(No Model.)

3 Sheets—Sheet 1.

F. F. RAYMOND, 2d.

HEEL ATTACHING MACHINE.

No. 347,061. Patented Aug. 10, 1886.

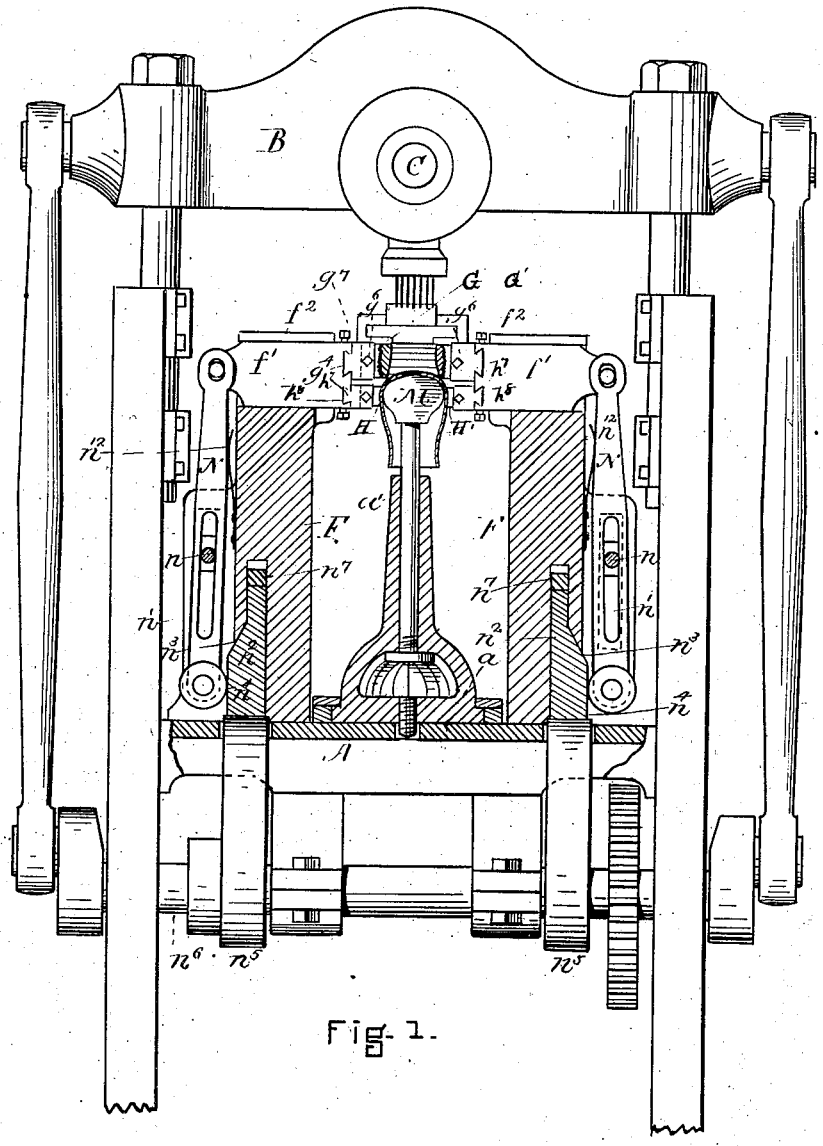

Fig. 1.

WITNESSES

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INVENTOR

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(No Model.)

