July 26, 1960 H. HITZL 2,946,273

ROLL FILM DEVELOPING MACHINE

Filed Aug. 1, 1958 2 Sheets-Sheet 1

FIG. 1

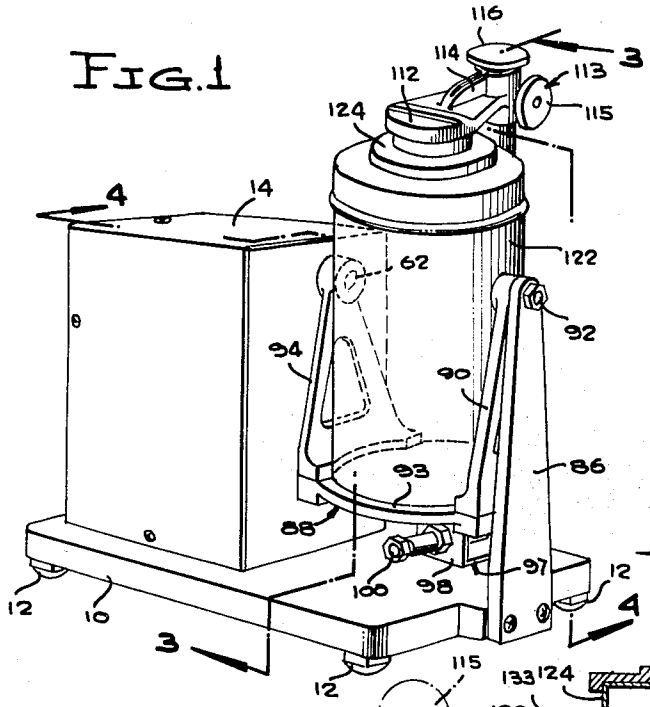


FIG. 2

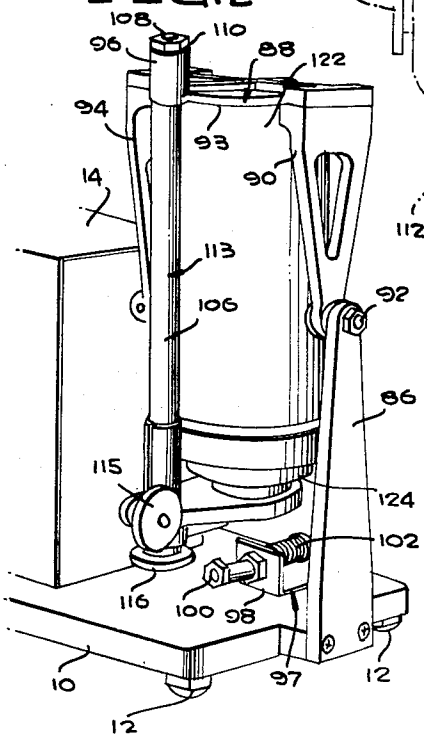
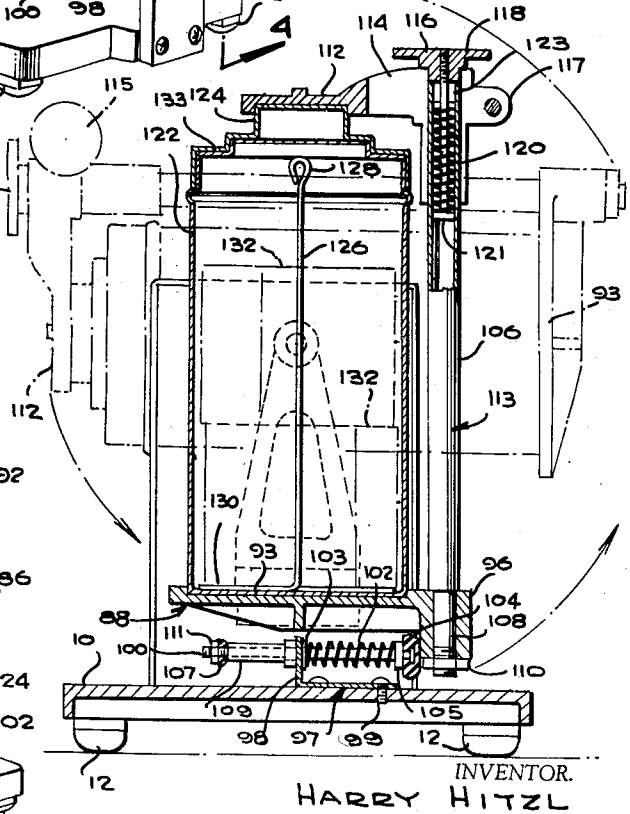


