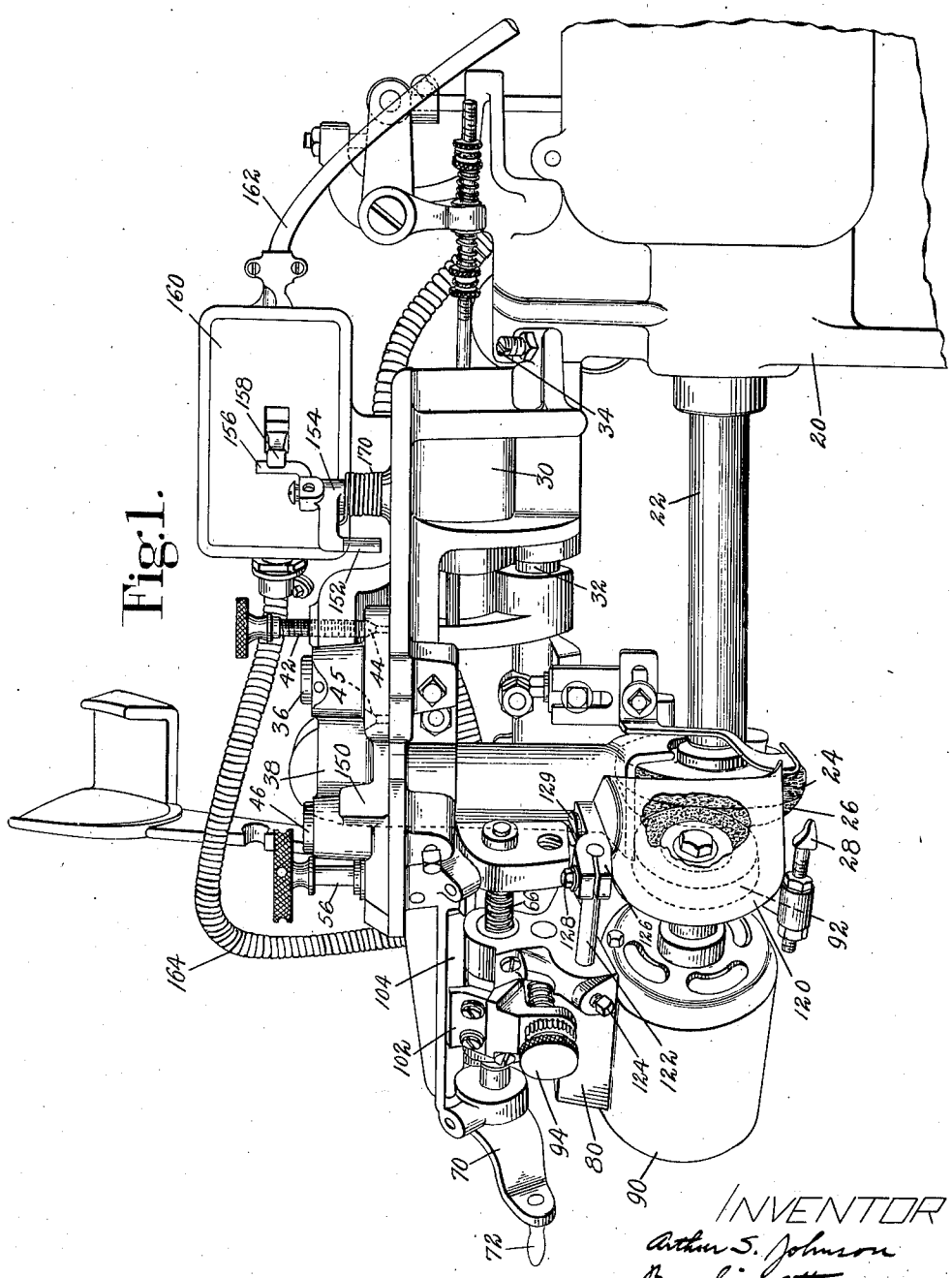
Jan. 20, 1942. A. S. JOHNSON 2,270,446

GRINDING MACHINE

Filed Jan. 11, 1939 4 Sheets-Sheet 1

Fig. 1.



