No. 767,363. PATENTED AUG. 9, 1904.

E. C. PHILLIPS.

APPARATUS FOR PERFORATING MUSIC SHEETS.

APPLICATION FILED JULY 8, 1901. RENEWED AUG. 4, 1902.

NO MODEL. 3 SHEETS—SHEET 1.

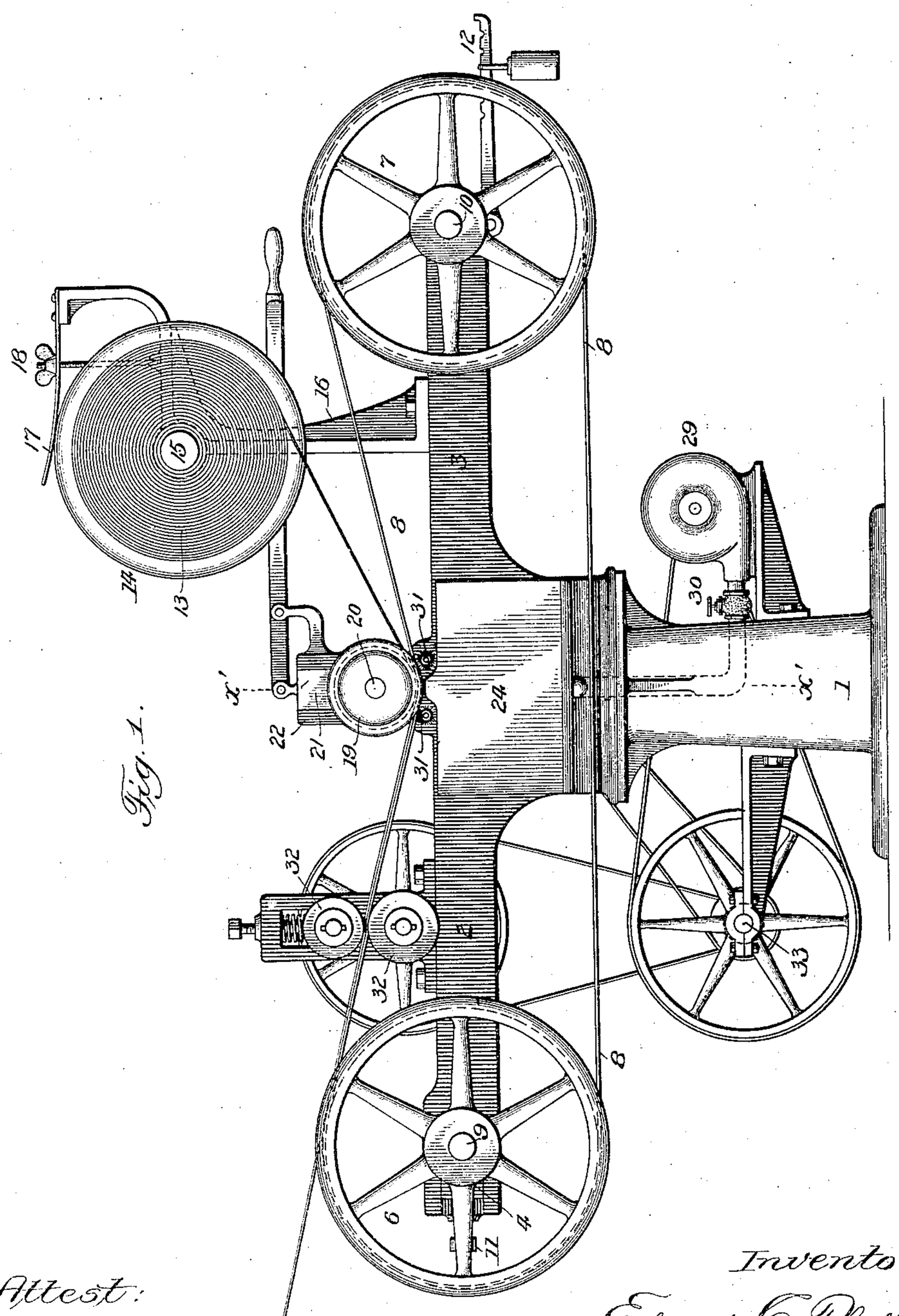

Fig. 1.

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NO MODEL. 3 SHEETS—SHEET 2.

Fig. 2.

