35 with which the stop member is provided, and which screws into the rim portion of the body section 1.

When the stop member 30 is in its raised position shown in Fig. 5, the fingers 32 are above the protuberances 29, and the cover section 6 will be free to be turned on the rim portion 5 of the body section. When the cover section has been turned to bring a protuberance 29 into register with the stop element 30, the film-receiving chamber 12 will then be registering with one of the compartments 2, 3, or 4, and each protuberance 29 may be provided with some special indication to indicate just which compartment is in register with the chamber 12 when said protuberance is in register with the stop member 30. After any protuberance has been brought into register with the stop member 30 as shown in Fig. 5, then the latter may be lowered so that the fingers 32 will embrace the corresponding protuberance 29, thereby locking the cover section in its adjusted position.

The cover section may be unlocked by merely pressing upwardly on the in-turned end 33 thereby to lift the fingers 32 above the protuberance 29.

The nut 26 is shown as made with a body portion 40 which enters the opening 19 in the hub 15 when said nut is tightened, and with a flange portion 41 to engage the cover element 27. The nut is also shown as provided with the recess 42. The rod 21 is provided with a longitudinal drain groove 43 to allow any liquid which accumulates in the chamber 42 to drain therefrom when the film carrier is raised into the chamber 12.

I claim:

1. A film developing apparatus comprising a

body section provided with a compartment to contain a developing solution, a cover section fitting the body section with a light-tight joint, a film carrier having a central hollow hub portion and a film-receiving chamber surrounding said hub and open at its upper end, a bar extending transversely across said hub portion, a carrier-supporting rod extending through the cover section and adapted for vertical movement relative thereto, said rod having a hook at its lower end to engage said bar, and also having a screw threaded portion above the hook, a cover member for the open upper end of the film-receiving chamber, and a nut screw threaded to the rod, for both clamping the cover to the film carrier and locking the hook to said bar.

2. A film developing apparatus having a film carrier formed with a center hollow hub portion and a film-receiving chamber surrounding said hub portion, which chamber is open at the top for the introduction of films thereto and the removal of films therefrom, said carrier also having a bar extending transversely across said hub portion, a carrier-supporting rod provided with a hook at its lower end to engage said bar, the portion of the rod above the hook being screw threaded, a cover member for the open top of the film-receiving chamber, and a nut on said screw threaded portion of the rod operative both to clamp the cover to the film carrier and to lock the hook to said bar.

3. A portable film developing apparatus comprising a body section having a plurality of open-topped compartments to receive different solutions and also having a circular rim portion, said compartments being equally spaced from the center of the rim portion, a circular cover section loosely resting on and removable from said rim portion and having a downwardly opening film-receiving chamber situated the same radial distance from the center of the rim portion as said compartments, said cover section and rim portion having annular inter-engaging surfaces concentric with said center and situated at a greater radial distance therefrom than the compartments and which provide a light-tight joint between said sections but which permits the cover section to be turned about said center while maintaining the light-tight characteristics of said joint, thereby to bring said film-receiving chamber into vertical alinement with any one of the compartments, and means carried by the cover section and operable from the exterior thereof to transfer films vertically from said chamber through its open bottom to a compartment with which it is vertically alined.

4. A portable film developing apparatus comprising a body section having a plurality of open-topped compartments to receive different solutions and also having a rim portion, said compartments being equally spaced from a point within said rim portion defined as the center thereof, a cover section loosely resting on and removable from said rim portion and having a film-receiving chamber situated the same radial distance from the center of the rim portion as said compartments, a film carrier in said chamber, the latter having an open bottom to permit the film carrier to be loaded into it through said open bottom, the said cover section and rim portion having annular inter-engaging surfaces concentric with said center and situated at a greater radial distance therefrom than said compartments and which provide a light-tight joint between said sections while permitting the cover section to be turned about said center on the said rim portion while maintaining the light-tight characteristics of said joint, thereby to bring said film-receiving chamber into vertical alinement with any one of the compartments, and means carried by the cover section and operable from the exterior thereof to move the film carrier vertically thereby to transfer films from the chamber to a compartment with which it is vertically alined.

5. A portable film developing apparatus comprising a body section having a plurality of compartments open at the top to receive different solutions and also having a rim portion, said compartments being equally spaced from a point within said rim portion defined as the center thereof, a removable cover section resting on said rim portion of the body section, said cover section being turnable on said rim portion about an axis which coincides with the center of the rim portion and having a downwardly opening film-receiving chamber situated at the same radial distance from said center of the rim portion as said compartments, said cover section and rim portion having cooperating annular guiding surfaces concentric with said center and situated exterior to said compartments and which guide the cover section in its turning movement and which constitute a light-tight joint between the cover section and said rim portion, whereby the cover section can be turned on the rim portion to bring said film-receiving chamber into vertical alinement with any one of the compartments while maintaining the light-tight characteristics of said light-tight joint, a film carrier in said chamber and means operable from the exterior of the cover section to move the film carrier vertically from said chamber through its open bottom to a compartment with which it is vertically alined.