INVENTOR

Arthur S. Johnson

By his attorney

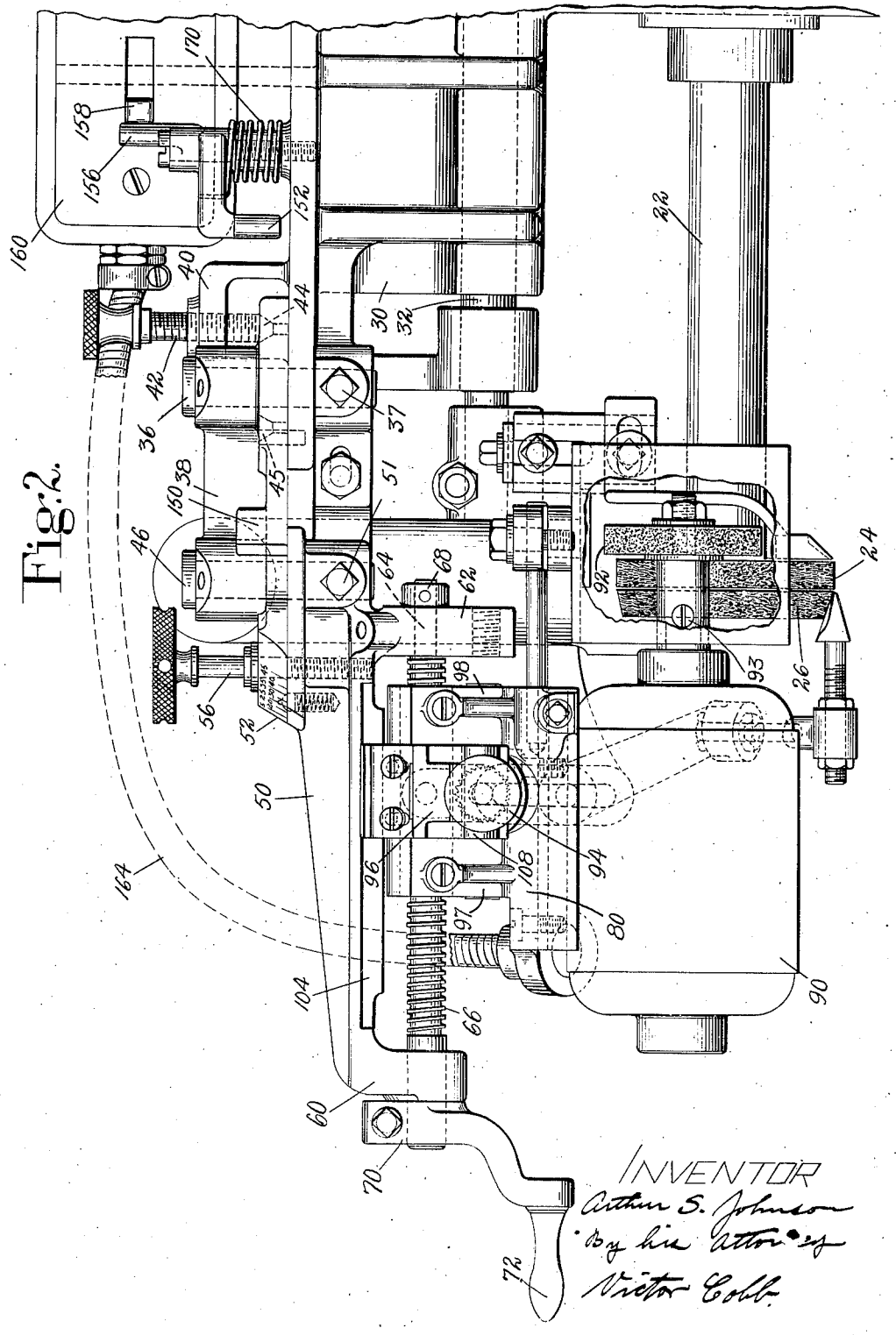
Victor Cobb

Jan. 20, 1942. A. S. JOHNSON 2,270,446

GRINDING MACHINE

Filed Jan. 11, 1939 4 Sheets-Sheet 2

Fig. 2.



INVENTOR
Arthur S. Johnson
By his Attorneys
Victor Cobb

Jan. 20, 1942. A. S. JOHNSON 2,270,446

GRINDING MACHINE

Filed Jan. 11, 1939 4 Sheets-Sheet 3

Fig. 3.