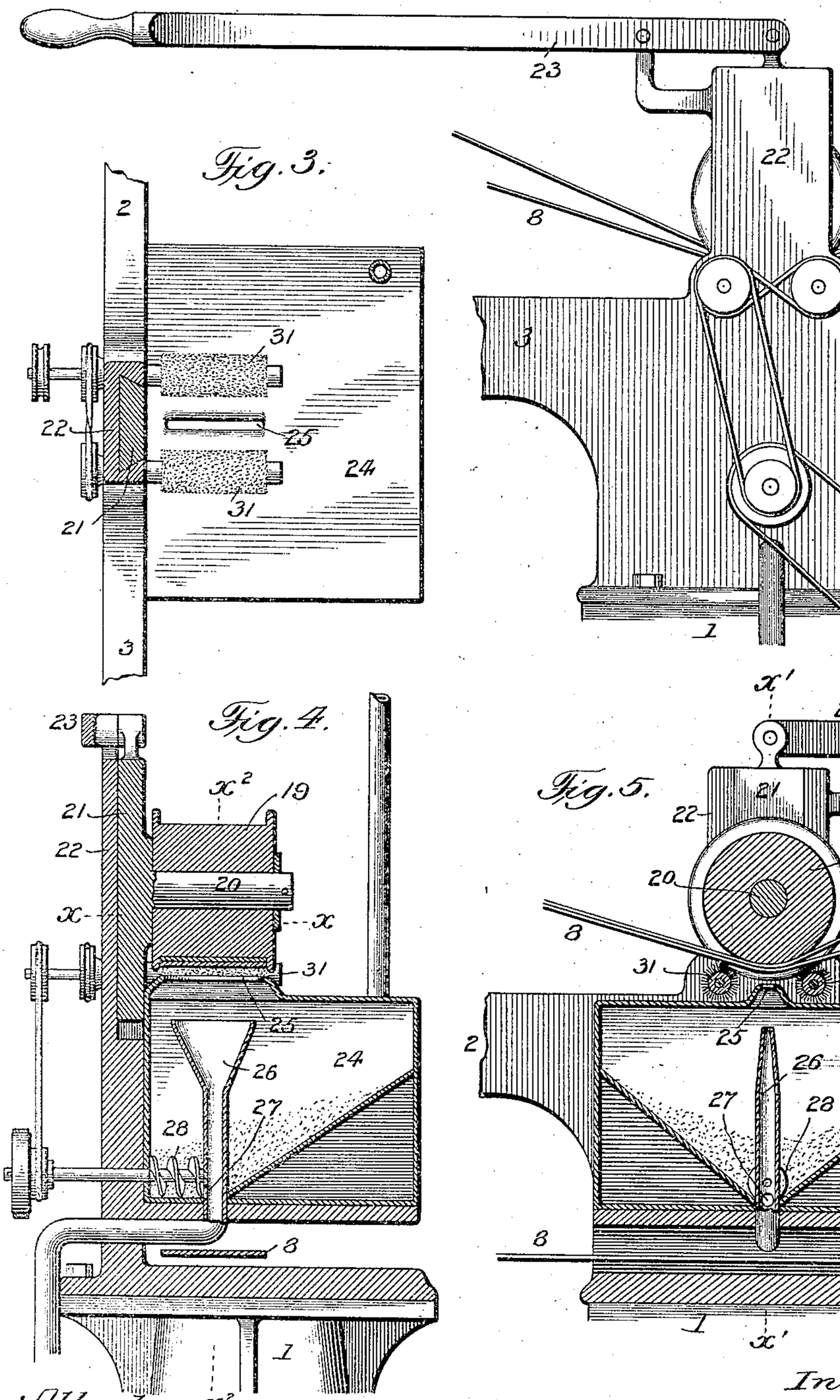

Fig. 3.

Fig. 4.

Fig. 5.

Attest: x²

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NO MODEL. 3 SHEETS—SHEET 3.

Fig. 6.

