(Specimens.)

J. E. TAYLOR.

PROCESS OF AND APPARATUS FOR MAKING EMBOSSED PAPER.

No. 361,849. Patented Apr. 26, 1887.

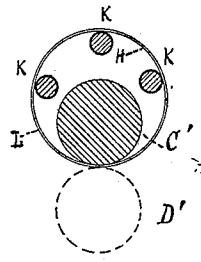

Fig. 2.

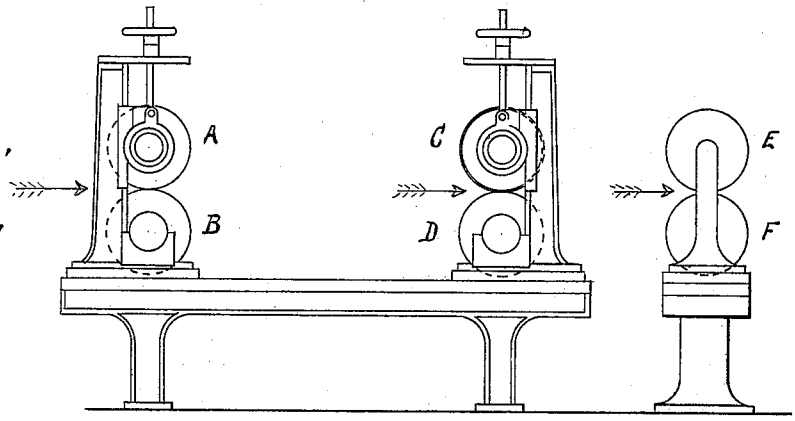

Fig. 1.

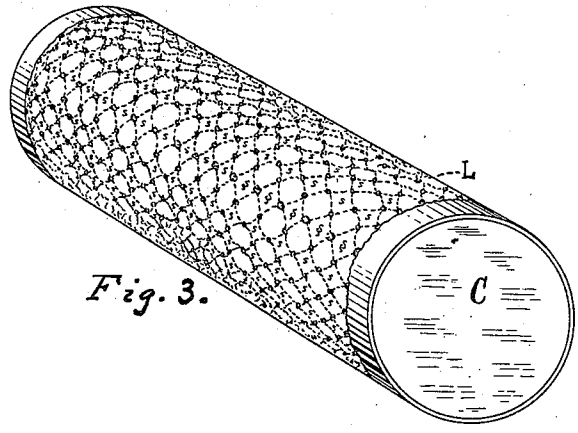

Fig. 3.

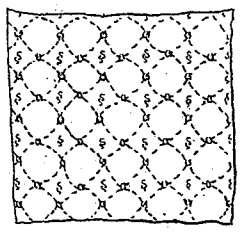

Fig. 4.

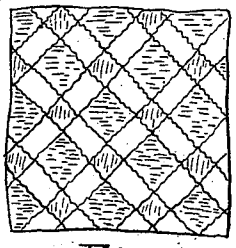

Fig. 5.

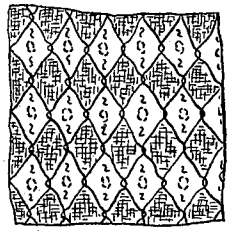

Fig. 6.

Witnesses—
H. H. Chapman
J. E. Chapman.

Inventor—
John E. Taylor.
By Hawes & Chapman
Attorneys.

UNITED STATES PATENT OFFICE.

JOHN E. TAYLOR, OF SPRINGFIELD, MASSACHUSETTS.

PROCESS OF AND APPARATUS FOR MAKING EMBOSSED PAPER.

SPECIFICATION forming part of Letters Patent No. 361,849, dated April 26, 1887.

Application filed September 30, 1886. Serial No. 214,914. (Specimens.)

To all whom it may concern:

Be it known that I, JOHN E. TAYLOR, a citizen of the United States, residing at Springfield, in the county of Hampden and Commonwealth of Massachusetts, have invented a new and useful Process of and Apparatus for Making Embossed Paper, of which the following is a specification, taken in connection with the accompanying drawings, forming part thereof.

My invention relates to the manufacture of embossed paper for use in all grades of fancy stationery, and in all of the various arts where the employment of paper having an ornamental finish is customary or desirable. It has for its object to simplify the processes of producing such paper as heretofore practiced, to lessen the cost of such production, to produce a better quality of paper, and to facilitate the reproduction in the body of the paper of any design or pattern the fancy of the user may dictate.

