Oct. 18, 1927. 1,645,845

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MACHINE AND PROCESS FOR MAKING BOX TOE BLANKS

Filed June 26, 1925 2 Sheets-Sheet 1

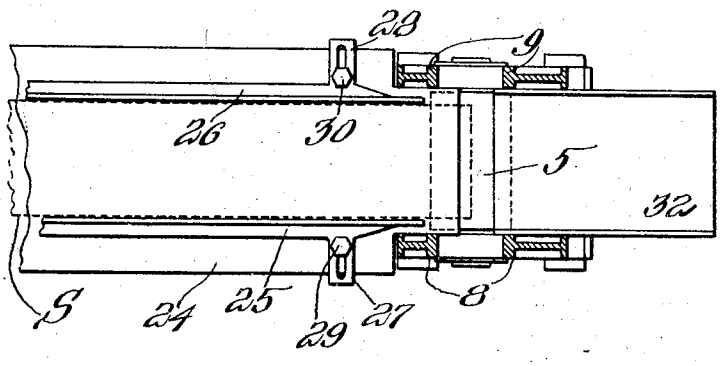


Fig. 1.

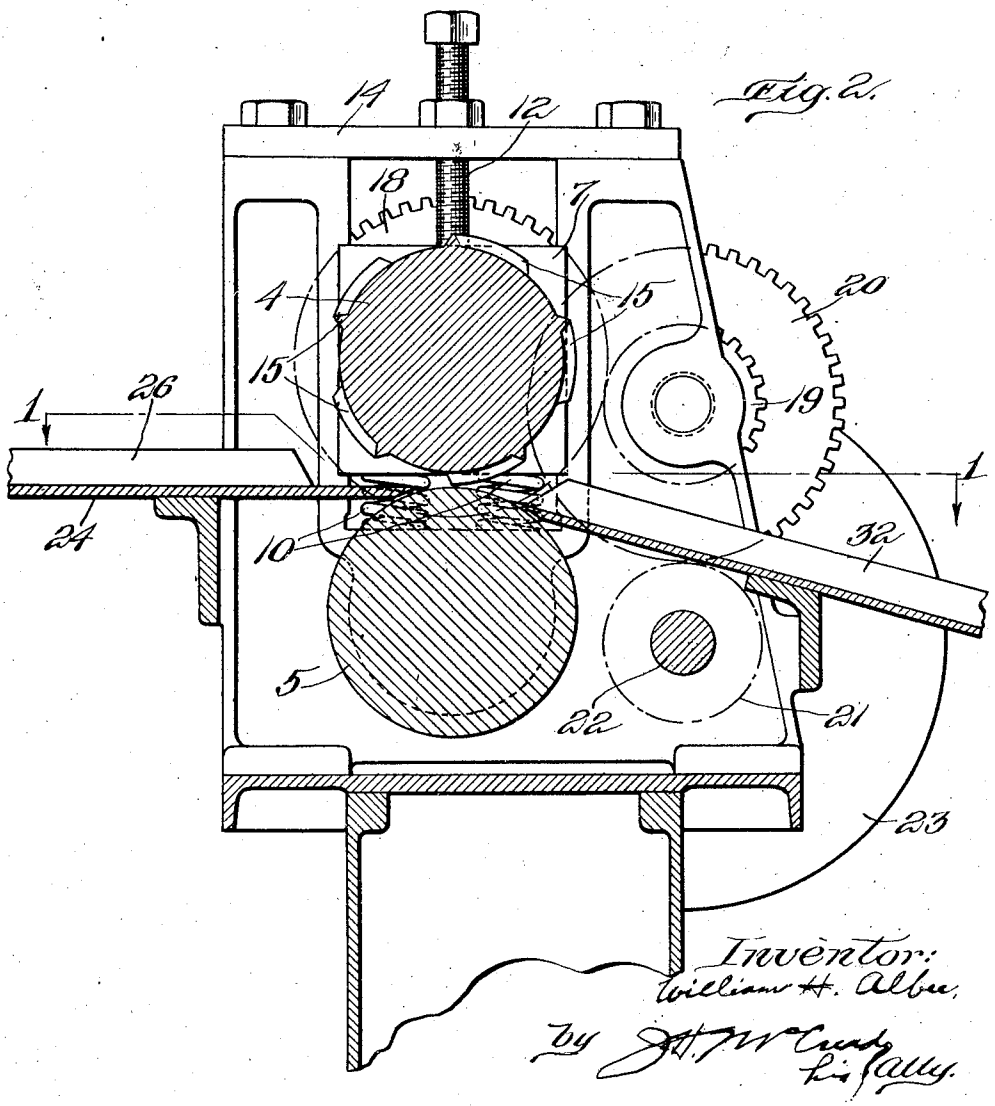


Fig. 2.

