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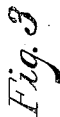
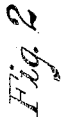
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1,616,752

METHOD AND APPARATUS FOR CUTTING BLANKS FROM SHEET MATERIAL

Filed Feb. 17, 1923

2 Sheets-Sheet 1



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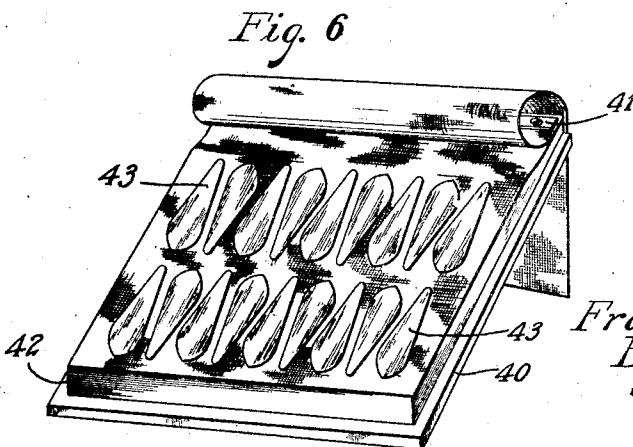
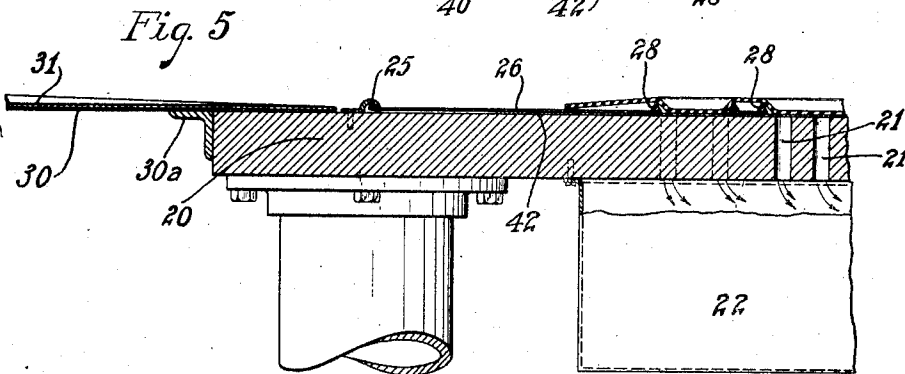
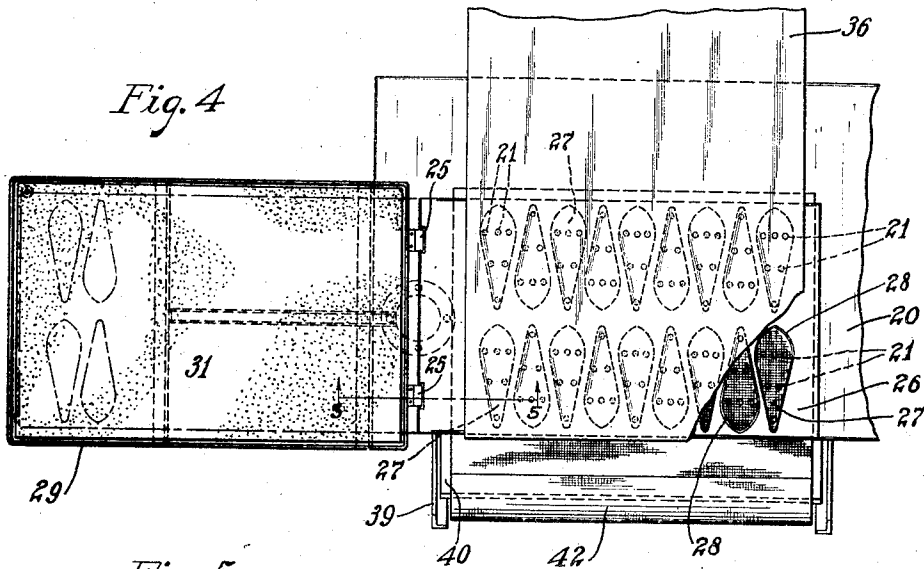
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METHOD AND APPARATUS FOR CUTTING BLANKS FROM SHEET MATERIAL

Filed Feb. 17, 1923

2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE.

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METHOD AND APPARATUS FOR CUTTING BLANKS FROM SHEET MATERIAL.

Application filed February 17, 1923. Serial No. 619,595.

This invention relates generally to methods and apparatus for cutting blanks from sheet material, and more particularly to methods and apparatus for cutting simultaneously a plurality of such blanks, being especially applicable to cutting blanks for rubber shoe parts from thin sheets of unvulcanized rubber, wherein the natural tackiness and the flimsy structure of the material make the manual handling thereof difficult.

The chief object of this invention is to eliminate the manual handling of the blanks after they are cut from the sheet. Another object is simultaneously to cut a plurality of blanks, expeditiously and with a minimum of waste.

Of the accompanying drawings:

Fig. 1 is a side elevation of apparatus embodying and adapted to carry out my invention.

