July 15, 1930. F. NIELSEN 1,770,655

MACHINE FOR VULCANIZING RUBBER SOLES TO FABRIC OR OTHER UPPERS

Filed May 29, 1929 4 Sheets-Sheet 1

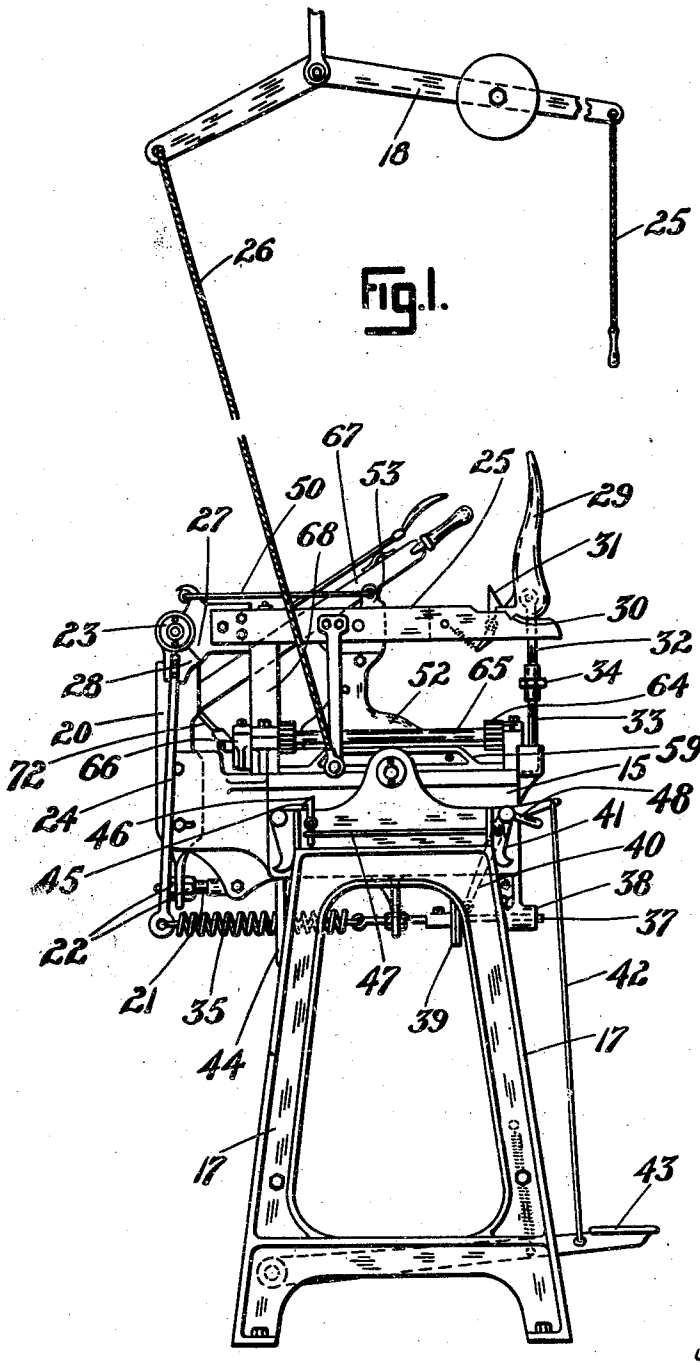


Fig. 1.

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Filed May 29, 1929 4 Sheets-Sheet 2

