Jan. 31, 1939. F. L. BRANDT 2,145,337

NAILING MACHINE

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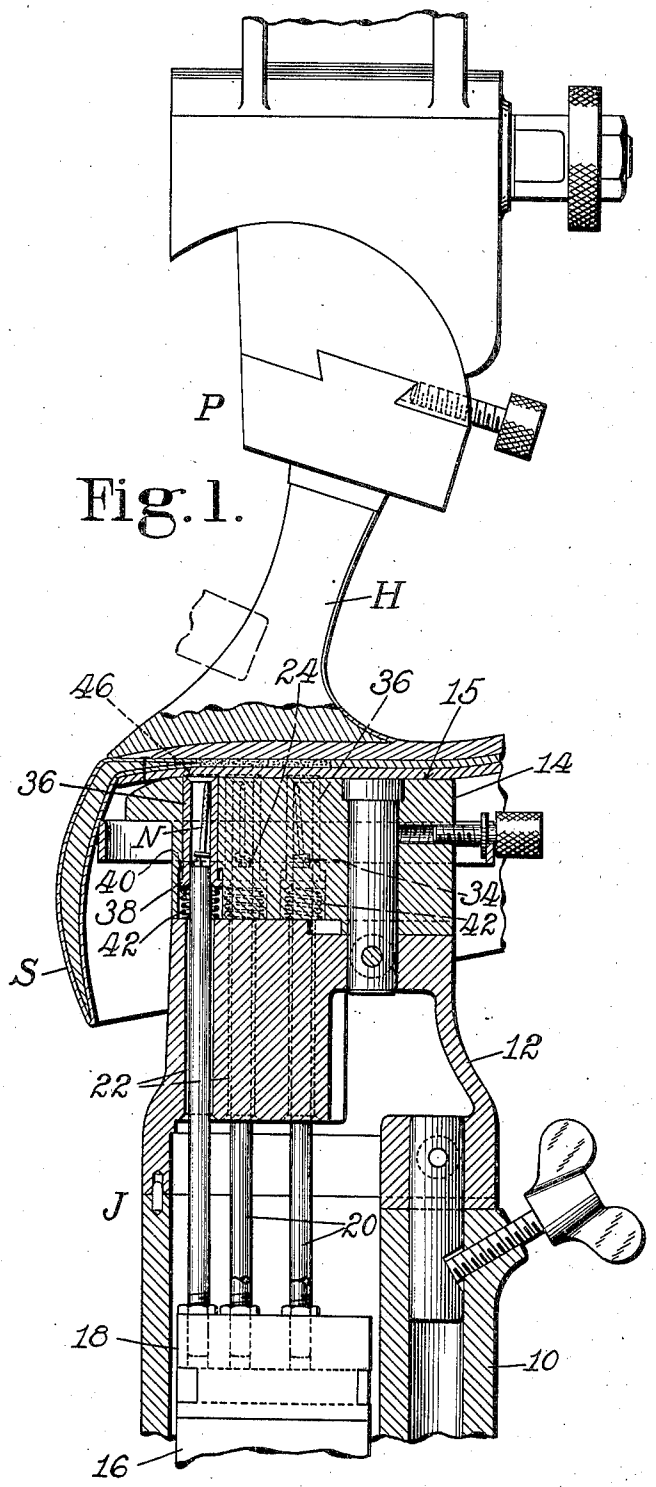

Fig. 1.

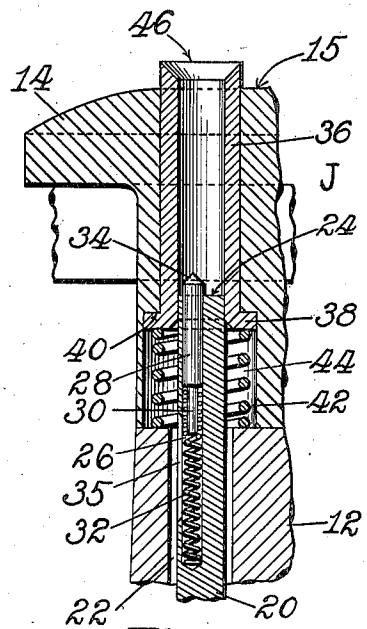

Fig. 2.

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Fig. 3.

