

Oct. 24, 1933.

F. J. CHANDLER

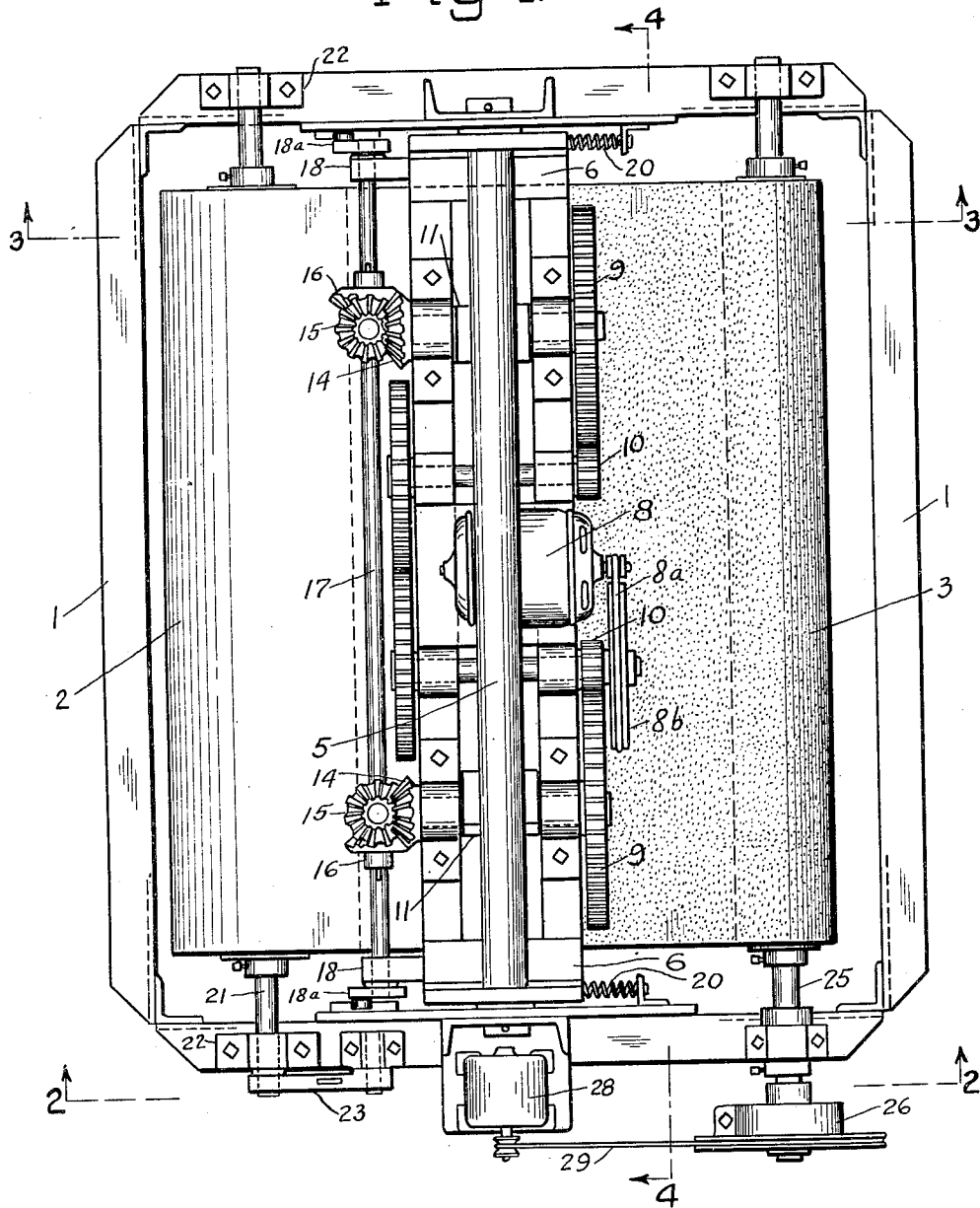
1,931,979

PERFORATING MACHINE

Filed Feb. 25, 1931

4 Sheets-Sheet 1

Fig. 1.



