April 4, 1933. E. A. BESSOM 1,903,280

METHOD OF MAKING ROTARY CUTTERS

Original Filed July 11, 1929

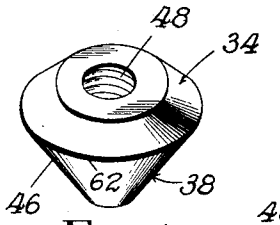


Fig. 1.

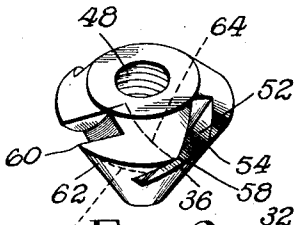


Fig. 2.

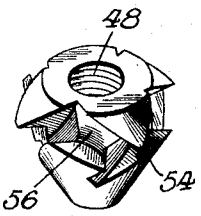


Fig. 3.

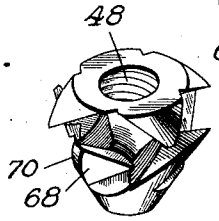


Fig. 4.

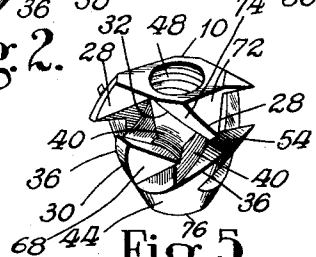
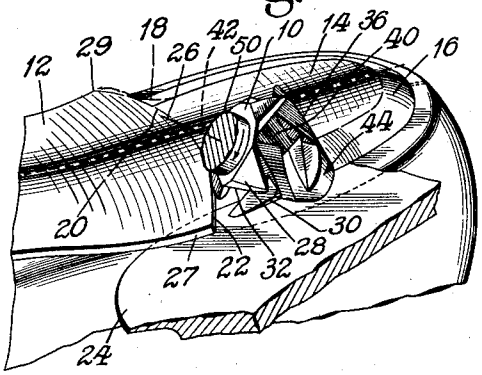


Fig. 5.

Fig. 7.



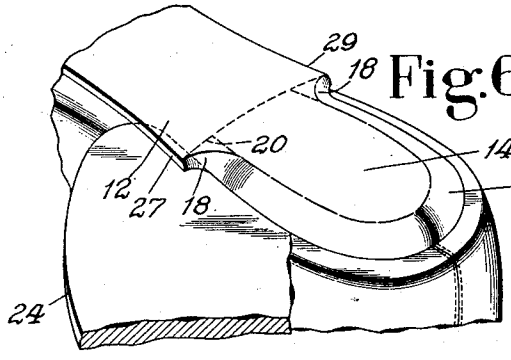


Fig. 6.

INVENTOR
Earl A. Bessom
By his Attorney
Harlow M. Sears

Patented Apr. 4, 1933

1,903,280

UNITED STATES PATENT OFFICE

EARL A. BESSOM, OF MARBLEHEAD, MASSACHUSETTS, ASSIGNOR TO UNITED SHOE MACHINERY CORPORATION, OF PATERSON, NEW JERSEY, A CORPORATION OF NEW JERSEY

METHOD OF MAKING ROTARY CUTTERS

Original application filed July 11, 1929, Serial No. 377,438. Divided and this application filed April 1, 1932. Serial No. 602,493.

This invention relates to methods of making cutters and is exemplified with reference to a cutter such as described and claimed in my copending application for United States Letters Patent Serial No. 377,438, filed July 11, 1929 of which the present application is a division.

It is an object of this invention to provide a method by the practicing of which cutters, such for instance as those disclosed in the above-identified application, may be manufactured quickly and accurately. With the above object in view, my novel method contemplates the forming of a blank of the general shape of two cones having a common base, cutting in the blank in series of grooves each of which begins at a conical surface of one of the cones and terminates at the conical surface of the other of the two cones, and cutting in the blank another series of grooves connecting the grooves of the first series, thereby forming two series of circumferentially staggered teeth spaced from each other by an opening extending substantially circumferentially of the cutter in which the chips are received and through which they pass off and hereinafter spoken of as a chip-disposing opening.

With the above and other objects in view, the invention will now be described in connection with the accompanying drawing and pointed out in the claims.

