No. 774,865. PATENTED NOV. 15, 1904.

G. F. BUTTERFIELD.

SHOE SOLE VULCANIZING AND APPLYING APPARATUS.

APPLICATION FILED AUG. 1, 1904.

NO MODEL. 3 SHEETS—SHEET 1.

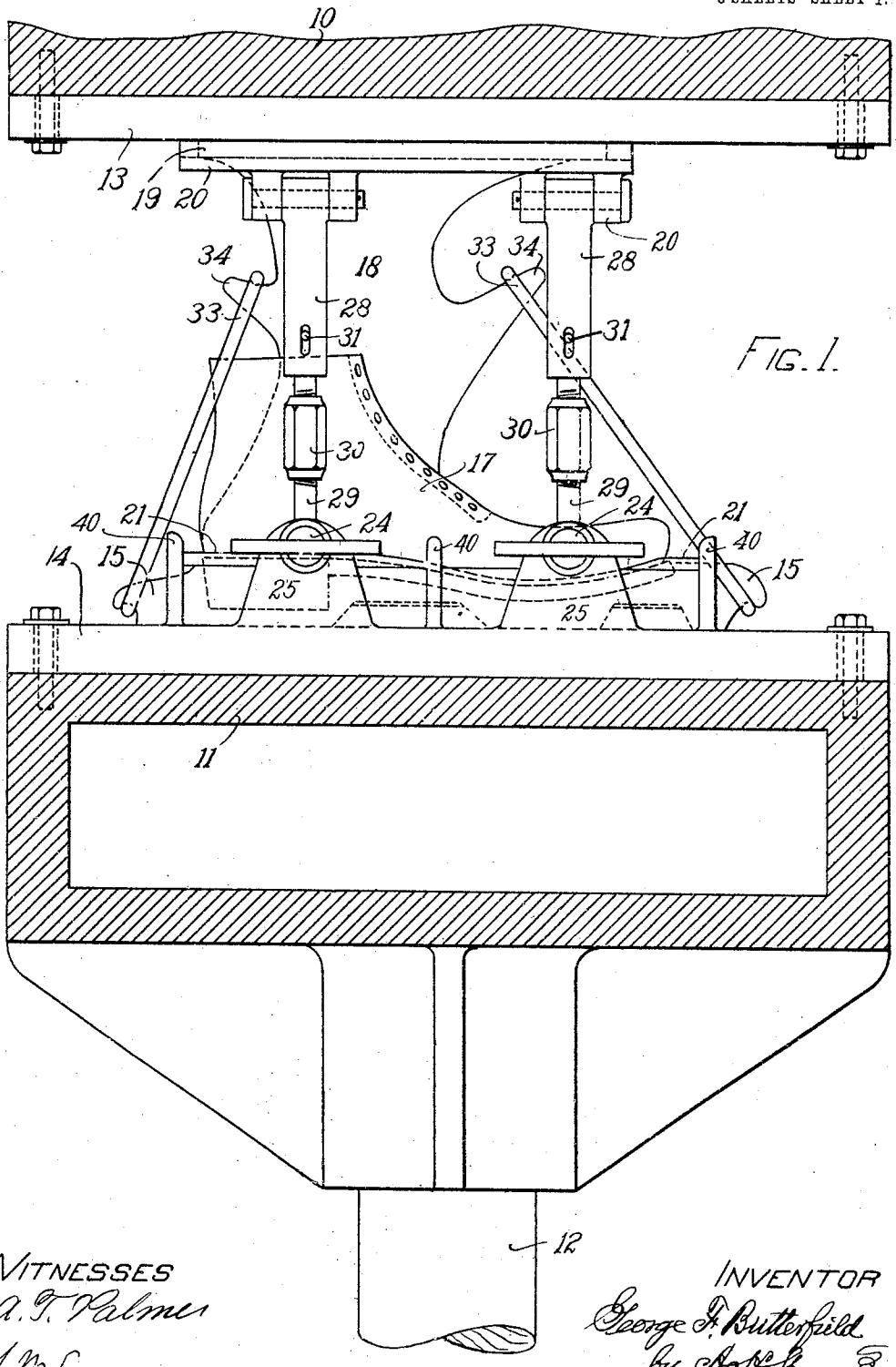

FIG. 1.

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NO MODEL. 3 SHEETS—SHEET 2.

