

March 24, 1936.

F. L. BRANDT

2,034,740

FASTENER TURNING MACHINE

Filed June 23, 1932

2 Sheets-Sheet 1

Fig. 1

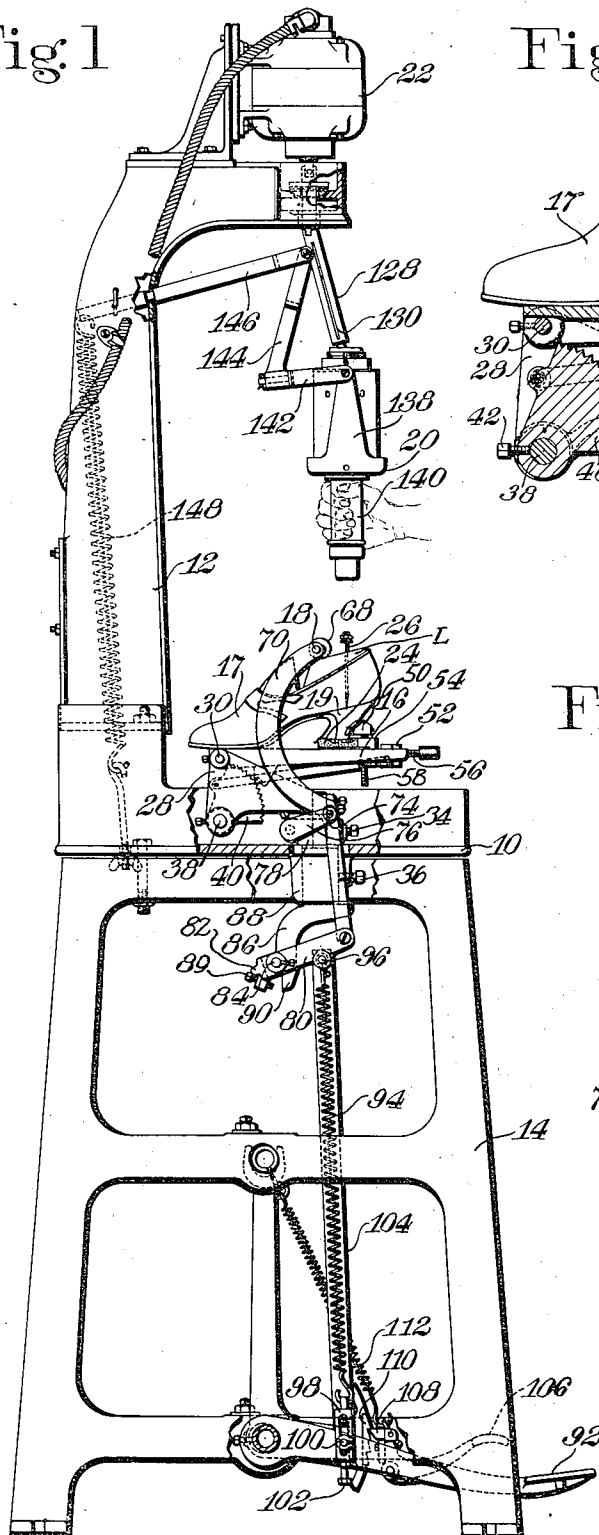


Fig. 2

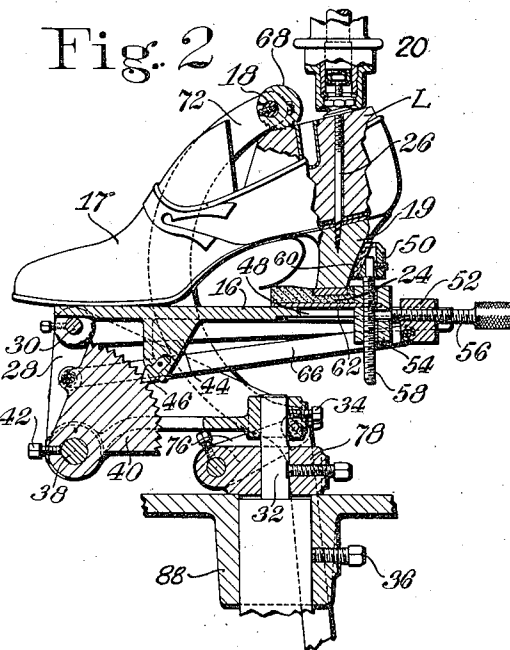
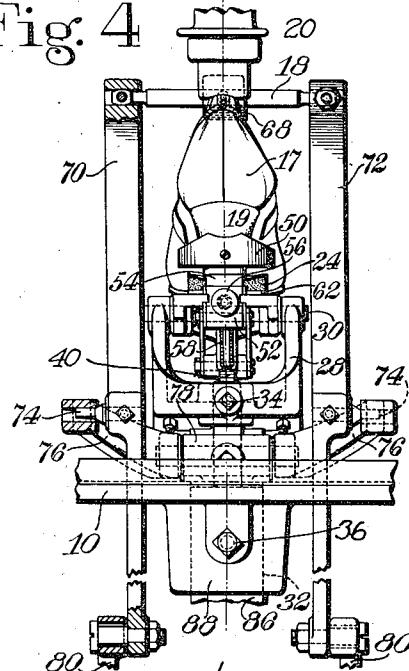


