United States Patent

Fairbanks

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[54] PHOTOGRAPHIC PROCESSOR

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[52] **U.S. Cl.**.....**95/94,** 95/89 R, 118/423

[51] **Int. Cl.**.....**G03d 3/12**

[58] **Field of Search**.....95/89 R, 89 A, 89 L, 94 R; 118/423–428

[56] **References Cited**

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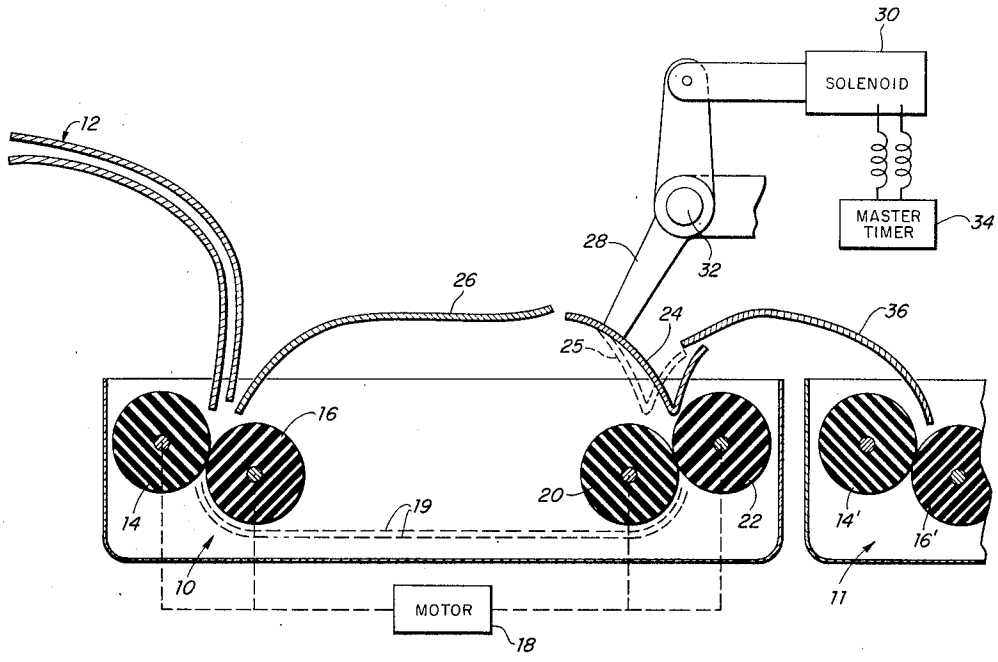
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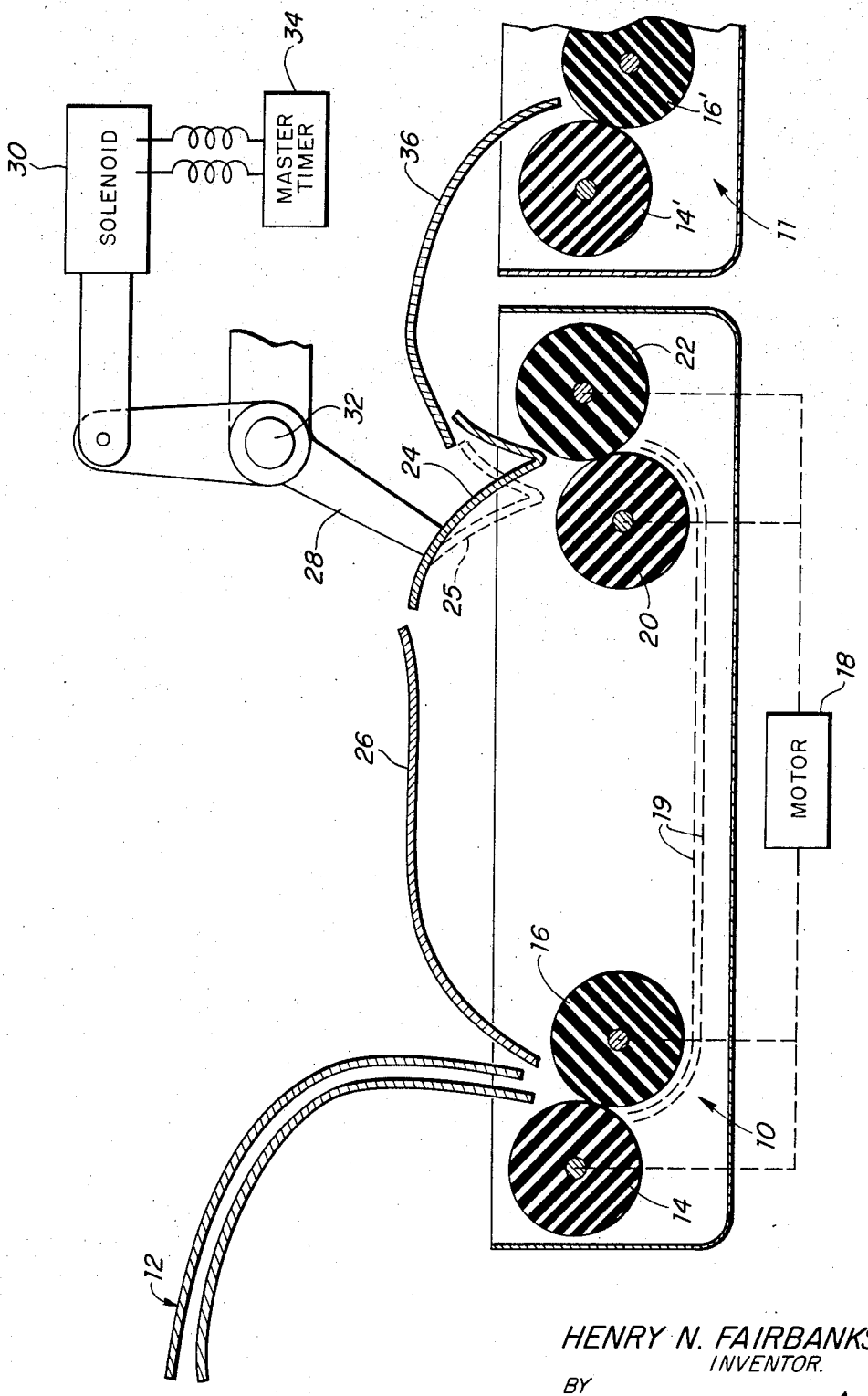
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[57] **ABSTRACT**

