Feb. 27, 1945. E. C. V. OLDOFREDI 2,370,186

METHODS OF AND MEANS FOR PRODUCING DECORATED MATERIAL

Filed Feb. 2, 1942

Fig. 1

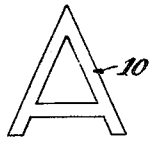


Fig. 2

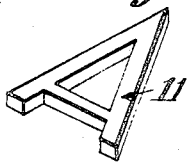


Fig. 3

Fig. 4

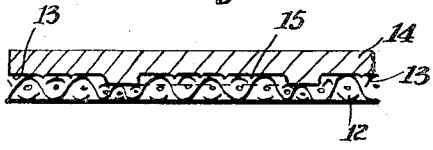


Fig. 5

Fig. 6

Fig. 7

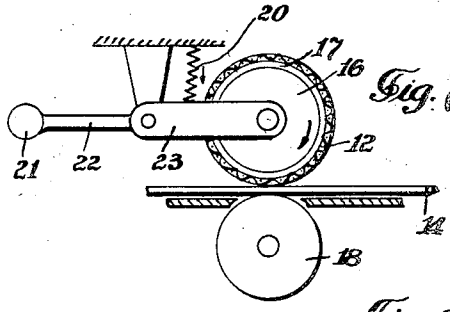


Fig. 8

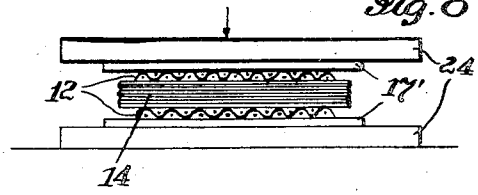
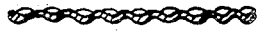


Fig. 9



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Patented Feb. 27, 1945

2,370,186

UNITED STATES PATENT OFFICE

2,370,186

METHOD OF AND MEANS FOR PRODUCING DECORATED MATERIAL

Edgar C. V. Oldofredi, New York, N. Y.

Application February 2, 1942, Serial No. 429,298

6 Claims. (Cl. 101—28)

This invention relates to methods of and means for producing decorated material and relates more particularly to methods of and means for producing decorated sheet metal, textile fabric, sheets of Celluloid and plastics in general, leather, paper, board and other materials likewise. It provides means for obtaining a novel three-dimensional effect similar to the appearance of embossing, debossing, pebbling, perforating, etc., by working a pattern or design into the material itself.

The principal object of my invention is to provide a method of working a three-dimensional design into a final material and producing thereby a novel effect and appearance of said material.

A further object of my invention is to provide means for working a design into a final material.

A further object is to provide a method of producing a design which comprises impressing said design into a screen by depressing a portion of its surface, corresponding to the area and contour of the design, and thereafter reproducing said design therefrom into a final material.

Another object is to provide means of and a method for reproducing an artificial watermark and a shaded watermark into paper of any suitable grade and colour, by working it into the finished paper.

Another object is to provide an article for reproducing a design into a final material, said article being inexpensive and substantially indestructible.

Another object is to provide an article for producing a design into a final material, said article being light in weight and small in size.

Another object is to provide such an article which will be easy to clean and to protect from corrosion.

Another object is to provide means for working a design into a final material for the utilizing of which unskilled labor may be employed.

Another object is to provide a method of producing a design, which comprises a succession of steps, each one of which may be made easily and speedily, and for each of which unskilled labor may be employed to carry out the same.

Another object is to provide an article into which a number of designs may be formed successively, and which may be utilized to reproduce all of the designs simultaneously onto a material.

Another object is to provide a method of and means for protecting written commercial paper or documents against alteration of the signatures or other data having been written thereupon before.

Further objects and advantages of the invention will be in part set forth in the following specification and in part will be obvious therefrom without being specifically pointed out.