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Fig. 5.

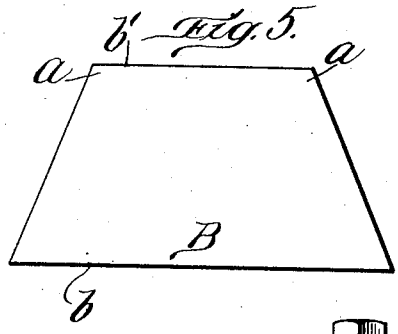


Fig. 4.

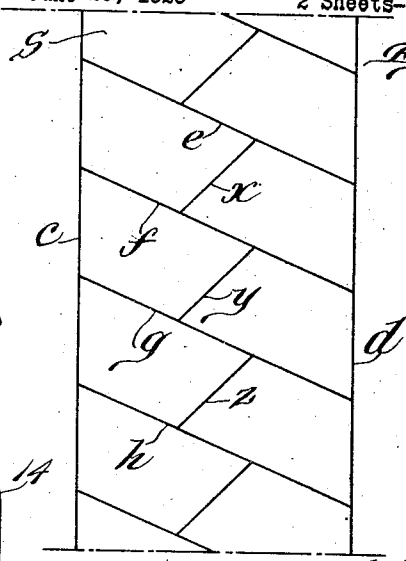
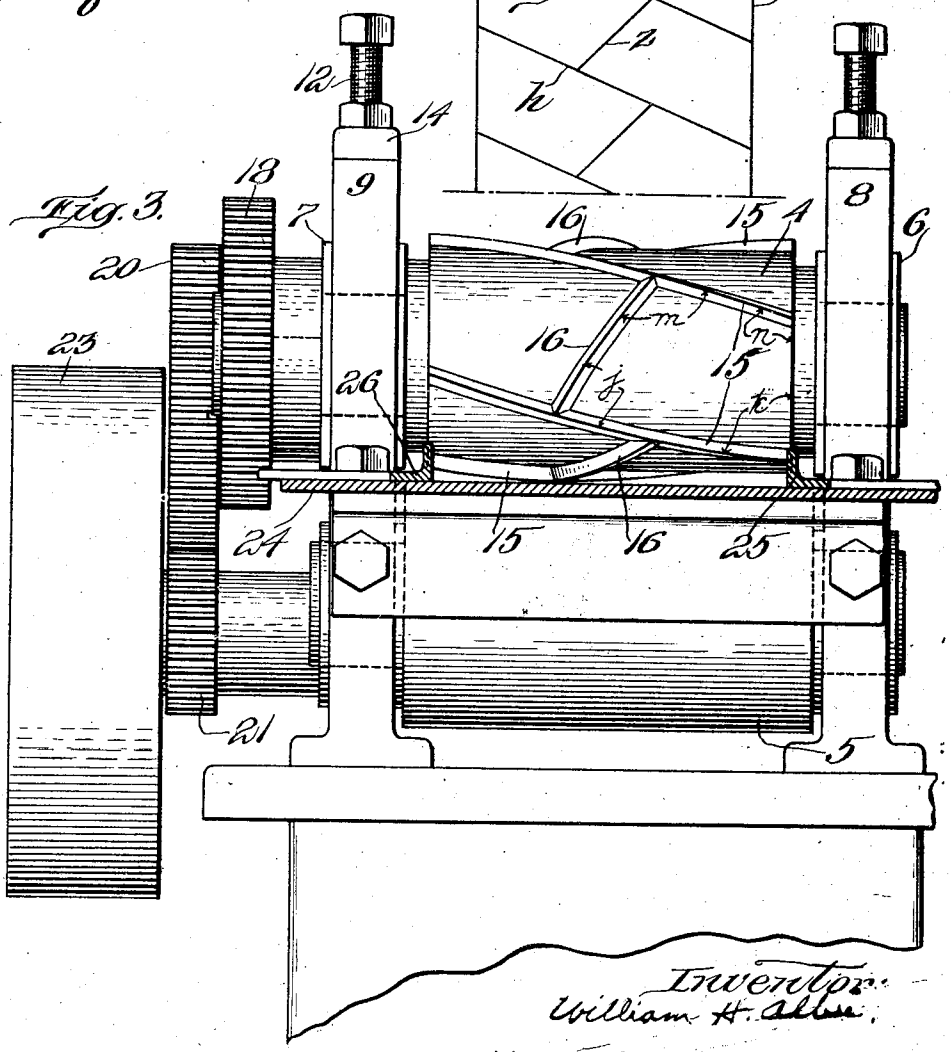


