E. W. CALDWELL.

PHOTOGRAPHIC DEVELOPING APPARATUS.

APPLICATION FILED JULY 1, 1915.

**1,205,708.**

Patented Nov. 21, 1916.

Fig. 1,

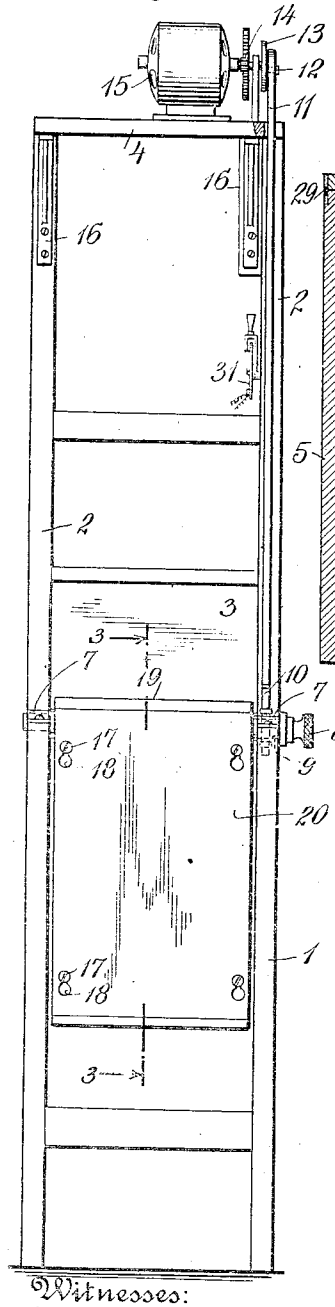



Fig. 3,

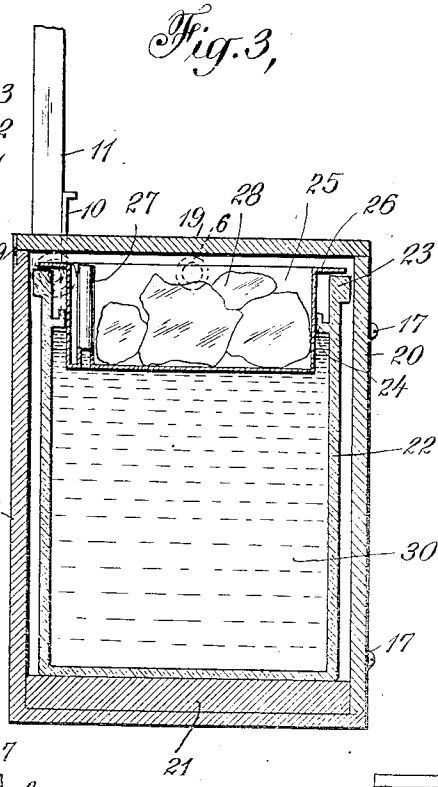
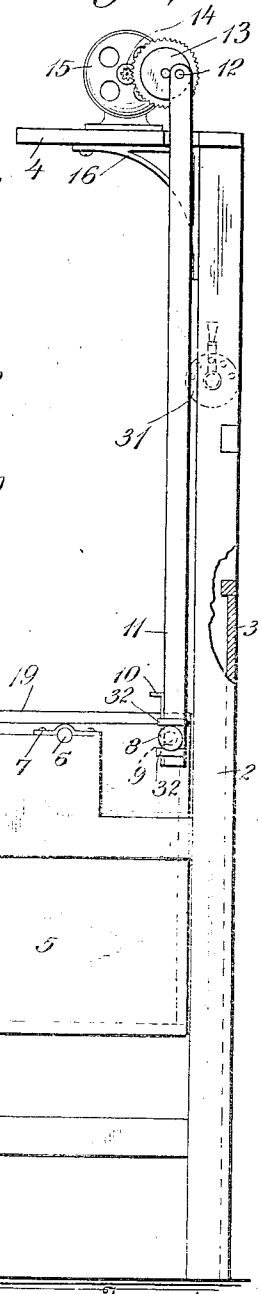



Fig. 2,




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## PHOTOGRAPHIC DEVELOPING APPARATUS.

