Oct. 20, 1942. H. LYON 2,299,159

FINISHING TOOL

Filed July 29, 1940

Fig. 3.

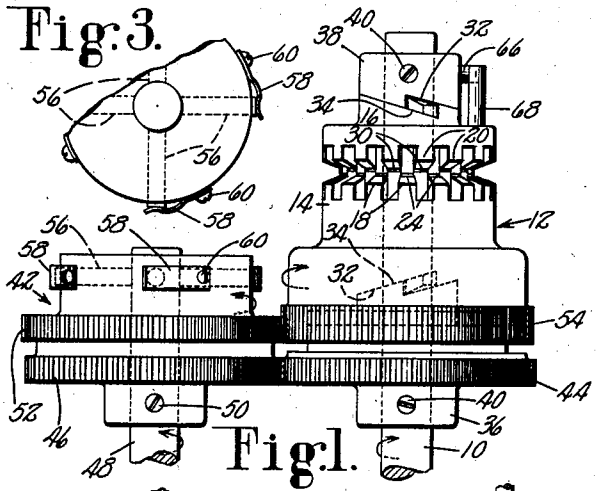


Fig. 1.

Fig. 2.

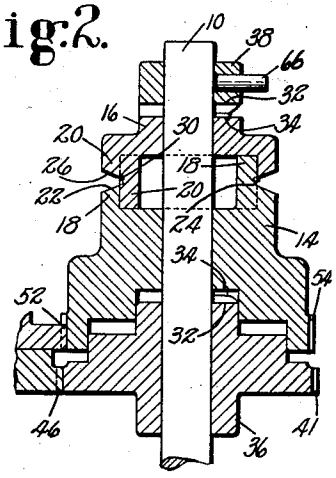


Fig. 4

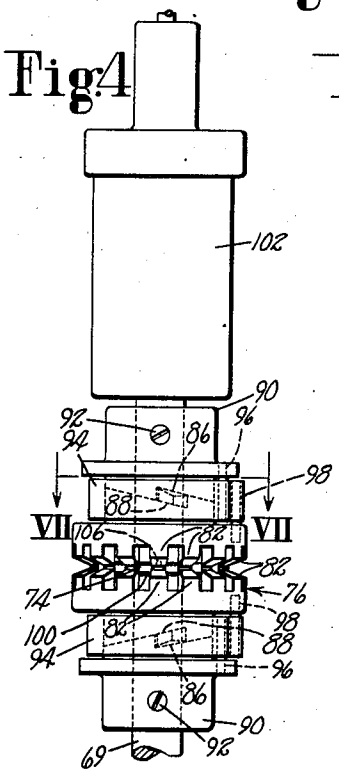


Fig. 5.

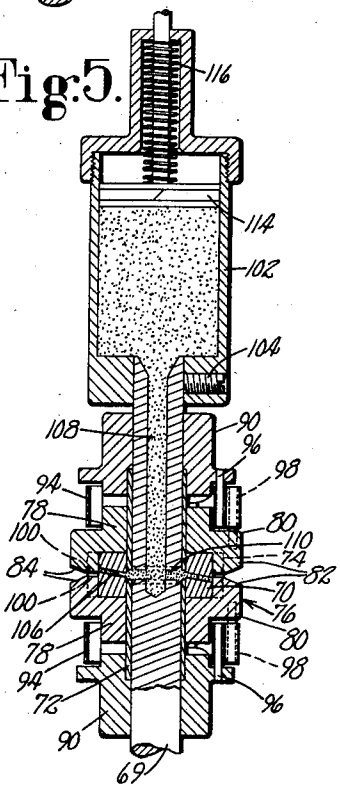


Fig. 6.

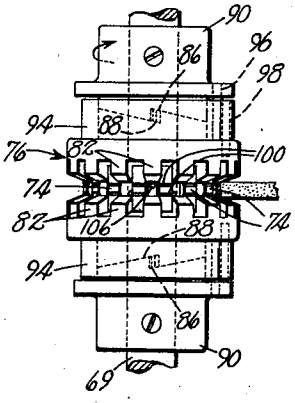
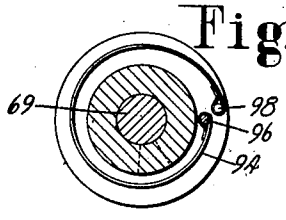


Fig. 7.



