

[54] **FILM PROCESSING APPARATUS FOR PROCESSING FILMS OF DIFFERENT TYPE**

[72] Inventor: **Einar W. Jensen**, Rochester, N.Y.
 [73] Assignee: **Eastman Kodak Company**, Rochester, N.Y.
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[52] U.S. Cl. **95/94 R, 95/89 R, 95/90.5, 226/110, 226/189, 118/12**
 [51] Int. Cl. **G03d 3/12**
 [58] Field of Search..... **95/89 R, 89 F, 90.5, 94; 226/110, 189; 118/12, 419; 134/64, 164; 68/9, 175**

[56] **References Cited**

UNITED STATES PATENTS

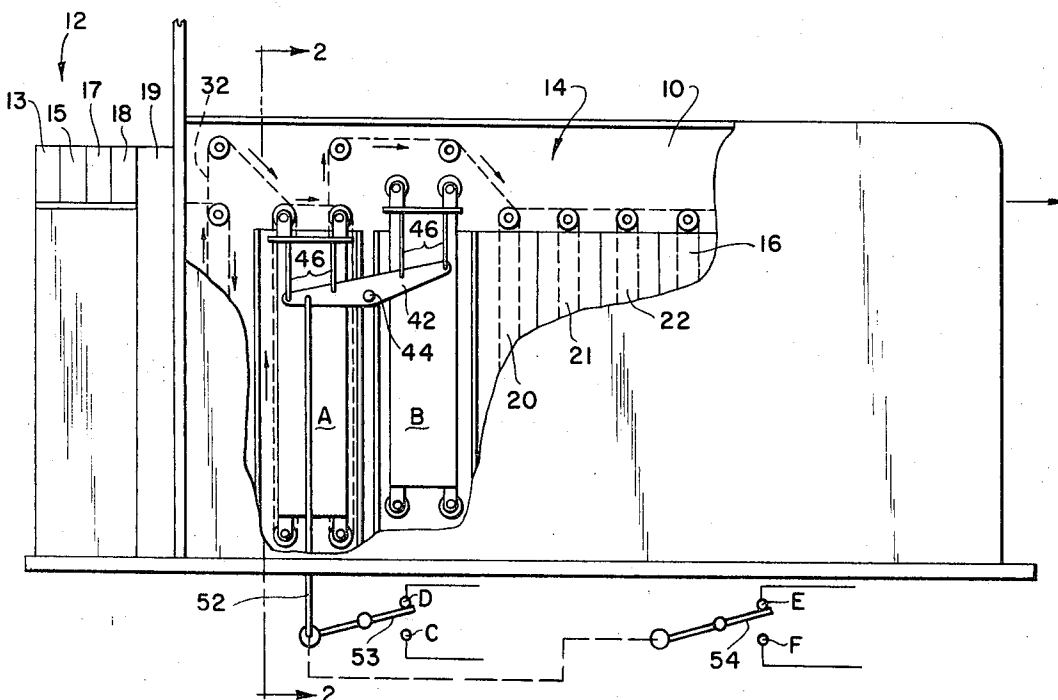
3,116,677	1/1964	Wetzel.....	95/94
2,933,032	4/1960	Pardee.....	134/74 X
3,025,779	3/1962	Russell et al.....	95/94
3,418,913	12/1968	Snarr.....	95/94

Primary Examiner—Samuel S. Matthews
Assistant Examiner—Alan A. Mathews
Attorney—Robert W. Hampton and Steve W. Gremban

[57] **ABSTRACT**

A processing apparatus having two chambers, one for properly processing a film of one type or ASA number, and the other for properly processing a film of a different ASA number or type. Each of the processing chambers is provided with a film supporting rack movable between an enabled position, in which the rack transports film, and a disabled position in which the film is not transported. Each chamber further has processing solution circulation, replenishment and temperature control systems. The film racks in the two processing chambers are coupled together such that movement of a rack in any one processing chamber to its enabled position results in movement of the rack in the other processing chamber to its disabled position. Once the threaded rack is moved to its enabled position and the processing apparatus threaded through all of its stations for properly processing a film of a predetermined type, an interlock system is actuated for (1) accepting for introduction into the processing apparatus only film of the predetermined type and rejecting all other types of film, and (2) activating recirculation, temperature control and replenishment systems for only the processing solution being used.