3 Sheets—Sheet 2.

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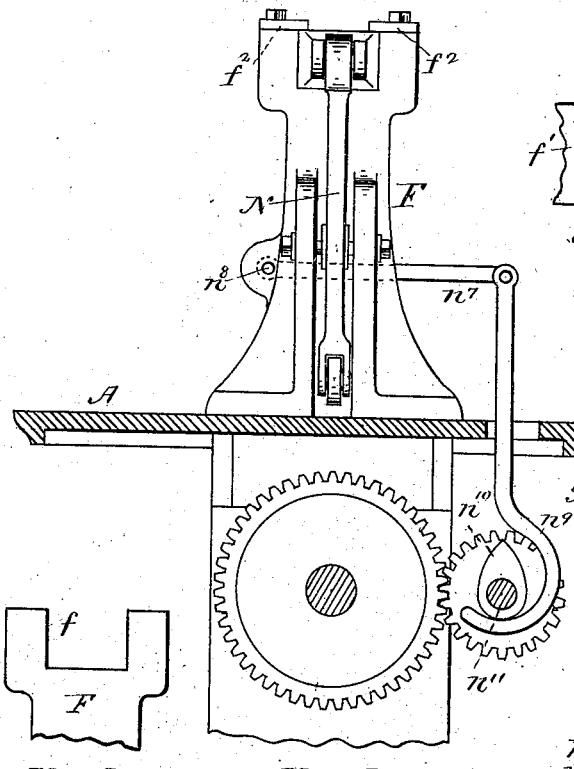

Fig. 2.

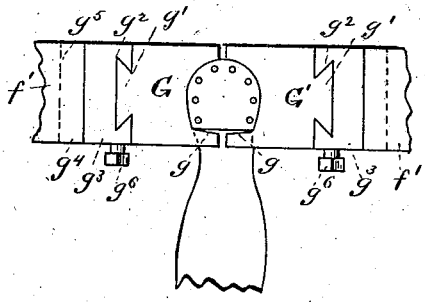

Fig. 5.

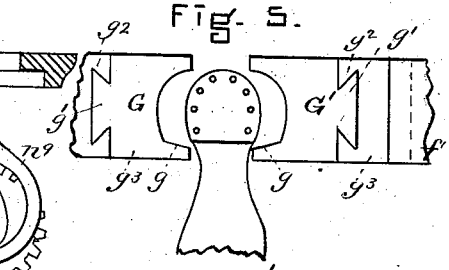

Fig. 6.

Fig. 8.

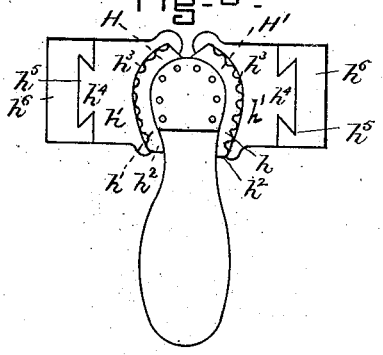

Fig. 7.

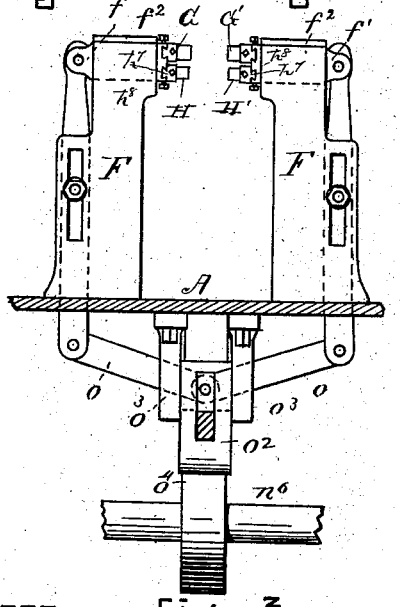

Fig. 3.

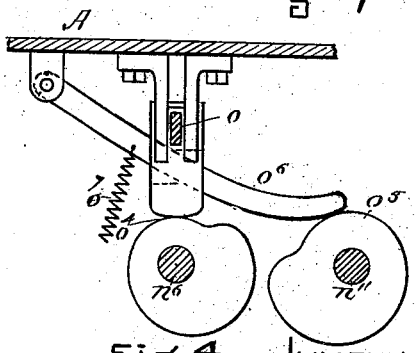

Fig. 4.

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(No Model.) 3 Sheets—Sheet 3.

