Nov. 25, 1947. D. M. WILSON 2,431,442

MACHINE FOR AUTOMATIC DEVELOPMENT OF PHOTOGRAPHIC FILMS

Filed Nov. 22, 1946 3 Sheets-Sheet 1

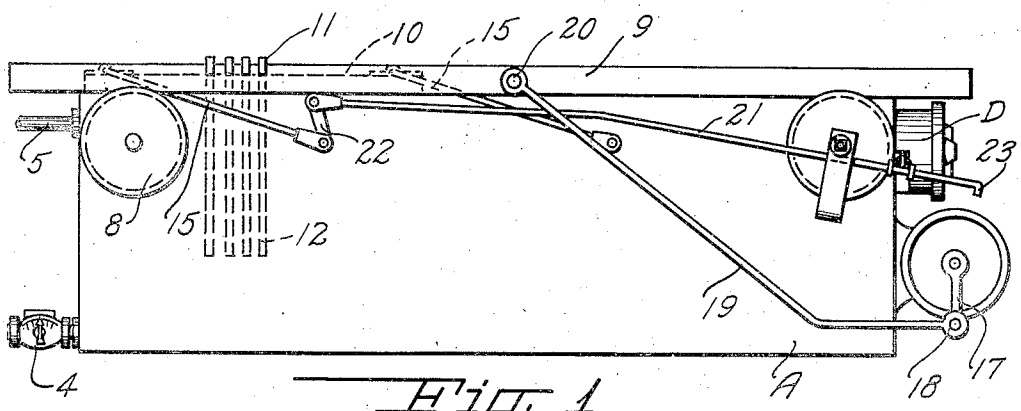


Fig. 1

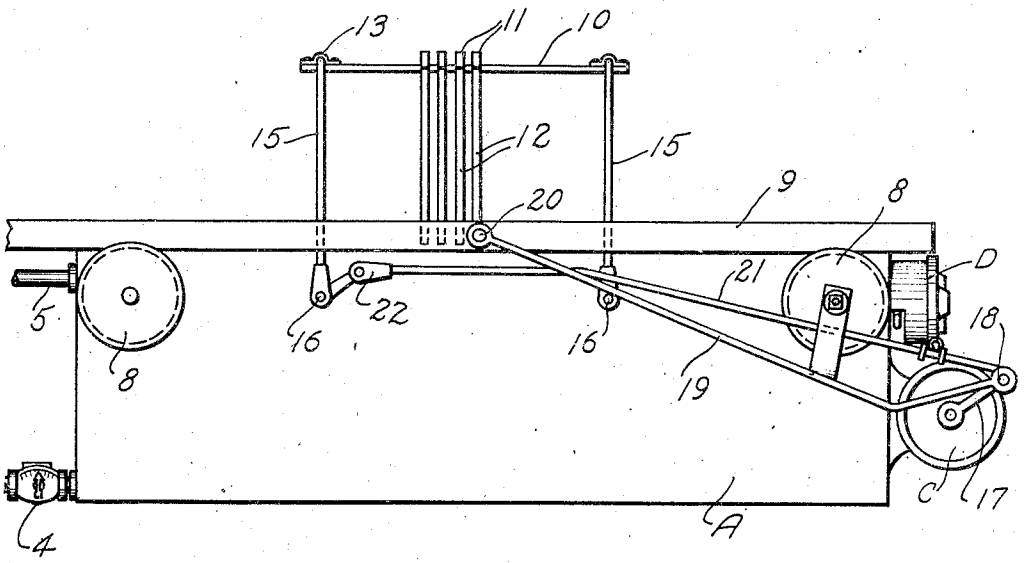


Fig. 2

Inventor
Dern M. Wilson

By McMorrow, Berman & Davidson
Attorneys

Nov. 25, 1947. D. M. WILSON 2,431,442

MACHINE FOR AUTOMATIC DEVELOPMENT OF PHOTOGRAPHIC FILMS

Filed Nov. 22, 1946 3 Sheets-Sheet 2

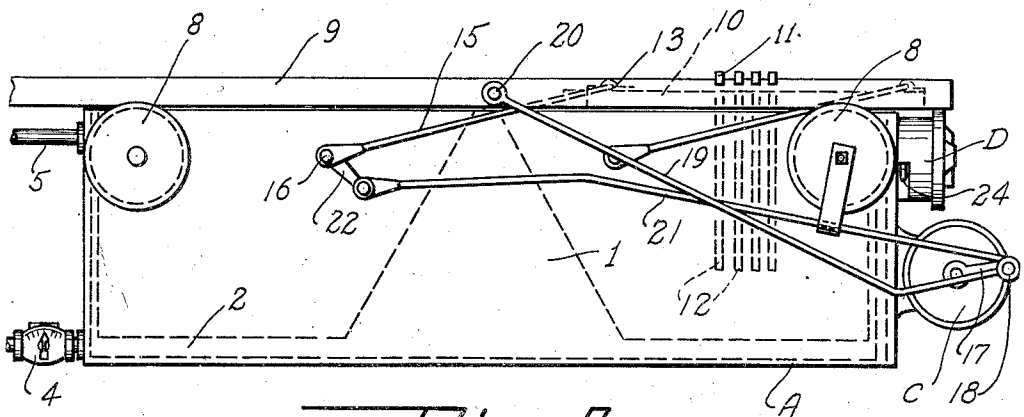


Fig. 3

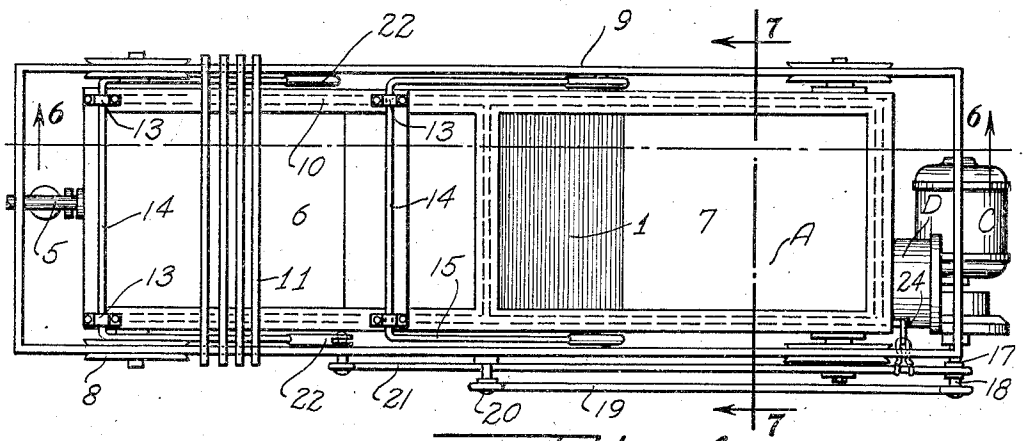


Fig. 4

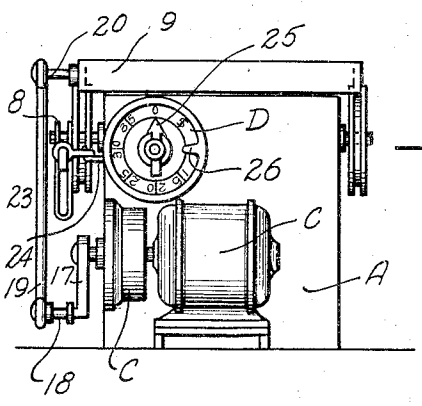


Fig. 5

Inventor
Dern M. Wilson

By McMorrow, Berman & Davidson
Attorneys

Nov. 25, 1947. D. M. WILSON 2,431,442

MACHINE FOR AUTOMATIC DEVELOPMENT OF PHOTOGRAPHIC FILMS

Filed Nov. 22, 1946 3 Sheets-Sheet 3

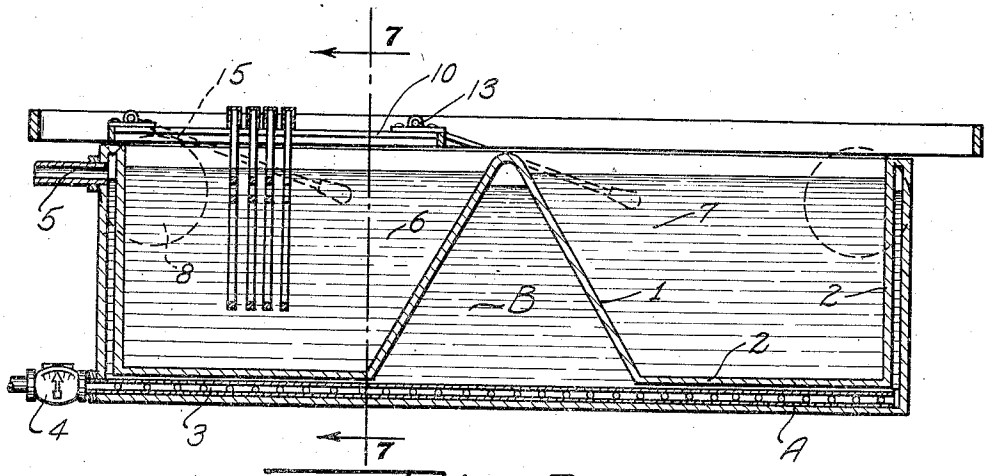


Fig. 6

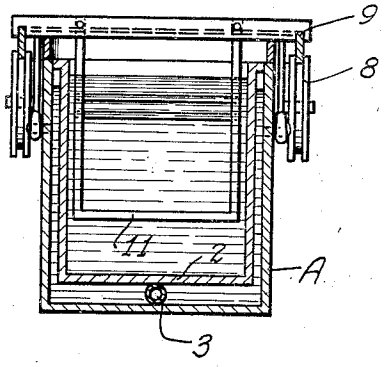


Fig. 7

Inventor
Dern M. Wilson

By McMorrow, Berman and Davidson
Attorneys

Patented Nov. 25, 1947

2,431,442

UNITED STATES PATENT OFFICE

2,431,442

MACHINE FOR AUTOMATIC DEVELOPMENT OF PHOTOGRAPHIC FILMS

Dern M. Wilson, Burbank, Calif.

Application November 22, 1946, Serial No. 711,560

4 Claims. (Cl. 95—89)

1

This invention relates to a film developing and treating machine and more particularly and specifically to an automatic film developing machine of which the following is a specification.

The primary object of this invention resides in the provision of a film developing machine which automatically agitates the film in a developer and at a predetermined set time removes the film from the developer and places it in the hypo wash.