10 Claims, 5 Drawing Figures



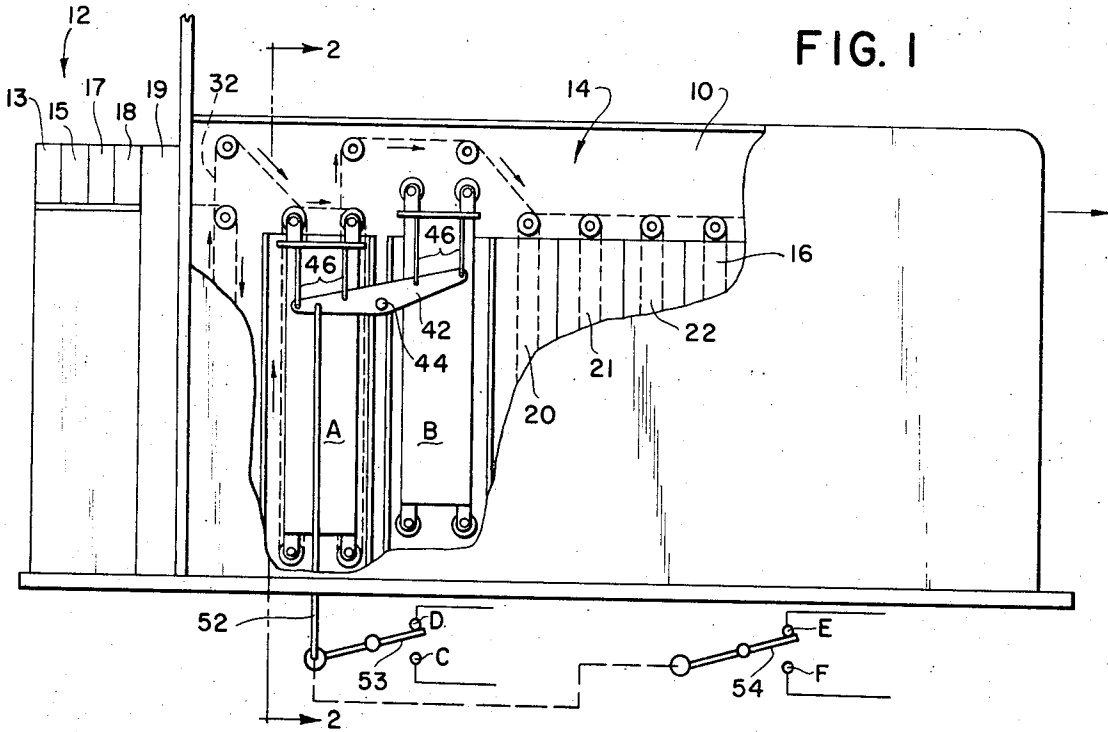


FIG. 1

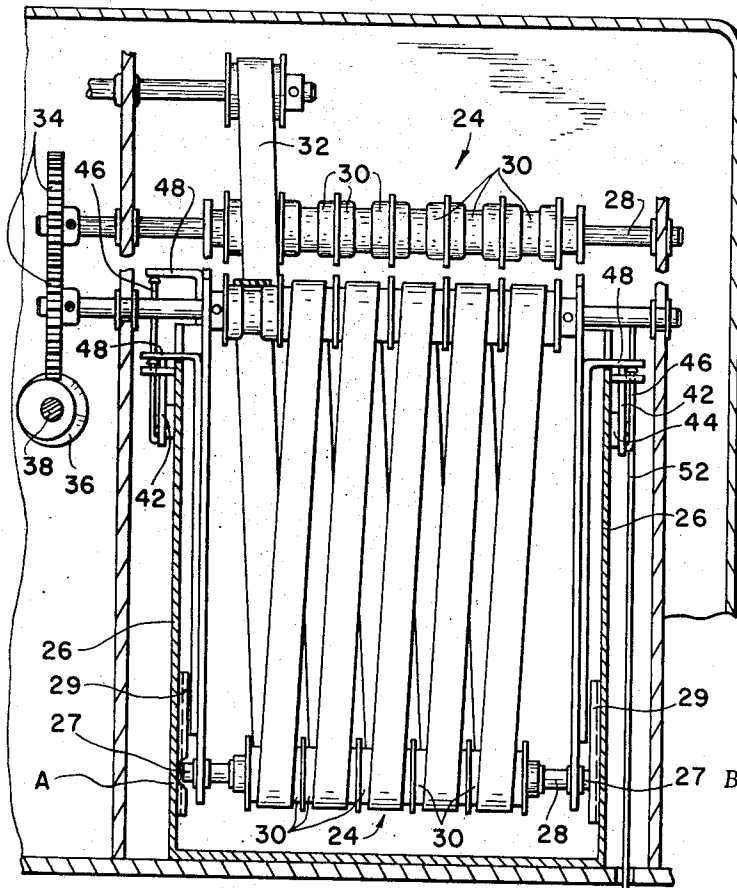


FIG. 2

EINAR W. JENSEN
INVENTOR.