F. F. RAYMOND, 2d.

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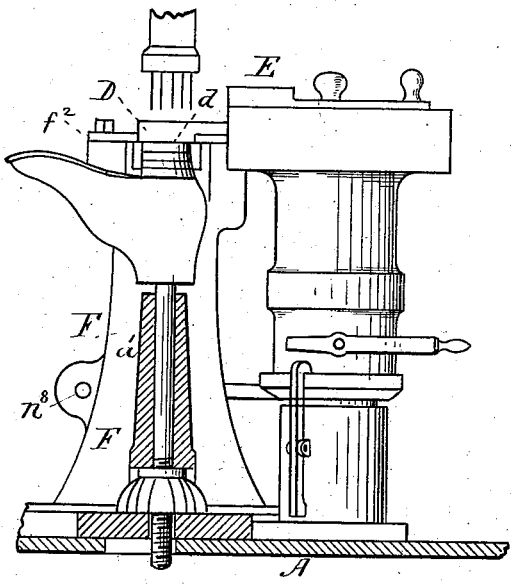

Fig. 9.

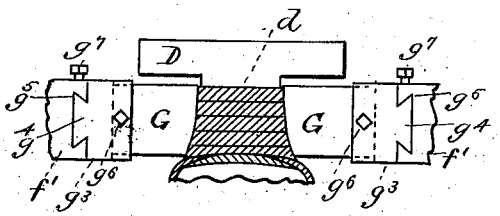

Fig. 10.

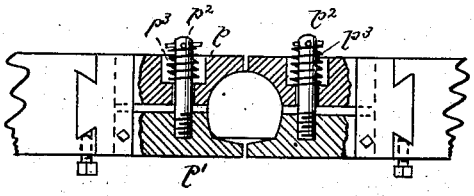

Fig. 11.

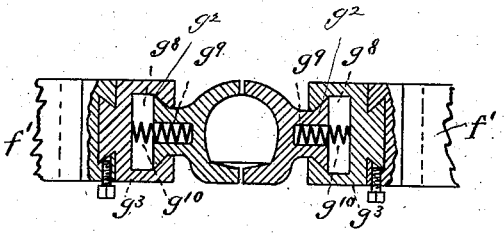

Fig. 12.

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UNITED STATES PATENT OFFICE.

FREEBORN F. RAYMOND, 2D, OF NEWTON, MASSACHUSETTS.

HEEL-ATTACHING MACHINE.

SPECIFICATION forming part of Letters Patent No. 347,061, dated August 10, 1886.

Application filed January 30, 1885. Serial No. 154,388. (No model.)

To all whom it may concern:

Be it known that I, FREEBORN F. RAYMOND, 2d, of Newton, in the county of Middlesex and State of Massachusetts, a citizen of the United States, have invented a new and useful Improvement in Heel-Attaching Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification in explaining its nature.

The invention relates especially to means for compressing and centering the heel-blank or heel upon the sole of the boot or shoe to which it is to be attached; also, to means for centering the boot or shoe while the heel-blank or heel is being compressed or attached; also, to the combination of the heel compressing and centering devices and the shoe centering and holding appliances, or either of them, with the pricking, nail feeding and driving mechanism, or what is generally known as the "heel-attaching" mechanism.

Referring to the drawings, Figure 1 represents in section and front elevation a heel-nailing machine containing the features of my improvement. Fig. 2 is a view in section and side elevation of a portion thereof, further illustrating the invention. Fig. 3 is a view part in elevation and part in vertical section, illustrating one method of operating the heel-presenting and shoe-centering devices. Fig. 4 is a view, part in elevation and part in vertical section, of the device shown in Fig. 3. Figs. 5 and 6 show in plan the heel-compressing device. Fig. 7 shows in plan the shoe-centering device. Fig. 8 is a detail view of portions of one of the posts for supporting the sliding block carrying one section of the heel-compressing die and shoe-centering device. Fig. 9 is a view, part in side elevation and part in section, still further illustrating the invention. Fig. 10 shows the position which the presser-plate bears to the heel-compressing dies when it is closed down upon the heel. Figs. 11 and 12 represent in horizontal section modifications which are hereinafter fully described.

