

R. F. McFEELY.
MACHINE FOR REMOVING SURPLUS MATERIAL.
APPLICATION FILED APR. 18, 1910.

1,054,656.

Patented Feb. 25, 1913.

4 SHEETS—SHEET 1.

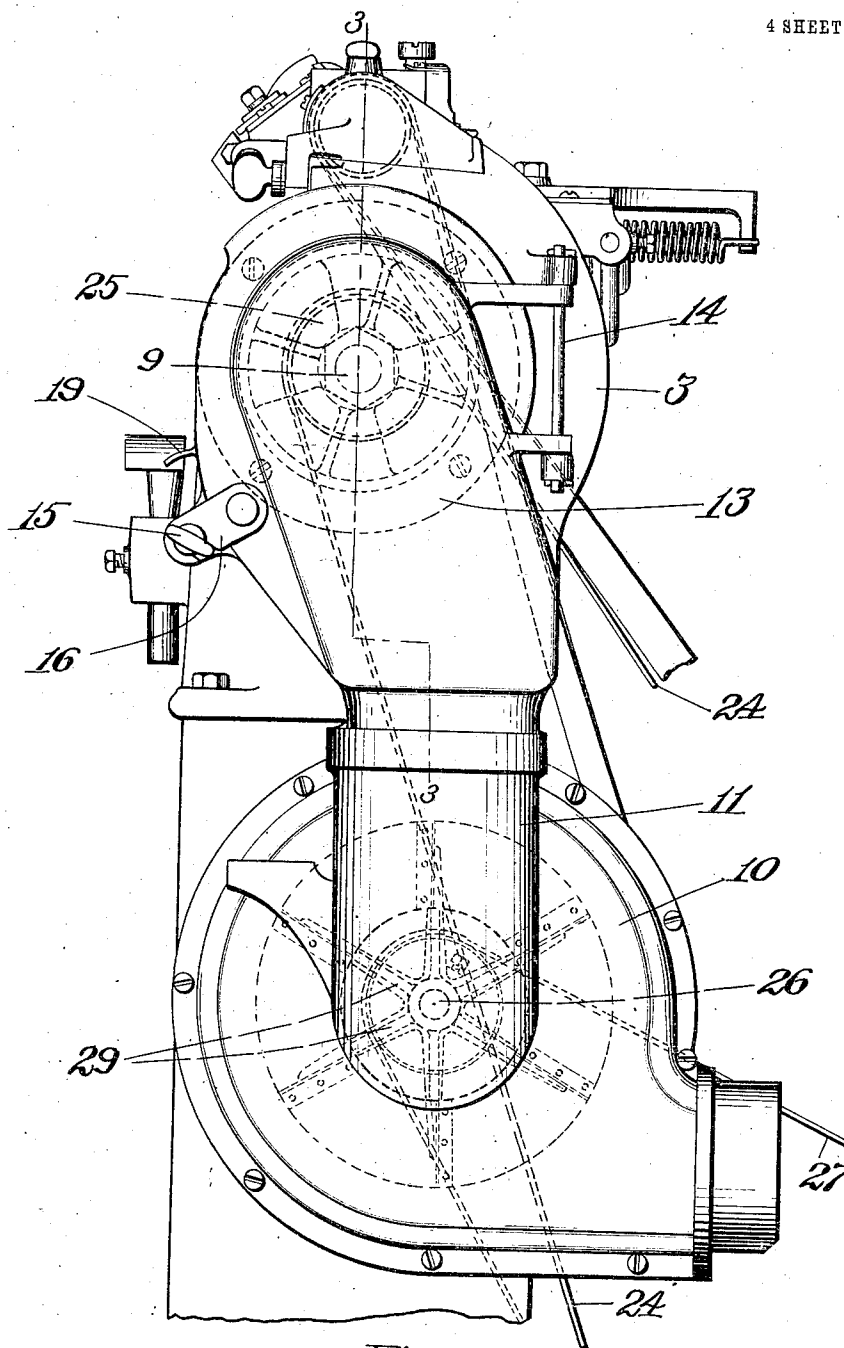


Fig. 1.

