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3,121,162 THERMOGRAPHIC COLLOID TRANSFER PROCESS

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This invention relates to a thermographic process in which gelatin-containing layers are exposed imagewise to heat so as to increase the solubility, swelling and adhesive properties of the gelatin layers in the heated regions whereupon the more adhesive portions are transferred to an absorbent support.

Many photographic processes are known in which a gelatin layer such as dichromated gelatin is exposed to a subject with visible light resulting in an insolubilization or decreased swelling tendency in water of the gelatin in the exposed regions. Subsequently the unexposed portions of the gelatin layer may be removed, for example, with warm water, leaving a negative relief image corresponding to the less soluble portions of the gelatin layer. Positive processes involving the differential solubilization of a gelatin layer are known, such as the so-called peroxide etch process, wherein the gelatin in the region of a negative silver image is treated with peroxide solution to leave a positive gelatin relief image on the support.

We have discovered a process, not involving the use of special chemicals, for locally modifying the swelling tendency in water of a gelatin layer. In this process, a subject containing an infrared absorbing image is exposed to infrared radiations in contact with a high jelly strength layer of gelatin or gelatin derivative applied onto a support, such exposure being very short but sufficient to suddenly raise the temperature of certain regions of the gelatin layer, thus causing a substantial increase in the swelling tendency of the gelatin in water, the difference in swelling tendency in water of the heated and unheated portions being utilized to form an image visible in the gelatin layer or by transfer. Such transformation is differently apparent according as the gelatin layer is or is not hardened. If a substantially unhardened gelatin layer is used, it is found, after thermographic exposure, that the heated areas can be completely washed out in water at 25° C. On the other hand, if a layer of hardened gelatin is used, there only appears a difference in the swelling speed between the heated and unheated regions, which may be evidenced by immersing the gelatin layer in a dyeing solution for a few seconds.

According to an embodiment of the invention, wherein a substantially unhardened gelatin layer is used, it has been found, after thermographic exposure and moistening of said gelatin layer, that the heated regions are more adhesive than the other regions and that, consequently, they can be transferred onto an absorbent support by simply pressing the moist gelatin layer against the absorbent support. When the sandwich is separated, a thin pellicle of the more adhesive heated regions remains on the support.

Alternatively, it is possible to use a gelatin layer hardened by certain compounds, such as certain metallic salts for obtaining transfers, provided an appropriate moistening bath is used as indicated in detail hereunder.

It is also possible to use the gelatin image directly without any transfer by revealing it with a dyeing solution.

In the most general case, the gelatin areas whose structure is modified are those behind the image of the original and a positive is obtained. That is, the image areas are heated by absorbing infrared radiations and the heat is

transmitted to the corresponding portions of the gelatin layer.

On the other hand, it has been found that, if an original and a gelatin layer product with translucent supports are used, if contact exposure is made and if an infrared absorbent pigment is incorporated into the gelatin layer or if a paper or a similar infrared absorbent material is placed in contact with the receiving product, the areas located behind the clear portions of the document are those which undergo a transformation making them capable of being transferred. This reproducing system is useful for the printing of photographic negatives.

The process of the invention is therefore subject to many variations, such as those described hereafter which are more particularly suitable to contact or reflex printing methods.

The process of the invention thus differs from the mentioned prior art processes particularly in that gelatin per se is used as the heat-sensitive composition and the process does not depend upon the presence of an auxiliary image such as a silver image nor the addition of chemical activators such as bichromate for effecting the differential solubilization or swelling in water. The local heating of the gelatin layer in the image areas alone suffices to bring about the change in swelling tendency in water of the gelatin layer. The effect is believed to be due to a brief and sudden thermographic heating of the gelatin at a temperature of the order of about 50 to 200° C. and preferably above 100° C. followed by quick cooling of the gelatin without passage through the gel stage, with the result that the gelatin in the heated areas is converted to a metastable condition in which the structure is relatively weak and unorganized. The structure is somewhat comparable to that of a sol-dried gelatin, i.e., a gelatin dried at a temperature in excess of 35 or 40° C. The structure may slowly revert to that of a dried organized gel after standing several days at room temperature, particularly at high humidities, or upon wetting and allowing to dry. Prior to this reorganization of the structure, the gelatin is more readily swollen in water at about 15 to 30° C., and when swollen in water, has less cohesion and is more tacky. In this condition such gelatin is transferable to a receiving sheet. Comparable properties in an unheated dried gelatin gel are obtained only after swelling at temperatures which are several degrees higher.

