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54 Improvements relating to the treatment of medium used in photographic processors.

57 The invention provides for the treatment of fixer medium in photographic processing. One the one hand, the fixer medium is extracted from the fixer station to a first treatment tank in which it is subjected to light electrolysis for regeneration of the fixer medium so that it can be re-circulated to the fixer station. When the fixer medium has reached a predetermined saturation condition of silver content, it is discharged from the first treatment station to a second treatment station where it is subjected to electrolysis for the removal of the silver. On the other hand, the fixer medium is constantly circulated from the fixer station to an electrolytic cell in which silver is extracted under an automatic control device which ensures that the electrolysing current is increased or decreased dependent upon the silver content of the fixer medium to ensure that the silver content keeps to a sensibly constant predetermined value.

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Improvements relating to the treatment of medium used in photographic processors.

This invention relates to photographic processing, and in particular concerns an invention which will result in economisation of the chemicals which are used in photographic processing and effective control of the recovery of the free silver which results from the processing.

The present invention applies to the photographic processing of various forms of photographic plates and films such as the graphic art film, offset, gravure, phototypesetting and X-ray plates as used in medical and industrial applications where the developed photograph is black and white in nature, as distinguished from the ordinary colour photographic film as used in hand held cameras.

In the processing of such plates and films, liquids are used in the processing apparatus, such liquids including developer, fixer, and water.

The most expensive of these liquids is the chemical fixer which is used for the fixing of the images, and this chemical fixer in being brought into contact with a plate or film containing a concealed image extracts the silver from the plate or film in order to make the image visible and permanently to fix the image. Additionally, however the fixer extracts copper sulphate and various other additives (which are contaminants) which are in the film or plate, with the result that the fixer to some extent becomes contaminated and finally has to be discarded.

Normally, the photographic processing involves three stages or units. A first unit contains the developer through which the plate or film is passed. The second unit contains the fixer through which the film or plate is passed and the third unit contains water through which the film or plate is passed.

From the second unit, the fixer after use is passed to a silver extracting cell which is an electrolytic cell containing a cathode and an anode between which electric potential is applied, and the current which flows between the anode and cathode causes electrostatic deposition of the silver contained in the mixture to be deposited on the cathode. The cathode and anode are in fact rotated whilst immersed in the fixer but the remaining liquid after the silver deposition is discarded as it still contains the copper sulphate and other additives. The potential which is applied across the anode and cathode is such as to give a current flow between the anode and cathode of the order of 10 amps, and this high current furthermore has a chemical effect on the fixer which destroys its properties and therefore apart from the chemical contamination caused by the copper sulphate and other additives, the utility of the fixer is destroyed.

The used water from the third unit is discarded.

This of course represents an expensive use of the fixer and the present invention seeks to provide a method and apparatus whereby a more economic use of the fixing medium can be achieved, and seeks to provide a method for the controlled recovery of the silver.

According to a first aspect of the invention there is provided a method of treating the fixer fluid used in the fixer station in photographic processing wherein the fixer medium is subjected to two stage treatment for the extraction of silver in the fixer, the fixer medium being circulated from the fixer station to the first stage of the two stage treatment in which the medium is subjected to a restoration treatment until the fixer medium reaches a pre-determined condition, when it is passed to the second treatment stage which is an electrolysis treatment for extraction of residual silver and other materials before the medium is discharge to sump. The first stage treatment is preferably also an electrolysis treatment stage.

Preferably, the deposition of silver in the second stage treatment is automatically controlled so as to keep the amount of silver in the medium discharged from the second stage treatment to a predetermined level.

The second stage electrolysis treatment may comprise two electrolytic cells, and the fixer medium flows from the first cell into the second cell over a division plate which forms a weir.

In the first cell, the fixer medium is subjected to a first electrolytic current which is automatically controlled dependent upon the amount of silver in the fixer medium and in the second cell it is subjected to a second electrolytic current which is automatically controlled dependent upon the amount of silver in the fixer medium and which is smaller than the first electrolytic current.

By this means, maximum silver extraction can be achieved, and also before the spent fixer medium is discharged to sump other harmful constituents such as copper sulphate can be neutralized, whereby damage to the environment can be neutralized. In other words, the spent fixer medium can more safely be discharged into the environment.

The fixer medium whilst in the first stage electrolysis treatment may be subjected to an aeration treatment thereby to generate a profusion of bubbles in the medium which disperses the copper sulphate and other additives.

By this means, and by a specific construction and method, it has been found that at least the fixer can be recycled several times before being

discharged to the second stage electrolysis treatment.

The saving of fixer medium arises because normally in the known method the processor has to be replenished with fresh fixer at a certain frequency dictated by the capacity of the processing plant. By using the treatment method according to first aspect of the invention, it has been found that the replenishment frequency is considerably reduced and the silver recovered is increased because of the second stage electrolysis treatment.

