

July 21, 1959

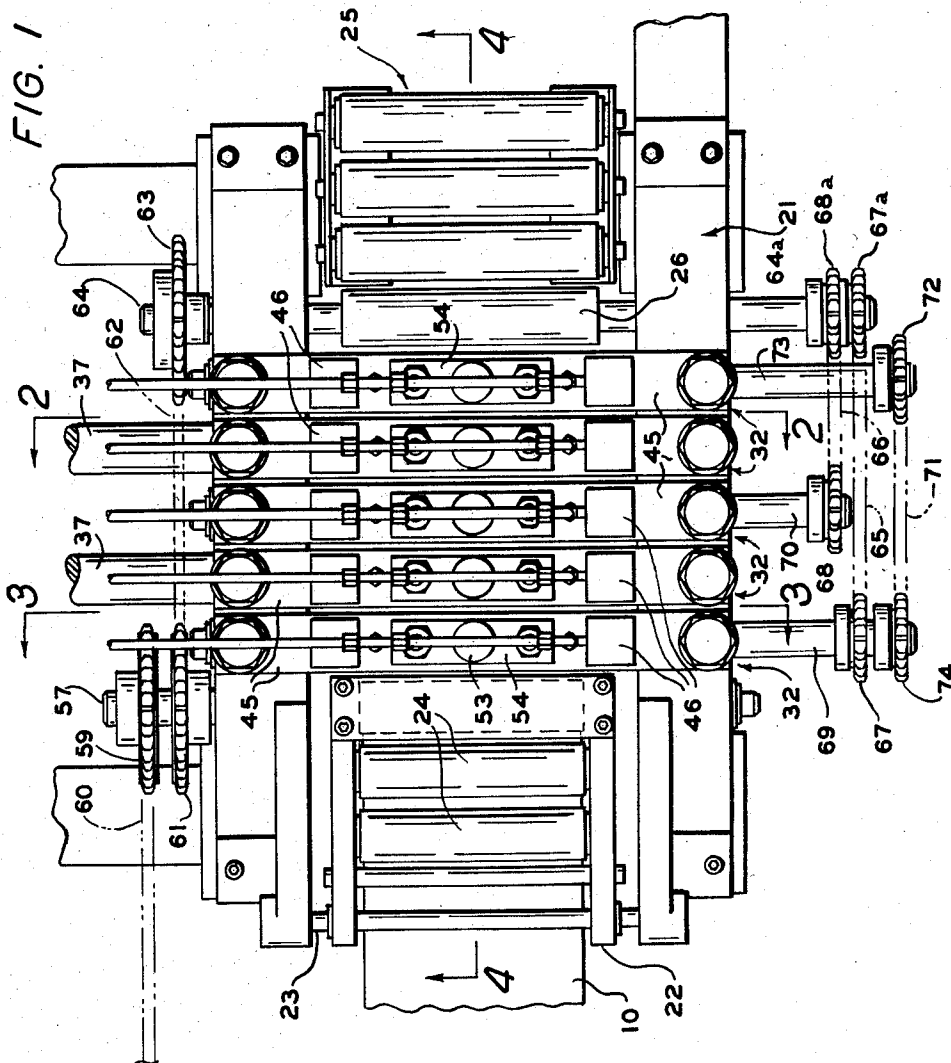
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METHOD AND APPARATUS FOR BUFFING SHOE SOLES