Fig. 3.



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UNITED STATES PATENT OFFICE.

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MACHINE AND PROCESS FOR MAKING BOX-TOE BLANKS.

Application filed June 26, 1925. Serial No. 39,848.

This invention relates to the manufacture of box toe blanks or stiffeners for footwear.

It is the usual practice to insert a box toe blank or stiffener between the outer leather and lining of a shoe at the toe portion thereof when the parts of the upper are being assembled. During the pulling over and lasting operations this stiffener is made to conform to the contour of the toe portion of the last, and forms a firm or "box" toe, as distinguished from a soft toe. At the present time stiffeners or blanks of this character usually consist of an approximately semicircular piece of felt impregnated with materials which make it very hard at normal temperatures, but permit it to become sufficiently soft and pliable to be lasted when heated to a point substantially above normal. The blanks are cut out of a sheet of this box toe stock usually by means of suitable cutting dies.

The present invention relates to the cutting of box toe blanks from sheet stock, such for example as that above described, and it aims to effect economies in this operation.

The nature of the invention will be readily understood from the following description when read in connection with the accompanying drawings and the novel features will be particularly pointed out in the appended claims.

Referring now to the drawings,

Figure 1 is a plan view, partly in cross section, of a machine constructed in accordance with the present invention;

Fig. 2 is a transverse, vertical, cross sectional view of the machine shown in Fig. 1;

Fig. 3 is a view partly in vertical cross section and partly in front elevation of the machine shown in Figs. 1 and 2;

Fig. 4 is a plan view showing the manner in which a strip of box toe stock is cut up into blanks; and

Fig. 5 is a plan view of a box toe blank of the form produced by the machine shown.

I have found that it is not necessary to make box toe blanks in the usual semicircular form, but that they can be made advantageously in approximately the form of an isosceles trapezoid as shown, for example, at B in Fig. 5. Such a blank is incorporated in a shoe in the usual manner, and the surplus stock in the margin and at the corners *a*—*a*, Fig. 5 is removed in the toe trimming operation. This form of blank may be manufactured more economically than the usual form, especially by the process and machine provided by this invention.

According to the preferred process a sheet of box toe stock is first cut into strips of a width suitable for the cutting of two blanks and of a length equal to the length of the original sheets. This operation may be performed in any suitable slitting machine, and a portion of such a strip is shown at S in Fig. 4. This strip has substantially parallel opposite edges *c* and *d* and these edges are utilized in my process. After the original sheet of stock has been stripped, as above described, I next make parallel diagonal cuts completely across the strip as indicated for example by the lines *e*, *f*, *g* and *h*, Fig. 4, thereby dividing it into a series of equal sections. Considering the section *c*, *f*, *d*, *g*, for example, it will be observed that it is of rhomboidal shape. The other sections formed by the diagonal lines of cut are of substantially the same shape and dimensions. Each of these sections is then divided transversely by cuts, such as those shown at *x*, *y* and *z*, into two blanks, each like the blank B, Fig. 5. The cuts above described may either be made simultaneously, successively, or progressively, depending upon the character of the apparatus with which the process is to be performed.

The machine shown in the drawings is designed particularly to practice the process above described. This machine comprises a cutting roll or die roll 4 and a bed roll 5 which supports the stock for the operation thereon of said die roll. The die roll has reduced end portions forming journals which are mounted to rotate in bearing blocks 6 and 7, respectively, these blocks being mounted in vertical guideways formed, respectively, in frame pieces 8 and 9. The block 7 is urged upwardly in its guideway by two compression springs 10—10, Fig. 2, and it may be adjusted against these springs by an adjusting screw 12 which is threaded through a cap plate 14 bolted to the upper end of the frame piece 9. The opposite bearing block 6 is supported and adjusted in the same manner. Additional bearing blocks support the bed roll 5 for rotation about a fixed axis.

