Oct. 4, 1938. W. H. NUTT 2,131,845

MEANS FOR OPERATING UPON THE HEEL PORTIONS OF SHOES

Filed Sept. 12, 1935 5 Sheets-Sheet 1

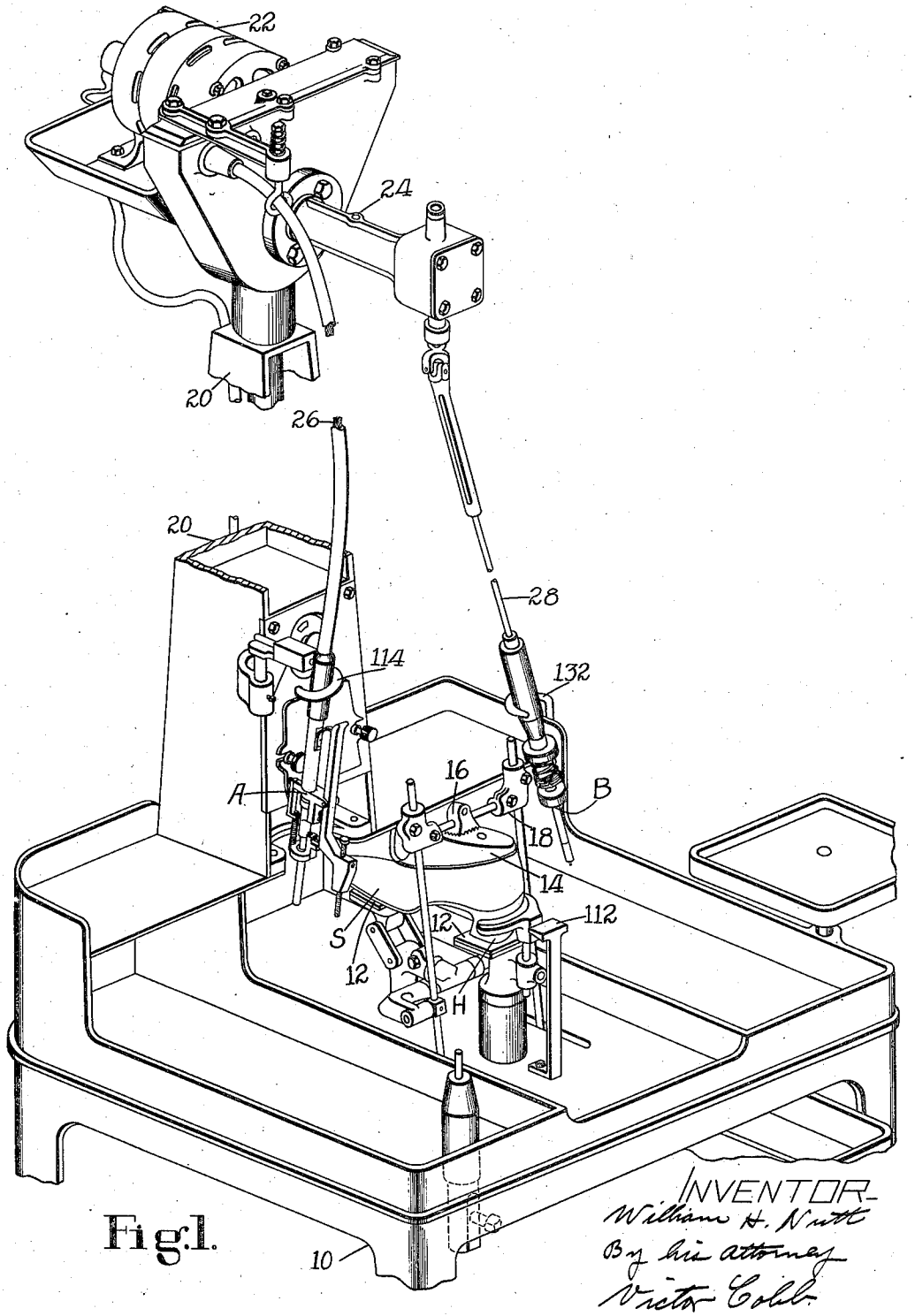


Fig. 1.

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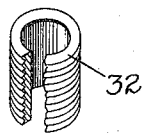


Fig. 4.

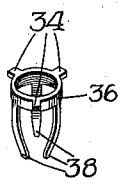


Fig. 3.

