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(54) Method for recycling photographic film

(57) The method comprising; shredding the photographic film into a plurality of fragments to be processed; swelling the fragments to be processed formed in the shredding step by dipping each of these fragments to be processed into hot water; and drying the fragments to be processed swollen in the swelling step by applying an impact frictional striking force to each of these fragments to be processed, peeling layers other than a resin material base of the photographic film, i.e., a protective coat, an emulsion layer, a base coat layer, from each fragment to be processed and classifying these layers, and grading the resin material base so as to be resin material to be recovered.

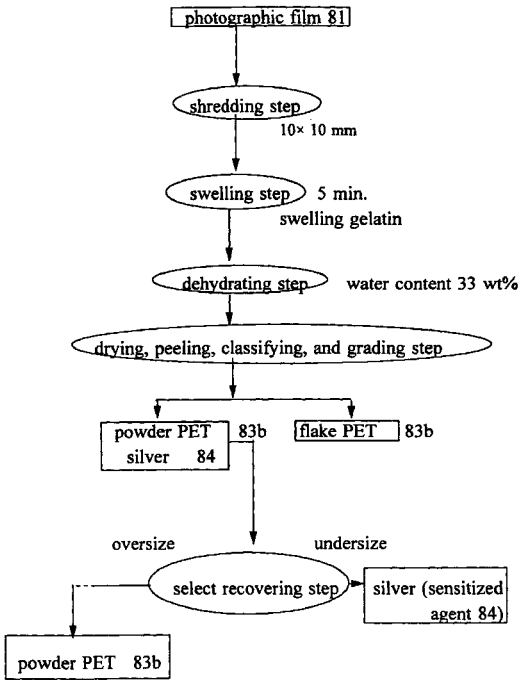

FIG.1

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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] This invention relates to a method for recycling photographic films. Precisely, the object to be processed in this method is the photographic film such as a black and white photographic film, an x-ray photographic film, and various types of photographic films each of which is composed of multi layer of a protective coat, an emulsion layer, a base coat layer, a base, and an anti halation layer laminated in this order.

[0002] For the above mentioned base, in these days, instead of conventional photographic plate or TAC, polyester having the thickness of 0.08 to 0.13 mm is commonly used. The protective coat is formed by coating gelatin in the form of thin layer so as to be coated on the emulsion layer of film.

[0003] The emulsion layer is formed by uniformly dispersing silver halide into the gelatin so as to be coated with small thickness. Then, the emulsion layer is photosensitive. The anti halation layer is coated in order to eliminate or decrease reflected light caused at a boundary surface between film base and air.

[0004] The present invention relates to a method for recycling a photographic film disposed of after its usage, by which the resin material base 83 made of synthetic resin is collected as resin material to be recovered as the material of the photographic film by peeling the layers other than the base, i.e., the protective coat, the emulsion layer, the base coat layer and anti-halation layer, off the photographic film and by which silver contained in the above emulsion layer, i.e., silver halide is also collected.

2. Description of the Prior Art

[0005] The amount of shipment for photographic films is 213, 851 ($10^3 m^2$). Then, the amount of shipment for specific films such as x-ray photographic films, photographic films used for printing processes and the like is about 210, 000 ($10^3 m^2$). In application in market, these photographic films are used as common black and white photographic films, specific photographic films such as x-ray photographic films, or the like.

[0006] Each photographic film disposed of after its usage has normally been discarded before incineration. Alternatively, from the emulsion layer in each film, the silver has been collected by utilizing enzyme or caustic soda or with electrolysis. However, the incineration of film may generate harmful gas, while the collection of silver causes a problem related to pollution of river water due to waste water.

[0007] That is to say, recycling of photographic film has been performed in only severely limited range. Particularly, the resin material of base has not been recycled at all, and it is always to be discarded.

[0008] The present invention has been developed for solving the above mentioned problems, thus the object of the present invention is to provide a relatively simple and easy method for recycling photographic film disposed of after its usage, by which the synthetic resin material as the main material of the photographic film is graded so as to be resin material to be recovered by peeling the layers other than the base, i.e., the protective coat, the emulsion layer, the base coat layer, off the photographic film and classifying them, by which, the above mentioned silver is collected, and by which the range of re-use of photographic film can be enlarged.

SUMMARY OF THE INVENTION

[0009] In order to accomplish the above object, according to the present invention, there is provided a method for recycling a photographic film comprising at least the following steps of:

shredding the photographic film into a plurality of fragments to be processed;
swelling the fragments to be processed formed in the shredding step by dipping each of these fragments to be processed into hot water; and
drying the fragments to be processed swollen in the swelling step by applying an impact frictional striking force to each of these fragments to be processed, peeling layers other than a resin material base 83 of each photographic film, i.e., a protective coat, an emulsion layer, a base coat layer, off each fragment to be processed and classifying these layers, and grading the resin material base 83 so as to be a resin material to be recovered.

[0010] The step where, the impact frictional striking force is applied to the fragments to be processed, the layers other than the base, i.e., the protective coat, the emulsion layer, the base coat layer, are peeled, and the resin material base 83 is graded so as to be the resin material to be recovered, can be repetitively carried out several times.