In the drawing,

Figs. 1 to 4 are perspective views showing the partially completed illustrated cutter during four progressive stages of its construction;

Fig. 5 shows the completed cutter;

Fig. 6 is a perspective view of a partially fitted heel-seat portion of a shoe in a condition to be operated upon by the illustrated cutter; and

Fig. 7 shows the relative positions of the cutter and a sole attached to a shoe as the cutter moves toward the median line of the sole to form a heel breast receiving shoulder upon the sole and to trim fillets from the heel-seat portion thereof.

The illustrated cutter 10 is described with reference to its application in performing a step of a heel-seat fitting operation upon soles attached to shoe uppers. In fitting the heel-seats of shoes in a machine, such for example as that described in United States Letters Patent No. 1,837,399, granted December 22, 1931, on an application filed in my name, it is customary to trim the rear portion of a sole 12 attached to a shoe to form a sole tongue portion or heel-seat portion 14 which has a beveled marginal portion 16 and has a shape complemental to that of the attaching face of a heel to be applied to the shoe. The tongue portion 14 is fitted by a rotary cutter (not shown) commonly known as a back cutter and mounted for rotation about an axis disposed at substantially right angles to the plane of the sole and movable in a horseshoe-shaped path from one end of the heel breast line of the sole to the other.

After shaping the tongue portion 14 of the sole (Fig. 6) in the above-mentioned machine, it is desirable to remove fillets 18 which are located rearwardly of and at the opposite end portions of the breast line 20 of the sole 12 and also to form on the sole at the opposite end portions of the heel breast line thereof heel breast receiving shoulders or abutments 22 with which the breast of the heel is engaged when the heel is properly located upon the shoe. The illustrated cutter 10 is designed simultaneously to form the heel breast receiving shoulders 22 and to wing out the fillets 18 in order that each of the forward lateral beveled portions 16 of the tongue portion 14 will extend to its respective shoulder 22 and form therewith a clean-cut dihedral angle.

The machine for performing the heel-seat fitting operation is described in detail in the above-mentioned United States Letters Patent No. 1,837,399 and need not be described herein. In such a machine the shoe is positioned bottom side up and crease plates 24 engage within the rand crease at opposite sides of the shoe to support the sole 12 and to guard the shoe upper from injury during the fitting operation. After the tongue portion 14 has been beveled by the above-mentioned back cutter, the cutter 10, the axis of rotation 26 of which is inclined at an angle

to the sole (Fig. 7) is moved transversely of the sole from one edge 27 of the sole to the edge 29 successively to form the heel breast receiving shoulders 22 and to wing out fillets 18 at opposite sides of the sole of the shoe.

The cutter 10 is fully described in application for United States Letters Patent Serial No. 377,438 above referred to and comprises a series of circumferentially disposed shoulder forming teeth 28 and a series of circumferentially disposed winging out or fillet cutting teeth 30, the teeth of one series being in circumferentially staggered relation with the teeth of the other series. The cutting edges 32 of each of the shoulder forming teeth 28 are arranged in the conical surface 34 (Fig. 1) of one of two truncated cones having a common base and the cutting edges 36 of the fillet cutting teeth 30 are arranged in the conical surface 38 of the other cone. The teeth of one series are also spaced from the teeth of the other series by a chip-disposing channel or opening 40 of zigzag shape and extending circumferentially of the cutter.

As the cutter 10 operates upon the sole 12 the shoulder forming teeth 28 cut down upon the sole and therefore tend to force the sole against the crease plates 24. It will be noted, however, that as the cutter 10 moves toward the median line 42 of the sole the fillet cutting teeth 30 have a slight tendency to pick up from the crease plate 24 the portion of the sole being trimmed. This condition should be avoided since it causes the cutter 10 to cut too deeply into the sole and prevents the proper shaping of the sole. The tendency of the sole to be picked up by the cutter has been overcome to some extent by constructing the fillet cutting teeth 30 in such a manner that they trim by a draw shearing cut, but in order further to insure that the sole will not be picked up during the operation of the cutter the cutter 10 is provided with a conical or button portion 44 which engages the sole as the cutter moves transversely thereof.

In order to make the cutter 10, a threaded recess 48, shaped to receive a shaft 50 upon which the cutter is mounted for rotation, is formed in a piece of stock and then the stock is turned down to provide a blank 46 (Fig. 1) having the general shape of two cones or frustums of cones which have a common base.