Fig. 2.

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MEANS FOR OPERATING UPON THE HEEL PORTIONS OF SHOES

Filed Sept. 12, 1935 5 Sheets-Sheet 3

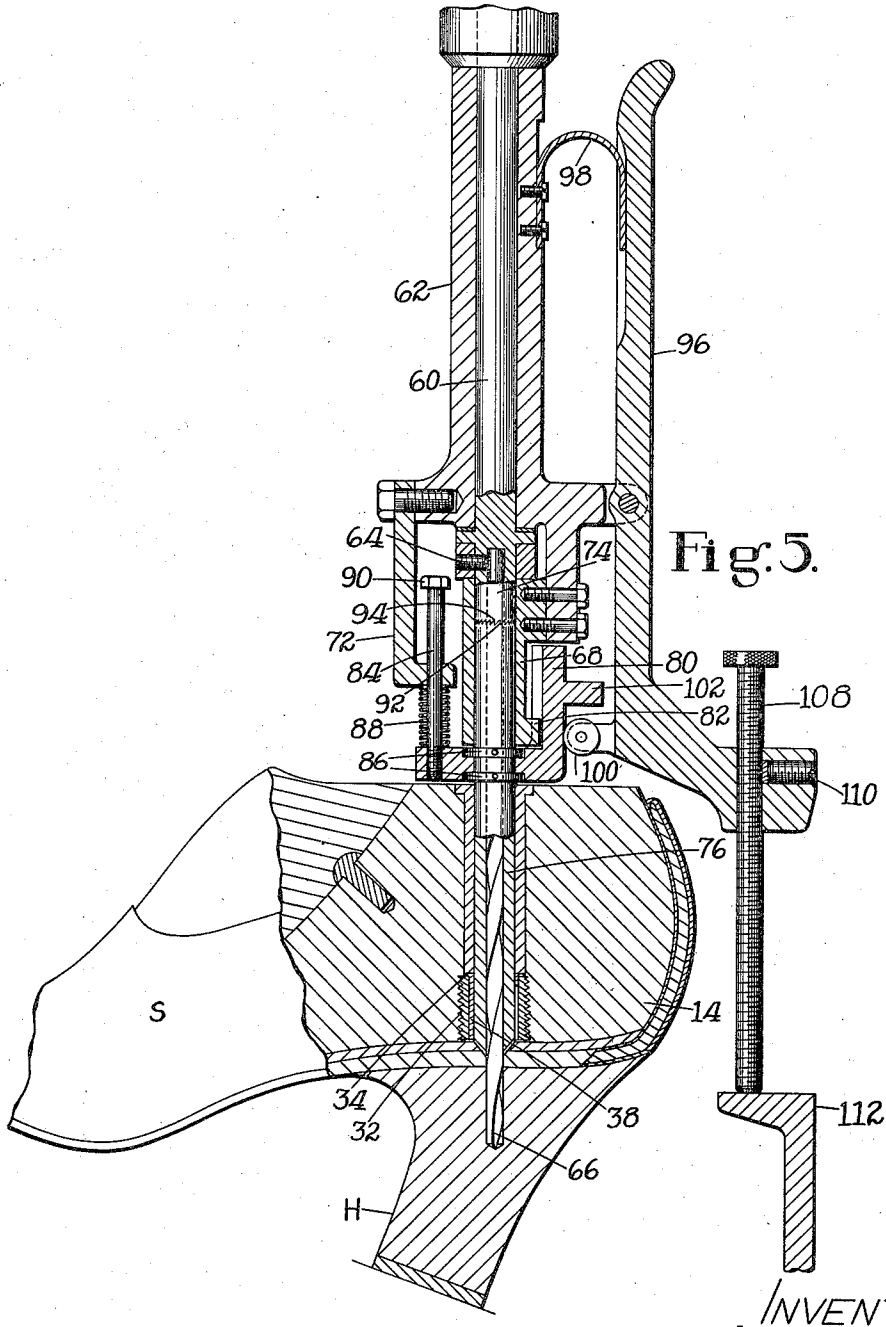


Fig. 5.