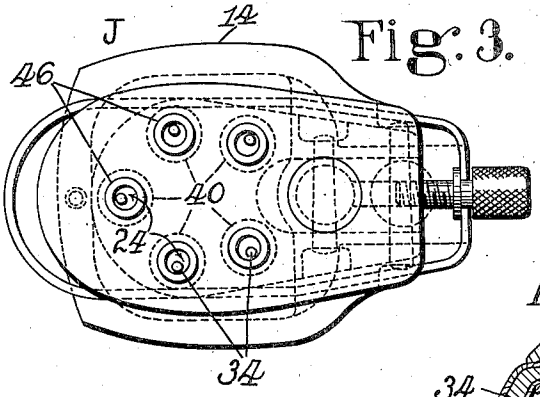


Fig. 4.

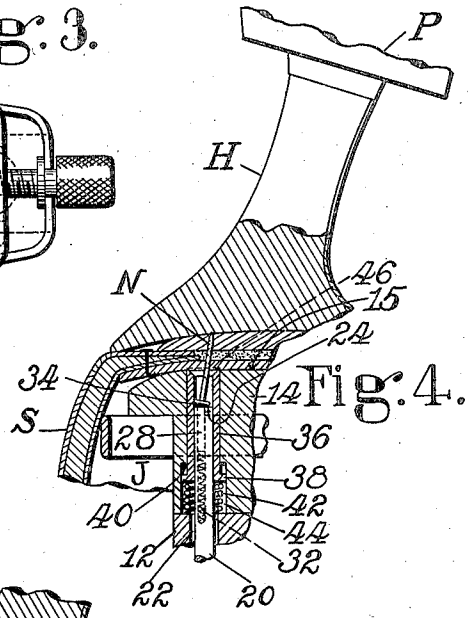


Fig. 5.

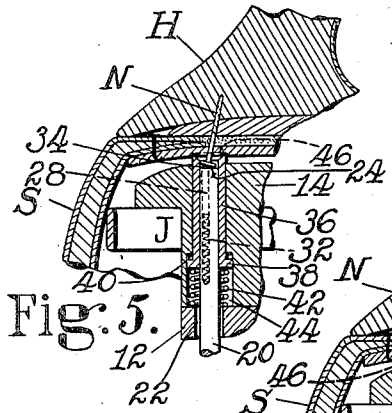


Fig. 6.

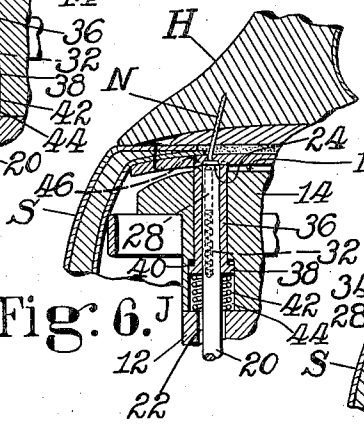


Fig. 7.

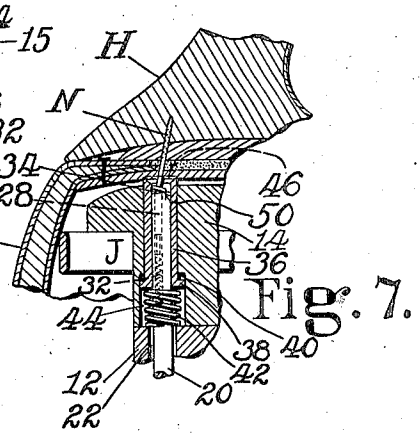
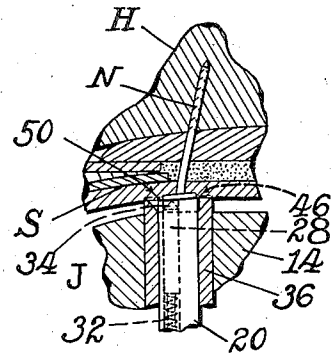


Fig. 8.



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By his attorney
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Patented Jan. 31, 1939

2,145,337

UNITED STATES PATENT OFFICE

2,145,337

NAILING MACHINE

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Application February 2, 1937, Serial No. 123,658

17 Claims. (Cl. 1—32)

This invention relates to machines for inserting such fastenings as nails and especially those in which the nails are driven for attaching heels to shoes.