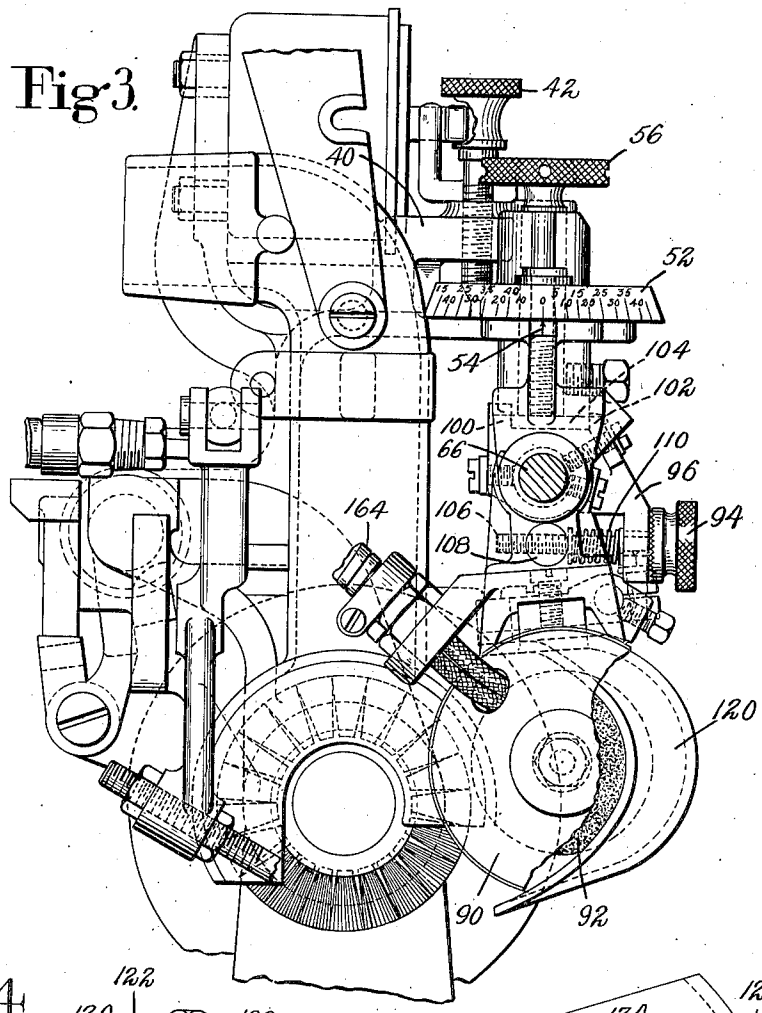


Fig. 4.

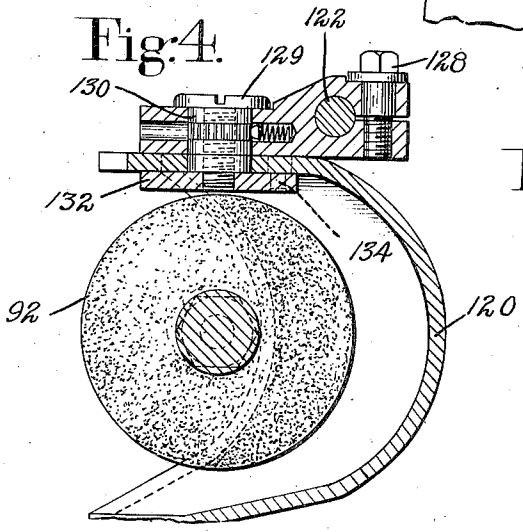
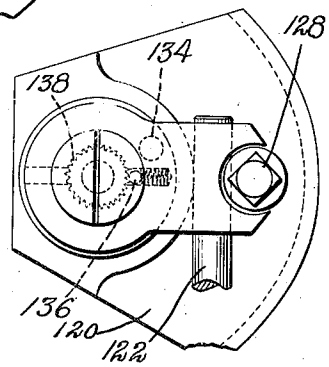


Fig. 5.



INVENTOR

Arthur S. Johnson

By his Attorney

Victor Cohl.

Jan. 20, 1942. A. S. JOHNSON 2,270,446

GRINDING MACHINE

Filed Jan. 11, 1939 4 Sheets-Sheet 4

Fig:6.