The first stage electrolysis treatment may comprise a treatment tank, and in the treatment tank is contained an electrolytic unit comprising a chamber which is closed but for apertures in the wall thereof and through which the fixer medium can pass, and inside the chamber are anode and cathode electrodes for effecting electrolytic treatment of the fixer medium to remove small amounts of silver therefrom. Additionally, an air supply is connected to the chamber interior so that air can be bubbled into the base of the chamber to give said aeration effect. The air bubbles out of those of said apertures located at the top of the chamber. The first stage electrolytic treatment is conducted at much lower amperages than is conventional in order not to destroy the chemical utility of the fixer.

The said chamber may be defined by a container having a lid which is in fact removable, but normally it will be connected to the body of the container by means of a tamperproof connection.

The cathode may comprise a V-sectioned plate of stainless steel, whilst the anode typically will be a block of carbon.

The electrolytic unit is preferably run at an amperage of up to no more than 2 amps and typically no more than 300 mA and the cell may be served by a control box by which the unit can be run at any of several different amperages, for example four different amperages ranging from up to 300 mA the unit being set to operate at a particular amperage as dictated by the positioning of a multi-position switch on the control box. The control box may also contain the prime mover which supplies the air for the aeration aspect of the process. The prime mover may comprise a small air pump driven by an electric motor inside the control box.

The chamber size and the size of the apertures on the wall through which the liquid and aerating medium can pass will be controlled to give maximum operational efficiency.

The silver which collects on the cathode may be extracted by conventional means and in a conventional method.

The fixer eventually becomes saturated with silver, copper sulphate and other additives and it is then that it is passed to the second stage electrolysis stage where the silver is extracted from the

spent fixer solution in achieving high silver recovery on site. The process then becomes much more economical in the operation.

The method may also provide for recovery of the small amounts of silver which are carried over by the plates and film from the fixer processor into the washing unit, by passing the water to a water treatment tank provided either with one of the electrolysis units described above or by means of higher amperage rated electrolytic cell, such as a cell similar to the first or second cell of the second stage electrolytic treatment. When an electrolytic unit is used the treated water may be recycled if desired until it is too contaminated to be used further.

According to a second aspect of the invention there is provided a method according to claim 10, wherein the level of silver in the fixer medium in the electrolytic cell is monitored by a sensing device which emits a signal representative of said silver content and said signal is used to control the electrolysing current of the cell to maintain the required level of silver content.

The advantages of the invention, at least in its preferred form, are that the fixer can be used more times without loss of quality. It is not necessary to adjust the processor in any way. There is less downtime of the processor. More silver is recovered and there is less toxic effluent per unit time located. The operator can recover virtually all of the silver on site, making the whole operation much more economical.

The principles of operation of the invention in its various aspects are contained in the embodiment of the invention illustrated in the accompanying drawings, wherein:-

Fig. 1 is a diagrammatic view of a photographic film or plate processing system operating according to aspects of the invention;

Fig. 2 is an exploded perspective view illustrating the electrolyte unit and control box according to the invention; and

Fig. 3 is a sectional elevation illustrating the electrolyte cell shown in Fig. 2.

Referring to the drawings, in Fig. 1 numeral 10 represents a conventional photographic film or plate process comprising three processing units 10A, 10B and 10C containing developer, fixer and water respectively and in turn through which photographic film or plates 11 are passed in order to develop the images on the film or plates.

In conventional arrangements, when the fixer in processor unit 10B has reached the stage where it is no longer usable (which may be after one use only), because of the silver concentration therein and the build up of gelatinous materials it is normally discharged through outlet 18 to a silver recovery unit (not shown) of conventional form to

recover silver therefrom. The silver recovery unit may be remotely located (in another factory) and it may be owned by a different entity (a silver recovery company). The residual liquor from the silver recovery unit is not re-used and is simply discharged to drain.

The rate of utilisation of the fixer is determined by the frequency at which the used fixer has to be discharged through outlet 18. The arrangement illustrated provides a means whereby the said discharge and replenishment rate can be reduced or in other words the fixer solution in the processor 10 can be used for a longer period, and as will be explained hereinafter, the operator can now do his own extraction of the silver on site, making the whole process more economical.

The solution from the processor 10B is recycled through the recycle pipes 20 and 22. The liquid flows from the processor 10A through pipe 20 which is an overflow pipe into a treatment tank 24, and from the treatment tank 24 the liquid is pumped back through pipe 22 and returned to the processor 10 by pump 22A.

The treatment tank contains immersed therein a treatment unit 26 which is powered from a control box 28 (Fig. 2) as will be described in relation to Figs. 2 or 3.