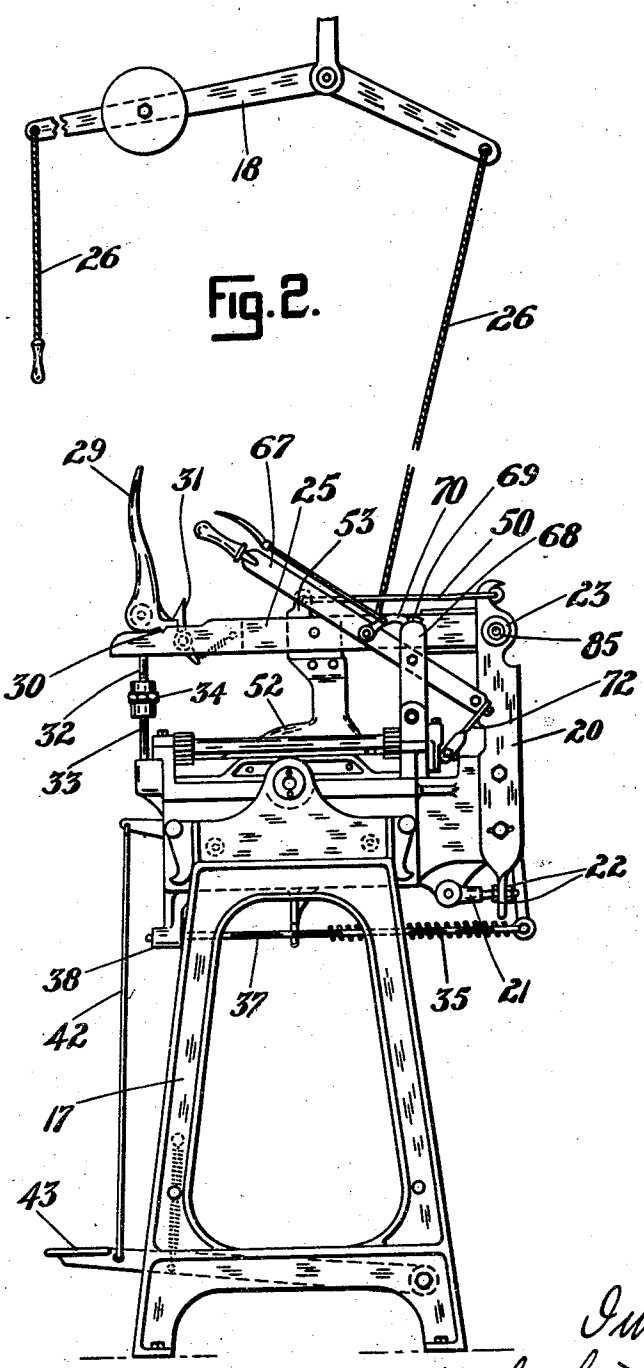


Fig. 2.

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MACHINE FOR VULCANIZING RUBBER SOLES TO FABRIC OR OTHER UPPERS

Filed May 29, 1929 4 Sheets-Sheet 3

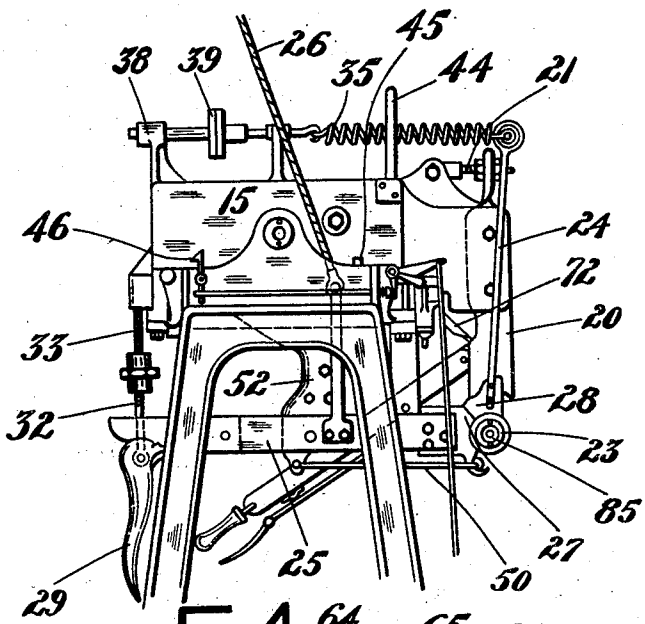


Fig. 4.

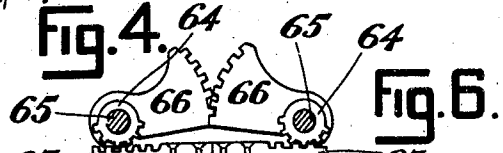


Fig. 6.

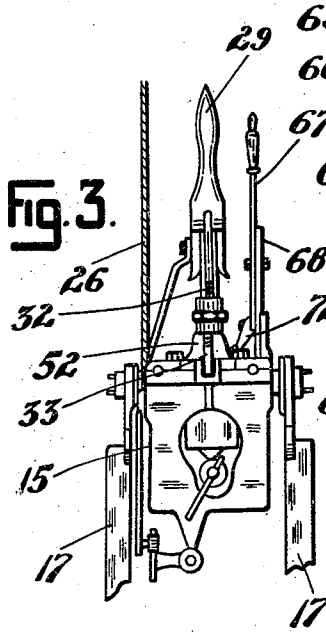


Fig. 3.

