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(71) Applicant: **KODAK LIMITED**
Patent Department,
Headstone Drive
Harrow, Middlesex HA1 4TY(GB)
(84) **GB**

(71) Applicant: **EASTMAN KODAK COMPANY**
343 State Street
Rochester New York 14650-2201(US)
(84) **CH DE FR IT LI**

(72) Inventor: **Fyson, John Richard, c/o Kodak Limited**
Patent Department,
Headstone Drive
Harrow, Middlesex, HA1 4TY(GB)

(74) Representative: **Phillips, Margaret Dawn et al**
Kodak Limited
Patent Department
Headstone Drive
Harrow, Middlesex HA1 4TY (GB)

(54) Photographic processing apparatus.

(57) It is well known to replenish photographic processing apparatus and to treat used solutions so that unwanted material is removed therefrom which may be deleterious to final product. Described herein is a unit which contains both replenisher chemistry and clean-up chemistry. The unit (10) comprises a plurality of compartments (20, 22, 24, 26, 30, 34) each of which contains either replenisher chemistry or clean-up chemistry. Each compartment (20, 22, 24, 26, 30, 34) is connectable to the appropriate stage of the processing apparatus.

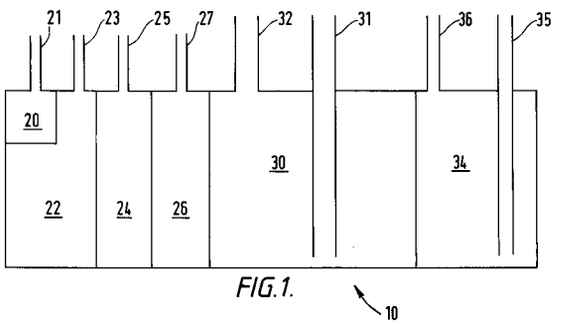

FIG.1.

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This invention relates to photographic processing apparatus and is more particularly concerned with the supply of replenishment and clean-up chemistry for use in such apparatus.

Replenishment processes are well known in the art and comprise replacing components in a photographic process which become used up during the processing or which deteriorate due to age and/or oxidation.

In continuously used processing apparatus, it is usual to provide means of replenishing the chemistry so that exhausted components are replaced and unwanted components flushed out of the main processing tank. In order to reduce the amounts of materials used in the process, it is useful to clean the solutions chemically to remove unwanted material which may have a deleterious effect on the final product, for example a photographic print.

Published International patent application WO-A-91/17478 discloses a method of reducing the amount of retained developing agent in a photographic material by subjecting a processing solution through which the material passes after development but before washing to the influence of an absorbing agent. The absorbing agent may be an ion exchange resin or an activated carbon.

Published International patent application WO-A-91/17479 discloses the use of an absorbing agent to treat an amplification bath in a photographic process, the amplification bath following a developing bath in a photographic process. The treatment of the amplification bath is to remove any carried over developing agent which may cause degradation of the bath or of the material being processed.

British patent application no. 9208185.0 discloses a method of processing photographic material in which wash water or stabilizer solution is treated with an absorbing agent in order substantially to reduce the amount of retained developing agent in the solution.

Traditionally, replenishment and clean-up are carried out by separate units. This has the disadvantage that more space is needed to accommodate the photographic processor which has both these units.

It is an object of the present invention to provide a combined replenishment/clean-up unit for removing non-desirable components from photographic processing solutions.

According to one aspect of the present invention, there is provided a chemical supply unit for use with a photographic processor having at least one processing stage, the unit comprising a plurality of compartments characterized in that at least one compartment contains replenishing chemistry for the photographic processor, and at least one other compartment contains chemical components for treating such chemistry.

By this arrangement, all the replenishment chemistry and clean-up chemistry can be housed in a single unit having a plurality of compartments, each compartment containing either replenishing chemistry or clean-up chemistry.

For a better understanding of the present invention, reference will now be made, by way of example only, to the accompanying drawings in which:-

Figure 1 illustrates a schematic arrangement of one embodiment of a combined replenishment/clean-up unit constructed in accordance with the present invention; and

Figure 2 illustrates a schematic arrangement of a second embodiment of a combined replenishment/clean-up unit constructed in accordance with the present invention.

Figure 1 illustrates a combined replenishment/clean-up unit 10. The unit 10 comprises a plurality of compartments 20, 22, 24, 26, 30, 34 each containing either replenishment chemistry or clean-up chemistry. In the embodiment shown, compartments 20, 22, 24, 26 contain replenishment chemistry and compartments 30, 34 clean-up chemistry.

