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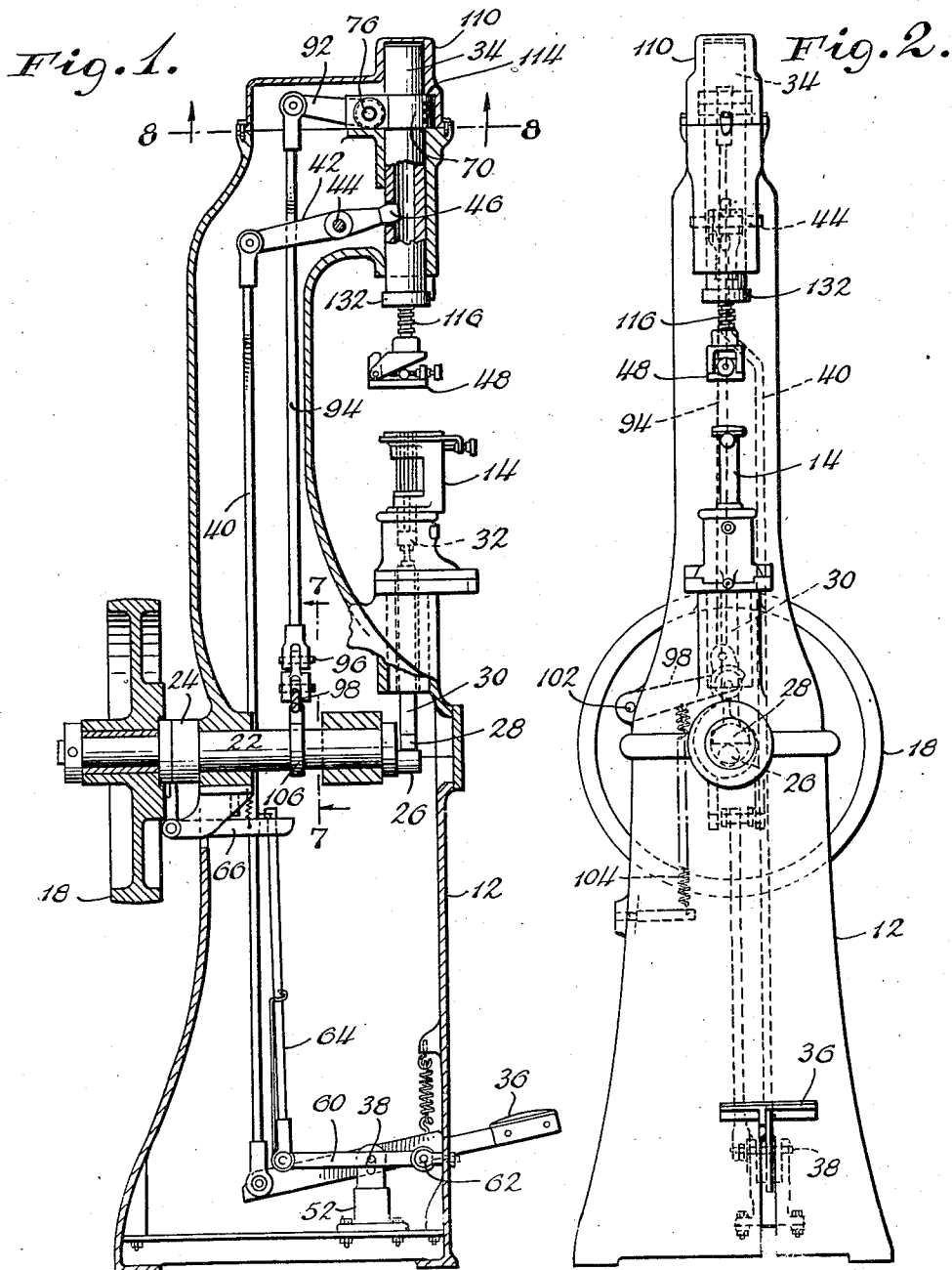
H. P. SCHNEIDER

