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A. C. SQUIRES.

MACHINE FOR MAKING RUBBER FOOTWEAR.

APPLICATION FILED APR. 30, 1907.

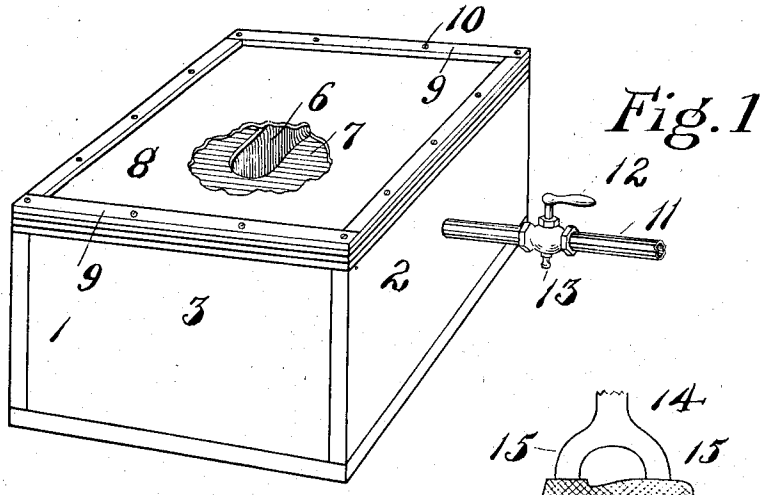

Fig. 1

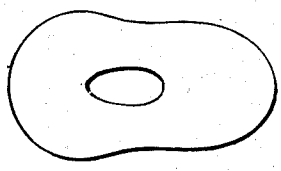

Fig. 3

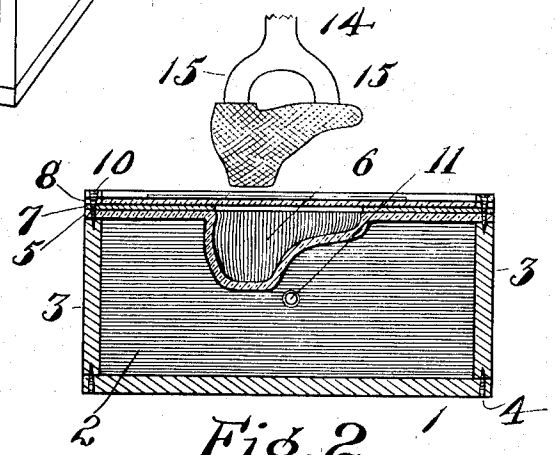

Fig. 2

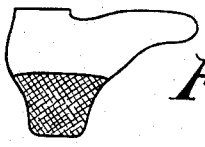

Fig. 4

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MACHINE FOR MAKING RUBBER FOOTWEAR.

No. 878,572. Specification of Letters Patent. Patented Feb. 11, 1908.

Application filed April 30, 1907. Serial No. 371,049.

To all whom it may concern:

Be it known that I, ARTHUR C. SQUIRES, a citizen of the United States, residing at Akron, in the county of Summit and State of Ohio, have invented new and useful Improvements in Machines for Making Rubber Footwear, of which the following is a specification.

This invention relates to machines for manufacturing rubber footwear, and the object thereof is to provide a mechanical means for placing certain of the component parts of foot wear in position on the last, in a more satisfactory and perfect manner than can be accomplished by hand, and also accomplish the same in much less time. In the common manufacture of rubber boots and shoes the fabric lining is placed upon the last and after stretching to place, the ends of the lining are lapped at the rear of the heel, whereby a seam is formed. The same operation is employed with respect to the upper, resulting in a second seam being formed which is superposed on the lining seam itself, materially increasing the thickness of the shoe at this point and a consequent weakness due to the employment of the seams.