BY *Steve W. Gramban*
Robert W. Hampton

ATTORNEYS

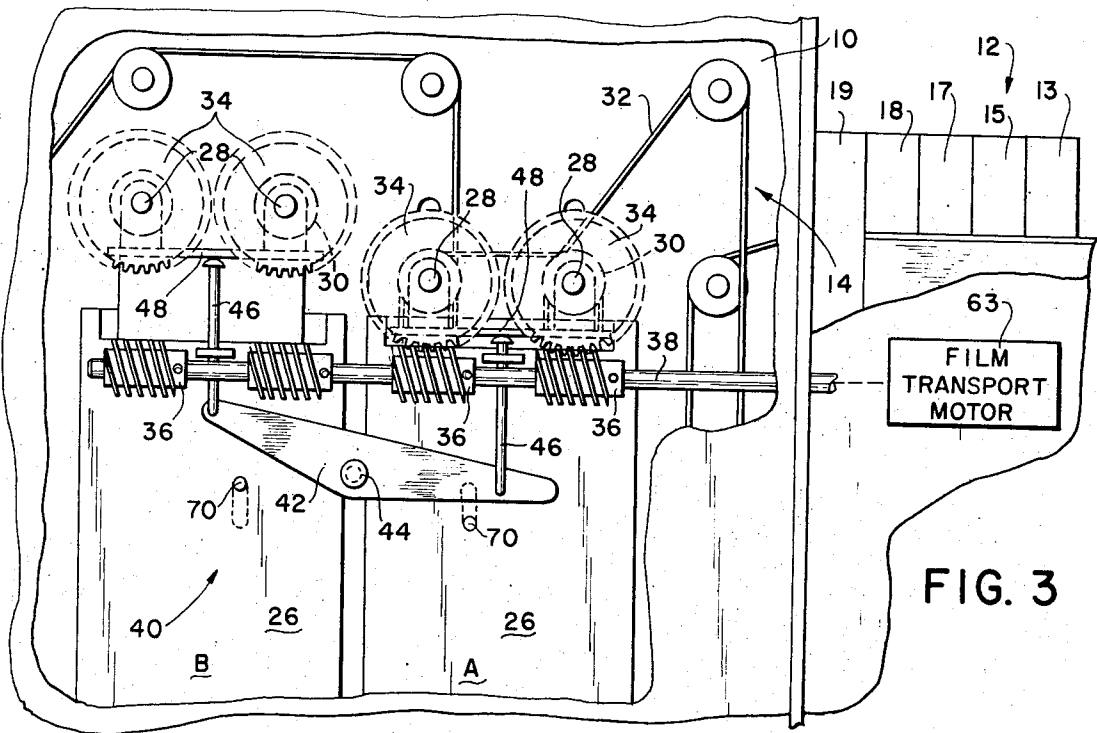


FIG. 3

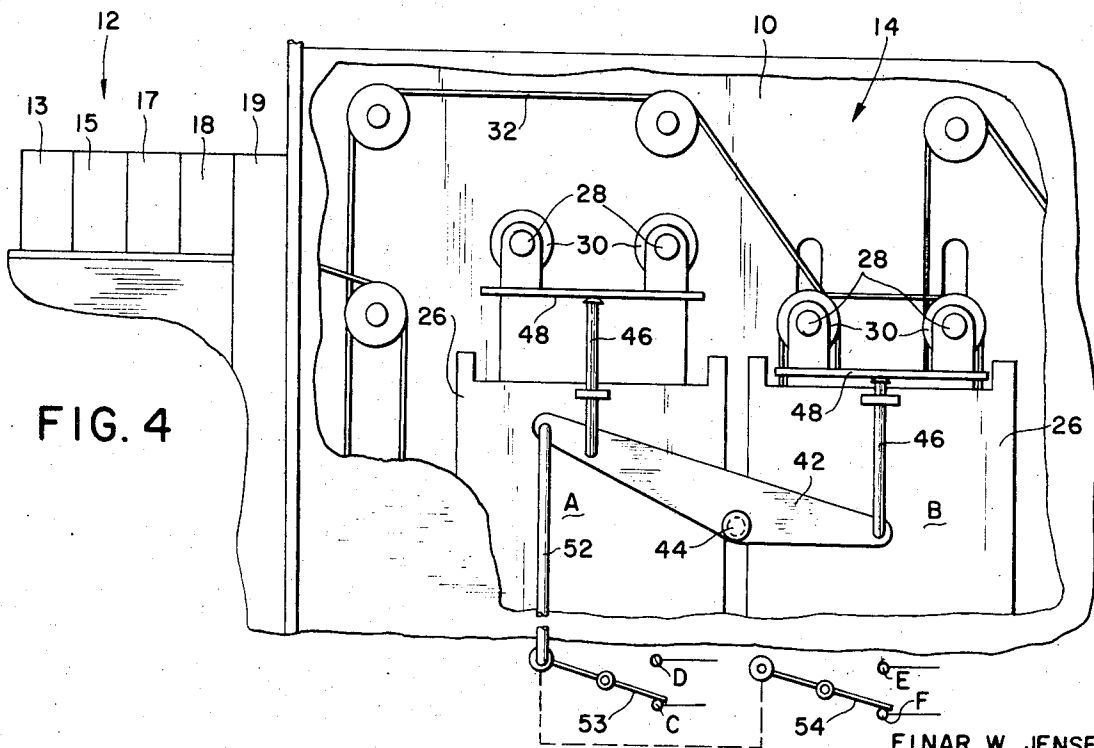


FIG. 4

EINAR W. JENSEN
INVENTOR.

BY *Steen W. Grambo*
Robert W. Hampton

ATTORNEYS

FILM PROCESSING APPARATUS FOR PROCESSING FILMS OF DIFFERENT TYPE

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to processing apparatus, and more specifically to a photographic processing apparatus having two separate processing stations, each adapted when selected and threaded to properly process a film of a predetermined type, and an interlock system for accepting for introduction into the processing apparatus only film of the predetermined type, and rejecting all film of a different type, and for activating recirculation, temperature control and replenishment systems of only the solution being used.

2. Description of the Prior Art

Photographic processing apparatus for sheet or continuous film comprising a plurality of processing stations or chambers through which the film is transported for processing are generally well known in the art. In processing apparatus of this type, such as described in U.S. Pat. No. 2,933,032, it is known to provide two separate processing chambers, one containing one type of processing solution for properly processing a film of one ASA number or type, and the other containing a different type of processing solution for properly processing a film of different type. With this dual processing solution capability, the processor operator can feed the film through the processor to utilize either of the two processing chambers to match the type of film being processed with the appropriate processing solution. A major difficulty with a processing apparatus of this type, particularly when the type of film is changed frequently, is that a film may be inadvertently processed in a processing chamber containing processing solution that will improperly process the film.