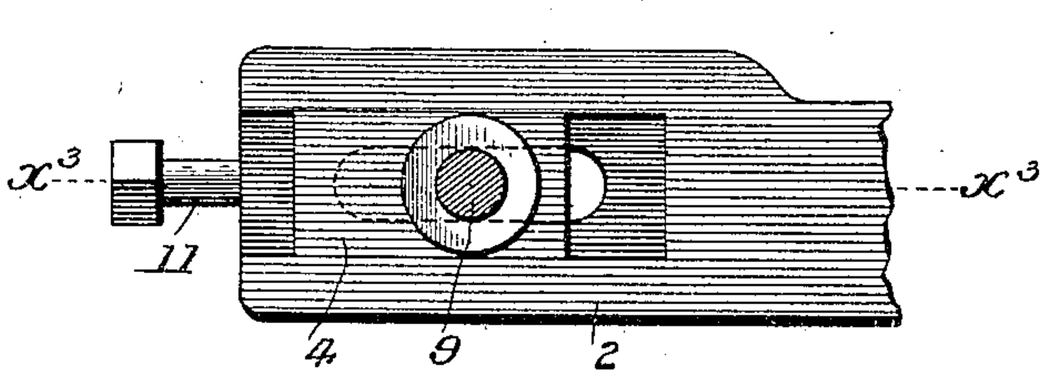


Fig. 8.

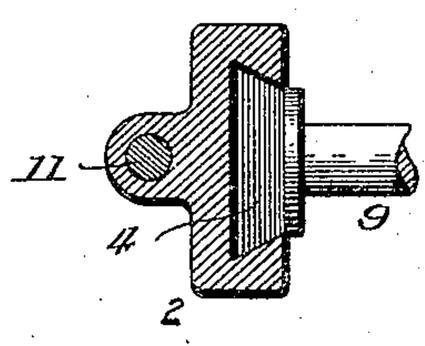


Fig. 7.

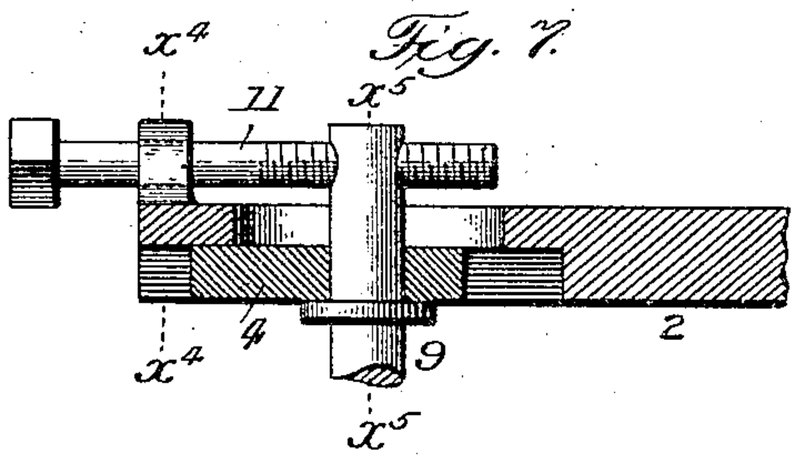


Fig. 9.

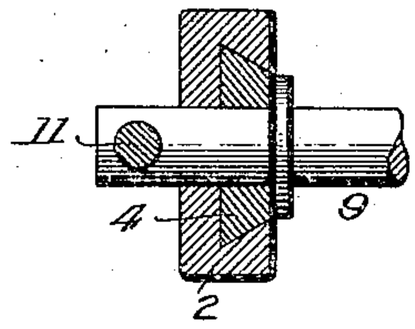


Fig. 10.