A photographic processing unit in which an increased amount of processing time in one processing station of the unit is attained by recycling the photographic materials through that processing station. Recycling is achieved by providing a movable two position deflector at the exit of the processing station. The deflector is movable to a first position in which it deflects the photographic materials existing from that processing station back to the entrance for one or more further cycles through the processing station. After the photographic materials have been recycled a sufficient number of times to allow complete chemical treatment, the deflector is moved to a second position wherein it deflects the photographic materials to the next processing station of the unit wherein the same type of recycling may be utilized if so desired.

9 Claims, 1 Drawing Figure





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PHOTOGRAPHIC PROCESSOR

BACKGROUND OF THE INVENTION

The present invention relates generally to photographic processing equipment, and more particularly pertains to a simple, compact and inexpensive photographic processing unit for processing exposed photographic materials at an increased speed, and wherein the increase in processing speed is attained by reducing the travel time of photographic materials through the unit during which the materials are not actually being chemically processed.

In the field of photographic processing, simple and compact processing units have been built which utilize a slow rate of travel of photographic materials through the processing unit, typically one-half inch per second. If the processing unit were to process an exposed photographic plate, typically having a length of 15 inches, at the rate of travel through the unit of one-half inch per second, it would take 30 seconds just to get the plate all the way into a chemical processing station of the unit. Actual chemical development typically might take 20 seconds. Thus, more time is expended in travel time just getting the plate into and out of a chemical processing station than in the actual chemical treatment of the plate. It would be desirable to have a simple, compact and inexpensive processing unit which has a faster rate of travel of photographic materials through the processor to reduce the expended travel time during which the materials are not being chemically treated, while retaining the materials in the chemical processing stations for a sufficient amount of time to allow complete chemical treatment. It would also be desirable to have such a photographic processing unit which utilizes a constant rate of travel of photographic materials through the unit while not increasing the size of the unit by elongating a processing station of the unit or by increasing the number of processing stations in the unit.

SUMMARY OF THE INVENTION

In accordance with a preferred embodiment, a simple, compact and inexpensive processing unit is disclosed wherein the rate of travel of photographic materials through the processing unit is increased to reduce the expended travel time during which the materials are not being chemically treated, while retaining the materials in the chemical processing stations of the unit for a sufficient amount of time to allow complete chemical treatment. Further, the preferred embodiment is economical and inherently simple as it utilizes a constant rate of travel of photographic materials through the unit which allows the drive motor to be a single speed motor.

The preferred embodiment increases the velocity of travel of photographic materials through the unit and retains the photographic materials in a processing station of the unit for a sufficient amount of time to allow complete chemical treatment by recycling the photographic materials through the processing station for one or more recycles. In one embodiment a movable, two position deflector is located at the exit of the processing station in which more processing time is desired. The deflector is movable to a first position in which it deflects the photographic materials exiting from that processing station back to the entrance for a further cycle through the processing station. After the photographic materials have been recycled a sufficient number of times to allow complete chemical treatment, the deflector is moved to a second position wherein it deflects the photographic materials to the next processing station of the unit wherein the same type of recycling may be utilized if so desired.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a sectional illustration of one embodiment of a deflector system which may be utilized to achieve recycling in a processing station.