SUMMARY OF THE INVENTION

This invention includes within its scope a photographic processing apparatus having two processing chambers, each having a film supporting rack movable between an enabled position, in which the rack transports film, and a disabled position, in which the film is not transported. Each chamber is further provided with processing solution recirculation, replenishment, and temperature control systems. The film racks in the processing chambers are coupled together so that the enabling of the film rack in any one processing chamber automatically disables the film rack in the other processing chamber. The coupling is accomplished by a linkage comprising levers engageable with the film racks. The linkage actuates an interlock system at a film feed station for (1) accepting for introduction into the processing apparatus only film that is compatible with the processing solution in the chamber containing the enabled rack, and rejecting all noncompatible films, and (2) insuring operation of only the proper recirculation, temperature control and solution replenishment systems.

One of the objects of the present invention is to provide a photographic processing apparatus having processing chambers containing different solutions, and a film supporting and transporting mechanism in each chamber which is selectively enabled for properly processing film of a selected type.

Another object of the invention is to provide a photographic film processing apparatus having selective processing chambers containing solutions for properly processing different types of film, and an interlock system responsive to the selected chamber for accepting for introduction into the processing apparatus only film compatible with the processing solution in the selected chamber, and rejecting all noncompatible films, and for insuring operation of only the proper recirculation, temperature control and solution replenishment systems.

