Aug. 28, 1951 A. MURRAY 2,566,290

MULTICOLOR PRINTING DEVICE

Original Filed Feb. 26, 1944 2 Sheets-Sheet 1

FIG. 1.

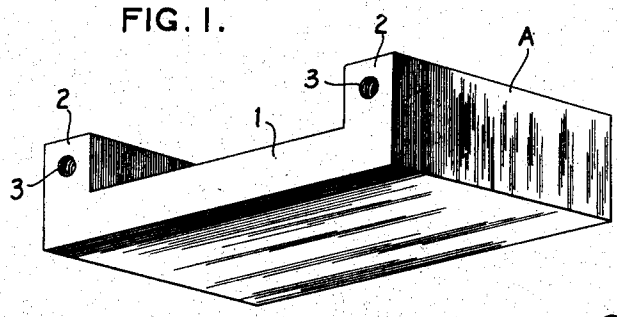


FIG. 2.

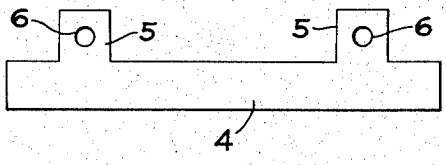


FIG. 3.

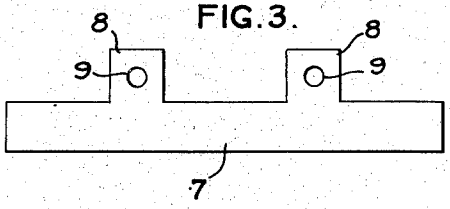


FIG. 4.

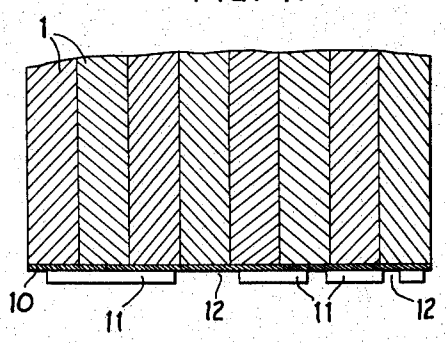


FIG. 5.

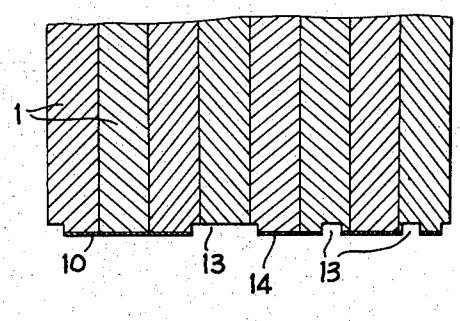
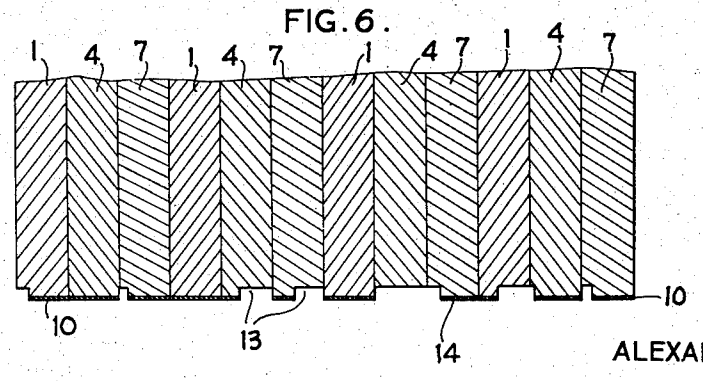


FIG. 6.



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FIG. 7.