[0011] The method for recycling the photographic film defined above, further comprises, after the above mentioned

drying, peeling, classifying and grading step, the step for selectively recovering, by screening, the above classified resin material base 83 and the above silver contained in the emulsion layer.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] The object and advantages of the invention will become understood from the following detailed description of preferred embodiments thereof in connection with the accompanying drawings in which like numerals designate like elements, and in which:

Fig. 1 is a system diagram which schematically shows the outline and principle of process steps in the basic embodiment of a method for recycling a photographic film as an object to be processed by the present invention;
Fig. 2 is a front view which shows the outline of separator (peeling, shredding, and classifying means) used in the embodiment of the present invention;
Fig. 3 is a plan view of the separator shown in Fig. 2;
Fig. 4 is a sectional view which shows the outline of the separator of Fig. 2;
Fig. 5 is a perspective view which totally shows a separator (drying, peeling, classifying and grading means) used in the embodiment of the present invention and equipment communicated with this separator; and
Fig. 6 is an enlarged schematic sectional view showing the structure of a photographic film which is an object to be processed by the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0013] Now, a method for recycling a photographic film according to the present invention will be explained referring to the drawings.

Photographic film to be processed

[0014] In the present invention, a photographic film 81 such as a black and white photographic film, an x-ray photographic film, which has a base made of polyester and which has been disposed of and collected after its usage or after its available period, can be used as the photographic film to be processed.

Photographic film shredding step

[0015] The above mentioned photographic film is collected and shredded in the shredding step into fragments to be processed having a suitable size.

[0016] As shown in Fig. 1, a photographic film 81 is introduced into a conventional shredding means, e.g., a milling cutter, where they are shredded into fragments which are indefinite in shape but have quadrilateral shape such as rectangle or square or other shape such as triangle, trapezoid, rhomboid and have a size of about 10 x 10 mm.

[0017] The shredding means used for the present invention is not limited to the milling cutter. Another kind of crusher is applicable to the present invention, for example, several kinds of mono cutter, shredder, crusher, such as Gynax Crusher by Horai Co., Role Crusher by Nara Machinery Co. One example of construction of crusher will be stated below. Precisely, a crusher main body is provided with, at its top, an inlet port through which objects to be shredded are fed. Two shafts are supported in the crusher main body so that they are parallel and rotated inwardly so as to be faced each other. A plurality of rotary blades are attached to each shaft with a predetermined distance. Three claws are attached so as to be projected, with a predetermined angle, from the outer periphery of each rotary blade. Then, the outer periphery of each rotary blade of one shaft engages to that of the other shaft each other. Thus, with the above claws, the objects to be shredded can be shredded into fragments having the suitable size. Precisely, the objects to be shredded are fed through the inlet port at the top of the crusher main body. Next, the objects to be shredded are introduced into the inside of crusher main body with the claws of rotary blades of two shafts which are rotating inwardly so as to be faced each other. In this time, the objects are slitted due to a shearing force continuously applied between the outer periphery edges of rotary blades which are rotating while they are engaging each other. Further, the objects are shredded and cut due to a compression force applied on introducing of objects. Thus-formed fragments are passed through a screen provided below the above mentioned rotary blades of the two shafts, and discharged through a discharge port.

Swelling step

[0018] The fragments to be processed, which have been shredded in the preceding step, are dipped into hot water

having the temperature of about 40 °C for about 5 minutes to 1 hour or longer so that the gelatin is swollen. In this swelling step, in order to accelerate the swelling of gelatin, stirring means such as an agitator can be also used.

Dehydrating step

[0019] The fragments to be processed, which have been swollen in the preceding step, are dehydrated with dehydrating means such as a centrifugal separator until their moisture content is decreased to about 30 wt%.

Drying, peeling, classifying, and grading step

[0020] In this drying, peeling, classifying, and grading step, the following operations are carried out. First, an impact frictional striking force is applied to the fragments to be processed 82, which have been shredded in the above mentioned shredding step. Then, due to this impact frictional striking force, particularly due to frictional heat caused by impact force, the fragment to be processed 82 are dried. Further, due to this impact force, the layers 84 other than the base 83a, i.e., the protective coat, the emulsion layer, the base coat layer, (hereinafter referred to as a laminate) are peeled off the base 83a so that the resin material to be recovered 83b composed of the above base 83a can be separated from the laminate 84. Then, due to the above impact force and frictional heat caused from this force, the separated resin material to be recovered 83b are graded. Hence, the resin material 83b and laminate 84 can be classified for individually collecting. More closely, the fragments to be processed 82 repetitively undergoes a smashing and bending action caused from the impact frictional striking force, whereby the laminate 84 is minutely shredded and peeled off the surface of resin material to be recovered 83b composed of base 83a of each fragment to be processed 82. Alternatively, the laminate 84 is partly cut together with the base 83a. Thus, the laminate 84, i.e., the protective coat, the emulsion layer, the base coat layer, are individually peeled among the layers of photographic film 81.

[0021] Subsequently, since the laminate 84 which has been peeled off each fragment to be processed 82 undergoes centrifugal action, the laminate 84 can be easily separated from the surface of base 83a.

[0022] Additionally, since the temperature of photographic film 81 is increased due to the frictional heat caused at each fragment to be processed 82 by the impact frictional striking force, the photographic film 81 as well as the laminate 84 is dried and solidified. Thus, the laminate 84 can be peeled off further easily.

[0023] Fig. 5 is one example showing the composition of general unit including drying, peeling, classifying, grading means (in the present embodiment, for convenience's sake, this means is called as a separator) used in the method of the present invention.

