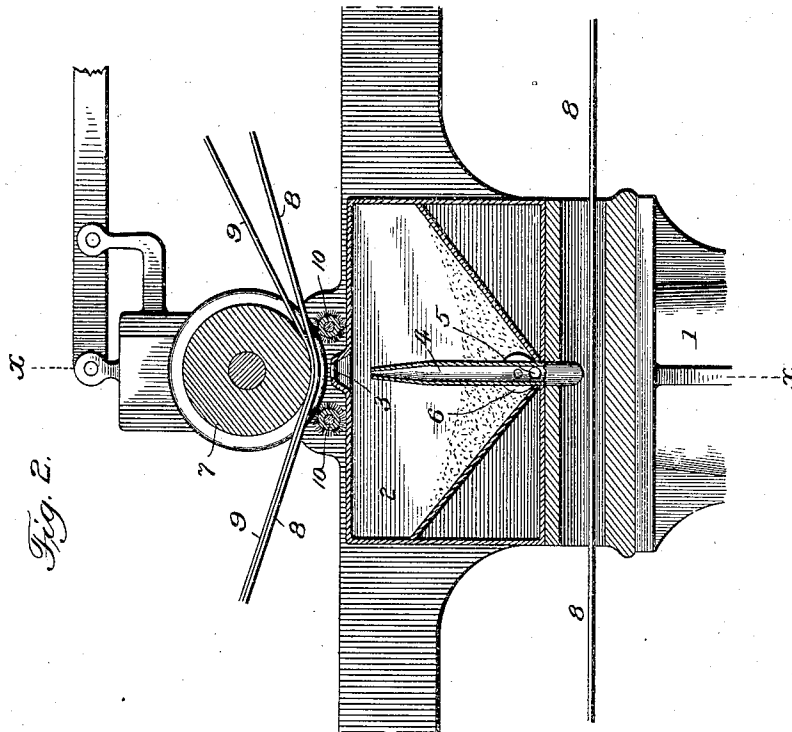
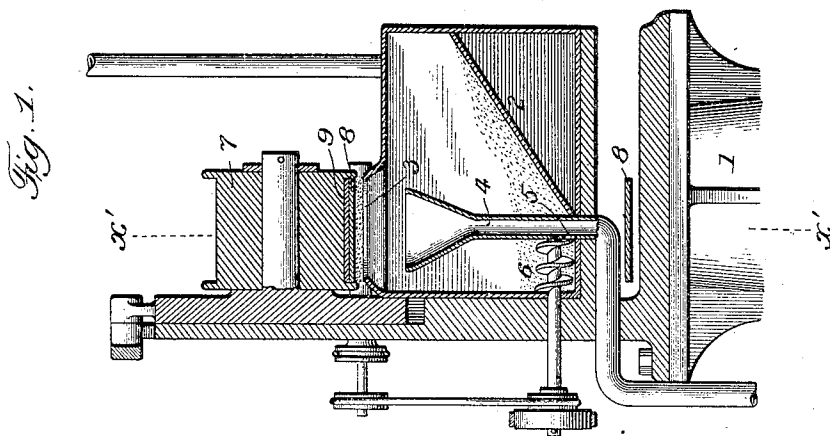


No. 767,362.

PATENTED AUG. 9, 1904.

E. C. PHILLIPS.
PROCESS OF PERFORATING MUSIC SHEETS.
APPLICATION FILED JULY 8, 1901.

NO MODEL



Attest:
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UNITED STATES PATENT OFFICE.

ELWOOD C. PHILLIPS, OF CHICAGO, ILLINOIS, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO MARTIN TULLGREN AND CLEMENT K. PITTMAN, OF CHICAGO, ILLINOIS.

PROCESS OF PERFORATING MUSIC-SHEETS.

SPECIFICATION forming part of Letters Patent No. 767,362, dated August 9, 1904.

Application filed July 8, 1901. Serial No. 67,402. (No model.)

To all whom it may concern:

Be it known that I, ELWOOD C. PHILLIPS, a citizen of the United States of America, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Processes of Perforating Music-Sheets, of which the following is a specification.

The present invention relates to a process of perforating sheets or webs for mechanical musical instruments and other mechanisms and instruments of a kindred type.