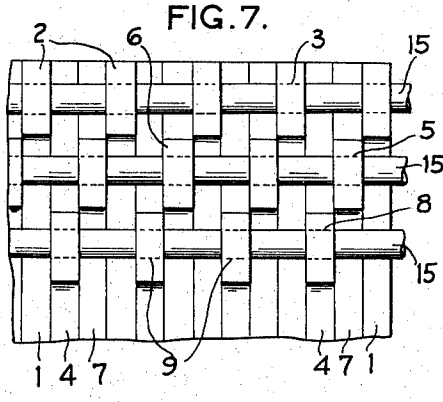


FIG. 8.

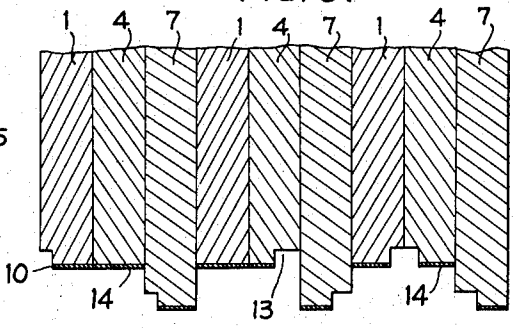


FIG. 9.

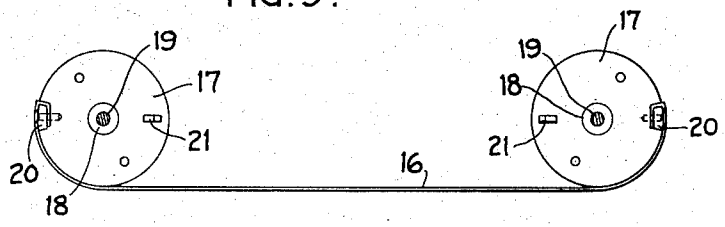


FIG. 10.

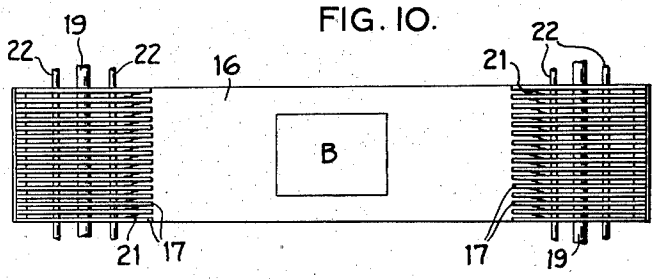
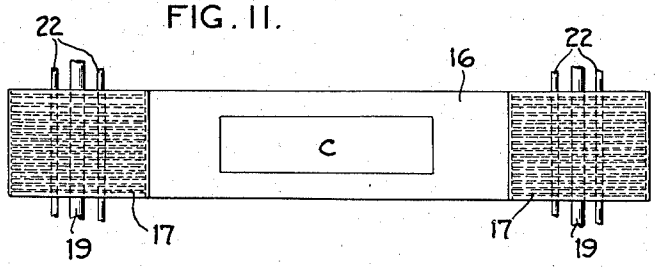


FIG. 11.



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MULTICOLOR PRINTING DEVICE

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Original application February 26, 1944, Serial No. 523,999. Divided and this application March 27, 1946, Serial No. 657,524

1 Claim. (Cl. 101—201)

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This invention relates to apparatus useful in carrying out a method of making a multicolor ink picture by a single impression of a suitable press.

The method, the description of which is included in this specification in order that the utility of the apparatus herein claimed may be fully understood and appreciated is the subject of my copending application Serial No. 523,999, filed February 26, 1944, of which this is a division, which matured into Patent No. 2,405,754 on August 13, 1946.

The method comprises the making of color component images on the edges of a pack of metal plates, each component being made on a separate pack by known processes, then separating the packs and reassembling them in succession, one from each pack, thus producing a series of line images. If there are three color components for the cyan, magenta, and yellow colors, every third line will be a part of the same component image. By suitable selective mechanism each set will be separately inked, and the three sets placed with their freshly inked edges in a plane and at once contacted with the impression-receiving surface upon which there will be imprinted a three-color image in the form of fine lines, every third line being of the same color.

