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(54) Picture forming apparatus.

(57) A picture forming apparatus comprises a porous member which has a multiplicity of pores and is impregnated with ink, and ink blocking means for blocking flow of the ink according to the picture pattern of the original.

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PICTURE FORMING APPARATUS

BACKGROUND OF THE INVENTION

1. Filed of the Invention:

This invention relates to a picture forming apparatus in which letters or pictures are sequentially transferred onto printing paper by gradually applying ink which is impregnated in a porous material such as sponge rubber.

2. Description of the Related Art:

One of the most popular picture forming devices using a porous material is a name stamp in which the porous material is embossed so as to make a relief picture and perform printing continuously without using a stamp pad.

However since the relief type stamp mentioned above should be made by preparing a mold, it takes time to be completed. In addition, it is expensive and time consuming to prepare a variety of stamps in small amounts. Needless to say, it is impossible for a user to prepare a stamp according to his taste or necessity.

SUMMARY OF THE INVENTION

It is therefore an object of this invention to provide a picture forming apparatus such as a stamp which can be manufactured easily based on the princi ples for making the porous printing method.

According to this invention, there is provided a picture forming apparatus comprising a porous material formed with a desired picture pattern and impregnated with ink and ink blocking means for stopping up pores of the porous material according to the picture pattern.

When the porous material is contacted to paper, the ink is applied to the paper via pores which are not blocked by the ink blocking means.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. 1 and 2 are cross-sectional views showing processes to make a picture on a porous material according a first embodiment of the invention;

FIGS. 3 to 6 are views similar to FIGS. 1 and 2 showing processes to make a picture on a porous material according to a second embodiment of the invention;

FIGS. 7 and 8 are views similar to FIGS. 1 and 2 showing processes to make a picture on a porous material according to a third embodiments;

FIGS. 9 to 11 are views similar to FIGS. 1 and 2 showing processes to make a picture on a porous material according to a fourth embodiment; and

FIGS. 12 to 14 are views similar to FIGS. 1 and 2 showing processes to make a picture on a porous material according to a fifth embodiment of the invention.

DETAILED DESCRIPTION

A first embodiment of this invention applied to a stamp will be described with reference to FIGS. 1 and 2 of the accompanying drawings.

In FIG. 1, reference numeral 1 stands for a master composed of a thermoplastic synthetic resin film (hereinafter called "film") and a porous screen as a support member, both adhered together. For producing an original picture on the master 1 by making pores 2, the master 1 and an original may be superimposed in such a manner that the film of the master 1 and the picture side of the original contact each other, whereupon flash light may be applied over the master 1 from its screen side to form in the film an original picture in pores corresponding to the picture of the original. Alternatively, a thermal head may be used to directly make pores in the master. In this embodiment, flash light is used for making the picture of the original.

Subsequently the master with the original picture thereon is closely superimposed on the surface 3a of a porous material 3. In this case, the screen side of the master 1 is contacted to the surface 3a of the porous material 3 so as to form a reverse picture on the porous material.

The porous material 3 is a hard elastic material having a multiplicity of pores. The hardness of materials such as sponge rubbers, expansive rubbers, and soft rubbers is tested by a rubber hardness tester GS-701 manufactured by Techlock Co., Ltd., a spring type hardness tester, which meets SRIS-0101 (Japan Rubber Association's Industrial Standard) and JIS K6301. The porous material 3 employed in the embodiment has the hardness of 30| or more, preferably about

Next, blocking resin 4 as ink blocking means is

applied by means of a squeegee 5 over the surface of the master 1, which is in close contact with the porous surface 3a of the porous matorial 3. The ink blocking resin 4 infiltrates to the surface of the porous material 3 according to the picture on the master 1, through the openings 2 on the master. Then pores on the porous material 3 are blocked according to the shape of the openings 2.

After the ink blocking resin 4 is hardened, ink is applied over the porous material 3. Then the porous material 3 can be used as a stamp.

The stamp 6 made as described above comprises the porous material 3 of a predetermined hardness, and the ink blocking resin 4 which is applied over the surface of the porous material 3 to form a flat picture of the original.

A printing ink having high fluidity is applied to the porous material 3 so as to print the picture. When the surface 3a of the porous material 3 is contacted to a material to be printed, the ink comes out from the area of the surface 3a which is not applied the ink blocking resin 4. In this case, since the porous material 3 has the predetermined hardness, no excessive ink will ooze when the porous material 3 is in pressure contact with the material to be printed. In other words, the apparatus according to the invention can overcome the inconvenience that the printed picture is blurred by a superfluous ink which penetrates between the ink blocking resin 4 and the printed material, thereby producing a good, excellent picture.