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4 Sheets-Sheet 1



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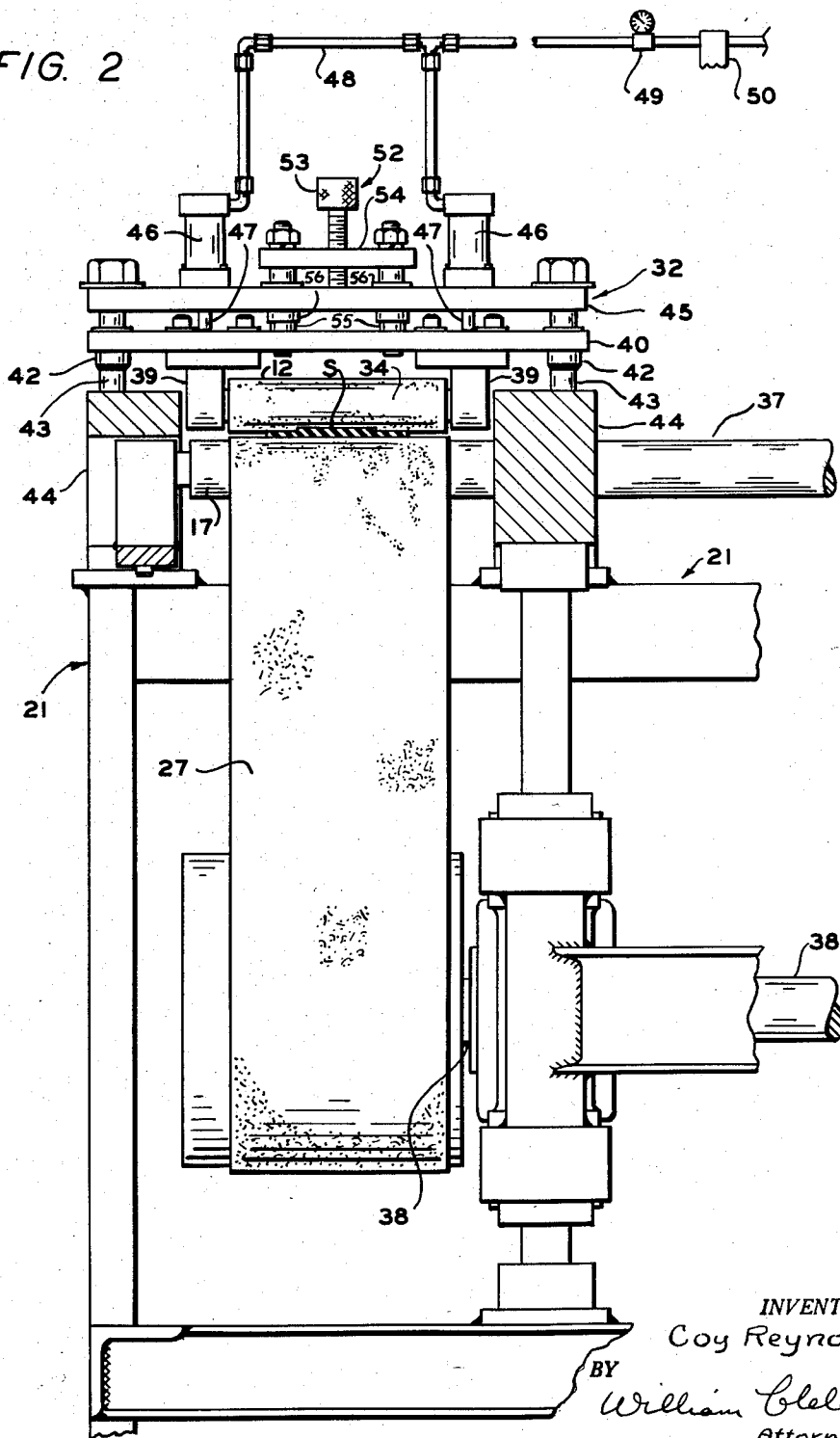
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FIG. 2