To these ends my invention consists in a new process of making embossed paper, which comprises the application to the web of moist paper at a point between the "couch-rolls" and the drying-rolls, at which time it is in condition to most readily receive and retain the impression of a textile fabric of vegetable, animal, or analogous fiber, having the pattern which it is desired to emboss upon the pulpy sheet.

My invention consists, further, in the special means devised by me for practicing this novel method, as hereinafter fully described, and particularly pointed out in the claims.

Heretofore, so far as I am aware, the embossed finish has, when a textile fabric of vegetable or animal fiber was used, invariably been imparted to paper in a completed state, and it is usually done by engraving the design or pattern upon one of the calender-rolls, so that the paper receives the impression as it passes through the calenders. It has also been proposed to emboss paper (but not, that I am aware, before it was dried and the fiber set) by means of a textile fabric artificially hardened, as by the application of shellac; but I do not know that this latter method has been successful in practice. I am also aware that it has been proposed to emboss the moist undried paper by an engraved metallic roll, and I do not wish my claims to be understood as extending, broadly, to the embossing of the moist undried paper by whatever means.

Embossing by an engraved roll, while it secures fairly good results, is open to serious objections, in that the expense of producing the design upon the metallic roll is very considerable. It necessitates passing the paper through the calenders—an operation additional to and distinct from its manufacture—at an increased cost of time and labor, and the paper thus treated is more or less brittle and unserviceable, owing to the crushing and rupturing of the fiber by the sharp unyielding surface of the metallic die, particularly when the paper is of light weight. These objections are necessarily true of any mode of imparting an embossed ornamentation to paper after it has passed through the last stage of its manufacture—to wit, the drying process—for its fiber is then set, and every line impressed in its surface displaces the fiber, and to that extent weakens the paper. I have discovered that these objections can be obviated and a beautiful finish imparted to paper without detracting from its tensile strength, at the same time avoiding the expense and other objections attending the use of an engraved metallic roll by applying fabric of vegetable, animal, or analogous fiber to the web of paper in its semi-pulp condition before it reaches the drying-rolls. The paper at this stage of its manufacture is of such consistency that the particles thereof adjust themselves to the outlines of the design, so that the latter is literally worked into the body of the paper.

The important feature of my invention incident to working the design into the paper at this stage of its manufacture is the use of textile material as the medium through which to impart the design to the paper, thus dispensing with the expensive engraved rolls that must of necessity be used in embossing finished paper, while at the same time, by reason of the stage in the manufacture at which the fabric is applied, the paper then being pulpy, the design or pattern of the comparatively soft textile is nevertheless distinctly and permanently impressed upon the product. This use of a soft textile medium for conveying the impression enables me to select designs from the

almost endless variety of manufactured fabrics, and to change from one to another with great facility.

While it is immaterial to the broad idea embodied in my invention at what particular point within the limits I have mentioned the ornamenting apparatus is located, I have shown in the drawings what I believe to be the best application thereof to an ordinary paper-making machine.

In the drawings, Figure 1 is a side elevation of so much of a paper-making machine with my invention applied thereto as is necessary to a clear understanding thereof. Fig. 2 shows a slight modification of the manner of applying my invention to the same machine. Fig. 3 is an enlarged perspective view of the press-roll C in Fig. 1. Figs. 4, 5, and 6 show examples of the fabric employed in carrying out my invention.

The letters A B and C D indicate the two sets of press-rolls, and E F one of the pairs of drying-rolls, of an ordinary paper-making machine.

I have deemed it unnecessary to show the other parts of such machine, for the reason that, however much the various styles of machines differ in other respects, they are all substantially the same at this point, and also for the reason that my invention is confined to this part of the machine. It will be understood, therefore, by those skilled in the art that the web of pulp, after leaving the couch-rolls, (not shown,) passes, as indicated by the arrows in Fig. 1, directly to and between the first set of press-rolls, A B, thence to and between the second set of press-rolls, C D, and thence to the drying-rolls E F, which vary in number in different machines, and from which drying-rolls the web issues in the form of finished paper.