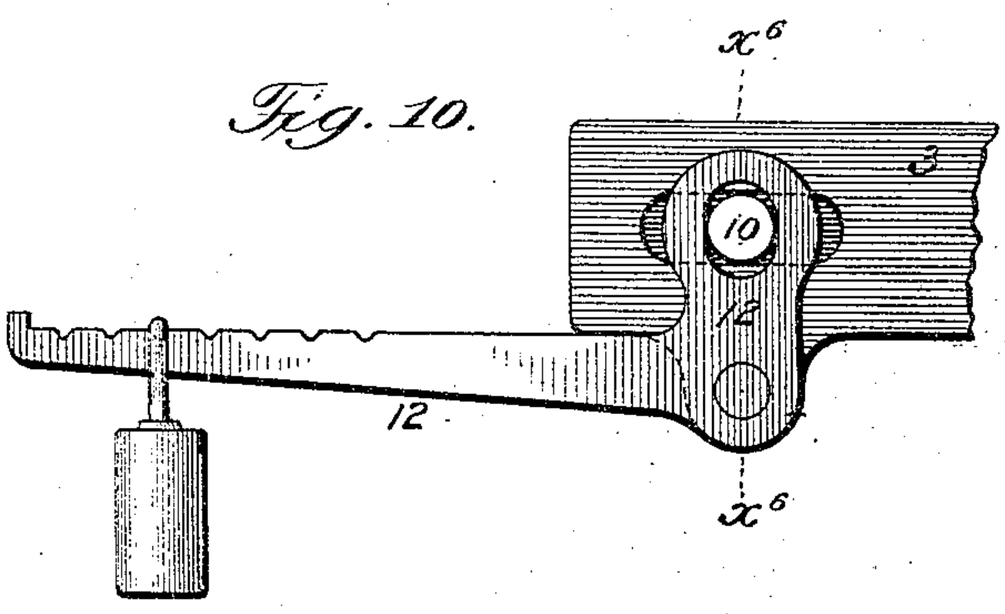


Fig. 11.

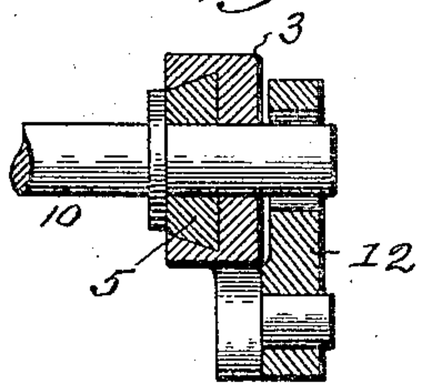
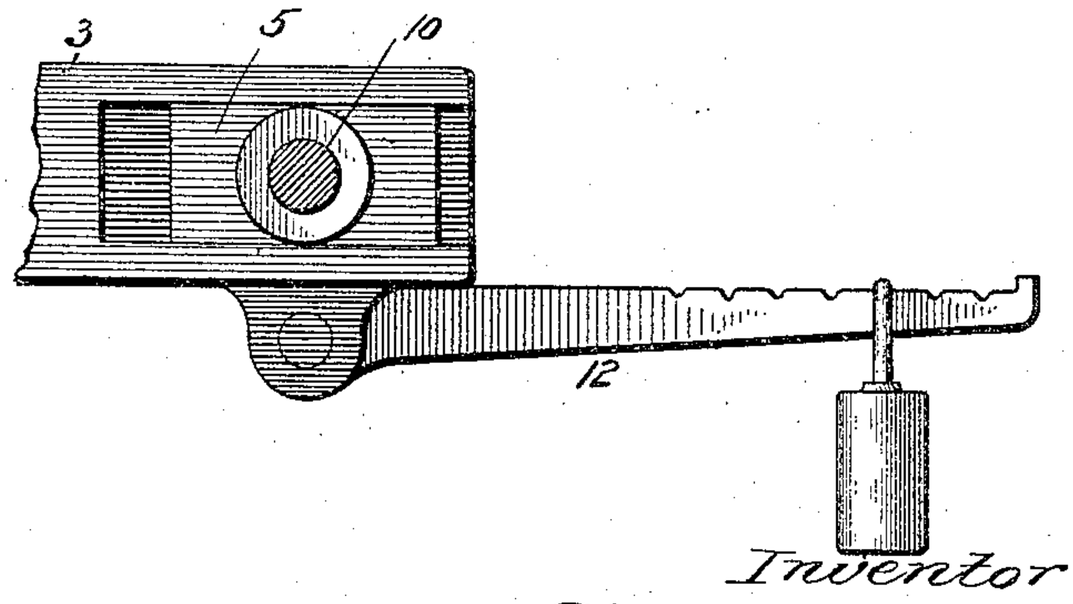


Fig. 12.



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No. 767,363. Patented August 9, 1904.

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.

APPARATUS FOR PERFORATING MUSIC-SHEETS.

SPECIFICATION forming part of Letters Patent No. 767,363, dated August 9, 1904.

Application filed July 8, 1901. Renewed August 4, 1902. Serial No. 118,349. (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 Apparatus for Perforating Music-Sheets, of which the following is a specification.

The present invention relates to an apparatus for perforating webs or sheets of paper or like material for use in automatic musical or other like instruments or mechanisms.

