





# UNITED STATES PATENT OFFICE.

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## PROCESS OF PRODUCING PAPER FOR LITHOGRAPHIC PRINTS.

No. 816,497.

Specification of Letters Patent.

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*To all whom it may concern:*

Be it known that I, LEWIS W. NOYES, a citizen of the United States of America, and a resident of Mechanicsville, in the county of Saratoga, State of New York, have invented certain new and useful Improvements in Processes of Producing Paper for Lithographic Prints, of which the following is a specification.

10 This invention has reference to a novel process of coating paper and like materials with enamel.

It consists in a process of sizing the web of paper, drying same, and then coating it during one operation. The sizing may be applied on one or both sides of the web, as desired. The coating-enamel may also be applied on one or both sides. This combined process of sizing, drying, and coating the paper in one operation produces a stiffer, snappier, and more stocky sheet, which is particularly desirable for lithographic work. The sizing acts as a binder on the paper and reduces to the minimum the tendency of same to stretch when used for lithographic work. The importance of this feature cannot be overestimated, as it means a more perfect register in the press, and consequently a more perfect result is attained in lithographic work. The sizing also fills the pores of the paper and acts as a foundation for the coating of enamel, producing a more homogeneous surface for the latter. The preliminary sizing of the paper prevents the sizing material contained in the enamel from entering the interior portions of the web, whereby a saving in the sizing material used in the enamel is effected. The preliminary or auxiliary sizing assists in fastening the enameled coating to the paper and counteracts the tendency of the coating to come off on the plate or stone when a strong ink is used. Hereby a coated paper is produced which withstands any ink and does not necessitate the pressman to adapt his inks to conform to the tenderness of the enameled stock. Thus he is enabled to produce a higher effect and when desired a greater contrast in the lights and depths of shade. By applying the sizing material on both sides of the web before it is coated the paper is less susceptible to the effects of moisture, which is a decided advantage.

Paper sized and coated according to my

novel process will finish higher, as the finishing quality of the coating material will not in the slightest degree be absorbed by the web of paper, the coating-enamel remaining on the surface. Consequently when calendering the web the maximum finish will be obtained. The filling of the pores of the paper with preliminary or auxiliary sizing enables the manufacturer to reduce the quantity of coating-enamel to be spread on the surface of the web and at the same time with the reduced quantity of enamel used a paper is produced with a perfect surface for lithographic or fine tone printing. Furthermore, the reduction in the quantity of enamel used for covering the surface of the web also reduces to a great extent the liability of the surface to lift or pick. In addition thereto the folding quality of the sheet is improved. The sizing of the web of paper before the enamel is applied materially reduces the tendency of the web to curl on the edges. This was a prolific source of waste in the coating of light-weight stock.

In this process any composition for sizing well known to the art may be employed. These usually consist of an aqueous solution of glue or starch, in which may be suspended some filling material—such as clay, sulfate of lime, sulfate of barium, precipitated chalk or magnesia, or other suitable substance. Likewise any well-known composition for enamel may be used for coating the paper on one or both sides. Such compositions preferably contain casein, a material for cutting the casein, such as borax, and clay or sulfate of barium. In order to give the paper the desired finish, a slight quantity of spermaceti, yellow wax, or paraffin is added.

I am aware of the fact that heretofore paper has been produced with a paraffin or wax coating for wrapping up sugared fruits, candies, and the like. In the process of making such paraffin-paper the raw material was sized by glue, which was fixed by formaldehyde, the paper was then dried and conveyed through a paraffin-bath and dried again. It is obvious that this process produced a paraffin-paper which cannot be used for lithographic prints and constitutes a commercial article which may be readily distinguished in the market from the article produced by my novel process—that is, a paper having a sur-



face coating of enamel whereby same is adapted for lithographic print.

A machine by means of which my improved process may be carried out is diagrammatically illustrated in the accompanying drawings, in which—

Figure 1 represents, partly in section, a machine for sizing and coating the paper on one side. Fig. 2 shows in section a sizing-tub permitting of sizing the paper on both sides, and Fig. 3 represents in section a device by means of which the paper is coated on both sides.

Similar letters of reference denote like parts in all the figures.