The invention is represented as attached to or forming a part of the "National Heel-Nailing Machine," so called.

In the drawings, A represents the bed or table of the machine, upon which slides the jack-plate *a*.

B is the cross-head; C, the revolving head, which supports the awls, drivers, and top-lift spanker, top-lift holder, and heel-breasting knife, or a combination of any two of them.

D is the templet or pressure plate.

E is the nail holder and transferrer. The nail-holder and pressure-plate are provided with horizontal sliding and with vertical movements; and these portions of the machine are like similar parts described in various patents granted H. A. Henderson and myself. Beneath the cross-head, and preferably attached to the table, are two posts or supports, F, between which is the jack-post *a* when in operative position. Each of these posts or supports has ways *f*, formed in its upper surface to receive the sliding blocks *f'*, which are secured to their respective posts or supports by the overlapping plates f^2, which are bolted thereto. These blocks are reciprocated or moved in their respective ways by any suitable mechanism, and they carry at their inner ends the side heel-compressing dies or forms, G G', the form G being carried by one of the blocks *f'*, and the form G' by the other, and also the shoe centering and holding devices H H'.

Each section of the heel-compressor, preferably, is formed with a surface the reverse of the general shape of the side of the heel or heel-blank upon which it is moved, and is therefore curved in horizontal section and inclined inward and downward, as shown. It may be made detachable from its holder, although it is preferable to make it in one piece therewith. I prefer that the front section, *g*, of each presser shall be so formed upon the surface as to exert a wedging action upon the breast of the heel or heel-blank as the compressors close, thereby forcing the heel-blank or heel back against the rear surface of the compressors, and thus providing not only for the accurate centering of the heel, but for the proper application of pressure to the parts of the heel or heel-blank most benefitted thereby. It is, of course, essential that these side compressors shall have various adjustments in relation to the boot or shoe support or last M and to the pressure-plate, and I have shown a simple device for providing them with uni-

versal adjustment. It comprises the vertical dovetail g' upon each holder G G', which enters the vertical dovetail recess g^2 in an intermediate piece or block, g^3, and the intermediate piece, g^3, is provided with a horizontal dovetail, g^4, which enters the horizontal dovetail recess, g^5, in the front edge of the block. It will therefore be seen that by the vertical dovetail construction the side compressors may be vertically adjusted, and that by the locking-screw g^6 they may be locked in any desired position, and that by horizontal dovetails the compressors may be moved horizontally to any extent and locked in any position by locking-screws g^7, and that a combination of these two means will lock the compressors in any operative position in relation to the boot or shoe support, or to the templet.

The heel-compressors may have a horizontal yielding movement provided them when desired, and I have shown in Fig. 12, as a means of accomplishing it, the dovetail recess g^2 extended back to form the space g^8, and the holder as having the recess g^9, for receiving the spring g^{10}, which bears against the surface of each dovetail recess, and acts to hold outward the dies or compressors. Each sliding block may also carry or support the boot or shoe supporting and centering devices H H, above referred to. The centering device comprises two abutments or surfaces, which approximate the shape of the side and back of the last or shoe support from the shank backward, and they are adapted to be moved simultaneously against the last or shoe-support and move it to a central position and hold the boot or shoe thereto with a greater or less degree of firmness, according to the nature of the work. These surfaces or abutments may be of rubber, leather, or other material of like nature, or they may be metallic. In Fig. 7 I show the abutments made of rubber, h, and held by screws, or in any other suitable way, to the metal holders h', which are shaped to furnish a backing or support for the rubber abutments, preferably so that the shank portions h^2 of the rubber shall first be brought to bear upon the shank portion of the boot or shoe and its support. Of course the rubber must be so shaped as to assist in accomplishing this purpose; and it is desirable, although not essential, that the abutments upon being moved forward shall first begin to bear at or close onto the shank and press the upper at that point onto the support, so that any fullness of the upper about the heel may be prevented, and the shoe and its support pressed back and held against the back stop or prevented from being moved forward by the immediately following contact of the abutting surfaces with the side portions of the last or heel-support about the heel. In order to give the rubber abutments some degree of conformability, I have provided them with the corrugations h^3 upon their outer surfaces, as represented in Fig. 7. It is intended that the shape of this shoe supporting and centering device shall be such as to embrace the portions of the boot or shoe from immediately below the outsole downward a reasonable distance, and upon the sides and corners of the heel portion or counter, and preferably forward into the shank. When metal abutting or contacting surfaces are used instead of rubber or yielding surfaces, it will be necessary to mount them upon slightly-yielding holders, and for this purpose the construction shown in Fig. 11 may be used.