In order to form the teeth 28, 30 from the blank and to provide the chip-disposing channel 40, the blank 46 is cut by a series of circumferentially spaced grooves or slots 52 (Fig. 2) each of which is inclined to the common base of the cones. Each of the slots 52 extends from the conical surface 34 of one of the cones to the conical surface 38 of the other cone. The cutting edge 36 is formed by the intersection of the slot 52 with the conical surface 38, and the inclination of the slot to the common base is such that the cutting edge 36 will wing out the fillets 18 by a draw shearing cut which will have little tendency to pick up the sole. In making this cut it is customary to cause the slot forming cutter to move lengthwise of the slot 52 in order that the side 54 of each of the slots 52 which terminates in the cutting edge 36 can be readily undercut.

After forming the above-described grooves or slots 52 another series of circumferentially spaced grooves or slots 56 is formed in the blank 46. The slots 56 terminate at the slots 52, and are formed by radially sinking a milling cutter into the blank 46. The cutting edges 32 of the shoulder forming teeth 28 are formed by the intersection of the slots 56 and the conical surface 34. It will be noted that one side of each of the slots 56 passes substantially through a point 58 (Fig. 2) which represents a point at which a side of slot 52 intersects the periphery 62 of the common base of the cones and that the other side of each of the slots passes substantially through a point 60 at which a side of an adjacent slot 52 intersects periphery 62. In order to strengthen the ends of the teeth 28 it is sometimes the practice to reduce the width of slots 56 so that the sides thereof are located slightly within the lines 62, 64 respectively.

The slots 56 may be said to be inclined to the common base of the cones and to be positioned between, inclined to, and to connect, successive slots 52. After the teeth 28, 30 have been blanked out as illustrated in Fig. 3, angular portions are removed from the rear part of the fillet cutting teeth 30 to form secondary clearance surfaces 68 (Fig. 4) and portions of the conical surfaces of the teeth 30 located between the cutting edges 36 and the secondary clearance surfaces 68 are relieved to provide primary clearance surfaces 70 for the teeth 30. In like manner the rear portion of the conical surface of each of the shoulder forming teeth is flattened to form a secondary clearance surface 72 and the portion located between the cutting edge 32 and the secondary clearance surface 72 of each of the teeth 28 is trimmed away to provide a primary clearance surface 74.

It will be noted that the lower ends of the slots 52 are spaced from the end 76 of the blank 46 in order to provide the conical or button portion 44 which engages the sole during the operation of the cutter 10 to insure that the sole will be held down against the crease plates during the operation of the cutter.

Having described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. That method of making a rotary cutter which comprises the steps of forming a blank of the general shape of two cones having a common base, cutting in the blank a series of

grooves each of which begins at the conical surface of one of the cones and terminates at the conical surface of the other cone, and cutting in the blank another series of grooves connecting the grooves of the first series thereby forming two series of circumferentially staggered teeth spaced from each other by a chip-disposing opening extending substantially circumferentially of the cutter.

2. Those steps of the method of making rotary cutters consisting in forming a blank having the general shape of two cones having a common base, cutting at spaced intervals circumferentially of the blank a series of grooves each of which is inclined to the common base of the cones, cutting at spaced intervals circumferentially of the blank and between the grooves of the first series another series of grooves connecting successive grooves of the first series and forming therewith a zigzag chip-disposing channel extending circumferentially of the cutter.

3. That method of making rotary cutters which comprises the steps of forming a blank having the general shape of two cones provided with a common base, cutting at spaced intervals circumferentially of the blank a series of slots each of which is inclined to the common base and has an undercut side terminating in a cutting edge lying in the conical surface of one of the cones, cutting at spaced intervals circumferentially of the block and between the slots of the first series another series of slots connecting successive slots of the first series and one of the sides of which terminates in a cutting edge lying in the conical surface of the other cone, the slots forming a zigzag chip-disposing channel extending circumferentially of the cutter.