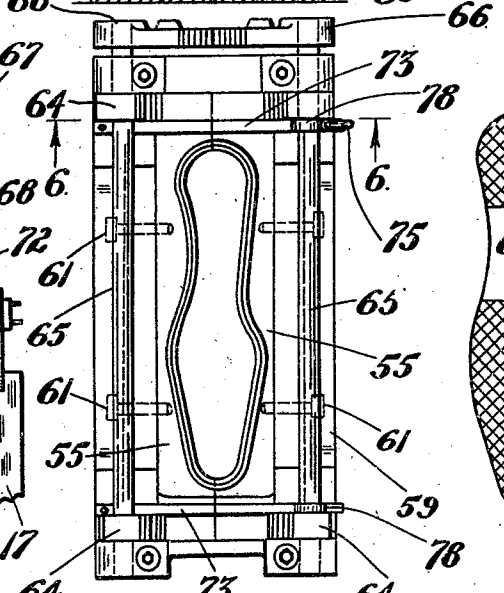


Fig. 5.

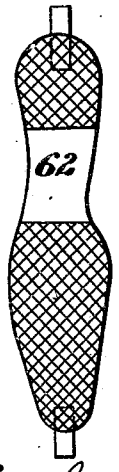


Fig. 7.

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MACHINE FOR VULCANIZING RUBBER SOLES TO FABRIC OR OTHER UPPERS

Filed May 29, 1929 4 Sheets-Sheet 4

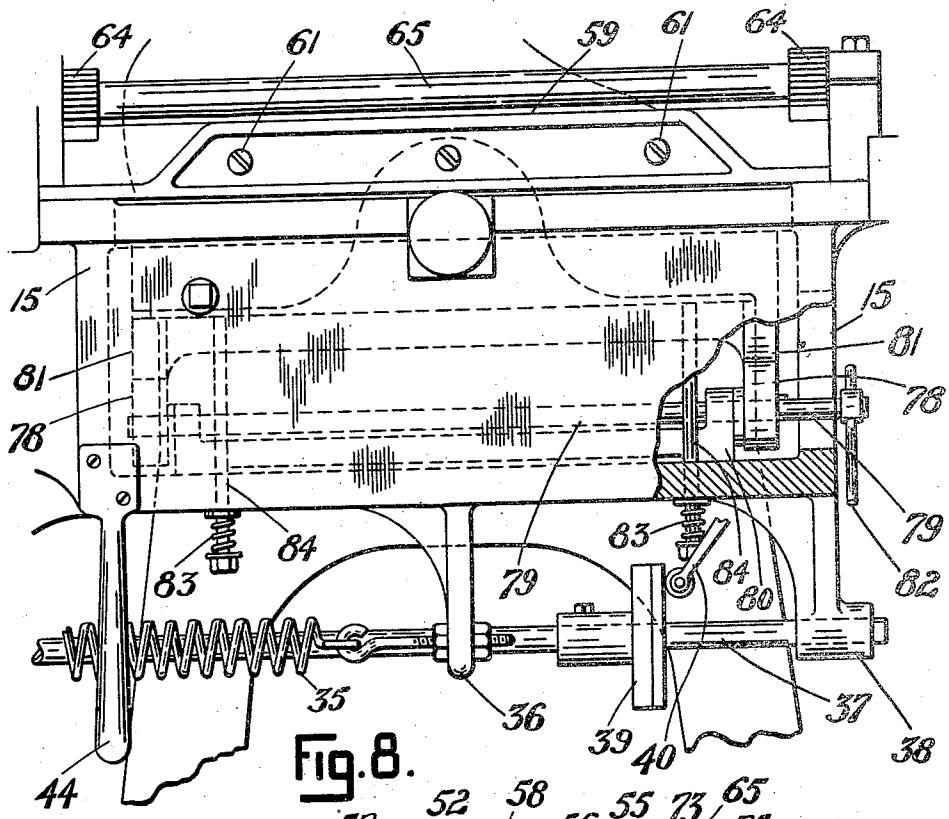


Fig. 8.