1,205,708. Specification of Letters Patent. Patented Nov. 21, 1916.

Application filed July 1, 1915. Serial No. 37,430.

*To all whom it may concern:*

Be it known that I, EUGENE W. CALDWELL, a citizen of the United States, and resident of the city, county, and State of New York, have made a certain new and useful Invention Relating to Photographic Developing Apparatus, of which the following is a specification, taken in connection with the accompanying drawing, which forms part of the same.

The invention relates especially to developing apparatus in which a containing or rocking box, preferably of heat non-conducting material, is provided to inclose a developing tank and a floating cooling cover pan is arranged within the developing tank so as to largely cover its upper surface and minimize oxidation of the developer and at the same time efficiently cool it through the action of ice or other cooling material in the pan.

In the drawings showing in a somewhat diagrammatic way an illustrative embodiment of this invention, Figure 1 is a front elevation. Fig. 2 is a side view; and Fig. 3 is a transverse section taken substantially along the line 3—3 of Fig. 1.

This apparatus may comprise a tank container, such for instance, as a rocking box 5 of any suitable material preferably of a heat insulating character and preferably swingingly mounted on suitable trunnions, such as 6, on either side of the box which may with advantage be arranged some distance above the level of the developer so as to secure a more thorough movement of all parts of the developer by this swinging movement. The trunnions 6 may be mounted in suitable bearings in a frame comprising the vertical members 1, 2 and suitable connectors therefor including the back 3 which is sometimes desirable to minimize splashing difficulties. When desired the box may be oscillated by any suitable mechanism which may comprise an electric motor, such as 15, shown for instance as mounted on a shelf 4 at the top of the frame and supported by brackets, such as 16. This motor may have gearing arranged in connection therewith, such as the pinion 14 on the motor shaft meshing with the enlarged reducing gear 13 which may have the crank pin 12 secured thereto in any suitable way so as to oscillate the connector 11 passing through a suitable slot or opening in the shelf. The lower end of this connector may be detachably connected with a suitable pivot, such as 8, secured to the rocking box and for this purpose the connector may be formed with a suitable slot 9 as shown in Fig. 2 and with a holding bolt 10 which is adapted to slip down past the end of the slot and hold the pivot in proper alinement therewith in connection with the two guide straps 32 which may substantially or partly encircle the connector at this point. This effects the oscillation of the rocking box whenever the motor is running and for some purposes it is desirable to regulate the speed of the motor which may be readily effected by a suitable regulating rheostat 31 properly connected in the motor circuit.

The developing tank may with advantage be removably mounted within the rocking box and insulated therefrom so as to minimize heat transference and for this purpose it is desirable to have a suitable block or slab of heat insulating material 21, such as impregnated wood or felt interposed between the bottom of the tank 22 and the rocking box. This tank may with advantage be formed of celluloid which is tough and durable and has relatively low heat conductivity and the shape and size of the tank are of course so arranged as to accommodate the plates or films to be developed therein. For some purposes it is desirable to form the tank with an external flange, such as 23, adjacent the top which assists in spacing the sides of the tank away from the rocking box and internal supports or flanges 24 may be provided especially where the tank is to be used in connection with suitable developing frames, such as those described in the Caldwell Patent 1,141,314 of June 1, 1915. To facilitate the use of the apparatus the rocking, sliding or otherwise movable box may be provided with a suitable light tight removable cover, such for instance, as the hinged cover 19 secured

to the box by the hinge 29 along its rear edge, for example, so that this cover can be swung up and access secured to the open top of the tank for insertion or withdrawal of plates, developing frames or the like, while with the top closed the plates cannot become light struck so that development does not need to take place in a dark room. For some purposes it is of considerable advantage to have the free side of the rocking box open so as to withdraw the tank laterally instead of being obliged to lift it vertically out of the box. For this purpose the front 20 of the rocking box may be removably mounted thereon, as for instance, by securing it by the screw fasteners 17 which for instance may coöperate with the bayonet slots 18 so that on slightly raising the front side of the box it may be bodily withdrawn and the developing tank slid out through this open side for cleaning or renewal of the developer and so forth.