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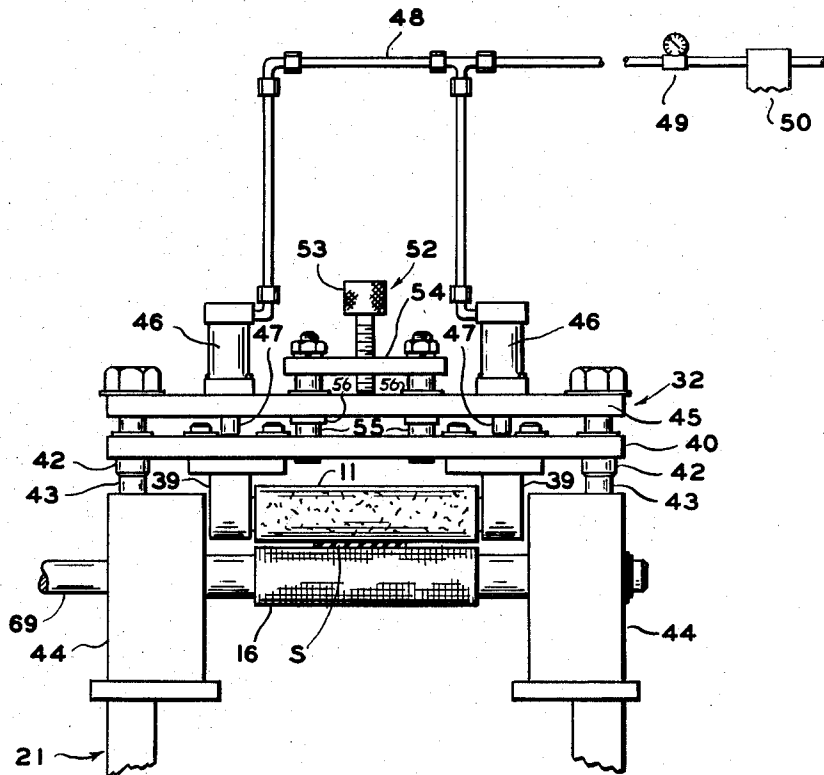
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FIG. 3



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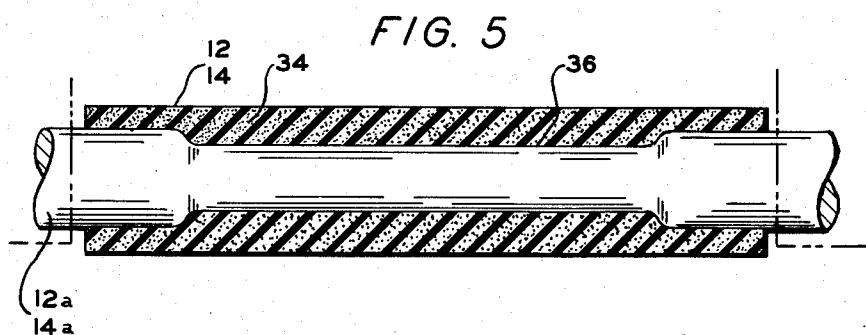
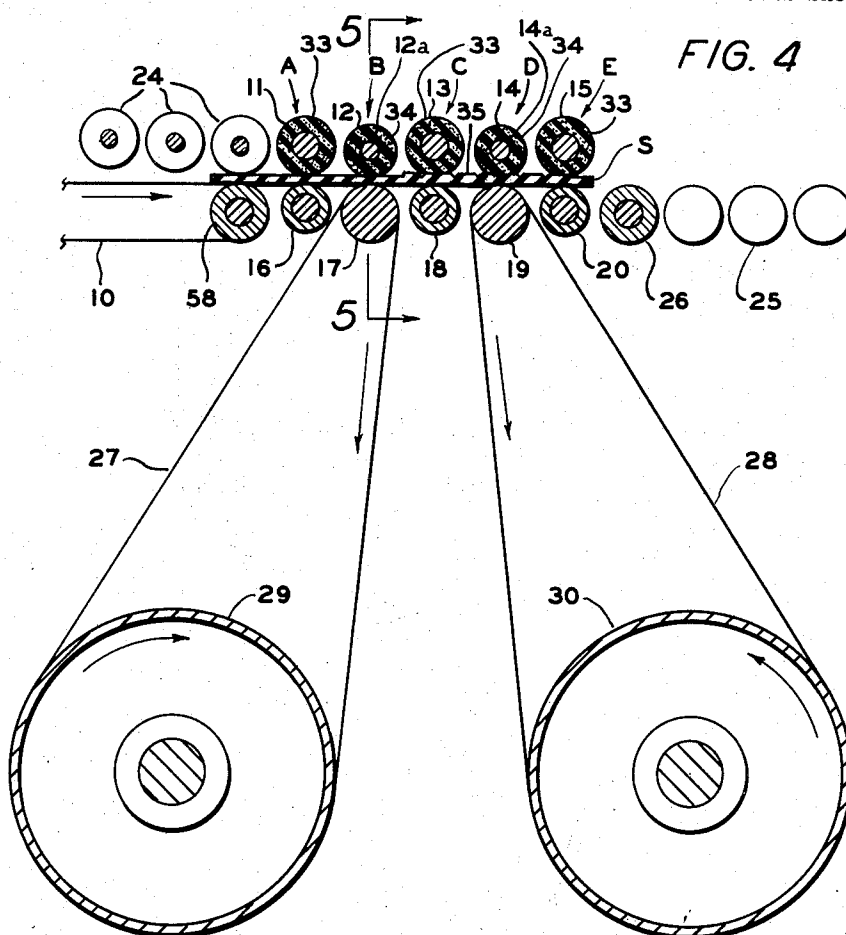
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METHOD AND APPARATUS FOR BUFFING SHOE SOLES