The successful operation of this copy system depends on the difference in the swelling tendency of the gelatin in image and non-image areas after thermographic exposure. The swelling of the heated regions of the gelatin layer after 2 minute immersion in water at 20° C. must be more than about 1.5 times the corresponding swelling in the unheated regions to produce copies of acceptable quality. The swelling of the gelatin may be measured by any convenient method which records the difference in thickness of swollen heated and unheated layers of gelatin.

The gelatin of the heat-sensitive element of the invention should be one known in the art as relatively high jelly-strength gelatin such as ordinary photographic gelatin which has not undergone any appreciable amount of hydrolysis as opposed to the more soluble glues. Gelatin from various sources, such as bone, calfskin, pigskin and goat skin gelatin having a high jelly strength of the order of 200 to 250 bloom gelometer units are quite useful in the process. Reference may be had to the Journal of Industrial and Engineering Chemistry, vol. 16, p. 310, of 1924 for a description of the bloom method of grading gelatins according to jelly strength. Hydrolyzed gelatins having a jelly strength of about 10 or less bloom units are ordinarily not useful in the process except that a minor amount of such gelatin may be added to a high jelly-

strength gelatin and useful results will be obtained. The "gelatin" useful in the processes of the invention includes gelatin derivatives such as phthalated gelatin and other dicarboxylic acid derivatives of gelatin such as disclosed in the Yutzy and Frame U.S. Patent 2,525,753, granted October 10, 1950.

As indicated above, a substantially unhardened gelatin layer is generally used. In this case, it is advantageous to carry out transfer in the presence of a tanning or gelatine hardening agent such as aluminium sulfate, chromium alum, potassium alum, formaldehyde, chromium chloride, glyoxal, tannic acid, etc., which is generally incorporated into the moistening aqueous solution. This permits one to obtain a larger number of copies from the same master sheet. That is, since the unhardened master sheet must be moistened before each transfer, the unheated areas may tend to adhere to the receiving support after a certain number of immersions. This does not happen if a tanning agent for gelatin is incorporated into the moistening bath or into the receiving sheet.

According to a modification of this process already indicated above, it has been found that it is possible to use a gelatin layer hardened by certain compounds such as metallic salts, and capable of being "dehardened," in the case of metallic salts, by certain acids (citric, tartaric, etc.) which complex the cations of such salts. Accordingly, the process of the invention permits one to transfer the areas, heated by thermographic exposure, of a gelatin layer hardened by certain metallic salts, provided the operation is carried out in the presence of complexing agents which may be incorporated, for instance, into the moistening bath which complexing agents may then be termed an activator. Under such conditions, the activator softens the gelatin preferentially in the heated areas, owing to the increase in the swelling speed in such areas and thus allows the latter to be transferred.

In preparing a heat-sensitive element for use in the processes of the invention, a film, paper or similar support is selected depending upon the particular process under consideration, for example, depending upon whether contact printing (original toward the incident radiation) or "so-called" reflex printing (heat sensitive layer toward the incident radiation) methods are to be used. In the latter case, since printing takes place through the support of the gelatin layer, placed in thermal contact with the document, the absorption of infrared light by the support should be as low as possible. It is also desirable that the support be free of material, such as formaldehyde, tending to harden the gelatin layer. A solution of the gelatin for coating on the support is prepared in the usual manner by swelling in water followed by heating moderately to obtain solution, after which a uniform coating of the gelatin solution is applied to the support followed by drying under moderate conditions using a limited amount of heat during the drying operation.

