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(54) **Decoration of articles by use of transfer sheets.**

(57) A method for the automatic transfer decoration of articles comprises providing one or more transfer sheets having image-bearing portions in closely spaced juxtaposition, removing selected image-bearing portions from the sheet or sheets and positioning them on a support in a layout conforming to the desired layout on the article of ware to be decorated and transferring the layout of image-bearing portions from the support to the surface of the article by mechanical means, preferably a flexible pad movable between a pick up position in contact with the support and a decorating position in contact with the surface of the article to be decorated.

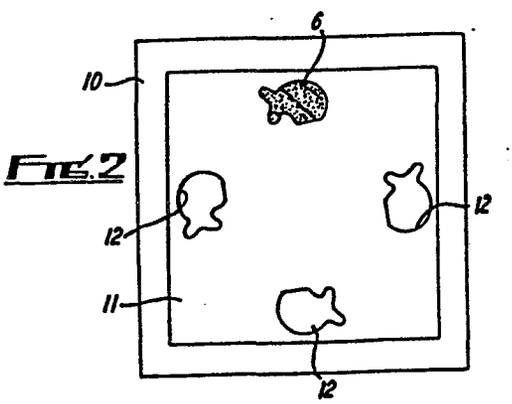

Fig.2

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Decoration of Articles

This invention relates to the decoration of articles and is especially, but not exclusively, applicable to the decoration of ceramic articles.

Ceramic articles such as cups, saucers, plates and the like are conventionally decorated by two principal methods. In some instances a decorative pattern is applied directly to the surface of the article by a flexible printing member which picks up an impression of the pattern from an inked plate or the like. While this produces satisfactory results for some puposes it is not suitable for high quality work or complex patterns which are conventionally applied by means of decals or transfers. These can be pre-printed on to a supporting sheet in a flat condition by silk screen or other suitable printing processes with a substantial degree of accuracy and the transfer is then separated from its supporting sheet and positioned on the surface of the article to be decorated by an operative. Although allowing greater accuracy of printing and lending itself to more complicated patterns, this technique is time-consuming and expensive since application of the transfers to the ware is a skilled job and the operative requires to carefully position the transfer and smooth it down over the surface of the article to avoid entrapment of air between the transfer and the surface of the ware.

As a result of these drawbacks in transfer printing attempts have been made to produce equipment which will automatically pick up and apply transfers to the surfaces of articles to be decorated. One such proposal utilizes a transfer having temperature sensitive layers serving firstly to ensure adhesion of the transfer to a mechanical transfer member and its release from a temporary support and secondly to enable the transfer to adhere to the surface of the ware and separate from the transfer member after application to the ware to permit withdrawal of the transfer member for subsequent operations. This technique forms the basis of a practicable mechanical transfer decorating system but suffers from a number of disadvantages including relatively high cost of the transfer material itself.

In conventional transfer printing the decorative items to be applied to the ware are printed on support sheets in close juxtaposition to one another so that there is minimum wastage of relatively expensive transfer sheet material. However this technique cannot be employed when mechanical application systems of the kind referred to above are employed since the design must be arranged on the transfer sheet in the same manner in which it is to appear on the ware. As a result very substantial areas of transfer material are wasted with the result that in many instances the technique becomes uneconomic.

It is an object of the present invention to obviate or mitigate this disadvantage.

The invention provides a method for the automatic transfer decoration of articles comprising providing one or more transfer sheets having image-bearing portions applied thereto in closely spaced juxtaposition, removing selected image-bearing portions from the transfer sheet or sheets and positioning them on a support in a layout conforming to the desired layout on an article of ware to be decorated, and transferring the layout of image-bearing portions from the support to the surface of the article of ware by mechanical means.

Preferably the image-bearing portions applied to the transfer sheet are separated or partially separated from one another to facilitate transfer to said support. Separation may be effected by cutting partially but not completely around the image-bearing portions so that they remain attached to the sheet but are readily separable from one another.

Adherence of the image-bearing portions to the support is preferably effected by application of suction through perforations in the surface thereof.

Preferably also transfer of the layout of image-bearing portions from said template to the article of ware is effected by a flexible transfer member movable between pick-up and printing positions respectively in contact with said platen and with the article of ware to

be decorated.