Although these compartments are shown as two separate sets, namely, replenisher and cleaner, the compartments may be intermingled in the unit as desired. Furthermore, there may be a greater or fewer number of each type of compartment according to the type of photographic process carried out in the processor to which the unit is to be attached.

In the unit 10, the compartments are filled as follows:-

compartment 20 contains developer;
compartment 22 contains base;
compartment 24 contains bleach-fix (blix);
compartment 26 contains stabilizer;
compartment 30 contains blix cleaner; and
compartment 34 contains stabilizer cleaner.

As shown, each replenishment compartment 20, 22, 24, 26 has a single inlet/outlet 21, 23, 25, 27 respectively. The chemistry contained in each of these compartments is removed as required by means (not shown) and fed to an appropriate stage in the photographic processor to which the unit 10 is connected.

Each clean-up compartment 30, 34 has an inlet 31, 35 and an outlet 32, 36 respectively. Each inlet 31, 35 is connected to the appropriate processing stage of the processor for receiving used processing chemistry contained therein for treatment. Each outlet 32, 36 can either be connected to the associated replenishment compartment (not shown) or to the appropriate processing stage as desired.

Operation of the unit 10 will now be described with reference to a paper processor filled with RA4

processing solutions for processing 2001 colour negative paper.

The processor (not shown) is fitted with needles arranged to pierce septa (not shown) provided in the outlet 21, 23, 25, 27, 32, 36 of each compartment 20, 22, 24, 26, 30, 34 of the replenisher/clean-up unit 10 to provide the appropriate connections for the transfer of processing chemistry.

As described above, compartments 20, 22 contain replenisher components for the developer chemistry. Colour developer is contained in compartment 20 and the remaining components are contained in compartment 22. These components are well known in the art and will not be described here. The two component parts of the developer chemistry are added to the developer tank of the processor, as required, by drawing solutions through the needles by means of a suitable pump (not shown).

Compartments 24, 26 are filled with conventional bleach/fix and stabilizer replenishers respectively which are used to replenish the appropriate processing tank in the processor (not shown). As before, a suitable pump (not shown) is used to draw each of the bleach/fix (blix) and stabilizer chemistries into the appropriate processing tanks.

Compartment 30 contains carbon as the blix cleaner to remove developer and its derivatives from the blix solutions. The method of operation of this cleaner is described in WO-A-91/17478 mentioned above.

Compartment 34 also contains carbon. However, in this case, the carbon is used to remove organic species. Ion-exchange resins are also present in compartment 34 for removing ionic species from the stabilizer solution. The method of operation of this cleaner is described in British application 9208185.0.

Figure 2 illustrates another combined replenishment/clean-up unit 100 which can be used with different photographic chemistry, for example, it can be used with a colour paper processor which uses redox amplification chemistry. The unit 100 comprises a plurality of compartments 110, 120, 130, 140, 150 each containing either replenishment or clean-up chemistry as described above.

The compartments are filled as follows:

compartment 110 contains developer;

compartment 120 contains bleach-fix (blix);

compartment 130 contains wash or stabilizer;

compartment 140 contains wash or stabilizer;

compartment 150 contains wash or stabilizer

and ion exchange resins as indicated by the numeral 160.

As before, each compartment 110, 120, 130, 140, 150 has a respective inlet/outlet 112, 122, 132, 142, 152 as shown. In this arrangement, the chemistry can be dispensed using gravity, and once used can be pumped back into the respective compartments by means not shown.

Units 10, 100 in accordance with the present invention provide convenient means of adding processing chemistry to a processor. In particular, for each photographic product, a unit could be supplied along with the product, thereby making delivery and distribution easy.

After the chemistry is exhausted in each unit, it can be returned to the supplier or licensed disposal contractor for recycling of the chemicals therein or for refilling as appropriate.

The unit provides a means of supplying chemicals and clean-up chemistry in a form in which the operator of the processor does not come into contact with the chemistry. This is advantageous when considering the health and safety of the operator.

The unit in accordance with the present invention may be of any desired size according to the processor to which it is to be connected. For example, the unit may be small to fit in a desk top processor.

Each compartment of the unit may be filled directly with the desired chemistry. Alternatively, the unit may simply house chemistry in a flexible container such as a plastic bag. Plastic bags may be filled at remote sites before insertion into the appropriate compartment of the unit.