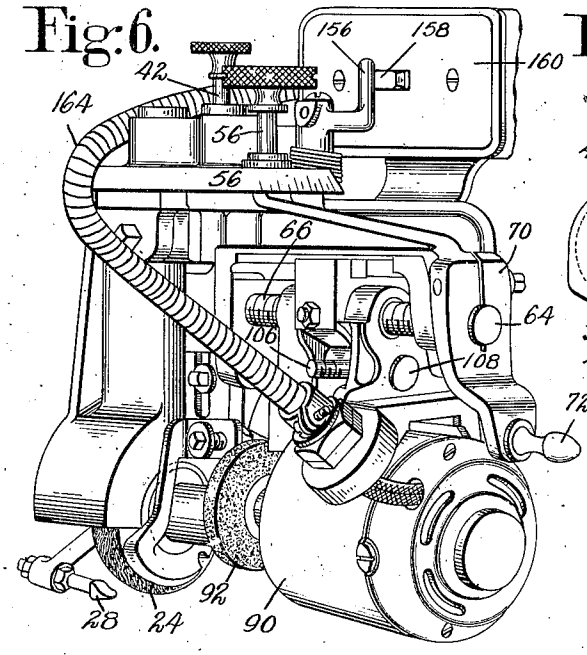


Fig:7.

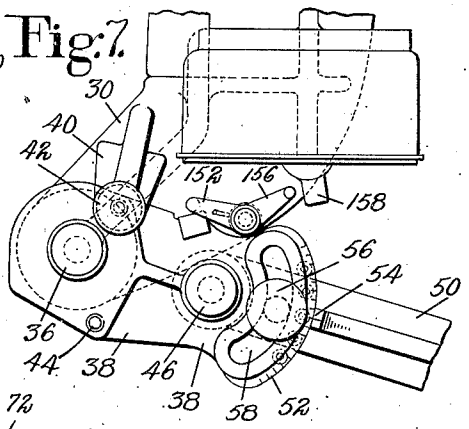


Fig:14.



Fig:8. Fig:9. Fig:10. Fig:11. Fig:12 Fig:13.

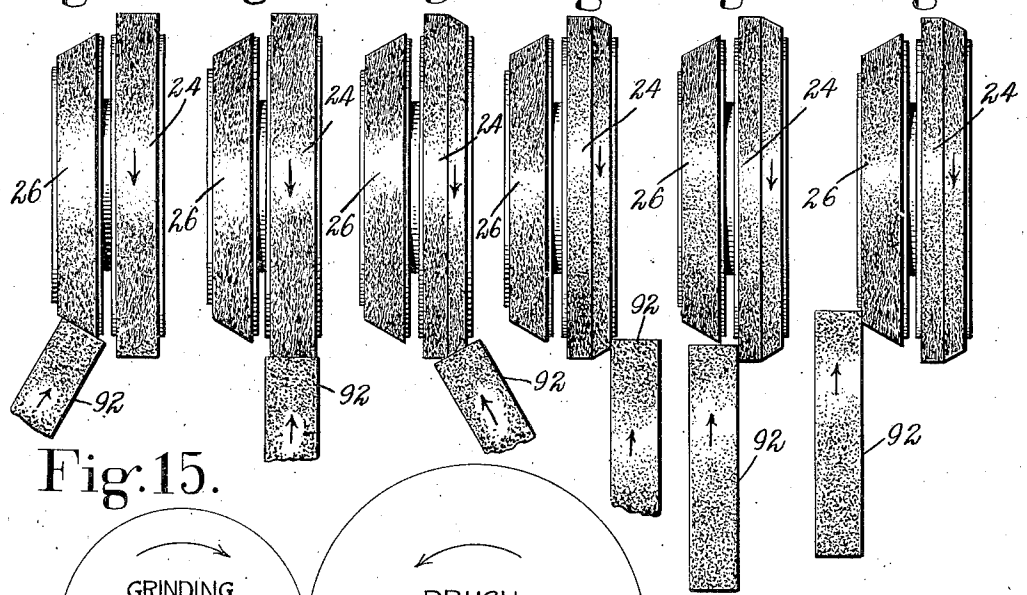
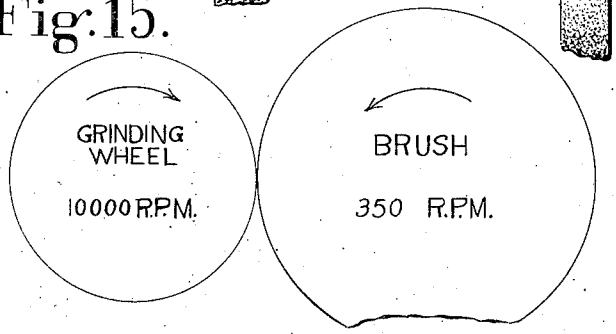


Fig:15.