In a preferred form of the invention the three packs are each of a certain size, so that when the three packs are assembled, one dimension of the resulting printing surface will be three times the original size of one pack. This is inked and printed upon a rubber blanket stretched in one dimension to several times its unstretched size. The freshly printed rubber blanket is then permitted to resume its normal size, the three-color image being thus also reduced to a desired standard size and at once printed by offset upon the final impression-receiving surface.

Reference is now made to the accompanying drawings in which the same reference characters designate the same parts throughout:

Fig. 1 is a perspective view of a pack of strips constituting one color component;

Figs. 2 and 3 are face views of single strips designed for use in other color component packs;

Fig. 4 is a magnified fragmentary section of the ends of the strips carrying a photographically formed relief image;

Fig. 5 is a similar view after etching and the removal of the resists;

Fig. 6 is a similar view of a pack of strips reassembled after sorting;

Fig. 7 is a top view on an enlarged scale of a

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portion of one end of the reassembled packs, supported by rods;

Fig. 8 is an enlarged fragmentary section of the edges of a pack with one set of strips out of line with the others;

Fig. 9 is an edge view of a rubber blanket and its supporting rolls;

Figs. 10 and 11 are top views of the blanket and the rolls showing the blanket in unstretched and stretched condition, respectively.

In Fig. 1 is shown a color component pack A, consisting of a series of strips or leaves 1 having registering lugs or ears 2, having accurately registering apertures 3 therein. A second pack is made up of leaves or strips 4, one of which is shown in Fig. 2, having accurately registering lugs or ears 5 having registering apertures 6, and third pack is made up of strips or leaves 7, one of which is shown in Fig. 3, having registering lugs or ears 8 having accurately registering apertures 9 therein.

The three packs are identical except for the position of the lugs or ears. The leaves are made of any suitable metal such as copper, brass, steel, or zinc. The strips are made accurately of the same dimensions so that when assembled in a pack, their long lower edges will lie in a plane. In use they will be clamped together as explained later. If desired, the face of the pack thus formed may be ground or dressed to a plane surface. It is then preferably electroplated with a thin skin of copper, nickel, silver, or other suitable metal to give a continuous surface bridging the interstices between the leaves.

As an example of the dimensions, the following may be mentioned. A convenient size of the fact of a pack constituting a color component may be five by seven inches. A leaf thickness of .003 inch is suggested as suitable. The electroplated metallic skin is very thin, of the order of .0001 inch.

Each pack is securely clamped together prior to electroplating, and on the electroplated layer is coated a continuous sensitive layer, ordinarily a bichromated colloid, in which a relief image of the appropriate color component is formed by well known photographic methods. This would be a negative with the half-tone separations and angles as usual.

Fig. 4 shows on an exaggerated scale a section of the edges of a few strips 1 after a relief image is formed but before etching. The thin metal skin is designated 10, and the relief images 11, with spaces 12 between them. Fig. 5 shows the same strips after etching and the removal of

the relief images. It is to be understood that the pack is etched through the relief images, and the latter removed as is customary in photo-engraving processes. It is to be noted that, opposite the points where there were spaces 12, there are now etched depressions 13.

The clamps are now removed from the three packs and the strips 1, 4 and 7, constituting the three packs, are sorted and reassembled in succession. Because of the extreme thinness of the metal skin 10, this will break with a clean line along the cracks between the strips. The edges of the reassembled strips will then appear as in Fig. 6. Every third strip is from the same pack, and the resulting face of the assembled strips comprises depressions 13 and faces 14 of the plated metal coating 10 lying in a plane.