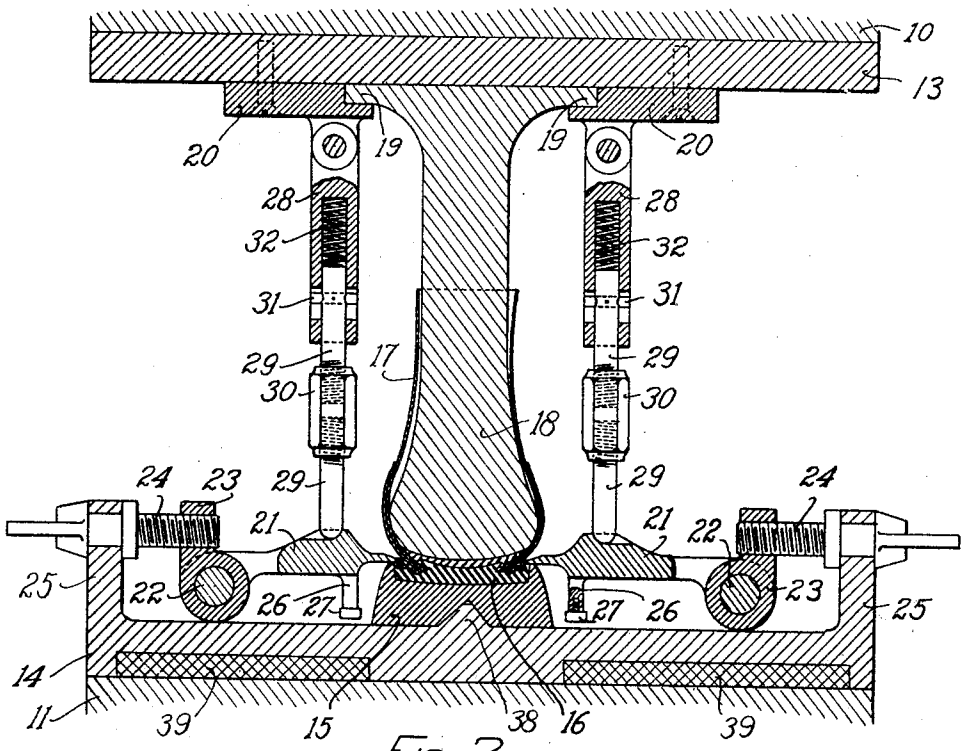

FIG. 2.

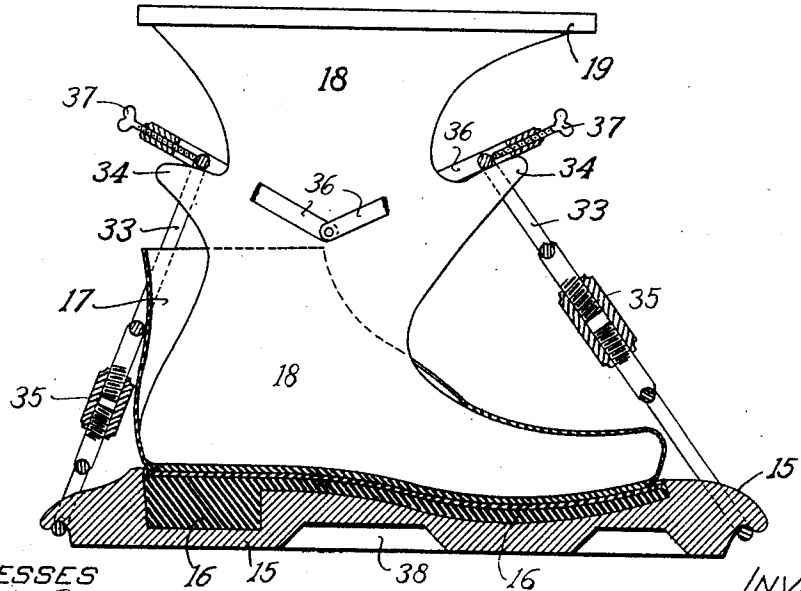

FIG. 3.

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NO MODEL. 3 SHEETS—SHEET 3.