FIG. 3



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FIG. 4

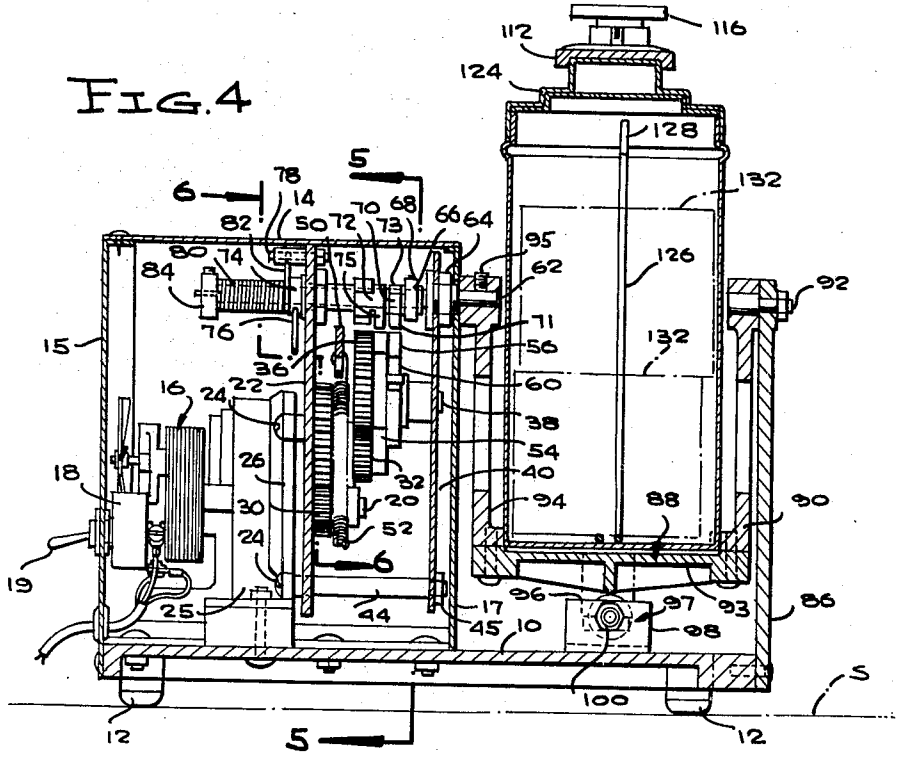


FIG. 5

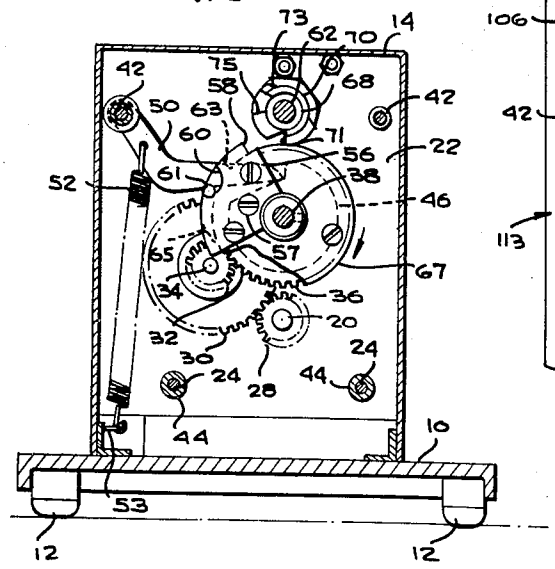
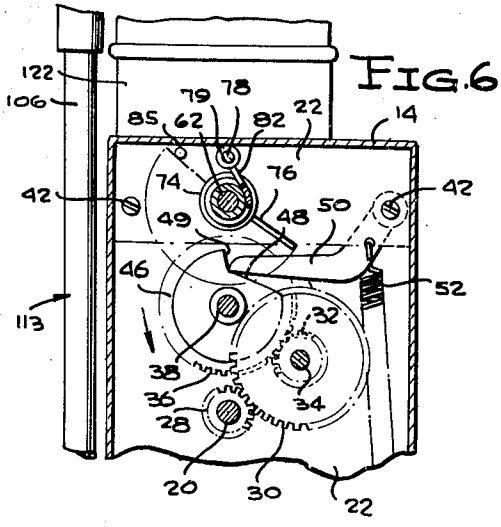


FIG. 6



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ROLL FILM DEVELOPING MACHINE

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8 Claims. (Cl. 95—99)

This invention relates generally to devices for developing photographic film. More particularly, the invention has reference to an apparatus used for developing roll films.

One important object of the present invention is to provide apparatus as stated which is designed particularly for use by amateur photographers or other photographers who operate on a comparatively small scale. To this end, the machine is a compact device designed for precision developing and designed, further, to insure the repetition of a given developing time, condition, and procedure to any extent desired in the development of roll film. It is not intended, as will be understood from the detailed description to be provided hereinafter, that the machine replace large machines used for commercial purposes. Such large machines, of course, are inturn completely unsuitable for purchase and operation by amateur or small scale photographers.