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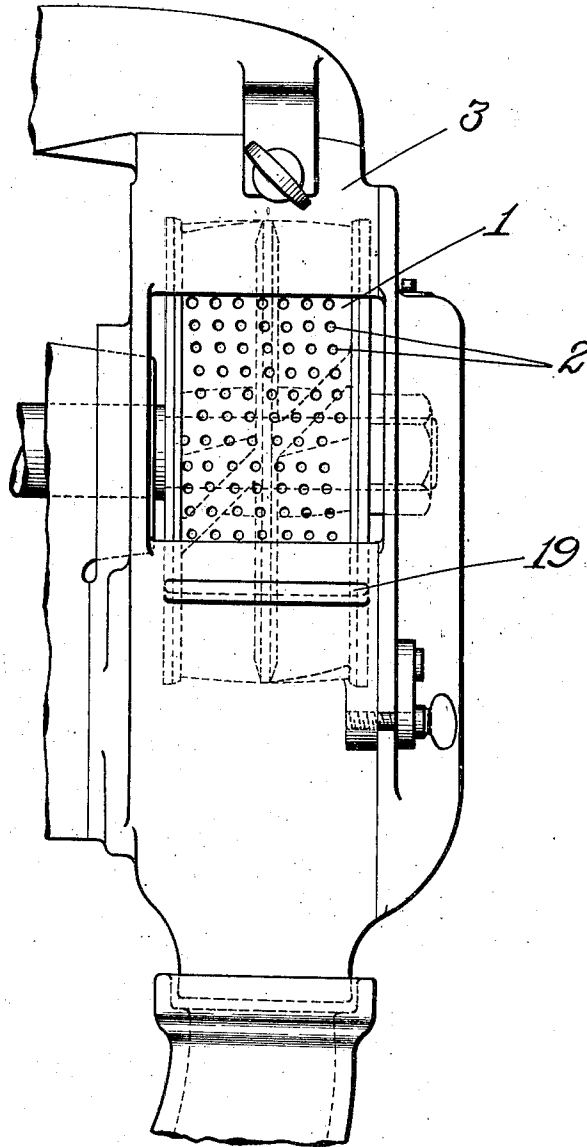


Fig. 2.

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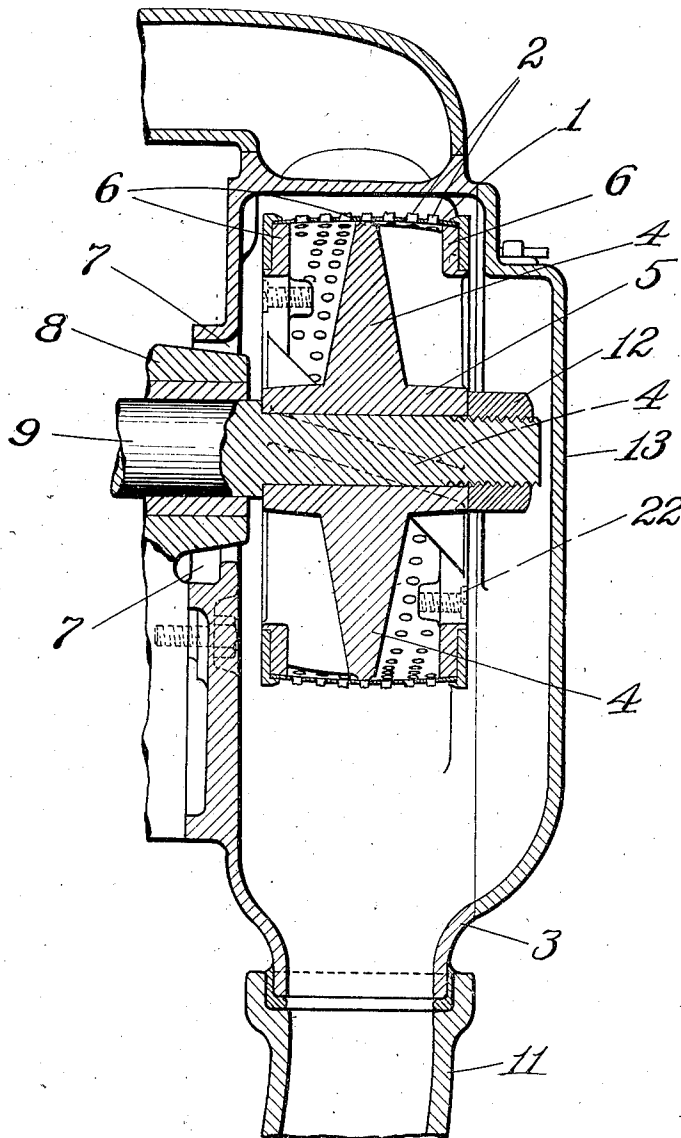


Fig. 3.