The parts of the shoe centering and supporting mechanism are made adjustable horizontally and vertically, and I represent in the drawings one means of obtaining these adjustments, the holder h' being provided with vertical dovetail projections h^4, which enter vertical dovetail recesses h^5 in the intermediate blocks, h^6, having the projections h^7, which enter the horizontal dovetail recesses h^8 in the front of each sliding block. It will be seen that this construction provides the abutments with all the necessary adjustments in relation to the lasts or shoe-supports or in relation to the side heel-compressors, and that the holders and intermediate plates are locked in any desired position by means of the locking-screws.

From what I have said it is obvious that the side pressure-plates perform two offices: First, they may act as compressors for compressing or solidifying the heel-blank by lateral pressure, and, second, they may act as guides in centering the heel-blank in relation to the templet and the last or shoe support. It is also of course obvious that when they are used for compressing the heel-blank or heel that they also necessarily center them. I would say, however, that this mechanism can also be used for centering the heel-blank without compressing it, if so desired, and that the form of the centering-plates will be substantially like that of the compressing-plates, although they need not be so nicely made and accurately shaped.

As above intimated, the blocks f' may be moved in any desirable way. It is necessary, however, when the attachment is applied to a machine containing the elements of the attaching-machines above described that the operation of the machine and the timing of the movement of the blocks be substantially as follows, namely: The boot or shoe being adjusted upon its support, which may be the last upon which it was lasted or beat out, or which may be an iron support, the jack is moved into position. The heel is then placed between the compressors, which are opened sufficiently to receive and hold it. The machine is then set in operation, the blocks carrying the heel-pressure plates and centering devices are immediately moved inward, bringing pressure to bear upon the edge of the heel-blank and centering it, and if the shoe-centering devices and supports are used they will project somewhat in front of the compressors, or so that they may be brought in contact with the last or shoe-support before the compressors begin to compress or

