Photographic Roll Film Developing Tank

I, HELMUT VON SZWOLINSKI, of Hotel Noppling, Salzburg, 1-Maxglan, Austria, (formerly of Elisabethstrasse 6, Salzburg, Austria), of Austrian nationality, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

Roll film developing tanks are known which are provided with a film developing spool rotatably mounted, in an upright position, on the tank bottom and on a removable tank cover, the tank being completely light-tight. In addition to a compartment for the film developing spool these developing tanks are provided also with a compartment for a winding apron and a compartment for a film magazine. In these tanks only one film developing spool is provided, onto which the film to be developed is wound by means of the winding-on band by turning the film magazine inside the tank with the cover removed, the film being developed after the tank has been closed. Developing tanks of this kind are therefore entirely unsuitable for the development of several roll films at the same time. For this purpose large-scale developing apparatus have been constructed which enable several film developing spools, each provided with one roll of film, to be accommodated and developed, thus rendering possible the simultaneous developing of several roll films. Apparatus of this kind, however, necessitates driving means for continuously rotating the film developing spools, and the casing is in most cases of complicated construction. This apparatus can be used only for large scale work.

It is an object of the invention to provide a roll film developing tank for the simultaneous developing of several roll films, permitting at the same time continuous checking and individual limitation of the duration of treatment for the various rolls of film according to the speed, i.e. light-sensitivity, of each film.

According to the invention this object is achieved by the fact that several film developing spools are rotatably mounted on the tank bottom in the common completely light-tight tank chamber in an upright position, and are coupled in rotation with one another and with a turning button passing through the tank cover in such a way as not to permit the access of any light, each film spool carrying at least one roll of film and being capable of being lifted out of the tank independently of the other film spools in the tank chamber. Thus there is provided a convenient piece of equipment of general utility which with the simplest means yields the same output as the known large mechanically-operated developing apparatus and renders possible completely individual treatment of the rolls of film in regard to development time.

The accompanying drawing illustrates, by way of example, several constructions of developing tanks according to the invention.

In the drawing:

Figures 1 and 2 are a perspective view of and a central-section through an embodiment for three developing spools with the drive arranged in the centre.

Fig. 3 is a partial section through a modified arrangement of the drive.

Fig. 4 is a perspective view of a modified design of the casing.

Fig. 5 is a partial-section through a modified bearing arrangement for the developing spools, and

Figs. 6 and 7 are a central-section and a plan of a modified embodiment having three developing spools and an eccentrically arranged drive.

According to the mode of execution...
shown in the Figs. 1 and 2 the tank, 1, e.g., made from plastic or drawn metal sheets, has outwardly, in cross-section, the shape of an equilateral triangle with rounded-off corners. For reducing the quantity of developer liquid required the inner wall snugly nestles to the developer spools so that the inner space has the shape of a trefoil leaf. Made into one with the bottom of the tank, 1, by casting, pressing or injection moulding, there are three stub axles 2 for the developing spools and a fourth stub axle 3, of a smaller diameter, for the drive. The cover 4 is made in a similar manner as the casing and is so joined to the tank 1 as to prevent the light from penetrating into same. Each stub axle 2 carries a developing spool 5 for the film to be treated, said spool consisting of a hollow core 6, and an upper and a lower flange 7 and 8, the outer part of the latter being machined into a toothed wheel 9. A driving shaft 10, provided with a bored bearing surface fitting on the stub axle 3, at its bottom end, carries a driver pinion 11 meshing with the toothed wheels 9, and at its top end is provided with a diametrical groove. The knurled turning button 13, for driving the spool, is journaled in the cover 4, and the bottom end of its bearing stub axle is provided with a diametrical rib 14 engaging the groove 12. For use the cover 4 is removed from the tank 1, and the spools are taken out, whereupon the films to be developed are wound on same in the dark. Then the tank is filled with the developer liquid, and the spools are reinserted into same, whereby the toothed wheels arranged on said spools are made to engage the driving pinion. Then the cover 4 is put on again, and the turning button is reinserted whereby the rib 14 of the latter engages the groove 12 of the driving shaft 10, thus coupling said shaft to the turning button. Then, as usual during the first minute of the development, the turning button 13 is rotated, whereby all spools contained in the tank are put into rotation at the same time. As the diameter of the driving pinion 11 is greater than that of the toothed wheels 9 one complete revolution of the driving pinion 11 entails more than one complete revolution of the toothed wheels 9.