In the foregoing embodiment, the master 1 which is prepared by the heat sensitizing process is used to make the surface 3a of the porous material 3 partially applied with the ink blocking resin 4. Since the master 1 can be easily prepared by a user, a stamp having a desired picture thereon can be made more easily than those made according to the conventional relief printing method.

In addition, the original picture formed on the master 1 and the picture formed on the stamp are in the reversed relationship, so-called negative-positive relationship in which the positive and the negative portions are reversed.

A second embodiment of the invention will be described with reference to FIGS. 3 to 6.

In this embodiment, a stamp 16 is formed with a picture by reversing the negative and the positive of the original picture on the master.

As illustrated in FIG. 3, a prepared master 11 is closely superimposed on a surface 13a of a porous material 13 having the predetermined hardness.

Subsequently a masking material 17 made of a water soluble resin is placed on the master 11 so as to print the original picture thereon by using a squeegee 18. The master 11 is then removed. As shown in FIG. 4, the pattern of the original picture on the master 11 is printed on the porous material 13 via the masking material 17.

Subsequently ink blocking resin 14 is applied over the surface 13a of the porous material 13 by spraying or some other means, as shown in FIG. 4.

The ink blocking resin 14 infiltrates into the surface 13a and the porous material 13 except for the masking material 17. The masking material 17 is washed off or wiped off after the ink blocking resin 14 is hardened.

The stamp 16 thus made includes the porous material 13 having the predetermined hardness and being able to hold a printing ink therein, and the ink blocking material 14 infiltrated into the surface 13a of the porous material 13 so as to form a flat picture of the original.

As described in the first embodiment, the user can easily prepare a stamp having his desired picture at his will. The stamp thus made can offer the good and excellent picture.

A third embodiment of the invention will be described with reference to FIGS. 7 and 8.

In this embodiment, a very thin thermosensitive film is used as ink blocking means. As shown in FIG. 7, the thermosensitive film 21 (hereinafter called as "film 21") is directly adhered onto the surface 23a of a porous material 23. PET (polyethyleneterephthalate) as thin as about 2 μm is used as the film 21, and is adhered onto the porous member so as not to block the multiplicity of pores thereof.

The film 21 is made pores 22 according to the picture of the original. For this purpose, a thermal head may be used to directly make pores in the film 21 adhered onto the porous member 23. Alternatively, an original depicted on light-transmitting paper with carbon may be superimposed on the film 21, whereupon light may be applied over the original and the film 21 to form in the film 21 an original pictures in pores corresponding to the picture of the original.

Alternatively, when a vinylidene resin sheet of about 7 μm thick is used as the film 21, foam resin is filled in pores 22 formed in the film 21 as a filler which can flow the ink, as shown in FIG. 8. The surface of the filler 24 and that of the film 21 are made flush by squeezing the foam resin on the film 21.

In the foregoing embodiment, an original picture is formed on the film 21 after the film 21 is adhered onto the porous member 23. Alternatively, the film on which the original picture has been formed can be adhered onto the porous member 23. In such a case, it is preferable to make pores in the film according to the original picture by using a thermal head. In addition, an adhesive may be applied over the porous member 23 to the amount not to block the pores therein.

A further embodiment of the invention will be described with reference to FIGS. 9 to 11.

In this embodiment, ink blocking means 34 is made of photosetting resin which is hardened when illuminated by light. A printing master 31 and a porous member 34 are similar to those used in the first em bodiment.

As illustrated in FIG. 9, photosetting resin which serves as ink blocking means 34 and is not yet hardened is applied over the surface of the porous member 34. The photosetting resin used here is of a type which not hardened by light when it is exposed to oxygen (hardening fault due to oxygen), and is made of acrylic group materials of photosetting type.

The printing master is superimposed on the surface of the porous member 33 covered with the photosetting resin and is exposed to the sunlight for about ten minutes. The printing master 31 is made pores 32 according to the picture of the original. The portions of the photosetting resin which correspond to the picture-in-pores are exposed to oxygen and are not hardened. The remaining area will be hardened since they are covered with the printing master and are not exposed to oxygen, thereby forming ink blocking means 34. The non-hardened portions of the film will be washed off or wiped off by means of tissue paper.