[0024] Referring to Fig. 5, first, the outline of separator 130 will be explained generally. The separator 130 has an inlet port 132 for feeding each fragment to be processed 82. The separator 130 has also an outlet port 153 for taking off the resin material to be recovered 83b formed by peeling the photographic film 81 having the laminate 84 other than resin material base 83, i.e., the protective coat, the emulsion layer, the base coat layer, off the fragments to be processed 82 in its treatment within the separator 130. Further, the separator 130 has also the discharge port 152 for discharging the laminate 84 other than the base 83, i.e., the protective coat, the emulsion layer, the base coat layer, which have been separated and peeled from the above resin material to be recovered 83b, as well as dusts, minute resin material, and the like, which are produced by grinding the surface of each fragment to be processed 82 due to the impact frictional striking force.

[0025] Through the above mentioned inlet port 132, each fragment to be processed 82, which has been treated in the preceding step, is fed via a supply pipe 23. The above mentioned outlet port 153 is communicated with the inlet port 132 via a communication pipe 235. A pipe 236 is connected to a compressed air source (not shown), and is communicated with the outlet port-side of this communication pipe 235. At the communicating point of this pipe 236, a current plate is provided so that the compressed air can be mainly flown to the inlet port 132-side. A branch pipe 237 is provided in the commurication pipe 235 so as to be communicated with a recovery tank 240 for recovering the resin material 83. A two-way solenoid valve 238, which is switched at a predetermined time using, e.g., a timer, as required, is disposed at the branch point of the branch pipe 237. On the other hand, the above mentioned discharge port 152 is communicated with a collecting tank 250 via a discharge pipe 239. The laminate 84, dusts from the other layers and the like, which have been discharged through the discharge port 152, are introduced, via the discharge pipe 239 equipped with a blower 157, into the collecting tank 250 by a suction force.

[0026] As shown in Figs. 2 to 4, the separator 130 has the following internal composition. Precisely, the above mentioned inlet port 132 is communicated with and opened at the center of a fixed disk 131. A fixed end plate 133 is positioned so as to be opposite to the fixed disk 131 with a processing space 155 ensured between them. The outer periphery of the fixed disk 131 is fixed to the outer periphery of the fixed end plate 133 by means of a circumferential side plate 135. A movable disk 141 is provided in the processing space 155 so as to be rotated by a horizontal rotary shaft 142. The horizontal rotary shaft 142 is supported by bearings 143, 143.

[0027] The horizontal rotary shaft 142 is rotated by rotating means such as a motor 161.

[0028] In the present embodiment, a plurality of fixed pins 134 are attached to the fixed disk 131 so as to form a plurality of concentrically circular patterns (which are relative to the movable disk 141), e.g., six rotary trajectories a1 to a6 (Fig. 4). On the other hand, movable pins 144, which are different in number from the fixed pins 134, are attached to the above mentioned movable disk 141 so as to form a plurality of concentrically circular patterns, e.g., six rotary trajectories b1 to b6.

[0029] Those six rotary trajectories a1 to a6 and these six rotary trajectories b1 to b6 form alternating circular rows. Then the fixed and movable pins 134 and 144 are positioned with respect to each other such that the laminate 84 undergo effects so as to be peeled off and separated from fragments to be processed 82 due to the impact frictional striking force between them.

[0030] More closely, the fixed pins 134 are disposed on the fixed disk 131 from its center to its outer periphery in the concentrically circular patterns with a greater number of pins 134 in each successive layer, namely, the numbers of pins 134 are 16 - 24 - 32 - 36 - 40 - 42 on the rotary trajectories a1 - a2 - a3 - a4- a5 - a6, respectively. Here, the rotary trajectory a1 is located most adjacent to the center of the fixed disk 131, the rotary trajectory a2 is located at the outer periphery-side of the rotary trajectory a1.... and the rotary trajectory a6 is located most adjacent to the outer periphery of the fixed disk. On the other hand, the movable pins 144 are disposed on the movable disk 141 from its center to its outer periphery in the concentrically circular patterns, namely, the numbers of pins 144 are 4 - 4 - 4 - 4 - 4 - 6 on the rotary trajectories b1 - b2 - b3 - b4 - b5 - b6, respectively. Here, the rotary trajectory b1 is located most adjacent to the center of the movable disk 141, the rotary trajectory b2 is located at the outer periphery-side of the rotary trajectory b1.... and the rotary trajectory b6 is located most adjacent to the outer periphery of the movable disk.

[0031] Actually, the frictional striking force applied to the fragments to be processed 82 is reduced by increasing the clearance between the fixed and movable pins 134 and 144, whereas it is increased by decreasing the clearance.

[0032] Further, in Fig. 2, on the outer peripheral of the movable disk 141 and inner peripheral of the above circumferential side plate 135, a screen 151 of predetermined mesh with apertures of a desired diameter formed by punching is provided circumferentially with a discharging space 156 ensured between the screen 151 and circumferential side plate 135. Then, the discharge port 152 is provided below the discharge space 156. In the present embodiment, the above mentioned screen 151 has meshes which measures 1.5 mm, but preferably 1.3 mm.

[0033] The outlet port 153 is provided at the internal side of the screen 151 and at the lower portion of the processing space 155. As explained before, the outlet port 153 is communicated with the inlet port 132 via the communicating pipe 235 and is communicated with also the recovery tank 240 for recovering the resin materials via the branch pipe 237 which is provided on the inlet port-side of the communicating pipe 235. In another embodiment, by providing a plug valve at the above outlet port 153 for controlling its open and close, as shown in Fig. 5, the outlet port 153 can be communicated with the inlet port 132 via a blower 158 attracting air from the separator 130 with a suction force.

