Jan. 6, 1970 W. L. PENSGEN 3,487,763

WATER CONSERVATION SYSTEM FOR A PHOTOGRAPHIC FILM PROCESSING DEVICE

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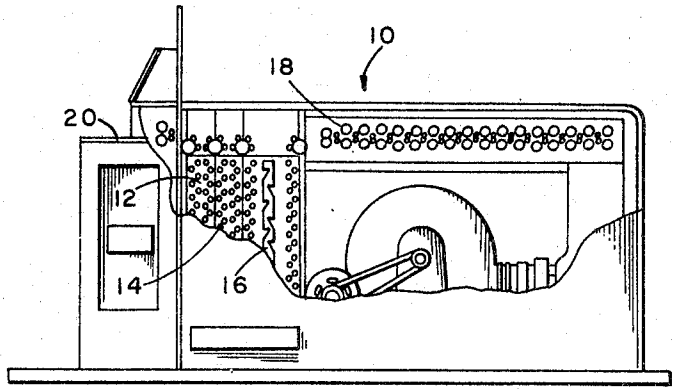
FIG. 1



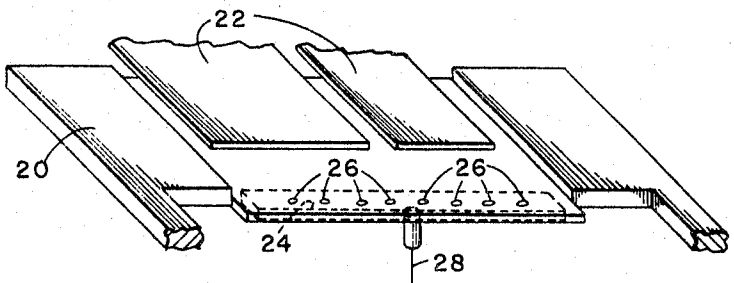
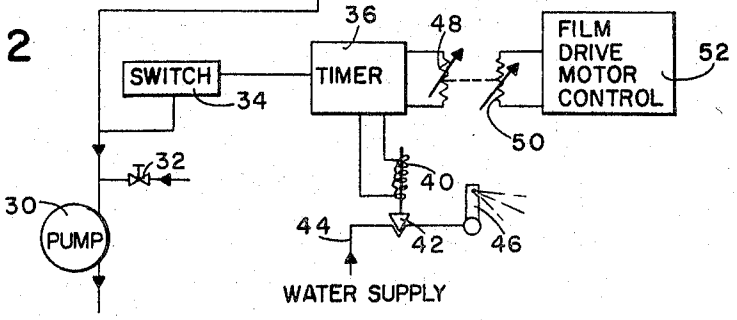


FIG. 2



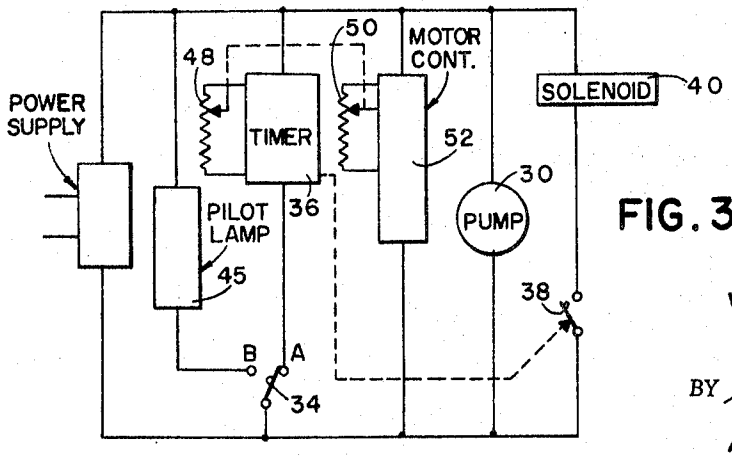


FIG. 3

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ABSTRACT OF THE DISCLOSURE

A water conservation system for use in a photographic film processing device. The water conservation system is activated by a film sensing device which moves a valve in either of two positions. In the first position the valve supplies a minimum water flow to the wash chamber or cuts off the flow of water entirely. In the second position the valve supplies a maximum flow of water in the wash chamber. The valve is moved to the second position when the film is sensed by the sensing device and is held in the second position for a predetermined time after the film is no longer sensed by the film sensing device to assure that the film is subjected to a maximum water flow while it is transported through the wash chamber. The film sensing device has a chamber connected to the water supply. A pump is also connected to the chamber. The chamber has openings therein across which the film passes as it is transported through the photographic film processing device.