Another object of the invention is to provide a film processing apparatus capable of processing different types of film which is of simple design and construction, thoroughly reliable and efficient in operation, and economical to manufacture.

The invention and its objects and advantages will become more apparent from the detailed description of the preferred embodiment presented below.

BRIEF DESCRIPTION OF THE DRAWINGS

In the detailed description of the preferred embodiment of the invention presented below, reference is made to the accompanying drawings, in which:

FIG. 1 is a side elevational view partly in schematic form of a processing apparatus embodying the invention and with a portion thereof sectioned to show a plurality of processing chambers;

FIG. 2 is a section view taken along line 2—2 of FIG. 1 and showing a film supporting rack mechanism;

FIG. 3 is an enlarged segmental rear elevational view of the processing apparatus of FIG. 1 showing the film transport mechanism;

FIG. 4 is an enlarged segmental view similar to FIG. 1 showing the initially enabled film rack mechanism in a disabled condition, and the previously disabled film rack mechanism in an enabled condition; and

FIG. 5 is an electrical wiring diagram for the processing apparatus of this invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Because photographic processing devices are well known, the preferred description will be directed in particular to elements forming part of, or cooperating more directly with, the present invention, processing apparatus elements not specifically shown or described herein being understood to be selectable from those known in the art.

With reference to the drawings, a photographic processing apparatus 10 is shown in FIG. 1 having a film feeding station 12 for receiving exposed film preferably in a container such as a cartridge 13, a wet processing section 14 in which the film is processed, and a film dryer 16 of any suitable type. The processing apparatus 10 is particularly suited for a continuous processing operation in which exposed film in roll or cartridge form received from customers is sensed at the feeding station 12 by a sensing means 15 and if enabled by a film advance enabling means 17 is fed to any suitable film splicing means 18 where the film is spliced to the trailing end of a leader or previously fed film. The spliced film is transported by any suitable means into a film accumulator 19 of known type from which it is continuously drawn into the wet processing section 14.

Since the film advance enabling means 17, film splicing means 18 and film accumulator 19 may involve any suitable known mechanism, they are depicted in block diagram form. Preferably, the cartridges for film of different types or the film itself may be code marked, and the coding sensed by the sensing means 15 for sensing the type of film in the cartridge, and in response thereto enabling the film advance enabling means 17 to permit feeding of the film to the film splicing means 18. The film sensing means may be any suitable type of photosensitive device such as a photocell for sensing radiation reflected from or passing through appropriate holes or notches in the cartridge or film. The film sensor may also be a fluidic sensor, not shown, for sensing a notch or any other form of discontinuity in the cartridge or film. The film advance enabling means 17 may be any suitable means for releasing or unblocking the film so that it may be advanced to the film splicing means 18.

The wet processing section 14 is shown as having a pair of processing chambers designated A and B containing different processing solutions such as developers for selectively properly processing different film types such as ASA 40 and 160, hereinafter designated film types A and B respectively. The wet processing section 14 further has a stop bath solution chamber 20, a fixing solution chamber 21, and a wash chamber 22. Although only a single chamber is shown in FIG. 1 for certain of the processing functions, normally more than one is provided. Since the processing chambers A and B are substantially identical except for the type of processing solution or developer contained therein, in the ensuing description, similar parts located in processing chamber A and B will be designated by the same numerals.

As best seen in FIGS. 1-4, each of the processing chambers A and B has a film rack 24 for supporting and transporting a web such as film 32 through the processing apparatus 10. The rack 24 may be of the type shown and described in U.S. Pat. No. 3,380,678, or any other suitable type, and in the present application is shown as comprising side plate 26 secured together by any suitable means and mounted for reciprocal movement within the chamber by virtue of projections 27 on plates 26 extending into guide ways 29. The rack 24 supports upper and lower shafts 28 upon which are mounted a plurality of rollers 30 around which film 32 is threaded. As best seen in FIG. 3, the shafts 28 each have a gear 34 secured thereto which is movable into engagement with a corresponding drive worm 36 on a drive shaft 38 for driving the rollers 30 by direct or tendency drive when rack 24 is lowered in the chamber into an enabled condition in which gear 34 engages drive worm 36. Raising rack 24 to its disabled condition disengages gear 34 from drive worm 36.