The object of the present improvement is to provide a simple, durable, and efficient apparatus in which an automatic and substantially continuous operation is attained and with which a very perfect perforation of the music or other sheet or web is produced, all as will hereinafter more fully appear and be more particularly pointed out in the claims. I attain such object by the construction and arrangement of parts illustrated in the accompanying drawings, in which—

Figure 1 is a front elevation of an apparatus embodying the present improvements; Fig. 2, an enlarged detail rear elevation of the central portion of the apparatus; Fig. 3, an enlarged horizontal plan view of the same with parts in section at line $x\ x$, Fig. 4; Fig. 4, an enlarged transverse sectional elevation of the same at line $x'\ x'$, Figs. 1 and 5; Fig. 5, an enlarged longitudinal sectional elevation at line $x^2\ x^2$, Fig. 4; Fig. 6, an enlarged fragmentary elevation with parts in section, illustrating the adjustment for one of the carrying-drums of the endless pattern sheet or web of the present invention; Fig. 7, an enlarged fragmentary horizontal section of the same at line $x^3\ x^3$, Fig. 6; Fig. 8, an enlarged transverse section of the same at line $x^4\ x^4$, Fig. 7; Fig. 9, a similar section at line $x^5\ x^5$, Fig. 7; Fig. 10, an enlarged fragmentary elevation illustrating the tension adjustment for the companion carrying-drum of the endless pattern sheet or web of the present invention; Fig. 11, an enlarged transverse sectional elevation of the same at line $x^6\ x^6$, Fig. 10; Fig. 12, an enlarged fragmentary elevation, partly in section, of the reverse side of the mechanism illustrated in Fig. 10.

Similar numerals of reference indicate like parts in the several views.

Referring to the drawings, 1 represents the main support or pedestal, having longitudinally-extending brackets 2 and 3, at the outer ends of which are guideways for the movable or adjustable slides 4 and 5, upon which are the carrying-drums 6 and 7 for the endless pattern web or sheet 8 of the present invention.

The carrying-drums 6 and 7, having side or marginal flanges, so as to positively guide and retain the endless pattern-web in position, are supported in an overhanging manner at one side of the supporting-brackets 2 and 3 by fixed arbors 9 and 10, projecting outwardly from the carrying-slides 4 and 5, as illustrated in Figs. 1, 6, 7, 8, 9, 11, and 12.

The slides 4 and 5 have movement longitudinally upon the brackets 2 and 3 by the usual dovetail formation of the respective parts, as illustrated in Figs. 8, 9, and 11. Other well-known and equivalent means for connecting the parts in an adjustable manner may, however, be employed without departing from the spirit of this part of the present invention. In the present construction one of the drum-carrying slides will have a positive longitudinal adjustment imparted to it by means of an adjusting-screw 11 to take up an excess of slack in the endless pattern-web 9, while the other drum-carrying slide will have a constant outward tendency imparted to it by means of a weighted bell-crank lever 12, pivoted to the main supporting-frame, with its shorter vertical arm operatively engaging the drum-carrying slide, as illustrated in Figs. 10, 11, and 12.

The endless pattern band or web 9 will be formed of any usual and suitable elastic material, such as india-rubber, and will be perforated in accordance with the musical air, &c., and as so formed will be carried by the pair of carrying-drums 6 and 7, from which it can be readily removed and replaced in a lateral direction with a slight movement toward each other of the carrying-drums 6 and 7.

13 is a roll of paper or other like material

from which the musical sheet is to be produced and which in the present apparatus is carried on a supporting-reel 14, the carrying-arbor 15 of which projects laterally from a vertical bracket 16 on the main frame, the construction permitting of a ready removal and replacement of the reel in the continued operation of the apparatus.

17 is a spring friction brake or finger secured to the bracket 16 and bearing upon the rim of the reel 14 to retard the unwinding movement of the paper sheet or web from the reel 14.

18 is a tension-screw by which the tension of the spring brake or finger 17 is regulated to suit any particular requirement.

19 is an impact drum or roller, preferably of india-rubber or other like elastic material, having a central relation between the pair of carrying-drums 6 and 7 and carried by a laterally-projecting arbor 20 on a vertically-adjustable slide 21, which has movement in vertical guides 22 on the main frame.

23 is a hand-lever for effecting a vertical movement of the slide 21 and the impact-drum 19, carried thereby, in the operation of changing the webs of the apparatus and other like operations. Said impact-drum 19 is preferably formed with marginal flanges, as shown, and is adapted to bear directly upon the portion of the paper sheet or web that is undergoing the perforating process in the present apparatus and indirectly upon the upper stretch of the endless pattern sheet or web 9, between which and the impact-drum 19 the sheet or web of paper to be perforated is carried, as illustrated in Figs. 1, 4, and 5.