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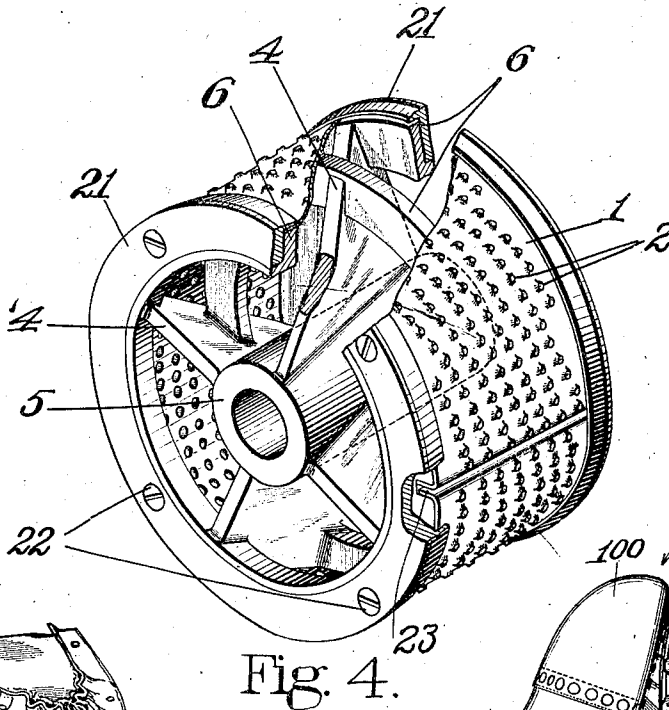


Fig. 4.

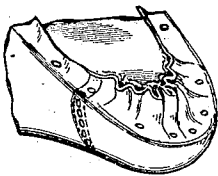


Fig. 6.

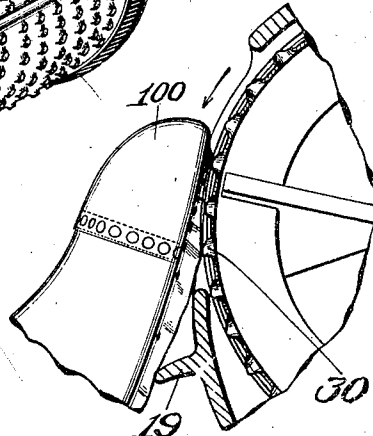


Fig. 7.

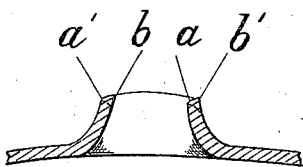


Fig. 9.

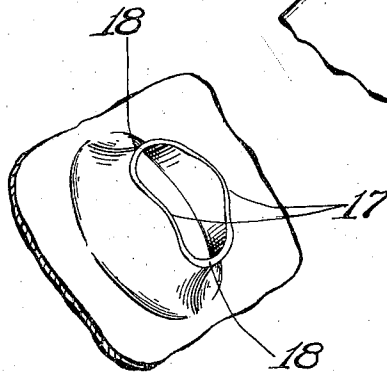


Fig. 5.

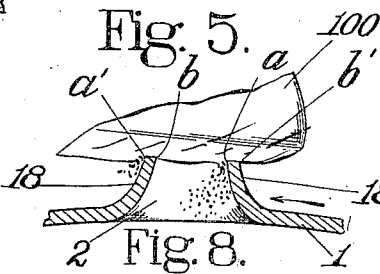


Fig. 8.

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UNITED STATES PATENT OFFICE.

RONALD F. McFEELY, OF BEVERLY, MASSACHUSETTS, ASSIGNOR TO UNITED SHOE MACHINERY COMPANY, OF PATERSON, NEW JERSEY, A CORPORATION OF NEW JERSEY.

MACHINE FOR REMOVING SURPLUS MATERIAL.

1,054,656.

Specification of Letters Patent.

Patented Feb. 25, 1913.

Application filed April 18, 1910. Serial No. 556,164.

To all whom it may concern:

Be it known that I, RONALD F. McFEELY, a citizen of the United States, residing at Beverly, in the county of Essex and State of Massachusetts, have invented certain Improvements in Machines for Removing Surplus Material, of which the following description, in connection with the accompanying drawings, is a specification, like reference characters on the drawings indicating like parts in the several figures.