Similarly, the water from the unit 10C is drawn through pipe 19 and delivered to a water tank 21 containing another of said units 26 for the recovery of residual silver in the water which is carried over by the plates and film from the unit 10B. The water is re-cycled from tank 21 through pipe 23.

The treatment unit 26 as regards the fixer medium at least serves two purposes. On the one hand it serves to effect electrolytic deposition of a small amount of the silver contained in the circulating liquid, and it more importantly aerates that liquid in order to keep the copper sulphate and other additives dispersed evenly throughout the liquid to prevent aggregation and setting out of same and also to liberate small amounts of silver which deposit on the cell electrodes. The unit 26 is not intended however to be a silver recovery unit and is run at low amperage (up to 2 amps) so as not to chemically affect the fixer liquid or to chemically affect the liquid as little as possible.

The unit and control box are shown in Figs. 2 and 3, and it will be seen that the cell comprises a body 30 closeable by means of a screw cap 32 having turning wings 32A and a central aperture 32B so that the cell is closed, and there may be a tamperproof device coupling cap 32 and body 30 to prevent unauthorised moving of the cap without it being obvious that it has been tampered with. Inside the cap 32 is a rubber sealing ring 32C which seals the top of body 30 when the cap is applied thereto.

The cell body 30 is provided with a series of apertures 34 through which the surrounding circulated liquid can pass, and out of the top ones of which aerating medium can escape, and inside the cell is a pair of electrodes 36 and 38 being a carbon block anode 36 and a stainless steel plate cathode 38. These are supported by a rigid plate 40 and are electrically insulated in relation thereto. The electrical power to the electrodes is supplied through lines 42 (which pass through apertures 32B and cap 32) from the control box 28, the control box in turn receiving its power from an input mains line 44. The control box is provided with an on/off switch 50 a setting switch 46 controlling the voltage across lines 42, and hence the amperage through from the electrodes 36 and 38, and an ammeter 51 for reading the electrolysis current flowing between the electrodes 36, 38. The electrical circuitry in the control box 28 is connected to the standard mains 250 volts/50 cycles per second supply to ensure that only a small current is drawn through lines 42 for example, up to a maximum of 2 amps.

Typically, the four settings A, B, C and D as shown for the control switch 46 corresponds to amperages ranging in even steps up to 2 amps, between the electrodes 36 and 38. By using such low amperages, there is no chemical destruction of the fixer material, which would render same unusable. In another embodiment, the maximum current may be as low as 300m amps.

The plate 40 is held in position in relation to body 30 by providing cut outs 30A in the threaded neck 30B of body 30 so that the plate is recessed or cut into as shown in Fig. 3 and when the cap 32 is secured to neck 30B the plate 40 is then trapped in the position shown in Fig. 3 by which the electrodes 34, 38 hang down into the interior of body 30.

The control box 28 houses a small electric motor 48 which is electrically driven to drive an air pump 49 when the control box on/off switch 50 is positioned to the "on" position. Pump 49 supplies a stream of aerating medium, in this case air through a delivery pipe 52 which extends through the aperture 32B through the plate 40 and is threaded into a screw 52A which passes through the base of the body 30 as shown. The pipe 52 has apertures 52B in the wall thereof out of which the air bubbles when the cell is in use. The pipe 52 is a plastics material pipe of 3mm inside diameter.

The air bubbles out of the aperture 52B of the pipe 52 to inside the unit as shown in Fig. 3, and because the pipe 52 is narrow, in fact very many tiny bubbles emerge into and pass through the liquid, and this ensures an even dispersion of the copper sulphate and other additives throughout the liquid, making the useful life of the liquid so much greater. Whilst the current flows from the elec-

trodes 36 and 38, silver is deposited on the cathode and subsequently can be recovered. The apparatus can be operated so that only the air flows, if it is not required to have the simultaneous electrodeposition of silver, on the cathode.

The unit and the connections 52 and 42 thereto may be arranged to be tight plug-in connections with the box 28, so that when the unit is saturated in that the electrode 38 cannot hold any further silver, the unit can be removed and replaced easily by a replacement unit of a similar type, and the removed unit can be processed to extract the silver.

A typical unit may comprise a body 30 of diameter 200mm and length 300mm, air being supplied to the interior of the cell at a rate of 2.25 litres/min at a 1.4 metres head during such operations as much as 150 litres of fixer can be processed over 36 hours to recover 0.50 grammes/litres of silver. There may be a range of differently sized units for handling different volumes of fixer.

It has been found that in using the invention, the full life of the fixer in the liquid can be increased four or more times, and clearly this represents a considerable financial saving as regards costs for the fixer material. A similar unit 26 may also be used for recovering silver from the washing unit 10B.