The provision of a revoluble abutment or drum 19 in the present apparatus is very material to the successful operation of the same in that it affords means whereby the operation is continuous in its action and, further, 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 sand or other 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 result.

24 is a sand box or chamber arranged immediately beneath the impact-drum 19 and in separated relation thereto to permit the passage of the before-mentioned webs or sheets. Such sand-box is formed with a hopper-shaped bottom and with a transversely-elongated opening 25 at top for the passage of the blast of sand employed in the present apparatus upward against the perforated pattern-web and against the blank sheet or web of paper screened thereby to effect the required perforation of such blank sheet or web.

26 is an air-blast jet or nozzle arranged centrally in the sand-box and provided with a lateral opening 27 at a point immediately above the bottom of such sand-box for the entrance of the sand-blast of the present apparatus.

28 is an endless screw for feeding the sand to and through the opening 27 into the path of the passing air-blast.

29 is a pressure-blower or other usual source of air-pressure adapted to supply the required blast of air to the air-blast jet or nozzle 26 and which pressure-blower will be provided with a regulating valve or damper 30 to regulate the force of the blast.

31 represents a pair of counterpart revolving brushes arranged at opposite sides of the transverse opening 25, heretofore described, and adapted to contact with the endless pattern-web 9 to brush away any particles of sand, &c., which may adhere to the same.

32 represents a pair of feed-rollers journaled in the main frame in manner hereinafter set forth and adapted to engage the pattern-sheet 9 and the paper sheet undergoing the perforating operation and impart a slow feed to the same past the sand-blast mechanism of the apparatus. In the construction shown in the drawings the upper feed-roller is held under spring tension toward the lower feed-roller, and the lower feed-roller is positively driven by belt-and-pulley connections with a main driving-shaft 33. Said driving-shaft 33 also has belt-and-pulley connections with the pressure-blower 29, and with the pair of revolving brushes 31 to attain a unison of movement in the various mechanisms of the present apparatus, as illustrated in Figs. 1, 2, 3, and 4 of the drawings.

The drum or roller 19 and the feed-rollers 32 are overhung—that is to say, they are journaled on arbors supported at one end only—so that the pattern band or web and the sheet to be operated upon may be readily inserted between them. This is especially important as to the pattern band or web, because the latter is endless, and such bands or webs will of course vary in length and must frequently be changed.

No claim is made in the present case to the described process or method of perforating music sheets or webs by the use of a sand-blast and a pattern-screen, as the same constitutes the subject-matter of a companion application for Letters Patent, Serial No. 67,402, filed July 8, 1901. In like manner no claim is made to the sheet or web of music so produced, as the same forms the subject-matter of another companion application for Letters Patent, Serial No. 67,401, filed July 8, 1901.

The operation of the present apparatus is as follows: With the endless pattern-web 8 in place upon the carrying-drums 6 and 7 and the required adjustment thereof effected, paper from the roll 13 having been previ-

ously inserted between the impact-drum 19 and the pattern-web 8 and between the pair of feed-rollers 32 32 in conjunction with said web, with the parts so positioned the driving-shaft 33 is set in motion and by its various connections to the different moving parts of the machine, as heretofore fully set forth, imparts a slow and continuous movement to the pattern-web 8 and accompanying sheet of paper to be perforated and a rapid movement to the sand-blast apparatus to impart the desired impact to the same.

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

1. In an apparatus for perforating pliable sheets of paper or the like, in combination, a sand-blast mechanism having a nozzle, an adjustable abutment opposite the nozzle for resisting the impact of the sand, a pattern web or screen, means for moving the pattern web or screen over the nozzle, and means for carrying the pliable sheet between the pattern web or screen and the abutment, substantially as set forth.

2. In an apparatus for perforating pliable sheets of paper or the like, in combination, means for projecting a sand-blast, means for guiding a pliable sheet or web past the sand-blast, an interposed pattern web or screen, and adjustable means alined with the sand-blast for compressing the sheet or web being operated on against the pattern web or screen, substantially as set forth.

3. In an apparatus for perforating pliable sheets of paper or the like, in combination, means for projecting a sand-blast, means for guiding a sheet or web past the sand-blast, an interposed pattern web or screen, and an adjustable abutment alined with the sand-blast for compressing the sheet or web being operated on against the pattern web or screen, substantially as set forth.