It is highly desirable to protect the developer against oxidation and also to cool it either while the developing is taking place or at least during the intervals between various developments. For this purpose a floating cooling cover pan may be provided which fits within the top of the developing tank and is adapted to float on the developer therein or rest in close contact therewith and cool the developer through the close contact of the ice or other cooling agent in the cover pan and the developer surrounding it. This cover pan 25 may be conveniently formed of copper or other suitable conductive metal or material which does not undesirably act on the developer and of such size as to fit within the top of the developing tank so as to considerably minimize the contact of air with the developer and also minimize oxidation by the cooling effect produced. This cooling pan may with advantage have an upper flange 26 of such size as to fit within the rocking box and extend over the upper end of the tank so as to limit the descent of the pan into the developer and it is also of advantage to provide a suitable thermometer tube, such as 27, extending up from the bottom of the pan so that a test thermometer can be inserted through this tube and the temperature of the developer below can be determined while the pan is in position. By placing a small quantity of ice 28 in this pan and inserting it in the developing tank after use the cover 19 of the rocking tank may be closed so as to limit the transfer of heat and in this way the developer can be kept at the desired low temperature for many hours with little or no trouble and at the same time there is practically no oxidation of the developer because of the slight air contact with its upper surface and because of its reduced temperature. Under these conditions the ice melts in the cooling pan and the resulting ice water spreads over the bottom of the pan so as to make contact therewith throughout its entire extent and heat is thus efficiently abstracted from the upper surface of the developer, this cooled developer then falling so that the entire body of the developer in the tank is thoroughly and substantially uniformly cooled. This action is so rapid that the ice pan can cool the developer sufficienty in the course of a relatively short time and then the remaining ice may be removed and the pan left in position to act as a cover, the heat insulating rocking box minimizing further temperature changes and also reducing oxidation, or this same result may be secured by placing a relatively smaller amount of ice in the cooling pan and allowing it to thoroughly melt and adding further small amounts of ice from time to time so that a substantially uniform temperature of the developer can be maintained. Thus by this apparatus a very large proportion of the renewal expense of the developer is saved as compared with ordinary open tanks.

This invention has been described in connection with a number of illustrative forms, portions, parts, materials and arrangements, to the details of which disclosure the invention is not of course to be limited, since what is claimed as new and what is desired to be secured by Letters Patent is set forth in the appended claims.

I claim:

1. In photographic developing apparatus, a rocking box formed of heat insulating material and having a hinged cover and a removable front side, a frame, trunnions for said rocking box above the normal level of the developer therein and swingingly mounted in said frame, a motor mounted on said frame and a connector operated by said motor and detachably pivoted to said rocking box to rock the same, a developing tank in said rocking box and having heat insulating material between the body of said tank and said rocking box, internal supports in said tank to support developing frames and a floating cooling cover pan formed of heat conducting material and fitting within said developing tank to float on the developer therein and minimize undesirable contact of air with the upper surface of the developer and adapted to contain ice to cool the developer.

2. In photographic developing apparatus, a rocking box formed of heat insulating material and having a movable front side, a frame, trunnions for said rocking box above the normal level of the developer therein and swingingly mounted in said frame, a motor mounted on said frame and a connector operated by said motor and detachably

pivoted to said rocking box to rock the same, and a developing tank in said rocking box and having heat insulating material between the body of said tank and said rocking box.

3. In photographic developing apparatus, a rocking box formed of heat insulating material, a frame, trunnions for said rocking box above the normal level of the developer therein and swingingly mounted in said frame, a motor and a connector operated by said motor and pivoted to said rocking box to rock the same, and a developing tank in said rocking box and having heat insulating material between the body of said tank and said rocking box.