2,296,954

HEEL NAILING MACHINE

Filed Jan. 26, 1942

3 Sheets-Sheet 1



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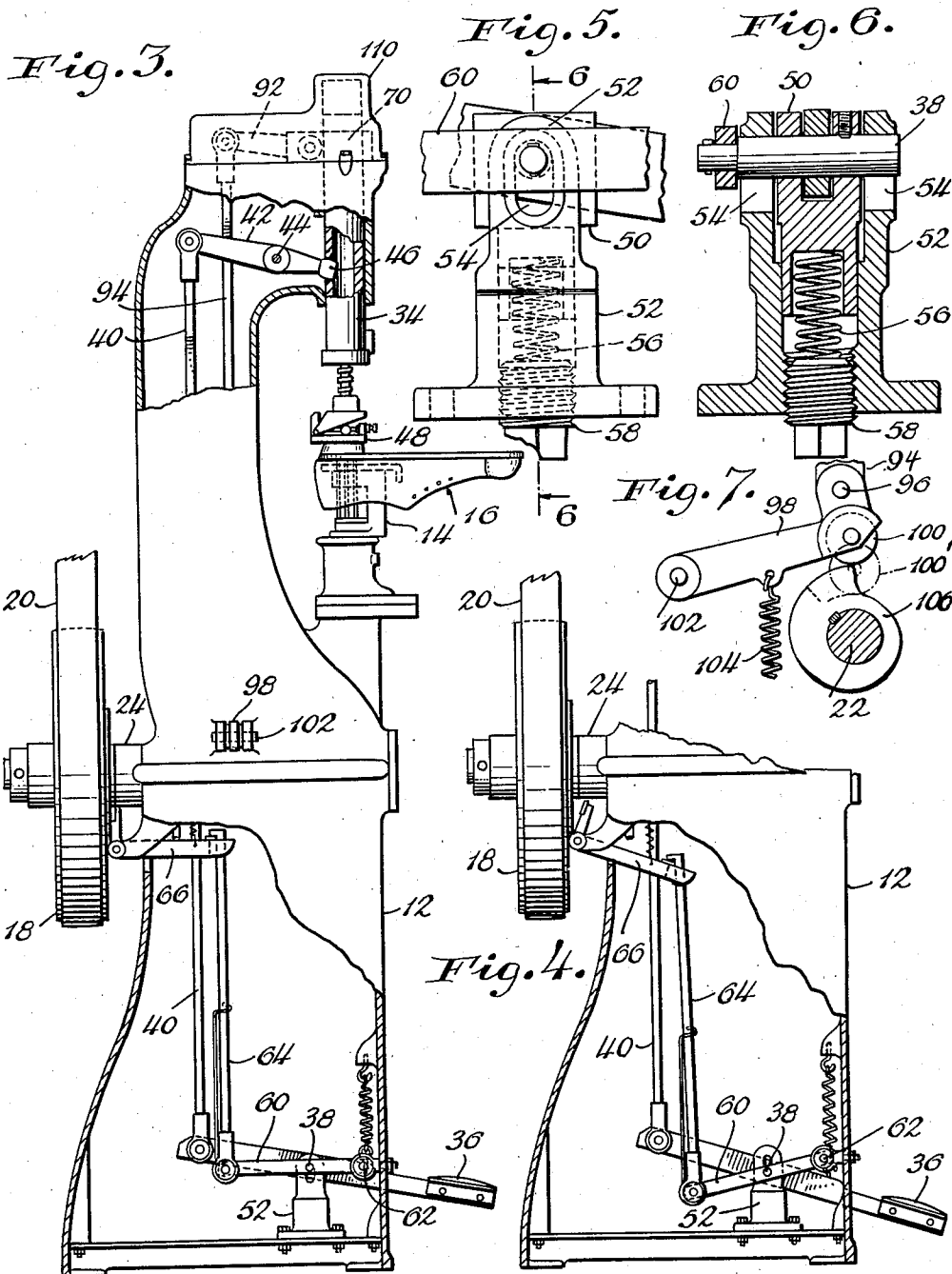
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3 Sheets-Sheet 2