It may be desirable to supply coloring material to form a color in the transfer gelatin image at some stage prior to, during or subsequent to its formation on the reeciving sheet in order to obtain more readily visible images. Thus, a dye or other pigment such as Prussian Blue, colloidal silver, silver halide, copper ferrocyanide, dyes such as Pontamine, Fast Green, etc., may be added to the gelatin coating, or may be present in the aqueous solution used in the process. The coloring material should be chosen for good density in visible light and good transparency to infrared.

The gelatin coating may also contain gelatin softening agents such as urea, glycerol, thiourea, sorbitol, tartaric acid, citric acid, sodium nitrate, etc., to aid in maintaining the gelatin layer in a substantially unhardened condition in the procedures in which such a condition is desired.

The gelatin layer may be exposed to a halftone or line document by contact exposure or reflex exposure and usual sources of infrared radiation may be used, such as a flash light lamp, or the usual thermographic printing machine capable of supplying highly intense infrared radiation, so that the heated gelatin areas may be raised to the desired temperature in a very short time. In the usual reflex printing method, the original is placed with the print material in contact with the gelatin layer and exposure is made through the latter and its support. The support of the gelatin layer should therefore be relatively transparent to infrared radiation and, if the gelatin layer contains coloring materials such as those mentioned earlier, these should have comparatively low infrared absorption.

In the contact printing method, several cases should be considered. For instance, the diffusing support of the document may be placed in contact with the gelatin layer which may contain coloring materials, carbon black, etc., and exposure may be made through the document towards the gelatin layer. The copy obtained on the receiving sheet is wrong-reading, but if a transparent receiving-sheet is used, a right-reading image may be obtained by looking at the print through its support. Thus, with two-sided documents, it is possible to copy the print material on that side away from the gelatin layer, without any interference from the print material on the side closest to the gelatin layer. Apparently, in this case, the radiations are filtered out or diffused by the support of the original and so do not heat the printed characters on the side of the original closest to the gelatin layer, only the heat of the characters of the opposite side being conductively transmitted through the document which must be thin.

It is also possible to place the printed characters of the document in contact with the gelatin layer which may contain a pigment that does not absorb infrared radiation, and expose through the support of the document which is then preferably little diffusing. A wrong-reading positive master sheet is thus obtained and, accordingly, right-reading positive copies are obtained by transfer. In this case, only one-sided documents can be copied.

Finally, as indicated above, it is possible to copy negatives, in particular by using documents having translucent supports. This procedure will be described in detail in Examples 7 and 8.

After exposure, the unhardened gelatin layers are immersed for a few seconds in water, containing a gelatin hardening agent as mentioned above, if desired or they are otherwise wetted at a temperature of about 15 to 25° C.; then the moist gelatin layer is pressed into contact with an absorbent reception sheet momentarily and peeled off to leave the possibly colored gelatin image thereon. Additional prints are obtained from the same gelatin layer by rewetting the layer and repeating the transfer operation using fresh reception sheets. It has also been found that several transfers are possible without repeating the moistening operation, the first wetting operation only being required. If desired, following thermographic exposure of the gelatin coating, rather than making the transfer prints at once, the exposed gelatin coating may be stored for several days and then moistened with the aqueous solution and the transfer made for the desired number of times to reception sheets.

Exposure is made in a similar manner, as also the treatment of the previously hardened layers, except that the wetting operation is carried out by means of a liquid containing a dehardening agent and maintained at a temperature of about 20° to 25° C.