BACKGROUND OF THE INVENTION

This invention relates generally to photographic film processing, and more specifically to an improved photographic film processing device having means for conserving the water supply.

In prior know photographic film processing devices, maximum wash water flow is supplied to the wash chamber continuously throughout the processing cycle. Such cycle normally includes developing, fixing, washing and drying operations. In addition, maximum wash water flow is provided during stand-by periods, particularly in those processing installations in which the wash water is used to maintain the developer and fixer solutions at a predetermined temperature. Accordingly, it is evident that a considerable quantity of wash water is used in the aforementioned processing devices over and above that required to wash the processed film. The purpose of the present invention is to eliminate the wasting of wash water that has occurred heretofore.

It is generally well known in the art to provide apparatus such as motion picture projectors and tape recorders capable of sensing the presence or absence of a film or web of material, and in response thereto to actuate film reversing control mechanisms. However, applicant is unaware of any film sensing mechanisms incorporated in photographic processing devices for conserving wash water.

SUMMARY OF THE INVENTION

This invention includes within its scope an improvec photographic processing device having a film material sensing mechanism for detecting the presence of a photographic film material in sheet or web form as it is transported through the processing device, and in response thereto actuating control mechanism to provide maximum water flow to the wash chamber, such maximum wash water flow being automatically reduced to a minimum water flow or cut off entirely after the trailing end of the material leaves the wash chamber.

More specifically, when a photographic material is introduced into a processing device of a width capable of covering one or more openings in a chamber, a negative pressure is generated therein for operating a switch connecting the power supply to a solenoid controlling a water valve. Energization of the solenoid opens the water valve causing a water source under pressure to direct a maximum flow of wash water against the material through a plurality of nozzles. When the trailing end of the material uncovers the openings in the chamber, the negative pressure is reduced and the switch is returned to its normal position; however, the solenoid is still energized for a predetermined period of time depending upon a resistance-capacitor setting of a timer to maintain maximum water flow until the material passes completely through the wash chamber. The time delay is electrically interconnected with a film speed potentiometer of a film drive motor control, and the two are calibrated so that as the trailing end of the material leaves the wash chamber, the solenoid is de-energized causing the valve to return by known means to its normal position reducing the flow of wash water to a minimum, or cutting it off entirely.

One of the objects of the present invention is to provide an improved processing apparatus having a water conservation system for providing maximum wash water flow during at least a portion of the time that a film is being processed, and for cutting off the water flow entirely or reducing it to a minimum water flow during the remainder of the processing cycle and during stand-by periods.

Objects and advantages other than those set forth above will be apparent from the following description when read in connection with the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

In the drawing:

FIG. 1 is a schematic view of a photographic processing device showing the developing, fixing, washing and drying chambers thereof;

FIG. 2 is a schematic view partially in perspective and partially in block diagram form showing a wash water conservation system for a processing device of the type disclosed in FIG. 1; and

FIG. 3 is an electrical wiring diagram for the processing device of FIG. 1.

DETAILED DESCRIPTION

Referring to the drawing, this invention is embodied in a processing device **10** of known type having developing, fixing, washing and drying chambers **12**, **14**, **16** and **18** respectively. The processing device has a photographic film material sensing mechanism comprising a film feed table **20** over which the film **22** in sheet or web form is transported into the processing device **10**. The film feed table **20** has a recess extending laterally thereof as shown dotted in FIG. 2 to form a chamber **24**, and a plurality of small spaced openings **26** extend from the top of table **20** into chamber **24**. Although chamber **24** is shown integral with table **20**, it may be a separate unit secured to table **20** or to any other portion of the processing device **10** provided it is positioned so that film **22** is transported over it in passing to the wash chamber. The film sensing mechanism may also be provided in other forms, not shown, such as opposed film transport rollers, one of which is movable relative to the other when a film is introduced therebetween for operating a switch. The switch, in turn, may control the operation of other mechanisms such as a solenoid for controlling the wash water flow.

The film sensing mechanism of this invention has a conduit **28**, one end of which is connected to the bottom of chamber **24**, and the other end thereof connected to a pump **30** for drawing air through openings **26** and chamber **24**. The conduit **28** is provided with a negative