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UNITED STATES PATENT OFFICE

2,299,159

FINISHING TOOL

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Application July 29, 1940, Serial No. 348,251

18 Claims. (Cl. 12—17)

This invention relates to finishing tools, such, for example, as are employed for setting and burnishing the edges of shoe soles.

When treating the edges of shoe soles, particularly unattached soles having reduced shank sections, it is important that the effective width of the finishing tool be varied, as the operation progresses about the sole, in accordance with the variations in the thickness of the sole edge so as to avoid bulging, upsetting or otherwise deforming the sole edge while under treatment.

With this in view, it is an object of this invention to provide an improved means for quickly and positively varying the width of an adjustable finishing tool during the operation upon a sole member in accordance with variations in the thickness of the edge portion of the sole. To this end the adjustable finishing tool, which comprises sections mounted for axial and rotative movement upon a driving shaft, is provided with inclined surfaces on the sections, which surfaces are arranged in abutting engagement with complementally inclined surfaces on the shaft so that the width of the tool is varied upon relative rotation between the shaft and the sections.

In accordance with an illustrated embodiment of this feature of the invention, relative rotation between the sections and the shaft in one direction is caused by a spring which tends to rotate the sections on the shaft; and relative rotation in the opposite direction is caused by the action of the work upon the sections when the thickness of the sole edge increases at the point of operation.

Another feature of this invention relates to the construction of the adjustable finishing tool which, as illustrated, comprises a burnishing member and a pair of oppositely located sections arranged to slide over opposite lateral portions, respectively of the burnishing surface thereby to vary the effective width of the tool. The burnishing tool is provided with spaced grooves which, when the tool is opened wide as when the operation progresses around the relatively thick forepart, are rendered operative to form beads on the sole edge, and are rendered inoperative when the width of the tool is reduced as when the operation progresses through the relatively thin reduced shank section.

A further feature of this invention relates to the means for automatically applying an edge treating medium to the edge of the sole member during the finishing operation. This means comprises a reservoir for the edge treating medium which is connected with the burnishing tool by means of a passageway that extends from the reservoir to the finishing tool and thence through an opening in a face of one of the sections of the tool, another section of the tool being adapted to close said opening when there is no work being presented to the machine. The medium may be composed of coloring matter or a mixture of coloring matter and wax, and may be in either powder or paste form. In the illustrated embodiment of this feature, the medium is forced outwardly from the tool by means of a plunger located in the reservoir.

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

In the drawing:

Fig. 1 is a side elevation of one form of an adjustable finishing tool and its control mechanism, in which the invention is illustrated:

Fig. 2 is a vertical section of the finishing tool and a portion of the control mechanism shown in Fig. 1;

Fig. 3 is a fragmentary plan view of the control mechanism of Fig. 1;

Fig. 4 is a side elevation of another form of finishing tool and also a reservoir for edge treating medium which is to be extruded through the tool;

Fig. 5 is a vertical section taken along the axis of the structure shown in Fig. 4;

Fig. 6 is a fragmentary view of the construction shown in Fig. 4, illustrating the position of the parts when operating upon the relatively thick edge portion of the forepart of a sole member; and

Fig. 7 is a sectional view taken on line VII—VII of Fig. 4.

Referring particularly to Figs. 1 to 3, inclusive, 10 indicates a rotary shaft which is driven by any convenient source of power; and, for purposes of illustration is shown as located in an upright position, but which can be located in a horizontal or angular position if desired. Mounted on the shaft 10 is an edge setting tool 12 which comprises sections 14 and 16 that are rotatable and axially movable on the shaft. The section 14 consists of a tubular body having a series of spaced burnishing teeth 18 extending from one end. Projecting outwardly and downwardly from the base of the teeth 18 is a shoulder 22 which engages and burnishes the lower corner of the sole edge during the edge setting operation. The sole edge engaging faces of the teeth 18 extend parallel to the axis of the shaft 10 and at