[0034] Therefore, in the above separator 130, the horizontal rotary shaft 142 is rotated by rotating means of the motor 161, so that the movable disk 141 is also rotated. At this time, if the fragments to be processed 82 are introduced into the inlet port 132, the fragments to be processed 82 are subjected to the impact frictional striking force caused between the fixed and movable pins 134 and 144 in the center of the processing space 155. Then, the fragments to be processed 82 repetitively undergoes bending action due to the impact formed by the fixed and movable pins 134 and 144, thus the laminate 84 is minutely shredded and peeled off the base 83a.

[0035] But, by application of this impact frictional striking force, together with the laminate 84, also the part of resin material 83b composed of base 83a of each fragment to be processed 82 is cut and peeled off at its surface.

[0036] Additionally, by the frictional heat applied to each fragment to be processed 82 due to the impact frictional striking force, the temperature of the surface of each fragment to be processed 82 is increased, hence the laminate 84 can be further easily peeled off the surface of each fragment to be processed 82. More closely, since the temperature of photographic film 84 is increased due to the frictional heat, the photographic film is dried and solidified, at the same time, the photographic film undergoes repetitively smash action due to the impact with the impact frictional force. Thus, shredding and peeling action for the laminate 84 is accelerated.

[0037] The resin material 83b is recovered in the form of flake. On the other hand, the photographic film 81 having the laminate 84 from which the resin material 83b has been peeled off, and the above mentioned part of resin material which has been cut are collected in the form of powder or thin-piece-like fragment having a side of 1.5 mm or smaller.

[0038] The laminate 84 which has been separated from each fragment to be processed 82, and the part of resin material which has been cut, are passed through the screen 151 by virtue of centrifugal force caused by the movable pins 144 before classified so as to be in the discharging space 156. Then, they are attracted and discharged through the discharge port 152 via the blower 157 so as to be outside.

[0039] In the present embodiment, for the blower 157, either a large blower operated at 5.5 kw, 5 kg / cm2 / pressure, 2m3 / min. or a compact blower operated at 3.7 kw, 3 kg / cm2 / pressure, 1 to 1.5m3 / min. is used to attract, together with the air in the separator 130, the laminate 84 and the like which have been separated from the above fragment to be processed.

[0040] Base particles 83a composed of resin material to be recovered 83b which can not be passed through the

screen 151 because of their size are remained on the screen 151. Then, into these remained resin material to be recovered 83b, resin material to be recovered 83b to which the laminate 84 is still attached is mixed.

[0041] However, the outlet port 153 is communicated with the inlet port 132 via the communicating pipe 235, thus, the fragments to be processed 82 and resin materials 83b to be recovered, which have been taken off from the outlet port 153, are returned to the inlet port 132. In the separator 130, they undergo again smashing and bending action by the impact frictional striking force, whereby the laminate 84 which has been attached to the surface of each fragment to be processed 82 is peeled off, passed through the screen 151, and discharged through the discharge port 152 by means of blower 157 so as to be outside. On the other hand, the returned resin material to be recovered 83b is not shredded minutely enough so that it is not passed through the screen 151, but remained inside of the screen 151.

[0042] The drying, peeling, classifying, and grading step described above can be repetitively carried out several times as desired until the laminate 84 of fragments to be processed 82 formed during the period of one batch can be almost completely separated and discharged through the discharge port.

[0043] The separator 130 constructed as stated above is driven by means of rotary driving means 161. The down-stream-side of the above communicating pipe 235 is opened by means of three-way solenoid valve 238 while the branch pipe 237-side of the above communicating pipe 235 is closed. Then, by the compressed air supplied from the pipe 236 to the communicating pipe 235, air flow can be circulated through the communicating pipe 235, the inlet port 132, the processing space 155, and the outlet port 153. If the fragments to be processed 82 formed during the period of one batch are supplied to the inlet port 132 via a supply pipe 23, the laminate 84 which has been peeled off the surface of each fragment to be processed 82 and shredded resin material 83b by the treatment in the separator 130 are passed through the screen 151 and conveyed to the collecting tank 250 by means of blower 157.

[0044] On the other hand, the resin material to be recovered 83b remained on the screen 151 is conveyed to the communicating pipe 235 and returned to the processing space 155 by means of the above circulating air flow so as to be treated in the separator 130. This sequential processes are repetitively carried out as desired until the laminate 84 formed during the period of one batch can be completely separated and removed.

[0045] At last, after the above treatments, the communicating pipe 235 is closed at its down stream-side with the two-way solenoid valve 238, and is opened at its branch pipe-side. By doing this, the resin materials to be recovered 83b which are remained on the screen 151 are recovered in the recovering tank 240 via the branch pipe 237.

[0046] In this connection, the water content of polyester which is recovered in the recovering tank 240 is about 0.6 wt%. On the other hand, that of powder polyester and silver (halide) which are collected in the collecting tank 250 is about 8 wt%. If solenoid valves, instead of the above two-way solenoid valve 238, are provided at the above branch pipe 237 and communicating pipe 235, respectively, for opening and closing them, the pipes 237, 235 can be opened and closed alternately with these valves.