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4 Sheets-Sheet 4



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1

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METHOD AND APPARATUS FOR BUFFING SHOE SOLES

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11 Claims. (Cl. 51-139)

This invention relates to a method and apparatus for buffing shoe soles or like articles.

Shoe soles are buffed on the upper sides thereof to facilitate cementing the same to shoe bottoms. Heretofore, machines for buffing or roughening shoe soles, and particularly those of rubber compositions, have been generally objectionable for several reasons. In the first place there was a great tendency for such machines to take a deeper bite out of the leading edges of the soles, due to tilting action of the same, so that said leading edges were gouged or chamfered instead of square as desired. Secondly, when uniform pressure of conventional guide and buffing rollers was applied to the upper faces of shoe soles having protruding design configurations on the undersides thereof, for example, there was a serious tendency to buff to greater depth at the portions of said upper side opposite said design configurations.

One object of the invention is to provide an improved machine for buffing the upper faces of shoe soles or the like without gouging the leading edge of the work as it is fed through the machine, and without forming depressions in said upper faces due to the soles being of irregular thickness.

Another object of the invention is to provide a buffing machine of the character described which may be operated for accurately buffing the work at substantially higher speeds than has been possible heretofore.

Another object of the invention is to provide a machine of the character described which is easily and quickly adjustable to regulate or vary the amount of material removed from the work.

Other objects of the invention will be manifest from the following brief description and the accompanying drawings.

Of the accompanying drawings:

Figure 1 is a top plan view of a shoe sole buffing machine embodying the features of the invention.

Figure 2 is a vertical cross-section, on the same scale, taken substantially on the line 2-2 of Figure 1.

Figure 3 is a similar vertical cross-section, partly broken away, taken substantially on the line 3-3 of Figure 1.

Figure 4 is a semi-diagrammatic vertical cross-section, on the same scale, taken substantially on the line 3-3 of Figure 1.

Figure 5 is a cross-section, partly broken away, taken longitudinally through one of the two upper buffing pressure rollers, substantially as viewed on the line 5-5 of one of the same in Figure 3.

Referring to the drawings generally, there is illustrated a rubber shoe sole buffing machine, wherein a continuous conveyor 10 is adapted to convey a rubber or like shoe sole S flatwise in a horizontal plane toward a series of vertically aligned pairs A, B, C, D and E of upper and lower rollers mounted in a framework 21, the upper rollers of the pairs of said series being designated 11, 12, 13, 14 and 15, respectively, and the lower rollers thereof being designated 16, 17, 18, 19 and 20, respec-

2

tively. For assuring flatwise feeding of the sole S into the first pair of rolls A, a frame 22 is pivotally mounted at 23 (see Figure 1), to extend toward the first pair A of rollers, said frame having thereon a plurality of rollers 24, 24 which, under the weight of the same and the frame 22, rotatably engage and hold down the sole S as it moves along conveyor 10. Suitable conveyor means 25, including a driven take-off roller 26, is provided at the other end of the machine, to convey soles S from the last pair of rollers E.