This invention contemplates the use of a seamless lining and also a seamless upper, and as it has been found commercially impossible heretofore to place seamless linings and uppers upon lasts, it is the primary object of this invention to place linings and uppers of this description perfectly in position upon the last during the building up of a shoe preparatory to vulcanization. In order to make a perfect shoe the wrinkles must be removed and air bubbles expelled from the structure before the same is vulcanized, and my invention contemplates employing such means as will properly accomplish these results.

One form of and a practical embodiment of my invention is illustrated in the accompanying drawings, in which similar reference numerals indicate like parts in the different figures.

In the drawings, Figure 1 is a perspective view of a portion of my improved device; Fig. 2 a longitudinal, central, vertical section of a device embodying my invention; Fig. 3 is a plan view showing the general outline of a shoe upper employed in connection with my invention; and, Fig. 4 is a side elevation of a shoe last with a seamless upper and lining in position thereon.

The structure which I prefer to employ consists generally of a box containing a suitable form for the reception of the last, a plunger to force the last into the form and retain it there, and means for compressing an elastic form or mold about the last upon which the lining or upper has been placed.

It will be stated before giving a detailed description of the apparatus, that the same device is capable of placing not only the seamless lining but also the seamless upper in position, and a description of one will apply with equal pertinency to the other.

Describing specifically the device illustrated in the drawings, the reference numeral 1 is a hollow air-tight member, hereinafter referred to for the purpose of this description as a box, consisting of a bottom, sides 2 and ends 3, all constructed of any suitable or preferred material and securely united together by any of the ordinary fastening devices such as screws 4. Across the top of this box is laid and preferably strained very slightly, a sheet of rubber 5 which is comparatively thick and which has formed in its central portion a pocket 6 having the general outline of a boot or shoe last of a certain style and size. This pocket will be hereinafter referred to as the mold. The rubber of which the sheet 5 and mold 6 is composed need not be highly elastic, but sufficiently firm to resist unintentional change of form by repeated use. Upon the rubber sheet 5 is placed a cover 7 consisting of a sheet of rigid material, such as wood or sheet metal having an opening therein corresponding in outline to the top of the mold 6 and adapted to be vertically flush therewith. Upon the cover 7 is placed an apron 8 of thin and highly elastic and resilient rubber having the capability of stretching to a great extent and returning to its normal flat condition at all time. In order to maintain the apron 8, as well as the cover 7 and mold sheet 5 in position, there are placed on the top of the apron 8 strips of suitable

material 9 secured to the sides and ends of the box by appropriate fastening devices such as screws 10, so that all the parts constituting the top of the box are united together and held fixedly in position.

It will be seen from the foregoing description, that when all the parts are in proper position, the structure will present the appearance of an ordinary box with an elastic rubber apron covering the top thereof, such as is indicated in Fig. 1. Air under pressure is conveyed to the interior of the box by means of an inlet pipe 11 provided with a threeway cock 12 having an exhaust vent 13 by which any air returning from the box after the cessation of the pressure therein will be permitted to escape therethrough.

Mounted above the box 1 is a plunger 14, (only the lower end of which is shown in Fig. 2) which is provided with a pair of fingers 15 arranged to press upon the heel and sole of a last during the process of placing the lining and upper of a rubber shoe and to force the last downward into the mold 6 after stretching the elastic rubber apron 8 sufficiently.