In the development of roll film, certain conditions should be met, to insure uniform development of the entire film, the absence of streaks, and other defects which detract from the finished product. For example, it is recognized that roll film can be best developed by inversion of a tank, within which the film is confined in a developing solution. The purpose of the inversion is to produce a bodily movement of the roll film through the solution, designed to prevent the film from being impinged upon by a portion of the solution that has been exhausted so far as its developing capabilities are concerned. In other words, fresh solution should be caused to impinge upon the surface of a film through the entire roll, at prescribed, predetermined intervals, due to the fact that developing solution in contact with the film is rapidly oxidized and exhausted. In order to successfully develop film, new solution must come in contact with the film approximately every minute of developing time. Developing time can of course be from perhaps three to thirty minutes, depending upon the film and the nature of the developing solution.

Movement of the film in the tank once each minute is generally accepted as standard procedure by amateur photographers, and heretofore, a more or less haphazard method of meeting this requirement has been followed. Ordinarily, the photographer will time himself, paying full attention to the developing task, and approximately once each minute, will invert the tank.

It is important, during this operation, that any movement of film through the solution shall be as uniform as possible. For example, when roll film is wound upon a spool or plastic developing apron, there are two or four feet of film in the coil. Should the spool be rotated, that is, should the developing be by a torsion action, then the several convolutions of the wound film move at different speeds, that is, the film moves most slowly at the center of the coil, and with maximum rapidity at the periphery of the coil. This is undesirable in view of the fact that it tends to cause uneven development.

Further, most mechanically operated developers of the type used by amateur photographers are the agitator type and effect development in the manner described immediately above, producing the mentioned uneven development.

It is, accordingly, one object of importance to provide a developer which will not be of the agitator type, and which will insure even development of the film. To this end, the invention incorporates a tank which is inverted at prescribed, predetermined intervals, in such a manner that the film has bodily movement longitudinally of the tank for a predetermined distance, to cause the film to be impinged upon by fresh developing solution to the same extent over the full length of the film. It is a further object that not only will the fresh solution be applied uniformly and simultaneously to all portions of the wound film, but also, no developing solution which is becoming exhausted will remain in contact with the film. The arrangement is, rather, one in which fresh solution impinges upon the film at a proper time, due to the movement of the film through different areas of the solution responsive to the inversion of the tank and the subsequent return of the tank to a normal position.

In carrying out the above stated purposes, the machine comprising the present invention includes a base on which there is provided a drive means, and a motion-translating linkage designed to invert the tank 180°, keep the tank in the inverted position for a prescribed period of time, and then return it to its original position. The invention further includes means whereby the retention of the tank in the inverted position is controlled from the standpoint of time, the invention further incorporating a similar control with respect to retention of the tank in its normal or upright position. In accordance with the invention, means is provided for repeating the cycle as many times as the operator desires.

Apart from the above, there is a characteristic, during conventional developing practices, for air bubbles to form upon the surface of the film when the film is immersed in a developing solution. This is due to surface tension which prevents the liquid from flowing evenly over the full surface of the film. As a result, in the manual development of films in tanks, the operator usually gives the tank several sharp blows with the palm of his hand, or thumps it on a soft pad so as to break the air bubbles. In accordance with the invention, a stop limiting the movement of the tank beyond its upright position discharges the function of imparting a blow or shock to the tank each time it returns to normal position in the carrying out of the developing operation. The stop or bumper is so designed as to perform the same function as has previously been performed manually, in respect to the breaking up of air bubbles.

Another object is to provide a machine of the character described in which there will be maximum, precision control with respect to developing, in the sense that the development of each film may be carried out under the exact same conditions, and for the exact amount of time, as the development of a preceding roll of film. Erratic timing, uneven film movement, differing quantities of developing solution, and differing lengths of movement of the roll films, such as results when these factors are left to the operator, are eliminated by reason of their being fully controlled by the machine itself during the automatic operation of the machine.

Other objects will appear from the following description, the claims appended thereto, and from the annexed drawing in which like reference characters designate like parts throughout the several views and wherein:

Figure 1 is a perspective view of a roll film developing machine according to the present invention;

Figure 2 is a fragmentary perspective view of the

machine showing the tank inverted, as distinguished from Figure 1 in which the tank is in its normal, upright position;

Figure 3 is an enlarged sectional view through the machine showing the tank in longitudinal section, taken substantially on line 3—3 of Figure 1, the dotted lines showing the tank midway between its upright and its inverted position and the full lines showing the same in upright position;

Figure 4 is a longitudinal sectional view through the machine, taken substantially on line 4—4 of Figure 1 with the tank in upright position, on the same scale as Figure 3;

Figure 5 is a transverse sectional view through the machine taken on line 5—5 of Figure 4; and

Figure 6 is a transverse sectional view, portions being broken away, taken on line 6—6 of Figure 4.