Heretofore, embossing, debossing, indenting and perforating as well as any other three-dimensional marking was done by brass or steel relief dies and corresponding female dies, both either in plate form for flat bed pressing or for the use on steel rolls, the pattern or design being engraved or partly etched into the male die. Also letterpress types, photo-engravings, woodcuts, electrotypes, etc., have been used for light embossing on soft materials, but such substitutes do not give satisfactory results on finer jobs, owing to the softness and deformability of finer lines on such dies made from type alloy or etchable metals like zinc and copper. On electrotypes, also the lead backing represents another difficulty for use in embossing. All such dies are not sufficiently rigid and strong to insure good work; they soon wear out and cannot be re-engraved. Therefore, the commonly used method throughout the related arts consists in applications of the Gaufrage process, the use of engraved steel cylinders as male dies working against a female or counter roll usually of papier mâché or cotton. The pattern has to be worked into the latter by a preceding operation, rolling in the male die after dampening. For heavy work such as metal sheet rolling or high class work on other materials two engraved steel rolls are necessary. In light embossing of short runs such as book covers, seals and similar paper work, also brass types and brass dies are used. In most embossing, debossing and indenting work heavy pressure is used necessitating expensive machinery or heavy calenders. Heat, dampening and other auxiliary methods are employed for facilitating the forming.

Softer metals, such as copper, brass and zinc, can be routed by hand-operated, motor-driven routing machine; such routed cylinders are usable on softer materials only, finer parts have to be finished by hand.

Steel or other tough dies have to be engraved by hand or hand-operated apparatus or pre-etched and then finished by skilled work.

An entirely photo-mechanical preparation of steel rolls or brass dies is not possible if finer details are to be represented.

For embossing rolls and plates a high grade, entirely uniform steel is used, such as Sheffield steel, and hardening is often required.

Thus, in the present art expensive material and

work is required in making any kind of embossing, indenting or perforating and considerable time is required in preparing a more intricate pattern, as one engraver at a time only can work on each cylinder. The manufacture of embossed or otherwise three-dimensional decorated products is considerably handicapped by this expensiveness and by the time element involved. These obstacles are prohibitive in providing embossed patterns for short runs, and individualisation and styling of the designs as well as seasonal and fashionable changes are rendered very difficult.

With the above and other objects of the invention in view, the invention consists in the novel methods, construction, arrangements and combination of various elements, devices, and parts, as set forth in the claims hereof, certain embodiments of the same being illustrated in the accompanying drawing and described in the specification.

In the accompanying drawing:

Fig. 1 discloses the drawing of a design, the letter A having been selected for purpose of illustration,

Fig. 2 is a perspective view of the same letter A having been cut out of a suitable material to serve as a master for the design to be reproduced,

Fig. 3 is a front elevation showing a wire fabric in cross section and the master impressed thereon,

Fig. 4 is a cross section of the wire fabric having impressions on its surface, the material to receive the design in reproduction shown placed thereabove, having the design upon it,

Fig. 5 is a cross section through a wire fabric having received impressions of the same design on both surfaces,

Fig. 6 is a cross section through a wire fabric having a perforation,

Fig. 7 discloses a schematic side view of a machine having a roll carrying a wire screen, a counter roll, and the material being worked upon. The roll carrying the fabric is shown resiliently held in position,

Fig. 8 is an elevational view of an apparatus for impressing designs from the upper and lower side simultaneously to a plurality of sheets of material, and

Fig. 9 is a cross section through a final material after having been subjected under pressure to two screens, one from above and one from below.

In the description of the drawing in which similar numerals designate similar parts throughout, 10 indicates a design to be reproduced in a material. A master 11 is made therefrom in any suitable manner hereinafter set forth in detail. The master 11 is thereafter impressed into a wire fabric 12 by the application of small pressure, sufficient, however, to deform and flatten some of the weavings corresponding to the shape and outline and contour of the master. Said wire screen or fabric 12 having its permanent impressions produced by the master 11 is then placed in contact with the surface 13 of a material 14 for imparting thereupon the shape of the design 10 while being subjected to pressure. Small elevations 15 resulting from the mesh of the fabric 12 will be imparted to the surface 13 of the material 14. In the machine shown in Fig. 7, the wire fabric 12 is disclosed being in form of a sleeve over the roll 16 and being secured thereto for following the rotation of the roll without slipping.