In the foregoing embodiment, UV-setting resin may be used as the film instead of the photosetting resin. In addition, the photosetting resin can be hardened without use of the hardening fault due to oxygen phenomenon. In such a case, the original pic ture is converted into portions transmitting light and those not-transmitting light. To be more specific, the porous member 33 is first covered with photosetting resin. Then a film having a good light transmission is formed a picture of the original by using nonlight-transmitting type material. The film is then superimposed on the photosetting resin covering the porous member, and is illuminated by light so as to have the non-picture area of the film hardened. The picture on the film can be easily made by means of such methods as photography, thermosensitive coloring, and thermosensitive transfer.

A fifth embodiment of the invention will be described referring to FIGS. 12 to 14. A master 40 comprises thermo-melting resin 43 (including powder material) and a photosensitive film 42.

As illustrated in FIG. 12, the master 40 is superimposed on the carbon picture 43 of the original 44 in such a manner that the photosensitive film 42 is closely contacted to the picture of the original. Then the master 40 and the original picture are illuminated by flash light so that both the thermo-melting resin 41 and the film 42 will be made pores according to the original picture.

The thermo-melting resin 41 of the master 40 is closely contacted to the surface of the porous member 45. Then the master 40 and the porous member 45 are heated and pressed , from the film 42 side, by means of heating means 46 such as an iron. The resin 41 will melt and soak into the surface of the porous member 45 in the pattern of the original picture. When the photosensitive film 42 is removed, a stamp having a flat picture thereon will be produced. The use and advantages of the stamp thus made are the same as those described with respect to the foregoing embodiments.

According to the above embodiment, the thermo-melting resin 41 containing the powder material also serves as a support member of the photosensitive film 42. In other words, when the master 40 is illuminated by flash light to make pores theron, the melted photosensitive film 42 and thermo-melting resin 41 are astringed around nuclei of the powder material. Therefore the pores in the master are composed of a number of minutes pores. When making the master using the photosensitive printing, the thermo-melting resin 41 containing the powder material dhould have relatively high light transmitting ability, but should not have strong light absorbing ability. The master used in the invention is disclosed in the applicant's Japanese Patent Publication No. 002,838/1983.

The thermo-melting resin 41 is generally known as a thermo-melting type adhesive. For example, an EVA thermo-melting type adhesive including EVA as a base polymer is widely used. The property of EVA is determined uoually from two parameters, i.e., the content (%) of vinyl acetate and a melt flow rate (MFR). In addition, elastomer type, polyamid type, polyester type, and polyolefin type adhesive are well known as thermo-melting resin.

According to the present invention, a picture of the original is formed on the surface of the porous material by applying the ink blocking member. Therefore the stamp can continuously produce the picture without using a stamp pad. In addition, the original picture can be formed on the porous material without using a mold in a simple manner and in a short period of time. Therefore the invcntion is applicable When manufacturing a variety of and small amount of stamps at a reduced cost. In addition, the picture area and non-picture are flush with each other. When tho ink impregnated into the stamp is of a water soluble type and an oily stamp pad is used, the stamp can offer the picture and the non-picture areas in two different colors.

The simple printing mechanism of the apparatus according to the invention will find a variety of applications in the printing field.

Claims

1. A picture forming apparatus comprising:
   (a) a porous member having a multiplicity of pores and having ink impregnated therein; and
   (b) ink blocking means for blocking pores of on the surface of said porous member according to a picture formed thereon.
2. A picture forming apparatus according to claim 1, wherein said blocking member is impregnated according the picture pattern of the original onto the surface of said porous member by using a master having the original picture thereon.
3. A picture forming apparatus according to claim 1, wherein said ink blocking member is impregnated according to the picture pattern of the original onto the surface of said porous member through a masking material disposed on the surface of said porous member.