Fig. 4



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2 Sheets-Sheet 2

Fig. 3

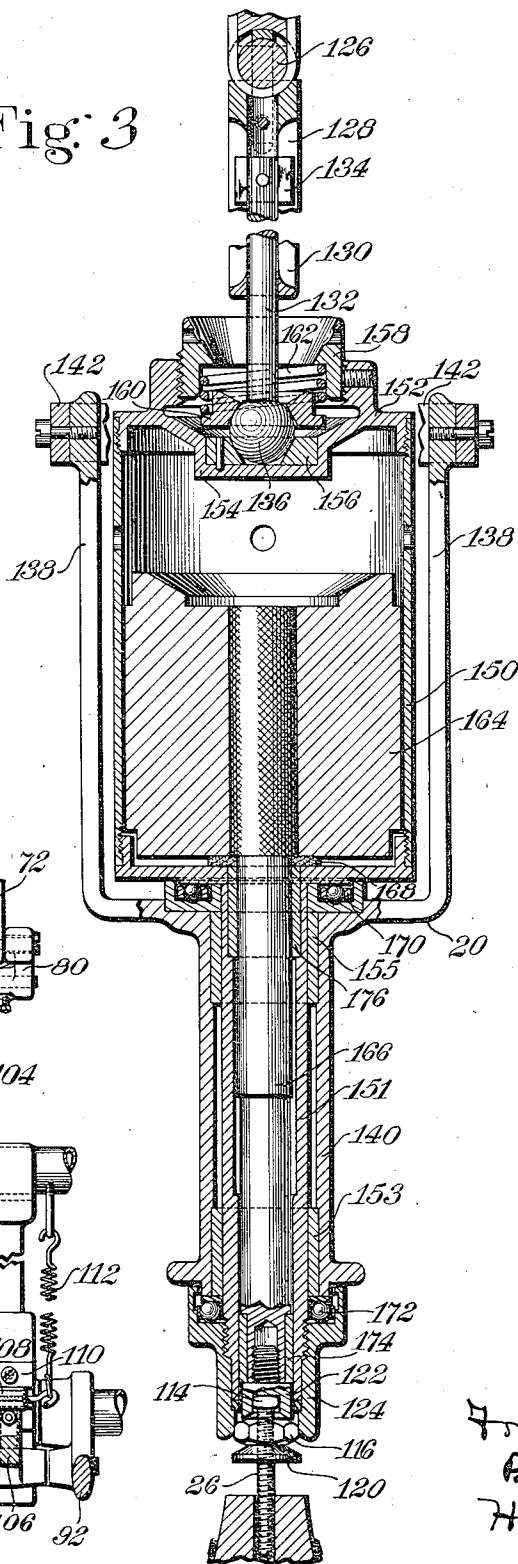


Fig. 7

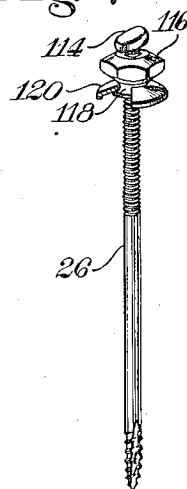


Fig. 5

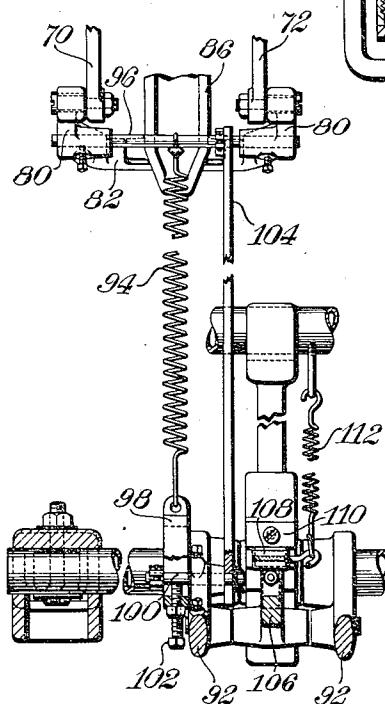
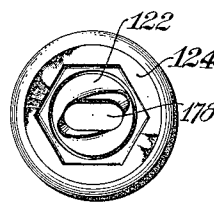


Fig. 6



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UNITED STATES PATENT OFFICE

2,034,740

FASTENER TURNING MACHINE

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Application June 28, 1932, Serial No. 619,707

14 Claims. (Cl. 81—54)

This invention relates to machines for turning fasteners and is illustrated herein as embodied in a machine particularly adapted for use in attaching heels to shoes.

5 In the practice of a method disclosed in United States Letters Patent No. 1,615,258, granted January 25, 1927 on application of Maurice V. Bresnahan, a lasted shoe and a heel are clamped in assembled relation, and a screw fastener is inserted through a hole in the last through the shoe bottom and into the heel to secure the heel to the heel-seat of the shoe during the setting of an adhesive which has been applied between the heel and the shoe. The screw fastener 10 may have a nut threaded upon its shank to be turned down into engagement with the top of the last after the screw is driven into the heel to complete the clamping action.

In view of the foregoing, my improved fastener 20 turning machine combines with a tool for operating upon a fastener, such a power member as a shaft and means connected to the tool and shaft and constructed and arranged to turn the fastener by stored kinetic energy, the connection between the shaft and means being incapable of transmitting sufficient force to drive the fastener. This allows the driving force to become ineffective