Dec. 29, 1936. N. P. BILLING 2,065,506

APPARATUS FOR THE TREATMENT OF LIGHT SENSITIVE SURFACES

Filed Oct. 23, 1934

Fig. 1.

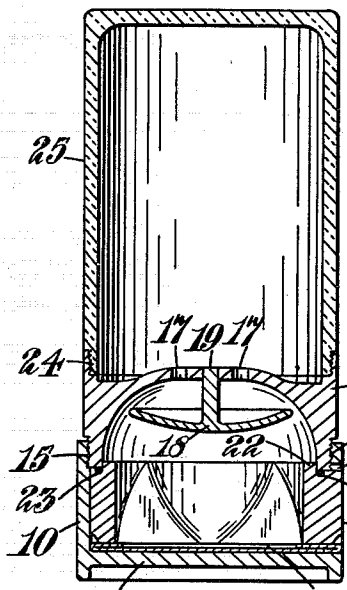


Fig. 2.

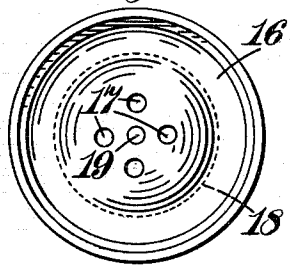


Fig. 5.

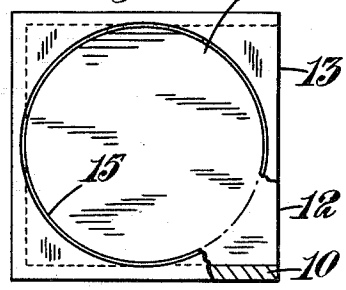


Fig. 6.

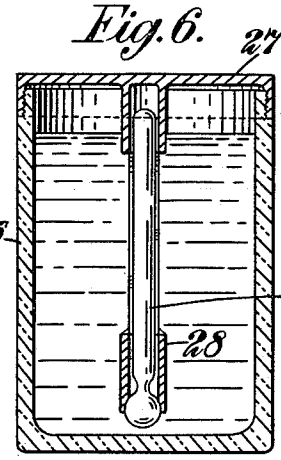


Fig. 4.



Fig. 3.

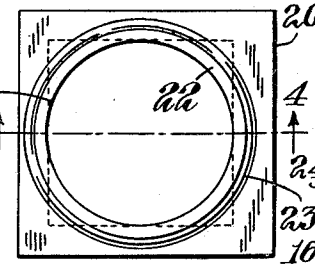


Fig. 7.

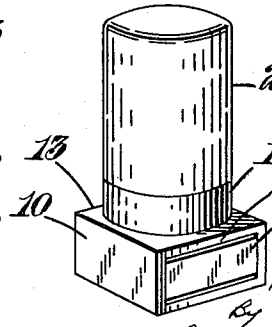


Fig. 8

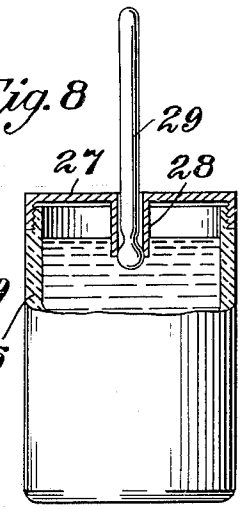
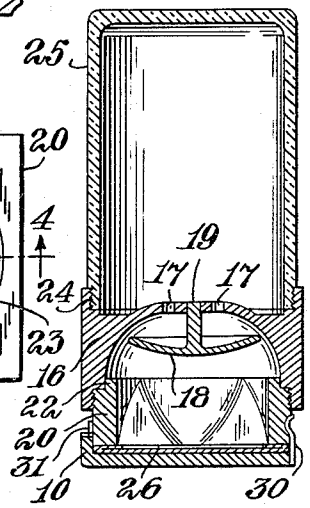


Fig. 9



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APPARATUS FOR THE TREATMENT OF LIGHT SENSITIVE SURFACES

Noel Pemberton Billing, London, England

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In Great Britain November 3, 1933

14 Claims. (Cl. 95—90)

This invention consists in improvements in or relating to apparatus for the treatment (e. g. the development) of a light-sensitive surface such as a photographic film or plate or a photographic printing surface.