The reception sheet for receiving the gelatin image may be paper, glass, metal, synthetic polymer sheeting, etc., depending upon the exact process for which the resulting master sheet is intended and ordinary office copy paper is quite useful. In case a transparent copy is desired, a transparent sheet such as glassine paper or a cellulose ester or synthetic polymer sheet may be used. If a printing plate is desired, the gelatin image may be transferred to a hydrophilic lithographic support such as grained zinc or aluminum sheet or a casein-coated paper and after suit-

ably hardening the gelatin image, for example, with a hardening agent and/or heat, lithographic prints may be made in the usual manner on a lithographic printing press.

Our invention will now be illustrated by the following representative examples:

Example 1

Finely divided Prussian Blue was prepared by adding an excess of ferric chloride solution (22 cc. of $FeCl_3$ (d.=1.26) in 80 cc. of distilled water) to an agitated solution of 16.8 grams of trihydrated potassium ferrocyanide at 40° C. over a period of 30 seconds. Eight cc. of 2.5 normal sodium hydroxide solution were then added.

A solution of 30 grams of phthalated gelatin (containing 4.5 percent phthalyl) in 300 cc. of water at 40° was prepared and the Prussian Blue added thereto followed by stirring for five minutes at 40° C. after which 150 grams of the same phthalated gelatin in 1000 cc. of water were added followed by 60 cc. of 50 percent glycerol and 18 cc. of saponin solution. Additional water was added to a total weight of 1800 grams.

The resulting dispersion of Prussian Blue in gelatin was coated on a cellulose triacetate film base at a coverage of 170 milligrams of solids per sq. dm. and dried.

The dried gelatin coating was then exposed by reflex printing methods in a commercial thermographic printer having an infrared-rich light source and providing a brief and intense exposure. Thereafter, the exposed gelatin coating was immersed in a solution of 1.5 grams of aluminum sulfate at 17 H_2O in 1500 cc. of water at 20° C. and the gelatin coating then squeegeed against a paper receiving sheet. Upon separating the gelatin layer from the paper sheet, a blue positive image remained on the sheet. Seven additional copies were made in the same manner from the same exposed gelatin layer with a freshly coated product, whereas three weaks after coating 20 copies could be obtained.

Example 2

Forty-five grams of gelatin were dissolved in 400 cc. of water and the following added:

Glycerol ---------- cc.	7.5
Urea ---------- grams	4.0
Poly-α-methylallylamino guanidine, 12% solution in 7% glycolic acid solution ---------- cc.	166.0
Styrene-butylacrylate-acrylic acid copolymer (Fowler U.S. Patent 2,772,166, Nov. 27, 1956); 15% aqueous hydrosol ---------- g.	31.0
Glycolic acid, 6 N ---------- cc.	7.5
Saponin (15%) ---------- cc.	10.0

The resulting gelatin solution was then coated on a cellulose triacetate film base to obtain 150–200 milligram solids per square dm. The dried coating was then exposed thermographically as described in Example 1. The exposed coating was immersed for 30 seconds in a solution of 90 cc. of a cyan dye solution (obtained by dissolving in 60 liters of water 810 g. of Erio Fast Cyanine S Supra) in 600 cc. of water, 300 cc. of 50 percent glycerol solution, and 1080 cc. of 20/80 acetone/ethyl alcohol solution. Thereafter the dyed gelatin coating was squeegeed to a paper receiving sheet and a cyan colored gelatin image transferred thereto. Three other copies were obtained in a like manner by rewetting the gelatin layer and transferring to fresh sheets of paper.

Example 3

An 8 percent aqueous solution of photographic gelatin containing 1 percent of Fastosol blue dye and 0.3 percent of urea was coated on a paper base and dried. The coating was exposed thermographically to a printed subject, then briefly treated wtih water at room temperature and a transfer of the exposed regions of the gelatin coating made to a paper receiving sheet in the manner described in Example 1. A positive blue gelatin image of the original subject was seen on the receiving sheet.

Example 4

This example relates to the direct use of the image obtained in a gelatin layer hardened by thermographic exposure.