In the securing of heels by nails driven from within shoes supported upon a jack with which co-operates a pressure-abutment, difficulties are frequently encountered. To keep the nails from breaking through the heel-wall, the nail-contacting ends of the drivers are inclined downwardly and inwardly toward the axis of the jack. This tends to tilt the nails in the jack-passages to direct the points toward the center of the heel. But the assumption of the desired position is not certain. Dirt or waste, such as chips which have been left in the shoe from the drilling for an attaching screw, may fall into the driver-passages. This dirt, settling to the inner sides of the passages upon the inclined driver-ends, will prevent the supplied nails from tilting inwardly. Then, instead of toeing in when driven, their points may even emerge through the heel-wall. There is a further objection to the drivers having their ends inclined as just indicated, in that the heel-seat of the shoe is concave, and the low side of each driver-end will be toward the center of this concavity. Consequently, while the outer portions of the nail-head may be well sunk in the insole, the inner portion will project objectionably above the insole-surface. Further, with the inclined driver-end, a nail-head resting upon it is subjected to the resistance to outward movement which it offers. As the point of the inclined nail moves inwardly in entering the heel, the head cannot readily accommodate itself to this movement because it is held against outward displacement by the outwardly and upwardly inclined surface of the driver. The shank is therefore heavily bent, throwing upon the heel near the curved portion of the nail a strain which has a splitting effect. At the same time, under these conditions, the nail-head, as it is forced through the driver-passage, wears the inner side of the wall and changes its form. In addition to all this, although the pressure applied by the heel-engaging abutment should be sufficient to hold the work firmly down to the jack-top, it should not be such as to crush the heel or wrinkle its covering. In avoiding this last-mentioned effect, there may be a tendency toward an inadequate clamping force which will permit the action of the drivers during the insertion of the nails to lift the work from the jack. If this happens, and a space is created between the jack-top and the insole of the shoe, the nails are deprived of the proper lateral support and may cripple, with their heads and portions of the shanks bent over against the insole. With these conditions in mind, it is an object of my invention to bring about the full insertion of the nails, in the proper directions and with the entire heads sunk in the insole.

To this end, I provide a nail-driver or each of a plurality of such drivers, with means contacting with a nail to be driven for normally separating from the nail-driving surface the head of said nail. Then, if dirt gathers upon the end of the driver, it may be within the space produced by this separation, leaving the nail-head free to take its desired position. To avoid interference with the driving of the nail, this separation from the driver-end is caused by a yieldable portion thereof, as a spring-plunger, and to insure the inclination of the nail in the definite, chosen direction, this portion is located at one side of the driver-axis. In a heel-attaching machine, the separating means or spring-plunger is preferably at the opposite side of the driver-axis from the axis of the jack, with its end lying normally outside the nail-engaging surface of the driver, so the invariable toeing-in of the nail is obtained. With the employment of this yieldable plunger, the driver-end need not be inclined downwardly and inwardly but may be square, or even inclined downwardly and outwardly. When thus formed, the driver will fully sink the nail-head. Since the spring-plunger offers no material resistance to the outward movement of the head of the nail during its driving, this is left free to shift laterally away from the inner side of the passage, tending to aline itself with the point. This reduces or avoids the splitting effect upon the heels and the wear upon the passage-wall. To furnish a guard against crippling of the nails, a sleeve is movable in each driver-passage, the end of this sleeve being held at all times outside the work-supporting surface of the jack by a spring. The sleeve is depressed upon application of the work, and then, if there is insufficient clamping pressure to hold the insole upon the jack-top, the sleeve will follow it as it moves away and will offer uninterrupted lateral support to the nail. The upper extremity of the sleeve furnishes about the opening of the driver-passage a barrier against the entrance of dirt. There may be upon the upper edge of the sleeve a reduced edge, which by its engagement with the insole will prevent the shoe from slip-

ping upon the jack-top when clamping pressure is applied.

In the accompanying drawings, illustrating my invention in two of its possible forms,

Fig. 1 is a central, vertical section through a jack in which the invention is embodied, with a co-operating pressure-abutment in side elevation;

Fig. 2, an enlarged, sectional detail through the driver and its associated sleeve;

Fig. 3, a top, plan view of the jack;

Figs. 4, 5 and 6, broken, sectional details showing, together with Fig. 1, successive steps in the insertion of a nail by a square-ended driver, while

Figs. 7 and 8 are similar views with a driver having a downwardly and outwardly inclined end.