An object of the present invention is to provide apparatus in which the treatment may be carried out in ordinary day-light and which will be of simple form and easy to manipulate.

The present invention comprises a container one wall of which is constituted by the light-sensitive surface which is to be treated.

For example, the container, constituting a treating chamber, is formed with an aperture in a wall thereof and is combined with means to hold the light-sensitive surface over the aperture to serve as a closure therefor so that treating liquid charged into the chamber will be retained therein, so far as the aforesaid aperture is concerned, by the light-sensitive surface and the latter will receive treatment by the liquid.

Thus assuming the light-sensitive surface is an emulsion which will swell when treated with liquid, the retention of the emulsion over the margin of the aperture will, owing to the swelling of the emulsion, ensure a liquid seal around the margin of the aperture.

In a modified form of the invention a treating chamber affords within it a support or retainer for the light-sensitive surface and has a passage or passages opening into the chamber through a wall thereof, in combination with a baffle so disposed as to intercept passage of light-rays which may enter the passage or passages and to serve as a light-trap to prevent such rays reaching the light-sensitive surface.

Preferably, the support or retainer for the light-sensitive surface is situated at an open end of the container and the light-sensitive surface may be utilized to serve as the closure therefor with the aid of a retainer to hold the said surface in position.

Conveniently, the passage or passages above mentioned, which serve to permit treating fluid to enter the chamber and to pass to the light-sensitive surface, are situated in a wall of the chamber opposite to that at which the light-sensitive surface is retained.

In a modification of the invention the chamber is built up of two or more elements connected together to afford a chamber having the construction defined above of a volume to accommodate the requisite quantity of treating fluid.

In order that the invention may be more clearly understood a preferred example will now be described with the aid of the accompanying drawing, in which—

Figure 1 is a central sectional elevation of the apparatus including a container for the treating fluid,

Figure 2 is a plan of the apparatus illustrated in Figure 1, with the container **25** removed,

Figure 3 is a plan looking from above of a lower element of the chamber,

Figure 4 is a section on the line **4—4** of Figure 3 viewed in the direction of the arrows,

Figure 5 is a plan of another lower element of the chamber,

Figure 6 is a view similar to Figure 1 of a modified form of the upper container shown in Figure 1,

Figure 7, on a reduced scale, is a perspective view of the assembled apparatus as it will appear in use,

Figure 8 is a view similar to Figure 6 of a further modified form of upper container, and

Figure 9 is a view similar to Figure 1 of apparatus having a hinged cover for holding the light-sensitive material in position for treatment.

Like reference numerals indicate like parts in the several figures of the drawing.

As shown most clearly in Figures 1 and 7 the chamber in which treatment is to be effected comprises a base portion of the apparatus illustrated. This base portion comprises a box-like member having rectangular side walls **10** closed by a floor or lower wall **11**. One of the side walls is cut away at **12** to permit of another member being slid therein. The upper end of the member **10** is partially closed by a cover **13** having a central aperture **14** which is screwthreaded at **15** as shown in Figures 1 and 5. Within the screwthread **15** is accommodated an upper member **16** which is of substantially cylindrical form externally and has the lower portion of its cylindrical wall screwthreaded for engagement with the screwthreads **15**. When in the position shown in Figure 1 the interior of the member **16** affords a domed cavity and through the top wall there are provided several apertures **17** constituting the passages first referred to herein. These passages afford communication between the interior of the member **16** and the space outside or beyond it and internally of the member **16** there is a baffle or light-trap **18** to prevent light passing through the aperture **17** to the lower wall **11** or to a light-sensitive surface supported thereon. The baffle **18** is of inverted mushroom shape and is attached by the free end of the stalk portion at **19** to the member **16**. The baffle **18** is, however, such that

and is so disposed that liquid such as a developing agent, for instance, may enter through the aperture 17 and pass around the edge of the baffle into the space enclosed within the members 10 and 16.