when a definite resistance is encountered, independently of the source of power from 30 which the shaft is rotated. In one aspect of the invention, the machine is organized to turn a plurality of fasteners together initially and then to permit the rotation of a predetermined one of the fasteners to be stopped while that of another continues. This may be applied to the simultaneous rotation of the previously mentioned screw and the nut thereon, this being followed by the completion of the turning of said nut. In this case both of these fasteners may be driven in the manner above indicated, there being an energy storing member for each of these fasteners. One of such members may be rotated from the power shaft through frictional connections. In the present instance, the rotation of 40 the other member is produced in a like manner by connection to the member just mentioned.

The work support and clamp disclosed herein is made the subject of the divisional application filed August 3, 1934, Serial No. 738,304.

50 The invention will be best understood from a description of a particular embodiment thereof illustrated in the accompanying drawings, in which,

Fig. 1 is a view in side elevation of a machine 55 illustrating one embodiment of the invention;

Fig. 2 is an enlarged view in side elevation partly in section of the last, shoe and heel clamping means;

Fig. 3 is a sectional view of the mechanism for actuating the screw fastener;

Fig. 4 is a front elevation corresponding to Fig. 2;

Fig. 5 is a view in front elevation of the treadle mechanism for operating the shoe and heel clamping means;

Fig. 6 is a bottom view of the chuck for inserting the screw fastener; and

Fig. 7 is an enlarged detailed view of the screw fastener to be applied.