The object of the present improvement is to provide a simple, rapid, and economical process of manufacturing perforated sheets or webs for mechanically or automatically operated musical and other like instruments and mechanisms and with which a very accurate and perfect puncturing of the sheet is effected, all as will hereinafter more fully appear, and be more particularly pointed out in the claims.

In the accompanying drawings, illustrative of an apparatus for carrying on the present improved process, Figure 1 is a transverse sectional elevation at line *x x*, Fig. 2; and Fig. 2, a longitudinal sectional elevation at line *x' x'*, Fig. 1.

Similar numerals of reference indicate like parts in both views of the drawings.

The present improved process of manufacturing perforated sheets or webs for mechanical musical instruments consists in cutting away the material of the said web or sheet to form the perforations by means of a sand-blast directed against such sheet or web, a pattern screen or web being interposed to protect the portions of such first-mentioned sheet or web other than where such perforations are to be formed.

In the apparatus illustrated in the drawings as adapted to carry on the present improved process, 1 represents the main supporting frame or standard, and 2 the sand-box, having an inclined bottom, as shown, and provided at top with a laterally-elongated sand-blast orifice 3 for the passage of the blast of sand employed in the present process upward against the perforated pattern-web and

against the blank sheet of paper screened thereby to effect the desired perforation of such blank sheet or web.

4 is an air-blast nozzle arranged centrally in the sand-box and provided with a lateral opening 5 at a point immediately above the bottom of such sand-box for the entrance of the sand to form the sand-blast of the present process.

6 is an endless screw for feeding the sand to and through the opening 5 into the path of the passing air-blast.

7 is an impact drum or roller, preferably of india-rubber or other like elastic material, having a central relation above the sand-blast orifice 3 of the sand-box. Said drum is preferably formed with marginal flanges, as shown, so as to maintain the webs, hereinafter described, against lateral displacement.

8 is the pattern web or band, formed of any usual and suitable elastic material, such as india-rubber, and suitably perforated in accordance with the musical air, &c., it is intended to reproduce.

9 is the blank sheet or web of paper or other like material adapted to undergo the perforating operation of the present invention to produce a music or other like sheet.

In the practical operation of the apparatus illustrated in the drawings the sheet of paper 9 will bear directly upon the impact-drum 7, while the pattern sheet or web 8 will lie directly against said sheet 9 and between the same and the sand-blast orifices 3. Suitable means (not shown) may be provided to draw the two webs in unison past the sand-blast orifices either in a continuous manner or intermittant manner, as the judgment of the constructor may suggest.

The provision of an impact or abutment drum in the present process is very material to the success of the perforating operation in that it affords means whereby the impact action of the sand-blast is rendered uniform over the entire area of the opening or openings to be formed in the music-sheet. Without such provision the loose abrasive material would blow through an opening as soon as the

same was partially formed, and as a consequence the impact action of such abrasive material would cease to be uniform, and an imperfect final perforation of the sheet would accordingly be the result.

10 represents a pair of counterpart revolving brushes arranged at opposite sides of the sand-blast opening 3 and adapted to contact with the endless pattern sheet or web 8 to brush away any particles of sand, &c., which may adhere to the same.

No claim is made in the present application to the mechanism shown nor to the perforated sheet or article produced, as the same constitutes the subject-matter of companion applications for Letters Patent, Serial Nos. 67,401 and 67,403, filed July 8, 1901.

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

1. The herein-described method of perforating pliable sheets, such as paper, consisting in arranging the sheet between a pattern-web and a hard backing or abutment, and applying a sand-blast to the portions of such sheet exposed by the apertures of the pattern-web until the substance of such exposed por-

tions has been entirely removed, substantially as set forth.

2. The herein-described method of perforating pliable sheets of paper and the like, consisting in covering the sheet with a pattern-web and backing it with a hard abutment, and directing a sand-blast against the portions of the sheet exposed by the pattern-web, the intensity of the blast and the speed of movement of the material being so related that the substance of the portions of the sheet acted upon is entirely removed, substantially as set forth.

3. The herein-described method of perforating pliable sheets of paper and the like, consisting in masking the portions of the sheet which is to remain imperforate, and entirely removing the other portions of the sheet to form openings through the same by an impact of loose abrasive material, the impact of such abrasive material being rendered uniform during the operation, substantially as set forth.

Signed at Chicago, Illinois, this 27th day of June, 1901.

ELWOOD C. PHILLIPS.

Witnesses:

ROBERT BURNS,
HENRY A. NOTT.