

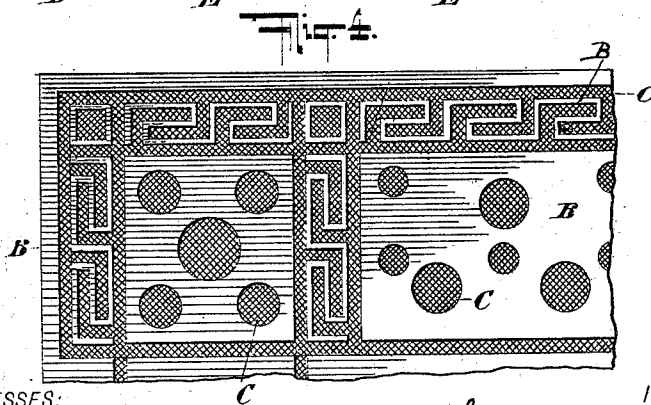
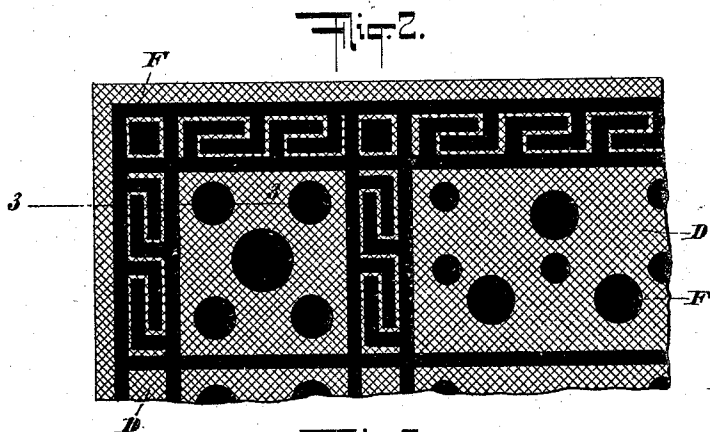
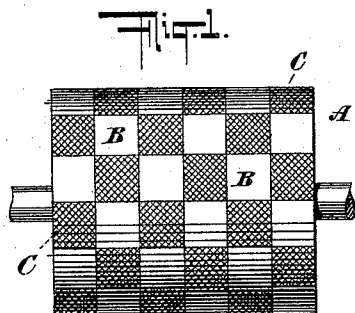
(No Model.)

S. CRUMP.

METHOD OF PRODUCING MOLDS FOR PAPER MAKING MACHINES.

No. 554,243.

Patented Feb. 11, 1896.



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# UNITED STATES PATENT OFFICE.

SAMUEL CRUMP, OF SPOKANE, WASHINGTON.

## METHOD OF PRODUCING MOLDS FOR PAPER-MAKING MACHINES.

SPECIFICATION forming part of Letters Patent No. 554,243, dated February 11, 1896.

Application filed May 21, 1895. Serial No. 550,072. (No specimens.)

*To all whom it may concern:*

Be it known that I, SAMUEL CRUMP, a citizen of the United States, and a resident of Spokane, in the county of Spokane and State of Washington, have invented certain new and useful Improvements in Methods of Producing Molds for Paper-Making Machines, of which the following is a specification.

The invention relates to improvements in the manufacture of decorated paper and pulp boards; and it consists particularly in the novel methods, hereinafter described and pointed out in the claims, of producing the molds, (whether of the cylinder, Fourdrinier or hand type,) whereby the decoration in pulp may be applied to the paper or pulp boards, as hereinafter described.

In accordance with my invention the paper and straw or other pulp boards during or after their process of manufacture have imparted to their upper or lower or both surfaces permanent designs of any desired outline or pattern in pulp-stock, preferably of a color differing from that of the main body of the paper or board. The designs in color form an integral part of the body of the paper or board, and hence the latter after leaving the machine will possess a surface or surfaces bearing permanent designs in as many colors and as elaborate in character as may be desired.

The general machine for producing the decorated paper and pulp boards will possess, in addition to the usual cylinder mold or molds for making the body of the board, one or more pattern-molds for forming in colored pulp the design or decoration to be applied to the main body of the board.

It is well known that in the manufacture of plain board it is customary to employ several cylinder-molds, each forming a layer of the pulp and delivering the same to the layer formed on the succeeding mold in order that the requisite thickness of body may be secured, and it is also customary to cover this board that it may have a white or colored plain surface.

In the paper-making machine embodying my invention the mold which is to form the surface decoration will have provided upon it a fixed imperforate pattern which will entirely exclude the pulp, while the remaining

portion of the surface of the mold is left in its usual open condition, whereby the mold will be enabled to form its layer of colored pulp with an entirely open design corresponding with the imperforate pattern of the mold. The layer of pulp thus formed becomes an integral part of the surface of the board, and hence the design is permanent in character. As many of the pattern-molds may be employed as desired in accordance with the particular effect it may be wished to produce in the finished board. If it should be desired to decorate the board with several colors, a corresponding number of the pattern-molds should be employed, and the outlines formed thereon should be so arranged with respect to each other as to secure the proper register in the finished design.

