Nov. 24, 1925. 1,563,096

F. J. MacDONALD

METHOD OF AND APPARATUS FOR PRESSING FOOTWEAR

Filed May 19, 1924 3 Sheets-Sheet 1

FIG-1-

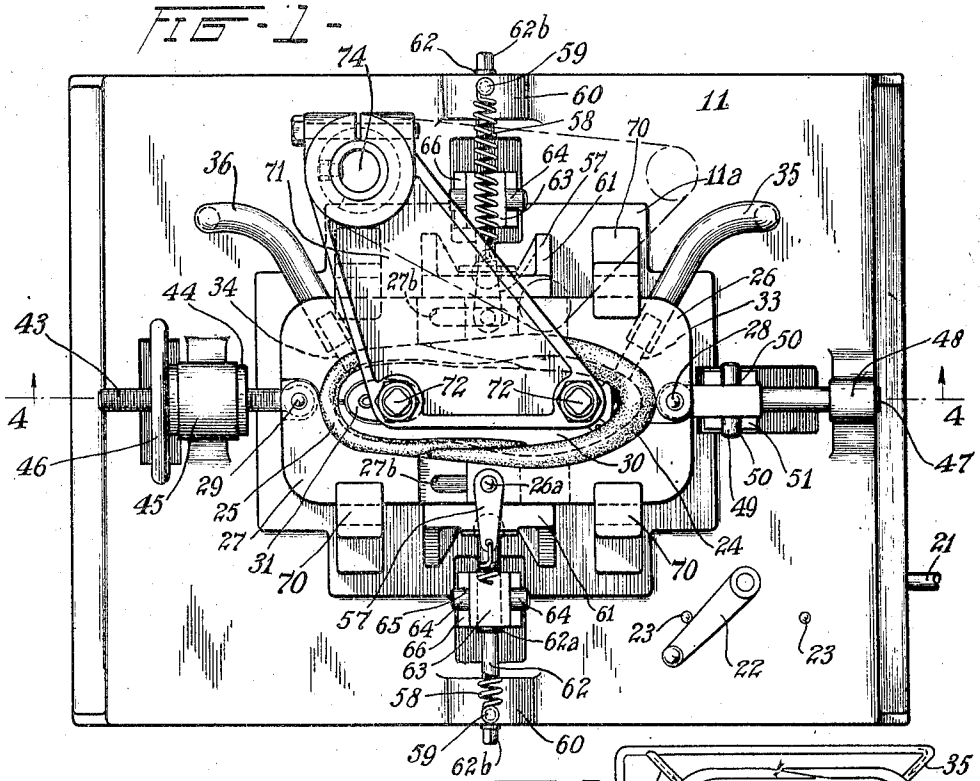


FIG-2-

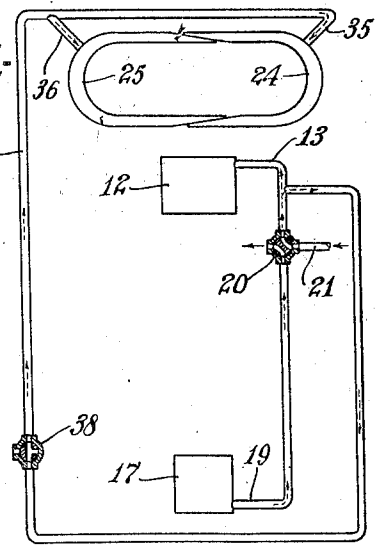
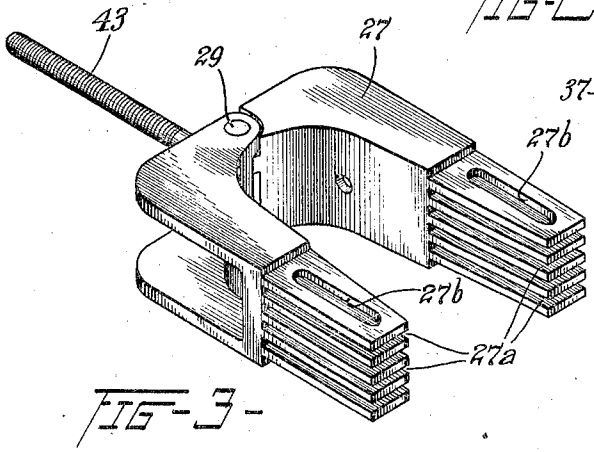