The illustrated machine comprises a table 10 15 and a standard 12 mounted on a base 14. The table 10 is provided with means including a tread plate or work support 16 and a clamping bar 18 for respectively supporting a lasted shoe 17 and holding a heel 19 in place thereon during the operation of inserting a fastener through the heel-seat into the heel. The standard 12 carries a fastener inserting or driving tool 20 together with an electric motor 22 for actuating said tool.

The tread plate 16 is shaped to engage the tread face of the forepart of the sole of the shoe 17 and is provided with a pad 24 of rubber or other yieldable material which engages the tread face of the heel 19. The tread plate is mounted for angular adjustment to position correctly for co-operation with heels of different heights the shoe with a contained last L. Through a vertical bore in the cone of the last a screw fastener 26 passes to clamp the heel and the shoe in assembled relation. For its adjustment, the plate is 35 pivoted for vertical oscillation to a bracket 28 by a pin 30, the bracket being adjustably mounted on the table 10 by a post 32. This post is secured to the bracket by a set screw 34 and is maintained adjustably in a depending portion of the table by another set screw 36. Mounted below the pin 30 in the bracket 28 is a shaft 38 which carries an eccentric toothed segment 40 secured to the shaft 38 by a set screw 42. The bottom of the plate 16 is provided with a downwardly extending lug 44 having a hole to receive a pawl 46. The pawl is arranged to engage the eccentric toothed periphery of the segment 40 to maintain the plate 16 in adjusted position, as will hereinafter be more particularly described.

The forward end of the plate or support 16, that is, the end nearest the operator, is provided with a slot 48 in which a gage 50 is mounted for adjustably determining the position of the heel 19, and consequently the top of the last cone, 55

relatively to the clamping bar 18. The gage is secured to the upper extremity of a screw 58 threaded vertically through a supporting member 54 arranged to slide in the slot 48. By turning the gage, and thus shifting it with the screw up or down, its height may be varied and consequently the distance from the heel-seat end of the heel to be clamped of the area with which the gage contacts. This provides for leaving a space at which the operator may grasp the heel while introducing the work into the apparatus. Also movable in the slot 48, outside the member 54 and independently thereof, is a gage positioning slide block 52 through which is threaded horizontally a screw 56 having an end portion entering an opening in the supporting member for engagement with a flattened side of the screw 58. When the work is clamped by the bar 18 and the inner supporting member is thereby forced back toward the positioning block, this engagement between the screws 58 and 56 locks the former and the gage 50 in their adjusted positions for each complete rotation of the screw 58 and also alters the heel locating position of the support 54. The block 52 is joined by a link 66 to the segment 40; so by moving the block in the slot the segment may be turned about the axis of the shaft 38. The eccentricity or contour of the toothed edge of the segment is such that, to whatever angle the plate 16 may be turned about the axis of the pin 30 to present correctly the fastener hole in the last to the tools which are to operate upon the fastener, a corresponding relation will be established between the gage 50 and the clamping bar 18, so when the work is positioned with a heel against the gage said bar will engage the end of the last cone to bring the direction of application of the clamping force properly within the heel-seat, yet clear of the fastener hole. This locating of the gage is effected when movement of the slide 52, acting through the link 66, turns the segment to its retaining position with a space between adjacent teeth receiving the plate projection 46. To adjust the gage horizontally so the engagement of the bar 18 will be correct for different lasts and different types and heights of heels, the screw 56 is turned, this furnishing a variable stop for the outward operating position of the support 54. Separation of the support from the block by inward movement along the slot 48 frees the screw 58 from the screw 56, so the former with the gage which it carries may be vertically adjusted. When the operator wishes to change the angle of the plate 16 to arrange for operation upon a different height of heel, one of said heels held upon the heel-seat of a shoe is placed upon the yieldable pad 24 of the plate with its rear wall against the gage 50. Then the plate is lifted, for example by the screw 56, so the pawl 46 leaves the notch which it has engaged in the segment 40. By moving the slides 52 and 54 the link 66 may be caused to turn the segment until it is fully clear of the pawl for the various angles which the plate may assume. The plate may thereupon be adjusted to the desired angular relation, or so the last bore which receives the fastener 26 is approximately vertical, then the operator again moves the slide to bring the segment into retaining engagement with the pawl. This automatically so locates the gage 50, and thereby the heel with the lasted shoe held against it, that the end of the last cone will receive contact of the clamping bar 18 well within its edge, yet clear of the last bore and the tools which are to operate in