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MEANS FOR OPERATING UPON THE HEEL PORTIONS OF SHOES

Filed Sept. 12, 1935 5 Sheets-Sheet 4

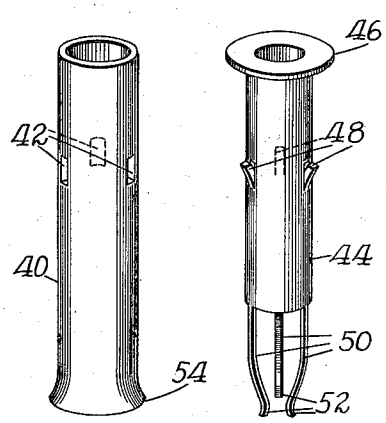


Fig. 11.

Fig. 10.

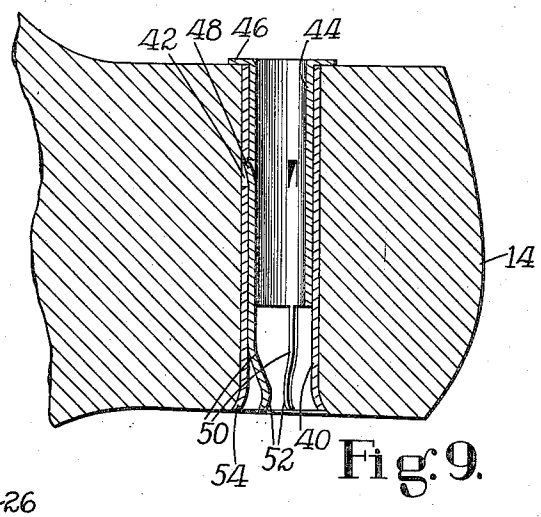


Fig. 9.

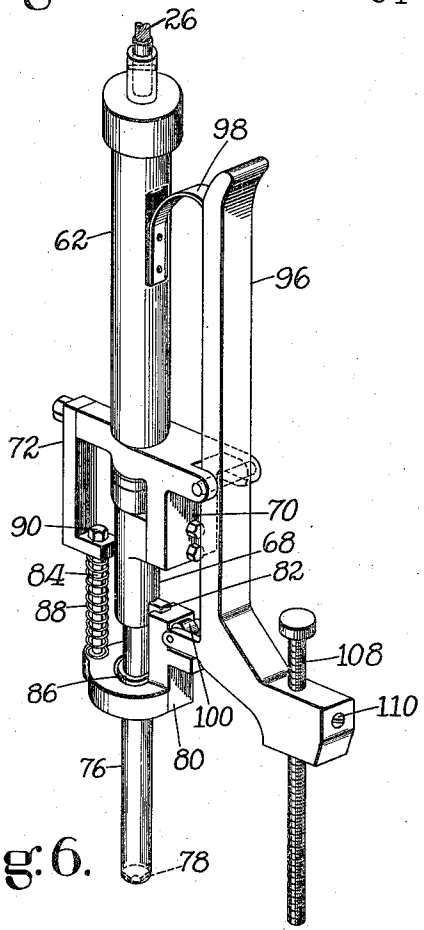


Fig. 6.

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MEANS FOR OPERATING UPON THE HEEL PORTIONS OF SHOES

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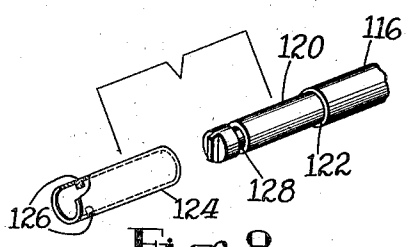


Fig. 8.