FIG-3-



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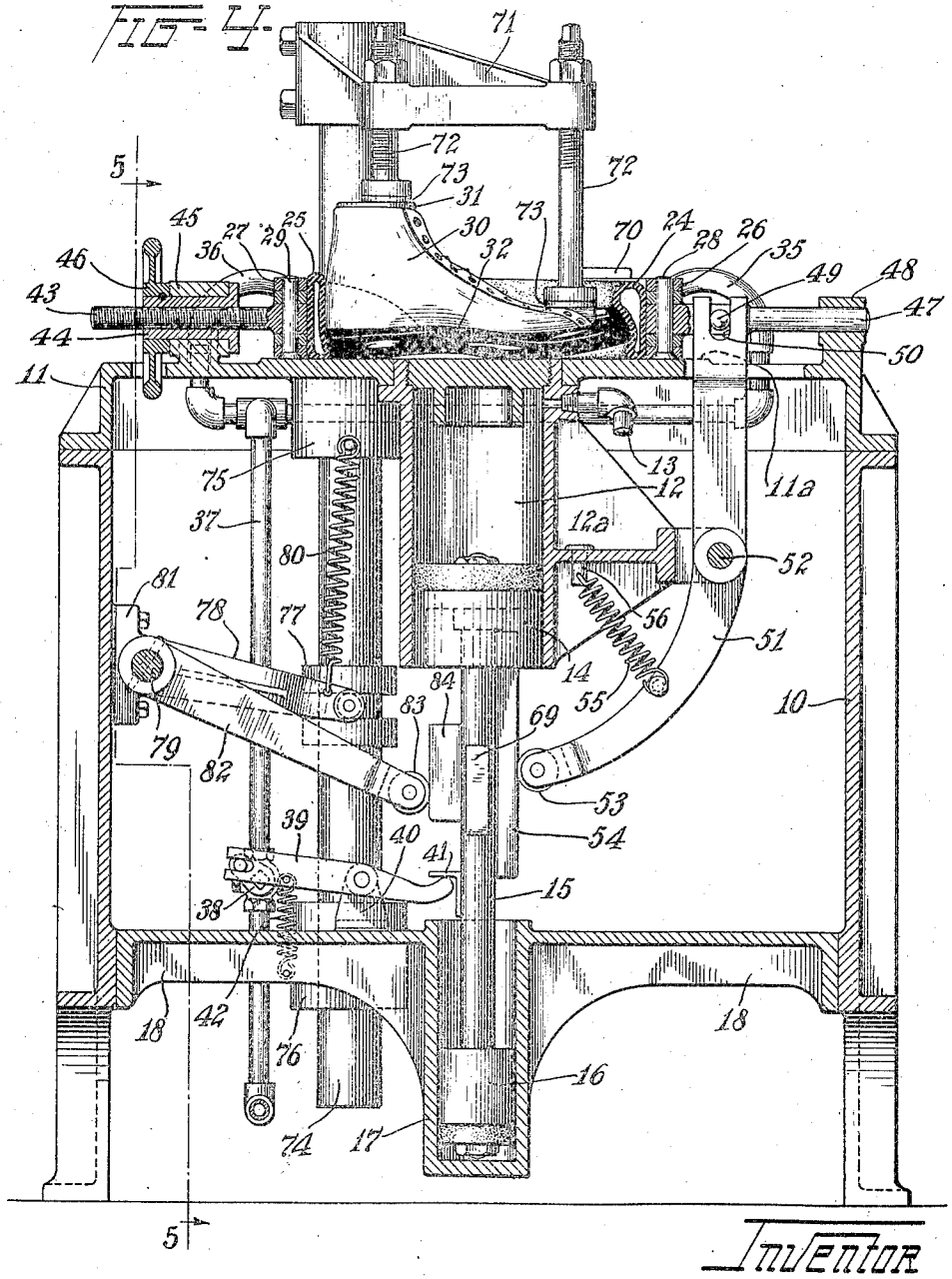
Nov. 24, 1925. 1,563,096

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METHOD OF AND APPARATUS FOR PRESSING FOOTWEAR

Filed May 19, 1924 3 Sheets-Sheet 2

FIG. 4.