solidify the heel-blank or heel, for it is essential that the boot or shoe be centered before the heel-compressors begin to solidify the heel-blank, as the pressure is not only lateral but downward upon the sole of the boot or shoe; and immediately after this lateral pressure has been applied the pressure-plate is moved downward and the heel-blank or heel submitted to vertical pressure from it. The awls preferably are at the same time driven and withdrawn, the nails fed by the nail holder and carrier and driven while the heel is held compressed by the side compressors and pressure-plate, and after the nails are driven the pressure-plate may be removed and the heel-blank or heel spanked by the spanker while still under the lateral compression of the side pressure-plates. It will therefore be seen from this description that the mechanism for operating the sliding blocks must be such as to move the pressure-plates inward immediately upon the starting of the machine, and before the awls begin to pierce the heel, and that the pressure-plates must be held stationary during the reciprocation of the awls and the feeding and driving of the nails, when they may be withdrawn, or they may be held closed upon the sides of the heel or heel-blank until the spanker has been reciprocated. Therefore the mechanism for moving the blocks not only must be moved quickly and powerfully, but the blocks must be held locked after having been so moved and during the manipulations which I have mentioned. I have shown in the drawings for accomplishing these objects the levers N, which are made very strong, and are pivoted to the posts or supports F by sliding fulcrum-pins n, which not only slide in slots in their respective posts or supports, but also slide in slots n' in the levers, and I am thus enabled to obtain variation in the throw of the upper ends of the levers. These levers are operated by means (in one instance see Fig. 1) of the wedge-blocks n^2, which have the wedging-surface n^3 and the straight surface n^4, and are adapted to be moved vertically in their guides by the cams n^5 upon the shaft n^6, the cams being so shaped as to impart a prompt vertical movement to the wedge-blocks immediately upon starting the machine, and the wedge-blocks are thereby driven upward behind the levers, causing the upper ends to be moved forward, and they are moved up sufficiently to bring their straight portions behind the levers, thereby locking the levers in position, and at the same time they are prevented from falling back or returning by the friction or pressure of the levers thereon. This permits the cams to be moved on, and when the cams are upon the crank-shaft of the machine it is of course obvious that the cams will continue to revolve while the wedge-blocks are held up by the friction of the ends of the levers upon them, and that they will continue thus suspended unless there were some means of moving them downward at proper intervals of time; and this motion I have provided by means of the levers n^7, which are pivoted at n^8, and which are connected with the upper portions of the wedge-blocks and extend backward, and have downward-extending arms n^9, which are shaped substantially as shown in Fig. 2, so that the wiper n^{10} upon the shaft n^{11}, which revolves one revolution to every three of the cam-shaft, shall at proper intervals of time strike the ends of the arms and move them downward, thereby causing the levers to move the wedge-blocks from behind the levers N, and permitting the spring n^{12} to move out the upper ends of the levers, thereby separating the pressure-plates.

In lieu of the wedge-blocks and cam I may use the construction shown in Figs. 3 and 4, which is on some accounts more desirable, and it comprises a toggle-joint, $o\ o'$, the outer ends of which are connected with the lower ends of the lever N. The inner ends of the toggle are pivoted to each other and to the sliding block o^2, which has a vertical movement in the guides o^3, extending downward from the bed A. This sliding block rests upon the cam o^4 upon the crank-shaft n^6, which is so shaped as to impart to it upon the beginning of the revolution of the shaft a sharp upward movement, thereby straightening the toggle $o\ o'$ and moving the lower ends of the levers N outward, and the cam holds the block in this position until the cam o^5 on the shaft n^{11} has been revolved sufficient to support the lever o^6, which passes through the hole in the sliding block o^2 and has been lifted with the block by the cam o^4. This cam o^5, making but one revolution, holds the block $o\ o^2$ up, while the lifting-cam o^4, which makes three revolutions to every one of the cam o^5, continues to revolve.

If desired, the cam o^5 may be so shaped as to increase the pressure on the dies or pressers at any point in its revolution, so that there may be, if desired, a gradually-increasing compression exerted during the entire time that the heel is submitted to the action of the dies or pressers; or the pressure may be varied, so as to be greater at certain periods and less at others. This result is obtained, of course, by changing the shape of the cam o^5, the lever of course following the shape of the cam, and being lifted or let down, as the case may be. The weight of the block-toggle will be sufficient generally to return them to their normal condition when the cam o^5 has been moved sufficiently to permit it; but if it is desired to have a quick return a spring, o^7, attached to the end of the lever o^6 at any stationary part of the machine below it, may be employed.

It will be desirable, when the dies G G′ are used for compressing-dies, to have the templet or pressure plate formed with a projection, d, of a size to enter at the top of the die, so that it shall compress by a vertical movement the heel-blank within the dies. (See Fig. 10.)

In Fig. 11 I have shown the die or presser G G′ made in two parts, $p\ p'$, connected with each other by a stud-post, p^2, about which is

arranged a strong coiled spring, p^3, which is adapted to hold the two parts comprising the section together, while it permits a slight yielding movement of the part p in relation to the part p', so that provision is given in the dies for their automatic adjustment to the heel-blanks somewhat varying in size.