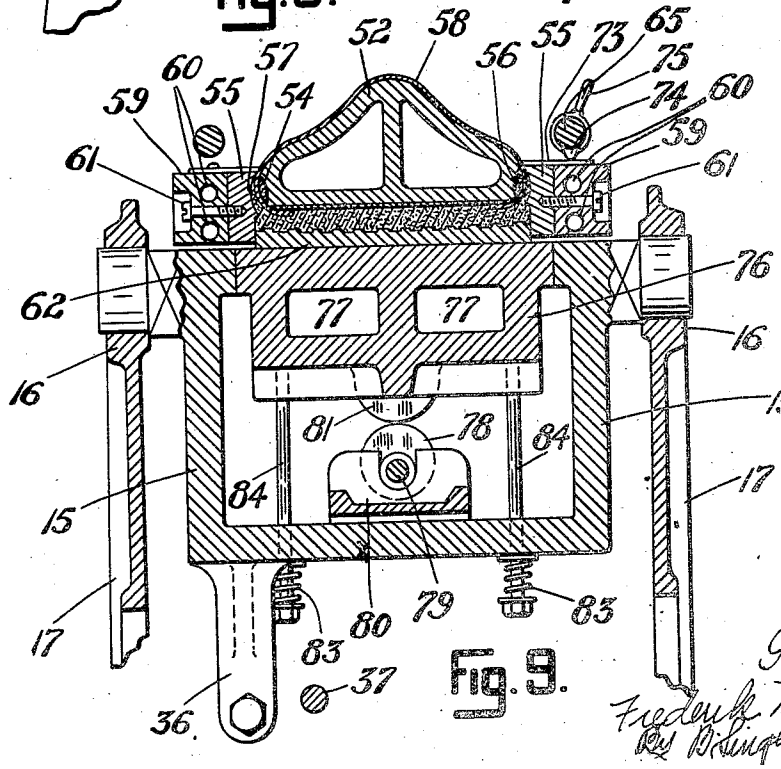


Fig. 9.

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Patented July 15, 1930

1,770,655

UNITED STATES PATENT OFFICE

FREDERIK NIELSEN, OF EPPING, NEAR SYDNEY, NEW SOUTH WALES, AUSTRALIA

MACHINE FOR VULCANIZING RUBBER SOLES TO FABRIC OR OTHER UPPERS

Application filed May 29, 1929, Serial No. 367,047, and in Australia December 31, 1928.

This invention relate to improvements in machines for vulcanizing rubber soles to fabric or other uppers, and has particular reference to the type of rubber soled footwear provided with a rubber foxing strip around the lower portion of the upper, and in some cases, a rubber toe cap and/or a rubber piece at the heel or ankle portion of the upper or the like.

My invention has been devised so that such a foxing trip and, if desired a rubber toe cap and/or a heel or ankle portion or the like may, with the sole and heel of the shoe, be moulded and vulcanized to the upper in a single operation. My invention also enables a welted sand shoe to be made without any alteration to the last or its mould by simply omitting to place a foxing strip upon the upper.

My invention is an improvement upon vulcanizing machines wherein a vulcanizer is used having a space provided therein for steam, which is supplied from an external source, such as a boiler, and wherein provision is made for the escape of the water of condensation, the vulcanizer being pivoted to a supporting frame or legs and being capable of rotation through an angle of approximately 180°.

The invention is also applicable to a vulcanizing machine having a combined internal vulcanizer and last provided for use in conjunction with a main vulcanizer which is capable of being rotated through an angle of 180°.

The invention is further applicable to vulcanizing machines wherein pressure and heat are imparted from a combined internal vulcanizer and last by means of a metal insole situated between the lower face of the internal vulcanizer and the insole of the boot or shoe.

According to my present invention I embody in a machine of the kind referred to steam heated side moulds which extend upwards to the preferred height on the shoe upper, and may also provide the last with a groove opposite to the inner face of said moulds. The groove is adapted to receive padding material, for the purpose of effectively preventing the rubber from extending beyond the moulds. The present invention also contemplates the shaping of the moulds in such manner that when they are closed they extend over a desired portion of the upper and leave a space between their inner faces and the shoe upper to receive sufficient rubber to form a foxing strip, and when a rubber toe cap or the like is to be provided the moulds are adapted to enclose the toe or other portion of the upper and leave a space for sufficient rubber to form the toe cap or the like. In some cases a toe cap of material other than rubber may be provided.

The body portion of the vulcanizer is adapted to slide vertically in a casing pivoted to the side frame or supports of the machine, the sliding movement being effected by cam operated mechanism or by other suitable means capable of exerting an upward pressure on the sole plate.