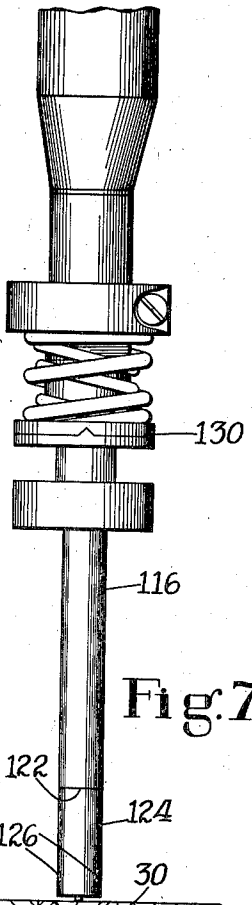
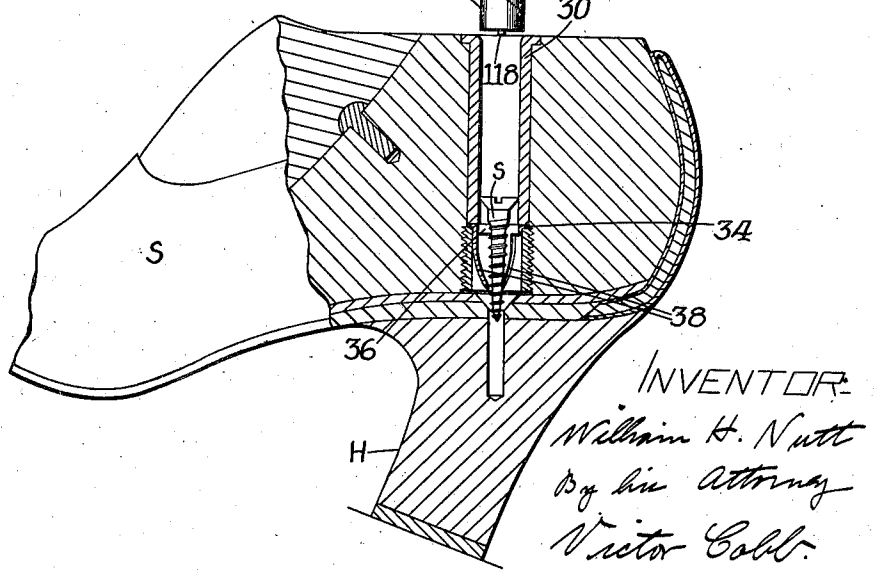


Fig. 7.



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2,131,845

UNITED STATES PATENT OFFICE

2,131,845

MEANS FOR OPERATING UPON THE HEEL-PORTIONS OF SHOES

William H. Nutt, Beverly, Mass., assignor to United Shoe Machinery Corporation, Paterson, N. J., a corporation of New Jersey

Application September 12, 1935, Serial No. 40,287

21 Claims. (Cl. 144—93)

This invention relates to the performance upon the heel-portions of shoes of such operations as the attachment of heels thereto. A divisional application for improvements in lasts was filed in the United States Patent Office on January 21, 1937, Serial No. 121,625.

In attaching heels, and especially those of wood, a recognized practice is to operate through a passage in the cone of a last within a shoe to be heeled to drill an opening through the heel-seat of the shoe into a heel clamped thereon, countersink the insole-material about the drilled opening, insert a screw in the last-passage, and finally set the screw in place with a screw-driver to draw the heel-seat and the cup of the heel together. An adhesive is customarily applied between the attaching surfaces. Difficulties are encountered in such a procedure. The last-passage must be of sufficient diameter to admit the head of the screw. Because of the size of the passage and the consequent tendency of the drill and the point of the screw to enter the work out of correct axial alinement, it is desirable to have some centering means by which both are held in their true paths. Since, however, the drill and countersink and the screw-driver must rotate, injury by these tools to a screw-centering device is liable to occur through wear or by breaking. An object of my invention is to insure the correct positioning of the tools and of the fastening for insertion without endangering the means by which said fastening is positioned. To this end, I employ a last adapted to enter a shoe and to co-operate with a support to clamp the work for the operations upon it, said last having a passage opening through the heel-seat-surface. The last-passage contains a fastening-centering device, preferably provided with yieldable arms extending into proximity to the opening, and movable through the passage is rotatable operating means having a portion which may be held against rotation by the centering device. The operating means may be a drill and countersink by which the heel-seat and heel are prepared to receive a screw-fastening and a screw-driver by which said fastening is inserted in the work. These operating means are shown herein as mounted on a frame, to a support upon which the last clamps the work. The operating means, whether the drill and countersink or the screw-driver be considered, preferably consists of two concentric members, the outer of which is in the form of a sleeve held against rotation by the centering device while the inner is acting. For the drill and countersink, the latter furnishes the initially stationary member, it thereafter being given its operating rotation intermittently through a clutch connecting it to a spindle which may continuously drive the drill. For the screw-driver, the sleeve which engages the centering device may be at all times free to turn relatively about the spindle carrying the screw-driver-bit. In the arrangement for driving the drill and countersink and for controlling their operation, there is believed to be patentable novelty irrespective of their particular use as herein described. The centering device, which may be termed a quill, is shown as mounted in the last-passage and held against longitudinal displacement by one or more projections from it, these projections either entering depressions in a last-thimble or extending between the end of the thimble and a sleeve threaded into the opposite extremity of the passage.