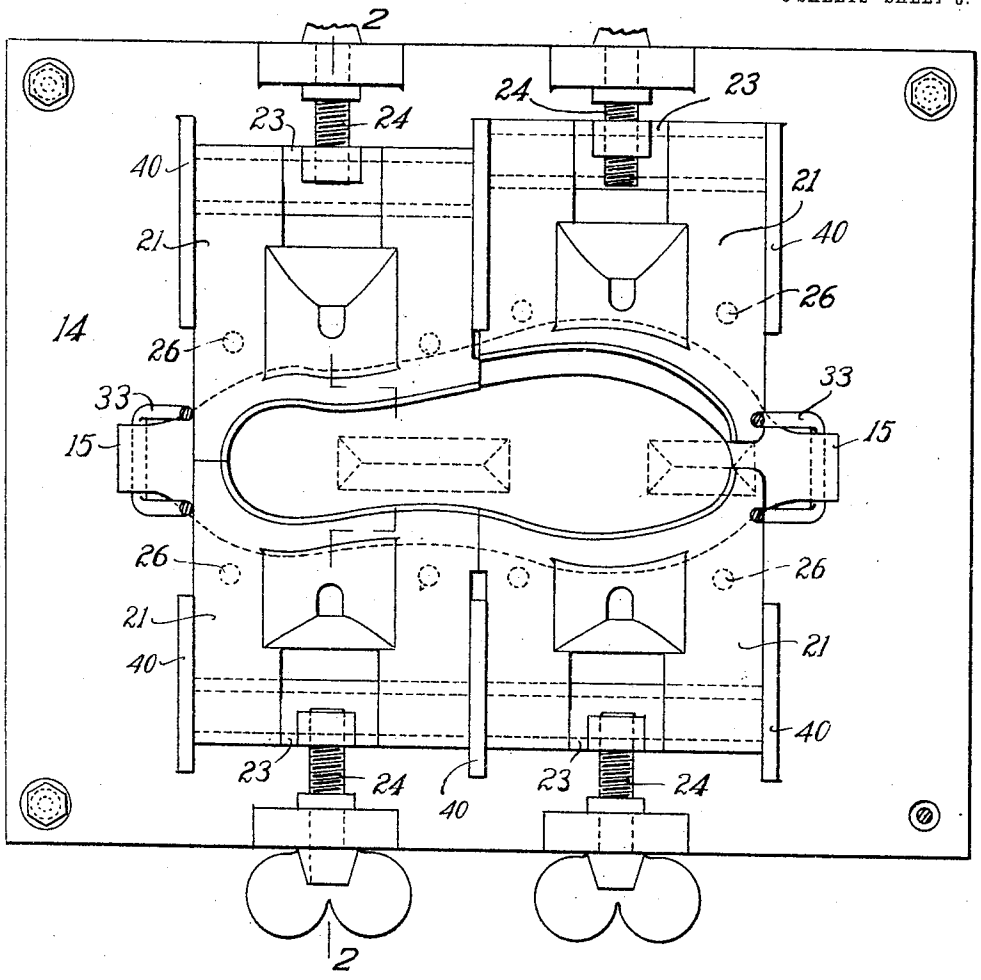

FIG. 4.

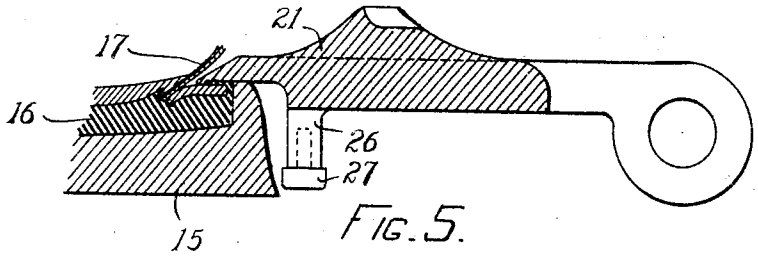

FIG. 5.

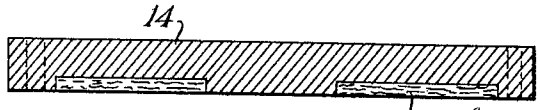

FIG. 6.

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No. 774,865. Patented November 15, 1904.

UNITED STATES PATENT OFFICE.

GEORGE F. BUTTERFIELD, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO GRACE I. BUTTERFIELD, OF BOSTON, MASSACHUSETTS.

SHOE-SOLE VULCANIZING AND APPLYING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 774,865, dated November 15, 1904.

Application filed August 1, 1904. Serial No. 219,085. (No model.)

To all whom it may concern:

Be it known that I, GEORGE F. BUTTERFIELD, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Shoe-Sole Vulcanizing and Applying Apparatus, of which the following is a specification.

This invention relates to shoe-sole vulcanizing and applying apparatus of a skeleton character designed to hold a leather shoe in position while a rubber sole is secured thereon by vulcanization.