Between the sleeve formed by the fabric 12 and the roll 16 a layer of rubber 17 is provided. The material 14 is rolled through the machine in contact with the fabric 12 and the counter roll 18. A spring 20 provides a resilient pressure of the roll 12 on the material 14, said pressure being variable by the exchange of a weight 21 carried by an extension lever 22 of the roll carrier 23, said carrier being connected with relation to the frame of the machine in a pivotal manner. The machine shown in Fig. 8 consists of two frame plates 24 carrying rubber plates 17' for providing resiliency to the wire fabrics 12 placed thereon for working upon a plurality of sheets of material 14.

In accordance with my invention, the decorating of material is achieved by first preparing a wire fabric into which a design has been suitably impressed, and thereafter utilizing the screen containing the design to impress the same into the surface of the material to be decorated.

For the working into the fabric 12 of the master 11 in a preparatory operation I have devised several methods. After that, the treated fabric can be used immediately as a master for working the material to be decorated, as will be hereinafter set forth. This previous working in of a design into the fabric I have done in numerous ways, every one being substantially equal, in effect, for reproducing the desired design.

The principle of the method consists in the removing of the junctions of warp and shute and the relative flattening of the same corresponding to the shape and contour of the design. The parts that are thus impressed in the weaving of the fabric provide a negative form of the design as it will appear later on in positive form in the final material. The outlines of the design appear embedded in the surface of the screen or fabric 12.

The impression on the fabric and thereby the relative flattening of the portions to become the negative of the design may be done by creating a relative depth in the surface of the fabric, or these portions may be removed entirely by cutting through the fabric, as shown in Fig. 6. If a depressing of the surface is made, the depth of it has to be determined in relation to the thickness of the material to be worked upon and the height of the raised effects desired thereon.

This depressing may be done in various degrees of depth, from a slight superficial depressing to a very deep one, by regulating the pressure employed in the apparatus used therefor, such apparatus being well known in the art of printing and reproducing.

The results obtained in working from such fabrics employed as masters are amazing, in comparison with methods and apparatus employed heretofore, as the finished work shows faithful reproductions of various degrees of impression on the fabric. Thus I have achieved novel and unusual effects by the simple means of impressing the same pattern several times on the same fabric master, but in various degrees of depth, the impressions being made close to one another or across each other.

The work product with a fabric containing such a combination of impressions shows unique effects of crossing shades and shadows of varying degrees, one on top of the other giving a perspective appearance, an abundance of half tones and realistic plastic not achieved heretofore by any known method. These effects may be easily attained with any geometrical or linear pattern, at a small cost.

The reproducing of the design into the fabric may be done in different ways depending on the character of the design employed and on the necessary fineness of reproduction required. The following description is intended to disclose a few of the methods out of a multitude that I have found to be practicable, and it will be understood that the same result may be accomplished in many other ways without departing from the spirit of my invention within the scope of the appended claims.

Designs consisting of plain outlines, signatures, etc. may be worked into the fabric directly by hand. The work is done by employing tools such as used by engravers or moulders; also any hand tool which may be power driven, such as a router, may be used.

Such handworking, of course, is limited to designs having simple outlines; the advantage offered by my method lies in the easy application of various mechanical resources for simple reproduction of even the most intricate designs into the fabric.

Signatures, plain letters, and other outlined designs have been cut out by me by various methods, such as jig sawing, etching, hand cutting, and various others, from any tough material, like hard fiber, pressboard, sheet metal or the like, using it as masters 11 for a subsequent reproduction thereof into the fabric 12.

These masters are used as punch, pressing them into the fabric, the pressing being done by rolling the fabric 12 and the punch or master 11 through a matrix mould or a similar suitable pressure device.

The design is thereby instantaneously reproduced into the fabric with all its inherent details. Care should be exercised in utilizing the proper punch, in accordance with the desired height of the three-dimensional result in the finished product and in accordance with the mesh and toughness of the fabric used.

For the reproduction of linear ornaments even simpler means are available. Any suitable straight piece of board or metal may be used as punch by pressing it into the fabric.