Silver recovery and/or treatment can take place continuously, i.e. whether or not plates are being processed in the unit 10 as an intermittent treatment. That is to say, in the intermittent treatment the fixer may be treated in unit 30 over a period of time when no plates or films are being processed in process 10 to regenerate the fixer and then at the end of the treatment of the fixer in unit 30, the film is returned to the plate/film in processor 10, and when the film/plate processing is complete, the liquid medium is again returned to unit 30 for regeneration of same, but in any event the running of the plant is at the convenience of the operator.

The aeration treatment in tank 24 can take place without the electrolysis if required, and in this connection, aeration can take place at any suitable location or in any suitable tank, for example tank 24, in which case unit 26 may not be necessary.

The arrangement provides in addition to the tank 24 for conditioning the fixer medium, additional processing means so that the entire processing plant can be economically run, enabling the extraction and recovery of the silver in the fixer medium, which provides that the processing plant can not only operate more economically, but can operate in a more environmentally desirable fashion in that the resulting effluents which are discharged into the environment will be cleaner.

Reverting therefore to Fig. 1, it will be noticed

that the return pipe 22 has a branch valve 50 which is manually operated by the turning of a tap (not shown) leading to a branch line 52 through which the fixer medium can be discharged when it has reached a stage where it is no longer usable in the process of 10B. In this state, the fixer medium will be saturated or almost saturated with silver and other undesirable additives such as copper sulphate. The medium is therefore discharged along pipe 52 to a second stage, assuming tank 24 to be the first stage of treatment, and in the second stage treatment, the medium is subjected to controlled electrolysis in order to achieve electrostatic deposition of the silver to such an extent to extract substantially all of the silver from the spent fixer medium i.e. to leave no more than 50 parts per million per 25 litres of fixer medium. The second stage comprises a treatment tank 54 which is divided into two cells 56 and 58 by a division plate 60 which in fact forms a weir over which the medium flows from cell 56 into cell 58. Inside cell 56 is a central stainless steel electrode 62 which forms the cathode of the electrolysis, and the anode is formed by carbon blocks or bars 64 arranged around the inner wall of the cell 56, the cathode 62 being arranged centrally. A controlled electric potential is applied between the electrodes as indicated by the circuit 66, and in fact this electrical circuit is arranged to provide an electrolysing current which is controlled so that it is increased or decreased depending upon the quantity of silver detected in the medium supplied to the cell 54. If the medium contains a high concentration of silver, then a higher electrolysing current will be applied but as the silver is progressively extracted, so the electrolysing current is reduced automatically. The object of thus controlling the electrolysing current is to ensure that silver extraction will take place at the desired rate, and that the fixer medium will be left with no more than very small traces of silver i.e. of the order of 50 parts per million per 25 litres of fixer medium. As regards the cell 58, again there is a central stainless steel cathode 68 and carbon anodes 70 arranged similarly to anodes 64, and the circuit 70 is arranged to provide that the current which flows between the electrodes in cell 58 is also controlled similarly to the cell 54. A discharge pipe 74 provides for the discharge of the electrolyte after electrolysis.

The cell 56 may be considered a first or main silver extractor cell, whilst the cell 58 is considered a second or overflow silver extractor cell, and each is provided with various controls such as an amp meter and an amperage adjusting device, indicator lights for indicating on and off condition and a silver cut-off sensor for cutting off the operation of the cell when a certain amount of silver has been

deposited on the anode.

The operation of the plant described is that the fixer solution is circulated through the cell 24 which conditions the fixer to enable it to be re-cycled to the process unit 10B, and when the utility of the fixer medium has been consumed, it is dumped to the silver extraction cells 56 and 58 so that the silver can be extracted and the operator can recover virtually all of the silver in the medium. Additionally, the operator can by electrolysis or chemically, neutralise the copper sulphate in the fixer medium in order to render it less contaminating.

As regards the treatment of the wash water as used in processing unit 10C, in place of the tank 21 containing an aerating unit 26, this may be replaced by an electrolysis tank similar to cell 56 or 58, such tank being for silver recovery, and comprising the same control devices as are provided in the main cell 56 and the overflow cell 58.

The fixer medium is dumped from tank 24 to the cells 56 and 58 either automatically depending upon the detection of the condition of same, or as a result of examination by eye as required.

The installation shown in Fig. 1 has a further conditioning circuit for the fixer solution contained in tank 10B. Thus, a pump 80, which is provided in conventional arrangements circulates the fixer medium from the tank 10B through pipes 82 and 84. This circulation is to maintain the fixer medium in tank 10B in motion and in agitation, and in addition ensures that the medium in the tank 10B remains throughout at an even temperature. As mentioned this particular circulation circuit is used extensively in existing treatment installations.