connection with it. Or the locating steps may be taken, in part, reversely. That is, when a change of the heel height occurs and with the work in place as before, the operator, after freeing the segment 40 by lifting the plate 16, may move the slides 52 and 54 until the top of the last cone is in the desired relation to the bar 18. Then, on dropping the plate, the segment will have been so positioned through the link 66 that when the pawl enters between two segment teeth said plate will be fixed at the desired angle. The heel engaging surface of the gage 50 is provided with a felt pad or any other soft covering 60 to prevent injury to the heel cover. A plate 62 is secured to the supporting member 54 and carries the rubber pad 24 above referred to. The pad 24 engages the tread face of the heel 19, and when the shoe 17 is clamped to the supporting plate 16 by the bar 18 the heel 19 will move downwardly and press against the felt surface 60 of the gage 50. This not only holds the heel 19 firmly against lateral displacement, but also wedges it forward against the breast cut in the sole.

The clamping bar 18 is located above the table 10 and is mounted for movement toward and from the tread plate 16 to clamp against it the lasted shoe 17 and the heel 19 in assembled relation. The clamping bar 18 is adapted to engage and apply this pressure to the cone of the last upon which the shoe is mounted and for this purpose is provided centrally of its length with an eccentric serrated contact portion 68 rotatable on the bar through a limited angle. As the portion 68 tends to turn under the influence of the clamping force, it becomes effective to urge the breast cut in the shoe sole against the heel and said heel against the gage 50. A pair of links 70, 72 are offset toward the toe end of the tread plate 16 to allow the greatest amount of space for the operator in positioning the shoe within the clamp, and these links carry the clamping bar 18 at their upper extremities. Between their ends the links are pivoted at 74 to arms 76 of a U-shaped bracket mounted in a hollow bearing member 78 surrounding the post 32. At their lower ends the links 70, 72 are secured to arms 80 of a yoke 82 (Fig. 5) which is pivotally mounted on a spindle 84 (Fig. 1) carried by a bracket 86 secured to the lower extremity of a sleeve 88 depending from the table. It will be observed that the arms 80 are substantially longer than the arms 76. By this arrangement whenever the links and clamping bar are moved upwardly by the arms 80, said links are also rocked about the connections 74 with the arms 76 to carry the clamping bar toward the toe end of the shoe 17 to an inoperative position, in which the bar will not interfere with the operator in placing a shoe within the clamp or removing one therefrom. The upward and inward or inoperative position of the bar 18 is adjustably determined by a threaded stop 89 which engages an abutment 90 formed on the bracket 86.

The links 70, 72 are rocked to operate the above-described clamping mechanism by yielding adjustable connections from a treadle 92. A coiled spring 94 extends between the treadle and the yoke 82. The upper end of the spring is secured to a rod 96 between the arms 80 of the yoke and its lower end to a member 98 having a slot through which extends a pin 100 secured to the treadle. The lower end of the slotted member 98 is provided with an adjusting screw 102 by which the tension of the spring 94 may be adjusted. At-

tached to the rod 96 is a treadle rod 104 which is provided with an open slot in its lower end for the reception of the pin 100 on the treadle 92. Mounted on said treadle 92 is a locking treadle 106 which carries a pawl 108 arranged to engage a stationary rack 110 when the clamping bar 118 is in operating position. A spring 112 secured to the treadle 106 and to a cross bar mounted in the machine frame or base 14 serves to hold the pawl 108 in engagement with the teeth on the rack and after clamping pressure has been released to return the clamping bar to its inactive position.