their lower corner near their junction with the shoulder 22 are provided with a groove 24 which forms a bead on the lower part of the sole edge operated upon. The upper section 16 likewise consists of a tubular body which is provided on its end adjacent to the section 14 with spaced burnishing teeth 20 that slidably fit in the spaces between the teeth 18. Extending outwardly and upwardly from the base of the teeth 20 is a shoulder 26 which burnishes the upper corner of the sole edge operated upon. A groove 30 formed in the face of the teeth 20 near their junction with the shoulder 26 forms a bead on the upper portion of the sole edge operated upon. The teeth 18 and 20, respectively, terminate short of the grooves 24 and 30 in the opposite sections 14 and 16 when the sections are widely separated, as they will be when operating around the relatively thick forepart of a sole member. When, however, the operation reaches the relatively thin reduced shank section of the sole member, the sections 14 and 16 are moved toward each other by a mechanism which will subsequently be described, causing the end portions of the teeth 18 and 20 to overlap the grooves 24 and 30 so that the beads formed in the relatively thin shank section of the sole member are destroyed by the overlapping sections of the teeth as soon as they are formed.

When the sections 14 and 16 are rotated relatively to the shaft 10 they are moved back and forth along the shaft 10 to open and close the tool by the camming action of inclined surfaces 32 on abutment sleeves 36, 38 upon complementally shaped abutting surfaces 34 on the sections 14 and 16. The abutment sleeves 36, 38 are fixed to the drive shaft 10 by set screws 40.

When not operating upon a sole member the sections 14 and 16 are held in their closed position shown in Fig. 2 by an overdrive transmission 42 which tends to rotate the section 14 at a higher rate of speed than that of the shaft 10, and as the fingers 18 and 20 of the sections 14 and 16 intermesh the section 16 is caused to move with the section 14 at the higher rate of speed. This rotation of the sections 14 and 16 relatively to the shaft 10 causes the inclined surfaces 34 on the sections to move to the right as viewed in Fig. 1 over the surfaces 32 on the abutment sleeves 36 and 38 thereby camming the sections toward each other and reducing the opening between the shoulders 22 and 26.

The overdrive 42 consists of a gear member 44 formed on the periphery of the sleeve 36 and a second gear member 46 which is fastened by a set screw 50 to a countershaft 48 that is parallel to the shaft 10. Rotation of the shaft 48 is transmitted to the section 14 by a gear 52 which meshes with a peripheral gear 54 on the section 14, the gear 52 being connected with the shaft 48 by a slip clutch which consists of four pins 56 located in equally spaced radial openings in the hub of the gear 52 and pressed against the shaft 48 by backing springs 58 which are attached to the hub by screws 60. The following arrangement of gear teeth on the different gear members has been found to produce satisfactory results. The gear member 44 is provided with sixty-one teeth, the gear 54 on the section 14 with fifty-nine teeth, and the gears 46 and 52, which transmit the motion from the gear 44 to the gear 55, are provided with sixty teeth each. Thus, the gear 44 is continuously trying to rotate the sections 14 and 16 at a higher rate of speed than that of the shaft 10.

When the edge setting operation moves from the relatively thin reduced shank section of a sole to the forepart section, the thicker edge portion of the sole exerts a drag on the shoulders 22 and 26 which resists their movement and tends to slow down the speed of the sections 14 and 16. This, in turn, causes the clutch pins 56 to slip on the shaft 48 thereby allowing the sections to slow down with respect to the drive shaft 10 with the result that the surfaces 34 on the sections move to the left, as viewed in Fig. 1, along the inclined surfaces 32 on the sleeves, thereby allowing the sections 14 and 16 to separate and accommodate the thicker portion of the sole member. When the operation reaches the relatively thin shank section on the other side of the sole, the shoulders 22 and 26 no longer contact the corners of the sole edge and as a result the drag on the sections 14, 16 is decreased and the overdrive transmission 42 increases the speed of the sections and closes the tool until the shoulders again engage the top and bottom surfaces of the reduced sole edge.

Movement of the sections toward each other is limited by the engagement of a stud 68 on the section 16 with a laterally extending pin 66 on the abutment sleeve 38.