In this way decorative images may be printed in close juxtaposition on a carrier sheet with a view to attaining minimum wastage of unprinted sheet, and may then be manually transferred to said support, following which application of the transfer to the articles of ware is effected mechanically. This reduces the operator involvement to detachment of individual image-bearing portions from the transfer sheet and their arrangement on the platen which is facilitated by the provision of the template having apertures corresponding to the positions in which the image-bearing portions require to be placed to produce the final decoration.

The invention also provides apparatus for use in the transfer decoration of articles, comprising a support member and a template having apertures therein corresponding in size, shape and position to decorated areas of a pattern to be applied to an article of ware.

Preferably said template is separate from and detachably mounted on said support member in order that alternative templates may be selectively fitted corresponding to different pattern layouts and/or different articles of ware.

The surface of said support member on which said template is mounted is preferably perforated and adapted for communication with sources of vacuum and of air under pressure which act through the perforations on

image-bearing transfer portions located in the apertures in said template.

Preferably the appartus includes means for presenting a series of printed transfer sheets to a zone adjacent to said support member and means for transferring image-bearing transfer portions from said support member and applying same to an article of ware.

The means for transferring the image-bearing portions preferably comprises a flexible pad movable between a pick-up position in contact with said support and a decorating position in contact with the surface of an article of ware to be decorated. The pad preferably incorporates means for heating same in order to facilitate pick-up of image-bearing transfer portions from said support and application of same to the surface of an article to be decorated.

An embodiment of the invention will now be described, by way of example only, with reference to the accompanying diagramatic drawings, in which:

Fig. 1 is an illustration of a sheet of printed transfers;

Fig. 2 shows a template and support adapted to receive individual transfers removed from the sheet of Fig. 1; and

Fig. 3 is a plan view of a plate showing a pattern of transfers applied thereto.

Referring to the drawings, there is shown in Fig.

1 a transfer sheet 5 consisting of a backing or support sheet surmounted by a transparent film or films having image-bearing areas 6 printed thereon and arranged in close proximity to one another. The image-bearing areas 6 are separated by lines of cut 7 extending through the transfer sheet or film and the backing sheet. The lines of cut 7 are discontinuous but are sufficient to enable individual image-bearing areas 6 to be readily detached from the sheet as required. By virtue of the close printing of the image-bearing areas 6 on the sheet 5 a high ratio of printed image to unwanted surrounding sheet is produced , thereby reducing the cost of sheet material required to bear a given number of printed images. The images are printed in colours which are resistant to the high temperatures used in ceramic kilns and may be applied by any convenient printing process such as screen printing.

Fig. 2 is a plan view of a support or platen 10 on which a template 11 is detachably mounted. The template has areas removed to define apertures 12 corresponding in shape and size to the image-bearing portions 6 of the sheet 5 shown in Fig. 1, the apertures 12 being arranged in the template in positions corresponding to the layout of image-bearing portions 6 on the surface of an article of ware to be decorated. Thus in the illustrated embodiment four apertures 12 are provided in the template 11 and an operative can successively remove

four image-bearing areas 6 from the transfer sheet 5 and place them in the apertures 12, therby automatically positioning the decorative images in the correct positions for application to the surface of a plate or the like. The upper surface of the platen 10 is perforated and the platen is connectable to sources of vacuum and of air under pressure which act on the image-bearing areas 6 through the perforation at different times during the operating cycle as will be described hereafter.

A transfer member (not shown) is provided to pick up the image-bearing areas 6 from the template 11 and transfer them to an article of ware such as the plate 15 shown in Fig. 3. The transfer member preferably comprises a flexible pad capable of conforming both to the surface of the support 10 to pick up image-bearing transfers 6 therefrom and to the surface of the plate 15 to apply the image-bearing transfers thereto and press them into intimate contact with the surface of the plate. The pad is provided with means to raise its temperature and the transfers are constructed from a layer or layers of material arranged such that on heating the transfer attaches more strongly to the pad than to the surface of the support 10, thereby enabling the image-bearing portions 6 to be picked up from the surface 10 and transferred to the plate 15. The construction of the transfers is also such that when in

contact with the surface of the plate 15 they have a greater degree of adherence thereto than to the pad of the transfer member and the latter may therefore be withdrawn from the plate leaving the image-bearing transfer portions 6 attached to the plate surface and firmly pressed into intimate contact therewith. Thereafter the plate may be glazed and fired in a conventional manner to produce the final decorated article.