This invention relates to machines for removing surplus material from stock and more particularly for removing from the toe of an unfinished shoe the surplus material which results from the pulling-over and lasting operations.

The shoe upper at the toe portion commonly comprises the leather of the upper, the lining, the box toe which is more or less impregnated with a stiffener, and often a lining for the box toe. When this bulky portion of the upper is drawn over the comparatively sharp curve at the toe of the innersole and tacked, or otherwise fastened in place, that part beneath the sole is crumpled and forms a projecting bunch which if allowed to remain would interfere with the proper laying of the outersole. It is therefore customary to remove the surplus of this part of the stock and then to pound and press the remainder so as to flatten it as thoroughly as possible. A coarse-grained emery or similar wheel has been used for removing this surplus. Such wheels, however, are subject to the disadvantage that they soon lose their cutting qualities. This results from the fact that the stiffener with which the box toe is impregnated is rendered sticky by the heat of the grinding operation and unites with the shreds of leather and cloth to form a paste-like mass which fills the interstices between the cutting projections of the wheel and soon produces a smooth glazed surface so that it becomes necessary to remove the wheel and cut away this material until the original properties of the wheel have been restored. In addition to this the heating of the stiffener and the leather during the grinding operation causes a most disagreeable stench, and the pressure required to be exerted by the operator is considerable at best and increases rapidly as the surface of the wheel becomes glazed.

Accordingly in order to obviate these disadvantages as well as to produce a more effective machine, one feature of this invention consists in the provision of a shell provided with projections and with perforations adjacent said projections for preventing the accumulation of waste material on the cutting surface of said shell. And in order to remove the waste material which would otherwise tend to form a layer upon the interior wall of the shell and thereby close the perforations and clog the machine, means are provided for ejecting such material from the shell, and preferably this means takes the form of a fan having spirally arranged blades, said fan being rotated within said shell so that a current of air is drawn through said perforations as well as through said shell transversely to its direction of rotation. Preferably the shell is inclosed, save for a work receiving opening, by a casing, and a suction device is provided to remove such particles as may cling to the abrading surface as well as those ejected from the interior of the shell. With this construction and arrangement the abrading tool or shell is kept free from waste material, and no appreciable heat is generated.

Another feature of this invention consists in the provision of abrading projections of particularly efficient form. Preferably these projections are hollow and are formed with thin shredding or slitting teeth which lie approximately in planes perpendicular to the axis of the shell and with cutters or scrapers the greater portion of the edges of which lie approximately in planes transverse to those of the teeth. With this construction, the stock is first slit and then cut or scraped off, the greater part of the material removed being guided through the perforations in the projections to the interior of the tool.

In the course of continued use these projections will, of course, be worn down, but in order to prolong their efficiency another feature of this invention consists in a construction and arrangement of parts whereby the cutters are so worn by use when the shell is rotated in one direction that they are sharpened for use when the direction of rotation of the shell is reversed.

In the illustrated embodiment the hollow projections are so formed and the pres-

entation of the work so governed that the cutting or scraping is accomplished by the square inner edge of one cutter and the similar outer edge of the other cutter of each projection whereby said edges become rounded off. The same wear, however, which rounds off the edges referred to above serves to render square and thereby to sharpen the other inner edge and the other outer edge of the respective cutters so that when the direction of rotation of the shell is reversed these sharpened edges will become operative while the previously rounded off edges will be squared again. And, in order to obviate the necessity which would otherwise arise of reversing the direction of rotation of the driving shaft, the cylindrical shell or tool is made symmetrical and is so mounted that it may be reversed end for end when the cutters have been sharpened by use as described above. The presentation of the work is also so controlled as to do away with the necessity of exerting any considerable pressure upon the work; and this is accomplished by so positioning the work support and the work receiving opening with respect to the abrasive projections as they come into operative position that the work is automatically drawn in toward the tool.

These and other features of the invention including certain details of construction and combinations of parts will be described more fully in connection with the accompanying drawings and pointed out in the appended claims.