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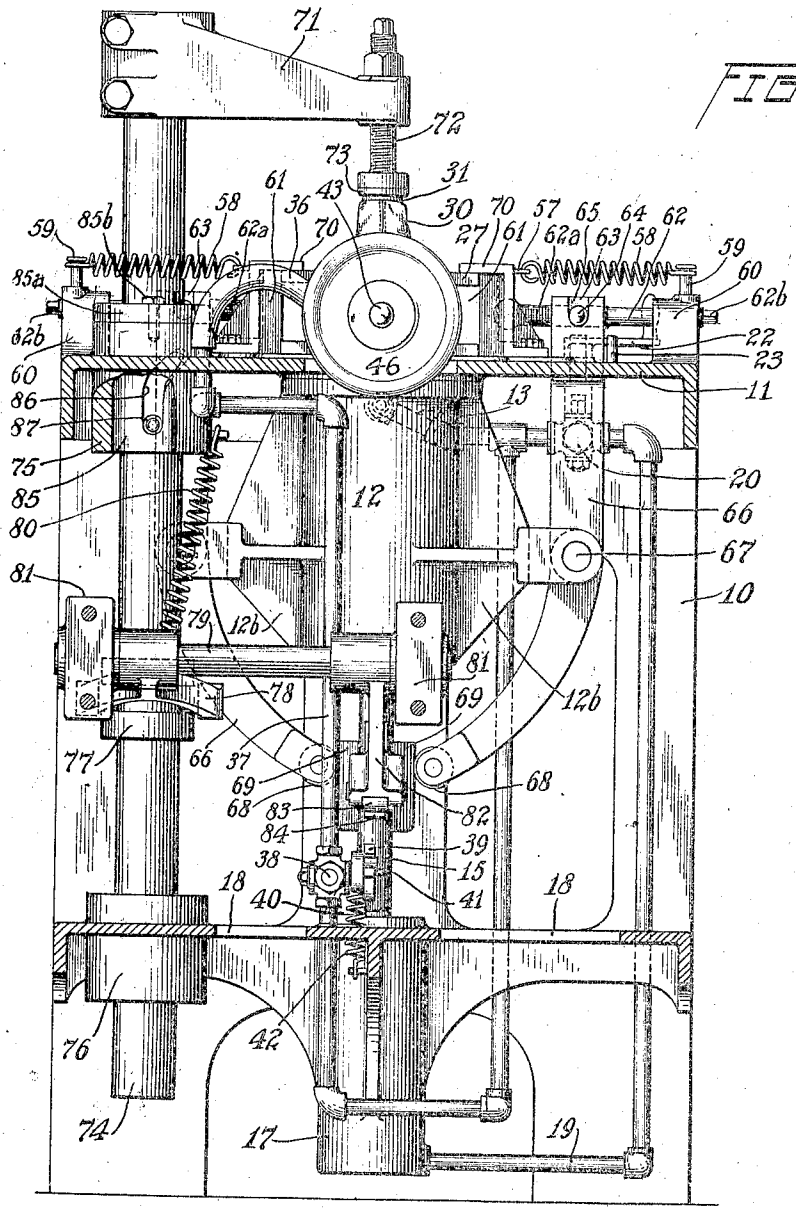
Nov. 24, 1925. 1,563,096

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METHOD OF AND APPARATUS FOR PRESSING FOOTWEAR

Filed May 19, 1924 3 Sheets-Sheet 3

FIG. 5.



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Patented Nov. 24, 1925. 1,563,096

UNITED STATES PATENT OFFICE.