The lower rollers 16, 18 and 20 of the pairs A, C and E thereof, may be rotatably mounted in the framework 21 to have the uppermost peripheral portions thereof aligned in said horizontal plane passing through the upper surface of conveyor 10, and also passing through the top portions of take-off roller 26 and the conveyor means 25. Lower buffing rollers 17 and 19 have continuous sandpaper or like belts 27 and 28, respectively, extended from the same to relatively larger rolls or drums 29 and 30, respectively, rotatably mounted beneath the rollers 17 and 19, to have the uppermost portions of the sanding belts substantially in said horizontal plane of support of the shoe sole S. Rollers 16, 18 and 20 are continuously driven to have constant linear speed at peripheral portions thereof, which linear speed may be substantially the same as that of the conveyor belt 10. Take-off roller 26 is also driven to have substantially the same peripheral linear speed. Some or all of the driving rollers 16, 18 and 20 may have serrated peripheral surfaces, as indicated at 31 in Figure 3, to provide improved driving negagement with the sole S. The rollers 16, 18 and 20, being separately driven with respect to conveyor 10 in a manner to be described later, may be driven at greater linear speed than conveyor 10, if desired.

Upper pressure-applying rollers 11 to 15 of the respective pairs A, B, C, D and E thereof are idlers mounted to be urged downwardly against the respective driven lower rollers thereof, by separate predeterminedly variable pressure means 32, 32 (see Figures 1, 2 and 3), to be described later, the upper rollers 11, 13 and 15 having semi-hard rubber portions 33, 33 of substantial thickness or depth adapted yieldingly to engage the rubber sole S against the respective lower rollers, to hold the sole flat as it is frictionally driven from left to right through the machine, as viewed in Figure 4. Upper pressure rollers 12 and 14 have substantial thicknesses 34, 34 of relatively softer rubber or like stock, than the rollers 11, 13 and 15, adapted yieldingly to conform to protrusions, such as the usual design configurations 35, on the sole, so that the respective variable pressure means 32 will independently apply uniform pressure to said sole regardless of variations in thickness, particularly at the points of contacts of the bottom surface of the sole with sanding belts 27 and 28. Thus, by varying such pressures applied by the respective pressure means 32, the amount of rubber removed or buffed from the sole may be accurately predetermined and correspondingly varied. The rubber of the pressure rollers 11, 13 and 15 may be in the nature of vulcanized wringer roll stock, while that of the pressure rollers 12 and 14 may be of the relatively more spongy stock. Conformity of the rubber of pressure rollers 34 to the aforementioned protrusions 35 on the sole may be further aided by reducing the diameter of the roller shafts 12a and 14a, as indicated at 36 in Figure 5, to provide proportionately greater thicknesses of resilient rubber at the points of contact with the protrusions.

Sanding belt 27 may be driven at substantially greater linear speed than sole S, in the same direction at point of contact therewith, while the other belt 28 is driven in opposing direction to offset any tendency to speed

up the desired forward movement of the sole. The grade of the first sanding belt 27 may be finer than that of the sanding belt 28, further to improve the smoothness of operation of the machine, and to provide the requisite uniform roughened or buffed surface for best cementing the sole on a shoe.

For driving the sanding belts 27 and 28, as described above, shafts 37, 37 of the rollers 17 and 19, and shafts 38, 38 of the drums 29 and 30, may be extended to any suitable power means, to be continuously driven thereby in synchronism with each other. The shafts 37 and 38 are rotatably supported in framework 21, as best shown in Figure 2.