When the operator depresses the treadle 92 the clamping bar 18, through the arms 80 of the yoke 82 and the links 70, 72, is rocked toward the cone of the last by the spring 94, and when the treadle 92 has been depressed a distance sufficient to obtain the necessary pressure, the pawl 108 engages the teeth on the rack to maintain the bar in its clamping relation. It should be understood, however, that under some conditions the operator may prefer not to lock the clamping devices in operative position but to stand on the treadle until the operation to be performed on the shoe has been completed. After such operation has been performed as by the tool 20, the operator depresses the treadle 92 slightly and then the treadle 106 to disengage the pawl. Both treadles are thereupon moved upwardly under the influence of the spring 94 until the pin 100 strikes the end of the slot in the rod 104. At this time the pawl has passed beyond the teeth on the rack and the treadle 92 and the clamping bar 18 connected thereto are swung into inactive position by the spring 112.

Referring now to Fig. 7, it will be noted that the forward end of the fastener 26 is fluted or slabbled off to permit said fastener to be inserted without the necessity of first forming a hole for its reception in a work piece. In other words the fastener acts as a drill to form a hole in the heel 19. The other end of the fastener is provided with an elongated head 114 by which it can be turned into the work. Immediately below the head, the shank of the fastener is threaded to receive a clamping nut. The nut 116 is provided with a collar 118 on which is mounted a conical washer 120. The purpose and operation of the parts of the screw fastener will be more clearly understood when the mechanism for its insertion has been described.

The inserting mechanism 20 will now be considered. This comprises a screw driver 122 and a wrench 124. These are provided with a telescopic driving connection which includes a universal joint 126 connected to the armature shaft of the motor 22 and to a sleeve 128 which is provided with diametrically opposed slots 130 extending lengthwise of the sleeve. A shaft 132 is arranged for longitudinal sliding movement in the sleeve 128 and is provided with a key 134 which fits into the openings 130. The lower end 136 of the shaft 132 is ball shaped and acts through connections to rotate the fastener inserting mechanism 20.

This mechanism 20 is supported in a frame 138 which, as is shown best in Fig. 1, is in the form of a yoke having a downwardly extending portion 140 shaped to form a convenient hollow handle by which the operator may move the tool to operating position. The handle portion 140 is hollow and in this the driving connections for the wrench and the screw driver are concentrically rotatable. The frame 138 is supported in inac-

tive position by a member comprising a yoke 142 pivoted to the upper end of the yoke 138. Secured to the rear end of the yoke 142 is a link 144, which is pivoted to a lever 146 fulcrumed in an opening in the standard 12. The lever is normally maintained in the position shown in Fig. 1 by a spring 148 attached at one end to said lever and at its other end to the table 10. By this construction the fastener inserting mechanism is so positioned that it does not interfere with the actions of the operator in placing work on the support 12 or in removing work therefrom but permits the fastener inserting mechanism readily to be moved to operating position.

The wrench 124 is directly connected to a shell 150 by a sleeve 151 which rotates in bearings 153 and 155 formed in the handle 140. The upper end of the shell 150 is closed by a screw cover 152 provided with a downwardly extending portion 154 into which is fitted a member 156 having a conical hole formed therein and which furnishes one part of the socket for the ball shaped end 136 of the shaft 132. The upper portion of the cover 152 is fitted to receive a screw cap 158. Co-operating with the member 156 is a washer 160 which has a conical hole and furnishes the other portion of the socket for the end of the shaft 132. The washer 160 is held against the ball 136 by a spring 162, the expansive force of which may be adjusted by screwing the cap 158 into the cover 152. The pressure of the washer against the ball 136 is normally very light, so the rotation of the wrench 124 may be stopped without putting undue load on the motor. The shell 150, rotating under the momentum acquired when the machine is idling, will operate through the wrench 124 to turn the nut 116 until the desired clamping pressure has been attained.

Mounted inside of the shell 150 is a cylindrical block or member 164 of substantial weight. For present purposes I have found approximately six pounds to be correct. The block is of substantially the same diameter as the inside of the shell 150 but is not so high, this permitting these elements to have a relative axial movement. Depending from the block 164 is a shaft 166 to the lower end of which the screw driver 122 is secured. Surrounding the shaft between the lower end of the block 164 and the shell 150 is a friction washer 168 through which the block is driven. The shell rotates on a ball bearing 170 mounted in the supporting member 138. Between the lower end of the handle 140 and the wrench 124 is a ball bearing 172. Between the screw driver shaft 166 and the wrench carrying sleeve 151 are bearing sleeves 174 and 176 permitting free relative axial and rotative movement of said sleeve and shaft.

