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2,992,937

FILM PRINTING

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Fig. 1

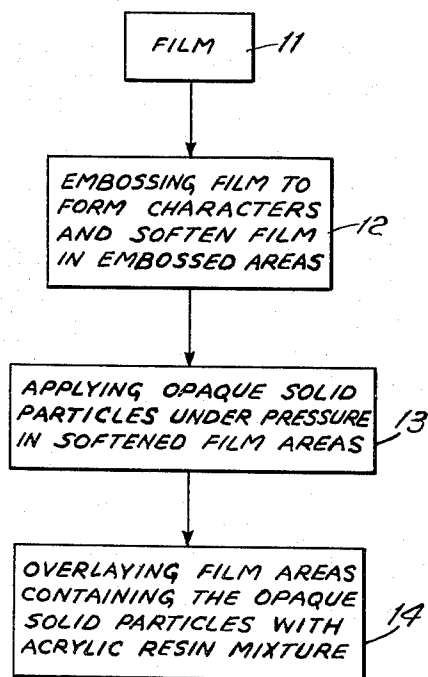


Fig. 2

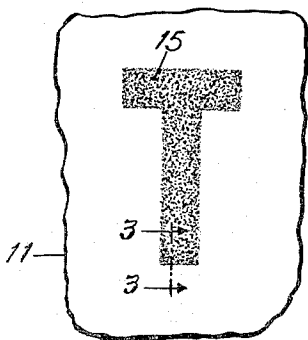
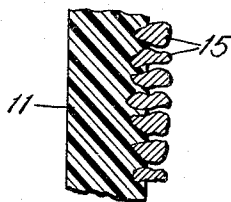


Fig. 3



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FILM PRINTING

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This invention relates to printing processes and in particular to printing on film.

In connection with microfilm techniques and arrangements there is often found a key or indexed area on the microfilm which enables the user of a microfilm arrangement to determine what is on the film. An example of such an arrangement is in microfilm aerial reconnaissance wherein an aircraft camera, which is looking at an area over which it is flying, has added to the film a code notation indicating the speed, altitude, direction, etc., of the aircraft. Very often this coded information is found in the form of a dotted raster in the corner of a film frame. The user of such an arrangement, obviously, cannot readily go to the trouble of decoding the rasters to determine this vital information each time the microfilm strip is viewed. It therefore has been desirable to translate the raster information or a part thereof into plain language on the film frames. A scheme to put the information in the form of plain language on the film has been used whereby a film title has been put on photographically. This scheme entails the removal of the photosensitive emulsion from the area of the film where the title is to be placed, after the film has already been exposed in the course of taking the main picture. It is then necessary to reapply new emulsion in order that the title might be added by a second photographing process. Obviously, this arrangement necessitates the use of a great deal of equipment and requires a great deal of time since there is the emulsion removal procedure and the second photographic process.

Another scheme has been tried whereby there has been a direct printing on a film using ordinary ink or carbon deposits. This system has proved undesirable because the ink and carbon deposits, being basically liquid in nature, spread under the pressure of character impressions and result in producing printed characters which are fuzzy or even indefinite.

It is therefore an object of the present invention to provide an improved process for printing on film. It is a further object of the present invention to provide a printed film with well-defined characters.

It is a further object of the present invention to provide a process for printing on film wherein the characters will be of a permanent nature and wherein the result will be accomplished with relatively little equipment.

In accordance with a main feature of the present invention there is transferred to the film under pressure solid or metal particles which form the characters to be printed.

In accordance with another feature of the present invention in conjunction with the above-mentioned feature, the film having the metal or solid particles deposited thereon is coated with an acrylic resin mixture to prevent inadvertent removal of the metal or solid particle from the film.

The foregoing and other objects and features of this invention and the manner of attaining them will become more apparent and the invention itself will be best understood by reference to the following description of the inventive process taken in conjunction with the accompanying drawing comprising FIGS. 1, 2 and 3, wherein:

FIG. 1 is a flow chart of the process;

FIG. 2 is the letter T magnified 20 times;

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FIG. 3 is a cross section of the letter T of FIG. 2 magnified 80 to 90 times.

Considering the flow chart of FIG. 1 there is shown film stock 11 being subjected to an embossing process 12 which causes the film to become viscous or soft under pressure, the film then having opaque solid particles applied as indicated at 13 in the soft areas and thereafter being subjected to a overlaying process 14 wherein the material overlayed on is an acrylic resin mixture to form a protective coating.