As the variable pressure means 32 for the pairs of rollers A to D are essentially the same, only one of them will be described in detail. Accordingly, as best shown in Figures 1, 2 and 3, the upper pressure roller (11 to 15) is rotatably mounted between spaced bearings 39, 39 (see Figure 2), secured to the underside of an elongated floating bar 40, at opposite ends of which are bushings 42, 42 vertically slidably receiving upright rods 43, 43. These rods are secured on fixed supporting parts 44, 44 of framework 21. A bar 45 is affixed between the rods 43, in spaced parallelism above floating bar 40, and supports horizontally spaced, fluid-pressure cylinders 46, 46 in which pistons are urged downwardly, whereby piston rod extensions 47, 47 engage or connect with the movable bar 40 to urge the same downwardly in substantial parallelism, and thereby to urge the upper pressure roller (11 to 15) into yielding pressurizing engagement with the sole S, while backed by a plurality of the rollers 16 to 19. Fluid pressure medium, such as pressurized air, is supplied to the spaced cylinders 46, through conduit means 48 thereto, from a suitable source of the medium. The fluid pressure is maintained constant as indicated on a gauge 49 in the conduit, and may be predeterminedly varied, as by an adjustable pressure-control device 50 of known type (see Figures 2 and 3).

For limiting downward movement of the floating bar 40, adjustable stop means 52 may be provided. As best shown in Figures 1, 2 and 3, this stop means may comprise a manually operable screw 53 threaded in a plate 54 spaced above fixed bar 45, and affixed between the upper ends of spaced upright rods 55, 55, which are in turn affixed at the lower ends thereof to the floating roller-supporting bar 40, said rods 55 being vertically slidably received through sleeves 56, 56 secured in fixed bar 45. In other words the screw-holding plate 54 floats with the floating bar 40. Thus, as best illustrated in Figure 2, the bar 40 is free to be moved upwardly against the uniform pressure applied thereto by the piston rod extensions 47. The limit of downward movement of bar 40 provided by the screw 53 prevents the rollers 11 to 15 from contacting and possibly damaging the mating rollers beneath the same as when there is no work in the machine. This limiting action of screw 53 also minimizes tapering of the leading edges of soles S upon initial contact thereof with the sanding belts 27 or 28, as the case may be. In other words, the amount of material removed from the sole S is determined by the speed of the sanding belt, the linear speed of the sole, and the amount of downward pressure applied to the sole at the point of contact with the respective sanding band, which is easily adjusted.

As best shown in Figures 1 and 4, for driving the conveyor 10 at requisite linear speed, as previously described, a rearward shaft extension 57 of a forward roller 58 thereof (Figure 4), has a sprocket 59 keyed on the same, from which a chain 60 extends to a suitable electrical power means (not shown). Another sprocket 61, on the same driven shaft extension 57, has a chain 62 extended therefrom to a sprocket 63 on a rearward shaft extension 64 of roller 26 to drive the same. The lower rollers 16 and 18 are likewise driven, as by means of chains 65 and 66 extended from sprockets 67 and 68, on

forward shaft extension 69 and 70 of the respective said rollers 16 and 18 and sprockets 67a and 68a, respectively, on a forward shaft extension 64a of a driven roller 26. A chain 71 extended from a sprocket 72 on a forward shaft extension 73 of roller 20 to a second sprocket 74, on shaft extension 69, similarly drives the last-named roller.

In operation of the machine, a succession of closely spaced soles S of the same size and resilient material are fed top side down by conveyor 10, into the bight of the first pair A of driving rollers, the rollers 24 of the pivoted hold-down device 22 maintaining said soles in flatwise condition. As the soles quickly pass through the machine they are maintained in such flat condition by engagement between the aligned pairs A to E of rollers. The action of the soft rubber rollers 12 and 14, applying uniform pressures to the soles against oppositely moving sanding bands 27 and 28 regardless of variations in thickness of the same, is effective to remove a predetermined uniform thickness of material from the downwardly presented surfaces of the soles, and thereby to provide requisitely roughened surfaces best suitable for cementing the soles to shoes in known manner. As the soles pass from between the last pair E of driving rollers, the driven roller 26 will urge the buffed soles onto conveyor 25, from which the soles may be carried to another stage of operation by any suitable conveyor means.

It should be noted that the soles S pass from the conveyor 10 into the bight between the first pair A of work-driving rollers in full flat condition, and hence there is no tendency for the first set B of buffing rollers to gouge the leading edges of the soles. Also, by means of the alignment of the bights of the pairs A to E of rollers in a horizontal plane, combined with uniform fluid-actuated pressure applied to the resilient upper rollers of said pairs thereof, the soles are firmly maintained in flatwise condition all through the aforementioned buffing operation. The construction and operation is such that soles S may be effectively buffed in quick succession, as fast as seventy feet per minute, or approximately ten times faster than the best machines previously available on the market.