Referring to the drawing in detail, a horizontal, flat, rectangular base **10** is elevated a short distance above a supporting surface S by cushioned feet **12** extending downwardly from the corners of the dependingly, peripherally flanged base.

Mounted upon one end of the base is a rectangular housing **14** including a rear end plate **15** which is fixedly mounted upon and extends upwardly from the base **10**, in close proximity to an electric motor **16** mounted within the housing. The body portion of the housing includes side walls and a top wall, all formed from a single piece of sheet material bent to an inverted U-shape, said body portion at one side being connected to the end plate **15** and at the other side being connected to a front end plate **17** also secured to and extending upwardly from the base **10**. There is thus provided a rectangular, fully closed housing, so designed that access to any of the components housed therein is readily had, by removing the screws that connect the body portion to the end plates, and by then removing the body portion to expose the components located inside the housing.

Motor **16** is turned on and off by a main control switch **18**, the handle **19** of which projects exteriorly of the housing, said switch being mounted upon end plate **15** as best shown in Figure 4.

The shaft **20** of the motor projects forwardly through a vertically disposed, rectangular bearing plate **22** disposed intermediate the end plates **15** and **17**. Bearing plate **22** is fixedly mounted in the desired position through the provision of bolts **24** that extend forwardly from the mount or casing **25** of the motor, through openings provided in the bearing plate. The mount or casing **25** has a vertically disposed flange lying transversely of the housing, through which the bolts **24** extend, said flange being designated **26**.

Referring to Figure 6, secured to the shaft **20** immediately in front of the bearing plate **22** is a small drive pinion **28**, in mesh with a large gear **30** to the front surface of which is secured a small pinion **32**. Gear **30** and pinion **32** rotate upon a support shaft **34** carried by and projecting forwardly from the bearing plate **22**.

Referring to Figures 5 and 6, in mesh with the pinion **32** is a large diameter gear **36** secured to a shaft **38** one end of which is journaled in a bearing plate **22**, and the other end of which is journaled in a front bearing plate **40**. Front bearing plate **40** is positioned transversely of the housing, in a vertical plane adjacent front end plate **17**. Bolts **24** extend through openings of plate **40**, and upper bolts **42** (see Figure 5) extend forwardly from the upper portion of the bearing plate **22**, also passing through openings of plate **40**. Spacer sleeves **44** receive the bolts, and extend between the bearing plates. Nuts **45** (Figure 4) are applied to the bolts, to hold the bearing plates assembled in their desired relationship.

Secured to the shaft **38** for rotation therewith is a time indicator wheel **46** (see Figure 6). Said wheel is disposed immediately in back of the gear **36**, and is of a diameter slightly smaller than that of the gear **36**. At this point, it may be noted that the gears **28**, **30**, **32**, and **36** constitute a reduction gearing, designed to produce rotation of the shaft **38** at a slow speed.

The time indicator wheel **46** is cut away over a portion of its circumference, to produce an obtusely-angular recess **48** one end wall **49** of which forms a step extending substantially radially of the axis of rotation of the wheel or disc **46**.

Peripherally contacting the wheel **46** is the distal end of an obtusely angular arm **50**, swinging upon one of the bolts **42** and normally urged downwardly, that is, clockwise in Figure 5 or counterclockwise in Figure 6, by the pull of a contractile, coil spring **52**. One end of spring **52** is hooked to arm **50**, the other end being hooked to an ear **53** fixedly secured to the housing.

By reason of this arrangement, one is enabled to locate all the moving parts in a prescribed, starting position before placing the machine in operation for the purpose of developing roll film. Further, one is enabled to determine when the machine has completed its operational cycle. This is done in the following manner.

Assuming that, for example, the arm **50** does not happen to be at the point shown in Figures 5 and 6, and instead has its distal end in engagement with some portion of the unrecessed part of the periphery of disc **46**, one merely switches on the machine without positioning the film in the tank. The motor starts, and drives shaft **38** through the reduction gearing until, with disc **46** turning counterclockwise in Figure 6, the free or distal end of arm **50** drops off step **49** into the recess **48**. When this happens there is an audible click as arm **50** strikes the bottom surface of the recess **48**. The operator now turns off the machine and as a result the arm **50** will be in the position shown in Figure 6. As will presently appear, all other moving components of the machine are thus caused to assume a prescribed, starting position, since they are all interrelated in such a manner that they will be at a starting position whenever the disc **46** is in the position shown in Figure 6.