Sliding through the aperture 12 in the lower member 10 is an inner lower member 20 of annular form. The upper end of this member has an aperture which is circular but at the lower end the aperture is square. This may be obtained by forming the inner wall of the annulus as though a V-shaped portion were cut away commencing from a point indicated at 21 in Figure 3 and terminating in an adjacent angle of the square opening at the opposite end. The upper end of the member 20 is formed with a flange 22 which can fit within the lower extremity of the upper member 16 and is formed to receive a gasket 23.

At the upper portion of the member 16 there is an annular flange internally screwthreaded at 24 to receive a correspondingly threaded neck of a container 25 which is preferably formed of glass. It may, however, be formed of any preferred material. The container 25 is intended to contain the treating liquid which will normally be retained therein by a cover screwing on to the neck of the container. In operation the apparatus will be employed as follows:—

The cover is first removed from the container and the member 16 is threaded on to the neck of the container in place of the cover. These two parts will be screwed tightly together. The base member 10 is then screwed on to the member 16 and the inner member 20 may be passed into the base member 10 either before or after the latter has been engaged with the member 16.

The surface to be treated which is indicated at 26 is now inserted between the wall 11 and the adjacent end of the member 20, whereafter the member 16 is screwed tightly home thus closing the member 20 tightly around the margin of the light-sensitive surface 26 and at the same time closing the member 16 on to the gasket 23 in both cases to effect a fluid-tight seal.

All these operations are carried out with the apparatus in the reverse position from that illustrated in Figure 1.

Having assembled the various parts in the manner just described the apparatus is tilted to allow treating liquid to run from the container 25 through some of the passages 17, air within the chamber beneath the container being allowed to escape upwardly through others of those passages. This will take but little time and eventually the apparatus is allowed to stand in the position of Figure 1 for the required length of time according to the nature of the treatment desired, the type of light-sensitive surface undergoing treatment and the nature of class of treating liquid employed.

Thus, assuming the light-sensitive surface is an exposed negative film the container 25 will be used for developing liquid for the required time according to the conditions of temperature, degree of sensitivity of the surface and the developing liquid employed. As soon as the treatment has been carried out for the requisite time the liquid can be returned to the container and another container applied in position to supply fixing liquid to the surface in a similar manner.

In an alternative use of the apparatus the lower portion thereof including the parts 10, 20 and 16 may be immersed bodily in the treating liquid or liquids instead of using the container 25. It will be appreciated that the chamber first referred to in the preamble of this specification consists essentially of the parts 10, 20 and 16 and this may be considered, in the form of the invention illustrated herein, as comprising a portion of a larger apparatus embodying also the container 25. In such a case the perforated wall of the chamber comprises a diaphragm separating the liquid container from the treating chamber.

In the form of container 25 illustrated in Figure 6 a screw-on cover 27 is provided from the inner surface of which depends a support 28 for a thermometer 29 by which the temperature of the treating liquid can be ascertained before the apparatus is put to use. The temperature can be read through the closed walls of the container. If, however, the walls of the container are made from opaque material of any preferred nature the thermometer could be carried in the lid so that the stem of the thermometer projects beyond the lid in order that the temperature may be ascertained during the time that the lid is in position immediately prior to use. Such a form of construction is shown in Figure 8 which is provided with reference numerals corresponding to those employed in Figure 6.

The invention is not limited to the development of negative films as it may be employed for the development or other treatment of photographic positive printing surfaces or any other light-sensitive surface requiring treatment by a liquid or fluid medium.

Moreover, the details of construction may be modified in many ways. For example, in place of securing the base 10 in a manner described above, it may be hinged to the upper portion of the apparatus in such manner that after the sensitized sheet to be treated has been inserted between the base 10 and the part to which the latter is hinged, these two parts can be engaged by any preferred form of catch to hold the sensitized material tightly in position and ready for treatment. An example of this form of construction is shown in Figure 9 which is provided with reference numerals similar to those employed in Figure 1. The base 10 is hinged at 31 to the part 20 and is securable in the position shown by the catch 30. Parts 16 and 20 are modified slightly so as to be securable together and the envelope containing the film 26 is manipulated from one side of the base 10 having a cut-away flange or otherwise suitably formed for the purpose of enabling the slider of the film envelope to be withdrawn.