Screening (selectively recovering) step

[0047] By the above drying, peeling, classifying, and grading step, since the impact frictional striking force was applied to the objects to be processed, the resin material base 83 and the resin material to be recovered 83b has been shredded so as to have the same size as that of laminate 84 and both of them have been collected in the collecting tank 250. Subsequently, in the next screening step, these collected resin material and laminate 84 are selected according to their particle sizes for individual collecting.

[0048] The sieve opening is 0.2 x 0.2 mm. The powder polyester which is resin material to be recovered are recovered as the oversize. On the other hand, the silver halide, sensitized agent including gelatin, and the like are recovered as the undersize.

[0049] A resin material is recovered from a photographic film in accordance with the above method of the present invention. Then, its result will be shown as one embodiment.

Table 1

photographic film	x-ray photographic film after its usage
thickness	0.145 mm
weight	6 kg
resin material base	
material	polyester
thickness	0.13 mm

Table 1 (continued)

photographic film	x-ray photographic film after its usage
dipping in hot water	5 min.
dehydrating	water content 33 wt%
separator screen mesh	1.5 mm
	45 Hz 920 rpm
process time	60 sec
recovering tank 240	base (PET) 91.4 wt%
collecting tank 250	powder: PET
	silver halide:8.6 wt%
oversize powder PET	7.4 wt%
undersize silver halide, sensitized agent, etc.	1.2 wt%

[0050] The present invention is constructed as stated above, thus, with relatively simple and easy method, from a photographic film to be processed, a laminate which is other than a base, i.e., a protective film, an emulsion layer, a base coat layer, can be peeled off and removed, whereby, only synthetic resin which is a main material of photographic film can be recovered efficiently for re-use.

[0051] Thus the broadest claims that follow are not directed to a machine that is configure in a specific way. Instead, said broadest claims are intend to protect the heart or essence of this breakthrough invention. This invention is clearly new and useful. Moreover, it was not obvious to those of ordinary skill in the art at the time it was made, in view of the prior art when considered as a whole.

[0052] Moreover, in view of the revolutionary nature of this invention, it is clearly a pioneering invention. As such, the claims that follow are entitled to very broad interpretation so as to protect the heart of this invention, as a matter of law.

[0053] It will thus be seen that the objects set forth above, and those made apparent from the foregoing description, are efficiently attained and since certain changes may be made in the above construction without departing from the scope of the invention, it is intended that all matters contained in the foregoing description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

[0054] It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

Now that the invention has been described;

Claims

1. A method for recycling a photographic film by separating a laminate which is other than a resin material base of a photographic film, i.e., a protective film, an emulsion layer, a lower coat layer, from a resin material base for collecting a resin material, said method comprising at least the following steps of:

   shredding said photographic film into a plurality of fragments to be processed;
   swelling said fragments to be processed formed in said shredding step by dipping each of these fragments to be processed into hot water; and
   drying said fragments to be processed swollen in said swelling step by applying an impact frictional striking force to each of said fragments to be processed, peeling layers other than said resin material base of said photographic film, i.e., said protective coat, said emulsion layer, said base coat layer, off said fragment to be processed and classifying these layers, and grading said resin material base of said photographic film so as to be said resin material to be recovered.

2. The method for recycling said photographic film according to Claim 1, said step where, said impact frictional striking force is applied to said fragments to be processed, said layers other than said resin material base, i.e., said protective coat, said emulsion layer, said base coat layer, are peeled, and said resin material base is graded so as to be

said resin material to be recovered, can be repetitively carried out several times.

3. The method for recycling said photographic film according to Claim 1 further comprising, after said drying, peeling, classifying and grading step, a step for selectively recovering, by screening, said classified resin material base and silver contained in said emulsion layer.