A circumferential series of parallel cutting

edges or blades 15 extend diagonally across the periphery of the die roll 4 and preferably are integral with the roll. Additional shorter cutting edges 16 connect each of the diagonal edges 15 with that next adjacent to it. It will be seen from an inspection of Fig. 3 that each of these shorter cutting edges makes approximately the same angle, where it joints the diagonal edge 15, that the latter edge makes with a plane perpendicular to the axis of the roll, as for example, the plane of the end of the cutting section of the roll. In other words, the angle *j*, Fig. 3, is approximately equal to the angle *k*, and the angles *m* and *n* are likewise substantially equal to each other.

The cutting edges 15 serve to make the diagonal cuts which divide the strip S Fig. 4, into sections of rhomboidal form, as above described, while the shorter connecting cutting edges 16 divide these rhomboidal sections into blanks each having substantially the form of an isosceles trapezoid. I find that for some reason the length of a blank cut by the die roll is not quite as great as the circumferential distance between adjacent edges 15—15. While I am convinced that there is no actual slip of the stock with reference to the die roll, the result produced is the same as though a slight slip did occur. Consequently, in laying out the cutting edges 15 of the die roll it is necessary to allow for this apparent slip. For example, in order to cut blanks having a width between the edges *b*—*b'*, Fig. 5, of three inches, it would be necessary to space the edges 15—15 apart by a circumferential distance of approximately three and one-quarter inches, this distance being measured at right angles to the cutting edges.

For the purpose of driving the die roll 4 a gear 18 is mounted fast on the end of this roll, or is formed integral with it, and meshes with a pinion 19, Fig. 2, revolving on the same shaft as the gear 20. The latter gear is driven by a pinion 21 fast on the main driving shaft 22, this shaft carrying a pulley 23 by means of which the machine may be belted to any convenient source of power.

The strips of box toe stock are supported, while being fed to the rolls, on a table 24 which is approximately level with the bite of the rolls, and the opposite edges of each strip are guided by edge guides 25 and 26. These guides are provided with slotted ears 27 and 28, respectively, to receive bolts 29 and 30, this construction permitting the adjustment of the guides to accommodate strips of varying width. The blanks issuing from the machine fall on an inclined apron 32, Figs. 1 and 2, and slide into a suitable receptacle (not shown).

In operating the machine it is preferable to set the die roll 4 so that its cutting edges 15 and 16 will not quite touch the surface of the bed roll 5 but will be spaced from it by, say, two or three thousandths of an inch.

If the edge guides 25 and 26 are adjusted to guide the strip S centrally with reference to the die roll 4, the blanks B will all be of approximately the same dimensions, each rhomboidal section cut from the strip being divided into two blanks of equal size. Sometimes, however, it is desirable to cut the blanks of unequal lengths, and this may be done by setting the edge guides 25 and 26 toward one end or the other of the die roll, as will readily be understood.

It will also be observed that since portions of the opposite edges of the strip S form opposite edges of the rhomboidal sections, the same die roll will cut blanks varying widely in length, it simply being necessary to cut the strips S of the proper width and to set the guides 25 and 26 closer together or farther apart, as required, to guide the strip properly to the rolls. This is an extremely important advantage from a practical standpoint since box toe blanks for all of the ordinary sizes of men's shoes vary so little in width, that is, from the line *b* to *b'*, Fig. 5, that this difference can, as a practical matter, be completely disregarded. The length or distance between the inclined edges of the blank, however, varies considerably in these sizes. This means, therefore, that all the ordinary men's sizes of box toe blanks can be cut in the same machine and with the same die rolls. Another die roll will cut all the boys' sizes, and the same die roll will cut practically all of the women's sizes.

A further advantage of this process and of the machine provided by this invention is that practically no waste is formed during the cutting operation. This does not mean that all the stock in each blank is actually used in the finished shoe, but it does mean that the waste is all removed in the toe trimming or inseam trimming operation. This operation must be performed whether this kind of a blank or a blank of the usual shape is used, so that the elimination of this waste during inseam trimming does not add appreciably to the expense of this operation. At the same time the fact that it is unnecessary to handle this waste in the box toe cutting machine greatly expedites the latter operation. It permits the use of a simpler die roll and also permits the cutting of a great variety of sizes, as above described, on the same die roll. If desired, the blanks could be cut in rights and lefts, but I regard this as unnecessary.