As indicated earlier, it has been found that a hardened gelatin layer (hardened by heating or by means of an appropriate agent) has a higher swelling tendency in the heated regions. It is then of interest that the swelling speed be as low as possible. This result may be obtained by using water at a low temperature or by adding compounds which cheeck swelling.

A solution was prepared with 5 g. of gelatin (type 11927 sold in France by Cie Generale Rousselot), 100 g. of water and 1 cc. of a saponine solution. It was coated on a cellulose triacetate film base and dried. The coating was then hardened by dry heating for three days at 50° C. The coating was thermographically exposed to a printed subject and the film base carrying the hardened gelatin layer was immersed for 30 seconds in the following composition:

	Cc.
Solution of aforesaid cyan dye ----------	15
Water ----------	100
50% glycerol solution ----------	50
80/20 alcohol/acetone mixture ----------	180

A cyan image having excellent maximum and minimum density was obtained. If halftones were desired, a halftone intermediate should be used.

Example 5

It has been found that it is possible to carry out several successive dyeing operations of various colors on the same hardened gelatin layer. In this case, the gelatin layer should be treated after being immersed in the dyeing bath with a special solution which allows it to recover its initial properties, for example a solution having the following composition:

	Cc.
80/20 alcohol/acetone mixture ----------	250
50% glycerol solution ----------	40
Water ----------	20
2 N sulfuric acid ----------	20

When a trichrome copy was desired, the following procedure was followed.

A Kodak trichrome printing paper was thermographically exposed to a red light color separation image, then the exposed paper was immersed for 30 seconds in a cyan dyeing bath followed by immersion for 30 seconds in the aforesaid special solution and dried.

These operations were repeated twice, blue and green, light color separation images and yellow and magenta dyeing baths being respectively used.

The yellow dyeing bath had the following composition:

	Cc.
Solution of yellow dye ----------	30
Water ----------	30
80/20 alcohol/acetone mixture ----------	100

The magenta dyeing bath had the following composition:

	Cc.
Solution of magenta dye ----------	60
50% glycerol solution ----------	30
80/20 alcohol/acetone mixture ----------	150

The yellow dye solution was obtained by dissolving 1.8 kg. of Taylor Yellow dye in 60 liters of distilled water and the solution of magenta dye by dissolving 270 g. of Alizarine B Bright Red dye in 60 liters of distilled water.

Example 6

This example relates to the use of hardened gelatin layers for obtaining transfer images.

A solution A of 41 cc. of ferric chloride (d.=126) was prepared in 75 cc. of distilled water at a temperature of 20° C. and a solution B of 28.25 g. of potassium ferrocyanide ($Fe(CN)_6K_4.3H_2$) in 400 cc. of distilled water at the same temperature. Solution A was poured in solution B in seven minutes with strong stirring, the temperature being maintained at 20° C. 16.5 cc. of a 10% solution of pentahydrated cupric sulfate was added, followed two minutes later by 15 cc. of a 2.5 N solution of sodium hydroxide. The temperature was raised to 40° C. and the mixture was maintained at such a temperature for 10 minutes. It was then stirred in a mixer for 1 minute and a half by fractions of 350 g. and the resulting mixture was poured in a gelatin solution comprised of 67 g. of phthalated bone gelatin at 4.5% of phthalic anhydride and 333 cc. of distilled water at a temperature of 40° C. The resulting mixture was stirred for 10 minutes at 40° C., then it was stirred in a mixer for one minute and a half by fractions of 350 g. and poured in the following composition at 40° C., with stirring:

Phthalated bone gelatin (4.5% of phthalic anhydride)	g..	158
Distilled water	cc..	792

The mixture was stirred for 10 minutes, then there was added a gelatin solution prepared at 40° C. and having the following composition:

Gelatin (Cie Generale Rousselot type 11952)	g..	225
Distilled water	cc..	1125

40 cc. of a saponine solution (150 g. per liter), 50 cc. of a thymol solution (2.24 g. for 100 cc.), 75 cc. of glycerol and 100 cc. of chromium alum

$$((SO_4)_3Cr_2.SO_4K_2.24H_2O)$$

(2.25 g. for 100 cc.) were added and the mixture was completed up to 5 kg. with distilled water.