A coupling mechanism 40 is provided for coupling the film racks 24 in chambers A and B for simultaneous movement of any one rack to its enabled condition and the other rack to its disabled condition. This coupling mechanism 40 comprises pivotal levers 42 mounted on ends of a shaft 44. The shaft 44 is preferably positioned intermediate chambers A and B, and levers 42 have vertically guided push-pins 46 secured thereto engageable with corresponding push plates 48 secured to side

plates 26 of film racks 24. The racks 24 may be manually moved between their enabled and disabled positions, and any suitable latch, not shown, may be provided for releasably holding the racks in their enabled position.

To condition the processing apparatus 10 to process exposed film of a type A, the operator preferably initially moves the rack 24 in chamber A to its enabled position in engagement with drive worm 36, and the processing apparatus and enabled rack are threaded with a leader. Movement of rack 24 to its enabled position causes an end of a rod 52 carried by lever 42 to engage and move single pole, double throw pivotal switches 53, 54 from normal positions in engagement with contacts C and F respectively into engagement with contacts D and E as seen in FIGS. 1 and 5. Switches 53, 54 are part of an interlock system and are linked together for joint movement by any suitable linkage, not shown. With reference to the wiring diagram of FIG. 5, switch 53 in position D connects the solution recirculation pump 56 for film type A to the power source through a switch 61. Switch 54 connects power to a pilot light indicated that the processing apparatus is conditioned to process film type A. The replenishment pump 58 and temperature control system 60 for film type A is connected to one side of the power source through normally closed contacts R-1 and R-2 respectively of deenergized relay R. When switch 61 is switched on, the recirculation pump 56 will pump the appropriate developer A heated by the temperature control system 60 from any suitable source into chamber A. It will be appreciated by one having ordinary skill in the art that the replenishment pump 58 and the temperature control system 60 serve to regulate or control the appropriate developer A for effecting the processing of film type A.

The interlock system is further provided with verifying switches 55, 55' for accepting for feeding to the film splicing means 18 only film type A if the processing apparatus 10 has been conditioned to process film type A, and to block or arrest the feeding of any other type of film to the film splicing means 18. Each of the verifying switches 55, 55' is a single pole, double throw switch similar to switches 53 and 54, and are linked together by any suitable means for joint movement. The switches 55, 55' are manually set by the operator into engagement with contacts G, H if film type A is to be processed or in engagement with contacts I, J if film type B is to be processed. The interlock system further has sensing switches 57, 57' which are responsive to the film sensing means 15 for connecting the film advance enabling means 17 to one of the contacts H, J depending upon which type of cartridge is placed in the film feeding station 12 of the processing apparatus.

Let us assume that the processing apparatus 10 has been conditioned by movement of racks 24 into the position shown in FIG. 1 to process film type A and threaded with leader. Such action would close switch contacts 53, D and 54, E. The operator also manually moves switches 55 and 55' into engagement with contacts G and H respectively for accepting film type A. The manual movement of the racks 24 and switches 55, 55' may be done separately or jointly by any suitable coupling mechanism, not shown. Relay R' is energized

through the closed switch contacts 55, G and 54, E closing normally open relay contact R'-1. Now, if a cartridge 13 containing film type A is placed in proper position at the film feeding station, film sensing means 15 senses the film and in response thereto closes switch 57 completing the circuit through switch contacts 55', H; 55, G and 54, E. The film advance enabling mechanism 17 is enabled so that the film type A may be fed from the cartridge to the splicing means 18. Processing of film type A may be commenced by closing start switch 62 connecting power through previously closed relay contact R'-1 to the processor film transport motor 63 for transporting the leader and film type A through the processing apparatus.

If a cartridge containing film type B is placed at the film feeding station 12, switch 57' is closed by the film sensing means 15. The electrical circuit in series with the film advance enabling means 17 is not completed since switch contact J is open and hence the film advance enabling means 17 will not operate and the feeding of film B from the cartridge to the splicing means 18 is prevented. Although film advance enabling means 17 is disabled, the film transport motor 63 still continues to operate by virtue of the continued energization of relay R' through closed switch contacts 55, G and 54, E. Accordingly, the cartridge is removed from the film feeding station by the operator, and during this time the film type A continues to be fed into the processing apparatus 10 from the film accumulator 19.