4. In an apparatus for perforating pliable sheets of paper or the like, in combination, means for projecting a sand-blast, means for guiding a sheet or web past the sand-blast, an interposed pattern web or screen, and an adjustable abutment alined with the sand-blast for compressing the sheet or web being operated on against the pattern web or screen, substantially as set forth.

5. In an apparatus for perforating sheets or webs for automatic musical instruments and the like, the combination of a sand-blast mechanism, means for feeding a blank sheet or web past the same, an interposed pattern web or screen having an endless form and moving with the blank sheet or web, a pair of carrying-drums for said endless web, a main frame, and laterally-overhanging arbors carried by said frame and constituting the journals for said drums, substantially as set forth.

6. In an apparatus for perforating sheets or webs for automatic musical instruments and the like, the combination of a sand-blast mechanism, means for feeding a blank sheet or web past the same, an interposed pattern web or screen having an endless form and moving with the blank sheet or web, a pair of carrying-drums for said endless web, a main frame, a pair of adjustable slides moving on the main frame, and laterally-overhanging arbors carried by said slides and constituting the journals for said drums, substantially as set forth.

7. In an apparatus for perforating sheets or webs for automatic musical instruments and the like, the combination of a sand-blast mechanism, means for feeding a blank sheet or web past the same, an interposed pattern web or screen having an endless form and moving with the blank sheet or web, a pair of carrying-drums for said endless web, a main frame, a pair of adjustable slides moving on the main frame, laterally-overhanging arbors carried by said slides and constituting the journals for said drums, and means for imparting longitudinal adjustment to said slides, substantially as set forth.

8. In an apparatus for perforating sheets or webs for automatic musical instruments and the like, the combination of a sand-blast mechanism, means for feeding a blank sheet or web past the same, an interposed pattern web or screen having an endless form and moving with the blank sheet or web, a pair of carrying-drums for said endless web, a main frame, laterally-overhanging arbors carried by said frame and constituting the journals for said drums, and means for tensioning said drums, the same comprising a weighted bell-crank lever pivoted on the main frame with its vertical arm in operative engagement with one of the drums, substantially as set forth.

9. In an apparatus for perforating sheets or webs for automatic musical instruments and the like, the combination of a sand-blast mechanism, an adjustable revoluble impact-drum alined with the sand-blast mechanism, means for feeding a blank sheet or web past the same, and an interposed pattern web or screen moving with the blank sheet or web, substantially as set forth.

10. In an apparatus for perforating sheets or webs for automatic musical instruments and the like, the combination of a sand-blast mechanism, an adjustable revoluble impact-drum alined with the sand-blast mechanism, means for feeding a blank sheet or web past the same, and an interposed pattern web or screen having an endless form and moving with the blank sheet or web substantially as set forth.

11. In an apparatus for perforating sheets or webs for automatic musical instruments and the like, the combination of a sand-blast mechanism, an adjustable revoluble impact-drum alined with the sand-blast mechanism, means for feeding a blank sheet or web past the same, an interposed pattern web or screen having an endless form and moving with the blank sheet

or web, and means for supporting said endless web, substantially as set forth.

12. In an apparatus for perforating sheets or webs for automatic musical instruments and the like, the combination of a sand-blast mechanism, a revoluble impact-drum alined with the sand-blast mechanism, means for feeding a blank sheet or web past the same, an interposed pattern web or screen having an endless form and moving with the blank sheet or web, a pair of carrying-drums for said endless web, a main frame, and laterally-overhanging arbors carried by said frame and constituting the journals for said drums, substantially as set forth.

13. In an apparatus for perforating sheets or webs for automatic musical instruments and the like, the combination of a sand-blast mechanism, a revoluble impact-drum alined with the sand-blast mechanism, means for feeding a blank sheet or web past the same, an interposed pattern web or screen having an endless form and moving with the blank sheet or web, a pair of carrying-drums for said endless web, a main frame, a pair of adjustable slides moving on the main frame, and laterally-overhanging arbors carried by said slides and constituting the journals for said drums, substantially as set forth.

14. In an apparatus for perforating sheets or webs for automatic musical instruments and the like, the combination of a sand-blast mechanism, a revoluble impact-drum alined with the sand-blast mechanism, means for feeding a blank sheet or web past the same, an interposed pattern web or screen having an endless form and moving with the blank sheet or web, a pair of carrying-drums for said endless web, a main frame, a pair of adjustable slides moving on the main frame, laterally-overhanging arbors carried by said slides and constituting the journals for said drums, and means for imparting longitudinal adjustment to said slides, substantially as set forth.