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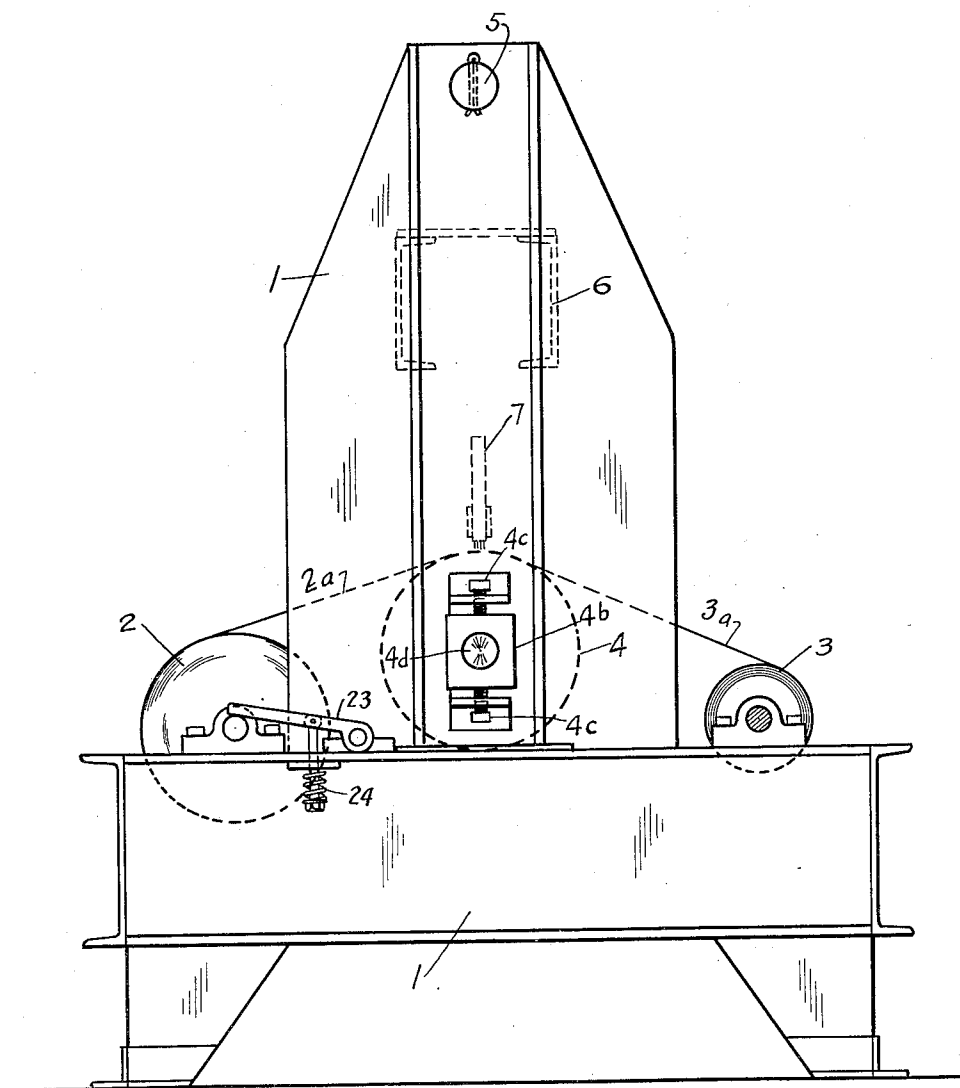
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Fig. 2.