When the tool is brought into engagement with the screw fastener 26, the head 114 is received by a socket 178 at the lower end of the screw driver 122 and the nut 116 enters an hexagonal recess in the lower end of the wrench 124. During the initial driving movement, the wrench and screw driver rotate as a unit. The block 164, due to its relatively large mass, has acquired an amount of kinetic energy sufficient to drive the slabbled-off end of the screw into the wood heel. The nut descends with the screw under the influence of the shell 150. When the resistance to the screw becomes sufficient to stop the rotation of the member 164, the wrench 124 continues rotating to turn the nut, thereby bringing the nut and washer against the top of the last to clamp the heel to the shoe. During this rotating downward movement of the wrench, the shaft 166 and

the screw driver 122 are stopped, so the friction drive 168 is disconnected and the shell 150 is free to rotate independently. The shell, however, has a relatively small mass and its kinetic energy is not so great as that of the member 164. It is, however, sufficient to turn the nut 116 against the top of the last to produce the desired clamping pressure between the heel and the shoe. Thus, there is established a predetermined relation between the times of setting of the two fasteners and the amount of force applied thereto.

Although the parts of the machine have been described in detail it may be well to summarize briefly the operation of the machine. The operator will adjust the tread plate 16 and the gage 50 to the desired positions to accommodate heels of different heights and shoes of different shapes. When the tread plate has been properly adjusted for the particular shoe to be operated upon, the operator places a heel 19 on the yielding pad 24 and a shoe on the tread plate with the heel seat of the shoe engaging the top surface of the heel. Clamping pressure is then applied through the bar 18 to maintain the parts temporarily in assembled relation. The contact portion 68 of the clamping bar, because of its eccentricity, acts to move the shoe rearwardly and downwardly, thereby securely wedging or clamping the heel 19 against the pad 60 of the gage 50. With the parts of the machine in this position the operator grasps the handle 140 and moves the tool 20 into engagement with the screw fastener 26, which he has placed in the bore of the last, and said fastener is driven into the heel until the resistance is sufficient to stop the rotation of the member 164. The screw will therefore have entered the heel to a substantially definite distance. The wrench 124 continues its operation to turn the nut 116 against the top of the last. The operator then releases the tool 20, which returns to the position shown in Fig. 1, frees the shoe from the clamping pressure and removes it from the machine, which is now ready for the succeeding operation.

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

1. In a fastener driving device, a rotating power shaft, an operating tool, means rotated by said shaft and connected to said tool constructed and arranged to drive home a fastener by kinetic energy stored in said means, and a driving connection between the shaft and said means which is incapable of transmitting sufficient force to drive said fastener.

2. In a screw and nut driving device, a rotating power shaft, a screw driver, a wrench, means rotated by said shaft and connected to said wrench and screw driver constructed and arranged to drive home a screw and a nut on the screw by kinetic energy stored in said means, and a driving connection between the shaft and said means which is incapable of transmitting sufficient force to drive said screw and nut.

3. In a screw driving device, a rotating power shaft, a screw driver, means rotated by said shaft and connected to said screw driver constructed and arranged to drive home a screw by kinetic energy stored in said means, and a driving connection between the shaft and said means which is incapable of transmitting sufficient force to drive said screw.

4. In a screw and nut driving device, a rotating power shaft, a screw driver, a wrench, a pair of members rotatable by said power shaft and con-

nected to the screw driver and wrench respectively, said members having sufficient kinetic energy imparted thereto by the power shaft to produce the driving effect independently of said power shaft, and a connection between said members permitting operation of the screw driver during the operation of the wrench.