FRANK J. MacDONALD, OF AKRON, OHIO, ASSIGNOR TO THE B. F. GOODRICH COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

METHOD OF AND APPARATUS FOR PRESSING FOOTWEAR.

Application filed May 19, 1924. Serial No. 714,368.

To all whom it may concern:

Be it known that I, FRANK J. MacDONALD, a citizen of the United States, residing at Akron, in the county of Summit and State of Ohio, have invented a certain new and useful Method of and Apparatus for Pressing Footwear, of which the following is a specification.

This invention relates to the manufacture of rubber footwear such as sport shoes, arctics and the like, and more particularly to the application of foxing such as usually is applied along the margin of the upper and folded over onto the bottom of the shoe before the outsole is applied.

Heretofore this operation commonly has been performed by means of a hand roller. The hand rolling operation is slow, and results in non-uniformity of product because of the varying pressure which an operator will apply to different parts of the shoe and because of the different strength of different operators.

My chief object is to provide improved, economical and effective procedure and apparatus for pressing foxing or the like in the building of rubber footwear. A more specific object is to provide simple and automatic apparatus for such operation, with the resultant saving of time and labor, and improved quality of the article.

Of the accompanying drawings:

Fig. 1 is a plan view of apparatus embodying and adapted to carry out my invention in its preferred form, and the work therein, said apparatus being shown in pressing position.

Fig. 2 is a diagram of the fluid-pressure system of the same.

Fig. 3 is a perspective view of one of the elements of my apparatus.

Fig. 4 is a section on line 4—4 of Fig. 1.

Fig. 5 is a section on line 5—5 of Fig. 4.

Referring to the drawings, 10 is a suitable upright frame, 11 is a top plate therefor, and 12 is a fluid pressure cylinder extending downwardly from the middle of the under side of the latter. Said cylinder 12 has a fluid connection 13 at its upper end, is open at its lower end, and is provided with a piston 14 and a downwardly extending piston-rod 15, the lower end of the latter being secured to the piston 16 of a fluid pressure cylinder 17 which is formed with integral arms 18, 18 and mounted thereby in the lower part of the frame 10.

The cylinder 17 is provided at its lower end with a fluid connection 19 which, together with the connection 13 of the cylinder 12, is controlled by a four-way valve 20 in a pressure-fluid supply line 21, said valve being adapted to be manually actuated by means of a hand-lever 22 connected therewith and positioned above of the top-plate 11, suitable stops 23, 23 being provided to limit the throw of said lever in either direction. The valve 20 is adapted to charge one of the fluid pressure cylinders while exhausting the other, to reciprocate the vertical piston rod 15, which, between said cylinders, is provided with suitable cams for actuating work-manipulating mechanisms presently to be described.

The top-plate 11 is formed with a central raised finished surface 11^a and mounted edgewise thereon are two U-shaped, flexible, diaphragm members or bags 24, 25, having the end portions of their respective legs beveled or tapered and disposed so as to overlap each other, the two bags thus defining a work-receiving space conforming generally to the contour of the shoe adjacent its sole portion. Said bags 24, 25 are backed by a surrounding abutment comprising a pair of articulated, two piece, U-shaped forms 26, 27, the two members of each form being connected by hinge-pins 28, 29 positioned respectively at the toe and the heel of the work. The forms 26, 27 have the end portions of their respective legs formed with numerous slots, as at 27^c, 27^a, Fig. 3, to provide complemental tongues on the respective forms, which are interfitted with each other, and said tongue portions of the form 27 are formed with aligned, elongate, longitudinal slots 27^b, 27^b which accommodate respective shackle bolts 26^b, 26^b, mounted in apertures in the interfitting tongue portions of the form 26, so that the respective leg portions of said forms may be simultaneously spread apart.