Fig. 2 is a transverse section on line 2—2 of Fig. 1.

Fig. 3 is an enlarged view of part of the apparatus shown in Fig. 2.

Fig. 4 is a plan view of part of my apparatus, and the work, in position for operation.

Fig. 5 is a section on the line 5—5 of Fig. 4.

Fig. 6 is a perspective view of a book in which the blanks are stored, some of the blanks being shown therein.

Referring to the drawings, 10 represents generally a table upon one end of which is mounted a fluid pressure cylinder 11, disposed lengthwise thereof, and having a piston 12, to the outer end of which is secured a carriage 13, which rides upon a presser roller 14 journaled in its frame, said carriage carrying a superposed weighting member 15. The cylinder 11 is provided with a pressure-fluid supply pipe 16, having branches 16^a, 16^b running to the respective ends of the cylinder, the branch pipes being provided respectively with manually-operated three-way valves 17, 18. The front end of the cylinder 11 is loosely attached to the table 10, as by the untightened bolts 19, 19, so that the cylinder may pivot on its rear mounting and accommodate itself to the position of the roller 14, which is required to operate over an uneven surface, the angular movement of the cylinder being so small that I have not found it necessary to pro-

vide a hinge or pivot, strictly speaking, at the rear end of the cylinder.

The end portion of the table 10 opposite the cylinder 11 comprises a horizontal metallic plate 20 having suitably positioned apertures 21, 21 therethrough, and having formed on its under surface a fluid tight chamber 22 in communication with all of said apertures. A pipe line 23 provided with a three-way valve 24 having an inlet port 24^a communicating with the atmosphere, connects said chamber with suction-producing apparatus (not shown).

Hinged at 25, 25 on the plate 20 is a die plate 26 which comprises a metal plate having openings 27 which conform to the shape of the blanks to be cut, the edge of each opening being provided with a circumscribing knife 28 projecting perpendicularly therefrom. The arrangement of the openings 27 is such that the minimum of space is left between adjacent openings. The die-plate 26, when in operative position, overlies part of the plate 20 with each of its openings 27 overlying a set of the apertures 21 therein, and with its knives 28 having their cutting edges uppermost, as shown in Fig. 5. Being hinged at one edge, the die-plate may be swung out of operative position and caused to lie inverted with its dies facing downward, in a flat tray 29 supported by brackets 30, 30^a, at the end of the plate 20. The bottom of the tray 29 is covered with a felt mat 31 which is kept saturated with water, thus being adapted to wet the knives 28 to lubricate them before each cutting operation.

Mounted on the floor behind the plate 20 are a pair of vertical supports, one being shown at 32 in Fig. 2, said supports being provided with lower and upper brackets 33 and 34 respectively. The brackets 33 support between them a roll 35 of sheeted unvulcanized rubber 36 interwound with a fabric liner 37. The brackets 34 support a roller 38 adapted to receive and wind up the liner 37 as said liner and rubber sheet 36 are withdrawn from the roll 35, said rubber sheet passing over and frictionally driving the roller 38 as it is manually drawn across the plate 20 prior to being cut.

Depending from the plate 20 is an open metal frame 39, adapted to support therein a stock book, such as is used for storing

small unvulcanized rubber pieces, the construction of said frame being such that the book therein will be inclined upward toward the front of the apparatus with its hinge or end clamp approximately level with the top of the plate 20. The book comprises a base board 40, an end clamp 41, and a plurality of leaves or liners 42, 42, of pervious material, said leaves being made, for example, of thin, loosely woven material, preferably cotton.

In the operation of the apparatus, the presser roller being in its retracted position, shown in full lines in Fig. 1, and the die-plate 26 resting in the tray 29, a leaf 42 of the stock book is spread upon the apertured or foraminous plate 20, covering all of the apertures therein. The die-plate 26 is then swung from the moistening tray into its operative position, where it rests upon the book leaf 42, with its knives projecting upward. Then the unvulcanized rubber sheet 36 is drawn across the plate 20 until it completely covers the die-plate 26, as is clearly shown in Fig. 4. The valve 24 is then operated to close its inlet port and permit suction to be applied, through the chamber 22, apertures 21, and book leaf 42, to the under surface of the sheet 36, the atmospheric pressure upon the upper surface of the sheet 36 pressing it down against the book leaf 42 within the openings 27, as shown in Fig. 5.

The valve 18 is then opened to admit pressure fluid to the rear end of the cylinder 11 to force its piston outward and move the presser roller 14 across the die-plate 26 to the position shown in broken lines in Fig. 1, thus forcing the cutting knives 28 through the rubber sheet 36 which covers said die-plate. The presser roller 14 is returned to its starting position by closing the valve 18 and opening the valve 17, to admit pressure fluid to the front end of the cylinder 11 while its rear end is exhausted, after which the net-work of surplus rubber is removed from between the openings 27 and cut from the sheet 36. The die-plate is then raised and laid in the tray 29, leaving the severed blanks, 43, 43, remaining upon the book leaf 42, and firmly held thereon by reason of the differential fluid pressures acting upon the faces of the blanks, namely, atmospheric pressure upon their upper faces, and sub-atmospheric pressure on their under faces effected by the suction applied through the apertures 21, said blanks passing through the openings 27 when the die-plate is so raised.