In operation, the boot or shoe is placed upon the last or work support in an inverted position to receive the heel-blank. The jack is moved horizontally to bring the last or work support between the two heel-compressors G G', and also between the shoe centering and holding devices H H'. The heel-blank is placed upon the sole of the boot or shoe in position between the heel-compressors G G'. Upon the starting of the machine the shoe centering and holding devices H H' are closed upon the heel end of the boot or shoe, and caused to accurately center the sole and to hold the boot or shoe firmly upon the last or work support. This is immediately followed by the closing of the heel-compressors G G' upon the side surfaces of the heel, compressing it by lateral pressure, and at the same time forcing it downward or against the surface of the outsole, so that the heel-blank is molded upon the outsole and in the position which it is to always occupy in relation thereto. This lateral compression and locating of the heel-blank upon the sole is immediately followed by the downward movement of the templet, which provides an additional vertical compression of the heel-blank upon the sole, so that it is not only formed thereon by the lateral compression, but also additionally by the vertical compression, and while it is thus held in its permanent position upon the sole the nail-driving devices are caused to be operated, and the heel rigidly or permanently fastened to the boot or shoe, and while held formed or shaped under pressure.

I am aware that it is not new to solidify and form the side or vertical surface or surfaces of a detached heel-blank by lateral compression, and I do not wish to be understood as broadly claiming this, as the object of the invention is not to compress, solidify, or form the side surfaces of detached heel-blanks, but it is to compress, solidify, and form heel-blanks upon the soles of the boots or shoes to which they are to be attached, and while they are being attached, so that there shall be a special relation between each compressed heel and the boot or shoe to which it is to be secured, and so that it can be molded upon the sole of the boot or shoe with which it is to be used, and while thus molded be permanently attached or secured thereto. That this varies from a heel-blank-forming mechanism is obvious, as the heel-blank-forming devices above referred to simply compress or form the surface of the heel with no reference to the particular boot or shoe to which it is to be attached. That it varies from all heel-attaching machines heretofore used is obvious from the fact that such machines do not contain any devices for compressing a heel-blank laterally and in permanent position upon the sole of the boot or shoe to which it is to be attached, and for holding it thus compressed while the attaching-nails are being driven, and this is a very important element in providing for and obtaining the accurate forming and fitting of the heel-blank, and for obtaining a solid heel and solid fastening, with the best results from edge or lateral compression.

Having thus fully described my invention, I claim and desire to secure by Letters Patent of the United States—

1. In a machine for compressing heels and attaching them to boots and shoes, the combination of a support or jack, and a last mounted thereon for holding the boot or shoe and presenting it to the heel-compressing and heel-attaching devices, the horizontally-movable heel-compressors G G', and nail-driving devices, whereby the heel-blank is compressed by lateral and vertical pressure upon the sole of the boot or shoe to which it is attached, and while it is being attached, all substantially as and for the purposes described.

2. In a machine for compressing heel-blanks and attaching them to the soles of boots and shoes, the combination of a jack or support, and a last mounted thereon for holding the boot or shoe and presenting it to the heel-compressing and heel-attaching devices, with the horizontally-movable heel-compressors G G', the vertically-movable pressure-plate or templet D, and nail-driving devices, all adapted for successive and conjoint action in an organized machine, substantially as and for the purposes described.

3. In a machine for attaching heels to boots and shoes, the combination of a jack or support, and a last mounted thereon for holding the boot or shoe and presenting it to the heel-attaching devices, with the horizontally-movable shoe centering and holding devices H H', adapted to be automatically moved to center and hold the shoe after the jack or support has been moved into operative position and the machine set in operation, substantially as described.

4. In a machine for compressing heel-blanks and attaching them to the soles of boots and shoes, the combination of a jack or support, and a last mounted thereon for holding the boot or shoe and presenting it to the heel compressing and attaching devices, shoe centering and holding devices H H', the heel-compressors G G', the templet D, and nail-driving devices, whereby the boot or shoe is automatically centered and held, and the heel-compressing devices then caused to compress and fit the heel upon the clamped sole, and the nail-driving devices actuated to attach the heel-blank while thus held compressed permanently to the boot or shoe, substantially as described.