The operation of this device is as follows:— The plunger 14 is raised sufficiently to permit a seamless lining of suitable shape to be laid upon the apron 8 immediately over the mold 6 and properly positioned thereon with respect thereto. A last of proper size is then taken and after being inverted, held immediately over the seamless lining on the apron 8. The plunger 14 is then caused to descend forcing the last down into the mold 6, carrying with it the lining, which during the descent of the last into the mold will be shaped about the sides of the last and caused to conform thereto to a certain extent. As soon as the plunger has made its entire downward movement, and while still retained there air under pressure is admitted to the interior of the box 1 by means of the cock 12 which causes the elastic mold 6 to be compressed against the apron which has been forced downward into the mold 6 with the last and which in turn forces the lining against the last evenly and perfectly, removing all wrinkles therein and driving therefrom any air bubbles that might exist thereunder. As soon as the air pressure has compressed the mold 6 upon the apron surrounding the last and lining, the plunger may be withdrawn and the last remain securely held within the confines of the elastic mold, for the reason that as the lasts used for this purpose conform in contour to the ordinary shoe, and as the molds 6 are made to conform to the lasts, the pressure of air will force the upper and lateral portions of the mold and apron into the hollow portion of the last which exists between the heel and sole of the last, thereby holding the last securely against upward movement; and as the mold 6 itself is held from being forced upward by reason of the cover 7, the last will remain fixedly in position until the air pressure is released. As soon as the air pressure in the box 1 is lowered, the mold 6 withdraws its clamping influence from the last, and the elasticity of the rubber apron will cause it to resume its normal flat condition which will force upward the last and throw it completely out of the mold 6. In placing an upper on the lining, the same operation is used as has just been described with reference to the lining, with this exception, that the ankle portion of the last is placed so that it will project through the opening in the upper and when the plunger forces the last downwardly, the upper will be forced onto the lining on the last in proper position thereon and the same process takes place with respect to the upper as has been described with reference to the lining. After the upper has been securely placed in position and before the air pressure is reduced in the box 1, the last being fixedly held in position, the outside sole of the footwear is placed in position by hand and caused to adhere to the inturned portions of the upper by manual pressure; then the pressure of air is released and the last with its footwear thereon is thrown upwardly by the apron and sent to the vulcanizing department. It will be seen from the foregoing description, that this device affords a perfect means for placing these two portions of a rubber shoe in position without any danger of wrinkles occurring or air existing under or between the various layers which go to make up the shoe, and also the necessity of employing seams is eliminated, thereby making a more perfect shoe without the necessity of the employment of a great amount of hand labor, thus making the manufacture of shoes by this device more perfect, cheap and expeditious.

What I claim and desire to secure by Letters Patent, is:—

1. A device of the class described comprising a hollow air-tight member, an elastic diaphragm extending across said member provided with a depending open-topped mold formed integral therewith, an inflexible member provided with an opening corresponding in contour to said mold superposed on said diaphragm, an elastic apron secured above said inflexible member and arranged to envelop articles forced into said mold, and means for producing an even and simultaneous pressure of said mold upon an object contained therein.

2. The combination in a device of the class described, of a hollow air-tight box, an elastic diaphragm extending across said box provided with a depending compressible mold formed integral therewith, a cover for said box provided with an opening so positioned as to register with the opening in said mold, a rubber apron mounted above said cover,

means for securing said apron, cover and diaphragm to the open end of said box, and means for introducing a fluid under pressure to the interior of said box about said mold.

3. A device for fixedly superimposing adhesive members in forming articles comprising an elastic member arranged to inclose the article, an elastic sustaining means integral with said elastic member, a substantially rigid member provided with an opening registering with the opening in said elastic member for maintaining said member against outward distortion, and means for exerting a fluid pressure about said elastic member for compressing said member upon a form carrying superimposed adhesive portions of the article to be produced.

4. A device for forming articles of a plurality of adhesive superimpositions comprising an elastic envelop to inclose a form carrying said impositions elastically sustained, a rigid member provided with an opening registering with the opening in said envelop, an elastic apron suitably sustained on the opposite side of said rigid member arranged to be carried into said envelop and inclose the article while sustained therein, and a fluid pressure-producing instrumentality to cause the compression of said envelop on said article.

5. A device for producing articles from a plurality of adhesive members successively imposed on a suitable form comprising an elastic envelop conforming approximately to the shape of the article to be produced, and provided with an integral sustaining member for elastically maintaining said envelop, an elastic member adapted to cover the open face of said envelop and to inclose the article to be produced and be carried into said envelop with said article, and means for producing fluid pressure about said envelop, whereby the successive superimpositions on said form are caused to simultaneously adhere to one another.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

ARTHUR C. SQUIRES.

Witnesses:
C. E. HUMPHREY,
GLENARA FOX.