Thus in use of the technique, sheets of transfers such as that indicated at 5 in Fig. 1 may be printed rapidly and accurately using known printing techniques to produce transfer sheets having a high ratio of image-bearing surface to waste material. After printing the sheets are presented to a cutting device which serves to cut around the image-bearing areas 6 but without completely isolating them so that the transfer sheet remains a unitary sheet but consists of a series of separately detachable image-bearing areas 6 in close proximity to one another.

The transfer sheets are then presented to an operator working adjacent to the support 10 and template 11 who removes image-bearing portions 6 from the transfer sheets as required and places them in the openings in the template where they are held by application of suction to the underside of the perforated upper face of the platen 10. Since the

openings correspond in both shape and size to the image-bearing portions 6 the operator automatically places them in the correct positions and dispositions unless the portions are of uniform shape, in which event the operator requires merely to ensure that they are correctly orientated. Thereafter the transfer member separates the image-bearing sheets or films from the backing sheets of the portions 6 and transfers the image-bearing portions to the plate 15 where they are pressed into intimate contact with the surface due to the flexible nature of the transfer member. The latter is then withdrawn and the plate is ready for glazing, firing or other appropriate operations. Before the next operating cycle the platen 10 is disconnected from the vacuum and connected to a source of air under pressure to blow the backing sheets of the portions 6 clear of the template 11.

It is preferred that the transfer sheets employed are prevented from adhering to one another without the use of intervening separating sheets or interleaves. This may be effected by appropriate surface coating of the decorated sheet or by application of a coating to the underside of the support sheet. The invention may be employed using transfer sheets having intermediate interleaves but savings can be effected in preliminary handling and cutting of the transfer sheets to separate the image-bearing areas if interleaving sheets are not

employed.

The arrangement described produces substantial benefits compared with techniques hitherto available. It enables mechanical application of decals or transfers to the surface of articles in a precise manner thereby eliminating the time and care currently required by operators in positioning the transfers on the surfaces of the article and in rubbing them down. At the same time it is possible to print the decorated portions closely together on the surface of transfer sheets thereby maintaining wastage at a minimum.

Moreover the arrangement produces very substantial benefits in versatility of decoration. It is possible, for example, for an operative presented with a variety of sheets of different patterns to apply a different pattern to each successive one of a number of plates provided the arrangement of the patterned areas is the same. Similarly it is a simple matter to decorate successive batches of plates with different patterns by substituting one template for another as required. The same or different patterns may also be applied to other articles such as saucers, cups or the like by simply removing the template and replacing it by an alternative template having openings laid out to correspond to the desired manner of decoration of the different articles. It is therefore possible to decorate in a semi-automatic manner small batches of different articles with the same

or different patterns, thereby greatly increasing versatility compared with fully automatic decorating processes hitherto proposed.

Various modifications may be made without departing from the invention. For example various alternative forms of transfer sheet may be employed provided these can be mechanically transferred from the template support to articles of ware to be decorated and will release from the appropriate surfaces when required. If desired transfer sheets could be printed in a closely spaced manner as described and thereafter cut completely through to form individual sheets each having a backing and carrying a single decorative image, but it is preferred that the transfers are retained in sheet form by cutting around the image-bearing portions in a discontinuous manner as described. Alternatively the cutting may be confined to the transfer sheet or film only leaving the backing sheet intact. The template may be made from various different materials and may be detachably mounted on its support in any suitable manner. Suitable materials include heat-resistant adhesive-backed plastics or metal materials and plastics sheets treated to render them magnetic and hence self-attaching to the platen which will generally be of metal construction. Various different mechanisms may also be employed for transferring the image-bearing portions from the

template to the articles to be decorated.