Referring now to the accompanying drawings,—Figure 1 is a side elevation of a machine embodying this invention, certain parts of a pounding-up machine being also shown; Fig. 2 is a front elevation, the parts of the pounding-up machine being omitted; Fig. 3 is a section on the line 3—3 of Fig. 1; Fig. 4 is a perspective showing the abrasive shell in place upon its support; Fig. 5 is a perspective of one of the projections enlarged to show its form more clearly; Fig. 6 is a perspective of the toe of a shoe as it appears before being subjected to the operation of the machine; Fig. 7 is a side view of a portion of the machine together with a portion of a shoe in position to be operated upon, the greater part of the surplus material having already been removed; Fig. 8 is an enlarged section of a projection showing the surplus material being acted upon, and Fig. 9 is an enlarged detail showing how the edges of the cutters or scrapers are alternately dulled by being rounded off and sharpened by being squared.

An abrasive shell 1 herein shown as a sheet of steel bent into approximately cylindrical form, hardened and provided with outstanding projections 2, is rotatively

mounted in a casing 3, an opening being provided in said casing, as shown in Figs. 1, 2 and 7, for the presentation of the toe of an unfinished shoe or other piece of work from which surplus stock is to be removed. The action of an abrasive tool of this sort is to produce a bulky mass of shreds and dust which tends rapidly to clog the abrasive surface of said tool. Accordingly, perforations are provided adjacent the abrasive projections and as herein shown these perforations are in the approximate center of the projections, one of their objects being to permit the waste material to pass to the interior of the tool or shell. When, however, this waste material has reached the interior of the shell centrifugal force tends to distribute it in a layer about the interior wall of said shell and thereby to close the perforations from the inside and interfere with the efficiency of the machine. To prevent this, means is provided for drawing air through the shell, and preferably this means takes the form of a fan located within the shell and comprising blades 4 arranged spirally so as to eject the waste material through the open end of the shell (the right hand end as shown in Fig. 3). In the illustrative machine these blades are integral with the hub 5 of the support and in addition to their function described above serve also as spokes or webs which carry the supporting rings 6, said hub, blades and rings being herein shown as integral. The effect of the rotation of the blades 4 is to draw air through the perforations thereby preventing them from becoming clogged, and at the same time to draw a current of air through the shell from end to end (from left to right as shown in Fig. 3). A large portion of the finely divided waste material is consequently drawn into the interior of the shell and ejected from its open end.

A suction device 10 of any suitable form is connected with the casing 3 by a pipe 11. The effect of the suction applied by this device is three-fold, to aid in keeping the perforations freely open, to stir the material inside the shell and thereby prepare it to be readily ejected by the blades, and to carry off the waste material which is ejected as well as any which may cling to the surface of the shell. This finely divided waste material would tend, if left to itself, to become matted on both sides of the shell, and consequently it is very desirable to stir it up continuously and sweep it out in the form of a cloud. And in this connection attention is particularly directed to the advantages of the pneumatic means illustrated whereby the perforations are prevented from clogging and the waste material is carried away from the cutting edges of the abrading projections as soon as it is severed from the stock.

Moreover the currents of air tend to prevent a rise of temperature with the attendant heating and softening of the stiffener of the box toe, the disadvantageous effects of which

5 have been referred to above. The hub 5 of the support is held on the reduced end of the shaft 9 by a nut 12; and in order to permit removal and replacement of said hub with its associated parts a door 13 is hinged upon a rod 14 and is held in closed

10 position by a screw 15 which passes through a lug 16 on said door and is threaded into the casing 3. The efficiency of the abrading projections is increased in the illustrated embodiment by making them of a particular form comprising two thin slitting or shredding teeth 17 (see Fig. 5) lying approximately in planes perpendicular to the axis of rotation of the

20 shell and two slightly curved cutters or scrapers 18 having their concave sides facing each other. These projections are produced by means of punches of particular form which are caused to break through the shell and to leave upstanding hollow burs. The

25 slitting or shredding teeth form the uppermost portion of these projections and are preferably narrower at the top than at the base while the edges of the cutters or

30 scrapers, the curvature of which is comparatively slight, extend approximately longitudinally of the shell at an angle to the planes of the teeth. As each projection comes into operative relation with the work a shred is produced by the teeth and then this shred is cut or scraped off by the cutter forming a part of that projection or some

35 of the following cutters, and the greater part of the waste material is directed into the interior of the shell. It should be noted too that the projections are arranged spirally on the shell so that they are in effect staggered, this arrangement insuring that the surplus material of the shoe shall be removed uniformly throughout its width.