The solution was coated on a 0.09 mm. triacetate film base, at a coverage of 150 mg. of solid per sq. dm. and dried.

The product was exposed thermographically as in Example 1, then squeegeed to a receiving paper after wetting it in a bath of the following composition:

By repeating the operation, 7 or 8 copies of a good quality could be obtained. No transfer was possible after treatment in pure water.

Examples 7 and 8 illustrate a variation of the invention in which the clear regions of the original are reproduced. The support of the gelatin coated product was applied in contact with the blacks of the original and the sandwich was exposed through the back side of the original. In this procedure, it was necessary that the supports of the original and of the gelatin coated product be infrared transparent.

Example 7

A gelatin layer containing no infrared absorptive substance was used, but a black infrared absorptive paper was placed in contact with the gelatin of the master sheet and the operation was carried out as indicated earlier. A positive reproducing master sheet was obtained from a negative. In effect, the light transmitted by the clear regions caused the temperature to be raised sufficiently in the corresponding areas of the black paper surface to modify the physical properties of the gelatin in contact with such areas, whereas infrared radiations were stopped by the black regions of the original.

Example 8

A gelatin layer containing an infrared absorptive layer was used, which permitted to obtain the same results as in Example 7.

A Kodak dye transfer matrix film was developed, fixed (in the absence of any hardening agent), washed and dried. It was then exposed as indicated above to obtain a positive reproducing master sheet from a negative film. In this case, it was silver which was used as an infrared absorptive pigment.

From a wrong-reading negative, a right-reading positive copy was obtained.

Other products may be present in the initial gelatin layer in addition to or instead of the dye, depending upon the use for which the layer is intended. Thus, an optical brightener such as "Leucophor B" yields copies fluorescing under ultraviolet light. When indicator dyes are incorporated into the gelatin layer, the copies produced are sensitive to changes in pH. If metal salts are added, pigmented copies are obtained when the gelatin-metal salt image is treated with substances such as sulfide. When silver halides are present in the gelatin layer, the initial gelatino-silver halide layer is sensitive to visible radiations as well as to infrared. Likewise, if the heated gelatin areas are transferred to a porous support or silk such as used in the silk-screen process, the resulting stencil may be used as usual.

In the process of the invention it may be desirable to remove all or a part of the gelatin image which has become soluble upon exposure to infrared by washing with water. Thus, a gelatin relief image remains on the support which may be used, for example, to print dye images on a mordanted sheet in the usual imbibition dye transfer process. Of course, in this case, a substantially unhardened gelatin layer is used. Colored gelatin images which have been obtained by transfer to transparent supports may also be superposed in register on other subtractively colored color-separation images to obtain a full-color reproduction as in the Carbro process.

The process of the invention may also be adapted to the production of multicolor copies by the exposure of separate gelatin layers to the red, green and blue light color-separation images of the subject. Each exposed gelatin layer preferably containing the corresponding subtractively colored dye or pigment, is then wetted in the manner described in Example 1 and successively squeegeed into contact with a mordanted reception sheet to transfer cyan, magenta and yellow colored gelatin images in register to the reception sheet.

The process has the advantage over conventional imbibition dye transfer processes in that the transferred gelatin images tend to prevent the dye from wandering.

It has also been found that the gelatin layer may be used for curve recording by means of a heated stylus.

In the above processes it is not necessary that the coloring material be applied to the gelatin coating prior to transfer of the gelatin image to the reception sheet. The transferred gelatin image may be bathed with a solution of a suitable dye, or powdered dye or other coloring material in powder form may be dusted on the moist gelatin image to render it more visible.

Thus, the invention provides a new, simple and cheap thermographic reproducing process making use of a gelatin layer as a heat-sensitive product and yielding perfectly stable copies.