In accordance with another preferred aspect of the invention however, branch pipes 86 and 88 enable the fixer medium from pipes 82 and 84 to be circulated through a silver extraction cell 90 by means of a pump 92 in line 86. In unit 90 is a plate cathode 92 and carbon anodes 94 for the extraction of silver from the medium which is circulated through the cell 90. A sensing device or monitoring device 96 is located in the cell and senses the silver concentration in the fixer medium and the signal generated by this sensing device is passed on line 98 to a control device 100 in the electrical circuit 102 supplying electric power to the cathode 92 and anodes 94. By this means, depending upon the concentration of silver in the fixer medium in cell 90 so electric current passing between the cathode 92 and anode 94 is controlled. The monitoring device 96 and the control 100 is set so that if the silver concentration in the fixer medium arriving in cell 90 is greater than a predetermined amount, in particular 2.5 g per litre, the electrolysis current is increased in order to increase the rate of extraction of silver from the medium so that the medium

being returned to the tank 10B will have no greater than 2.5 g per litre of fixer medium. The cell 90 may be associated with a display device indicating the level of current which is being drawn, which also indicates the level of silver contained in the medium relative to the preset level in the example 2.5 g per litre which is also indicated in the display device.

When the plant is switched on therefore, the operator will be able to see at a glance the condition of the fixer medium as regards its silver content.

The combined apparatus as illustrated in Fig. 1 provides an effective means for controlling the use of the fixer medium, and for the effective extraction of the silver. Any one of the treatment units can be used either alone or in combination with any one or more of the others. Thus, the closed loop treatment cell 90 can be used when the cell 24 and cell 54 are not present, or the cell 24 and 54 can be used independently of the cell 90. Additionally, the cell 54 with its automatic controls on electrolysis current can be connected directly to the outlet line 18 so as to receive fixer medium directly from the tank 10B.

As an added modification, air may be passed into the cell 90 in order to maintain the fixer medium in agitated condition when in the cell 90 for the more effective removal of silver from the fixer medium. The air may be introduced through a flexible plastic tube which is coiled round the inside of the cell 90, into which air at a pressure of 40 psi is introduced and through apertures in which the air bubbles into the fixer medium in cell 90.

In using the system shown in Fig. 1, it has been found that the amount of silver which is carried over from the fixer tank 10B to the washing tank 10C is very small and in fact is negligible to such an extent that invariably it will not be necessary to treat the liquid from the washing tank 10C for the removal of residual silver. However provided the closed loop treatment tank 90 is in use, and by such means silver is constantly being extracted from the fixer medium, so the concentration of silver in the fixer medium which is eventually passed to the treatment tank 54 will be less, and therefore the cells of tank 54 can be run at much lower amperages e.g. of the order of 50 mA to 1 amp.

However if the cell 90 is not in use, it has been found that the cell 54 must be run at much higher amperages e.g. of the order of 4 amps in order to achieve to effect a higher rate of silver extraction.

The complete plant as described can be considered therefore to perform four functions as follows.

1. Conditioning of the fixer in the tank 24.
2. Main silver extraction in cell 56.

3. Excess silver extraction in cell 58.

4. Silver extraction in tank 21 or in alternative electrolytic cell similar to cell 56 or 58.

All of these functions add up to the economical operation of the processor 10 and also to the creation of effluents which are much cleaner and can be more safely discharged into the environment.

When it is desired to neutralise certain chemicals in spent fixer solution and spent washing water, it is possible to use pre-packaged chemicals for example in small sachets which are simply inserted into the liquors, and such sachets can be used in not only the fixer and wash liquor mediums, but also in the developer medium in order to remove contaminants such as residual metals.

Typically the tank 54 and the electrolytic tank used in place of tank 21 may each be of a capacity of 40 litres.

Claims

1. A method of treating the fixer fluid used in the fixer station in photographic processing wherein the fixer medium is subjected to two stage treatment for the extraction of silver in the fixer, the fixer medium being circulated from the fixer station to the first stage of the two stage treatment in which the medium is subjected to a restoration treatment until the fixer medium reaches a predetermined condition, when it is passed to the second treatment stage which is an electrolysis treatment for extraction of residual silver and other materials before the medium is discharged to sump.

A method according to Claim 1 wherein the first stage treatment is also an electrolysis treatment stage.

3. A method according to Claim 1 or 2, wherein the deposition of silver in the second stage treatment is automatically controlled so as to keep the amount of silver in the medium discharged from the second stage treatment to a predetermined level.

4. A method according to Claim 3 wherein the second stage electrolysis treatment comprises two electrolytic cells, and the fixer medium flows from the first cell into the second cell over a division plate which forms a weir.