The foxing strip and toe cap or the like, when provided, may be roughly formed on the shoe upper before closing the moulds; otherwise enough rubber compound must be placed in the sole mould to fill the spaces before mentioned. It has been found essential for the above purpose of making a foxing strip shoe, that the last, when placed in position above the filled mould must remain immovable consequently the pressure on the sole of the shoe must be applied vertically upwards, and this is accomplished by means of a vertically slidable sole vulcanizer, the fixed position of which may be determined to suit any thickness of sole.

But in order that the invention may be more readily understood, reference will now be made to the accompanying drawings which illustrate the present invention incorporated in a vulcanizing machine of known construction.

Referring to the drawings:—

Figure 1 is an elevation of the left hand side of a vulcanizing machine suitable for use in conjunction with the present invention.

Figure 2 is an elevation of the right hand side thereof.

Figure 3 is a part end elevational view of the machine shown in Figures 1 and 2.

Figure 4 is a side view showing the vulcanizer of the machine and its associated parts reversed upon its pivot to permit the water of condensation to drain out.

Figure 5 is a plan view of the improved mould plates showing the racks and pinions by which they are opened and closed.

Figure 6 is a section on the line 6—6 of Figure 5 showing the improved mould plates in cross section and also showing the internal heating pipes.

Figure 7 is a plan view of a sole plate used with the machine to impart configuration to the sole of the shoe while it is in the mould.

Figure 8 is a side elevational view of portion of the improved main vulcanizer, on an enlarged scale, the slidable body portion being indicated by dotted lines, and the casing being broken away to show one of the cams provided for raising the said slidable body portion; the springs for returning the said slidable body portion are also shown, being disposed beneath the said casing.

Figure 9 is a cross sectional elevation on the line 9—9 of Figure 8 showing the last, the improved mould plates, the vertically slidable body portion of the vulcanizer and their associated parts, together with the means provided for the operation thereof.

The vulcanizer casing 15 with its associated parts is mounted in bearings 16 on the machine frame 17 which may be extended to take as many vulcanizing units as desired. The whole of the operating parts are carried by the vulcanizer and are rotatable about the bearings 16 thereof, as indicated in Figure 4.

The vulcanizer casing 15 has an extension at the rear thereof to which is adjustably secured a vertical member 20, the adjustability thereof being effected by a pivoted arm 21 which passes through the end of the member 20 and clamps it between two nuts 22.

A hollow pivot 23 is secured to the vertical member 20 and loosely supports an arm 24, see Figure 1, and a last supporting lever 25. The lever 25, and the parts carried thereby are free to rise upon the pivot 23 and are capable of being rotated through an angle of approximately 180° when actuated by the cord 26 and pull operated lever 18, as shown in Figures 1 and 2, but are maintained in the normal horizontal position by the engagement of a stop 27, with a stop 28 attached to the arm 24.

The last supporting lever 25 is held during vulcanization by an eccentric hand lever 29, which has a safety detent 30 engaging a notch in the lever 25 and is locked by one or more spring pressed catches 31. The eccentric hand lever 29 applies pressure to the last supporting lever 25 and brings the last down into close contact with a vulcanizable sole, adjustment being effected by right and left hand screws 32—33 and a correspondingly screwed sleeve 34.

To the lower end of the arm 24, one end of a coiled spring 35 is secured, the other end of the spring being anchored to a bracket 36 projecting from the bottom of the vulcanizer casing 15.

The lower end of the arm 24 has also connected to it a rod 37 adapted to slide in a bracket 38 depending from the vulcanizer casing 15. This rod 37 carries an adjustable flanged collar 39 adapted to be engaged by a bell crank lever 40 pivoted upon a bracket 41 forming part of the machine frame 17. The bell crank lever 40 is connected by a rod 42 to a foot lever 43 also pivoted to the machine frame 17.

The action of the spring 35 upon the arm 24 tends to raise the last supporting lever 25 clear of the mould when the latter is not held down by the eccentric hand lever 29. The foot lever 43, bell crank lever 40, and the rod 37 serve to take the load off the spring, and enable the last supporting lever and its associated parts to descend by their own weight and allow the eccentric hand lever 29 to be placed in position.

The vulcanizer casing 15 and its associated parts are capable of being reversed upon the bearings 16 with the assistance of the hand lever 29, and a handle 44 is normally held in the position shown in Figure 1 by the engagement of a stop 45 on the vulcanizer casing 15 with a catch 46 pivoted on the frame 17. When it is desired to reverse the vulcanizer upon its bearings to the position shown in Figure 4, the catch 46 is removed from the stop 45 by means of a rod 47 and hand lever 48.

