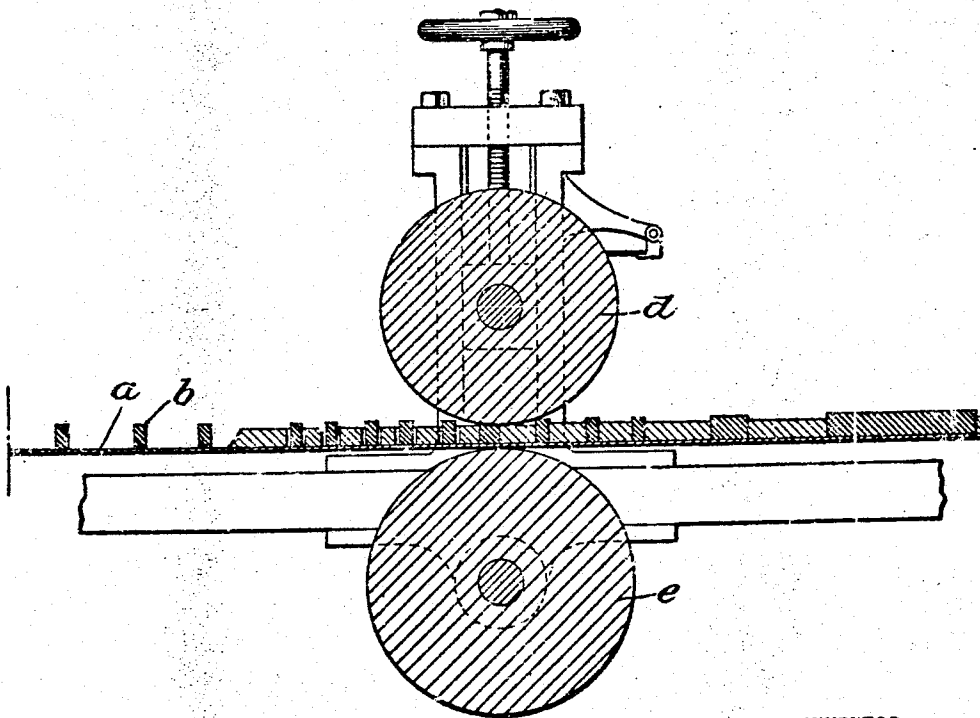
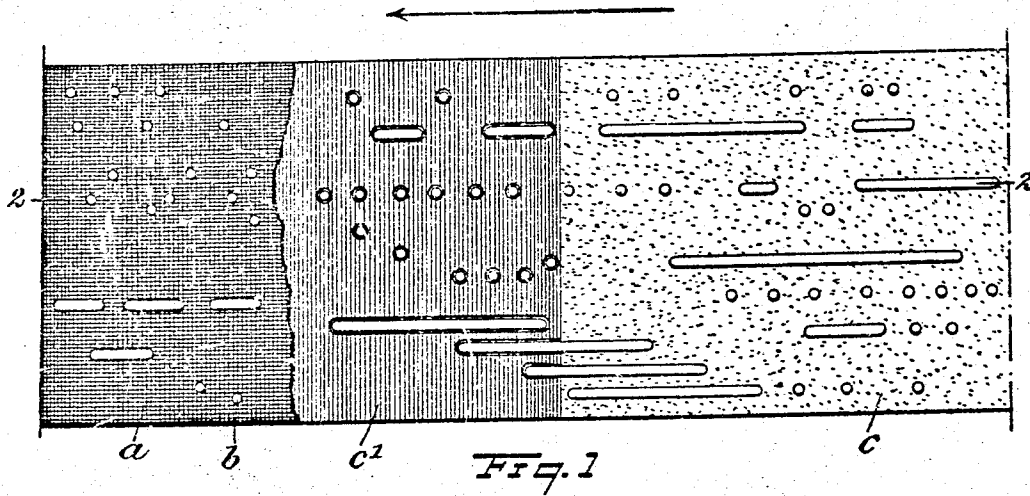


No. 795,719.