The work is shown herein as a cloth-uppered sport shoe 30 mounted upon a building last 31, and 32 is a strip of foxing extending around the sole-edge of the shoe and folded onto the bottom of the latter, the bags 24, 25, being adapted to be inflated to press the foxing firmly and uniformly onto the shoe,

and the forms 26, 27 as described being adapted to be spread apart for the reception of the shoe and to be closed in upon the bags to position the latter against the shoe before they are inflated, so that the overlapped portions of the bags may slide upon each other in such closing movement and thus avoid wrinkling of their work-contacting faces when they are inflated.

The bags 24, 25 secured to the forms only by respective inflating stems 33, 34, extending through and secured in apertures in the walls of the respective forms 26, 27, and connected with fluid pressure lines 35, 36, which are merged into a common supply line 37 connected with the line 13. The supply line 37 is provided with a three-way valve 38 adapted to be operated by a lever 39 fulcrumed in a bracket 40 mounted upon one of the cylinder-supporting arms 18, the free end of said lever being positioned adjacent the piston-rod 15 and adapted to be depressed, to admit pressure fluid to the bags 24, 25, by a dog 41 mounted on said piston rod. A tension spring 42 secured to the arm 18 and to said lever between its fulcrum and the valve 38 is provided for turning the valve in the opposite direction when the piston rod is raised, to deflate the bags 24, 25.

The bag manipulating movements of the forms 26, 27 consist in the movement of one of said forms longitudinally with relation to the other, and in the concurrent spreading apart of their respective leg portions upon their pivots 28, 29. The form 27 is adapted for longitudinal movement for adjustment purposes only, being provided with a threaded draw-rod 43 engaging its pivot pin 29 and extending through a nut 44 swiveled in an ear 45 formed on the upper surface of the top-plate 11, said nut being provided with a handwheel 46 for easy adjustment of the draw-rod 43.

For moving the form 26 longitudinally with relation to the form 27, a draw-rod 47 is secured to its pivot pin 28 and guided in an apertured ear 48 formed on the upper surface of the top plate 11 adjacent thereto. Said draw-rod is provided, at an intermediate point, with a transversely disposed stud pin 49 seated in slots 50, 50 in the forked upper end of a lever 51, the latter being fulcrumed at 52 in a bracket 12^a formed on the cylinder 12, and having an arcuate lower end portion which is provided with a cam roller 53 adjacent the piston rod 15 and adapted to be engaged by a cam 54 mounted thereon, the construction being such that downward movement of the piston-rod 15 causes the cam 54 to actuate the lever 51 to move the form 26 and bag 24 inward toward the work, against the force of a tension-spring 55, the latter being attached at one end to said lever and at its other end to a stud 56 in the bracket 12^a, and being adapted to restore said parts to inoperative position as the rise of the piston-rod disengages the cam 54 from the roller 53.

For laterally spreading apart the leg portions of the respective forms 26, 27, to widen the middle portion of the work receiving space, links 57, 57 are secured to the respective shackle-bolts 26^a and to respective springs 58, 58, the other ends of said springs being attached to studs 59, 59 mounted on apertured ears 60, 60 formed on the upper surface of the top-plate 11 at opposite sides thereof.

For urging the bags 24, 25 against the instep portions of the work, the leg portions of the respective forms 26, 27 are adapted to be forced laterally toward each other as shown, against the force of the springs 58, by shoes 61, 61 slidably mounted upon the finished surface 11^a and abutting the outer walls of said forms. Each of said shoes has formed in its outer face a socket to receive the end of a ball-ended push-rod 62 the other end of which is slidably mounted in the aperture in the ear 60. An intermediate portion of each push-rod 62 is formed with screw threads 62^a, and mounted thereon is a nut 63 formed at opposite sides with laterally extending studs 64, 64, the latter being seated in respective slots 65, 65, in the forked upper end of a lever 66. The lever 66 is fulcrumed at 67 in a bracket 12^b formed on the cylinder 12, and has its lower end portion curved toward the piston-rod 15, a cam-roller 68 being journaled in said lower end adjacent said piston-rod and adapted to be engaged by a cam 69 mounted upon the latter. The outer end of the push rod 62 is squared as at 62^b to accommodate a wrench or crank by which it may be rotated to vary the space between the shoe 61 and the nut 63 in adjusting the apparatus for work of different sizes. A plurality of angular brackets 70, 70 mounted upon the top plate 11 at each side of the forms 26, 27, are formed with overhanging portions which overlie the upper surfaces of said forms, to hold them to the finished surface 11^a while permitting them to slide thereon.