5. A method according to Claim 4, wherein the fixer medium is subjected in the first cell to a first electrolytic current which is automatically controlled dependent upon the amount of silver in the medium and in the second cell it is subjected to a second electrolytic current which is automatically

controlled dependent upon the amount of silver in the medium and which is smaller than the first electrolytic current.

6. A method according to any preceding claim wherein the fixer medium whilst in the first stage electrolysis treatment is subjected to an aeration treatment to generate a profusion of bubbles in the medium which disperses copper sulphate and other additives therein.

7. A method according to any preceding claim wherein the first stage electrolysis treatment comprises a treatment tank, and in the treatment tank is contained an electrolytic unit comprising a chamber which is closed but for apertures in the wall thereof and through which the fixer medium can pass, and inside the chamber are anode and cathode electrodes for effecting electrolytic treatment of the fixer medium to remove small amounts of silver therefrom.

8. A method according to any preceding claim, wherein the fixer medium is passed from the first stage to the second stage when it becomes saturated with silver, copper sulphate and other additives, and it is passed to the second stage electrolysis treatment by being diverted by means of a valve from a return pipe from the first stage electrolysis treatment to the fixer tank.

9. A method of treating the fixer fluid used in a fixer station for photographic processing, substantially as hereinbefore described with reference to the accompanying drawings.

10. A method of treating the fixer fluid used in the fixer station in photographic processing wherein the fixer medium is circulated through a closed loop from the fixer station to an electrolytic cell where silver is extracted by electrolysis and back to the fixer station, said electrolytic cell being monitored dependent upon the level of silver in the circulating fixer medium so as to control the current flowing between the cell electrodes to keep the amount of silver per litre in the fixer medium within predetermined limits or at a predetermined level.

11. A method according to Claim 10, wherein the level of silver in the fixer medium in the electrolytic cell is monitored by a sensing device which emits a signal representative of said silver content and said signal is used to control the electrolysis current of the cell to maintain the required level of silver content.

12. A method according to Claim 10 or 11, in combination with the method of any of Claims 1 to 10.

13. An installation for treating a fixer fluid used in photographic processing comprising a fixer station, a first stage treatment tank, means enabling the fixer medium to be circulated between the fixer station and the first treatment tank, a second treatment tank for extracting silver by electrolysis, and

means connecting the first and second treatment tanks enabling the discharge of the fixer medium from the first treatment tank to the second treatment tank when the fixer medium has reached a predetermined condition requiring electrolysis for the removal of silver therefrom. 5

14. An installation for treating a fixer fluid used in photographic processing comprising a fixer station, an electrolytic cell for the removal of silver from the fixer fluid, circulating means for circulating fixer fluid from the fixer station to the electrolytic cell and back to the fixer station, and monitoring means monitoring the silver content of the fixer fluid and means for adjusting the electrolysis current depending upon the silver level monitored by said monitoring means to ensure that the silver content does not drop below a predetermined valve. 10 15