PATENTED JULY 25, 1905.

F. J. MOTZ.
ART OF MAKING PERFORATED PAPER.
APPLICATION FILED DEC. 14, 1903.



WITNESSES:

John Berghman
Isaac B. Owens

Fig. 2

INVENTOR
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BY *Mum*
ATTORNEYS

UNITED STATES PATENT OFFICE.

FREDERICK J. MOTZ, OF NEW YORK, N. Y.

ART OF MAKING PERFORATED PAPER.

No. 795,719.

Specification of Letters Patent.

Patented July 25, 1905.

Application filed December 14, 1903. Serial No 185,075.

To all whom it may concern:

Be it known that I, FREDERICK J. MOTZ, a citizen of the United States, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented new and useful Improvements in the Art of and Machine for Making Perforated Paper, of which the following is a full, clear, and exact description.

This invention relates to a new method of making perforated paper. It is particularly intended to produce the perforated sheets used in musical instruments; but it is useful in other connections. Heretofore these perforations have been made by cutting or punching them in the paper, which involves a loss of paper, an extra expenditure of time and labor, and also materially weakens the sheets.

My invention comprehends forming openings in the paper stock while the same is yet in pulp-like form, and subsequently the stock thus orificed is converted into paper, producing the perforated sheet referred to. In connection with this improvement it will be observed that the perforations are formed during the very formation of the paper and without any additional expenditure of time or labor, and there is an actual saving rather than a waste of stock, and further and quite as important is the fact that by this process the fibers of the pulp adapt themselves to a large extent to the form of the perforations and assume positions lengthwise of the edges of the perforations, thus greatly increasing the strength of the perforated paper as compared with that of the paper which is cut or stamped to produce the perforations.

The invention also relates to a machine for carrying out my improvement in the art. This machine may be of various of the known types of paper-making machines—for instance, the Fourdrinier machine or a cylinder-machine. I prefer, however, to adopt a Fourdrinier machine, and in doing this the wire is provided with a number of protuberances around which the plastic paper-pulp is spread, so that when the pulp is couched the perforations are retained and made permanent as the paper-making operation is completed. In order to facilitate the removal of the pulp from the wire, the protuberances are made elastic, and at a certain point along the path of the wire these protuberances are expanded and then allowed to retract, thus separating their walls from the pulp and allowing the pulp to be easily removed from the wire.

I will now give as an example of my invention a specific description of one embodiment of the machine and one manner of practicing the art.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in both views.

Figure 1 is a plan view showing a Fourdrinier wire equipped for carrying out my process and illustrating the pulp spread thereon; and Fig. 2 is a vertical section of the same, this view also illustrating the compressing-rolls, the function of which will hereinafter appear.

My improvement may be practiced with the aid of paper-making apparatus of various sorts. In the drawings I have shown part of a Fourdrinier machine modified according to my invention. To do this, the Fourdrinier wire *a* has a number of protuberances *b*, carried on its upper or active face and arranged according to the order or pattern which it is desired that the perforated paper shall take. These protuberances *b* will vary in shape according to the shape of the orifices to be produced, and they are preferably formed of soft rubber suitably fastened to the wire. The paper stock or pulp is spread over the wire, as indicated at *c* in Fig. 1, the pulp lying around the protuberances *b* and said protuberances forming in the pulp-orifices corresponding in size and arrangement to the protuberances. The pulp is then carried by the wire on through the other operations of the Fourdrinier machine, and the pulp is thereby converted into paper in which the orifices formed by the protuberances *b* are faithfully retained. It will also be observed that as the pulp is advanced on the wire the agitation of the pulp, due to the characteristic movement of the wire, causes the fibers of the pulp to settle around the protuberances and to assume positions lengthwise of the side walls of the protuberances, and consequently of the orifices formed thereby, thus greatly increasing the strength of the perforated paper as compared with that of the paper which is cut or stamped to produce the perforations. In order to enable the pulp to be readily removed from the wire and disengaged from the protuberances *b* thereof, I construct the protuberances of soft rubber, as explained, or some other yielding material, and at a point on the frame of the Fourdrinier machine intermediate the last suction-