The foregoing description does not form part of the present invention, but has been given merely for the purpose of enabling the present improvements to be clearly understood.

According to the present invention a last 52, which may be internally heated, is mounted upon an arm 53 pivoted to the last supporting lever 25, said last 52 being maintained in an approximately level position by a coupling rod 50.

In some cases the last need not be carried by the supporting lever, provided that it is disposed in a similar position beneath the lever.

A groove 54 may be formed in the last adjacent to where a foxing strip, toe cap or the like is required.

Flexible material 56, such as felt, tubular fabric filled with sand, or inflatable tubing is placed in the groove 54 for the purpose of preventing the foxing strip spreading, by making a close joint at the top of the foxing strip or the like and to make allowance for any required thickness of foxing strip or

the like without the necessity of allowing for the same in the side mould. The flexible material also takes up the back pressure exerted by the side moulds upon the upper.

The last 52 may however be made without any groove or ridge in which case it will be particularly applicable to a foxing strip of limited thickness which will squeeze right into the canvas forming the upper without spreading on the surface thereof.

The present invention has mould plates 55 for shaping the edge of the sole, and for positioning a foxing strip 57 and/or toe cap and/or heel or ankle portion to the upper 58 of the shoe.

The mould plates 55 are preferably made of aluminium and are detachably secured to mould blocks 59 which are preferably formed from cast iron and are provided with steam circulating passages 60 to provide uniform heat distribution to the mould plates 55.

The mould plates 55 are made in sizes to suit the work in hand and may be made interchangeable for a range of sizes by removing the screws 61 from the mould blocks 59. By this means one machine can be made to accommodate shoes of various sizes without disconnecting any steam joints.

A metal sole plate 62 is provided to form the bottom of the mould and impart the desired configuration to the under surface of the sole of the shoe.

Each mould block 59 is provided with racks 63 adapted to be engaged by pinions 64 mounted on shafts 65 and adapted to be simultaneously operated in known manner by toothed quadrants 66, from a hand lever 67 which is pivoted to an arm 68 extending from the vulcanizer casing 15, and having a stop 69 for engagement by a pawl 70 on the hand lever 67. A universally pivoted link 72 is provided to connect the hand lever 67 with one of the toothed quadrants 66.

After the mould blocks and their mould plates 55 have been placed in the closed position by the above mechanism they are secured, and prevented from any tendency to spring open, when pressure is applied to the mould by means of a spring latch 73, see Figures 5 and 9, adapted to be pressed down by a cam 74 loosely mounted upon one of the shafts 65 and provided with a handle 75.

The vulcanizer casing 15 is provided with a body portion 76 upon which the sole plate 62 is adapted to rest. The body portion 76, which is provided with steam heating spaces 77, is slidably mounted in the said vulcanizer casing 15 and is capable of being elevated by cams 78 or like mechanism mounted upon a shaft 79 journaled in adjustable bearing brackets 80 carried by the vulcanizer casing 15. Two cams 78 are provided each of which engage a roller mounted upon a lug 81 projecting from the vertically slidable body portion 76 of the vulcanizer casing 15.

The shaft 79 is capable of being rotated by a bar 82, see Figure 8, when it is desired to raise the body portion 76. Springs 83 and guide rods 84 are provided to assist in returning the body portion 76 to its retracted position when the position of the cams 78 is reversed from that shown in Figures 8 and 9.

In commencing the operation of vulcanizing a sole upon the shoe body, the last 52 and its supporting lever 25 are turned through an angle of approximately 180° from the position shown in Figure 1, by means of the pull operated lever 18, the cord 26 serving to steady the lever 25 on each side of the dead centre.

When the last 52 is in the position just described a shoe body comprising an upper and an inner sole is placed thereon, the pull operated lever 18 is again operated to bring the shoe body into position above the open moulds in which position the last supporting lever 25 is locked by the hand lever 29.

The steam heated mould blocks 59 with their attached mould plates 55 are now moved inwards so as to enclose the last or upper and place the mould plates 55 against the foxing strips 57 on the shoe, and so as to apply pressure to the material in the groove 54 when such is used as a cushion for the foxing strips and the like attachments. In the case of an inflatable tube the latter may be inflated after closing the moulds.