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

I claim:

1. In a film processing apparatus having (a) a plurality of chambers for respectively containing film processing solutions which are respectively adapted to process films of different types, (b) film transport means actuatable for transporting film of a selected one of such different types through film processing solution which is adapted to process the last-mentioned film and which is contained in any one of said chambers, and (c) film processing solution regulating means activatable for controlling film processing solution for effecting film processing, the combination comprising:

means for actuating said film transport means to transport film of such selected type through film processing solution which is adapted to process the last-mentioned film and which is contained in any one of said chambers; and

means responsive to actuation of said film transport means for activating said film processing solution regulating means to control film processing solution for processing film of such selected type.

2. The invention as recited in claim 1, wherein said film processing solution regulating means has a plurality of recirculation, replenishment and temperature control systems respectively for film processing solutions which are respectively adapted to process films of different types, and wherein said activating means includes:

means responsive to actuation of said film transport means for activating said recirculation, replenishment and temperature control system for film

processing solution which is adapted to process film of such selected type.

3. In a film processing apparatus having (a) a plurality of chambers for respectively containing film processing solutions which are respectively adapted to process films of different types, (b) film transport means actuatable for transporting film of a selected one of such different types through film processing solution which is adapted to process the last-mentioned film and which is contained in any one of said chambers, (c) a film receiving station for accepting film of such selected type for introduction into said film processing apparatus and (d) film processing solution regulating means activatable for controlling film processing solution for effecting film processing, the combination comprising:

means for actuating said film transport means to transport film of such selected type through film processing solution which is adapted to process the last-mentioned film and which is contained in any one of said chambers;

means responsive to actuation of said film transport means for activating said film processing solution regulating means to control film processing solution for processing film of such selected type; and means for only accepting film of such selected type at said film receiving station and rejecting films of other types.

4. The invention as recited in claim 3, wherein said film transport means has (a) drive means and (b) a plurality of film support means respectively located in said chambers and individually engageable with said drive means, and wherein said actuating means includes:

means for substantially simultaneously engaging one of said film support means with said drive means and disengaging another of said film support means from said drive means.

5. The invention as recited in claim 3, wherein said film processing apparatus further has film advance enabling means actuatable for allowing film advance from said film receiving station, wherein the combination further comprises:

film sensing means for sensing film of such selected type at said film receiving station, and wherein said accepting and rejecting means includes:

electrical circuit means responsive to the last-mentioned film sensing for actuating said film advance enabling means so as to allow advance of film of such selected type from said film receiving station.

6. In a film processing apparatus having first and second chambers for respectively containing film processing solutions which are respectively adapted to process films of different types, the combination comprising:

first and second film transport means respectively located in said first and second chambers, said first film transport means being movable between disabled and enabled positions and effective in said enabled position for transporting film through film processing solution which is contained in said first chamber, and said second film transport means being movable between disabled and enabled positions and effective in said enabled position for transporting film through film processing solution which is contained in said second chamber; and

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means coupling said first and second film transport means for substantially simultaneous movement in a manner such that movement of one of said first and second film transport means to said enabled position is accompanied by movement of another of said first and second film transport means to said disabled position.

7. The invention as recited in claim 6, wherein said first and second film transport means includes: drive means; and

first and second film support means respectively located in said first and second chambers and individually engageable with said drive means, and wherein said coupling means includes:

means for respectively engaging said first and second film support means with said drive means when said first and second film transport means are in said enabled position.

8. The invention as recited in claim 7, wherein said first and second film support means respectively includes:

first and second film roller racks separately movable into and out of engagement with said drive means, and wherein said coupling means further includes: pivotal lever means having opposite ends respectively connected to said first and second film roller

8

racks for substantially simultaneously moving one of said first and second film roller racks into engagement with said drive means and moving another of said first and second film roller racks out of engagement with said drive means.

9. In a film processing apparatus for accepting and processing films of first and second different types, the combination comprising:

means for selectively effecting first and second operational modes respectively for processing films of first and second different types; and

means (1) responsive to effecting of said first operational mode for accepting only film of a first type for processing in said film processing apparatus and (2) responsive to effecting of said second operational mode for accepting only film of a second type for processing in said film processing apparatus.

10. The invention as recited in claim 9, wherein said effecting means includes:

first and second film transport means separately actuatable for respectively transporting films of first and second different types in said film processing apparatus.

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