The accompanying drawings illustrate a particular form of the invention, with two arrangements of the mounting of the last-quill. In these drawings,

Fig. 1 presents in broken perspective the entire apparatus;

Fig. 2 is a central vertical section through the drilling and countersinking mechanism, the tools being partially inserted in the last-passage;

Fig. 3, a perspective view of the quill used in the last of Fig. 2;

Fig. 4, a broken perspective of the sleeve for securing the quill in the last-passage;

Fig. 5, a view similar to Fig. 1 at the time of completion of the drilling and countersinking operations;

Fig. 6, a perspective view of the drilling and countersinking mechanism;

Fig. 7, a view similar to Figs. 2 and 3 but showing the screw-inserting mechanism;

Fig. 8, a detail in perspective of the screw-driver and its co-operating sleeve, these elements being separated;

Fig. 9, a central, vertical, longitudinal section through the heel-end of a last provided with a quill differing from that of the preceding figures;

Fig. 10, a perspective view of the quill of Fig. 9; and

Fig. 11, a similar view of the last-thimble by which the quill is retained in place.

The apparatus illustrated in Fig. 1 is organized generally as is that disclosed in Letters Patent of the United States No. 1,826,723, Bertrand, October 13, 1931, and designed for attaching heels to shoes. In this apparatus, a frame 10 has supports 12 for a shoe S and its heel H. With

these supports co-operates a last 14 within the shoe, to clamp it and its heel together by pressure applied to a member 16 contacting with the top of the last-cone and actuated through a yoke 18 by treadle mechanism, not illustrated. A column 20 of the frame carries a motor 22, which, through gearing enclosed in a casing 24, continuously rotates shafts 26 and 28 arranged for universal movement. These shafts operate, respectively, drilling and countersinking mechanism A and screw-inserting mechanism B.

Referring to Figs. 2 and 5, the last 14 has extending vertically through its cone a passage which at its upper portion may be protected by a thimble 30. Threaded into the lower portion of the passage is a sleeve 32 (Fig. 4) of greater internal diameter than the thimble. Held between the adjacent extremities of the thimble and the sleeve are outward projections 34 from a tubular body 36 of a centering device for a screw or other fastening. As is best shown in Fig. 3, this device is in the form of a spring-quill, there being resilient arms 38, which may be three in number, depending from the body 36 in proximity to the heel-seat-opening of the last-passage. When the arms are forced outwardly against the inside of the sleeve 32, the internal diameter of the passage between them is preferably substantially the same as that of the thimble 30. Another form of mounting for the quill appears in Figs. 9, 10 and 11. Here, a thimble 40 lines the entire last-passage and has in its wall openings or depressions 42. The quill has an extended body 44, a flange 46 of which lies at the top of the last-cone. Projections 48 are shown as struck out of the body, these being inclined outwardly and upwardly toward the flange. They are so located that when the quill is forced into the last-passage until the flange bears against the top of the cone, the projections will spring into the openings 42 and lock the elements together, as may be seen in Fig. 9. From the quill-body depend screw-engaging arms 50 which, when expanded, will have an internal diameter similar to that of the body 44, curved ends 52 of the arms then lying in a lower enlargement 54 of the thimble. In either form of the device, the lower ends of the arms converge downwardly and inwardly to normally approach relatively close to each other and, as illustrated in Fig. 7, so contact with the thread of a screw *s* that the point will be positioned substantially at the axis of the last-passage. The head of the screw fits the bore of the thimble of Fig. 7 and the body of the quill of Fig. 9 to move freely therethrough, yet with little lateral play. Therefore, when the screw is dropped into the last-passage, it will be so retained by the quill-arms that its axis and that of the passage practically coincide. Both the projections 34 and 48 retain their respective quills 36 and 44 against displacement in the last-passage.