This process can be repeated numerous times placing one embedded line beside the other or across each other in the fabric, by a method herein above described, for obtaining shaded effects and producing an ornamental pattern of any desired size by employing only one tool, at a negligible cost.

The same procedures of repeating the impressions have been used by me, employing various kinds of punches, obtaining most beautiful and amazing results thereby. The feature of using a single piece of punch for preparing a large sized master fabric 12 by reproducing it from the master 11, and combining various degrees of shading I consider to be a major advantage of this process over methods heretofore used, due to the simplicity and inexpensiveness of my process.

By preparing a set of letters, such as shown in Fig. 2, the letter A being designated 11, any combination of lettering may be composed and reproduced into the fabric 12. Such alphabets may be used over again repeatedly and their use makes available a means of transcribing. Likewise, circles, squares and many other geometrical or still other symbols may be used in the composition of different patterns.

By pressing a coarse mesh fabric into the master fabric 12, I have achieved intricate, new and beautiful effects. Choosing the proper angles, any silky or moiré effect is obtainable thereby, this method being advantageous because of its simplicity, and the minimum of effort or skill required; it permits to reproduce moiré effects in many materials not decorable in this pattern heretofore.

For preparing the masters 11 fancy cut-outs, metal stampings and various similar decorative patterns may be used with good results.

For transferring the finest details I use any photo engraving as intermediate process, in fact, any design which may be reproduced by photo engraving may be transferred on a master 11 thereby. Any common zinc photo engraving, linecut, as well as woodcut, or electrotype thereof, or a stereotype may be used. No special plating or hardening is required for this master 11; the photo engraving does not need to be routed or blocked, nor is deep etching required as for printing purposes, thus entailing savings in time and cost. These masters 11 are subsequently reproduced into the fabric 12 by means and methods herein above described.

From this reproduction into the fabric, a fabric master results that may immediately be employed for the ensuing process.

My process also provides that the design may be applied in such a way that it is usable for reproduction in reverse as well as obverse. For this purpose I impress the punch for about two thirds of the thickness into the fabric. Thereafter, I run the fabric through a pressure appliance, the impressed surface of said fabric being placed against a rubber plate or blanket as a counter. This procedure is repeated several times under progressively increasing pressure until the design impression is placed in the midway portion of the thickness of the fabric as shown in Fig. 5. In this way the fabric is prepared for the use on both sides thereof.

I believe this to be the only method of preparing a substitute die working on either side with uniform effect; the advantages are twofold: the fabric may be turned around in case one side should have become damaged and, also, every design may be shown in different ways. Portraits look different in reverse from the obverse, and any unsymmetrical pattern is available by this method in a distinct variety of alternation.

The present art also fails to provide means of duplicating or multiplying plates or rolls for embossing or perforating. The advantage of such a multiplying is obvious, for instance, in creating seasonal or standard patterns for a number of users at the same time without multiplying the original expense. The printing art makes considerable use of electrotypes, matrices, and stereos for such purpose in a steadily increasing volume, and the demand for means of duplicating dies is great. My process as herein above described provides such mechanical duplication at a very small cost, each duplicate having the quality of the original.

Most of the patterns used as masters for impressing the fabric, such as cutout designs or photo engravings, etc., may be used for many successive impressions into the fabric. But, when a large number of multiplications is required, it is advisable to have electrotypes or duplicates of other types made from the original pattern or master, thus providing a far greater number of multiplied patterns, simultaneously in turn to be used for impressions into the fabric. When cut-out or jig-sawed designs are used, duplicates of

them may easily be made in a single operation, or resistant materials may be substituted for softer originals, the resistant material preferably being chromium or duraluminum thereby providing masters or patterns for indefinitely repeated use.

I have discovered that wire fabrics made from the hardest and toughest metals and alloys, like chromium, Monel, or the like, can be impressed by a pattern punch which is made of incomparably softer material.