Another embodiment of this invention is shown in Figs. 4 to 7 wherein the power driven shaft 69 corresponds to the shaft 10 in Figs. 1 to 3. Mounted on the shaft 69 is an edge setting tool consisting of a central hub-like member 70 which is secured to a sleeve 72 that is freely rotatable upon the shaft 69. The member 70 is provided with a number of radially spaced teeth 74 that engage the edge face of a sole member in a manner illustrated in Fig. 6. Located on opposite sides of the member 70 are collars 76 which have hub sections 78 that are slidably mounted on the sleeve 72 so that they can be moved toward and away from each other. Each of the collars 76 is provided with a flange 80 from which project spaced fingers 82 that are slidably received in the grooves formed between the teeth 74 in the member 70. The fingers 82 are provided with beveled surfaces 84 which engage the top and bottom margins of the sole edge that is being operated upon and function similarly to the shoulders 22, 26 in the construction shown in Fig. 1. The collars 76 are moved toward each other to close the tool by the camming action of inclined surfaces 86 on abutment sleeves 90 upon complementally inclined abutting surfaces 88 formed on the hub sections 78, the abutment sleeves 90 being fastened to the shaft 69 by set screws 92 and having shoulders against which the opposite ends, respectively, of the sleeve 72 abut. The member 70 and the collars 76 are urged in a counterclockwise direction (as viewed from above in Figs. 4, 5 and 6) about the axis of the shaft 69 by tension springs 94 which are connected respectively at one end to pins 96 which project from the abutment sleeves 90 and at their other ends to pins 98 which extend from the flanges 80 on the members 76. Thus, when the shaft 69 is rotating in a counterclockwise direction (as viewed from above) and no work is presented to the machine, the springs 94 move the collars 76 and the member 70 in said counterclockwise direction about the axis of the shaft 69, causing the surfaces 88 on the collars to ride over the surfaces 86 on the abutment sleeves 90 and move the collars 76 toward each other to close the tool. When, however, a work piece is presented to the tool, the edges 84 strike the edge portion of the

work in the event that the work is thicker than the opening between the collars 76 and produce a drag that causes the springs 94 to give and allow the collars 76 and the member 70 to move slightly in a clockwise direction (as viewed from above) with relation to the shaft 69 thereby moving the surfaces 88 in the opposite direction along the inclined surfaces 86 and permitting the collars 76 to move away from each other until an appropriate opening between the collars has been produced. When the edge setting operation reaches a section of reduced thickness, the springs 94 will again cause the collars 76 and the members 70 to rotate in a counterclockwise direction (as viewed from above) with relation to the shaft 69 and the collars 76 to move toward each other. In this manner the effective width of the work engaging face of the tool is automatically varied so as to be correlated with the variations in the thickness of the sole member operated upon.

The teeth 74 are provided with heightwise spaced grooves 100 which correspond to the grooves 24 and 30 in the tool shown in Figs. 1 and 2. These grooves form ribs on the upper and lower portions of the edge face of the sole member operated upon when the operation is progressing around a portion of sufficient thickness to cause the collar 76 to withdraw beyond the grooves 100. When, however, a section of reduced thickness is encountered the collars 76 are moved toward each other, and their fingers 82 overlap the grooves in the manner shown in Fig. 4 thereby rendering them ineffective. The teeth 18 and 20 (Figs. 1 and 2), as well as the member 70 and the fingers 82 (Figs. 4, 5 and 6), may be described as being in overlapping relation lengthwise of their associated shafts and as being interlocked for movement as units together with and relatively to their associated shafts.

Upon some types of work it is desirable to apply edge treating medium to the edge of the sole member as it is being operated upon by the edge setting tool. To this end there is provided a cup-like reservoir 102 for edge treating medium. The reservoir 102 is fastened to the end of the shaft 69 by a set screw 104 and is connected with passages 106 in the member 70 by a passageway that extends through an axial bore 108 in the end portion of the shaft 10, thence through radial ports 110 in the shaft and through openings in the sleeve 72 to the passages 106 in the member 70. The passages 106 open onto the grooves between the teeth 74 slightly to one side or the other of the transverse center of the member 70, as viewed in Fig. 5, so that the fingers 84 overlap and seal the passages when the tool is closed while it is not operating upon a sole. The edge treating medium may be composed of coloring matter or a mixture of coloring matter and wax, and may be in either a powdered or a paste form. The medium is forced from the reservoir 102 and out through the passages 106 by a piston 114 which is urged toward the bottom of the reservoir by a spiral spring 116.