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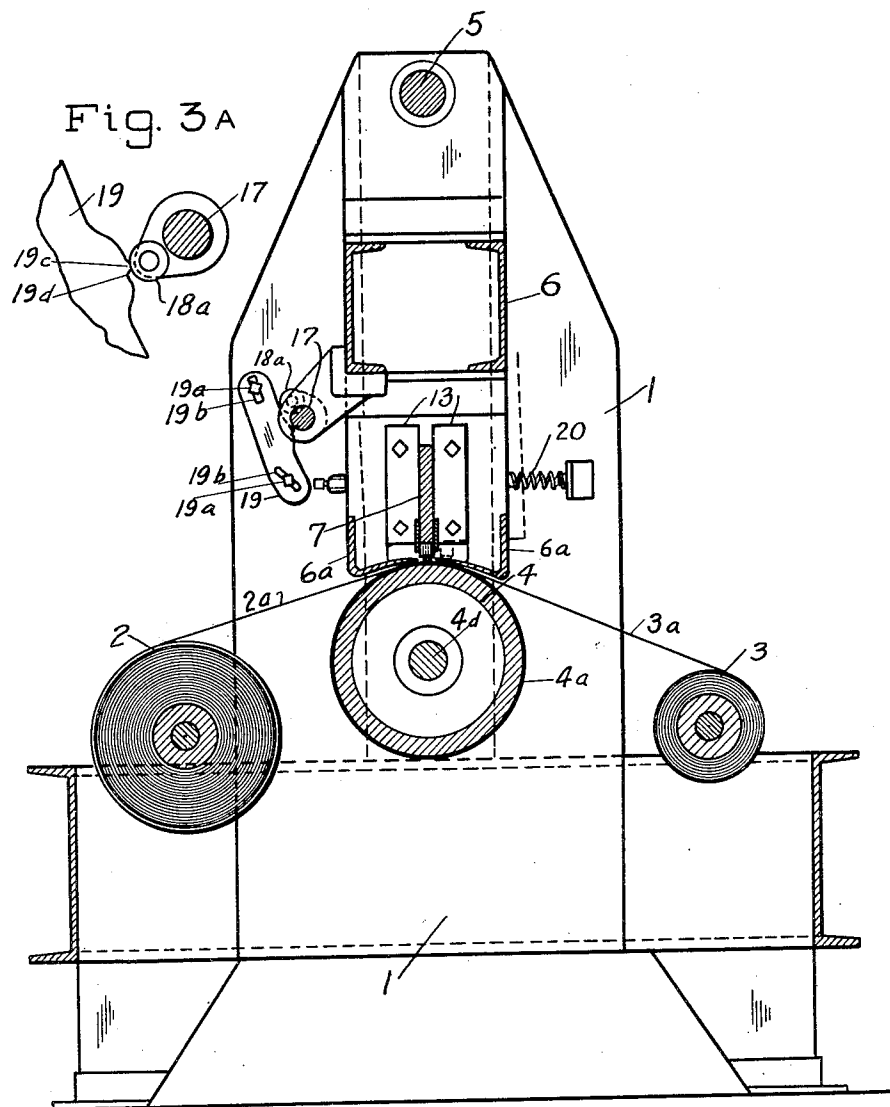
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Fig. 3.