Referring to the first six figures of the drawings, we have a work-supporting jack J including a hollow body **10** with an upper section **12** carrying a top-plate **14**. The jack is mounted upon an unillustrated frame, on which is movable toward and from the work-supporting surface **15** of the jack the customary abutment P arranged to force a heel H against the heel-seat of a shoe S resting upon the jack-top. Reciprocating vertically in the jack is a plunger **16** having at its upper end a plate **18** in which is secured a gang of drivers **20**. These drivers operate in passages **22** extending through the section **12** of the jack and through the top-plate **14**. Each driver has at its upper extremity, in the arrangement now being considered, a nail-engaging surface **24** substantially at right-angles to the axis. Extending from this surface along the driver, outside the axis thereof with respect to the axis of the jack, is a passage **26** in which is movable a plunger **28**. The lower extremity of the plunger is reduced at **30**, furnishing a shank about which is secured, as by soldering, a helical spring **32**. The length of the plunger and spring is such that normally the upper extremity of said plunger, when the spring is bottomed in the passage, lies above the surface **24** of the jack, where it has a conical or pointed end **34**. To render the plunger and spring readily removable from the driver, said driver has a longitudinal slot **35** (Fig. 2) opening into the passage **26**. Through this slot, a pointed implement may be inserted, and the plunger and spring lifted from the driver. The upper portion of each jack-passage **22** is preferably of substantially greater diameter than the driver **20**, and in the intermediate space is a sleeve **36** by which the driver is guided in its nail-inserting reciprocation. At its lower end, the sleeve has a flange **38**, which is forced against a shoulder **40** upon the jack-top by a helical spring **42** interposed between the sleeve and the upper face of the jack-section **12**. The flange and spring lie in an enlarged portion **44** of the driver-passage. In its normal position, the upper end of the sleeve **36** lies above the surface **15** of the jack-top, where it is shown as provided with a downwardly and inwardly beveled surface, furnishing a sharp circumferential edge **46**. When the spring **42** is compressed by the application of pressure to the upper end of the sleeve, the edge **46** still remains somewhat above the surface **15** of the jack forced into the insole of the supported shoe. It therefore slightly penetrates the surface and holds the work against lateral displacement. Since the upper portion of the sleeve is always above the jack-top, it bars the entrance to the driver-passage of dirt which might clog the plunger **28**. If the nail-driving operation forces the insole of the shoe from the jack, because of the application of inadequate pressure by the abutment P, the elevation of the sleeve by its spring will give constant protection against crippling deflection of the nails.

Fig. 1 shows a shoe S, having a heel H applied to its heel-seat, in place upon the jack J and clamped by the abutment P for the nail-inserting operation. The sleeve **36** will have been depressed by the contact of the insole of the shoe, but the edge **46** still remains sufficiently above the surface **15** to hold the shoe against displacement. If dirt has entered the driver-passage, this will usually be in such quantities that it will lie well below the nail-supporting point of the plunger **28**, so the position of the nail will be unaffected. But much of the foreign matter which may have fallen upon the surface **15** of the jack will be kept out of the passage by the elevated end of the sleeve. As the driver rises, the point of the nail penetrates the insole of the shoe (Fig. 4) and then the heel H (Fig. 5). During the inward movement of the point of the nail toward the axis of the heel, which occurs because of the inclined position in which it was held by the plunger, because said plunger offers little resistance to depression as the driver forces it against the nail, the head is free to shift outwardly through the clearance shown in Fig. 1. In consequence of this, the shank of the nail will be little bent, and there will be no heavy contact of the head with the sleeve-wall. There will be little or no splitting effect upon the heel such as might result from inability of the nail-head to maintain its alinement with the point, and wear upon the interior of the sleeve by the nail-head is slight. The final driving force causes the shank to be bent at a point close to the head (Fig. 6), and said head to be sunk in the insole. The square end of the driver will cause the outer face of the head to be practically parallel to the insole-surface, so there need be no projection into the interior of the shoe, nor any excessive depth of driving to avoid such projection. When the driver descends, the springs **32** and **42** respectively return the plunger and sleeve to their normal positions.