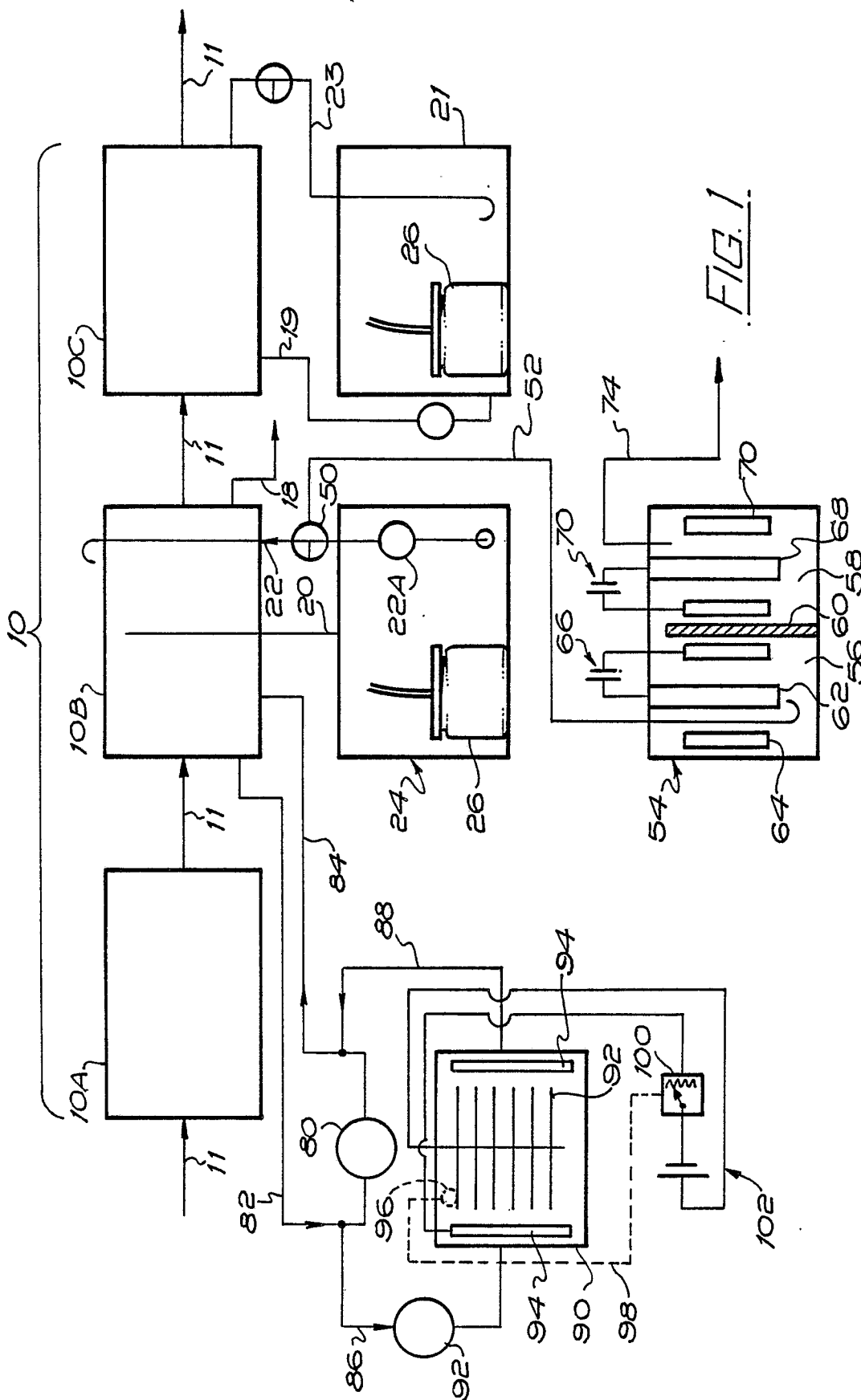
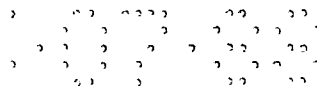
15. An installation for treating a fixer fluid used in photographic processing comprising a fixer station, a first stage treatment tank, means enabling the fixer medium to be circulated between the fixer station and the first treatment tank, a second treatment tank for extracting silver by electrolysis, and means connecting the first and second treatment tanks enabling the discharge of the fixer medium from the first treatment tank to the second treatment tank when the fixer medium has reached a predetermined condition requiring electrolysis for the removal of silver therefrom, and also comprising an electrolytic cell for the removal of silver from the fixer fluid, circulating means for circulating fixer fluid from the fixer station to the electrolytic cell and back to the fixer station, and monitoring means monitoring the silver content of the fixer fluid and means for adjusting the electrolysis current dependent upon the silver level monitored by said monitoring means to ensure that the silver content does not drop below a predetermined valve. 20 25 30 35