Another object of this invention is the provision of a film developing machine of the character described which enables the operator to work in darkness developing and washing film with an automatically timed machine which will allow for the development of a greater number of films in a relatively short period of time with practically no attention required on the part of the operator other than the placement of the film on the machine and their removal therefrom, the preparation and care of the baths, and the setting of the timing device prior to each new operation of the machine.

Still another object of this invention resides in the provision of a device of the character described which is of a simple and inexpensive design being constructed from parts readily and inexpensively available and assembled in a relatively short period of time to make possible the wide distribution and usage of this advantageous machine.

Further improvements and advantages of this invention will readily appear to those skilled in the art when the following description is read in the light of the accompanying drawings in which:

Fig. 1 is a side elevation of the machine with the timing device and motor thereon.

Fig. 2 is a side elevation of the machine illustrating the films in a lifted position.

Fig. 3 is a side elevation of the machine with the films disposed in the second tank.

Fig. 4 is a top plan view of Fig. 1.

Fig. 5 is an end view of the machine.

Fig. 6 is a vertical section taken on line 6—6 of Fig. 4.

Fig. 7 is a vertical section taken on line 7—7 of Fig. 4.

Referring now to the accompanying drawings which illustrate the preferred embodiment of this invention and in which like numerals indicate similar parts throughout the drawings A designates an elongated rectangular tank being open at the upper end thereof, said tank being divided internally on its transverse center line by a raised triangularly shaped division plate 1 formed integrally with the lining 2 of the tank which is

2

spaced from the bottom and side walls of the tank. A perforated pipe 3 is provided between the bottom of the liner 2 and the bottom wall of the tank A and is connected external the tank to a thermostatic valve 4 which controls the temperature and amount of water B from an external source admitting into the perforated pipe 3 where it is dispersed through the perforations therein and allowed to circulate freely in the chamber between the lining 2 and the walls of the tank. The overflow of this water is carried from between the liner and the tank walls by an outlet pipe 5 which opens into the chamber between said members at a high point on one side of said tank. This water acts as a temperature control for the developer 6 carried in one of the two divisions of the tank and the hypo 7 in the second division of the tank the triangularly shaped division plate 1 complete separating the two divisions.