For holding the work in position, an overhanging presser-arm 71 is provided with two, downwardly extending, adjustably mounted, presser-feet 72, 72, of suitable length to engage the top of the last and the toe portion of the shoe thereon. Said presser-feet are provided with resilient material 73, 73 such as rubber, on their work-engaging faces, to prevent damage to the work and to compensate for minor irregularities in the size of the same.

The presser-arm 71 is mounted on the upper end of a vertical shaft 74 which is journaled in apertured bosses 75, 75 formed on the top plate 11 and on one of the cylinder

supporting arms 18 respectively, said shaft being adapted for axial and angular movement therein. A grooved collar 77 is mounted on the shaft 74 intermediate its journals, and engaged by suitable stud rollers in the forked outer end of a lever 78 which is secured at its other end on a rock-shaft 79. Said lever is engaged by one end of a pull spring 80 which is secured at its other end to the boss 75, thus normally urging the shaft 74 upward to hold the presser-feet 72 out of engagement with the work.

The rock-shaft 79 is journaled in brackets 81, 81 mounted on the frame 10, and carries a cam-lever 82 extending toward the piston-rod 15, a roller 83 being journaled in the free end of said cam-lever and adapted to be engaged by a cam 84 secured to said piston-rod, to depress the shaft 74 against the tension of the spring 80 and bring the presser-feet 72, 72 into engagement with the work.

Within the boss 75 is a concentric sleeve or bushing 85 surrounding the shaft 74, said sleeve being formed with a flange 85^a at its upper end provided with screw bolts such as 85^b, by which it is secured in place. Said sleeve is formed with an arcuate cam-slot 86 which engages a roller 87 secured to and extending radially from the shaft 74, said cam-slot being adapted to rotate the shaft 74 as it is raised, through a substantial angle sufficient to swing the presser-arm 71 clear of the work, as shown in broken lines in Fig. 1 to permit the easy removal or placement of the latter.

The operation of my apparatus is simple and substantially automatic, manual operations consisting only in placing and removing the work and in manipulating the hand-lever 22. The apparatus being opened out, a shoe with the foxing lightly applied thereto is placed between the bags 24, 25. The hand-lever is then turned to the left, as shown in Fig. 1, which admits pressure fluid, through the valve 20, into the cylinder 12, forcing the piston-rod 15 downward and carrying the several cams thereon successively into engagement with their respective levers which operate the work engaging instrumentalities.

The sequence of operations is as follows: First the form 26 is moved longitudinally toward the form 27, by the action of the cam 54, and then the legs of the forms 26, 27 are closed toward the work by the action of the cams 69, bringing the expansible bags 24, 25 lightly into contact with the work at all points. Next the presser-arm 71 is swung over the work and drawn downward thereon by the cam 84, after which pressure fluid is admitted to the expansible bags through the valve 36, at the end of the downward stroke of the piston rod, by the dog 41 engaging the lever 39, causing the bags to press the foxing 32 firmly and evenly onto the cloth upper of the shoe. Reversal of the hand-lever 22 then restores the apparatus to its starting position, permitting the finished work to be removed.

While my invention is not wholly limited to a plurality of bags, I prefer to use a pair of them as shown, and to construct each of them in U-form, so that they may be fitted against the shoe prior to inflation without such longitudinal compression of their work-contacting portions and consequent wrinkling as may result when a curved bag of sufficiently loose fit is closed against the shoe solely by inflation of the bag.

Modifications may be resorted to within the scope of my invention, and I do not wholly limit my claims to the exact procedure described or to the specific construction shown.