box and the couch-roll I locate two rollers *e* and *e'*. These rollers are suitably mounted on the Fourdrinier frame, so that the wire *a*, with the pulp, passes between the rollers, and by proper adjustment of the rollers the elastic protuberances *b* will be compressed, thus increasing their thickness, and thereby widening out the perforations in the stock formed by the protuberances. This upon the retraction of the protuberances detaches the stock from the side walls of the protuberances and prevents the pulp from adhering to the protuberances when the pulp is taken from the wire. Fig. 1 shows at the point *c'* the pulp in the position it assumes when first placed on the screen, and the shaded portion *c'* shows the condition of the pulp after having passed between the rollers whereat the protuberances are spread out, so as to enlarge the perforations and separate their walls from the sides of the protuberances.

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

1. The improvement in the art of producing perforated paper, which consists in the following successive acts, to wit, first, in disposing plastic paper pulp or stock around a protuberance in a sheet the thickness of which is not more than equal to that of the protuberance to form an opening through the pulp, and, second, in separating the pulp from the protuberance and converting the pulp into paper without closing the opening formed by said protuberance.

2. The improvement in the art of producing perforated paper, which consists in the following successive acts, to wit, first, in disposing plastic paper stock or pulp around a protuberance to form an opening in the pulp, second, in enlarging said protuberance and permitting it to retract, to detach its sides from the adjacent pulp, and, third, in separating the pulp from the protuberance and converting the pulp into paper without closing the opening formed by said protuberance.

3. The improvement in the art of producing perforated paper, which consists in the following successive acts, to wit, first, in disposing plastic paper stock or pulp around a protuberance in a sheet the thickness of which is not more than equal to that of the protuberance to form an opening through the pulp, second, in agitating the pulp to cause the fibers to range lengthwise alongside of the protuberance, and, third, in separating the pulp from the protuberance and converting the pulp into paper without closing the opening formed by the protuberance.

4. A machine for making paper, having a pulp-carrying part with a series of protuberances on the pulp-engaging surface thereof, said protuberances being broken or spaced from each other longitudinally and transversely of said pulp-carrying part, for the purpose specified.

5. A machine for making perforated paper having a movable pulp-carrying part, with an elastic protuberance on the surface thereof for the purpose specified.

6. A machine for making perforated paper having a movable pulp-carrying part, with an elastic protuberance on the surface thereof for the purpose specified, and means for expanding said protuberance at a certain point along the path of movement of said paper-carrying part.

7. A machine for making perforated paper having a pulp-carrying part, with an expansible protuberance on the surface thereof for the purpose specified.

8. A machine for making perforated paper having a pulp-carrying part, with an expansible protuberance on the surface thereof for the purpose specified, and means for periodically expanding said protuberance.

9. A machine for making paper having a Fourdrinier wire, with a series of protuberances on the pulp-engaging surface thereof, said protuberances being broken or spaced from each other longitudinally and transversely of the wire for the purpose specified.

10. A machine for making perforated paper having a Fourdrinier wire, with an expansible protuberance on the paper-carrying surface thereof for the purpose specified.

11. A machine for making perforated paper having a Fourdrinier wire, with an expansible protuberance on the paper-carrying surface thereof for the purpose specified and means for periodically expanding said protuberance.

12. A machine for making perforated paper having a Fourdrinier wire, with an elastic protuberance on the pulp-engaging surface thereof, and a pair of rollers through which said wire runs, the rollers serving to expand the elastic protuberance when engaged therewith.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FREDERICK J. MOTZ.

Witnesses:

ISAAC B. OWENS,
JNO. M. RITTER.