I have found it facilitating to employ in work of that kind a heavy shock pressure and a counter of coarse grained or finely grilled surface and, preferably, the employment of heat in addition. In this way I have been able to prepare fabrics by using punches consisting of burlap or linen or laces. Even cut-out paper letters, stencils, and lace doilies have been found reproducible by using this method. I use a number of such doilies, etc., simultaneously after previously registering and pasting them together and impregnating and substantially hardening them subsequently in a glue solution, and thereafter fixating all of them in this pile in formaldehyde or a similar fixating agent.

Such soft tools, of course, are destroyed by working them into the fabric under the applied pressure. But aside from this ensuing destruction of the pattern, a perfect and clear impression into the fabric is made and I have attained fine and detailed impressions into the hardest fabrics by using the thinnest doilies and laces in this process.

For applying this kind of pattern for the best results, meshes of fine grades of brass fabric, Monel fabric, or nickel alloys fabric should be used. It is a unique fact that a medium such as a fabric should be workable enough to be impressible by so soft a tool, yet, at the same time be hard enough to work satisfactorily on long runs under pressure during the ensuing reproduction process to impart the design into a final material.

The qualities of wire fabrics make them usable for producing an unlimited number and variety of inexpensive patterns for the reproducing of designs.

I attribute the unusual effects to the important characteristic of wire fabric, namely, its requiring only a fraction of the pressure for obtaining three-dimensional impressions compared to the pressure necessary for the same impression into full material of the same hardness as the elements in said fabric. Furthermore, it is characteristic of wire fabrics to transfer into the final material only the inherent fabric pattern corresponding to the design or the designs impressed thereinto, instead of transferring a solid impression of the entire surface area and shape.

The nucleus of my discovery and the invention based thereupon was to have found that wire fabrics of a certain class of mesh, if combined with proper backing and corresponding counters possess suitable characteristics and qualities for reproducing designs impressed into said fabrics on various materials when applied under sufficient pressure, which is possessed by no other means of decorating materials by creating a three-dimensional effect thereon.

In carrying my invention into effect, I provide any backing plate 24 or roll 16 of smooth surface, over which I place a corresponding piece of wire fabric 12. Thus, a substitute die originates whose qualities are suitable for reproducing a design into a final material when worked against a proper counter. A resilient layer 17 or blanket of rubber or the like may be fastened to the backing plate 24 or roll 16 for providing resiliency necessary for the process of reproducing of intricate patterns with all details. The use of such a resilient blanket is feasible but not absolutely necessary. It is essential, however, that the backing plate or roll itself be composed of non-resilient material provided with a smooth surface throughout. Most satisfactory results have been obtained by the use of metal or fibre plates, or rolls of the same material.

The resulting effects are novel due to the appearance of beautiful patterns on the final material, heretofore unknown. The wire fabric itself provides unique and interesting pattern of striking beauty due to an unlimited inherent variety of shades providing silky or moiré effects and numerous other patterns. Furthermore, any special design or picture, however, intricate or detailed, may be faithfully reproduced on a final material by the use of wire mesh as a medium into which the design has been impressed before, appearing outstanding against a fancy and alternating background provided by the reproduction of the fabric itself.

The wire fabric best suited for a special effect has to be chosen in accordance with the quality of the pattern or design desired to be reproduced, the intricacy of the reproduction required, the final material to receive the reproduction, and the quantity required to be reproduced.

I have obtained very good results using all the various meshes between No. 40 and No. 250. A faithful reproduction of details will result by using finest mesh fabric as details are bound to be lost to a considerable degree if coarser mesh is employed. Such wider mesh, however, provides a clearly discernible and outstanding screen background and, with suitable designs, even a coarse mesh gives interesting reproduction of novel and distinctive appearance, although—or just because—some details are suppressed. On artificial leather for a final material, and similar materials, I have obtained the best results by using a coarse mesh in the neighborhood of No. 50.

The selection of a suitable mesh will have to follow artistic principles considering design and material, rather than purely technical rules, as observed in choosing half tone screens for reproduction.

For small quantities of reproduction or for light work any brass or even copper wire fabric of the proper mesh is sufficient. For greater quantities and for heavier duty on tough final materials, chromium, Monel, nickel alloy, or related metal fabrics will be preferable.