Because the inward inclination of the nail is independent of the angle of the driver-end, the outer surface of the nail-head may be caused to conform closely to the surface of the insole, even if this is deeply concaved. This is effected by inclining the nail-engaging surface of the driver **20** downwardly and outwardly from the axis of the jack, as shown at **50** in Figs. 7 and 8. The nail is inclined by the plunger **28** and inserted by the driver **20** as before (Fig. 7). Upon the termination of the driving action, when the plunger has been forced fully into its passage, the inwardly and upwardly inclined surface **50**, as compared with the square end **24** previously described, produces a sharper bend in the shank near the nail-head, which may therefore conform more closely to the greater concavity (Fig. 8).

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

1. In a nailing machine, a nail-driver provided with means contacting with a nail to be driven for normally separating from its driving surface the head of said nail.

2. In a nailing machine having a nail-receiving passage, a nail-driver having at its end a

yieldable portion for engagement in the passage with a nail to be driven.

3. In a nailing machine, a nail-driver having at its end a yieldable portion located at one side of the driver-axis and upon which the head of a nail to be driven may rest.

4. In a nailing machine, a nail-driver having at its nail-engaging surface a yieldable portion located at one side of the driver-axis for contact with a nail, the nail-engaging surface of the driver being inclined downwardly toward the yieldable portion from the other side of the axis from said portion.

5. In a nailing machine, a work-support, and a nail-driver movable therein and provided at its nail-engaging surface with a spring-plunger situated at the opposite side of the driver-axis from the axis of the work-support.

6. In a nailing machine a work-support, and a nail-driver movable therein and provided at its end with a spring-plunger situated at the opposite side of the driver-axis from the axis of the work-support and having a conical nail-engaging portion.

7. In a heel-attaching machine, a jack, and a driver movable in the jack and provided with means for holding spaced from its nail-driving surface the outer portion of the head of a nail to be driven.

8. In a heel-attaching machine, a jack, a driver movable in the jack and provided with a longitudinal passage opening through its nail-engaging end and situated at the opposite side of the axis of the driver from the axis of the jack, and a spring-plunger movable in the passage and having its end lying normally outside said passage.

9. In a heel-attaching machine, a jack, a driver movable upwardly in the jack for the insertion of a nail and provided with a longitudinal passage opening through its nail-engaging end, a spring seated in the passage, and a plunger carried by the spring and normally extending outside the passage to support the nail to be driven.

10. In a heel-attaching machine, a jack, a driver movable in the jack and having an inclined nail-engaging end, said driver being provided with a longitudinal passage opening through its nail-engaging end and situated at the lower portion of the inclined driver-end, and a spring-plunger movable in the passage and having its end lying normally outside said passage.

11. In a nailing machine, a nail-driver provided with a longitudinal passage, a nail-engaging member having a reduced end-portion, and a spring secured about the end-portion, the spring contacting with the inner end of the driver-passage and the nail-engaging member normally extending outside the passage.

12. In a nailing machine, a nail-driver provided with a longitudinal passage and with a longitudinal slot through the wall of the driver into the passage, and a nail-engaging member and a spring therefor situated in the driver-passage and accessible through the slot.

13. In a nailing machine, a jack provided with a driver-passage, a sleeve movable in the passage, a spring urging the sleeve outwardly and furnishing means for holding the end of said sleeve at all times outside the work-supporting surface of the jack, and a driver movable through the passage and sleeve.

14. In a nailing machine, a jack provided with a driver-passage, a sleeve movable in the passage and having a reduced end, a spring urging the reduced end of the sleeve outwardly and thereby holding said end at all times outside the work-supporting surface of the jack, and a driver movable through the passage and sleeve.

15. In a nailing machine, a jack provided with a driver-passage, a sleeve movable in the passage, a spring holding the end of the sleeve normally outside the work-supporting surface of the jack, a driver movable through the passage and sleeve, and a yieldable member rising above the upper extremity of the driver.

16. In a nailing machine, a jack provided with a plurality of driver-passages, a sleeve situated in each passage and having its upper extremity normally above the jack-top, a spring holding each sleeve yieldably in its normal position, a gang of drivers movable through the passages and sleeves, a plunger movable through the nail-contacting surface of each driver, and a spring holding the end of each plunger normally above this surface.

17. In a nailing machine, a nail-driver having an inclined nail-engaging surface and a portion yieldable through the inclined surface at one side of the axis of the driver.

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