With the roll of film now in the tank, the machine may be turned on once again. Now, it will go through its operational cycle, which cycle continues for one full 360° rotational movement of shaft **38** from its Figure 6 position. The instant the 360° cycle is completed, arm **50** once again drops off the step **49**. The operator hears, once again, an audible click, and switches off the machine. Of course, the cycle can be repeated as many times as the operator should so desire.

Designated at **54** is an advancing wheel secured to shaft **38** for rotation with gear **36** and timing wheel **46**. Wheel **54** is provided on its forward face (see Figures 4 and 5) with an advancing segment **56** of substantially quadrantal form, this being connected to the circular main portion of the wheel by screws **57**.

Segment **56** has, adjacent its leading edge, an abutment or nose **58** projecting outwardly beyond the main periphery of wheel **54**. Angularly spaced from abutment **58** and trailing the same in the sense of direction of rotation of the wheel **54** and segment **56** is a peripheral recess **60** of the segment. This is disposed substantially midway between the leading and trailing edges of the segment. Projecting laterally from wheel **54** within recess **60** is a lug **61**.

Wheel **54**, at one location on its periphery, has a radial projection **63** forming an abutment that trails the abutment **58**, but that is disposed forwardly of the lug **61**. Abutment **63**, however, is disposed laterally of the path within which the abutment **56** and lug **61** travel. This is by reason of the fact that the segment **56** is secured to one face of the wheel **54**, with abutment **58** and lug **61** being disposed in the general plane of the segment. Abutment **63**, on the other hand, is in the main plane of the wheel **54**.

Still referring to Figure 5, on wheel **54**, at the trailing end of the projection or abutment **63**, there is a sloped

surface 65, which declines gradually from the arcuate periphery or outer surface of the abutment 63 into the main periphery 67 of wheel 54.

Above the wheel 54 there is a shaft 62, journaled in the plates 40 and 22. A bearing 64 is provided in the plate 40, within which shaft 62 turns. A similar bearing is provided in the plate 22.

Designated at 66 is a set collar, secured to shaft 62 and held in place by a set screw 68. The set collar holds against endwise movement a plurality of dogs carried by the shaft. A first dog 70 is in the plane of the segment 56. This has a lower tooth 71 and an upper tooth 73.

When wheel 54 turns, abutment 58 will initially engage tooth 71. This will turn the dog and hence the shaft 62.

Next to dog 70 there is a dog 72. This has a tooth 75. This dog is also secured to shaft 62 for rotation therewith. When the shaft is turned by abutment 58 engaging tooth 71, tooth 75 is brought to a lowermost position and will be engaged by abutment 63, since the tooth 75 is in the plane of the wheel 54. Further rotation will now be imparted to the shaft, bringing to a lowermost position the tooth 73. This will be engaged by lug 61 and as a result still further rotation is imparted to the shaft 62. The rotational movement of the shaft 62 extends through a total of 180°, each tooth when engaged turning the shaft through 60°, approximately.

When the tooth 73 has been moved to its maximum extent counterclockwise in Figure 5, the dogs will have toothed portions of their periphery in engagement with the arcuate peripheral surfaces of the segment 56 and wheel 54. As a result, the dogs and hence the shaft 62 will be held against reverse turning movement at this time for a prescribed period of time to be described in greater detail hereinafter. Eventually, the segment moves fully past the dogs, that is, the trailing edges of the segment passes over the axis of rotation of the same, and at the same time the sloped surface 65 moves past the dog, so that the dogs are now free to rotate in the opposite direction, that is, clockwise in Figure 5.

At the same time the entire cycle of operation began, the parts were all positioned as in Figures 5 and 6. In this connection, and referring to Figures 4 and 6, a collar 74 is secured to the shaft 62 for rotation therewith, and rigid with and projecting radially from the collar is a limit arm 76. Projecting rearwardly from plate 22 above and parallel to the shaft 62 is a spindle 78, carrying a sleeve 79 to which is anchored one end of a torsion spring 80, said one end being designated 82. Spring 80 is wound about the shaft 62, and at its other end is anchored to collar 84 fixedly secured to the shaft 62.

Designated at 85 is a stop laterally spaced from spindle 78.

When the spring is free to expand, it rotates shaft 62 counterclockwise in Figure 6, so that arm 76 moves to the full line position shown in Figure 6. Movement beyond this position will be prevented by reason of the fact that a tank support means, to be described in detail hereinafter, is engaged by a stop exteriorly of the housing.

When the spring is wound, arm 76 travels through 180°, approximately, into engagement with the stop 85. This serves to limit movement of the tank beyond a full inverted position shown in Figure 2.

Fixedly secured to and projecting upwardly from the forward end of the base 10 is a standard 86, cooperating with base 10, housing 14, and bearing plates 22 and 40 in defining a support structure. Generally designated 88 is a cradle or saddle for the developing tank. The cradle is of U-shape, including a side portion or leg 90 the upper end of which is pivotally connected to standard 86 by a pin 92, a bight portion or tank seat 93 connected at one side to the lower end of the leg 90, and a second side portion or leg 94 fixedly secured at its upper end to the shaft 62 by means of a set screw 95.