FIG. 1

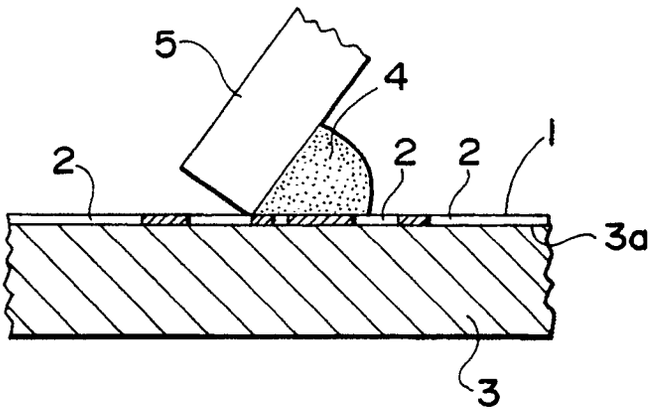

FIG. 2

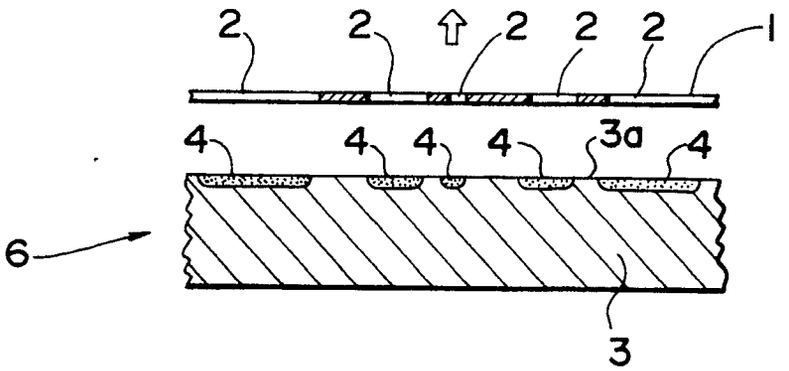

FIG. 3

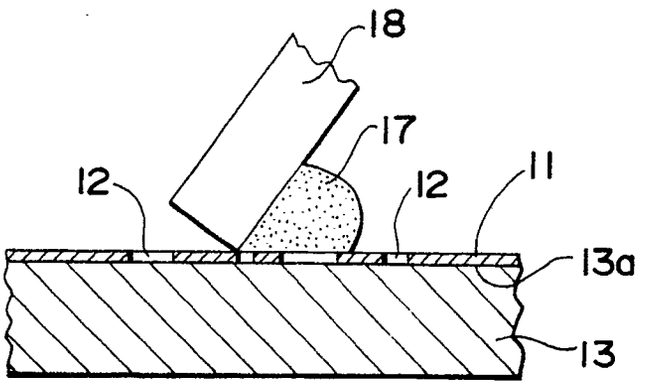

FIG. 4

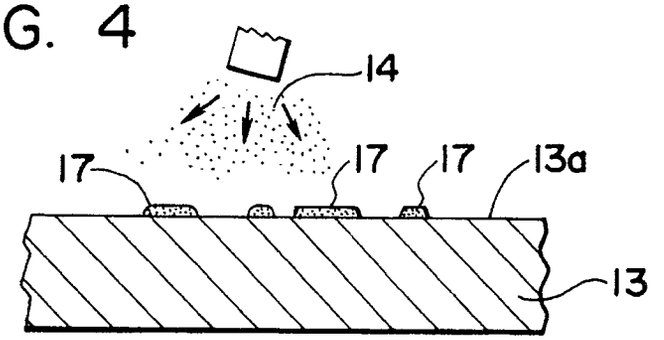

FIG. 5

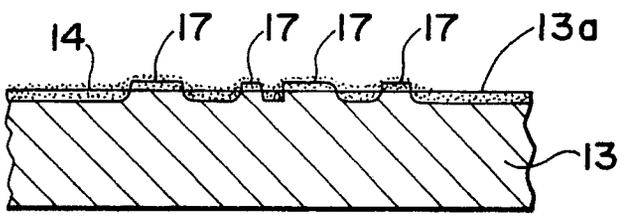

FIG. 6

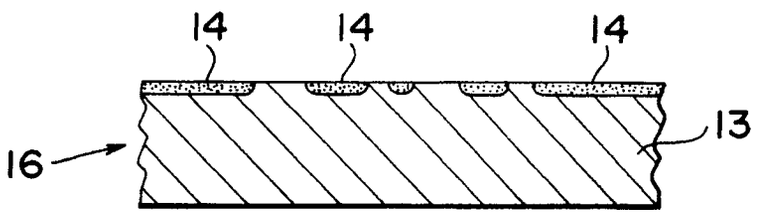

FIG. 7

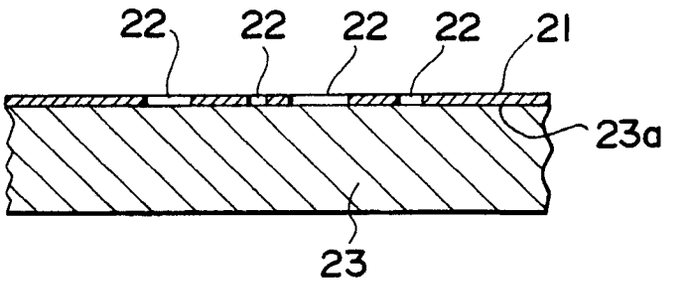