45 As has been stated, one feature of this invention consists in a construction and arrangement whereby the edges of the cutters are so worn when the shell is rotating in one direction that they are sharpened for rotation of the shell in the opposite direction. To accomplish this the projections are so formed that the edges of the cutters are approximately in line with the axis of the

50 shell, and means are provided for governing the presentation of the work so that said work is presented at a proper angle. In Fig. 7 a shoe is shown in the position which it occupies toward the end of the operation. The action of these cutters or

60 scrapers is illustrated particularly in Fig. 8 in which the cutters 18 have not as yet been worn down on either of their edges. The abrasive shell 1 with the projection 2 is shown as rotating counter-clockwise. The

cutters 18, it will be observed, have four edges $a a'$ and $b b'$ which act in pairs upon the surplus material at the toe of the shoe 100. As shown the edges $a a'$ are operative; and, as the abrasive tool is subjected to use, these edges which are now square will be rounded off by wear and thereby become dull. The shell will then be reversed end for end preferably by removing the nut 12 and reversing the support on the shaft

70 whereupon the edges $b b'$ will become operative; and, as these edges become rounded off by wear, the edges $a a'$ which were previously rounded off will be squared again. In Fig. 9 the full lines show the rounded edges $a a'$, as they would appear after having been worn down. The edges $b b'$, it should be noted, are still square and sharp. The dotted lines in this figure show the edges $b b'$ rounded off and the edges $a a'$ squared again and hence sharpened. Referring again to Fig. 8 and bearing in mind the yielding nature of the surplus material at the toe of the shoe, the manner in which it is presented to the machine and the fact that the forward cutter presents its convex side to the work, it will be apparent that the forward cutter or scraper (as shown in Fig. 8, that one having the edges $a' b$) is not as effective as the rearward one in removing the surplus material, its function being more to force the material against the insole thereby compacting it and preparing it to be acted upon by the edge a . It should be understood that the thin teeth 17 are worn down faster than the cutters or scrapers and that as they are worn their edges become thicker and hence less effective, so that in the later stages of usefulness of the shell the cutters or scrapers are principally effective.

The construction of the projections as described above, together with the manner of presenting the work, makes possible another desirable result. In presenting the unfinished shoe, the bottom is first caused to contact with the rest 19 and then the toe is rocked about the point of the rest toward the abrasive shell. In this way the most outstanding portion of the surplus material viz., that portion remote from the extremity of the toe, first comes into contact with the shell and is engaged by projections, such as the one indicated at 30, which are moving inwardly as well as downwardly. The result is that the work is seized and drawn inwardly and downwardly. This automatic drawing in of the work is of short duration, but owing to the high angular velocity of the shell the greater portion of the surplus stock is removed during its continuance, a light pressure being then sufficient to accomplish the remainder of the operation.

In order that the direction of rotation of the shell may be reversed without reversing

the direction of rotation of the shaft 9, the support is fastened in place by the nut 12, as stated above. The shell is also detachably fastened in place by clamping rings 21. The adjacent parts of these rings and of the outside rings 6 of the support are rabbeted, and screws 22 hold these members together. Alined grooves or sockets are also formed in the rings 6, and the adjacent ends of the shell are turned inwardly, as shown at 23, and cooperate with said grooves to oppose any tendency to relative rotation between the shell and its support.

As shown best in Fig. 3, the shell is crowned or convexed outwardly, the object of this construction being to permit the teeth to operate within the curve of the tacks or other fastening means by which the upper and toe tip of the shoe are held in position. This construction adds greatly to the efficiency of the shell or tool since otherwise the projections would soon become broken or worn down by contact with the tacks or other fastening means. The shaft 9 is rotated by means of a belt 24 which passes around a pulley 25 fast to said shaft; and the rotatable member 29 of the suction device 10 is fast to a shaft 26 which is similarly rotated by a belt 27.

The operation of the machine is as follows:—Power having been applied to the shafts 9 and 26 the operator presents the bottom of the unfinished shoe to the guide or rest 19 and rocks the toe portion toward the rapidly rotating shell. The sharp projections engage the surplus material, draw it downwardly and inwardly, and remove the greater portion of it almost instantly. The operator then brings the remaining portions lightly into contact with the shell. Part of the material torn from the shoe is at once acted upon by the suction device 10 which removes it while that which is drawn through the perforations in the tool is ejected by the current of air set in motion by the blades 5 and is then carried away by the suction device 10, the two currents of air acting at an angle to each other serving to keep the finely divided waste material (particularly that within the shell) thoroughly stirred up and to sweep it out in a cloud. The shell is also cooled by these air currents, and this cooling together with the fact that no considerable pressure is applied upon the shoe insures a temperature low enough to prevent melting of the substance used to stiffen the box toe. The device therefore becomes neither clogged nor heated, and at the same time removes the surplus material from the shoe very rapidly and efficiently. After the shell has been rotated in a given direction until the edges of the cutters or scrapers have been sharpened, as described above, the machine is stopped, the nut 12 removed and the sup-

port reversed end for end upon its shaft, this reversal being repeated at intervals until the projections are worn down a sufficient extent to make the use of a new shell desirable. By removing one of the clamping rings 21 the shell may be reversed end for end upon its support, if desired.