When the shoe S and the heel H are clamped between the supports 12 and the last 14, the heel-seat and heel are first to be drilled to the proper depth to facilitate the insertion of the screw *s* and the heel-seat-material countersunk to receive the screw-head. This is accomplished by the mechanism A, illustrated in detail in Figs. 2, 5 and 6. The driven shaft 26 is connected to a spindle 60 which is rotatable in a handle 62 arranged to be grasped by the operator. Secured in a socket at the lower extremity of the spindle by a set screw 64 is the shank of a drill 66, of the proper diameter to produce a hole in the work to receive the screw *s*. The handle is extended by a sleeve 68 attached to a lug 70 depending from said handle and by a bracket 72. The end of the spindle 60 turns in the upper portion of the sleeve at 74, while rotatable in the lower portion of the sleeve, concentric with the drill, is a sleeve or tube 76, the lower inclined end of which has cutting edges 78 furnishing a countersink. Below the sleeve 68, the countersink-tube 76 has a bearing in a slide 80, which is guided for movement longitudinally of the handle by a tongue-and-groove connection 82 with the sleeve and by a rod 84 passing through and operating in an angular end-portion of the bracket 72. The countersink-tube is compelled to move longitudinally with the slide while free to turn therein by collars 86, 86, fast on the tube at opposite sides of the slide. A spring 88 surrounds the rod 84 and urges the slide and countersink-tube down to an extent determined by engagement with the bracket 72 of a head 90 upon the rod. When this relation exists, the tube 76 is so yieldingly held that the point of the drill 66 is just at the countersinking surface 78. At the same time, a toothed clutch-surface 92 at the upper end of the countersink-tube is held spaced from a like surface 94 at the lower end of the spindle-portion 74, by a distance approximating the depth which the drill is to enter the work. Fulcrumed on the handle 62 is a hand-lever 96 normally so held by a spring 98 that a roll 100 rotatable upon it below the fulcrum-point is above a retaining projection 102 from the slide 80. With the elements thus related, the drill and countersink are latched together with the clutch members separated, as shown in Fig. 2.

The operator, grasping the handle 62 but leaving the lever 96 in its latching position, introduces the tools 66 and 76 into the thimble 30 of the last 14 by which the shoe S and heel H are clamped together upon the supports 12. The countersink having no driving force applied, save through the slight frictional engagement of the continuously rotating drill, upon contact with the arms 38 of the quill is held by these against rotation and presses them back against the inner wall of the sleeve 32. As the force applied to the quill-arms is therefore only longitudinally thereof, without the rapid rotary effect which would be imparted by a tool driven by the spindle, the quill is but little affected and will require only infrequent renewal. Were the rotary contact permitted, the quill-arms would be subjected to much wear, and, if they were caught at the edges by the tool, might be torn off. The descent of the tools will be stopped by the contact of the countersink with the insole of the shoe. When this is felt by the operator, he will unlatch the handle from the countersink by actuating the lever 96 with the fingers of the hand grasping the handle, thus withdrawing the roll 100 from above the slide-projection 102. The lever may be released after the roll has reached the under side of the projection. Downward pressure upon the handle will lower the drill through the countersink, which serves to center and guide it axially of the last-passage. The drill will therefore enter the insole substantially at right-angles to its surface. The spring 88 is compressed during this movement. The drill bores into the heel-seat-material and heel until the clutch-teeth 94 upon the spindle engage the teeth 92 upon the countersink (Fig. 5). The travel will be such that the hole approaches the desired depth for the screw. Because of the clutching together of

the continuously rotating spindle and the countersink, the latter will be driven and will produce a depression in the heel-seat-material in which the head of the screw may lie, the drilling of the opening being simultaneously completed. The rotation of the countersink-tube in contact with the quill may be very brief. To limit the action of both tools, the lever **96** may carry one portion of a stop device, as a screw **108**, threaded vertically through it and locked by a set-screw **110**. The other stop element may be furnished by a small standard **112** rising from the frame **10** at the outer side of the work-supports **12**. The stop-screw is so set that when it engages the companion element, the depth of both the drilling and countersinking will be determined. The operator then raises the handle **60** and actuates the lever **96**. The upward movement of the handle withdraws both the drill and the countersink from the work and from the last, and the spring **88** restores the two tools to their normal relation, as illustrated in Fig. 2, at which time the hand-lever **96** may be released to again latch the countersink to the handle. When not in use, the mechanism A may be held in an inactive position by a hook **114** near the rear of the frame.

Having prepared the shoe and heel as just described, the operator drops a screw *s* point down into the last-passage (Fig. 7). Here, its head will engage the wall of the thimble **30** with its lower threaded portion resting upon the quill-arms **38**, it thus being axially alined with the passage and with the drilled opening in the work. The point therefore cannot catch in the insole-material, and the slot in the screw-head will be properly positioned to receive the screw-driver which is to insert it.