4. In photographic developing apparatus, a substantially light-tight rocking box, a frame, trunnions for said rocking box above the normal level of the developer therein and swingingly mounted in said frame, means connected to said rocking box to rock the same, and a developing tank in said rocking box and provided with means to suspend plates substantially vertically in said tank substantially perpendicular to said trunnions.

5. In photographic developing apparatus, a rocking box having a hinged cover and a removable front side, a frame, trunnions for said rocking box above the normal level of the developer therein and swingingly mounted in said frame, a motor mounted on said frame and a connector operated by said motor and detachably connected to a pivot on said rocking box to rock the same and a developing tank adapted to removably fit in said rocking box.

6. In photographic developing apparatus, a movable agitating box having a movable front side, a frame, supports for said box and movably mounted in said frame, a motor mounted on said frame and a connector operated by said motor and detachably connected to said box to oscillate the same and a developing tank adapted to removably fit in said box.

7. In photographic developing apparatus, a box formed of heat insulating material and having a movable portion, a celluloid developing tank in said box and resting on a heat insulating block in the bottom thereof, an outer flange extending around the upper part of said tank to maintain an air space between the body of said tank and said rocking box, and a floating cooling cover pan formed of heat conducting material and fitting within said developing tank to float on and engage the developer therein and substantially prevent contact of air with the upper surface of the developer and adapted to contain ice to cool the developer, a thermometer tube in said pan and an outer suspending flange on said pan to limit its descent into said developing tank.

8. In photographic developing apparatus, a box formed of heat insulating material and having a movable portion, a developing tank in said box and a floating cooling cover pan formed of heat conducting material and fitting within said developing tank to float on and engage the developer therein and substantially prevent contact of air with the upper surface of the developer and adapted to contain ice to cool the developer.

9. In photographic developing apparatus, a developing tank and a floating cooling cover pan formed of heat conducting material and fitting within said developing tank to float on and engage the developer therein and substantially prevent contact of air with the upper surface of the developer and adapted to contain ice to cool the developer.

10. In photographic developing apparatus, a developing tank and a cooling cover pan formed of heat conducting material and fitting within said developing tank to engage the developer therein and minimize contact of air with the upper surface of the developer and adapted to contain a cooling agent to cool the developer.

11. In photographic developing apparatus, a celluloid developing tank, internal supports in said tank to support developing frames and a floating cooling cover pan formed of heat conducting metal and fitting within said developing tank to float on and engage the developer therein and substantially prevent undesirable contact of air with the upper surface of the developer and adapted to contain a cooling agent to cool the developer, a thermometer tube in said pan and an outer suspending portion on said pan to limit its descent into said developing tank.

12. In photographic developing apparatus, a developing tank and a floating cooling cover pan formed of heat conducting metal and fitting within said developing tank to float on and engage the developer therein and substantially prevent undesirable contact of air with the upper surface of the developer and adapted to contain a cooling agent to cool the developer, a thermometer tube in said pan and an outer suspending portion on said pan to limit its descent into said developing tank.

13. In photographic developing apparatus, a developing tank and a cooling cover pan formed of heat conducting metal and fitting within said developing tank to engage the developer therein and minimize undesirable contact of air with the upper surface of the developer and adapted to contain a cooling agent to cool the developer and an outer suspending portion on said pan to limit its descent into said developing tank.

14. In photographic developing apparatus, a developing tank and a cooling cover

pan formed of heat conducting metal and fitting within said developing tank to engage the developer therein and minimize undesirable contact of air with the upper surface of the developer and adapted to contain a cooling agent to cool the developer.

15. In photographic developing apparatus, a developing tank and a floating cover pan formed of inert material and fitting within said developing tank to engage the developer therein and minimize undesirable contact of air with the upper surface of the developer.

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