4. That method of making rotary cutters which comprises the steps of forming a blank having the general shape of two cones provided with a common base, cutting at spaced intervals circumferentially of the blank a series of slots each of which is inclined to the common base of the cones, and cutting at spaced intervals circumferentially of the blank and between the slots of the first series another series of slots which connect successive slots of the first series and the highest portion of each of the opposite sides of which passes substantially through a point of intersection of one of the sides of the first-named slots and the periphery of the common base, the slots of the last series forming with the slots of the first series a chip-disposing channel extending substantially circumferentially of the cutter.

5. That method of making rotary cutters which comprises forming a blank having the general shape of two cones having a common base, cutting at spaced intervals circumferentially of the cutter a plurality of spaced slots passing through and inclined at predetermined angles to the common base of the cones, and forming another series of circumferentially disposed slots, the sides of which respectively pass substantially through successive points of intersection of the first-named slots with the periphery of the common base, said second-named slots forming with the first-named slots a plurality of teeth staggered circumferentially of the cutter and spaced from each other by a chip-disposing opening extending substantially circumferentially of the cutter.

6. The method of making a rotary cutter comprising the steps of forming a blank of the general shape of two cones having a common base, cutting at spaced intervals circumferentially of the blank a series of grooves each of which is inclined to the common base of the cones and starts at the conical surface of one of the cones and terminates at the conical surface of the other cone, and cutting at spaced intervals circumferentially of the blank another series of grooves each of which is inclined to the common base and is positioned between, inclined to, and connects successive first-named grooves, said grooves forming with each other two series of circumferentially staggered teeth, the cutting edges of the teeth of one series lying substantially in the conical surface of one of the cones and the cutting edges of the teeth of the other series lying substantially in the conical surface of the other cone.

7. That method of making rotary cutters which comprises the steps of forming a blank having the general shape of two truncated cones having a common base, and cutting in the blank a plurality of slots each of which is inclined to the common base and to an adjacent slot to form two series of circumferentially staggered teeth, the cutting edges of the teeth of one series lying in the conical surface of one cone and the cutting edge of the teeth of the other series lying in the conical surface of the other cone.

8. That method of making rotary cutters which comprises the steps of forming a blank having the general shape of two truncated cones having a common base, cutting in the blank a series of grooves spaced at substantial distances from the end of one of the cones to form a conical portion which serves as a holddown for work to be operated upon by the cutter and each of which begins at the conical surface of one of the cones and terminates at the conical surface of the other cone, and cutting in the blank another series of grooves connecting grooves of the first series to form two series of circumferentially staggered teeth spaced from each other by a chip-disposing opening extending substantially circumferentially of the cutter.

9. That method of making rotary cutters which comprises the steps of forming a threaded recess in a piece of stock, trimming

the stock to form a blank of the general shape of two truncated cones having a common base, and cutting in the blank a plurality of slots each of which is inclined to the common base and to an adjacent slot to form two series of circumferentially staggered teeth, the cutting edges of the teeth of one series lying in the conical surface of one of the cones and the cutting edges of the teeth of the other series lying in the conical surface of the other cone.

10. That method of making rotary cutters which comprises the steps of forming a blank having the general shape of two cones provided with a common base, cutting at spaced intervals circumferentially of the blank a series of slots each of which is inclined to the common base, cutting at spaced intervals circumferentially of the block and between the slots of the first series another series of slots connecting successive slots of the first series, the slots of one series forming with the slots of the other series two series of circumferentially staggered teeth, the cutting edges of the teeth of one series lying substantially in the conical surface of one of the cones and the cutting edges of the teeth of the other series lying in the conical surface of the other cone, and removing portions of the conical surfaces of each of the teeth rearwardly of the cutting edge thereof to provide cutting clearances therefor.

11. The method of making rotary cutters which comprises the steps of forming a blank having the general shape of two truncated cones having a common base, cutting in the blank a plurality of slots each of which is inclined to the common base and to an adjacent slot to form two series of circumferentially staggered teeth, the cutting edges of the teeth of one series lying in the conical surface of one of the cones and the cutting edges of the teeth of the other series lying in the conical surface of the other cone, cutting away a portion of the conical surface of each of the teeth at points spaced from the cutting edges of the teeth to provide a secondary cutting clearance for the teeth and removing portions of the conical surface of the teeth located between the cutting edges and the secondary clearances to provide primary cutting clearances for the teeth.

In testimony whereof I have signed my name to this specification.

EARL A. BESSOM.