I claim:

1. Apparatus for pressing footwear, said apparatus comprising a flexible diaphragm member adapted to fit smoothly about the side face of the work adjacent the sole portion thereof without substantial distortion from its natural shape and means for forcing pressure fluid against said member to press it against the work.

2. Apparatus for pressing footwear, said apparatus comprising a fluid-containing bag structure adapted to fit against the side face of the work without substantial distortion from its natural shape, and means for moving said structure from and toward the work in a direction approximately parallel to the sole of the work.

3. Apparatus for pressing footwear, said apparatus comprising a fluid-containing bag structure adapted to fit against the work without substantial distortion from its natural shape, means for moving said structure from and toward the work, and means for distending it against the work.

4. Apparatus for pressing footwear, said apparatus comprising a naturally U-shaped bag adapted to fit about the work adjacent the sole portion thereof, and backing means for closing the legs of the U-shaped bag toward each other.

5. Apparatus for pressing footwear, said apparatus comprising a plurality of bags having tapered, overlapped ends and adapted to fit about the work adjacent the sole portion thereof, and backing means for said bags adapted to be closed in toward and opened out from the work, and means for so actuating said backing means.

6. Apparatus for pressing footwear, said apparatus comprising a plurality of bags having tapered, overlapped ends and adapted to fit about the work adjacent the sole portion thereof, and backing means for said bags adapted to be closed in toward and opened out from the work, means for so

actuating said backing means and means for conducting pressure fluid into said bags.

7. Apparatus for pressing footwear, said apparatus comprising a pair of U-shaped, fluid-containing bags adapted to fit about the work adjacent the sole portion thereof, the legs of each U-shaped bag terminating at the sides of the work, and backing means for said bags, at the ends of the work, adapted to be moved from and toward each other.

8. Apparatus as defined in claim 7 in which the backing means are provided with interfitting tongue-and-groove portions.

9. Apparatus for pressing footwear, said apparatus comprising a pair of U-shaped, fluid-containing bags adapted to fit about the work adjacent the sole portion thereof, the legs of each U-shaped bag terminating at the sides of the work, backing means for said bags, at the ends of the work, adapted to be moved from and toward each other, and backing means for said bags, at the sides of the work, adapted to be moved from and toward each other.

10. Apparatus as defined in claim 9 in which the backing means comprises a pair of members hinged together, at each end of the work, the members of each of said pairs having tongue-and-groove portions which are intercalated with similar portions of the members of the other pair, at the sides of the work.

11. Apparatus for pressing footwear, said apparatus comprising a bag structure adapted to fit about the work adjacent the sole thereof, and articulated backing members surrounding said bag structure and adapted to be closed in toward and opened out from the work.

12. Apparatus for pressing footwear, said apparatus comprising a support for the work, means for clamping the work on said support, a diaphragm member on said support adapted to fit about the work adjacent the sole portion thereof, and means for actuating said clamping means, and for applying fluid pressure to said diaphragm member to press it against the work, in timed relation.

13. Apparatus for pressing footwear, said apparatus comprising a support for the work, means for clamping the work on said support, a bag structure on said support adapted to fit against the work, backing means for said bag structure adapted to be closed in toward and opened out from the work, and means for actuating said clamping means and said backing means in timed relation.

14. Apparatus for pressing footwear, said apparatus comprising a support for the work, a bag structure on said support, adapted to fit against the work, backing means for said bag structure adapted to be closed in toward and opened out from the work, means for conducting pressure fluid into said bag structure, and means for actuating said backing means and said fluid conducting means in timed relation.

15. Apparatus for pressing footwear, said apparatus comprising a support for the work, means for clamping the work on said support, a bag structure on said support adapted to fit against the work, backing means for said bag structure adapted to be closed in toward and opened out from the work, means for conducting pressure fluid into and exhausting it from said bag structure, and means for actuating all of said instrumentalities in timed relation.

16. The method of pressing footwear which comprises mounting the work in a space defined by a plurality of distensible members, moving said members to close them in toward the work and thereafter distending them against the work.

In witness whereof I have hereunto set my hand this 17th day of May, 1924.

FRANK J. MacDONALD.