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Fig. 4

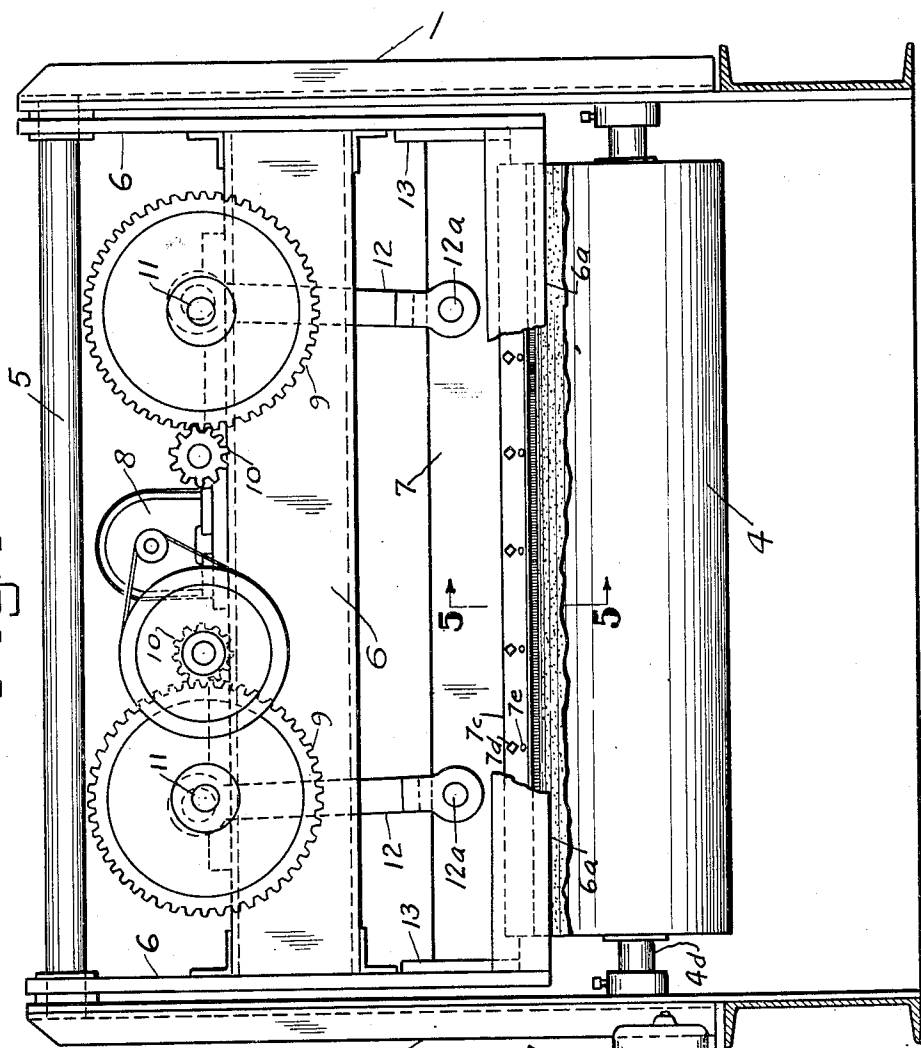
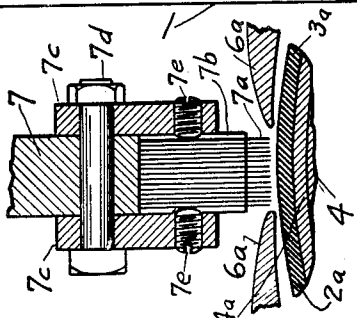


Fig. 5



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UNITED STATES PATENT OFFICE

1,931,979

PERFORATING MACHINE

Frank Jermain Chandler, Toledo, Ohio

Application February 25, 1931
Serial No. 518,128

9 Claims. (Cl. 164—85)

My invention relates to a machine for perforating non-porous strip material by a multiplicity of needle points thereby making it into porous material, and extending its useful applications.

5 It is intended for use in perforating fabrikoid, or other similar coated fabrics which, in their manufactured form, are non-porous.

Fabrikoid and other coated fabrics make excellent substitutes for leather, if given the breathing qualities of leather by mechanical perforation. Such materials, by the use of this perforating machine, become available for shoe material and are efficient leather substitutes. By forcing a multiplicity of needle points through such material, while it is in tension, minute pores are produced, which become smaller, when the tension is removed.

I attain this object by the machine illustrated in the following drawings, in which—

20 Figure 1 is a plan view of the machine; Figure 2 is a vertical section, showing one end of the machine; Figure 3 is a vertical section through the central portion of the machine on the line 3—3, Figure 1; Figure 3a is an enlarged view of the cam track and cam; Figure 4 is a vertical section on the line 4—4, Figure 1 and Figure 5 is a section through the perforating bar, on the line 5—5, Figure 4. Similar numerals refer to similar parts throughout the several views.

30 A framework 1, carries roller 2, for the unperforated material, roller 3 for the finished material, and roller 4, over which, material passes during perforation. Unperforated material is indicated by mark 2a and perforated material by mark 3a.