In the above description, by "substantially unhardened gelatin" we mean gelatin having a hardness not greater than would be the case with gelatin containing about 0.7 gram of dry formaldehyde per pound of gelatin freshly coated or about 3 cc. of 10 percent formaldehyde solution per pound of gelatin aged for about three to six months.

We claim:

1. A reproduction process which comprises irradiating a subject having heat absorptive image areas with infrared radiations in heat conductive contact with a supported layer of high jelly strength gelatin, sufficiently to raise the temperature of the gelatin substantially in regions of said heat absorptive image areas and thereby cause a substantial increase in swelling tendency of the gelatin in said areas, moistening the gelatin layer and pressing it into contact with an absorbent support to cause the gelatin in said areas to adhere to said sup-

port, separating the gelatin layer from said support to leave a stratum of the gelatin of said areas on the support.

2. A reproduction process which comprises irradiating a subject having heat absorptive image areas with infrared radiations in heat conductive contact with a supported layer of high jelly strength gelatin containing a coloring material, sufficiently to raise the temperature of the gelatin substantially in regions of said heat absorptive image areas and thereby cause a substantial increase in swelling tendency of the gelatin in said areas, moistening the gelatin layer and pressing it into contact with an absorbent support to cause the gelatin in said areas to adhere to said support, separating the gelatin layer from said support to leave a stratum of the gelatin of said areas on the support.

3. The process of claim 1 wherein the exposure of the gelatin layer to the subject is made by reflex exposure.

4. A reproduction process which comprises irradiating a subject having heat absorptive image areas with infrared radiations in heat conductive contact with a supported layer of high jelly strength gelatin containing Prussian blue, sufficiently to raise the temperature of the gelatin substantially in regions of said heat absorptive image areas and thereby cause a substantial increase in swelling tendency of the gelatin in said areas, moistening the gelatin layer and pressing it into contact with an absorbent support to cause the gelatin in said areas to adhere to said support, separating the gelatin layer from said support to leave a stratum of the gelatin of said areas containing Prussian blue on the support.

5. A reproduction process which comprises irradiating a subject having heat absorptive image areas with infrared radiations in heat conductive contact with a supported layer of high jelly strength gelatin, sufficiently to raise the temperature of the gelatin substantially in regions of said heat absorptive image areas and thereby cause a substantial increase in swelling tendency of the gelatin in said areas, moistening the gelatin layer and pressing it into contact with an absorbent support in the presence of a gelatin hardening agent to cause the gelatin in said areas to adhere to said support, separating the gelatin layer from said support to leave a stratum of the gelatin of said areas on the support.

6. A reproduction process which comprises irradiating a subject having heat absorptive image areas with infrared radiations in heat conductive contact with a supported layer of high jelly strength gelatin, sufficiently to raise the temperature of the gelatin substantially in regions of said heat absorptive image areas and thereby cause a substantial increase in swelling tendency of the gelatin in said areas, moistening the gelatin layer with an aqueous solution containing a gelatin hardening agent and pressing it into contact with an absorbent support to cause the gelatin in said areas to adhere to said support, separating the gelatin layer from said support to leave a stratum of the gelatin of said areas on the support.

7. A reproduction process which comprises irradiating a subject having heat absorptive image areas with infrared radiations in heat conductive contact with a supported layer of high jelly strength gelatin, sufficiently to raise the temperature of the gelatin substantially in regions of said heat absorptive image areas and thereby cause a substantial increase in swelling tendency of the gelatin in said areas, moistening the gelatin layer and pressing it into contact with an absorbent support containing a gelatin hardening agent to cause the gelatin in said areas to adhere to said support, separating the gelatin layer from said support to leave a stratum of the gelatin of said areas on the support.

8. The process of claim 1 wherein the irradiation of the subject causes a swelling of the gelatin in the irradiated areas in water at 20° C. for 2 minutes, at least 1.5 times the swelling tendency of the gelatin in the less irradiated areas.

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