Each compartment or individual bags contained therein could be separated before recycling the components.

The unit itself may be recyclable - the top being screwed down and the screws being removed after return for refilling etc.

Naturally, it may be more convenient to have only some of the replenishment and clean-up chemistry in a given unit. For example, one unit may contain replenishment and clean-up chemistry for the developing stage only of the processor.

Although the present invention is described in relation to replenishment and clean-up chemistry, other solutions may also be contained in the unit. For example, one or more compartment may be provided which contains wash water for the processor.

Water may also be included for the automatic washing of rollers in the processor before or after it is switched off. This is to prevent crystallization build up on moving parts of the processing apparatus.

The unit according to the present invention may be used with any suitable photographic processor, for example, film or paper processors and/or black-and-white or colour systems.

Furthermore, it may be the case that the unit according to the present invention can be fitted to existing processors replacing currently used replenishment tanks.

Although connection of the unit to a processor has been described as being by means of needles in the processor piercing septa in the outlets of the compartments, any conventional connection may be used. Furthermore, each outlet and/or inlet may be covered for transportation - the covers being removed when the unit is correctly located.

Claims

1. A chemical supply unit (10; 100) for use with a photographic processor having at least one processing stage, the unit (10; 100) comprising a plurality of compartments (20, 22, 24, 26, 28, 30, 34; 110, 120, 130, 140, 150) characterized in that at least one compartment (20, 22, 24, 26, 28; 110, 120, 130, 140) contains replenishing chemistry for the photographic processor, and at least one other compartment (30, 34; 150) contains chemical components for treating such chemistry.

2. A unit according to claim 1, wherein each compartment (20, 22, 24, 26, 28, 30, 34; 110, 120, 130, 140, 150) includes an outlet (21, 23, 25, 27, 32, 36; 112, 122, 132, 142, 152) through which chemistry contained therein is passed to the processor.

3. A unit according to claim 2, wherein each outlet (21, 23, 25, 27, 32, 36; 112, 122, 132, 142, 152) comprises a septum which can be pierced by the processor to connect it with the chemistry comtained in each compartment (20, 22, 24, 26, 28, 30, 34; 110, 120, 130, 140, 150).