The movable vulcanizer body portion 76 is now raised by the cams 78 to bring the sole plate 62 against the underside of the shoe, it being understood that the quantity of rubber required for the sole has been already placed in the mould formed by the sole plate 62 and the two mould plates 55.

After the above operations have been completed, the lever 48 is operated to release the catch 46 from the stop 45 and permit the reversal of the machine upon its bearings 16 into the vulcanizing position, see Figure 4, wherein steam is admitted to the body portion of the vulcanizer and also if desired to the last. During the vulcanization water of condensation can pass away from the vulcanizer 15, and also from the last, if heated, owing to both being in a reversed position. The inlet and outlet of steam to the vulcanizer body portion 76 may be effected through flexible pipes connected to stuffing boxes in the bearings 16. A stuffing box 85 is also formed on the hollow pivot 23 when it is desired to supply steam to the last 52.

After vulcanization the machine is returned to the position shown in Figure 1 whereupon the shoe is removed and the machine left ready for a fresh operation.

It should be understood that where a non-heated last is being used, the operation of reversing the vulcanizer for draining purposes is not required.

I claim:

1. In a vulcanizing machine of the kind described, the combination with a horizontally pivoted vulcanizer casing, of a vulcanizer body portion adapted to slide vertically in the said casing, a last for use with a last supporting lever pivoted horizontally above the vulcanizer body, a pair of mould blocks slidably mounted above the vulcanizer and a mould plate carried by each mould block.

2. In a vulcanizing machine of the kind described, the combination with a vulcanizer casing horizontally pivoted to the machine frame, of a vulcanizer body portion adapted to slide vertically in the said casing, means for raising the vulcanizer body portion within the vulcanizer casing, a last carried by a last supporting lever pivoted horizontally above the vulcanizer body, a pair of mould blocks slidably mounted above the vulcanizer casing, a mould plate carried by each mould block, and a sole plate disposed upon the body portion.

3. In a vulcanizing machine of the kind described, the combination with a horizontally pivoted vulcanizer casing, of a vulcanizer body portion adapted to slide vertically in the said casing, cams for raising the said body portion, and means for retracting the vulcanizer body portion, a last carried by a last supporting lever pivoted horizontally above the vulcanizer body, a pair of mould blocks slidably mounted above the vulcanizer and a mould plate carried by each mould block.

4. In a vulcanizing machine of the kind described, the combination with a vulcanizer casing horizontally pivoted to the machine frame, of a vulcanizer body portion adapted to slide vertically in the said casing, means for raising the vulcanizer body portion within the vulcanizer casing to apply upward pressure for moulding the sole during vulcanization, and means for retracting the vulcanizer body portion, a last carried by a last supporting lever pivoted horizontally above the vulcanizer body, a pair of steam heated mould blocks slidably mounted above the vulcanizer casing, a detachable mould plate carried by each mould block, a sole plate disposed upon the body portion, and means carried by one of the mould blocks, and adapted to engage the other mould block for preventing spreading of the said mould plates.

5. In a vulcanizing machine of the kind described, the combination with a horizontally pivoted vulcanizer casing of a vulcanizer body portion adapted to slide vertically in the said casing, cams for raising the said body portion to apply upward pressure for moulding the sole during vulcanization, means for retracting the vulcanizer body portion after vulcanization, a last carried by a last supporting lever pivoted horizontally above the vulcanizer body, a pair of steam heated mould blocks slidably mounted above the vulcanizer, and a detachable mould plate carried by each mould block, a sole plate disposed upon the body portion, and a pair of latches carried by one of the mould blocks and adapted to engage the other mould block.

6. In a vulcanizing machine of the kind described, the combination with a horizontally pivoted vulcanizer casing of a vulcanizer body portion adapted to slide vertically in the said casing, cams for raising the said body portion to apply upward pressure for moulding the sole during vulcanization, means for retracting the vulcanizer body portion after vulcanization, a last carried by a last supporting lever pivoted horizontally above the vulcanizer body, a groove in the last flexible material disposed in the groove in the last for the purpose of making a close joint and preventing spreading of the rubber when vulcanizing a foxing strip or the like to the upper, a pair of steam heated mould blocks slidably mounted above the vulcanizer and a detachable mould plate carried by each block, a sole plate disposed upon the body portion, and latches carried by one of the mould blocks and adapted to engage the other mould block.

In testimony whereof I have hereunto set my hand.

FREDERIK NIELSEN.