The suction is then broken by reversing the valve 24, which opens its inlet port, after which the book may be pulled out from its supporting frame, as shown in broken lines in Fig. 2, to withdraw the filled leaf from the plate 20 and permit it to fall onto the board 40 or other filled

leaves thereon. The operation as described may be repeated until the book is filled with blanks. A book with blanks therein is shown in Fig. 6.

The cutting is both rapid and accurate, the dies being so placed as to avoid waste of material without requiring the attention of the operator to that matter, and manual handling of the blanks is avoided.

Modifications may be resorted to without departing from the scope of my invention and I do not wholly limit my claims to the exact procedure, nor to the specific form of apparatus, herein described.

I claim:

1. The method of cutting blanks from sheet material which comprises placing the material upon a pervious liner, cutting blanks from said material, and then holding said blanks upon said liner by suction while removing the remainder of the material therefrom.

2. The method of cutting blanks from sheet material which comprises placing the material upon a pervious liner, applying suction to said material, through said liner, at certain points, cutting blanks from said material at the points where suction is applied, and then removing the surplus material from said liner while retaining the blanks thereon.

3. The method of cutting blanks from sheet material which comprises placing an apertured plate upon a pervious liner, placing a sheet of material to be cut, upon said plate, cutting from said material such part as overlies the aperture of said plate, and depositing the severed part, through said aperture, upon the liner.

4. The method of cutting blanks from sheet material which comprises placing a hollow die upon a fabric liner, placing a sheet of material upon said die, forcing said die through said material, and then drawing the cut blank through said die and removing the blank upon said liner.

5. The method of cutting blanks from sheet material which comprises placing an apertured die-plate upon a fabric liner, placing a strip of material upon said die-plate, applying suction to draw the material through the dies and against said liner, applying pressure to force the dies through said material, and then removing the cut parts upon said liner.

6. Apparatus for cutting blanks from sheet material, said apparatus comprising a die, a pervious liner adapted to be presented to the reverse side thereof, means for pressing material against said die to cut a blank therefrom, and means for drawing said blank through said die and onto said liner.

7. Apparatus for cutting blanks from sheet material, said apparatus comprising a die-plate having therein a plurality of cut-

ting members surrounding apertures in said plate, means for pressing material against said cutting members to cut blanks therefrom, a liner at the reverse side of said die-plate, and means for drawing said blanks through said apertures and onto said liner.

8. In apparatus for cutting blanks from sheet material, the combination of a plate having thereon a plurality of upraised cutting members surrounding apertures in said plate, a roller for pressing material against said cutting members to cut blanks therefrom, and means for drawing the cut blanks through said plate.

15 9. In apparatus for cutting blanks from sheet material, the combination of a hollow cutter, means for pressing a sheet of material thereagainst, and suction means mounted to draw the cut blank through the hollow cutter for stripping said cutter.

20 10. In apparatus for cutting blanks from sheet material, the combination of a hollow cutter, a roller for pressing a sheet of material thereagainst, and suction means mounted to draw the cut blank through the hollow cutter for stripping said cutter.

25 11. In apparatus for cutting blanks from sheet material, the combination of a foraminous support, a fabric liner thereon, an apertured cutter on said liner, means for pressing a sheet of material against said cutter to cut said material, and suction means operating through said support and liner to draw the material through said cutter onto said liner.

30 12. In apparatus for cutting blanks from sheet material, the combination of an apertured support, a liner thereon, an apertured die-plate hinged adjacent said support and adapted to be swung over onto said liner, a plurality of dies on said die-plate surround-

ing respective apertures therein, a roller adapted to press a sheet of stock against said dies to cut blanks therefrom, means for driving said roller, and means for applying suction to said stock, through said support, liner and die-plate, to draw said blanks through said dies.

13. In apparatus for cutting blanks from sheet material, the combination of an apertured plate, a stock book, means for supporting said stock book so that one of its leaves may lie upon said support, an apertured die-plate adapted to be laid upon said leaf, a die surrounding an aperture of said die-plate, means for pressing stock onto said die to cut a blank therefrom, and means for applying suction to said stock through said support, liner and die-plate.

14. In apparatus for cutting blanks, the combination of a support, a die-moistening device adjacent said support, an apertured, hinged die-plate adapted to be swung alternately onto said support and said device, and a die surrounding the aperture of said die-plate in position to present its cutting edge to said moistening device.

15. The method of cutting blanks from sheet material which comprises die-cutting the material and freeing the die-cut blanks by forcing the cut blank through the die by the use of differential fluid pressure.

16. Apparatus for cutting blanks from sheet material, said apparatus comprising a die, means for forcing the stock against said die to cut a blank therefrom, and means for creating differential fluid pressures on the respective faces of said blank to force it through the die.

In witness whereof I have hereunto set my hand this 14 day of February, 1923.

FRANK J. MacDONALD.