Standard fabrics may be used with satisfactory results for this method and those skilled in the art will have no difficulty in working even with the most inexpensive standard fabrics of the mesh and other qualities required as pointed out herein above.

The reproducing of a design embedded in the fabric on a final material may be done by simply running it through any mechanical appliance adapted to press the wire fabric into the final material while simultaneously backing it as above set forth. This may be done as well by any flat press (see Fig. 8), as by fastening the fabric around a cylinder and using the rotary pressure process (see Fig. 7).

The effects obtainable by my method are eas-

ily varied and modified by employing different counters (counter 18, Fig. 7). When a non-resilient counter is used, such as a smooth steel plate or steel cylinder, the effect results in an impression on the surface of the final material only, the impression being imparted by the fabric 12 thereupon. By regulating the pressure of the roll 16 any degree between superficial, slight indentation and a deep impression into the body of the final material may be obtained. The latter effect resembles perforation, the many minute junctions of warp and shute performing a function similar to a function performed by an equal number of perforating needles, and puncturing the final material.

If a resilient counter is employed, such as a layer of rubber, felt, or board, the pattern embedded in the wire fabric is pressed in and through the material, similar to embossing but different in appearance, due to the characteristics of wire fabric. A still heavier effect is obtained by pre-impressing a counter board or roll and thus forming a female die in a preparatory run, similar to the corresponding operation in pre-embossing.

Different and entirely novel effects are obtainable by using a second wire fabric as counter, as shown in Fig. 8. In this way, an unlimited number of varied and beautiful effects is obtainable by changing the angles of the weave in the two fabrics in varying directions to each other.

Even on tough materials like sheet metal, as nickel, silver, etc., and on heavy sheet fibre, Celluloid, cellulose acetate and other plastics, I have obtained by using this method a variety of fancy patterns of striking beauty differing from each other to a marked degree. The effect of the two wire fabric method, as shown in Fig. 8 results in a much more effective impression compared to the one obtainable by the use of ordinary dies, and the impressions formed by the wire junctions and crossings result in unique and attractive patterns. Even silky and moiré effects can easily be represented in silver, brass, or copper, an effect not obtainable heretofore even by using the most expensive dies.

In the same method by using two wire fabrics in the above way and by employing the proper amount of pressure, I have achieved in Cellophane paper, and other thin materials novel effects closely related to shaped perforating, but having a unique appearance. Furthermore, a plurality of up to 25 sheets may be worked upon in one operation as shown in Fig. 8. The perforation-like punctuation of the thin sheets goes through such a pile, and perfect results are obtained in a very economical way.

The perforation-like punctuation of the material, a sample of which being shown in Fig. 9 of the drawing provides means, if applied to paper, for protecting written, commercial paper or documents against alteration of the signatures or other data having been inscribed thereupon. Material, such as paper to be protected against alteration of inscriptions thereon, as shown in Fig. 9, will contain weave-like elevations in crosswise directions impressed on both surfaces, in addition to a design, if such design be desired therein. Furthermore, the impression from both wire fabrics may be so deep that the weave-like elevations may be severed from each other, and perforations appear in the material.

It will be understood that irrespective of the thickness of the material, impressions from below and above by two separate wire screens may be made.

The method disclosed opens up numerous important advantages compared to the state of the present art; it makes possible various novel and distinctive effects of unknown appearance in decorating various kinds of materials and a plurality of said material simultaneously, if desired, and provides an unlimited combination of different fancy patterns, also silky and moiré patterns, in materials wherein such effect has not been available heretofore. It provides an inexpensive substitute and may provide an imitation, of embossed, debossed, perforated, indented, and similar, three-dimensional effect.

It provides a means for artificially watermarking any grade of finished paper, even with a shaded watermark, hitherto unknown for the purpose of working it into dry and finished paper.

All these effects are obtainable by this method and means in a delicateness of design and faithfulness of reproduction of any pattern, superior to any previous method of three-dimensional decorating of final material.