INVENTOR
Arthur S. Johnson
By his attorney
Victor Cobb

Patented Jan. 20, 1942 2,270,446

UNITED STATES PATENT OFFICE

2,270,446

GRINDING MACHINE

Arthur S. Johnson, Beverly, Mass., assignor to United Shoe Machinery Corporation, Borough of Flemington, N. J., a corporation of New Jersey

Application January 11, 1939, Serial No. 250,384

12 Claims. (Cl. 69—1)

This invention relates, generally, to a method of and device for grinding rotary tools and especially those having roughing elements, such as wire bristles, for roughing the surface of leather or other material preparatory to the application of adhesive cement. More particularly, it has, for its purpose, the sharpening and maintenance of the proper shape of the peripheral contour of a roughing tool made of wire bristles especially shaped for roughing the channel flap and channel base of a channelled sole preparatory to cementing the channel so that the channel flap can be laid down and secured in its original position to conceal the seam by which the outsole is secured to a shoe.

When a rotary roughing tool consisting of a wire bristle brush is used for roughing leather or similar material, the ends of the bristles must be kept sharp and the brushes are more efficient for this purpose if the ends of the wire bristles have burrs on their leading edge similar to the burr on a cabinet-maker's scraper and when the ends also have a clearance angle behind the leading edges. Such an angle is produced when the radial length of the following side of each bristle is shorter than that of the leading side. The difference in length is minute, of course, in the small sizes of bristles used for this work.

In order to produce the roughing burr on the leading edge of each bristle end, it is necessary for the abrasive particles in the grinding device to pass across the ends of the bristles from rear to front, so that the particles of abrasive leave contact with each bristle at the leading edge thereof.

In order to provide the suitable clearance angle on the ends of the bristles, so that the following edge will not ride upon the work and prevent the leading edge from roughing the work, it is necessary, while the grinding is being performed, to deflect each bristle forwardly or toward its leading edge. This deflection naturally occurs from the frictional contact of the abrasive as it acts on the end of each bristle as the particles move from rear to front or in the same manner that they move in producing the burr. It should be noted that the bristles, when in use, become dulled on their leading edges, due to the fact that the bristles are circumferentially deflected in the opposite direction, or rearwardly, by contact with the work that is being roughed.

Heretofore, in order to obtain this burr and clearance angle, it has been necessary, when the brush is being sharpened, to rotate it in the opposite direction from that in which it rotates during a roughing operation. In order to do this it has been necessary, either to remove the brush from the machine in which it is used and mount it in a grinding device where it may be rotated in a reverse direction, or else it has been necessary to arrange a reverse drive for the brush in the roughing machine itself. There are obvious objections to both of these methods of procedure. In the first instance, considerable time is wasted by the operator in removing the brush from the machine where it is used and then remounting it in a jig or fixture in a position so that it may be rotated in the reversed direction to be sharpened. In the second instance, it is necessary to complicate the machine by adding a reverse drive mechanism in order to reverse the normal direction of rotation of the brush for the sharpening operation.

It is an object of the present invention to overcome the above objections and provide a grinding device which may be permanently mounted on the roughing machine and which, when necessary, may be positioned in contact with the roughing tool while it is rotating as in the normal operation of the machine, i. e., to grind the tool in situ, and by which a brush may be shaped and the bristles sharpened with the usual burr on the leading edge of each bristle end and with the usual clearance angle on such ends.

To accomplish this object, an important feature of the invention consists in a novel mounting for a grinding wheel in a roughing machine by which it may be positioned in a variety of different operating positions relatvely to the rotary tool or brush, to sharpen the bristles and produce and maintain the desired peripheral contour on the tool for the work at hand. In this arrangement, in order to produce the desider burr and clearance angle, the grinding wheel is arranged to rotate so that the part of its periphery that is in contact with the brush moves in the same direction as the movement of the contacting surface of the brush, but at a much higher speed, so that the abrading particles on the wheel, after passing across the ends of the bristles at high speed, leave such ends at their leading edge, producing a burr which will be the first part of each bristle to strike the work in the roughing operation. It is obvious that this arrangement also produces the desired clearance angle behind the leading edge of each bristle.

In other words, the grinding wheel is arranged to rotate at a relatively high peripheral speed while the brush is rotating in its usual location

and in its normal direction at a substantially slower speed, with the contacting surfaces of both moving in the same direction.