As a further modification the base may be slidingly engaged with the upper portion of the apparatus, provision being made for the sheet of material which is to be treated to be inserted between the slidingly engaged parts.

I claim:—

1. Apparatus for treating a light-sensitive surface comprising a chamber having an aperture in a wall thereof and having further an orifice which is separate from the aforesaid aperture and is situated in a wall of the chamber to admit treating fluid thereto, in combination with a cover to hold the light-sensitive surface pressed against the margin of the aperture in a light-tight manner and for the purpose of effecting a liquid-tight closure of said aperture, and light-excluding means to prevent passage of light through the orifice when the light-sensitive surface is being treated, said orifice being independent of the cover.

2. Apparatus according to claim 1 in which light-excluding means is constituted by a liquid container securable over said orifice.

3. Apparatus according to claim 1 having means to apply an adjustable pressure to the light-sensitive surface to hold it in close contact around the margin of the aperture.

4. Apparatus according to claim 1 in which the chamber walls surrounding the aperture are shaped, in the vicinity of the latter, to afford an edge against which the light-sensitive surface can form a fluid-tight seal by swelling upon being moistened.

5. Apparatus according to claim 1 in which the said chamber has disposed internally thereof a transversely extending light-trap in the form of a baffle which divides the chamber and is such as to permit fluid to pass from one side to the other, and in which the aperture to which the light-sensitive surface is applied is on one side and the orifice for admission of treating fluid is on the other side of the baffle.

6. Apparatus according to claim 1 in which the light-excluding means comprises a container for treating fluid securable to the walls of the treating chamber to cover the orifice therein in a light-tight manner and to render possible a fluid flow from the container through said orifice.

7. Apparatus according to claim 1 having at least one passage serving to permit entry of treating fluid into the chamber and situated in a wall thereof that is opposite to that at which the light-sensitive surface is retained.

8. Apparatus according to claim 1 in which the treating chamber is built up of two or more interconnected elements.

9. Apparatus according to claim 1 in which the treating chamber comprises upper and lower members of which the upper member has means for connecting it to the cover for holding the light-sensitive surface and in which the said cover comprises a box-like container for the lower member of the treating chamber received and held in position within the cover when the latter and the upper member of the treating chamber are connected together.

10. Apparatus according to claim 1 having a treating chamber composed of upper and lower members of which the upper member has means for connecting it to the cover aforesaid, the lower member is in the form of a frame such as to constitute side walls only of a part of the treating chamber and has one open end against which the light-sensitive surface will be gripped and the cover comprises a box-like container for the lower member whereby when the cover and the upper member are secured together the lower member of the treating chamber will have its open end forced against the sensitive surface which is gripped between that end and the bottom of the cover.

11. Apparatus according to claim 1 in which the treating chamber is built up of two or more interconnected elements and a fluid-inlet passage is provided in that wall of the upper member that is remote from the lower member.

12. Apparatus according to claim 1 in which the treating chamber is built up of two or more interconnected elements and in which the upper member is provided with means for attachment to it of a vessel from which treating fluid can be discharged when the vessel is in place through a passage into the interior of the treating chamber.

13. Apparatus according to claim 1 in which the treating chamber comprises upper and lower members of which the upper member has means for connecting it to the cover for holding the light-sensitive surface and in which the said cover comprises a box-like container for the lower member of the treating chamber received and held in position within the cover when the latter and the upper member of the treating chamber are connected together, and in which the upper member is provided with means for attachment to it of a vessel from which treating fluid can be discharged when the vessel is in place through a passage into the interior of the treating chamber.

14. Apparatus according to claim 1 having a treating chamber composed of upper and lower members of which the upper member has means for connecting it to the cover aforesaid, the lower member is in the form of a frame such as to constitute side walls only of a part of the treating chamber and has one open end against which the light-sensitive surface will be gripped and the cover comprises a box-like container for the lower member whereby when the cover and the upper member are secured together the lower member of the treating chamber will have its open end forced against the sensitive surface which is gripped between that end and the bottom of the cover, and in which the upper member is provided with means for attachment to it of a vessel from which treating fluid can be discharged when the vessel is in place through a passage into the interior of the treating chamber.

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