The method of the invention includes the steps of moving the rubber sole S along a given path, as described, while backed and supported in rigid or firm flatwise condition, and with the surface to be buffed presented downwardly in a plane; moving a pair of continuous surface portions of abrasive material (sanding belts 27 and 28), in inwardly opposite directions, upwardly against said surface of the sole and at substantially spaced points thereon, while yieldingly urging the sole downwardly toward said plane at variable predetermined pressures, whereby said abrasive surface portions will progressively buff a predetermined thickness of material from said surface. The method otherwise may be varied substantially in the manner previously described in connection with the description of the machine.

The apparatus has a distinct advantage in that the inwardly oppositely moving sanding belt surfaces are effective to carry the rubber buffings from sole S downwardly between inwardly opposed reaches thereof, to be received in a suitable receptacle. That is, the buffings are not thrown in all directions outwardly of the machine, in the manner commonly experienced with other machines in the past.

Modifications of the invention may be resorted to without departing from the spirit thereof or the scope of the appended claims.

What is claimed is:

1. A machine for buffing shoe soles or like articles, comprising a pair of relatively fixed and movable rollers aligned in a plane and between which the articles is to be fed, means for transversely conveying the article flatwise along a path between said pair of rollers, means for relatively urging said movable roller toward said fixed roller

5

6

to engage the article conveyed between them, means for rotating one of said rollers, continuous abrasive means backed by said one rotated roller and adapted to be continuously movable therewith for buffing the corresponding side of the article, the other said roller having peripheral portions of resilient material adapted yielding to conform to surface irregularities in the opposite side of the article, said means for urging including a relatively fixed support generally in said plane and spaced from said movable roller and having laterally spaced pressure-operated cylinders mounted thereon, laterally spaced guide means on said fixed support extending at right angles to the axis of said movable roller, an element mounted on said spaced guide means and carrying said movable roller to move the same in said plane in parallelism to said fixed roller toward and from the article conveyed between said rollers, said cylinders having pistons reciprocable therein, a source of pressure-fluid connected to said cylinders to provide uniform pressures to said pistons, and the pistons being provided with extensions therefrom operatively connected to said element, whereby the pressure operable on said pistons is effective to move said elements on said guide means and thereby move said movable roller in parallelism toward said fixed roller to apply substantially uniform pressure against said article conveyed between the rollers.

2. A machine of the character described as for buffing shoe soles, comprising a series of horizontally spaced and horizontally substantially aligned pairs of relatively fixed and independently vertically relatively movable members between which the work is adapted to be passed flatwise to have one face thereof in a horizontal plane tangent to aligned work-contacting portions of the relatively fixed members, at least some of said members being driven rollers adapted to feed the work flatwise between the bights of the aligned pairs of members, and fluid-pressure actuated means independently urging each of said relatively movable members toward the correspondingly relatively fixed members in parallelism thereto, thereby frictionally to engage the work between the pairs of members, at least one pair of said members including a driven roller having continuous abrasive means backed against the same and continuously movable therewith against said one face of the work to remove a thickness of material therefrom, adjustable stop means being provided for limiting the relative movement of each of said movable members towards the respective relatively fixed members.

3. A machine of the character described as for buffing shoe soles, comprising a series of horizontally spaced substantially horizontally aligned pairs of relatively fixed and independently vertically relatively movable members between which the work is adapted to be passed flatwise to have one face thereof in a horizontal plane tangent to aligned work-contacting portions of the relatively fixed members, at least some of said members being driven rollers adapted to feed the work flatwise between the bights of the aligned pairs of members, and fluid-pressure actuated means independently urging said relatively movable members in parallelism toward the corresponding relatively fixed members frictionally to engage the work between the pairs of members, at least one pair of said members including a driven roller having continuous abrasive means backed against the same and continuously movable therewith against said one face of the work to remove a thickness of material therefrom, at least one other pair of said members including a driven roller having continuous abrasive means backed against the same and continuously movable therewith against said one face of the work to remove a thickness of material therefrom, said moving abrasive means being moved against the work in opposite directions.