It is, of course, unnecessary for the grinding wheel to be in rotation when the rotary tool is being used. In order to simplify the operation of the device and to prevent waste of power and possible injury because of carelessness on the part of the operator in neglecting to shut off the power to the grinding wheel after a tool or brush has been sharpened, another feature of the construction consists in automatic means for stopping the grinding wheel when it is moved into inoperative position. In the preferred construction, the wheel is rotated by means of an electric motor and, as illustrated, provision is made whereby the swinging of the wheel into inoperative position moves to the "off" position the switch which controls the current that is supplied to the motor. As an alternative, a pneumatic or other fluid motor may be substituted for the electric motor.

It is within the scope of the invention to mount the grinding wheel so as to sharpen some other form of rotating tool, such as a circular knife. Means for shutting off the power from the grinding wheel when it is swung into inoperative position may also be provided with such modified construction.

The invention will be better understood when the following specification is considered in connection with the accompanying drawings, in which

Fig. 1 is a front elevation of a portion of a channel-roughing machine, showing the grinding attachment of the present invention mounted thereon, with the grinding wheel swung into an angular position for grinding an angular face of a roughing brush;

Fig. 2 is a similar view on a larger scale, showing further details of the grinding attachment, with the grinding wheel swung into position preparatory to feeding it across the face of a cylindrical roughing brush;

Fig. 3 is an end view of a roughing machine and the grinding attachment, with the grinding wheel slightly separated from the roughing brush and with the shaft of the grinding wheel in parallel relation to the brush shaft for grinding a cylindrical surface on the brush, i. e., as shown in Fig. 2;

Figs. 4 and 5 are details of construction of the guard for the grinding wheel;

Fig. 6 is a perspective view of the attachment with the grinding wheel swung into and locked in inoperative position;

Fig. 7 is a plan view of further details of construction;

Figs. 8 to 13, inclusive, show two different combinations of two-part roughing brushes, and the location in which the grinding wheel should be positioned to true up and sharpen these different shapes;

Fig. 14 is an enlarged view of one of the wire bristles of which the roughing brush is composed and shows the burr produced on its end by the grinding operation; and

Fig. 15 is a diagrammatic view showing the directions of rotation of the brush and grinding wheel, and their relative peripheral speeds, whereby the proper roughing burrs and clearance angles are produced on the ends of the bristles of the brush.

The frame of a channel-roughing machine is shown at **20** and from this frame projects a rotatable shaft **22** on which is mounted a two-part roughing brush. The part **24** of the brush operates on the channel base and the part **26** operates on the channel lip, to roughen these parts of a channeled sole of a shoe, preparatory to a cementing operation. An adjustable guide **28** is provided for guiding the shoe during the channel roughing operation. Such a channel roughing machine is shown in the copending application for United States Letters Patent Serial No. 125,608, filed February 13, 1937, in the name of Arthur S. Johnson, since issued as Patent No. 2,179,507, granted November 14, 1939.

In order that the grinding attachment may be conveniently located for truing up and sharpening the roughing brush, the attachment is mounted on a fixed bracket **30**, which bracket is secured to a fixed rod **32** that also carries a portion of the roughing machine. The rod **32** extends horizontally from the frame **20** and passes through a hole in the bracket **30**. The bracket **30** is secured to the rod **32** by set screws (not shown) after being positioned rotatively by an adjusting screw **34**, which bears against the frame **20**.

The fixed bracket **30** is provided with a vertical pivot pin **36**, which is held in position by a set screw **37**. On the pin **36** is pivoted a swinging bracket **38**. The fixed bracket **30** is provided with an overhanging arm **40**, having a tapped hole through which a knurl-headed locking screw **42** is threaded. The lower conical end of the screw **42** may pass into either one of two countersunk holes **44** or **45** in the swinging bracket **38**, to lock the bracket, respectively, in either operative or inoperative position, as will be made clear later. The bracket **38** has a vertical bearing for a pivot pin **46** which is secured in a second swinging bracket **50** by a set screw **51**. The bracket **50** may be swung into any definite angular position, as indicated by a graduated scale **52** and an index mark **54**, and locked in the desired position by a clamping screw **56** which is tapped into the bracket **50** and passes through an arcuate slot **58** in the bracket **38**. (See Fig. 7.)

Depending from the swinging bracket **50** are two separated ears **60** and **62** having bearings between which is mounted a shaft **64** having a coarse feed screw **66** cut thereon. The shaft **64** is prevented from longitudinal movement between the bearings by a collar **68** on one end and a crank **70** on the other end, the latter being provided with a handle **72** by which the screw **66** may be rotated. A depending bracket **80** hangs from the feed screw **66** and can be fed thereby across the roughing tool. An electric motor **90** is mounted on the under side of the bracket **80** and carries a grinding wheel **92** mounted on a sleeve secured to the motor shaft by a set screw **93**.