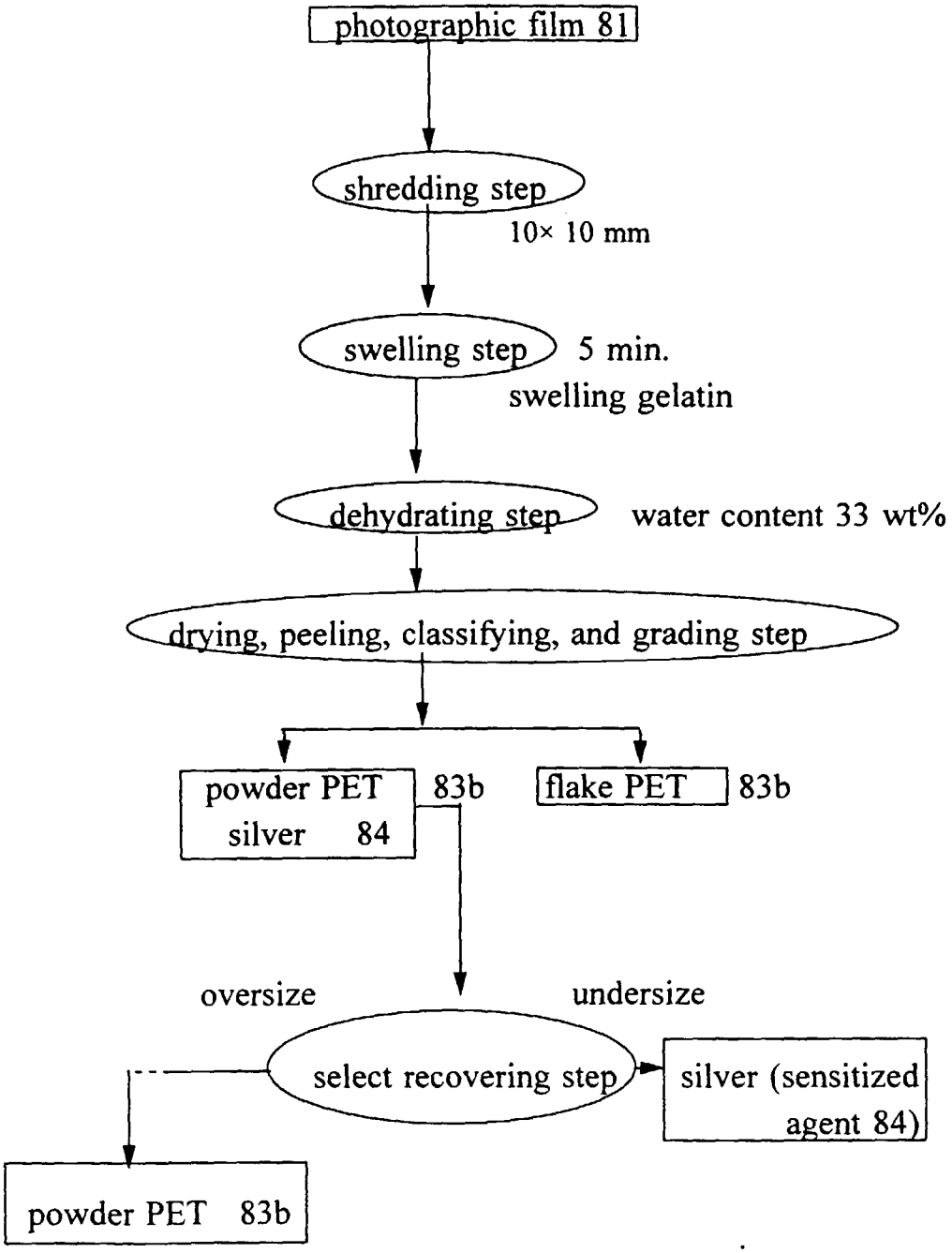
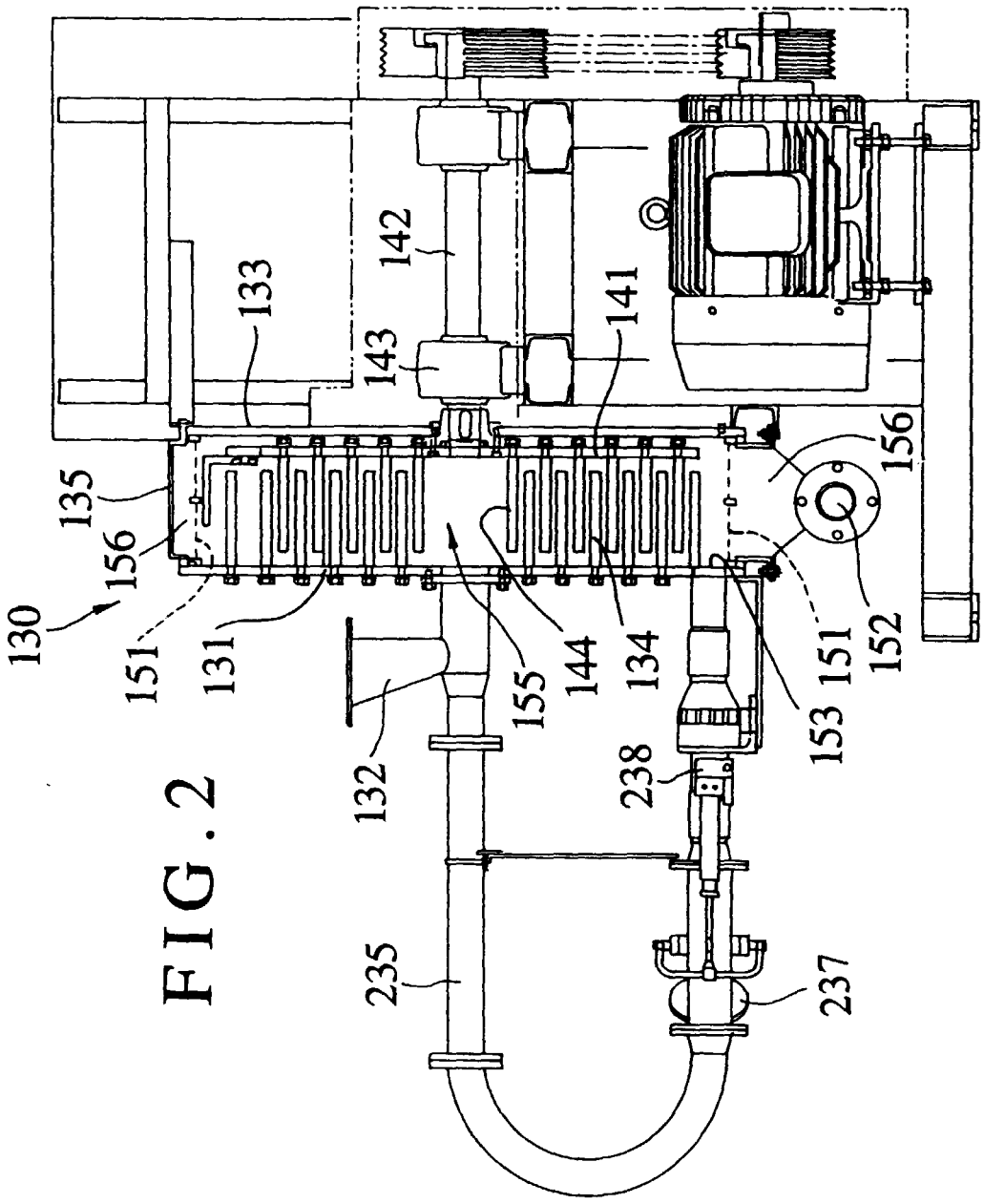