35 Framework 1 also supports shaft 5, on which is hung swinging framework 6, with bottom material guides 6a and carrying perforating bar 7. Motor 8, mounted on swinging framework 6, through pulleys 8a, 8b and gears 9 and 10, transmits power to crank arms 11, and through connecting links 12 and pins 12a, to perforating bar 7, which is free to slide, vertically, in guides 13.

40 The action of crank arms 11, is to cause an up and down movement of perforating bar 7.

45 A multiplicity of steel needle points 7a, are bedded in metal, 7b and attached to perforating bar 7 by means of side plates, 7c, bolts, 7d, and studs, 7e.

50 The action of motor 8, as aforesaid, moves perforating bar 7, carrying needle points, 7a, through unperforated material, 2a, which passes beneath perforating bar from roller 2.

55 Roller 4 is directly beneath perforating bar 7 and needle points, 7a. Position of roller 4 is

vertically adjustable through bearing 4b, and adjusting screws 4c.

Roller 4 is free to turn, on its shaft 4d.

Movement of swinging frame 6 is caused by bevel gears 14, on crank shaft 11, which gears through bevel gear train 15—16 and shaft 17, turning in bearings 18, attached to frame 6, cause rotation of cams, 18a, in connection with cam track 19, which is mounted on frame 1, by screws 19a, in slots, 19b. Movement of swinging frame 6 is restricted by the action of compression springs 20, carried on main frame 1.

Cam tracks 19 have a very slight indentation, 19d, and an elevation, 19c, on their working surfaces, which cause a slight vibrational movement of frame 6, when in its farthest forward position. This is for the purpose of disengaging needle points, 7a, from material, without undue vertical distortion of same.

Roller 2 is keyed to shaft 21, which is carried in bearings 22.

Movement of shaft 21 is retarded by brake 23, which applies pressure to the shaft through the action of spring 24.

Roller 3 is keyed to shaft 25 on the outer end of which is loose driving unit 26.

Power from motor 28 is transmitted through belt 29 to loose driving unit 26, which applies an adjustable torsional stress to shaft 25, and thus to roller 3.

In operation, non-perforated material, 2a is placed on roller 2, fed over roller 4, under perforating needles, 7b, and attached to roller 3.

Motor 28 is now started and tension is placed upon the material, through the action of loose drive unit 26. Brake 23 is adjusted, however, so that no movement of the material will take place, until same is caused through the action of perforating points 7a.

The material is now under tension and will tend to move toward roller 3.

Motor 8 is now started, and through its action, perforating bar 7, carrying needle points 7a, is driven downward, perforating the material, and the points of the needles enter the rubber covering, 4a, on roller 4.

While this action is taking place, swinging framework 6, is held by springs 20 in a position directly over the center of roller 4, against the action of cam 18a, and cam track 19.

Cam 18a is so connected to shaft 17 and gearing, that, when perforating bar 17 is in its lowest position, a movement will begin, forcing swinging frame 6, perforating bar 7, and all parts con-

ected to swinging frame 6, toward roller 3, against the action of spring 20.

This movement carries the perforated material forward, through the engagement of the needle points with the material, an amount equal to the width of the perforating area caused by the needles. Elevation 19c and depression, 19d, on cam track 19, now cause, through movement of frame 6 and bar 7, a very slight lateral movement of needle points, thereby allowing them to withdraw more freely from perforated material.

Cam 18a now arrests the motion of the swinging frame 6 and holds it in forward position until the needles have been withdrawn and are free of the perforated material, the withdrawing action being accomplished by motor 8, through gear trains and cranks 11, links 12, pins 12a, connecting to perforating bar 7.

When the needles are free of the material, rotation of cam 18a allows spring 20 to force the swinging frame, and all parts carried on it, back to original position, directly over the center of roller 4.

By the aforesaid action, material is pulled off from roller 2 and the loose drive 26 on roller 3, rolls up the material on the roller as fast as it is indexed through the machine.