It has been found in the attempts to print on film that ordinary ink or carbon deposits, because they are of a liquid nature basically, tend to spread when subjected to the pressures of a printing device forming letters on a film. The ink or carbon deposits spreading, as described above, tend to make the characters fuzzy and indefinite. Further, the ink or carbon deposited on the film rubs off with very little surface contact.

In accordance with the inventive process it has been found that if solid opaque particles dispersed in the form of metal foil, which in a preferred arrangement comprise gold particles, is deposited on the film under pressure the metal will assume, with a fine degree of resolution or definiteness, the shape of the instrument applying the pressure. Other solid particles that may be used include any of the metals such as silver, aluminum, platinum, copper and/or non-metallic solids such as glass, ceramics, or certain hard plastics, etc.

Normally film stock is made with an acetate base. When acetate film stock is subjected to pressure, the acetate becomes soft or viscous. Operating on this principle in a preferred arrangement of the inventive process, a typewriter using a plastic ribbon with gold particles adhered thereto and having the appearance of gold foil is used as the printing device. Such gold foil ribbon can be of the variety manufactured by the Columbia Ribbon and Carbon Company of New York City.

The gold foil ribbon has a plastic base and when the type of the typewriter exerts a pressure on the film through the ribbon, the acetate becomes viscous and gives to the film the characteristic of greater affinity for the gold foil than the plastic base of the ribbon. In this way the gold foil is transferred to the film and is only removed from the ribbon in the areas where the type creates the pressure to soften the film. Because the acetate is in a viscous state under the pressure of the type, the metal particles which are transferred become embedded in the film.

FIG. 2 shows the letter T as it appears under a microscope being magnified approximately 20 to 25 times. In the preferred arrangement, described above using the typewriter, the letter T printed on the film has material filled channels of approximately $\frac{3}{64}$ of an inch wide, $\frac{5}{64}$ of an inch high and a cross bar of $\frac{3}{64}$ of an inch wide. When this letter T is magnified 20 to 25 times, as depicted in FIG. 2, there appear to be areas which are not filled by the opaque material or metal. These void areas do not appear to be present when the letter is viewed with the naked eye as it appears on the film. FIG. 3 shows a portion of FIG. 2 being magnified 80 to 90 times. Under the microscope at this magnification level it becomes clear that the particles of metal or other solid opaque material 15 are embedded in the film 11 according to the irregular patterns which accompany their irregular shapes. When the film is cut and viewed as shown in FIG. 3, it is evident why the film has the greater affinity for the solid particles and why the particles adhere so strongly to the embossed areas of the film.

Under test, film printed on, as described, has shown characteristics of withstanding rubbing actions or surface

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contact actions without peeling off, but such film cannot withstand such actions in excessive repeated form. Therefore, another step in the process becomes desirable.

After the characters have been printed with solid opaque particles, the film is sprayed on the printed areas with an acrylic resin mixture. This mixture hardens into a protective coating which prevents the solid particles from peeling or being chipped due to any surface contacts which might be made.

Although in the preferred embodiment, described above, a typewriter device was used for the initial printing and gold foil ribbon was used in conjunction therewith, it is evident that other mechanisms can perform the process. Other printing devices or devices which will emboss film stock under pressure and simultaneously transfer opaque material particles which are harder than the soft film or metal particles to the viscous acetate that results from this embossing process, can be used to accomplish this inventive process of printing on film.

While I have described above the principles of my invention in connection with specific apparatus, it is to be clearly understood that this description is made only by way of example and not as a limitation to the scope of my invention as set forth in the objects thereof and in the accompanying claims.

I claim:

1. A process for printing on plastic photographic film comprising the steps of embossing areas of said film to soften the film in said areas to render the film viscous and embedding opaque solid particles in said softened embossed areas by pressure, said particles being simultaneously flowed into said viscous film by the pressure.

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2. A process for printing on plastic photographic film comprising the steps of embossing areas of said plastic film to soften the film and depositing under hammer pressure opaque solid particles in said film in the form of a character, and spraying on areas containing said opaque particles an acrylic resin mixture.

3. A process for printing on photographic film comprising the steps of embossing characters on a plastic film of acetate composition through a ribbon containing a metallic deposit thereon, transferring the metallic deposit to said film in the form of said characters by pressure to embed the metallic particles in the film and coating said film over the character impressed areas with an acrylic resin mixture, said pressure being localized to the area of said character and simultaneously producing a flowing of said metallic deposit into said acetate film.

4. A photographic film bearing a printed character comprising a film with an acetate base, which becomes viscous and embossed under pressure, gold particles being simultaneously embedded in the embossed portions by pressure and a coating of acrylic resin over said embedded particles.

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