photographic film 81
shredding step
10× 10 mm
swelling step
5 min.
swelling gelatin
dehydrating step
water content 33 wt%
drying, peeling, classifying, and grading step
powder PET
silver 84
83b
flake PET
83b
oversize
undersize
select recovering step
silver (sensitized agent 84)
powder PET 83b

FIG.1


130
135
156
151
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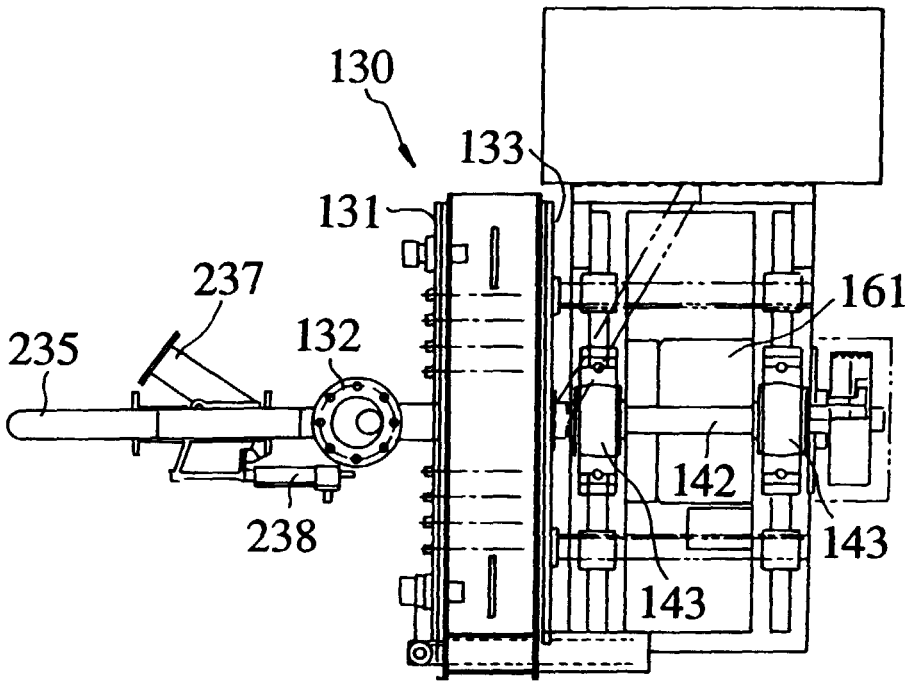
235
237

FIG. 2

FIG. 3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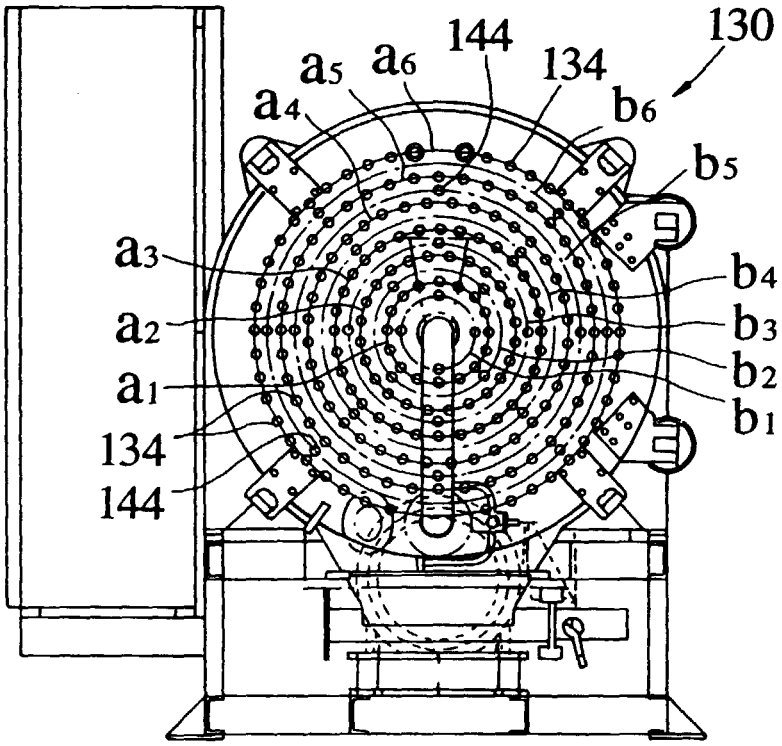
238
143

FIG. 4


130
144
134
a5
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b2
a1
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134
144