4. A machine as set forth in claim 3, wherein individually adjustable stop means is provided for predeterminedly limiting the relative movement of the re-

spective relatively movable rollers toward the corresponding relatively fixed rollers.

5. A machine for buffing shoe soles or like articles, comprising a plurality of longitudinally spaced units each having pairs of relatively fixed and movable rollers aligned substantially in a vertical plane and between which the article is to be fed; each said unit including means for relatively urging said movable roller thereof toward the fixed roller of the same to engage the article conveyed between them and means for rotating one of said rollers; at least one said unit having continuous abrasive material backed by said one rotated roller thereof and adapted to be continuously movable therewith for buffing the corresponding side of the article; said means for urging in each said unit including a relatively fixed support generally in the vertical plane of the respective pair of rollers and spaced from the movable roller, laterally spaced pressure-operated cylinders mounted on said fixed support, laterally spaced guide means on said fixed support extending substantially at right angles to the axis of the movable roller, an element mounted on said spaced guide means and carrying the respective said movable roller to move the same in said vertical plane in parallelism to said fixed roller toward and from the article conveyed between the rollers, the respective said spaced cylinders having pistons reciprocable therein and a source of pressure-fluid connected to said cylinders to provide uniform pressure to said pistons, the pistons being provided with extensions therefrom connected to said element, whereby the pressure operable on said pistons is effective through said extensions to move said element on said guide means and thereby to move said movable roller to apply substantially uniform pressure against said article conveyed between the rollers.

6. A machine as set forth in claim 5, wherein at least said one unit is provided with adjustable stop means between said movable element and said fixed support thereof for predeterminedly limiting relative movement of the relatively movable roller thereon toward the corresponding said fixed roller to control the depth of the buffing action on the article.

7. A machine as set forth in claim 5, wherein each said unit is provided with individually adjustable stop means for predeterminedly limiting the relative movement of the respective relatively movable rollers toward the corresponding relatively fixed rollers.

8. A machine as set forth in claim 5, wherein a second said unit in spaced relation to said one unit has abrasive material backed by said one rotated roller thereof and adapted to be continuously movable therewith for buffing the article in direction inwardly opposed to the movement of the first-named abrasive material.

9. A machine as set forth in claim 5, wherein a second said unit in spaced relation to said one unit has abrasive material backed by said one rotated roller thereof and adapted to be continuously movable therewith for buffing the article in direction inwardly opposed to the movement of the first-named abrasive material, the relatively movable rollers of said one and said second units having article-engaging surface portions of yieldingly depressible elastic material.

10. A machine as set forth in claim 5, wherein a second said unit in spaced relation to said one unit has abrasive material backed by said one rotated roller thereof and adapted to be continuously movable therewith for buffing the article in direction inwardly opposed to the movement of the first-named abrasive material, the relatively movable rollers of said one and said second units having article-engaging surface portions of yieldingly depressible elastic material, the spaced said one and said second buffing units having an intermediate said unit therebetween in which the said movable roller has article-engaging surface portions of yieldingly depressible elastic material.

11. A machine as for buffing shoe soles or like articles, having thickening surface irregularities on one side thereof comprising a pair of rollers between which the article is to be fed, means for conveying the article flatwise between said pair of rotatable rollers, means for relatively urging said rollers toward each other to engage the article conveyed between them, means for rotating one of said rollers, continuous abrasive means backed by said one rotated roller and adapted to be continuously movable therewith for buffing the other side of the article, the other said roller having a continuous peripheral area and being of resilient materials to substantial depth yieldingly to conform to said one side of the article fed between the rollers, the other said roller also having an inner supporting core of rigid material and which is of reduced diameter centrally thereof thereby to present correspondingly centrally thickened portions of said resilient

material to said thickening surface irregularities on the article.

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