While the machine herein shown and described represents the best embodiment of my invention that I have so far devised, it is contemplated that the invention may be embodied in other forms without departing from the spirit or scope thereof. Box toe

blanks have been particularly mentioned above, but it is obvious that the machine may be used in the cutting out of any parts having substantially the same shape as box toe blanks.

Having thus described my invention, what I desire to claim as new is:

1. In a machine for cutting box toe blanks from a strip of sheet stock having approximately parallel edges, the combination of a die roll, a bed roll cooperating therewith, said die roll having substantially parallel cutting edges extending diagonally across the periphery thereof, and additional cutting edges, each lying between and connecting one of said diagonal edges with that next adjacent to it and making approximately the same angle where it joins a diagonal edge that the latter edge makes with a plane perpendicular to the axis of the roll.

2. In a machine for cutting box toe blanks from a strip of sheet stock having approximately parallel edges, the combination of a die roll, a bed roll cooperating therewith, said die roll having substantially parallel cutting edges extending diagonally across the periphery thereof to cut said strip transversely into sections of approximately rhomboidal form, said die roll also having additional shorter cutting edges connecting said diagonal edges and operative to divide each of said sections into two blanks each having approximately the form of an isosceles trapezoid, means for supporting said rolls in cooperative relationship to each other, and adjustable means for guiding said strip of stock to said rolls.

3. In a machine for cutting box toe blanks from a strip of sheet stock having approximately parallel edges, the combination of a die roll, a bed roll cooperating therewith, means for supporting said rolls in cooperative relationship to each other with one roll mounted above the other, a table for supporting said strip of stock as it is fed to the rolls, and guides for engaging the opposite edges of said strip and guiding it to the rolls, said die roll having cutting edges extending diagonally across its periphery, and an additional cutting edge connecting each pair of diagonal edges, said edges being arranged to cut said strip into blanks of approximately trapezoidal form with a portion of the edge of the strip forming one of the inclined edges of each blank.

4. In a machine for cutting box toe blanks from a strip of sheet stock having approximately parallel edges, the combination of a die roll, a bed roll cooperating therewith, means for supporting said rolls in cooperative relationship to each other with one roll mounted above the other, a table for supporting said strip of stock as it is fed to the rolls, guides for engaging the opposite edges of said strip and guiding it to the rolls, said die roll having cutting edges arranged to make both diagonal cuts across said strip and also additional cuts in the central part of the strip connecting said diagonal cuts, whereby said edges cooperate to cut box toe blanks from said strip, and means supporting said guides for adjustment toward and from each other.

5. A die roll for a machine of the character described having a plurality of diagonal cutting edges on the surface thereof, and additional diagonal cutting edges connecting the first mentioned cutting edges and cooperating with them to divide the working surface of said roll into two circumferential series of sections, each section being of approximately trapezoidal form.

6. A die roll for cutting box toe blanks from sheet material, said roll having a plurality of approximately parallel cutting edges disposed diagonally on the periphery thereof, and additional diagonal cutting edges connecting the first mentioned cutting edges.

7. In a machine for cutting blanks from a strip of sheet stock having approximately parallel edges, the combination of a die roll, a bed roll cooperating therewith, and means, including substantially parallel cutting edges extending diagonally across the periphery of said die roll and additional cutting edges each lying between and connecting one of said diagonal edges with that next adjacent to it, to cut blanks of different sizes simultaneously from said strip.

8. In a machine for cutting blanks from a strip of sheet stock having approximately parallel edges, the combination of a die roll, a bed roll cooperating therewith, means including substantially parallel cutting edges extending diagonally across the periphery of said die roll and additional cutting edges each lying between and connecting one of said diagonal edges with that next adjacent to it, to cut blanks from said strip, and means to vary the size of the blanks cut by said roll.

9. In a machine for cutting blanks from a strip of sheet stock having approximately parallel edges, the combination of a die roll, a bed roll cooperating therewith, means, including substantially parallel cutting edges extending diagonally across the periphery of said die roll and additional cutting edges each lying between and connecting one of said diagonal edges with that next adjacent to it, to cut blanks of different sizes simultaneously from said strip, and means to vary the size of the blanks cut by said roll.

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