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

1. In a machine of the class described, a rotatable shaft, a finishing tool comprising a plurality of work engaging sections which are mounted on the shaft, said sections being rotatable as a unit together with the shaft and also being mounted for a limited degree of rotation as a unit relatively to the shaft, and means responsive to the rotative movement of the sections relatively to the shaft for effecting relative movement of said sections lengthwise of the shaft to cause the effective width of the tool to be varied in accordance with the thickness of the work.

2. In a machine of the class described, a rotatable shaft, a finishing tool comprising a plurality of work engaging sections, said sections being rotatable as a unit together with the shaft and also being mounted for a limited degree of rotation as a unit relatively to the shaft, means for rotating the sections in opposite directions relatively to the shaft to adjust the width of the tool, said means being responsive to variations in the edge thickness of work operated upon whereby the work engaging face of said tool is automatically correlated to the thickness of the work at the point of operation.

3. In a machine of the class described, a rotatable shaft, a finishing tool comprising a plurality of work engaging sections, said sections being rotatable as a unit together with the shaft and also being mounted for a limited degree of rotation as a unit relatively to the shaft, means responsive to the rotation of the sections of the tool relatively to the shaft for moving the sections relatively to each other to vary the dimensions of the work engaging face of the tool, and yieldable means for rotating said tool relatively to the shaft.

4. In a machine of the class described, a rotatable shaft, a finishing tool mounted on the shaft for rotative movement with and relatively to the shaft, said finishing tool comprising sections at least one of which is arranged for movement axially of the shaft, an inclined surface on said movable section and a complementally shaped inclined surface on the shaft arranged for engagement with the surface on said section whereby the section having the inclined surface is moved toward or from the other section of the tool depending upon the direction of relative rotation between the tool and the shaft.

5. In a machine of the class described, a rotatable shaft, a finishing tool mounted on the shaft for rotative movement with and relatively to the shaft, said finishing tool comprising sections arranged for relative axial movement on the shaft, each of said sections having an inclined surface, inclined surfaces on said shaft shaped complementally to the surfaces on the sections and arranged for engagement respectively with the surfaces on each of the sections whereby the sections are moved toward each other when they are rotated in one direction with respect to the shaft and away from each other when moved in the opposite direction.

6. In a machine of the class described, a rotatable shaft, a finishing tool mounted on the shaft for rotative movement with and relatively to the shaft, said finishing tool comprising movable sections arranged for adjustment axially of the shaft to adapt the tool to work of different thicknesses, an inclined surface on one of said sections, a complementally shaped inclined surface arranged for sliding engagement with the surface on said section, and a spring arranged to move one of said inclined surfaces relatively to the other.

7. In a machine of the class described, a rotatable shaft, a finishing tool mounted on the shaft for rotative movement with and relatively to the shaft, said finishing tool comprising sections mounted on the shaft for movement towards and from each other, oppositely inclined surfaces on said sections, surfaces on the shaft shaped com-

plementally to the surfaces on the sections and arranged for engagement therewith, resilient means for rotating said sections in one direction about the shaft thereby to move the sections toward each other, and work responsive means arranged to rotate the sections in the opposite direction to move the sections away from each other.

8. In a machine of the class described, a rotatable shaft, a finishing tool comprising a plurality of work engaging sections, said sections being rotatable as a unit together with the shaft and also being mounted for a limited degree of rotation as a unit relatively to the shaft, means responsive to the rotative movement of the tool relatively to the shaft for moving the sections relatively to each other lengthwise of the shaft, and power driven means for rotating the sections of the tool relatively to the shaft.

9. In a machine of the class described, a rotatable shaft, a finishing tool comprising a plurality of work engaging sections which are arranged in overlapping relation lengthwise of the shaft and are interlocked for movement as a unit together with and relatively to said shaft, and means responsive to rotative movement of the sections relatively to the shaft for moving at least two of said sections lengthwise of said shaft to vary the effective width of a work engaging face of the tool.