Integrally formed at one side of the flat, circular seat 93 is a boss or projection 96 shown to best advantage in

Figures 2 and 3. This is adapted to engage an abutment or bumper means generally designated 97, mounted upon the base below the cradle.

The bumper means 97 includes an angle bracket 98 fixedly secured by screw 99 to base 10. A plunger 100 is horizontally positioned and is slidable in bracket 98. A compression, coil spring 102 is circumposed about plunger 100. It abuts at one end against a washer 103 that abuts the upstanding portion of bracket 98. The other end of spring 102 abuts against a head 105, carrying a rubber bumper pad 104 which the boss 96 strikes when the tank moves to its normal, upright position shown in full lines in Figure 3.

Under the impact received from boss 96, the pin 100 may shift to the left in Figure 3, against the restraint of spring 102. Carried at the left hand end of the pin is a small rubber washer or abutment 107, and a spacer sleeve 109 is interposed between said washer and the bracket. Therefore, when spring 102 is free to expand, plunger 100 will shift to the right only until washer 107 engages sleeve 109. Suitable adjustments can be made, through the provision of a nut 111 carried by the pin, to adjust the normal position of the bumper pin 104, while simultaneously adjusting the tension of spring 102.

The cradle carries a hold-down clamp that engages the other end of the tank. Said clamp has been generally designated 113 and includes an elongated support tube 106 one end of which has a reduced axial extension 108 threaded to receive a nut 110. Extension 108 extends through boss 96, which has a through opening for this purpose. The shoulder defined by the reduced extension bears against one end of the boss and the nut 110 against the other so that tube 106 is fixedly secured to and extends upwardly from feet 93.

A hold-down plate 112 is spaced laterally from the other end of the tube 106 by means of a split clamp 114, which embraces the tube and which is secured to the tube in selected positions of adjustment longitudinally of the tube through the provision of a clamping screw 115. Screw 115 is threaded in one ear 117 of the clamp, the adjacent ear of the clamp having a smooth-walled opening, the screw having a shoulder bearing against said other ear so that when the screw is turned in one direction, the ears are moved toward each other to cause the clamp to bind against the tube 106.

Extending within the tube 106 is a plunger 118, to one end of which is secured a knurled knob 116. Circumposed about the plunger is a compression, coil spring 120. One end abuts against a head 121 provided upon the inner end of the stem or plunger 118. The other end of the spring abuts against a plug 128 secured in the tube 106.

Normally, screw 115 is loosened sufficiently to permit the clamp to slide upon the tube. Clamp 114 bears against knob 116. Therefore, when the spring is free to expand, it shifts the knob 116 and clamp 114 downwardly in Figure 3, to cause the hold-down plate 112 to bear firmly against the upper end of the tank. However, the hold-down plate can be lifted off the upper end of the tank by the user raising the clamp 114 against the restraint of the spring 120 a short distance sufficient to cause the plate 112 to be lifted clear of the tank. Then, the clamp 114 can be rotated about the shaft 106 laterally out of the way of the tank.

In the event that a shorter length tank is used, clamp 114 can be shifted downwardly along the tube 106, and secured fixedly to the tube in position bearing firmly against the upper end of the shorter tank. At such time as the shorter length tank is to be removed, the clamp is loosened and raised clear of the upper end of the tank.

The tank has been designated 122, and can have any of various shapes. In the illustrated example, it is a constant-diameter receptacle, seating snugly in a shallow recess of the seat 93 at its bottom end. The upper end

of the tank has a cap 124 against which plate 112 bears, the plate 112 being recessed to receive the cap.

Within the tank there is a wire spindle 126 extending axially within the tank and having at its upper end an eye 128, the spindle having a single, flat convolution 130 at its lower end providing a base. Two rolls 132 of a film that is to be developed are shown in dotted lines in the tank shown in Figure 3. When two rolls are used, the extent to which the rolls may move longitudinally of the tank is reduced, and comprises the distance between the top of the upper roll shown in Figure 3 and a shoulder 133 of cap 124. When one roll only is being developed, then of course that roll has a substantially greater distance within which it may move longitudinally of the tank.

The cradle 88, clamp 113, tank 122, and other smaller components supported with these larger parts for conjoint rocking movement together constitute a means for supporting a quantity of film in a developing solution. Said means, further, is rockable in the regular use of the device, through the medium of the drive means defined by the motor, reduction gearing, shaft 62, dogs 70, 72, and other components contained within the housing for the purpose of discharging a driving function as regards the film support means.