15. In an apparatus for perforating sheets or webs for automatic musical instruments and the like, the combination of a sand-blast mechanism, a revoluble impact-drum alined with the sand-blast mechanism, means for feeding a blank sheet or web past the same, an interposed pattern web or screen having an endless form and moving with the blank sheet or web, a pair of carrying-drums for said endless web, a main frame, laterally-overhanging arbors carried by said frame and constituting the journals for said drums, and means for tensioning said drums, the same comprising a weighted bell-crank lever pivoted on the main frame with its vertical arm in operative engagement with one of the drums, substantially as set forth.

16. In an apparatus for perforating sheets or webs for automatic musical instruments and the like, the combination of a sand-blast mechanism, a revoluble impact-drum alined with the sand-blast mechanism, means for imparting a vertical adjustment to said impact-drum, means for feeding a blank sheet or web past the same, and an interposed pattern web or screen moving with the blank sheet or web, substantially as set forth.

17. In an apparatus for perforating sheets or webs for automatic musical instruments and the like, the combination of a sand-blast mechanism, a revoluble impact-drum alined with the sand-blast mechanism, a main frame, a laterally-overhanging arbor carried by said frame and constituting the journal for said impact-drum, means for feeding a blank sheet or web past the sand-blast mechanism, and an interposed pattern web or screen moving with the blank sheet or web, substantially as set forth.

18. In an apparatus for perforating sheets or webs for automatic musical instruments and the like, the combination of a sand-blast mechanism, a revoluble impact-drum alined with the sand-blast mechanism, a main frame, an adjustable slide moving on the main frame, a laterally-overhanging arbor carried by said slide and constituting the journal of the impact-drum, means for effecting an adjustment of the slide, means for feeding a blank sheet or web past the sand-blast mechanism, and an interposed web or screen moving with the blank sheet or web, substantially as set forth.

19. In an apparatus for perforating sheets or webs for automatic musical instruments and the like, the combination of a sand-blast mechanism, means for feeding a blank sheet or web past the same, an interposed pattern web or screen moving with the blank sheet or web, and a pair of rotary brushes arranged adjacent to the sand-blast mechanism and adapted to contact with the webs, substantially as set forth.

20. In an apparatus for perforating sheets or webs for automatic musical instruments and the like, the combination of a sand-blast mechanism, means for guiding a blank sheet or web past the same, an interposed pattern web or screen moving with the blank sheet or web, a pair of feed-rollers, a main frame, and laterally-overhanging arbors carried by said frame and constituting the journals for said feed-rollers, substantially as set forth.

21. In an apparatus for perforating sheets or webs for automatic musical instruments and the like, the combination of a sand-blast mechanism, means for guiding a blank sheet or web past the same, an interposed pattern web or screen having an endless form and moving with the blank sheet or web, means for supporting said endless web, a pair of feed-rollers, a main frame, and laterally-overhanging arbors carried by said frame and constituting the journals for said drums and feed-rollers, substantially as set forth.

22. In an apparatus for perforating sheets or webs for automatic musical instruments and

the like, the combination of a sand-blast mechanism, means for guiding a blank sheet or web past the same, an interposed pattern web or screen having an endless form and moving with the blank sheet or web, drums for supporting said endless web, a pair of feed-rollers, a main frame, laterally-overhanging arbors carried by said frame and constituting the journals of said drums and feed-rollers, and means for imparting simultaneous operation to the sand-blast and the web-feeding mechanisms, substantially as set forth.

23. In an apparatus for perforating paper and other material, in combination, a pattern web or belt, means for moving the same, means for yieldingly holding the paper or other material against the pattern web or belt, means for feeding the paper with the pattern web or belt, and a nozzle for projecting a sand-blast against the pattern web or belt, the said nozzle being provided with means for deflecting the blast passing therethrough.

24. In an apparatus for perforating paper and other material, in combination, a pattern web or belt, means for moving the same, means for yieldingly holding the paper or other material against the pattern web or belt, means for feeding the paper with the pattern web or belt, and a nozzle for projecting a sand-blast against the pattern web or belt.

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

ELWOOD C. PHILLIPS.

Witnesses:
ROBERT BURNS,
HENRY A. NOTT.