In a further modification the process may be rendered fully automatic by the provision of means operable to pick-up individual image-bearing portions from the transfer sheet and place them in the template. For this purpose the platen on which the template is supported may be arranged to index through angular movements corresponding to the spacing between adjacent patterned areas of the article to be decorated so that the successive transfers are placed in the same position, thereby simplifying the construction of the transfer placing mechanism. Moreover while reference has been made herein primarily to the decoration of ceramic articles the invention may be applied to articles made from other materials such as glass or metals.

PATENT CLAIMS

1. A method for the automatic transfer decoration of articles using one or more transfer sheets having image-bearing portions applied thereto in closely spaced juxtaposition characterised by removing selected image-bearing portions (6) from the transfer sheet or sheets (5) and positioning them on a support (10) in a layout (11) conforming to the desired layout on an article of ware (15) to be decorated, and transferring the layout of image-bearing portions (6) from the support (10) to the surface of the article of ware by mechanical means.

2. A method according to claim 1 characterised in that the image bearing portions (6) applied to the or each said transfer sheet (5) are at least partially separated from one another (at 7) to facilitate removal from the sheet.

3. A method according to claim 1 or 2 characterised in that said image-bearing portions (6) are adhered to said platen (10) by application of suction thereto.

4. A method according to any preceding claim characterised in that transfer of said layout of image-bearing portions (6) from said template (11) to the article of ware (15) is effected by a flexible

transfer member movable between pick-up and printing positions respectively in contact with said platen and with the article of ware to be decorated.

5. A method according to claim 4 characterised in that said transfer member is heated.

6. A method according to claim 4 or 5 characterised in that the image-bearing portions (6) of said transfer sheet (5) incorporate temperature sensitive layers activable to effect adhesion of said portions to said transfer member, release therefrom and adhesion to the ware (15) to be decorated.

7. An article characterised in that it is decorated by the method of any of claims 1 to 6.

8. Apparatus for use in the transfer decoration of articles, characterised by a support member (10) and a template (11) having apertures (12) therein corresponding in size, shape and position to decorated areas (6) of a pattern to be applied to an article of ware (15).

9. Apparatus according to claim 8 characterised in that said template (11) is separate from and detachably mounted on said support member (10).

10. Apparatus according to claim 8 or 9 characterised in that the surface of said support member (10) on which said template (11) is mounted is perforated and adapted for communication with sources of vacuum and of air under pressure which act through the perforations on image-bearing transfer portions (6) located in the apertures (12) in said template.

11. Apparatus according to claim 8, 9 or 10 characterising means for presenting a series of printed transfer sheets (5) to a zone adjacent to said support member (10) and means for transferring image-bearing transfer portions (6) from said support member and applying same to an article of ware (15).

12. Apparatus according to claim 11 characterised in that said means for transferring said image-bearing portions (6) comprises a flexible pad movable between a pick-up position in contact with said support (10) and a decorating position in contact with the surface of an article of ware (15) to be decorated.

13. Apparatus according to claim 12 characterised in that said pad incorporates heating means.

14. Apparatus according to any of claims 8 to 13 characterised in that said template (11) is formed from

heat resistant material.

15. Apparatus according to any of claims 8 to 14 characterised in that said platen (10) is of metal construction and said template (11) is magnetic.

16. Apparatus according to any preceding claim characterised in that said template (11) is movably mounted and means is provided for indexing said template to present successive recesses (12) therein in the same position.

17. Apparatus according to claim 16 characterised by means for transferring successive image-bearing portions (6) from said transfer sheet (5) to the recesses (12) in said template (11).

18. Apparatus according to any of claims 8 to 17 characterised by means for supporting articles of ware (15) to be decorated.

19. An article characterised in that it is decorated by means of the apparatus of any of claims 8 to 18.

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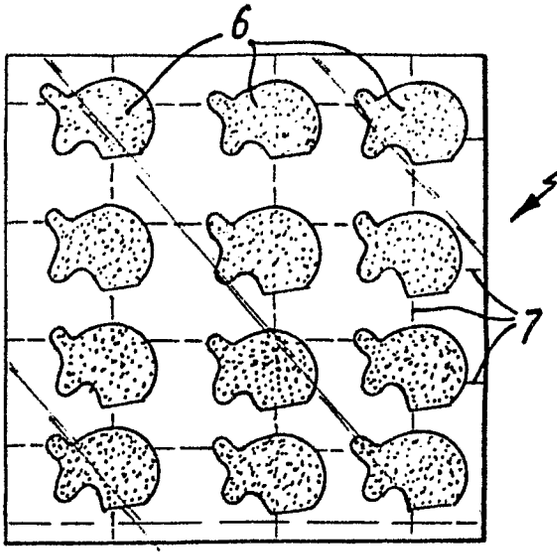