When the needles are withdrawn from the material, there is a tendency to raise the material off from roller 4. This tendency is checked by bottom material guides, 6a which are integral with frame 6, and move with it.

Adjustments are provided by means of screws, 19a, acting in slots, in cam track, 19b, so that an exact timing and indexing is possible. Roller 4 is also adjusted to exact position for best results by means of bearings, 4b and screws, 4c.

I claim:

1. A perforating machine for strip material comprising a multiplicity of needles points, means for thrusting the same through strip material, and means for maintaining adjustable tension on the strip material so that the finished material will contain holes smaller than at the time of perforation in proportion to the tension on the strip.

2. In a perforating machine for strip material, a main framework, a swinging frame hung from the main framework, a perforating element carrying a multiplicity of needle points slidably mounted in the swinging frame, means for forcing the perforating element to the perforating position, means for moving the perforating element forwardly and then withdrawing it, and means for vibrating the perforating element slightly, just before withdrawal to avoid vertical distortion of the material, during withdrawal of the perforating points.

3. In a perforating machine for semi-elastic strip material, a movable bar carrying a multiplicity of needle points, means for feeding the material under the movable bar, means for forcing the points through the material and means for maintaining adjustable tension on the material while perforating it, so that the holes may be smaller when the tension is removed, in proportion to the tension on the strip at the time it is perforated.

4. In a machine for perforating essentially non-porous strip material, a main frame, a swinging frame carried by the main frame, perforating

means carried by the swinging frame, cams carried on the swinging frame to cause movement of the perforating means in relation to the main frame, cam tracks carried on the main frame to receive the cams, slight elevations and depressions on cam tracks to cause vibration of the swinging frame at the time of withdrawal of the perforating means from the material, and adjustable means for timing operations, as aforesaid.

5. In a machine for perforating strip material, the combination of a multiplicity of points, means for thrusting said points through the strip and subsequently withdrawing the same, means for swinging the points forwardly while in engagement with the strip to advance the strip to the next perforating position and for swinging the points rearwardly while disengaged, and means for maintaining tension on the strip.

6. In a machine for perforating strip material, the combination of a multiplicity of points, means for repeatedly thrusting said points through the strip, each arrangement of the points with the strip being in rear of the previous engagement, and means for tensioning the material at the time of perforation so that the perforations in the finished material will be smaller than at the time of perforation.

7. In a machine for perforating non-porous strip material, the combination of a freely rotatable roller over which the material is fed, a frame mounted above the roller for swinging movement in the direction in which the material travels, numerous perforating points carried by said frame, means for thrusting said points through the strip, and means controlling the swinging movement of the frame to advance the points while in engagement with the strip a distance substantially equal to the length of the area covered by the points so as to position the strip for the next perforating operation to form a continuous perforated area.

8. In a machine for perforating strip material, a main frame, a roller supported in said main frame for free rotation, a frame mounted in the main frame above said roller for swinging movement in the direction in which the strip travels, spring means limiting the movement of the swinging frame in one direction, means controlling the movement of the swinging frame in opposition to said spring means, a bar slidable up and down in the swinging frame above said roller, perforating points carried by said bar, and means for forcing the bar downwardly to thrust the points through the strip and for withdrawing the same, the means for controlling the movement of the swinging frame being operable to advance the same while the points are engaged with the strip so as to advance the latter to the next perforating position.

9. In a machine for perforating strip material, a member movable up and down and provided with a multiplicity of downwardly projecting points, means for moving said member downwardly to thrust the points through the strip, means for swinging said member forwardly while the points are engaged with the strip to position the strip for the next perforating operation, and means for maintaining a constant tension on the portion of the strip which is beneath the perforating member.

FRANK JERMAIN CHANDLER.

CERTIFICATE OF CORRECTION.

3

Patent No. 1,931,979.

October 24, 1933.

FRANK JERMAIN CHANDLER.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, line 97, claim 6, for "arrangement" read "engagement"; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 14th day of November, A. D. 1933.

F. M. Hopkins

(Seal)

Acting Commissioner of Patents.