In order to swing the motor and its grinding wheel about the feed screw **66** into a desired adjusted position, an adjusting screw **94** is arranged to turn freely in a bracket **96** which is carried on the top of the threads of the feed screw **66** between ears **97**, **98** of the bracket **80**. In order to prevent the bracket **96** from turning about the axis of the feed screw **66**, the bracket is provided with a lug **100** and a cooperating gib **102** which bear on opposite sides of a guideway **104** that is integral with, and depends from, the bracket **50**. The shank **106** of the adjusting screw **94** is tapped into a short shaft **108** which is freely mounted in the bracket **80** and provides a swivel connec-

tion between it and the bracket 96, whereby turning the adjusting screw 94 will move the motor and grinding wheel 92 about the feed screw 66 toward and from the roughing tool. Interposed between the bracket 96 and the short shaft 108 is a stiff spring 110 to take up backlash while permitting a micrometric adjustment of the grinding wheel toward and from the roughing tool. With this arrangement, only a limited amount of material will be ground off at a time and overloading of the motor is prevented.

It will be seen that, with the above construction, the grinding wheel 92 may be located and secured in the several positions shown in Figs. 8 to 13, inclusive, and fed across the brush by the crank handle 72 and made to assume any adjusted position toward and from the brush by the adjusting screw 94 to determine the amount of material ground off from the roughing brush.

The grinding wheel 92 is provided with a guard 120 to protect the operator from flying dust and possible breakage of the grinding wheel. This guard is so mounted that it partakes of the positioning movements of the grinding wheel and motor. The mounting consists of a rod 122 secured, by a set screw 124, to the swinging bracket 80 that carries the motor. Adjustably mounted on the rod 122 is a clamp member 126 held in adjusted position by a clamp screw 128. The guard 120 is pivotally mounted on the rear portion of the clamp 126 by means of a shouldered pivot screw 129 moving with the guard, the screw having the end of its shoulder 130 seated securely on a threaded washer 132 fastened to the guard by means of a rivet 134. The guard 120, and its attached pivot screw 129, may be turned about the axis of the screw 129, the screw turning in a hole in the clamp 126. The guard will be held in any adjusted position by a spring pressed ball 136 acting against teeth 138 formed on the shouldered part of the screw. (See Figs. 4 and 5.)

The manner in which the directions of rotation of the brush and grinding wheel, and their relative peripheral speeds, form a burr on the leading edge on the end of each of the bristles of the roughing brush, with a clearance angle behind each leading edge, will be clear from an inspection of the diagrammatic view of Fig. 15.

In order to assure that the current is shut off from the grinding attachment when it is swung into inoperative position, automatic means are provided for the purpose. After the locking screw 42 has been freed from the counter-sunk hole 44, the bracket 38 is swung about its pivot 36 into inoperative position (see Fig. 6), at which time a flat-faced lug 150, integral with the bracket 38, strikes an arm 152 of a pivoted double-armed lever 154 and turns it. As the lever turns, its other arm 156 strikes the handle 158 of a toggle switch mounted in a box 160 and turns it to the "off" position. This severs the electrical connection between a portable cord 162 leading from the source of electric power and an armored cable 164 extending from the box 160 to the motor 90. The bracket is then locked in inoperative position by turning the locking screw 42 into the countersunk hole 45. The switch cannot be thrown to the "on" position until after the operator has swung the attachment into operating position and locked it by screw 42, when his hand is then free to throw the switch to the "on" position. A torsion spring 170 maintains the double-armed lever 154 so that there is a slight space between the handle 158 and the arm 156 of the lever. Accordingly, the motor may be stopped at any time by throwing the switch handle 158 to the "off" position but it cannot be thrown to the "on" position while the grinding attachment is in inoperative position.

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

1. The method of grinding the bristles of a wire brush which consists in rotating the brush in the direction in which it normally rotates during its use and rotating a grinding wheel in contact with the ends of the bristles of the brush with a greater peripheral speed than that of the brush and with the contacting portions of the brush and the grinding wheel moving in the same direction.