In use, as previously mentioned the machine is positioned so that it will be at the beginning of a cycle. The manner in which this has been done has been previously described herein. By reason of the method discussed, the parts initially appear as in Figure 6. Arm 76 is in the full line position shown in this figure of the drawing because spring 80 has unwound to rotate shaft 62 and thus turn cradle 88 to it normal position shown in Figure 1, in which it bears against the bumper as shown in Figure 3.

Now, with the developing solution filling the tank, the motor is turned on. The speed of the shaft 38 is selected by the use of appropriate reduction gearing such as shown, to provide for a passage of a predetermined time before the tank starts to invert. In other words, after the machine is started, there might, in a typical arrangement, be approximately six seconds before the tank starts to invert. Inversion is begun, of course, by reason of the fact that the abutment 58 moved into engagement with the dog 71 and begins to effect rotational movement of the shaft 62.

Inversion is complete, in a working embodiment, in ten seconds after the machine is turned on. In other words, dogs 71, 75, 73 have been sucessively engaged and the shaft 62 has been turned through 180° to move the tank from the full line position of Figure 3 to the position shown in Figure 2.

While the tank is being inverted, spring 80 is being wound, and arm 76 is traveling from its Figure 6 position clockwise in this figure of the drawing into engagement with the limit stop 85. Now, at the moment the arm 76 engages stop 85, the dogs will have been completely cleared by the wheel 54 and segment 58. It may be noted that clearance of the dogs by the segment does not occur at the moment that the tank reaches its inverted position. Rather, the tank is fully inverted while the dogs are still held against retrograde rotational movement by reason of being engaged by the peripheries of the wheel 54 and segment 56. In other words, after the tank has fully inverted, the dogs are still in engagement with the arcuate peripheral surfaces of the wheel 54 and segment 56. This causes the tank to remain in inverted position for a prescribed period of time.

This prescribed period of time in a working embodiment extends over ten seconds. Thereafter, the dogs are completely cleared by the wheel 54 and segment 56. This means spring 80 is now free to unwind and the spring unwinds instantaneously, so that the saddle is swung back through 180° from its Figure 2 to its Figure 3 position. When it reaches its Figure 3 position, boss 96 strikes the bumper and this breaks up any air bubbles that may have been caused to accumulate on the surface of the film when the film was initially immersed in the developing solution.

The motor continues in operation until eventually the arm 50 rides off the step 49. In a working embodiment, after the tank returns to normal position it stays in normal position for about fifty seconds until arm 50 rides off step 49 and causes another audible click. This completes the cycle. The user may now turn off the machine. If the user desires to recycle the device, the machine is simply permitted to remain in operation and will recycle any number of times. Thus, in a typical embodiment, there is a click, after which six seconds occur before the tank starts to invert. Inversion is completed in ten seconds and the tank remains in inverted position for ten seconds. The tank returns to normal position in one second and stays in normal position for fifty seconds where it again returns to the audible click position to complete the cycle. Of course, this timing can be varied as desired, but is mentioned simply to show one arrangement that has proved practicable.

Due to the construction illustrated and described, when the tank inverts, the roll or rolls of film must move from one end to the other end of the tank through the developing solution. This causes fresh solution to impinge upon the film. All portions of the film, through the full length thereof, are impinged upon uniformly, at the same time, by the fresh solution. When the tank returns to normal position, the rolls move in the opposite direction, causing fresh impinging action.

The machine, as will be readily understood, is especially well designed for manufacture in a compact assembly capable of being purchased by the amateur photographer to produce very desirable, uniform developing results. The same timing and uniformity is achieved each time a roll is developed, which is a desirable feature. Further, the possibility of human error is eliminated to the maximum extent. Still further, there is a uniform impinging action, and in addition, there is a means for breaking up of air bubbles.

The device, as previously indicated herein, is not intended for large scale commercial operations, which operations involve the use of substantially more bulky, expensive equipment. Such equipment cannot be purchased by the amateur photographer, and the hobbyist must necessarily seek much more inexpensive and compact equipment. The present equipment well serves the purpose of the amateur photographer, it has been found in practice, and is designed to provide a high quality film developing operation, requiring a relatively small amount of skill on the part of the user.

It is believed apparent that the invention is not necessarily confined to the specific use or uses thereof described above, since it may be utilized for any purpose to which it may be suited. Nor is the invention to be necessarily limited to the specific construction illustrated and described, since such construction is only intended to be illustrative of the principles, it being considered that the invention comprehends any minor change in construction that may be permitted within the scope of the appended claims.