6. A portable film developing apparatus comprising a body section having a rim portion and a plurality of compartments open at the top to receive different solutions, said compartments having a circular arrangement with all the compartments situated at the same distance from a common center, a cover section removably mounted on the body section and turnable thereon about an axis which coincides with said common center, said cover section having a downwardly opening film-receiving chamber which is situated the same distance from said common center as said compartments, whereby turning movement of said cover section about its axis will bring said chamber into vertical alinement with any one of the compartments, said cover section and body section having cooperating surfaces concentric with said common center and situated exterior to said compartments and which provide a light-tight joint therebetween in all relative positions thereof resulting from such turning movement of the cover section, and means carried by the cover section and operable from the exterior thereof to transfer films vertically from said chamber through its open bottom to a compartment with which it is vertically alined.

7. A portable film developing apparatus comprising a body section having a plurality of compartments to receive different solutions and also having a circular rim portion, said compartments being equally spaced from the center of the rim portion, a circular cover section removably supported on said rim portion and turnable thereon about said center, said cover section and rim

portion having circular inter-engaging surfaces concentric with said center and having a greater radial distance therefrom than the compartments, which surfaces provide a light-tight joint that retains its light-tight characteristics during any turning movement of the cover section on the rim portion, said cover section having a downwardly opening film-receiving chamber which may be brought into register with any one of the compartments of the body section by such turning movement of the cover section, said cover section and rim portion having cooperating locking means to lock the cover section in an operative position with its film-receiving chamber in vertical alinement with any one of the compartments, and means operable from the exterior of the cover for transferring films from the film-receiving chamber through its open bottom into the particular compartment with which it is alined.

8. A portable film developing apparatus comprising a body section having a rim portion and a plurality of compartments open at the top to receive different solutions, which compartments are spaced equally distant from a common center, a removable cover section resting on said rim portion and turnable thereon about an axis that coincides with the said common center, said cover section having a downwardly opening film-receiving chamber which is situated the same distance from said common center as the compartments, whereby turning movement of the cover section about its axis will bring said chamber into vertical alinement with any one of the compartments, said cover section and rim portion of the body section having annular interengaging surfaces concentric with said common center and located at a greater radial distance therefrom than said compartments, which surfaces provide a light-tight joint in all positions of the cover section during its turning movement, a film carrier within said chamber and provided with a stem which projects through the cover section and constitutes means exterior thereto to move the film carrier vertically from the chamber into a compartment with which it is alined, said stem maintaining the film carrier at the same radial distance from the center as the compartments.

9. A portable film developing apparatus comprising a body section having a rim portion and a plurality of compartments open at the top to receive different solutions, which compartments are spaced equally distant from a common center, a removable cover section resting on said rim portion and turnable thereon about an axis that coincides with the said common center, said cover section having a downwardly opening film-receiving chamber which registers with the compartments as the cover section is turned on the rim portion, said cover section and rim portion having annular inter-engaging surfaces concentric with said center and situated at a greater radial distance therefrom than said compartments and which provide a light-tight joint in all positions of the cover section during its turning movement, a film carrier within the film-receiving chamber and provided with a stem which projects through the cover section and maintains said carrier at the same radial distance from said center as said compartments, whereby turning movement of the cover section on the rim portion will bring the film carrier into vertical alinement with any one of the compartments, said stem constituting means exterior of the cover section by which the film carrier can be moved vertically from the film-receiving chamber into the compartment with which it is vertically alined.

10. A self-contained portable film developing apparatus comprising a body section having a plurality of compartments open at the top to receive different solutions, which compartments are equally spaced from a common center, a removable cover section resting on the body portion and turnable thereon about an axis that coincides with said common center, said cover section having a downwardly-opening film-receiving chamber which is in communication with the compartments as the cover section is turned on the rim portion, means providing a light-tight joint between the cover section and the body section exterior to said compartments said means comprising an annular rib on one of the parts and an annular groove on the other part to receive the rib, said rib and groove being concentric with said common center and situated at a greater radial distance therefrom than said compartments, a film carrier within the film-receiving chamber and provided with a stem which projects through the cover section and maintains said carrier at the same radial distance from said center as said compartments whereby turning movement of the cover section on the body section will bring the film carrier into vertical alinement with any one of the compartments, said stem constituting means exterior of the cover section by which the film carrier can be moved vertically from the film-receiving chamber into the compartment with which it is vertically alined.

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