DESCRIPTION OF A PREFERRED EMBODIMENT

FIG. 1 illustrates a first processing station **10** and a second processing station **12** of a photographic processing unit. The first processing station **10** may contain developing solution, and the second processing station **12** may contain fixing solution. Exposed photographic materials to be processed enter the processor through a guide **12**. The guide **12** deflects the materials to entrance drive rollers **14** and **16** which are driven at a constant speed by constant speed motor **18**. The entrance drive roller which normally contacts the emulsion side of the photographic materials, which could be either **14** or **16** depending on the design of the processor, should be slightly undercut at its central portions to avoid contacting the emulsion with spent of contaminated processing agents. The drive rollers **14** and **16** direct the photographic materials into the first processing station **10** wherein partial chemical processing of the materials occurs. The materials are directed from the entrance drive rollers to the exit drive rollers **20** and **22** by wire guides **19** in the processing station. Constant speed motor **18** also drives the exit rollers **20** and **22**. The spacing between the entrance and exit drive rollers is such that the photographic materials being processed are always being driven through the processing station by at least one set of drive rollers. The photographic materials are not completely chemically processed after one pass through the bath in processing section **10** because of the high rate of travel of the materials through the processing station. Recycling is attained by providing a movable steering means in the form of a two position movable deflector **24**, shown in a first position wherein it deflects the photographic materials back to guide **26** which further directs the photographic materials back through entrance rollers **14** and **16** for at least one further cycle through processing station **10**. It should be noted that the photographic materials carry processing solution with them as they pass by guides **24** and **26**, and thus chemical processing continues to a degree even though the materials are not directly immersed in developing solution in processing station **10**. If complete chemical processing has occurred after one recycle of the photographic materials, movable deflector **24** is moved to the position illustrated by dashed lines **25** wherein it directs the photographic materials to the next processing station **12** of the photographic processor. Deflector **24** is moved to its second position by arm **28** which rotates about shaft **32** under the direction of solenoid **30**. In one embodiment solenoid **30** may be actuated by a master timer **34** for the photographic processing unit. In other embodiments a

microswitch in the recycling path could be utilized to actuate solenoid **30** after recycling has occurred a predetermined number of times.

In the second and non-recycling position of deflector **24**, illustrated in dashed lines at **25**, the deflector directs photographic materials to guide **36** which then directs the materials to input rollers **14'** and **16'** of the second processing station **12**, wherein the same type of recycling may be utilized if so desired.

A differing number of recycle times may be desired in the processing unit depending upon the type of photographic materials being processed and the type of processing agent being utilized in the processing unit, or under certain circumstances recycling might be selectively omitted.

Recycling may be especially desirable in the washing processing station of the unit when it is desired to produce photographic materials of archive quality.

While several embodiments have been described, the teachings of this invention will suggest many other embodiments to those skilled in the art.

I claim:

1. A relatively compact photographic processing station for performing a processing step on photographic materials at a relatively high speed and wherein the increase in processing speed is obtained by reducing the travel time during which the photographic materials are not actually being processed and comprising:

a. a container means for containing a fluid processing agent;

b. a photographic materials entrance means into said container means;

c. a guide means for guiding photographic materials from said entrance means through said container means while the materials are exposed for processing to the fluid processing agent;

d. a relatively high speed drive means for driving photographic materials from said entrance means through said guide means with the photographic materials being partially processed by the fluid processing agent during a first cycle through the processing station, whereby said relatively high speed drive means minimizes the time the photographic materials spend in the nonprocessing operations of entering into and exiting from the processing station; and

e. means for completing the processing of the photographic materials including means for selectively directing the photographic materials which have passed through said guide means back to said entrance means for one or more subsequent passages through said guide means to recycle the photographic materials through the processing station for one or more times to complete the processing of the photographic materials by the fluid processing agent.

2. Apparatus as set forth in claim **1** wherein said means for selectively directing includes a movable steering means, and means for selectively positioning said steering means at a first position for steering photographic materials which have passed through said guide means back to said entrance means, or at a second position for steering photographic materials out of the photographic processing station.

3. Apparatus as set forth in claim **2** wherein said steering means includes a V shaped deflector, and said means for selectively positioning includes means for selectively positioning said V shaped deflector at said first and second positions.

4. Apparatus as set forth in claim **3** wherein said means for selectively directing includes a first fixed deflector means positioned adjacent to said V shaped deflector for further deflecting the photographic materials back to said entrance means after an initial deflection of the photographic materials by said V shaped deflector when positioned at its first position, and a second fixed deflector means, positioned adjacent to said V shaped deflector, for further deflecting the photographic materials out of the processing station after an initial deflection of the photographic materials by said V shaped deflector when positioned at its second position.

5. Apparatus as set forth in claim **4** and including a pair of exit rollers positioned at the exit end of said guide means, and wherein the point of the V of said V shaped deflector is movably positioned adjacent to said pair of exit rollers.

6. Apparatus as set forth in claim **5** wherein said entrance means includes a pair of entrance rollers, and said drive means includes a constant speed motor means for driving said entrance rollers and said exit rollers at a constant speed.

7. Apparatus as set forth in claim **6** wherein said photographic processing unit includes a master timer means for actuating said means for selectively positioning said V shaped deflector.

8. Apparatus as set forth in claim **1** wherein said entrance means includes a pair of entrance rollers, and the station includes a pair of exit rollers positioned at the exit end of said guide means, and said high speed drive means includes a constant speed motor for driving said entrance rollers and said exit rollers at a constant speed.

9. Apparatus as set forth in claim **8** wherein the station includes a master timer means for selectively activating said means for selectively directing.

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