What is claimed is:

1. A roll film developing machine comprising a support structure; a cradle mounted thereon for movement between upright and inverted positions; clamp means connected to the cradle; a developing tank supported on the cradle for movement with and gripped by said clamp means; and means for, at predetermined times, moving the cradle between said positions, comprising a motor and a driving connection between the motor and said cradle, said driving connection including reduction gearing adapted for effecting movement of the cradle between said positions thereof at a substantially slower speed than the speed of rotational movement of the motor shaft, said driving connection further including at least one wheel

driven by the reduction gearing, a shaft journaled on the support structure and connected to the cradle, and dog means carried by the shaft and adapted for engagement by said wheel for effecting rotation of the shaft responsive to rotation of said wheel, said last named shaft being under spring bias tending to rotate the same in one direction, the last named shaft being driven by said wheel in the opposite direction.

2. A roll film developing machine comprising a support structure; a cradle mounted thereon for movement between upright and inverted positions; clamp means connected to the cradle; a developing tank supported on the cradle for movement with and gripped by said clamp means; and means for, at predetermined times, moving the cradle between said positions, comprising a motor and a driving connection between the motor and said cradle, said driving connection including reduction gearing adapted for effecting movement of the cradle between said positions thereof at a substantially slower speed than the speed of rotational movement of the motor shaft, said driving connection further including at least one wheel driven by the reduction gearing, a shaft journaled on the support structure and connected to the cradle, and dog means carried by the shaft and adapted for engagement by said wheel for effecting rotation of the shaft responsive to rotation of said wheel, said last named shaft being under spring bias tending to rotate the same in one direction, the last named shaft being driven by said wheel in the opposite direction, said wheel and dog means being arranged to retain the cradle temporarily in an inverted position.

3. A film developing machine comprising: a support structure; means mounted thereon for rocking movement about a horizontal axis and adapted for supporting a quantity of film in a developing solution; means mounted on said structure drivingly engaged with the film-supporting means and adapted for rocking the same through an angular distance of approximately 180 degrees first in one direction from a normally upright position to an inverted position, and then in a return direction back to said upright position; and abutment means on said structure positioned to be struck by said film-support means on the return movement thereof, thus to beak up air bubbles within the film-support means.

4. A film developing machine comprising: a support structure including a base, a housing thereon, and a standard extending upwardly from the base in spaced relation to the housing; means mounted on said structure for rocking movement about a horizontal axis and adapted for supporting a quantity of film in a developing solution, including a U-shaped cradle pivotally suspended from the standard and housing between the same, clamp means on the cradle, and a tank engaged against the cradle by the clamp means; means mounted within the housing drivingly engaged with the cradle and adapted for rocking the same through an angular distance of approximately 180 degrees first in one direction from a normally upright position to an inverted position, and then in a return direction back to said upright position; and abutment means on said base positioned between the housing and standard at a location such that it will be struck by said cradle on the return movement of the cradle, thus to break up air bubbles within the tank.

5. A film developing machine comprising: a support structure including a base, a housing thereon, and a

standard extending upwardly from the base in spaced relation to the housing; means mounted on said structure for rocking movement about a horizontal axis and adapted for supporting a quantity of film in a developing solution, including a U-shaped cradle pivotally suspended from the standard and housing between the same, clamp means on the cradle, and a tank engaged against the cradle by the clamp means; means mounted within the housing drivingly engaged with the cradle and adapted for rocking the same through an angular distance of approximately 180 degrees first in one direction from a normally upright position to an inverted position, and then in a return direction back to said upright position, including a motor, reduction gearing driven by the motor, a rock shaft journaled in the housing and secured to said cradle to rock conjointly with the cradle as a pivot thereof, means extending between the shaft and gearing operatively arranged to intermittently rotate the shaft through 180 degrees in said one direction, and resilient, yielding means in the housing for biasing the shaft in a return direction so as to impart corresponding motion to the cradle; and abutment means on said base positioned between the housing and standard at a location such that it will be struck by said cradle on the return movement of the cradle, thus to break up air bubbles within the tank.

6. A film developing machine as in claim 5 wherein said means interposed between the shaft and gearing includes rotary elements driven continuously by the gearing in one direction and having abutments angularly spaced about the axis of rotation of said elements, and a plurality of dogs rigid with and angularly spaced about the shaft in position for engagement in successively following order by said elements to impart rotatable movement to said shaft, said elements disengaging from the dogs following rotation of the shaft through the prescribed angular distance of approximately 180 degrees in said one direction of the shaft, thus to free the shaft for rotation in the opposite direction under the bias of said resilient yielding means.

7. A film developing machine as in claim 6 wherein said rotary elements are disposed in side-by-side relation and the dogs are correspondingly disposed in side-by-side relation in the planes of rotation of the respective rotary elements.

8. A film developing machine as in claim 7, further including indexing means in the housing for indicating the presence of the rotary elements and dogs at a starting position thereof, comprising a peripherally notched rotary member connected with the reduction gearing for rotation conjointly therewith, and an arm pivotally mounted in the housing in position to drop into the notch of said rotary member when the rotary elements and dogs are in their starting position.

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