5. In a screw and nut driving device, a hollow handle, a wrench mounted to rotate in the handle, a screw driver mounted to rotate within the wrench, a power driven shaft, and a pair of members connecting the screw driver and the wrench respectively to the shaft, said members each having mass sufficient to store kinetic energy enough to drive home respectively a screw and a nut on said screw.

6. A screw and nut driving device having, in combination, a rotating power shaft, a hollow handle, a screw driver, a wrench, a member having relatively small mass connected to said wrench and to said shaft, and a second member having relatively large mass and supported by the first-mentioned member and connected to said screw driver whereby kinetic energy stored in said members is utilized to drive home a screw and to drive a nut on said screw with less force than that by which the screw is driven.

7. In a screw and nut driving device, a rotating power shaft, a screw driver and a wrench concentric with each other, a shell connected to the wrench, a relatively heavy member mounted within the shell and having the screw driver connected thereto, friction means connected to said shaft and to said shell to impart rotation to said shell and to the member secured to the screw driver, and means connecting said shell and said member constructed and arranged to permit operation of the screw driver to cease while permitting operation of the wrench to continue under momentum imparted thereto by the shaft.

8. A screw and nut driving device having, in combination, a screw driver and a wrench concentric with each other, a support for the screw driver and the wrench, a rotating power shaft, a shell mounted for rotation in said support and connected to said wrench, a member mounted within said shell and connected to said screw driver, friction means interposed between said shell and said member to permit rotation of the shell to be imparted to said member, and means connecting said shell to said shaft for rotating said shell and said member to impart sufficient kinetic energy thereto to drive home a screw and a nut on said screw after said member has been disconnected from the last-mentioned means.

9. A screw and nut driving device having, in combination, a screw driver and a wrench concentric with each other, a support for the screw driver and the wrench, a rotating power shaft, a shell mounted for rotation in said support and connected to said wrench, a member arranged to move axially in said shell and connected to said screw driver, friction means interposed between said shell and said member to permit rotation of the shell to be imparted to said member, and means connecting said shell to said shaft for rotating said shell and said member to impart sufficient kinetic energy thereto to drive home a screw and a nut on said screw.

10. A screw and nut driving device having, in combination, a screw driver and a wrench concentric with each other, a support for the screw driver and the wrench, a rotating power shaft, a shell having a relatively small mass mounted for rotation in said support and connected to said

wrench, a member having relatively large mass mounted within said shell and connected to said screw driver, and means connecting said shell to said shaft for rapidly rotating said shell and said member to impart sufficient kinetic energy thereto to drive home a screw and a nut on said screw with less force than that by which the screw is driven.

11. A screw and nut driving device having, in combination, a screw driver and a wrench concentric with each other, a support for the screw driver and the wrench, a rotating power shaft, a shell mounted for rotation in said support and connected to said wrench, a member arranged to move axially in said shell and connected to said screw driver, means connecting said shell to said shaft for rapidly rotating said shell and said member to impart sufficient kinetic energy thereto to drive home a screw and a nut on said screw, and friction means interposed between said shell and said member to cause rotation of the shell to be imparted to said member and the screw driver and the wrench to rotate together during the driving of the screw, while permitting axial movement of the member carrying the screw driver to disconnect the member from the shell and allow rotation of the wrench to continue to turn the nut.

12. In a screw and nut driving mechanism, a rotatable power shaft, a screw engaging member,

a nut engaging member, operating connections including friction means for applying the power of the shaft to rotate one of the engaging members, and operating connections including friction means for communicating the rotation of the thus rotated member to the other member.

13. In a screw and nut driving mechanism, a rotatable power shaft, a screw engaging member, a nut engaging member, operating connections including friction means for applying the power of the shaft to rotate one of the engaging members, and operating connections including friction means for communicating the rotation of the thus rotated member to the other member, the mass of the connections for one of the members being great as compared with that of the connections for the other member.

14. In a screw and nut driving mechanism, a rotatable power shaft, a screw engaging member, a nut engaging member, operating connections including friction means for applying the power of the shaft to rotate one of the engaging members, operating connections including friction means for communicating the rotation of the thus rotated member to the other member, and means arranged to vary the amount of power transmitted by one of the friction means.

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