It should be noted that the present machine performs the operation of removing surplus material much more expeditiously than does an emery wheel, that there is no perceptible heating of the stock and that the surface of the abrasive shell is only impaired by actual wear which in the hands of a careful operator is slight. It should also be understood that the abrasive shell can be manufactured from cheap stock and with very little labor so that the expense of producing a shell of the kind described is only a small fraction of the expense involved in manufacturing an emery wheel.

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

1. A machine for removing surplus stock from boots or shoes or parts thereof comprising a perforated shell provided with abrading projections, a hood inclosing said shell and having an opening to permit the presentation of the work, a rest to support the shoe, and a suction device for drawing waste material through said perforations and from the inner wall of said shell.

2. A machine for removing surplus stock from boots or shoes or parts thereof comprising a hollow tool of hardened metal having outwardly projecting hollow burs, said tool being circular in cross section and crowned at its center, a casing having an opening to permit the presentation of the toe portion of a shoe, and power actuated means for rotating said tool.

3. A machine for removing surplus stock from boots or shoes or parts thereof comprising a hollow abrading tool crowned to permit it to operate within the curve of the tacks at the toe portion of a boot or shoe and having perforations adapted to permit passage to the interior of the tool of waste particles taken from the stock by the abrading surface and a fan for ejecting said material from said tool.

4. A machine for removing surplus stock from boots or shoes or parts thereof comprising a hollow abrading tool crowned to permit it to operate within the curve of the tacks at the toe portion of a boot or shoe and having perforations adapted to permit passage to the interior of the tool of waste particles taken from the stock by the abrading surface and a fan within said tool for ejecting said material from said tool.

5. A machine for removing surplus stock from boots or shoes or parts thereof comprising a hollow abrading tool having per-

forations adapted to permit passage to the interior of the tool of waste particles taken from the stock by the abrading surface, a shoe support to present the toe portion of the shoe for the operation of said tool, and means for drawing a current of air through the interior of said tool.

6. A machine for removing surplus stock from boots or shoes or parts thereof comprising a hollow abrading shell having perforations adapted to permit passage to the interior of the shell of waste particles taken from the stock by the abrading surface and means within said shell for drawing a current of air through the interior of said shell, thereby removing waste material from the inner surface of the shell.

7. A machine for removing surplus stock from boots or shoes or parts thereof comprising a rotary shell circular in transverse section, having numerous perforations in its operative part and provided with abrading projections adjacent to the perforations, a stationary casing arranged about said shell having a work receiving opening, and means for applying suction to the interior of the shell and the interior of the casing.

8. A machine for removing surplus stock from boots or shoes or parts thereof having in combination an abrasive shell circular in transverse section, a shaft by which said shell is rotated, the construction being such that the shell may be reversed end for end with respect to the shaft, and means for rotating said shaft.

9. A machine for removing surplus material from boots or shoes or parts thereof comprising an abrasive shell provided with hollow self-sharpening projections, a casing partially inclosing said shell, means for drawing air through the abrasive projections of said shell, and means for rotating said shell.

10. A machine for removing surplus stock from boots or shoes or parts thereof having in combination a shaft, a shell mounted thereon provided with hollow abrading projections comprising spaced cutters each having two cutting edges, said shell being capable of being reversed end for end with respect to said shaft and means for rotating said shaft.

11. A machine for removing surplus stock from boots or shoes or parts thereof having in combination a tool circular in transverse section provided with hollow abrading projections comprising cutters or scrapers extending approximately longitudinally of said shell whereby as said cutters or scrapers come into operative position their forward edges are rounded off and their rearward edges rendered square, and means for rotating said shell.

12. A machine for removing the surplus stock from boots or shoes or parts thereof

having in combination a rotary shell provided with hollow projections comprising cutters or scrapers having square edges, a support for presenting said surplus material in such a manner that the forward edges of said blades are effective and become dulled, and means whereby said shell may be reversed end for end to permit the square or sharp edges to be effective.