In Fig. 1, *a* represents the web of paper, which runs over the guiding-roller *b* into the sizing-tub *c*. In the sizing-tub there is mounted a large roller *d*, located partly within the liquid, around which the web of paper passes. Two small rollers *b'* are mounted in the top portion of the tub, so arranged that the web reaches the roller *d* above the liquid. Its inner surface therefore is pressed close onto the roller *d* above the liquid, and consequently is not coated. Only the outside surface will be coated in this instance.

For applying sizing to both sides the arrangement illustrated in Fig. 2 is employed. The web here passes over the guiding-rollers. Between and below same there is the roller *d*, which is completely immersed in the sizing liquid. The web before reaching the roller *d* becomes wet on both sides, and when leaving said roller both sides again become wet.

When leaving the sizing-tub, the web passes through a pair of adjustable squeezing-rollers *e e* and then passes onto an endless apron of canvas *f*, which runs over a number of guiding-rollers *g*. Then the web passes over a drum *h*, a guiding-roller *i*, guiding-rollers *i'* onto the coating apparatus. The apron of canvas passes over rollers *f'* in the front, whereby it is made endless. A stretching device *f<sup>2</sup>* is provided, as shown in Fig. 1.

Around the endless apron I have arranged a blower *j*, which is provided with air-outlets *j'*. These extend across the whole width of the machine, so that the passing web after having been sized is dried here. The dry web passes onto the coating apparatus, which is arranged in Fig. 1 to coat paper on one side only. The web then passes over the large roller *k*. Below there is a coating-brush *l* in contact with a coating-roller *m* in the tub *n*, which contains the coating-enamel. The paper thus coated on one side passes the roller *o*, the dancing-brush *p*, the adjustable brushes *q*, the guiding-roller *r*, and onto a drier. (Not shown in the drawings.) After being dried here the web is rolled up into rolls of any desired size.

When it is desired to coat the paper on both sides, then the device illustrated in Fig.

3 is used. The web runs through a coating-tub *n'*, provided with two fine brushes *s*. As shown, it enters on the side of the tub and passes freely through the coating-enamel. When leaving the tub *n'*, the web passes through the adjustable squeezing-rollers *e'* and between sets of brushes and rollers alternately arranged, as shown in Fig. 3. The first set has a cylindrical brush *t* above the web and a roller *u* beneath same. The next set has a roller *u* above the web and a cylindrical brush *t* beneath same. Then the web passes sets of brushes and rollers alternately arranged, as shown. One set has a brush *v* on top and a roller *u* at the bottom, while the next set has a roller *u* on top and a brush *v* at the bottom. Then the web passes between the sets of brushes *v*. Now the web passes between sets of rollers consisting of large rollers *w* and small rollers *w'*. Between the last-named sets of rollers there are arranged on top and bottom hot-air blowers *y*, which dry the web from both sides. These blowers have longitudinal slots near the web, so that the hot air acts effectively on same from both sides. The blowers *y*, as well as all the rollers and brushes, naturally extend across the whole width of the machine.

The web of paper when coated on both sides, as above described and as shown in Fig. 3, has already passed through the sizing device and the blower. (Illustrated in Fig. 1.) If the web is to be coated on both sides, then same is not run through the coating devices shown in Fig. 1, but is passed through the device shown in Fig. 3. Thus I am able to size and coat paper by my improved process on one side only, or the paper may be sized on both sides and coated on one side only, or the paper may be sized on one side and coated on both sides, or it may be sized and coated on both sides. When the web of paper is sized on both sides, then it is run through a drying device similar to the one shown in Fig. 3 instead of being run through the drying device shown in Fig. 1.

Thus I am able to produce a more perfect coated paper by virtue of my improved process of sizing and coating paper during one continuous operation.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The process of coating paper to produce a surface for lithographic prints consisting in first sizing the web to fill the pores and provide a homogeneous surface, removing the excess of sizing solution, drying the web, then applying an enamel coating composed essentially of casein which fastens to the sizing and web, and finally drying the web after the application of the enamel coating, said several steps being successively performed in one continuous operation.



2. The process of coating paper to produce  
a surface for lithographic prints consisting in  
first applying a preliminary sizing to the web  
to fill the pores and provide a homogeneous  
5 surface, squeezing out the excess of sizing  
solution, then drying the web, next convey-  
ing it through a solution of coating-enamel  
containing as an essential ingredient casein,

and finally drying the coating-web by means  
of hot air.

Signed at New York, N. Y., this 2d day of  
February, 1904.

LEWIS W. NOYES.

Witnesses:

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