The couch-rolls press the bulk of the water from the web, and the two sets of press-rolls extract the greater part of what remains; but until it reaches the drying-rolls it retains its moist semi-pulp condition. At any point between the couch and drying rolls, therefore, the paper is of the proper consistency to have my invention successfully applied thereto; but I have found that the best results can be obtained by utilizing one of the second set of press-rolls for the purpose, as illustrated in the drawings. In thus carrying out my invention I secure to the periphery of the roller C a strip of fabric, L, (see Fig. 3,) having the figure which I desire to reproduce in the paper. The meeting edges of the strip should come together without overlapping, and in such a manner as to "match" the parts of the figure on each.

The fabric should embrace the roll with sufficient strain to prevent all puckering or wrinkling, and I have found that a convenient manner of securing this result is to put the fabric around the roll in a dry condition and unite its meeting edges by a line of stitches with strong thread, the shrinkage of the fabric, when wet by its contact with the paper, causing it to embrace the roll with sufficient force. If desired, the sides of the strip of fabric can also be anchored by loops of thread or twine extending therefrom at short intervals to collars of felt or other fabric placed upon the shaft of the roll at the ends thereof. The roll thus equipped is lowered into contact with roll D, and as the web of paper passes between them the weight of roll C causes the particles of the plastic mass to assume the outline of the pattern of the fabric, and the web passes on through the drying-rolls and issues therefrom in the form of finished paper, having a beautifully embossed surface.

In Fig. 2 I have shown another mode of applying the fabric to the paper, in which C′ D′ indicate two rolls, which may be one of the two sets of press-rolls shown in Fig. 1, or two additional rolls placed on the machine at some point between the couch and drying rolls. H indicates an endless belt, of felt or other suitable material, passing around roll C′ and stationary rollers K, suitably secured to the frame of the machine. The rollers K are so located with respect to roll C′ that the belt H is retained thereover under tension, and to the belt H is secured a strip of fabric, L, similar to the one shown in Fig. 3. This mode of mounting the strip of fabric secures the same result as the one first described; but, as it necessitates placing additional rollers on the machine, I prefer to utilize the regular press-roll, in the manner first described.

I am not limited in the fabric to be employed to any particular class or grade of fabrics; but to obtain the best results it should be either loosely woven or consist of open-worked figures—such, for instance, as I have shown in Figs. 4, 5, and 6.

The meeting edges of the strip may be reenforced by a cloth facing on the under side in the use of delicate fabrics, and if very delicate the meeting edges may overlap, care being taken to correctly match the figure.

From the above description it will be obvious that I not only have a vast field from which to select ready-made patterns, but that various combinations of such patterns can be readily arranged by placing strips of fabric containing them side by side upon the same roll, the figures of the different patterns being so blended as to obscure the lines of division between the strips. I am thus enabled by my invention to produce embossed paper of any desired pattern and to change the pattern at will at a cost which is trifling compared to the cost of its production by the engraved metallic rolls heretofore employed. Moreover, the paper made according to my invention is of a far better quality than that produced by the old process, as I have hereinbefore stated, owing to the difference between the action of the textile pattern upon the particles of the plastic web, as practiced under my invention,

and the action of the engraved metallic pattern upon the fiber of the finished paper, as heretofore practiced.

My invention is applicable alike to the production of the fancy grades of writing-papers now in general use and of embossed papers used in book-binding and the arts generally.

I do not wish to limit myself to the use of textile fabrics alone as the medium for transmitting the design, inasmuch as other fabrics—such as leather and soft rubber—could be successfully employed within the scope of my invention, in which case, however, the pattern would have to be first impressed within the surface of such fabric.

I claim—

1. The method of making embossed paper, consisting in impressing fabric having a raised ornamentation upon its surface within the surface of the web of pulp after the latter has been subjected to sufficient pressure to remove the bulk of the water therefrom and before it is subjected to heat, substantially as described.

2. The method of making embossed paper, consisting in impressing a relatively soft, flexible, and figured material within the surface of the web of pulp after the latter has been subjected to sufficient pressure to compact the same and remove a part of the water and before it is dried and set, whereby injury to the fiber of the paper is avoided, substantially as described.

3. In a machine for making paper, the combination, with the couch, press, and drying rolls, of an endless strip of fabric having an ornamental design upon its surface, and means located between said couch and drying rolls for supporting said strip of fabric in such manner as to continuously impress a portion of its ornamented surface within the surface of the web of pulp as it passes through the machine, substantially in the manner and for the purpose set forth.

JOHN E. TAYLOR.

Witnesses:
W. H. CHAPMAN,
J. E. CHAPMAN.