5. In a machine for compressing heel-blanks and attaching them to the soles of boots and shoes, the combination of a jack or support,

and a last mounted thereon for holding the boot or shoe and presenting it to the heel-compressing and heel-attaching devices, the heel-compressing devices G G′, the heel-attaching devices, the main shaft of the machine, and mechanism, substantially as specified, for connecting it respectively with the heel-compressors and heel-attaching devices, whereby said compressors and devices are caused to be successively operated, all substantially as described.

6. The combination, in a machine for compressing heel-blanks and attaching them to the soles of boots and shoes, of a jack or work-support, and a last mounted thereon for holding the boot or shoe and presenting it to the heel-compressing and heel-attaching devices, the heel-compressors G G′, and means, substantially as specified, for adjusting them vertically in relation to the jack or heel-support, and nail-driving devices, substantially as described.

7. The combination, in a machine for compressing heel-blanks and attaching them to the soles of boots and shoes, of a jack or support, and a last mounted thereon for holding the boot or shoe and presenting it to the heel-compressing and heel-attaching devices, the heel-compressors G G′, and devices, substantially as specified, for adjusting them horizontally in relation to the last or work-support, and nail-driving devices, all substantially as and for the purposes described.

8. The combination, in a heel-attaching machine, of the last or work-support, and a last mounted thereon, the sliding boot or shoe centering and holding devices H H′, and devices, substantially as specified, for adjusting them horizontally in relation to the last or work-support, substantially as described.

9. The combination, in a heel-attaching machine, of a jack or work-support and a last mounted thereon, the sliding boot or shoe centering and holding devices H H′, and means, substantially as specified, for adjusting them horizontally in relation to the work-support, substantially as described.

10. In a heel-nailing machine, the combination of the shoe centering and holding devices H H′, the sliding blocks f', and their operating-levers N, all substantially as and for the purposes described.

11. In a heel-nailing machine, the combination of the heel centering and holding devices H H′, the heel centering or compressing dies G G′, their supporting-blocks f', and their operating-levers N, all substantially as and for the purposes described.

12. In a heel-nailing machine, the combination of the boot and shoe centering and holding devices H H′, the heel centering or compressing dies G G′, their supporting-blocks f', and operating-levers N, all substantially as and for the purposes described.

13. In a heel-nailing machine, the combination of the blocks f', supporting the heel centering or compressing dies G G′, and shoe-centering devices H H′, the levers N, the toggles o o', the sliding block o^2, and the cam o^4, substantially as described.

14. In a heel-nailing machine, the combination of the block F, carrying the shoe-centering devices H H′, and the heel-centering devices or compressing-dies G G′, the levers N, toggles o o', lifting-block o^2, and cam o^5, substantially as described.

15. In a heel-attaching machine, the heel compressing or centering dies G G′, having the front sections, g, shaped upon their inner surfaces, as described.

16. In a heel-nailing machine, the shoe centering and holding devices H H′, comprising the movable blocks or holders h', shaped substantially as specified, and lined with rubber h, or other suitable material, substantially as described.

17. In a heel-nailing machine, the shoe centering and holding devices H H′, attached, substantially as specified, to their holding-blocks to yield horizontally in relation thereto, all substantially as and for the purposes described.

18. The combination of the block g^3, having a recess, g^8, shaped substantially as specified, the die G, having a projection entering the recess g^8, and the spring g^{10}, as and for the purposes described.

19. A die, G, made in two sections, p p', shaped substantially as described, and held together by a connecting pin or device, p^2, and a spring, p^3, for closing and maintaining the sections closed, substantially as described.

20. In a heel compressing and attaching machine, the combination of a jack or support, a last mounted thereon for holding and presenting boots and shoes to the compressing and attaching devices, the heel-compressors G G′, the templet-plate D, having the downward projection d, adapted to enter the die space or recess, and the heel-nailing devices, substantially as described.

FREEBORN F. RAYMOND, 2D.

Witnesses:
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FRED. B. DOLAN.