10. In a machine of the class described, a rotatable shaft, a finishing tool mounted on the shaft for rotative movement with and relatively to the shaft, said finishing tool comprising sections arranged for axial movement on the shaft relatively to each other, one of said sections having an inclined surface, a complementally inclined surface on the shaft arranged for engagement with the surface on said section, power driven means connected with the tool and arranged to rotate the tool in one direction relatively to the shaft so as to cause relative movement between the inclined surfaces, and work responsive means for causing rotative movement of the tool relatively to the shaft in the opposite direction thereby to cause opposite relative movement of the sections.

11. In a machine of the class described, a rotatable shaft, a finishing tool mounted on the shaft for rotative movement with and relatively to the shaft, said finishing tool comprising sections arranged for relative axial movement on the shaft, cooperating inclined surfaces on the sections and on the shaft arranged to regulate the movement of the sections toward each other when the tool is rotated relatively to the shaft in one direction and away from each other when rotated in the opposite direction, power driven means including a slip clutch arranged to rotate the tool relatively to the shaft in the direction tending to diminish the width of the tool, and work responsive means arranged to rotate the tool in the opposite direction to increase the effective width of the tool.

12. A finishing tool comprising a cylindrical member, movable work engaging sections mounted for axial and rotative movement on the cylindrical member, said sections having oppositely inclined surfaces, complementally shaped surfaces on the cylindrical member arranged for abutting engagement respectively with the surfaces on the movable sections, and yieldable means for rotating the sections relatively to the member thereby to cause the abutting surfaces to move across one another and cause relative axial movement of the sections.

13. An edge setting tool comprising a burnishing surface arranged to engage to edge to be treated, movable sections projecting over opposite lateral portions respectively of said burnishing surface, and yieldable means for urging said sections toward each other thereby to reduce the effective width of the burnishing surface.

14. An edge setting tool movable about an axis, said tool comprising circumferentially arranged burnishing surfaces, pairs of circumferentially extending grooves formed in each of said surfaces and arranged to form beads on the opposite sides of a sole edge operated upon, and means responsive to the thickness of the sole edge operated upon for rendering said grooves ineffective to form the beads on the work surface but adapted to render portions of the burnishing surfaces between the beads operative when the thickness of the sole edge reaches a predetermined minimum.

15. An edge setting tool comprising a burnishing iron having circumferentially spaced ribs arranged to operate upon the edge of a work piece, spaced grooves in said ribs adapted to form beads on the upper and lower portions of the edge face of the work piece, oppositely disposed members arranged for sliding engagement with the burnishing iron, said oppositely disposed members having burnishing surfaces arranged for engagement with the corners of the work piece operated upon by the burnishing iron, and means for urging the oppositely disposed members towards each other thereby to reduce the effective burnishing surface of the ribs.

16. An edge setting tool comprising sections one of which is arranged for adjustment to adapt the tool to work of different thickness, a container for an edge treating medium, means for connecting the container with an opening formed in one of said sections and extending to a work engaging portion of said one section, and means for causing the opening in said one section to be closed by another section when there is no work being presented to the machine.

17. In a machine of the class described, a rotatable shaft, a burnishing tool comprising interfitted sections arranged for relative axial movement along the shaft to vary the width of the tool to adapt it to work of different thicknesses, a passageway through said shaft opening onto the inter-fitted portions of the tool, and a container for coloring matter connected with said passageway, said inter-fitted sections of the tool being arranged to close the opening from the shaft when the sections are in their idling position and to uncover the opening when the tool is widened during the operation upon a work piece.

18. An edge setting tool rotatable about an axis, said tool comprising a plurality of circumferentially arranged burnishing surfaces for finishing an edge of a sole, a pair of circumferentially extending grooves formed in each of said burnishing surfaces, movable sections normally projecting over the opposite lateral portions respectively of the burnishing surfaces and over the grooves respectively thereby causing said grooves to be rendered inoperative, and means responsive to pressure applied against the sections by the sole for causing the sections to move away from each other thereby rendering said grooves operative to form beads on the edge of the sole.

HARRY LYON.