13. A machine for removing surplus stock from boots or shoes or parts thereof having in combination a shell circular in transverse section, said shell being provided with abrading projections having cutters or scrapers, a support for guiding the presentation of the work in such a manner that while the shell is being rotated in a given direction one edge of each blade is effective to remove surplus stock and the opposite edge is being sharpened, said shell being capable of being reversed end for end to bring the sharp edges of said cutters or scrapers into operative position, and means for rotating said shell.

14. A machine for removing surplus stock from boots or shoes or parts thereof having, in combination, a support, a shell mounted thereon provided with hollow projections each comprising two curved cutters having their concave sides facing each other, the construction being such that the shell may be reversed end for end upon the support, and means for rotating said shell.

15. A machine for removing surplus stock from boots or shoes or parts thereof comprising a rotary shell circular in transverse section provided with hollow abrading projections communicating with the interior thereof, said projections being formed with thin teeth the planes of which are substantially at right angles to the axis of rotation of the shell.

16. A machine for removing surplus stock from boots or shoes or parts thereof having in combination a rotary shell circular in transverse section provided with hollow abrading projections communicating with the interior thereof, said projections being formed with thin slitting teeth the planes of which are substantially at right angles to the axis of rotation and with cutting edges at an angle to said teeth.

17. A machine for removing surplus material from boots or shoes or parts thereof comprising a rotary perforated abrasive shell and means within said shell for drawing waste material through the perforations.

18. A machine for removing surplus material from boots or shoes or parts thereof comprising a rotary tool having abrading projections and means insuring the presentation of the work in such a manner that it will be drawn in toward said tool.

19. A machine for removing surplus material from boots or shoes or parts there-

of comprising a shell circular in transverse section, said shell being provided with abrading projections, and a support for the work, the support and shell being so relatively positioned that upon presentation the work is drawn against the tool.

20. A machine for removing the surplus upper material on the under side of the toe portion of an unfinished shoe comprising a rotary tool having abrasive projections, a casing partially inclosing said tool and means for guiding the presentation of said shoe in such a manner that the most outstanding portion of said surplus material is presented to projections which are moving inwardly with respect to said casing whereby said material is drawn toward said tool.

21. A machine for removing surplus material from boots or shoes or parts thereof comprising a hollow tool provided with abrading projections and with perforations adjacent said projections for permitting the removed material to pass through the tool, means for continuously rotating the tool, a shoe support to present the toe portion of a shoe for the operation of said tool, and means acting simultaneously upon approximately all points on the interior face of the tool to counteract the tendency of centrifugal force to hold the removed material against said interior face.

22. A machine for removing surplus material from boots or shoes or parts thereof comprising a hollow tool provided with abrading projections and with perforations adjacent said projections for permitting the removed material to pass through the tool, means for continuously rotating the tool, and cleaning means acting both on the exterior and the interior of the tool to carry away the waste product produced by the action of said tool.

23. A machine for removing surplus material from boots or shoes or parts thereof comprising a hollow tool provided with abrading projections and with perforations adjacent said projections for permitting the

removed material to pass through the tool, a shoe support to present the toe portion of a shoe for the operation of said tool, means for continuously rotating the tool, and cleaning means operating to take control instantly of the particles of waste material as they are produced by the action of said tool and to carry said particles laterally away from said tool.

24. A machine for removing surplus material from boots or shoes or parts thereof comprising a hollow tool provided with abrading projections and with perforations adjacent said projections for permitting the removed material to pass through the tool, means for continuously rotating the tool, and means to maintain the tool in clean condition arranged to direct a continuous current of air through the tool and a current of air across the periphery of the tool transverse to the direction of action of centrifugal force.

25. In a machine for removing surplus material from boots or shoes or parts thereof, a hollow abrading tool, a hollow rotatable carrier presenting end rings and a middle ring for supporting the tool, and a suction device to draw a current of air through the carrier.

26. In a machine for removing surplus material from boots or shoes or parts thereof, a hollow abrading shell and a carrier therefor, said carrier comprising end rings to support the ends of the shell and an angularly faced clamping member removably secured to an end ring and shaped to present an edge abutment and an overlying flange to confine the shell in operating position.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

RONALD F. McFEELY.

Witnesses:

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LAURA M. GOODRIDGE.