FIG. 1

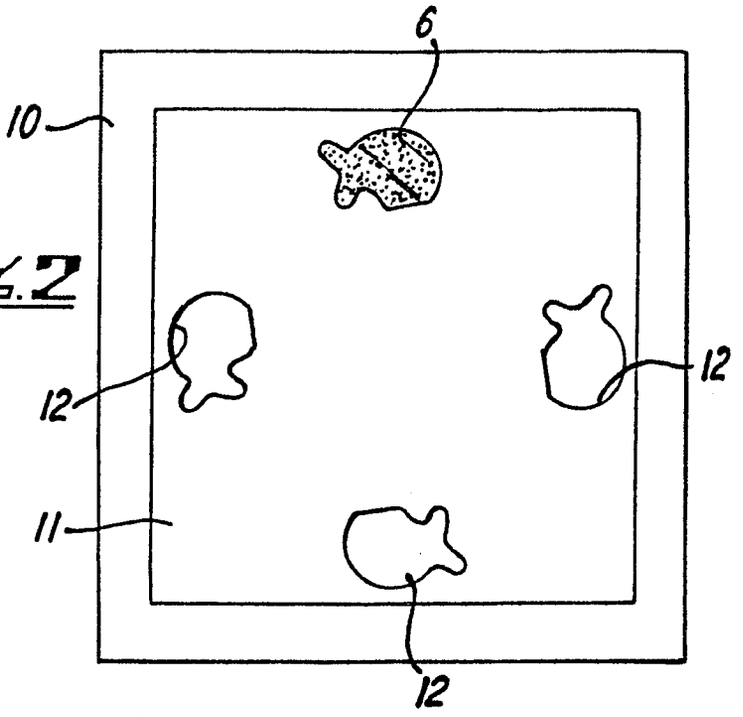

FIG. 2

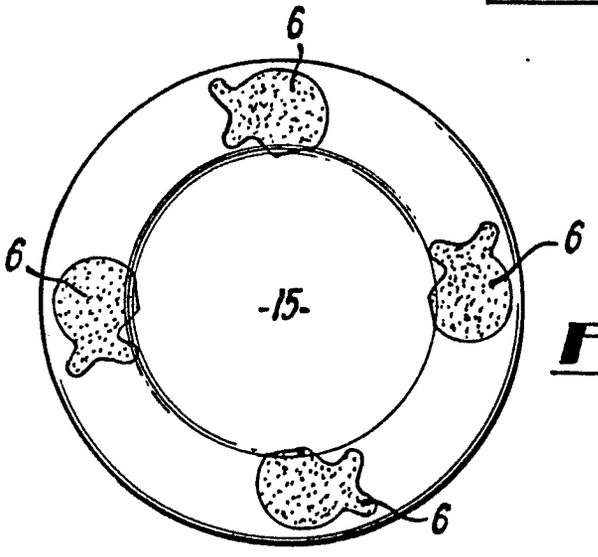

FIG. 3

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EUROPEAN SEARCH REPORT

0200285
Application number

EP 86 30 0002

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 4)
X	FR-A-2 143 119 (VAN DEN BERG) * Page 2, line 30 - page 3, line 25; figures 1-5 *	1,2	B 44 C 1/17
A	FR-A-2 139 273 (PICTORIAL PRODUCTIONS) * Page 2, line 8 - page 5, line 38 *	1,4,6, 7,11, 12	
A	EP-A-0 055 395 (NISSHA PRINTING)		
A	US-A-3 926 710 (S. WEINGRAD)	8	
A	FR-A-2 332 581 (B. KALBACHER)		

TECHNICAL FIELDS SEARCHED (Int Cl 4)

B 44 C 1/17

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	02-05-1986	SCHMITT L.P.

CATEGORY OF CITED DOCUMENTS

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