It is to be understood that the assembled strips are not at this point clamped tightly together, but each set of strips is supported by rods 15 passing through the registering apertures 3, 6, and 9 of the respective sets of ears, 2, 5, and 8, as shown in Fig. 7. The strips are thus supported with their etched edges forming the lower face of the pack. Two of the sets of strips are then lifted slightly by their supporting rods, leaving the edges of the third set in a lower plane, as shown in Fig. 8. An ink roller of appropriate color is then passed over this surface, inking the exposed set. This set is then raised and one of the others lowered and inked with a second color, after which the third set is similarly inked. The three sets are then restored to the position shown in Fig. 6 and clamped tightly together with the edges lying in a common plane. The inking of the three sets would of course be done rapidly and successively and the edges of the assembled pack carrying broken lines of differently colored inks at once brought into printing contact with the surface to be impressed. It is obvious that an image made as above described would consist of broken lines of three different colors and, in one direction, would be three times the required dimension.

This dimensional difficulty may be avoided by making the original half-tone separation prints through an anamorphotic optical system or by other means such as mechanical or photoelectric scanning and reproduction systems that will reproduce one dimension on one-third the scale of the other. If the final image is to be 5 by 7 inches, the color separation images will be 1⅔ by 7 inches, so that when reproduced as above described, the reassembled triple pack of strips will be 5 by 7 inches. In this case the lamanae may be only .001 inch thick.

Another way of obtaining the same end result will now be described, reference being made to Figs. 9, 10, and 11.

An elastic blanket 16, preferably of natural or synthetic rubber, is attached at its ends by clamps 20 to separated discs 17 mounted with ball bearings 18 on shafts 19 and together acting as rollers upon which the blanket may be wrapped. The discs carry and are separated by light leaf springs 21 which tend to force them apart. The ball bearings permit the discs both to turn and to slide easily on the shafts 19. Rods 22 pass through the discs and hold them in alignment but with sufficent play to permit the discs to slide upon them.

When the blanket is not under tension, as shown in Fig. 10, the discs are separated. The rods 22 may be used to turn the discs as a group and to stretch the rubber blanket 16 as shown in Fig. 11; stretching in a lengthwise direction also tends to contract the blanket transversely and also forces the discs toward each other, thus shortening the length of the effective roller constituted by them. The discs are shown in dotted lines in Fig. 11, as the blanket 11 is rolled around their periphery. The relative distortion of the two dimensions will differ with different blankets, but a typical effect is illustrated in Figs. 9 and 10. An area B, 5 by 7 inches in size, is distorted into the area C, 3½ by 15 inches. That is, the lengthening of the band 2.1 times results in the lessening of its width to .7 of its original dimension. If a "one way stretch" fabric coated with rubber is used, the distortion will be in one dimension only.

If a picture image, therefore, is imprinted on the area when in its distorted form C, and the band is then restored to its normal size and shape B, an image which is similarly distorted in both dimensions and imprinted on C will appear correctly when the band is unstretched. In order to obtain an undistorted 5 by 7 image, I make three undistorted color component images on three laminated packs of the structure described, each being 3½ by 5 inches, the laminations being five inches long. These three packs are sorted and reassembled into a pack 3½ by 15 inches; and the three sets are then separately inked in different colors and at once imprinted simultaneously on the rubber band while stretched. After the impression is made, the tension is released and the picture area assumes the 5 by 7 inch shape and size, and the dye image is at once printed by offset upon paper.

To prevent contamination of the colors by capillary absorption of ink in the interstices the sides of the strips may be wiped, or the interstices may be fed with a water-repelling oil where an aqueous ink is used, or with a glycerin mixture, for example, when an oily ink is used.

Having thus described my invention, what I claim is:

A printing device comprising a pack of thin metal plates in regularly recurring sequence, the corresponding plates in each sequence constituting a set, means for moving in their own planes all of the plates in each set simultaneously between upper and lower positions whereby when all but one set are in the upper position the edges of the plates of the one set may be inked, the corresponding edges of all of the plates when in the lower position lying in a plane and constituting a printing face, the edges of the plates of the several sets carrying inks of different colors and the images of the several sets being complementary color component images of the same subject and together constituting a multi-color image of that subject.

ALEXANDER MURRAY.

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