My present improvements comprise shoe-holding mechanism adapted for use between the platens of a vulcanizing-press, to which the top and bottom plates of my mechanism are secured.

A special feature of my invention provides for temporarily connecting the mold and the stem of the last or foot-form and making both removable together from the frame or holding mechanism, so that the shoe and removed parts may cool slowly and duplicates thereof be at once introduced into the space vacated in the frame. To facilitate such insertion and removal, guides for locating the mold and grooved ways for supporting the foot-form are provided. Adjustable clamps and pressure devices hold and release the shoe and mold. The mold will be cast from a soft metal which will expand in cooling to facilitate removing the rubber sole of the bottomed shoe therefrom when cooled. To prevent overheating the shoe-upper, a thick layer of non-conducting material may be interposed between the bottom plate and the hot steam-platen of the press except in that portion which is beneath the mold, where full heat is required.

In the drawings, Figure 1 is a side view of my apparatus with a shoe in position on the foot-form, the press-platens being shown in section. Fig. 2 is a transverse section taken through the stem of the foot-form on line 2 2 of Fig. 4. Fig. 3 shows the foot-form, shoe, and mold connected together and detached from the machine, the latter parts being in longitudinal section. Fig. 4 is a plan view of the lower plate and parts thereon. Fig. 5 is a sectional detail of the clamp and mold, and Fig. 6 a detail of the bottom plate.

In Fig. 1 the numerals 10 and 11 represent the platens of the vulcanizing-press, the lower one being formed hollow to receive live steam for vulcanizing the rubber contained in the mold. The lower platen has a limited vertical movement with its shaft 12, to which a powerful pressure may be applied.

To the platens 10 and 11 I secure the top and bottom plates 13 and 14 of my apparatus, preferably by bolts entering the platens after passing through holes of somewhat larger diameter in said plates, so that a slight lateral adjustment may be made, if required. Centrally on the bottom plate 14 I mount the soft-metal mold-casting 15, having a sole and heel shaped cavity which receives the unvulcanized or partially-vulcanized rubber 16, which is to form the outsole of the shoe 17. This shoe while under treatment is mounted upon a metal last or foot-form 18, by which it is pressed firmly upon the uncured surface of the rubber 16. The shank or stem of this foot-form is broadened at top to stand more firmly in use and is formed with parallel flanges 19, arranged to slide into grooved ways or rabbets in the edges of casting 20, formed on or secured to the top plate 13. (See Fig. 2.)

The bottom plate 14 carries a plurality of adjustable marginal clamps 21, four being represented in Fig. 4, one of them partially withdrawn to show its forward edge. These clamps conform at their forward edges to the outline of the shoe, their tips entering the angle between the upper and the welt and being pressed down upon the welt to aid in holding the shoe in position and keeping the rubber confined within the mold. Each clamp is forked and pivoted by a ring at its outer end on a rod 22, which connects it to an interposed nut 23, having an upward extension internally threaded to engage the threads of a thumb-screw 24. The thumb-screws rotate without longitudinal movement through upright ears 25, formed on plate 14 at each side of the mold. Such rotation moves the clamp forward or back for proper adjustment. Each clamp is formed with a depending foot 26

near its forward end to keep it from dropping down when the mold is withdrawn. It may have a non-conducting terminal button 27, as in Figs. 2 and 5. The extreme tip of each clamp has, as shown in Fig. 5, a slight downward extension to bear down on the welt along a median line, leaving above the welt a shallow space into which rubber may enter from the mold and cover the top and outer edge of the welt.

Downward pressure is applied to the clamps 21, as shown in Fig. 2, by means of extensible braces comprising a tubular portion 28, hinged at top to the casting 20, a two-part cylindrical core 29, reversely threaded at adjacent ends and joined by a right and left hand nut 30, the parts of the core being held in place and kept from rotation by a slot and pin 31. The upper member of the core bears against a spiral spring 32 in the tubular socket, and the lower one rests terminally in an open slot on the back of the clamp. The interposed spring gives elasticity to this pressure. Rotation of the nut 30 increases or relaxes it. When the tension is relaxed, the braces may swing outwardly at foot to release the clamps.