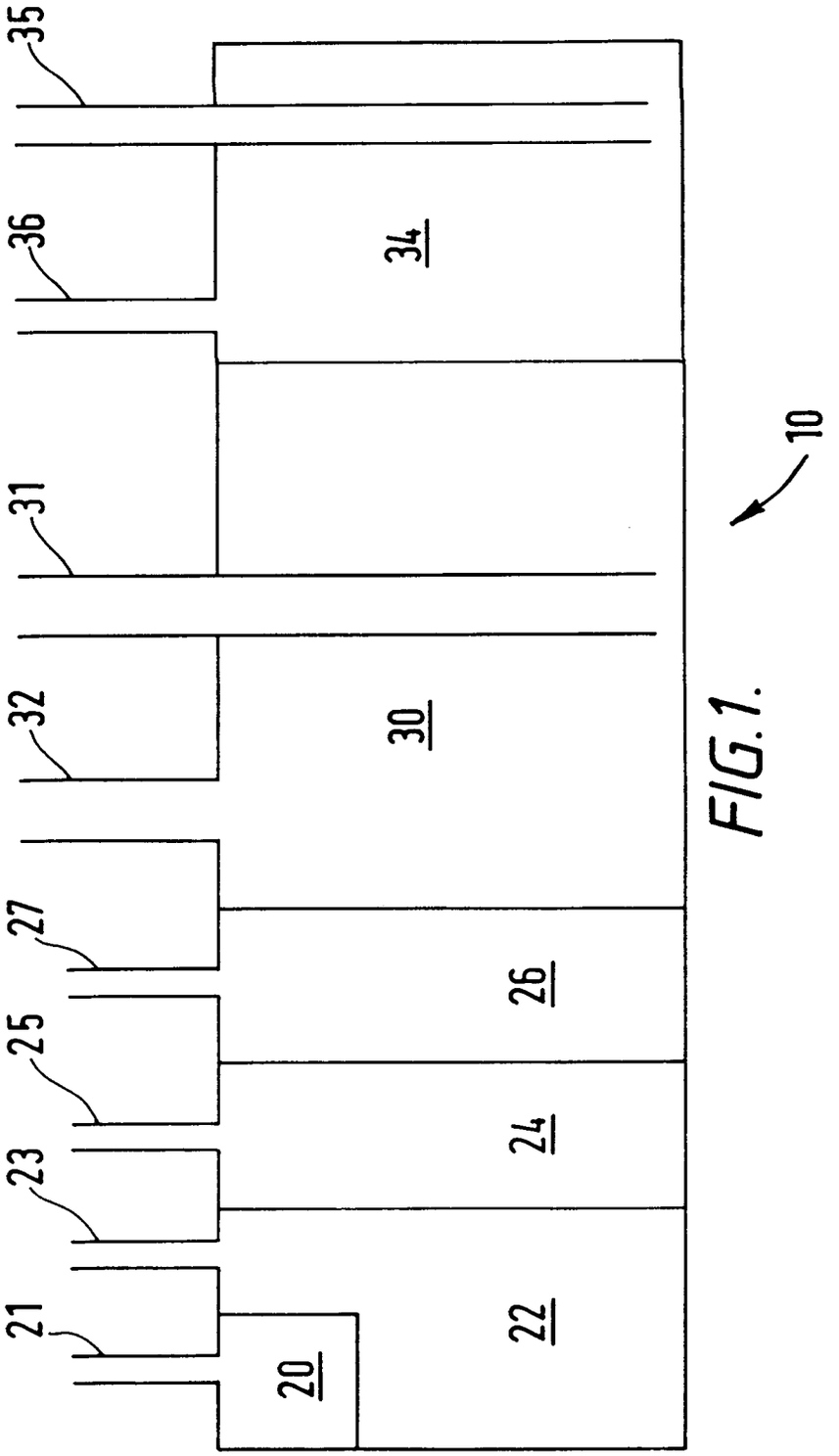

FIG.1.

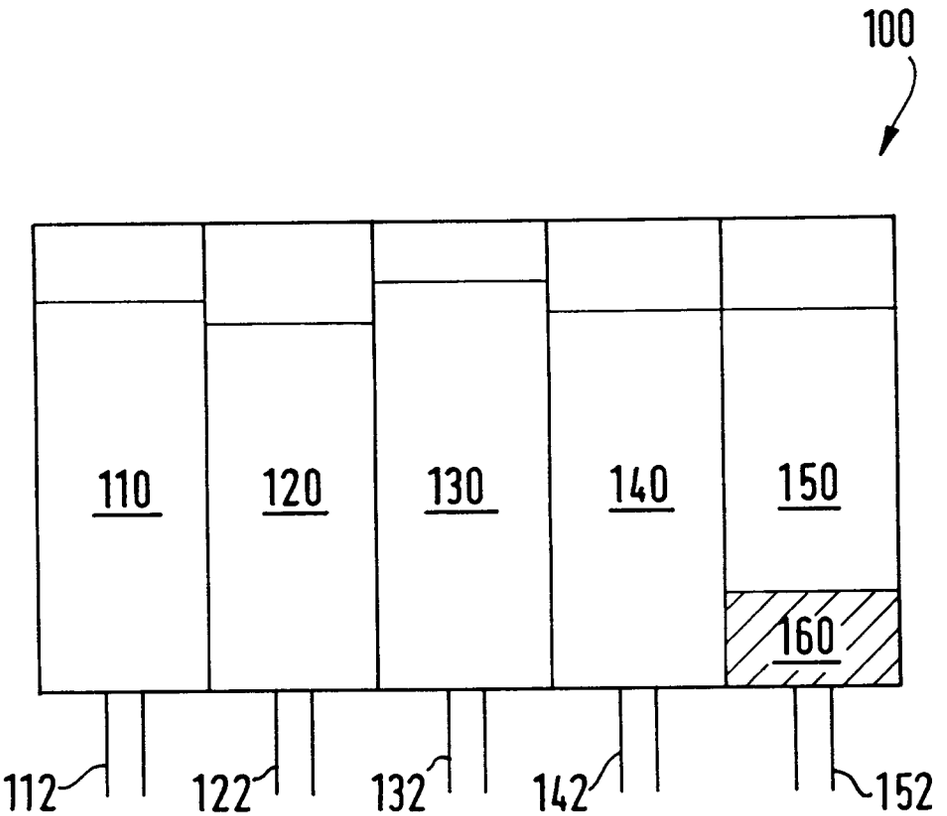

FIG. 2.