FIG. 5

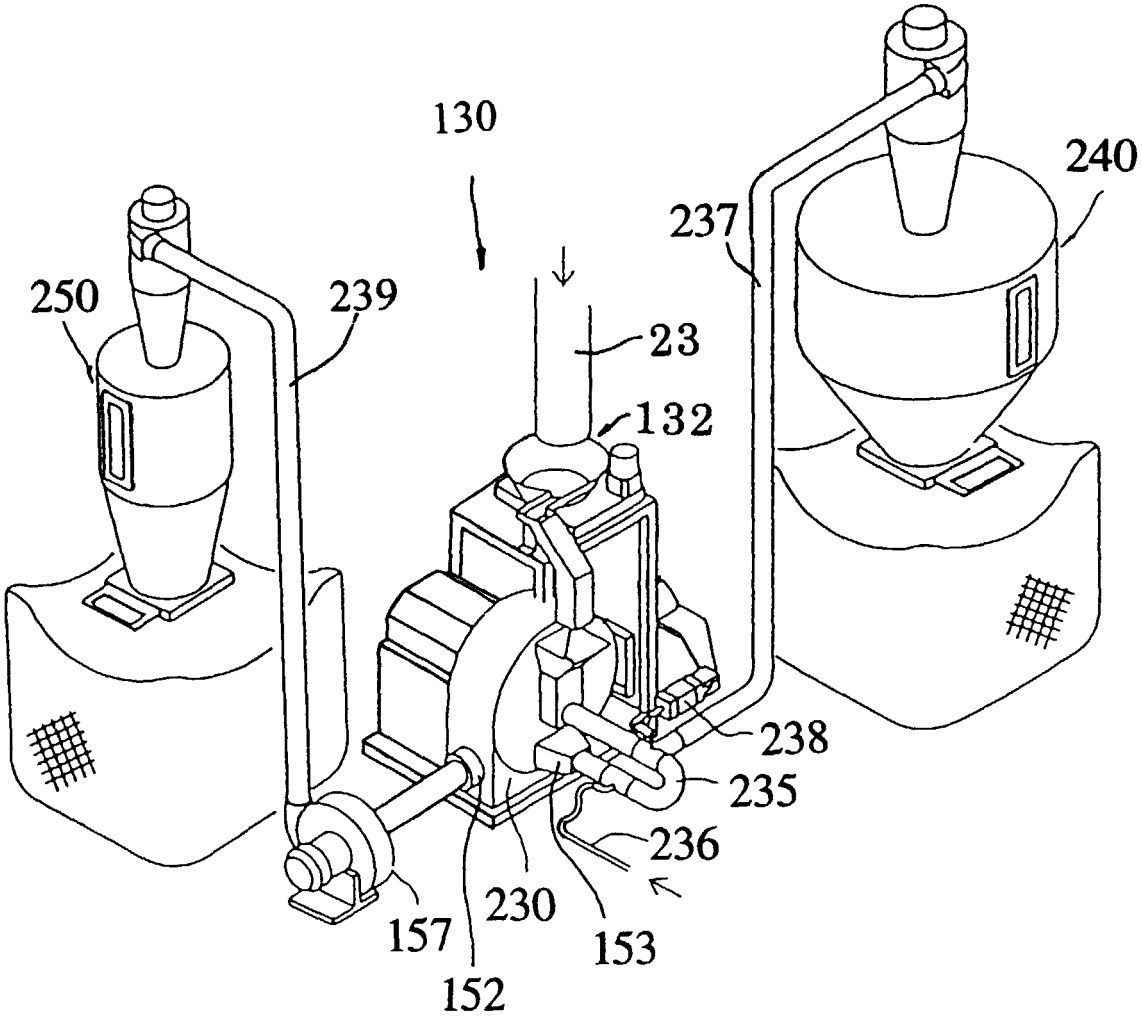
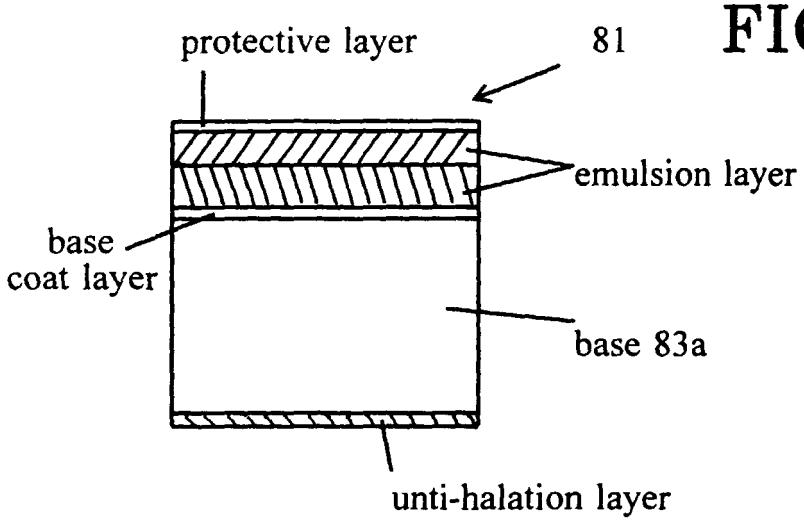


FIG.6


protective layer
81
emulsion layer
base
coat layer
base 83a
unti-halation layer

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 98 89 0270

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	US 4 612 057 A (E.I. DU PONT DE NEMOURS AND COMPANY) 16 September 1986 * see example *	1-3	G03C11/24
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G03C
C08J

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
MUNICH	21 April 1999	Okunowski, F

CATEGORY OF CITED DOCUMENTS

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 98 89 0270

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