pressure adjustment bleed valve **32** for controlling the amount of negative pressure developed in the conduit **28** and chamber **24**. A pressure actuated switch **34** of known type is connected to conduit **28**, and may be adjusted so that it will be operated by a predetermined value of negative pressure generated by a film **22** covering one or more openings **26** in chamber **24**. The switch **34** is connected through a commercially available time delay relay mechanism referred to in the drawing as a timer **36** involving a resistance-capacitor network of known type for controlling a switch **38** (see FIG. 3) which is in series with a solenoid **40**. The solenoid **40** controls a valve **42** in a water supply conduit **44** for controlling the wash water supplied to a plurality of spray rinse nozzles **46**, only one of which is shown in FIG. 2, for directing wash water against film **22**. The valve **42** is movable upon energization of solenoid **40** from a normal first position, in which a minimum water flow is achieved or the water flow is cut off entirely, to a second position for achieving maximum water flow. Normally, switch **34** is in a first position A as seen in FIG. 3 supplying power to timer **36** and energizing a relay in the timer, not shown, which holds switch **38** in an open position. When switch **34** is operated by a predetermined amount of negative pressure, it is moved to a second position B causing a pilot lamp **45** to light up indicating that maximum water flow is being provided to the washing chamber, and de-energizing the timer relay causing switch **38** to close. This provides power to solenoid **40** which is energized, moving valve **42** to its aforementioned second or maximum water flow position. When the film **22** uncovers openings **26**, the negative pressure is reduced causing switch **34** to return to its normal first position A. This resupplies power to timer **36**; however, the timer relay will not be energized until a capacitor associated therewith, not shown, is charged up to a sufficient voltage to energize the timer relay. The time delay for energization of the timer relay is controlled by a variable time delay resistor **48**, which is, in turn, coupled to a film speed potentiometer **50** of any suitable film drive motor control **52**. The film speed potentiometer **50** controls the speed at which the film is transported, normally by pairs of opposed rollers, through the processor **10**, and this motor control may in combination with time delay resistor **48** automatically adjust the time delay to correspond to the speed of film transport.

The invention has been described in detail with particular reference to one embodiment thereof, but it will be understood that variations and modifications can be effected within the spirit and scope of the invention as described hereinabove, and as defined in the appended claims.

I claim:

1. In a photographic processing device or the like having a water conservation system, the combination comprising:

means for transporting a photographic film material through the processing device for processing;

a wash chamber in which a film transported therethrough by said transporting means is washed;

means movable between a normal first position for supplying a minimum water flow to said wash chamber or cutting off the water flow entirely, and a second position for supplying a maximum water flow to said wash chamber;

means for sensing a film transported through said processor;

said water supplying means being responsive to said film sensing means only when it senses said film for movement to its second position for supplying said maximum water flow to said wash chamber; and

means for retaining said water supplying means in said second position for a predetermined time after said film is no longer sensed by said film sensing means to assure that said film is subjected to maximum water flow while it is transported through said wash chamber.

2. The invention according to claim **1** wherein said film sensing means comprises a chamber connected to said water supplying means, said chamber having openings therein across which the film passes as it is introduced into said processing device, and a pump connected to said chamber.

3. In a photographic processing device or the like having a water conservation system, the combination comprising:

means for transporting a photographic film material through the processing device for processing;

means for sensing a film as it is transported through the processing device;

a wash chamber in which the film transported therethrough by said transporting means is washed;

means for supplying water to said wash chamber for washing the film and including a part movable between a normal first position in which a minimum water flow is supplied to said wash chamber or the water flow is cut off entirely, and a second position in which a maximum water flow is supplied to said wash chamber;

said water supplying means being responsive to said film sensing means only when it senses the film for movement of said part to said second position; and

means for retaining said movable part of said water supplying means in said second position for a predetermined time after the film is sensed by said film sensing means to assure that the film is subjected to maximum water flow while transported through said wash chamber, said movable part then returning to its normal first position.

4. The invention according to claim **3** wherein said retaining means comprises a time delay mechanism.

5. The invention according to claim **3** wherein said film sensing means comprises a chamber operatively connected to said water supplying means, said chamber having openings therein across which the film passes as it is transported through the processing device, and a pump connected to said chamber.

6. The invention according to claim **3** wherein said movable part of said water supplying means comprises a valve, said water supplying means further comprising a solenoid for moving said valve to its second position when energized, and a switch responsive to a predetermined negative pressure for energizing said solenoid, and said film sensing means comprises a chamber having openings therein across which the film is transported in the processing device, said chamber being connected to said switch, and a pump connected to said chamber for producing said predetermined negative pressure when the film covers said openings.

7. The invention according to claim **6** wherein said retaining means comprises a time delay mechanism.

8. The invention according to claim **3** wherein said movable part of said water supplying means comprises a valve, said water supplying means further comprising a solenoid for moving said valve to its second position when energized, and said retaining means comprises a time delay mechanism for retaining said solenoid energized for said predetermined time.

References Cited

UNITED STATES PATENTS

3,157,103	11/1964	Lowry et al.	95—89
3,334,566	8/1967	Friedel	95—89

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