For checking the developing process it suffices to remove the cover 4 together with the turning button 13. Then, in the manner known, any film spool may be easily removed, checked and reinserted. Films whose development is completed may at any moment be removed from the tank independently of the others, and other films may be inserted in their place. This enables a considerable saving of time and material.

In conformity to Fig. 3 the toothed wheels 9 are arranged on the upper flanges of the developing spools so that the driving shaft 10 need not be continued down to the bottom of the tank. On the contrary, it is formed into a short stub shaft, shiftably journaled in the cover. By lowering or lifting the turning button 13 the driving pinion 11 arranged on the bottom end of the stub shaft 10 is made to engage the toothed wheels 9, or to be disengaged from same. Fig. 4 shows an embodiment in which, for saving material, also the outer contour of the casing presents the shape of a trefoil.

It is perceptible from Fig. 5 that the stub axle 2 need not be made in one with the tank, but may also be formed separately and inserted into same. For this purpose each stub axle 2 terminates downwards in a threaded bolt 15. The bottom of the casing is perforated so that the bolt 15 may be passed through same and then be firmly clamped by means of a screwed-on nut 16, the packing 17 providing a reliable seal against the passage of liquids.

The embodiment according to the Figs. 6 and 7 replaces the central turning button by a turning button 13 eccentrically located so that its axis coincides with that of one of the spools which entails a modification of several individual parts. In this embodiment the cover 4—above one of the spools—is provided with a pan 18 serving for introducing the developing liquid, said pan being perforated in the middle and being continued into a bearing sleeve 19 protruding downwards, in which the stub axle 20 of the turning button 13 is journaled. The core 6 of the respective spool is, at its bottom end, journaled e.g. in the same manner as in the Figs. 1 and 2 whilst it is additionally journaled in the bearing sleeve 19. In order that the turning button 13 may rotate the spool core 6, the stub axle 20 carries a rib engaging a groove 12 in the part of the spool marked 14 on Fig. 6. In this case the driver 11 is formed by the toothed wheel 9, fixed to the bottom end of this spool core and acts on the intermediate wheel 23, which may be located in one casing, all these spools being rotated by means of a joint drive. In this case too the cross-section of the casing is designed so that not more developer liquid is consumed than is necessary.
absolutely necessary, the shapes resulting being e.g. those of a four- or five-leaved clover or trefoil.

By using intermediate bands, provided with wart-like projections and the like, it is possible—as already known—to coil on one and the same developing spool two or more film strips or bands so as to further enhance the efficiency of the developing tank according to the invention.

The coupling of the turn-button with the driving shaft appertaining may be also effected by means different from groove and rib, without exceeding the scope of the invention.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:

1. A photographic roll film developing tank with a spool for supporting a roll film during development rotatably mounted on the tank bottom and on a removable tank cover in an upright position, the tank being completely light-tight and the spool being completely immersed in the developing liquid and capable of being lifted out of the tank, characterised by the feature that several such film developing spools are rotatably mounted in a common completely light-tight tank chamber in an upright position and are coupled in rotation with one another and with a single turning button passing through the tank cover in such a way as not to permit the access of any light, each film spool carrying at least one roll of film and being capable of being lifted out of the tank independently of the other film spools in the tank.

2. A photographic roll film developing tank as claimed in claim 1, characterised by the feature that the film developing spools are disposed in a circle inside the tank and by means of teeth at their bottom ends engage with a common intermediate toothed wheel, rotatably mounted in the tank, which allows the film spools to be lifted out individually.

3. A photographic roll film developing tank as claimed in claim 2, characterised by the feature that the turning button passing through the tank cover is capable of being coupled with the axle of the intermediate toothed wheel.

4. A photographic roll film developing tank as claimed in claim 2, characterised by the feature that the turning button is rigidly connected to a stub axle of the intermediate toothed wheel, this stub axle being rotatably and axially displaceably mounted in the tank cover, and the turning button being axially displaceable for the purpose of engaging and disengaging the intermediate toothed wheel.

5. A photographic roll film developing tank as claimed in claim 2, characterised by the feature that the turning button is capable of being coupled directly to one of the film developing spools.

6. A photographic roll film developing tank as claimed in any of the preceding claims with an inner wall surface embracing the spool flanges with clearance, characterised by the feature that the entire tank wall is adapted to the form of the flanges of all the film developing spools in the tank and embraces their flanges over an angle of at least 130° with clearance.

7. A photographic roll film developing tank substantially as described with reference to the accompanying drawings.

Dated this 23rd day of September, 1948.

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