Four cylindrical pulley wheels 8 are rotatably mounted one at each corner of the tank on opposite sides thereof in such a manner as to dispose their upper pulley surface at a point slightly raised above the top edge of the tank. An elongated rectangular metallic frame 9 of greater length and width than the tank A is adapted to lie with its lower edges in engagement with the pulley wheels 8 so that rotation of the pulley wheels will cause axial movement of the frame relative to the tank and the converse being true with any axial movement of the frame the pulley wheels will be caused to rotate in the direction of the movement.

A second rectangular frame 10 of substantially the same area as one-half of the tank is adapted to support transverse its width between its two sides conventional film hangers 11 with the film 12 supported thereby depending downwardly through and below the frame. This frame 10 is provided on each side and at each end of said side with small bearings 13 which are adapted to rotatably receive the center members 14 of a pair of U-shaped metallic rods 15 whose extended legs depend downwardly on either side of the frame to be pivotally secured by pins 16 at two points equidistant either side of the transverse center line of the tank on either side of the tank thus suspending the frame 10 directly above the center of the tank at a spaced vertical distance therefrom when said rods 15 are in a vertical perpendicular position relative to the tank. This condition allows for the swinging of the frame axially with the tank to allow it to be lowered to rest on the upper edge of the tank directly over one section thereof in a plane beneath the

larger frame 9 and in such a position as to allow the extended ends of the film holders 11 to engage the upper edge of the frame 9 thereby supporting the holders on that frame when frame 10 is in the plane beneath it.

A motor C is secured to one end of the tank A and is provided with an extended shaft therefrom to which is secured an L-shaped arm 17 which rotates with the motor with the foot member 18 of the arm describing an arc parallel with the side walls of the tank in a position beyond the side wall of said tank. An arm 19 is rotatably secured to the foot portion 18 and the L-shaped arm 17 at one end and extends angularly upwardly where it is rotatably secured by a pin 20 to the outer edge of the larger rectangular frame 9 on its transverse center line thus adapting the frame 9 to be axially moved backward and forward from the motor end of the tank with the rotation of the L-shaped arm 17. This operation provides for the agitation of the films 12 within either of said sections of the tank when the frame 10 is swung downwardly over that section of the tank and the film holders 11 are supported on the frame 9 and move axially with the frame 9 in its movement thus agitating the film within the bath of that section of the tank.

A second elongated arm 21 is secured to a bell crank 22 which in turn is secured to one of the pivotal lower ends 16 of the frame 10 supporting rods 15. The second end of the arm 21 is provided with a hook 23 which is normally carried at a position above but in the same vertical plane with the foot of the L-shaped arm 17 by the timing device D hereafter to be described in such a manner that the lowering of the hooked end of this arm will cause it to engage the foot 18 of the L-shaped arm 17 and cause it to be rotated therewith. The rotation of the hook 23 with the L-shaped arm causes, when said arm is at its furtherest point away from the end of the tank, the arm 21 to be moved axially with the side of the tank thus operating the bell crank 22 which swings the rods 15 upwardly to a vertical position and at the further extent of the movement of this arm 21 the rods 15 are carried past their center and allowed to fall into the second section of the tank in that end thereof adjacent the motor described. This operation removes the films 12 from the developing bath and carries them upwardly and over the division plate 1 and allows them to be placed in the hypo stopping bath 7. When the films have been placed in the hypo bath the arm 21 is at its limited movement axially with the tank with its hooked end riding freely with the L-shaped arm with the tension being placed on the rod, by the arm 19, not having changed in position, continues to move the frame 9 thus agitating the films in the hypo bath as described.

The timing device D comprises a timer with the conventional bell removed and a trigger-like member 24 added in replacement for the bell knocker usually found thereon. This trigger-like member is that part of the timer which supports the arm 21 above the arm 17 while the films are in the developing bath, and acts to release the arm 21 when the timing mark 25 has moved to the timing stop 26 carried on the face of the timer.

Thus it can be seen that a film developing machine has been provided which: provides for a temperature control means for maintaining the proper temperature of the developer and hypo baths of the machine; provides for an automatically timed operation for agitating the film in a developing bath and at a predetermined time

removing the films from the bath and placing them in a hypo bath where they are again agitated until they are removed therefrom or until the machine is stopped by means of a conventional snap switch supplied on the motor electrical inlet.