The disclosed method provides means for all these effects in an inexpensive way, the cost being a fraction of the expense necessary in making a metal die of the same design and size. The considerable difference in expense applies to the initial cost of the die metal itself as well as to the cost of engraving.

The dies of the usual solid kind are extremely heavy and often of a size surpassing the mail and air transportation limit of size or weight whereas the wire fabrics used by this method are of very light weight. Therefore, the shipment of the prepared wire fabric to distant places of use may easily and speedily be done at low cost. The handling and exchanging of the fabric in the machine may readily be done by unskilled labor without requiring much time, whereas the changing of a heavy steel cylinder requires the help of several men and special machinery, such as a hoist. In working with pattern rolls, the removing and storing is an important part of the work, as often alternating jobs require an exchange of patterns. The storing, maintenance and cleaning of metal dies and their protection against corrosion is another problem which is easily solved by the use of wire fabric. Owing to the small amount of material required for a wire fabric compared to a solid metal die of the same size, expensive alloys may be used which could not be afforded on a similar die of the old type. Therefore, protection against corrosion and other damages may be attained by choosing non-corrosive metal for the wire fabric.

Wire fabrics are not impaired by scratches or shocks, nor are they subject to damage when dropped, whereas engravings on brass or steel dies are quickly injured by scratches or other damages.

Cleaning of wire fabrics is easily done by brushing it or blowing water or a suitable cleaning fluid through its openings.

In treating materials under heat, the heat passes freely through the fabric holes, whereas a solid die has to be made of thick metal and, therefore, absorbs most of the heat.

Steam may be led through the fabric and thus new dampening methods are possible which may not be used while employing metal blocks.

Wire fabrics, if used in combination with ink, so that certain parts of the surface may be inked, and the ink imparted to the final material, pro-

vides the possibility for printing in combination with the above described method. The subject-matter of this paragraph is being claimed in a pending application, Ser. No. 566,430, filed on Dec. 4, 1944.

The easy attachability of wire fabrics to any kind of press or pressure roller due to its lightness and flexibility, and the possibility of wrapping it around any smooth roll, as well as the opportunity to have the fabrics woven as sleeves for simply sliding it over the cylindrical roll, and finally the possibility of having the fabric specially woven to any length and width for continuous processing, leads to the application of this method to mechanical applicances not yet used for three-dimensioned working, and to the combination of it with printing and other paper working processes. In addition, it may be applied to standard equipment of other industries.

Phosphor bronze, Monel and nickel alloy wire fabrics have proved to possess the greatest resistance against wear and tear occurring during the process. If such fabric bearing a pattern should become flattened by extremely long run under heavy pressure, it may readily be reconditioned by re-impressing the pattern or design at the places of original impression.

With the described method any individual design or picture, trade-mark, signature, name or lettering, diagram, personalized slogan or advertisement, coat of arms or any other illustration may be reproduced in a three-dimensional and novel effect, or embossing, indenting, watermarking or perforating effects may be substituted thereby.

I do not limit myself to the particular details of methods and construction set forth in the foregoing specification and illustrated in the accompanying drawing, as the same refer to and set forth only certain embodiments of the invention, and it is obvious that the same may be modified, within the scope of the appended claims, without departing from the spirit and scope of the invention.

Having thus described my invention, what I claim as new and desire to be secured by Letters Patent is as follows:

1. An article for reproducing a three-dimensional design comprising a wire fabric the upper and lower surfaces of which having depressions symmetrical to and opposite each other.

2. A method of embossing sheet material, which comprises pressing said material with a wire mesh die having a compacted design area.

3. A method of embossing sheet material, which consists of pressing said material with a wire mesh die having compacted design areas.

4. A method of embossing a design in sheet material, comprising placing said material face to face with a wire mesh die having compacted design areas and subjecting the whole to pressure.

5. A method of embossing sheet material, which comprises pressing two layers of said material with a wire mesh die therebetween, the upper and lower surfaces of the die having depressions symmetrical to and opposite each other.

6. A method of decorating sheet material, which comprises pressing said material with a wire mesh die having a compacted design area.

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