The inserting mechanism B is shown in detail in Figs. 7 and 8. The continuously rotating shaft **28** is connected to a spindle **116**, at the lower extremity of which is formed a screw-driver-bit **118**. The lower end of the spindle at **120** is of reduced diameter. Surrounding this portion **120**, and bearing at its inner end against a shoulder **122**, is a sleeve **124** having the same external diameter as the spindle **116**. Studs **126**, **126** extend through the sleeve and, entering a groove **128** of the spindle, retain said sleeve against outward displacement. The sleeve extends beyond the spindle-portion **120**, leaving only the bit **118** projecting. The sleeve **124** acts during the insertion of the screw-driver as did the sleeve **76** of the mechanism A, so that it is held against rotation by engagement with the quill-arms **38**, pressing these back without appreciable wear or distortion when the screw-driver-bit **118** enters the slot in the screw and inserts it in the hole drilled in the heel. A like protection is afforded the quill upon the withdrawal of the screw-driver. As in the Bertrand patent previously referred to, a clutch **130** may be interposed between the shaft **28** and the spindle **116** so the resistance set up upon the complete insertion of the screw will cause the clutch to slip and thus stop the application of the driving force to the work. A hook **132** is shown upon the frame for holding the mechanism B in inactive position.

When, in this specification, such a phrase as "means for initiating the rotation of said tools successively" occurs, it is to be understood that this covers equally the initiation of rotation of the tool first actuated, either at the beginning of a period of use, to continue uninterrupted through succeeding operating cycles, or initiation at the beginning of each operating cycle included in such period, with intermediate intervals of rest.

Having described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. Means for operating upon the heel-portions of shoes comprising a last having a passage opening through the heel-seat-surface, a fastening-centering device secured in the passage at the heel-seat-end and provided with yieldable arms extending in proximity to the heel-seat-opening of the passage, and rotatable operating means movable through the passage and having a portion constructed and arranged to be held against rotation by engagement with the centering device.

2. Means for operating upon the heel-portions of shoes comprising a last having a passage opening through the heel-seat-surface, a fastening-centering device secured in the passage at the heel-seat-end and provided with yieldable arms extending in proximity to the heel-seat-opening of the passage, a concentric inner drill and outer countersink movable through the last-passage, and means for rotating the drill and countersink, said countersink being initially free to be held against rotation by the centering device.

3. Means for operating upon the heel-portions of shoes comprising a last having a passage opening through the heel-seat-surface, a fastening-centering device secured in the passage at the heel-seat-end and provided with yieldable arms extending in proximity to the heel-seat-opening of the passage, a rotatable screw-driver movable through the last-passage, a sleeve surrounding the screw driver and free to be held against rotation by engagement with the centering device, and means for rotating the screw-driver.

4. Means for operating upon the heel-portions of shoes comprising a frame, a shoe-support thereon, a last between which and the support a shoe may be clamped, said last being provided with a passage through its cone and with a screw-centering quill at the heel-seat-end of the passage, means for applying pressure to the last to clamp the work, and drilling and countersinking mechanism and screw-inserting mechanism rotatable upon the frame and movable through the last-passage and each having a portion adapted to be held against rotation by engagement with the quill.

5. In an apparatus for operating upon a heel through a last having a passage provided at one extremity with a spring-quill, operating means comprising a spindle having at its end a screw-driver-bit and a sleeve having substantially the same external diameter as the spindle and free to turn relatively about said spindle, the sleeve extending in proximity to the end of the spindle at the bit to enter the last-passage therewith for contact with the quill, and means for rotating the spindle.

6. In an apparatus for operating upon a heel through a last having a passage provided at one extremity with a spring-quill, operating means comprising a spindle having at its end a reduced portion at the inner extremity of which is a shoulder and at the outer extremity of which is a screw-driver-bit, a sleeve surrounding the reduced portion of the spindle and being substantially equal in external diameter to the body of the spindle, the sleeve abutting against the shoulder and extending in proximity to the end

of the spindle at the bit for engagement with the quill and means for preventing longitudinal displacement of the sleeve upon the spindle while permitting it to rotate relatively thereto, and means for rotating the spindle.

7. In an apparatus for operating upon a heel through a last having a passage provided at one extremity with a spring-quill, operating means having an inner drill and an outer countersink arranged concentrically, means for applying power to rotate the drill, the countersink being arranged to enter the last-passage and to be held initially against rotation by the quill, means for rotating the drill, and means for communicating the rotation of the drill to the countersink.