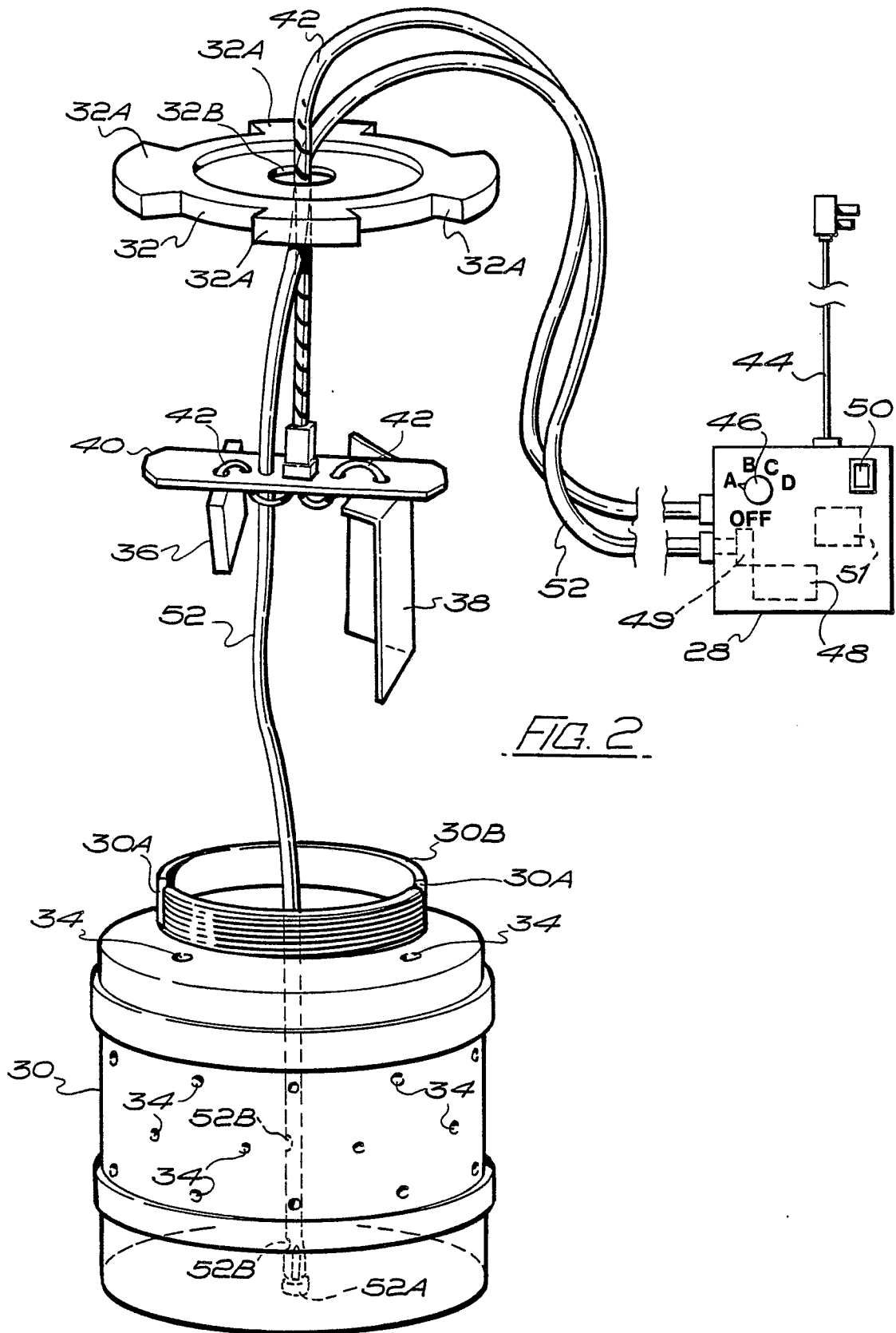
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Neu eingereicht / Newly filed
Nouvellement déposé

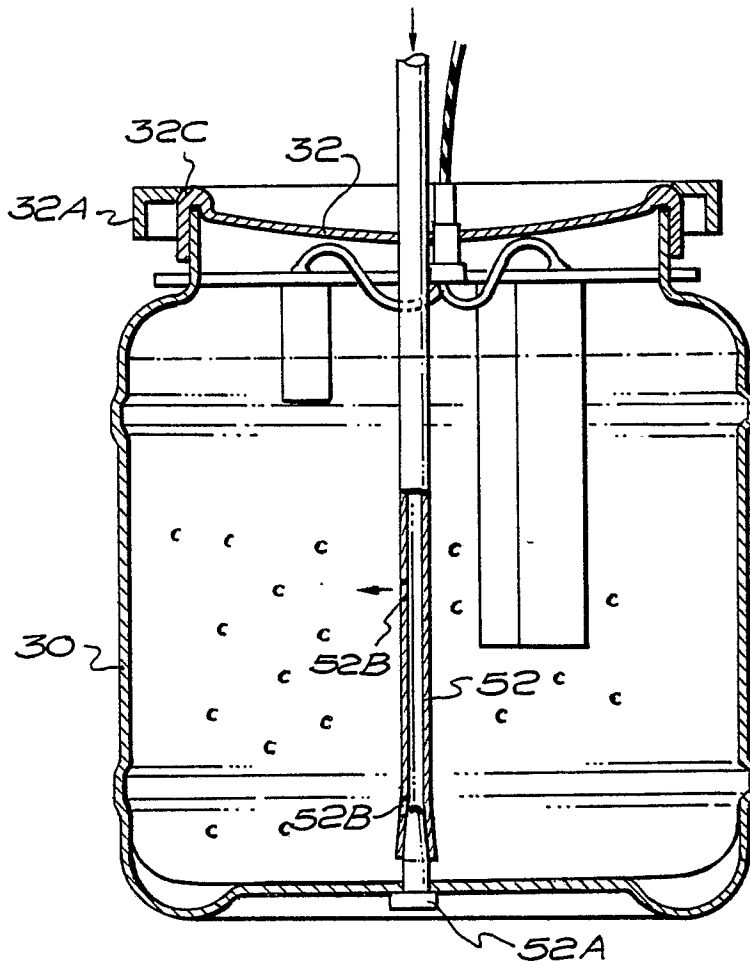


FIG. 3