It may have heretofore been attempted to decorate board by means of pattern-cylinder molds; but it is a fact, I believe, that never heretofore have any successful results beyond an experimental stage been accomplished, owing to defects existing in the pattern-molds as heretofore constructed.

The object of the present invention is to overcome the defects which have heretofore existed in pattern-molds and to produce a mold capable of effectually accomplishing the purposes sought for it and of that nature and construction rendering it permanently useful in a practical commercial sense.

In accordance with my invention I am enabled to produce the most elaborate patterns on the mold and to successfully apply the same in color to the surface or surfaces of the board, whereby the latter, instead of having a plain surface, may have imparted to its surface or surfaces elaborate designs in color without material increase in the cost of manufacture.

My present invention is confined to the pattern-mold; and it consists in the methods I have invented for producing the patterns on said mold.

In accordance with my methods of producing the patterns on the molds, I fill in the meshes of the wire at the desired points to form the imperforate pattern by electrical deposition, whereby the exterior surface of said pattern is left smooth and hard and permanently capable of totally excluding the pulp.

In the production of the pattern I first protect the inner surface of the wire with wax-coated paper, wax, india-rubber, gutta-percha, or any other suitable substance that will resist electrical action, the inner surface of the wire being coated with this resisting substance, which will preferably be pressed into the meshes of the wire until it has penetrated about half-way through the same and covered the lower longitudinal half of the wire. I thereafter prepare the design on the outer side of the mold by painting or printing the same upon the wire with any material which will resist electric action, or, in lieu of painting or printing the design upon the outer side of the mold, I may cut out the design from a sheet of wax-coated paper or other substance which will resist electric action and apply the same to the wire, pressing the same firmly upon the wire, so that the wax coating on the reverse side of the sheet may enter the meshes of the wire and meet the protecting-coating which was previously applied to the inner surface of the wire. The pattern applied to the outer surface of the wire will combine with the coating applied to the inner surface of the wire to fully protect from electric action all of the wire directly below the pattern.

The pattern applied upon the outer side of the wire, whether by paint, printing, waxed paper, or other substance or process, will, by reason of its open outlines, leave exposed through the wire meshes certain surfaces of the inner coating of wax-covered paper, which surfaces will exactly correspond in outline with the open-work design formed by said pattern, and upon these exposed wax surfaces I form a metal or otherwise conducting surface upon which electrical deposition readily takes place. The metal or conducting surface just referred to may be formed by working plumbago or other metallic conductor into the exposed wax surface or coating the same with a metal solution—such, for example, as nitrate of silver. The wire having been thus prepared with the open-work pattern of material which will resist electric action and with the metallic or conducting surface closely filling the open outlines of said pattern, is submitted to an electric-battery trough in order that the metal, preferably copper, may deposit itself upon the said metallic surfaces, thereby closing the meshes of the wire and producing a smooth solid permanent metal pattern exactly conforming to the open outlines of the design, and which during the manufacture of the paper will totally exclude the pulp. After the solid metal pattern has thus been formed upon the mold by electric deposition, the inner wax-coated paper and the outer design in paper or paint or other substances are removed from the wire, thus opening all of the meshes of the mold except those permanently closed by said metal pattern.

Referring to the accompanying drawings, forming a part of this application, Figure 1 is

a top view of a cylinder-mold constructed in accordance with and embodying my invention. Fig. 2 is a top view of a detached portion of the wire for a mold and illustrating the application to the outer surface thereof of the design it is intended shall be reproduced upon the surface or surfaces of the board during the manufacture of the latter; and Fig. 3 is an edge view of a detached portion of the wire for a mold and illustrating the application to the inner surface thereof of the protecting-coating of waxed paper or other material and to the outer surface thereof of the design, leaving exposed between the surfaces of said design those portions of the wire it is intended to render solid by means of electrical deposition. Fig. 4 is a top view of a detached part of the mold corresponding with Fig. 2 after the deposition has taken place and the material forming the design removed.

In the drawings, A designates the mold; B, the solid portions thereof, which exclude the pulp, and C the open portions thereof, which define the outlines of the design it is intended shall be applied to the surfaces of the board. The wire in Figs. 2 and 3 is lettered D. In Fig. 3 the coating of waxed paper or other substance applied to the inner side of the wire is designated by the letter E and the protecting substance of which the design is formed upon the outer surface of said wire by the letter F, while the reference-letter G denotes the open spaces between the portions of the design, and which spaces are filled by the electric deposition, and when filled form solid permanent metal surfaces. (Denoted in Fig. 1 by the letter B.) The design to be applied to the mold may be of any outline or character desired, and hence in Figs. 1 and 2 I illustrate two separate designs.