8. In an apparatus for operating upon a lasted shoe through a last-opening, two concentric cutting tools, one of which is movable through and beyond the operating end of the other to penetrate the work, and means made effective during the movement for communicating the rotation of such movable tool to the other tool.

9. In an apparatus for operating upon a lasted shoe through a last-opening, two concentric tools each adapted to enter said opening, one of which is movable through and beyond the operating end of the other to act upon the work after the passage of such other tool through the opening into contact with the work, means to impart feeding movements to said tools by a single movement of said means, and means for initiating the rotation of said tools successively.

10. In an apparatus for operating upon a lasted shoe through a last-opening, two concentric tools, one of which is movable through and beyond the operating end of the other to act upon the work, and means for rotating one of said tools continuously and the other intermittently.

11. In an apparatus for operating upon a lasted shoe through a last-opening, two concentric tools, means for rotating the inner tool continuously, and means for intermittently communicating the rotation of the inner tool to the outer tool.

12. In an apparatus for operating upon a lasted shoe through a last-opening, two concentric tools arranged to enter the last-opening, means for rotating one of the tools while the second is non-rotatable during the entrance of the tools into the last-opening, and means by which the second tool is rotated after both are within the last-opening.

13. In an apparatus for operating upon a lasted shoe through a last-opening provided with a spring-quill, a countersink arranged to enter the last-opening and contact with the quill, a drill situated normally with its operating portion within the countersink and movable longitudinally of its axis to be projected into operating relation upon contact of the countersink with the shoe, and means for rotating the drill and countersink.

14. In an apparatus for operating upon shoes, a handle, a spindle rotatable thereon, a tool carried by the spindle, a second tool rotatable upon the spindle and surrounding the first tool, co-operating clutch members upon the spindle and outer tool, and means for holding the clutch members normally separated.

15. In an apparatus for operating upon shoes, a handle, a spindle rotatable thereon, a tool carried by the spindle, a second tool rotatable upon the spindle and surrounding the first tool, co-operating clutch members upon the spindle and outer tool, means for holding the clutch members normally separated, and means carried by the handle for controlling the engagement of the clutch members.

16. In an apparatus for operating upon shoes, a handle, a spindle rotatable thereon, a tool carried by the spindle, a second tool rotatable upon the spindle and surrounding the first tool, co-operating clutch members upon the spindle and outer tool, and a lever fulcrumed upon the handle and normally retaining the clutch members separated, said lever being movable by the operator to allow the engagement of the clutch members.

17. In an apparatus for operating upon shoes, a handle, a spindle rotatable thereon, a tool carried by the spindle, a second tool rotatable upon the spindle and surrounding the first tool, co-operating clutch members upon the spindle and outer tool, and a lever fulcrumed upon the handle and normally retaining the clutch members separated, said lever being movable by the operator to allow the engagement of the clutch members and having means to limit the advance of one of the tools.

18. In an apparatus for operating upon shoes, a handle, a spindle rotatable thereon, a drill fixed in the spindle, a bearing member mounted to move upon the handle longitudinally of the spindle, a countersink rotatable in the bearing member and surrounding the drill, clutch members for rotating the countersink from the spindle, and means movable upon the handle and engaging the bearing member for controlling the engagement of the clutch members.

19. In an apparatus for operating upon shoes, a handle, a spindle rotatable thereon, a drill fixed in the spindle, a bearing member mounted to move upon the handle longitudinally of the spindle, a countersink rotatable in the bearing member and surrounding the drill, clutch members for rotating the countersink from the spindle, a spring interposed between the handle and bearing member to normally separate the clutch members, and means movable upon the handle and engaging the bearing member for controlling the engagement of the clutch members.

20. In an apparatus for operating upon shoes, a handle, a spindle rotatable thereon, a drill fixed in the spindle, a bearing member mounted to move upon the handle longitudinally of the spindle, a countersink rotatable in the bearing member and surrounding the drill, clutch members for rotating the countersink from the spindle, and a lever fulcrumed upon the handle and having a portion for contact with the bearing member.

21. In an apparatus for operating upon shoes, a handle, a spindle rotatable thereon, a drill fixed in the spindle, a bearing member mounted to move upon the handle longitudinally of the spindle, a countersink rotatable in the bearing member and surrounding the drill, clutch members for rotating the countersink from the spindle, a lever fulcrumed upon the handle and having a portion for contact with the bearing member, and a screw threaded through the lever for contact with a relatively fixed element.

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