Figs. 1 and 3 illustrate the connection of the mold and foot-form for removal together from the other apparatus. As here shown, links 33 extend obliquely from the ends of the mold-casting and hook over inclined projections 34 on the front and back edges of the foot-form shank. These links will preferably be detachable and may be simple elongated steel rings, as in Figs. 1 and 4, having a frictional engagement with the projections 34. In Fig. 3 the link is shown in two parts terminally looped to engage the mold and said projections, and the intermediate adjacent portions are reversely threaded and joined by a turnbuckle or right and left hand nut 35 to vary the length when desired. Fig. 3 also shows a tightening device comprising U-shaped swinging members 36, pivoted to the foot-form shank, and thumb-screws 37, working centrally through them and bearing against links 33 to advance them along the inclines 34.

In order to locate the mold, foot-form, and shoe with exactness when placed in the machine, I provide corresponding tapering centering devices 38 of suitable form in the bottom plate 14 and mold 15. Figs. 1, 2, 3, and 4 illustrate such guiding projections and recesses of an elongated pyramidal character.

Figs. 2 and 6 represent on each side of the space occupied by the mold the bottom plate 14 as provided with a filling 39 of material which is a poor conductor of heat, so as to lessen any liability to injury of the upper leather of the shoe by unnecessary conduction or radiation of heat from the steam-platen 11.

Figs. 1 and 4 show vertical guides 40 erected on the bottom plate 14 closely adjacent to the edges of the clamps 21 and serving to give them lateral support and avoid any undue strain on their adjusting-screws.

My present invention, wherein the foot-form and mold are together removable with the shoe from the other apparatus, should be distinguished from that set forth in my United State Patent No. 762,024, dated June 7, 1904, in which the top and bottom plates and the clamping and pressure devices were removable with the foot-form, shoe, and mold from the vulcanizing-press. The clamps in said patented apparatus were mounted to slide in swinging frames and not, as now, separately pivoted on hinge members which are actuated by separate screws through upright flanges on the bottom plate.

I claim as my invention—

1. In shoe-sole vulcanizing and applying apparatus, the foot-form and sole-containing mold, removable together from the edge-clamps and other apparatus, and provided with means for securing them to each other with the shoe-sole in position between them, whereby the said parts may be quickly detached and allowed to cool slowly while others are substituted therefor, substantially as set forth.

2. The foot-form and sole-containing mold, removable together from the edge-clamps and other apparatus, and adjustable connecting means for securing the mold-casting to the stem of the foot-form, with the shoe in position for treatment, substantially as set forth.

3. In shoe-sole vulcanizing and applying apparatus, parallel bottom and top plates with adjustable clamp and pressure devices connected respectively thereto, in combination with a mold and foot-form conforming terminally to said plates, removable together therefrom and adapted to hold the shoe-bottom upon the rubber in the mold, with the clamps in proper marginal position, substantially as set forth.

4. The bottom plate, the removable mold definitely located thereon, and adjustable clamps connected to said plate at each side of the mold, in combination with the top plate, grooved hinge-blocks secured thereto and extensible braces hinged to said blocks, and with the foot-form having a broad flattened top with marginal flanges adapted to enter the grooves of the hinge-blocks, whereby the foot-form, shoe and mold are supported from the top plate when the press-platens separate, substantially as set forth.

5. In a shoe-sole vulcanizing and applying apparatus, the bottom plate formed to expose the mold thereon to the full vulcanizing heat of the platen beneath it, and, at other points having a layer of non-conducting material interposed between said plate and platen, to reduce conduction of heat upwardly, substantially as set forth.

6. In a shoe-sole vulcanizing and applying apparatus, the bottom plate formed with up-

right marginal ears and carrying a central sole-shaped mold, in combination with separately-hinged adjustable clamps conforming to the sole edge, each clamp resting at the hinge on the bottom plate and with adjusting-screws engaging said ears and one member of the hinge, substantially as set forth.

7. A sole-mold casting having hook-like ends and a foot-form having hook-like projections on its shank or stem, in combination with links arranged to connect said hook-like portions temporarily, the mold-casting being formed with a centering device corresponding with one on the bottom plate of the machine to facilitate removal and accurate replacing of such molds, substantially as set forth.

8. In a shoe-sole vulcanizing and applying apparatus, the bottom plate, vertical clamp-guides formed thereon, and adjustable clamps for the sole edge arranged between said guides, in combination with a sole-shaped mold located on the bottom plate between the opposing clamp edges, a foot-form supported from the upper plate adapted to present the shoe thereon upon the rubber in the mold, and with yielding pressure devices depending from the upper plate and bearing on said clamps, substantially as set forth.

In testimony whereof I have affixed my signature in presence of two witnesses.

GEORGE F. BUTTERFIELD.

Witnesses:

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H. W. LADD.