2. The method of grinding the roughing elements of a rotary roughing tool which consists in rotating the tool in its usual operating direction and in its usual operating position and in rotating a grinding wheel in grinding contact with the outer ends of the elements to grind them while the elements are circumferentially deflected forwardly, so as to produce a clearance angle on the ends of said elements.

3. The method of grinding the bristles of a wire brush which consists in rotating a brush in situ in a roughing machine in its usual operating direction and in rotating a grinding wheel in contact with the ends of the bristles of the brush with a greater peripheral speed than that of the brush and with the contacting portions of the brush and the grinding wheel moving in the same direction.

4. The method of grinding the roughing elements of a rotary roughing tool which consists in rotating a tool in its usual operating direction while mounted in a roughing machine in its usual operating position and in rotating a grinding wheel in grinding contact with the outer ends of the roughing elements to grind them while the elements are circumferentially deflected forwardly, so as to produce a clearance angle on the ends of said elements.

5. The method of grinding the wire bristles of a rotary roughing brush which consists in rotating the brush in situ in a roughing machine and in rotating a grinding wheel in grinding contact with the outer ends of the bristles to grind them while the bristles are circumferentially deflected forwardly, so that the radial length of the following side of each bristle will be shorter than that of the leading side.

6. The method of grinding the wire bristles of a rotary roughing brush which consists in rotating a roughing brush in its usual operating position and direction of rotation while mounted in a roughing machine and in rotating a grinding wheel in grinding contact with the outer ends of the bristles with the contacting surface of the wheel moving in the same direction as, and much faster than, the ends of the bristles.

7. A machine having, in combination, a rotary brush provided with wire roughing bristles, means for rotating the brush, a grinding wheel, and means arranged to rotate said wheel at a peripheral speed greater than that of the brush and with the contacting portions of the brush and the wheel moving in the same direction.

8. A machine having, in combination, a rotary brush provided with wire roughing bristles, means for rotating the brush in a given direction and at a certain speed to perform a roughing operation upon a piece of work, a grinding wheel mounted in inoperative position, means for moving the

wheel into operative position to sharpen the bristles while the brush is rotating in said direction and at said speed and not performing a roughing operation, and means for rotating the grinding wheel at a peripheral speed greater than the peripheral speed of the brush and with the contacting portions of the brush and the wheel moving in the same direction, to produce a roughing burr on the leading edge of each bristle.

9. A machine for roughing shoe parts having, in combination, a rotary tool provided with a multitude of flexible roughing elements extending outwardly to its circumference, said elements being circumferentially deflected rearwardly by contact with shoe parts when the tool is rotated in its normal direction to use the outer ends of the elements for roughing purposes, means for rotating the tool in said direction, a grinding wheel, means to position said wheel in grinding contact with the roughing elements of said tool while the tool is rotating in its normal direction and means arranged to rotate said wheel at a peripheral speed greater than that of the tool and with the contacting portions of the tool and the wheel moving in the same direction, so that the rotating wheel will deflect the rotating roughing elements circumferentially forwardly and grind them in situ with a clearance angle on the ends of said elements.

10. A machine for roughing shoe parts having, in combination, a rotary tool provided with a multitude of flexible roughing elements extending outwardly to its circumference, means rotating said tool, a grinding wheel, means rotating said wheel at a higher peripheral speed than the tool, and means to position the rotating wheel in grinding contact with the roughing elements of said tool while the tool is rotating in its normal direction, so that the rotating wheel will grind the rotating roughing elements in situ with a roughing burr on the leading edge of the ends of said elements.

11. A device for grinding the roughing bristles of a rotary roughing tool in situ, having, in combination, a series of pivotally connected brackets, a grinding wheel mounted to move with the last bracket of the series, means for moving said last bracket in two directions at right angles to each other to feed the wheel both toward and across the tool, means for locking the remaining brackets of the series in either angularly adjusted operating position or in inoperative position, and means for rotating the grinding wheel at a speed and in the direction to produce a roughing burr on the leading edge of the bristle ends.

12. A device for grinding the roughing elements of a rotary roughing tool in situ, having, in combination, a series of pivotally connected brackets, a grinding wheel mounted to move with the last bracket of the series, means for moving said last bracket in two directions at right angles to each other to feed the wheel both toward and across the tool, means for locking the remaining brackets of the series in either angularly adjusted operating position or in inoperative position, and an electric motor for rotating the grinding wheel in such a direction and at such a speed that the contacting surfaces of the wheel and tool move in the same direction, with the surface of the wheel moving much faster than the surface of the tool.

ARTHUR S. JOHNSON.