For the purposes of description it may be assumed that the inner protecting substance E is of waxed coated paper pressed into the meshes of the wire D, and that the design F is also in wax-coated paper pressed into the meshes of the wire D, the facing-wax coatings on the parts E F coming into contact with each other through the meshes of the wire and thoroughly protecting the latter. The wire having been thus prepared is ready to have applied to the open spaces G the metallic or conducting surfaces—such as plumbago, nitrate of silver or other suitable substance—and thereafter the wire will be submitted to the electric-battery trough, wherein the copper or other metal will deposit upon the said metallic or conducting surfaces and permanently form the imperforate pattern it is desired the mold shall have. Upon the removal of the wire from the trough the inner protecting-surface E and the design F may be removed, leaving those portions of the wire protected by them in their usual condition, while the copper or other metal deposited upon the wire will fill the meshes thereof and form the permanent design. The mold thus formed may be used continuously and the solid pat-

tern thereof will exclude the pulp, while the open surfaces of the wire between the outlines of said pattern will constitute the design and take up the pulp and deliver the web thereof to the body of the board, which will thus carry as an integral part the desired design in pulp and of a character or color preferably different from the main body of the board.

The general processes above pointed out may be varied to some extent without departing from the scope or spirit of the invention. For example, the protecting substance, such as wax, intended for the inner surface of the wire may have a metallic or conducting surface applied to it before it is pressed against the wire in lieu of after being placed in position, and in certain instances the inner protecting substance may be omitted.

The invention is not limited to the order in which the steps of the process may be carried out, since, as above stated, the metallic or conducting surface may be applied to the wax before or after the latter is applied to the wire screen. It is true also that the design in material which will resist electrical deposition may be applied to the mold either before or after the metallized surfaces are applied to the wax backing.

When the inner protecting substance is employed it will be found convenient to print the pattern by means of rubber stamps directly against the outer surface of the wire, the rubber yielding to the wire and reaching down through the meshes to the wax backing, thus dispensing with the painting or cut-out patterns and facilitating the process of producing the mold.

The invention is not confined to any special type of mold and is applicable to cylinder, Fourdrinier or hand-molds.

The mold constructed in accordance with and embodying my invention will form the web of pulp possessing the open-work designs with certainty, rapidity and accuracy, and with such sharp well-defined outlines that said designs may be very elaborate and artistic in character. The mold constructed as above described is also very durable and the metal pattern is permanent, smooth and effectual.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The method hereinbefore described of forming an open pattern on a wire mold in order that the mold will take pulp in the form of an ornamental outline and apply the same to the body of paper or pulp boards to ornament the latter, which method consists in applying to the wire mold a design in material which will resist electrical deposition and which will represent the ornamental pattern sought for the paper or pulp boards, forming

conducting-surfaces within the meshes of the portion of the wire between the outlines of said design, depositing metal by electric action upon said surfaces to close the meshes between the outlines of said design, and removing said material forming the design so as to leave the meshes of the mold within the outlines of the design entirely open to act upon the pulp.

2. The method hereinbefore described of forming a pattern on the wire of a mold, which consists in applying to the reverse face of the wire a protecting-surface, which will resist electrical deposition, applying to the obverse face of the wire the design in material which will resist electrical deposition, applying metallic surfaces between the outlines of said design, and permanently depositing metal by electrical action upon said metallic surfaces to form the pattern.

3. The method hereinbefore described of forming an open pattern on the wire mold of paper-making machines in order that the mold may take the pulp in the form of an ornamental outline and apply the same to the body of the paper or pulp boards to ornament the latter, which method consists in applying to the surface of the wire mold a design in material which will resist electrical deposition and which will represent the ornamental pattern sought for the paper or pulp boards and temporarily close the meshes covered thereby, permanently depositing metal by electric action upon the surface of the mold to permanently close the meshes of the same between the outlines of said design, and removing said material forming the design so as to leave the meshes of the mold within the outlines of the design entirely open to act upon the pulp.

4. The method hereinbefore described of forming a pattern on the wire of a mold, which consists in applying to the reverse side of the wire a protecting-surface of wax or other resisting material which will enter the meshes of the wire, applying to the obverse face of the wire the design in material which will also resist electrical deposition and enter the meshes of the wire to meet and combine with the said protecting-surface, applying metallic surfaces between the outlines of said design, and permanently depositing metal by electric action upon said metallic surfaces to form the pattern.

Signed at Spokane, in the county of Spokane and State of Washington, this 13th day of May, A. D. 1895.

SAMUEL CRUMP.

Witnesses:

MILTON F. WEBSTER,  
SAMUEL DAVIS,