FIG. 8

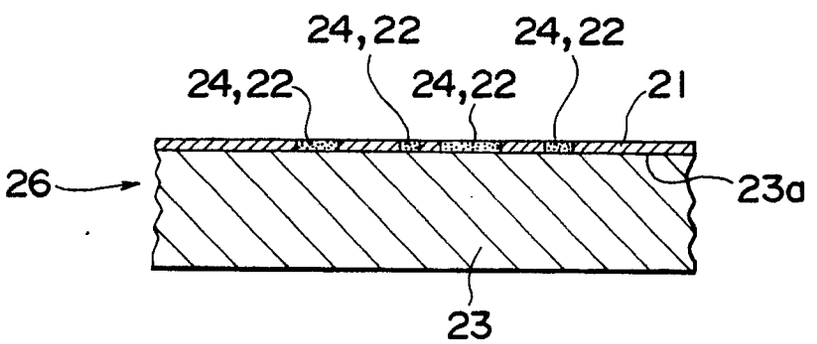

FIG. 9

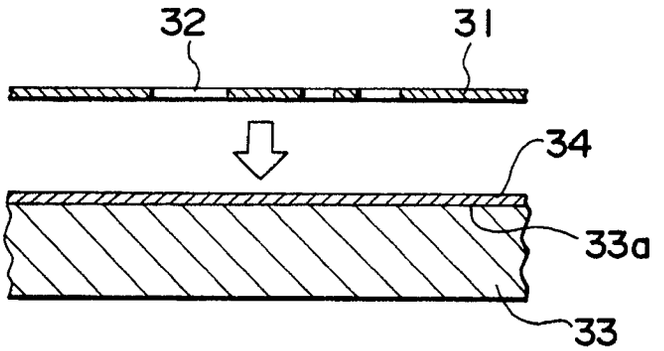

FIG. 10

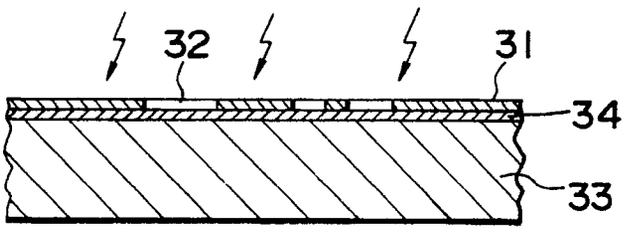

FIG. 11

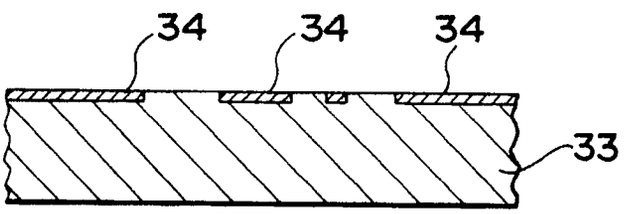

FIG. 12

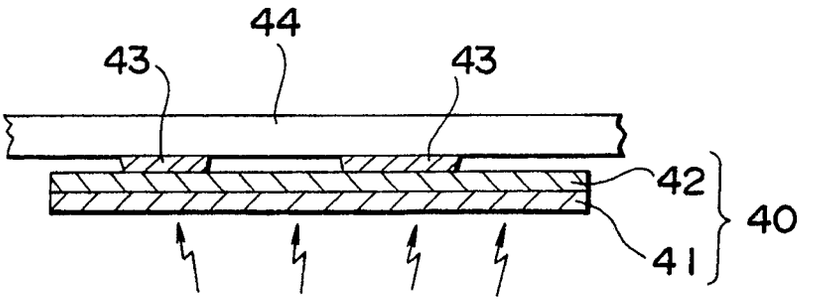

FIG. 13

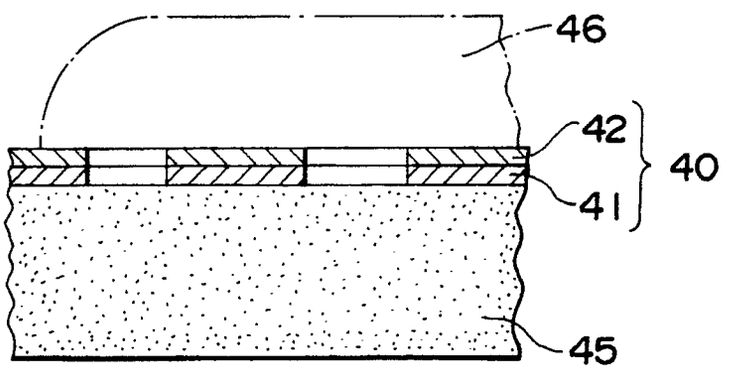

FIG. 14