It may also be seen that an improved and useful film developing machine has been provided which is of relative inexpensive cost, and which will be durable in use over a long period of time giving maximum efficiency and flawless performance at all times.

Having thus described and explained the construction and operational functions of this invention and with full belief that modifications in size, shape and general characteristics of this invention would not constitute a departure therefrom what I desire to claim in Letters Patent is:

1. A film developing machine of the character described comprising, an elongated tank, a plurality of sections longitudinal the tank for containing various film treating liquids, an elongated rectangular frame movably supported about the upper edge of said tank, film holders supported by said frame in a depending immersed position in one of said tank sections, automatic means for horizontally reciprocating said frame thus agitating said film holders within said section, and automatic means for removing said holders from said section and placing them in the next adjacent section after a predetermined period of time.

2. A film developing machine of the character described comprising, an elongated tank, a spaced liner within the tank, a raised division plate formed from said liner dividing said tank into two separate sections adapted to separately retain different film treating liquids, an elongated flat rectangular frame mounted above and around the upper edge of said tank for longitudinal horizontal movement, film holders supported by said frame transverse the tank in a depending immersed position within one of said sections, automatic means for continuous horizontal movement of said frame agitating said film holders within said section, and automatic means for removing said film holders from said section and lifting them over said division plate to immerse them in the next adjacent section of said tank after a predetermined period of time.

3. A film developing machine of the character described comprising, an elongated rectangular tank of considerable depth, a liner within said tank at a spaced distance from the inner walls and bottom thereof forming an enclosed chamber therebetween, means for circulating water of a controlled temperature through said passage, a division plate transverse the interior of said tank dividing it longitudinally into two separate sections adapted to retain different film treating liquids, a flat rectangular frame mounted for horizontal movement positioned above and around the upper open end of said tank, film holders supported by and transverse said frame in a depending position therefrom in an immersed condition in one of said tank sections, an electric motor mounted external said tank, a cam arm driven by said motor, an extension from said cam arm to said frame causing horizontal reciprocation thereof thus agitating said film holders within said section, a mechanical timer carried by said tank, means actuated by said timer after a predetermined period of timing causing said motor to actuate a lifting means which raises said film holders from said section and lifts them over

said division plate to immerse them in the liquid of the second section of said tank.

4. A film developing machine of the character described comprising, an elongated rectangular open topped tank of considerable depth, a liner within said tank at a spaced distance from the inner walls and bottom thereof forming an enclosed chamber therebetween, a thermostatic valve and water system controlling a temperature regulated flow of water through said chamber, a vertical division plate formed integrally with said liner dividing said tank transversely into two equal longitudinal sections adapted to retain film developer and hypo separately therein, rotatably mounted pulley wheels on the four upper corners of the elongated sides of said tank, a flat rectangular frame of greater length and width than said tank adapted to be horizontally rollably supported by said wheels at a spaced distance above the top of said tank, film holders supported by and transverse said frame in a depending immersed position within the developer bath section, an electric motor carried by said tank, a cam arm rotated by said motor, a linkage arm between said cam and said frame adapted to continuously horizontally reciprocate said frame on said wheels to agitate said holders with said section, a mechanical hand set timer carried by said tank, a second rectangular frame of substantially one-half the area of said tank adapted to be supported on the upper edge of said tank within and below said first frame, a pair of U shaped arms pivoted equidistant from the transverse center line of said tank to both sides thereof their interconnecting legs being pivotally supported across each upper end of said second frame, a bell crank connected to one pivoted end of one of said arms, an elongated arm from said bell crank with a hooked end thereon held above said cam arm by said timer, and means adapting said timer to release said hooked arm to engage said cam to rotate said bell crank and lift said smaller frame upwardly picking up said film holders and lifting them over said division plate to place them in said second section after a predetermined period of time.

DERN M. WILSON.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
833,626	Pifer	Oct. 16, 1906
2,004,410	Houch	June 11, 1935
2,386,781	Daly	Oct. 16, 1945

FOREIGN PATENTS

Number	Country	Date
462,329	Germany	July 11, 1928
768,290	France	May 14, 1934