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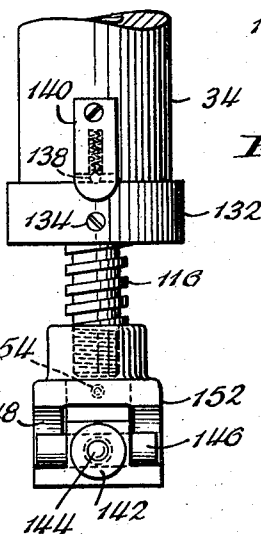
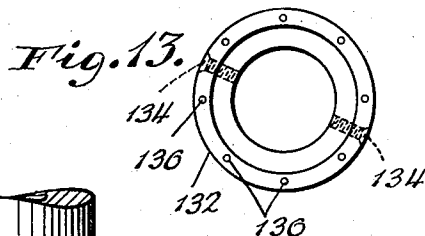
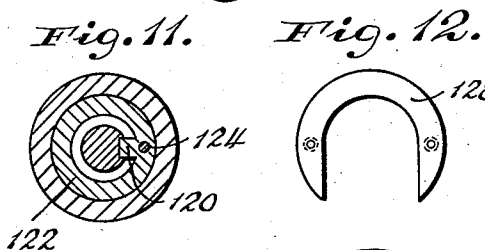
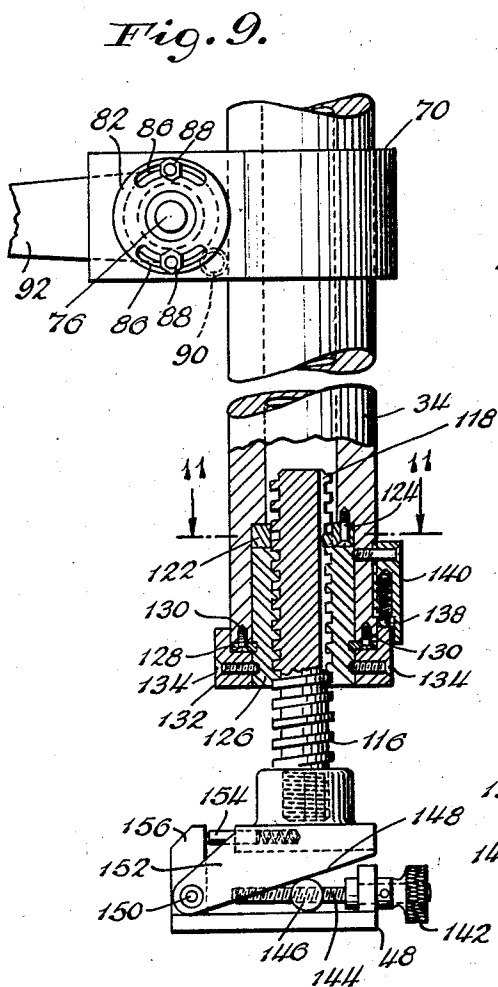
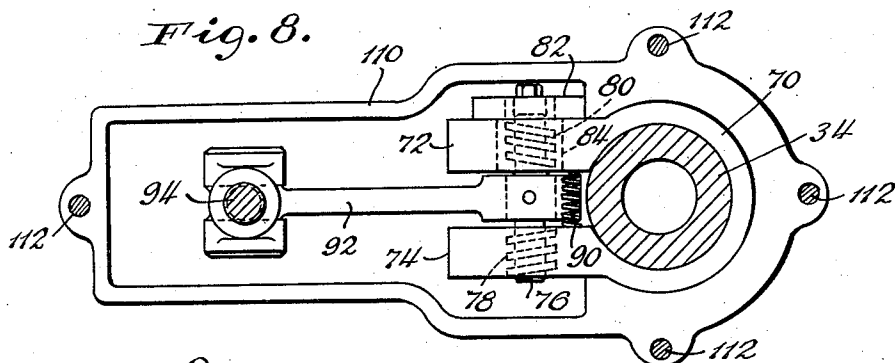
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HEEL NAILING MACHINE

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,296,954

HEEL-NAILING MACHINE

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Application January 26, 1942, Serial No. 428,197

18 Claims. (Cl. 1—32)

This invention relates to heel-nailing machines.

The primary object of my invention is to generally improve heel-nailing machines. A more particular object is provided a wholly mechanical locking mechanism for the pressure plunger of the machine, which mechanism is automatically operated and is relatively simple in construction. In accordance with still another object of the invention, the entire operation of the machine is controlled from a single foot pedal.

To the accomplishment of the foregoing general objects, and other more specific objects which will hereinafter appear, my invention consists in the heel-nailing machine elements and their relation one to the other as hereinafter are more particularly described in the specification and sought to be defined in the claims. The specification is accompanied by drawings in which:

Fig. 1 is a section taken in elevation through a heel-nailing machine embodying features of my invention;

Fig. 2 is a front elevation of the same;

Fig. 3 is a partially sectioned side elevation with the treadle partially depressed;

Fig. 4 is a similar view showing the lower part of the machine with the treadle fully depressed;

Fig. 5 is a fragmentary view showing the fulcrum of the treadle drawn to enlarged scale;

Fig. 6 is a section taken approximately in the plane of the line 6—6 of Fig. 5;

Fig. 7 shows the cam and cam follower for locking the plunger, said view being taken approximately in the plane of the line 7—7 of Fig. 1;

Fig. 8 is a horizontal section taken in the plane of the line 8—8 of Fig. 1;

Fig. 9 is a partially sectioned side elevation of the pressure plunger drawn to enlarged scale;

Fig. 10 is a front elevation of the lower end of the same;

Fig. 11 is a transverse section through the plunger taken approximately in the plane of the line 11—11 of Fig. 9; and

Figs. 12 and 13 are explanatory of some details of the invention.

Referring to the drawings, and more particularly to Figs. 1 through 4, the heel-nailing machine comprises a hollow frame 12 carrying a nail box 14, over which the heel portion of a shoe may be placed, as is indicated at 16 in Fig. 3. The nail box need not be described in detail, it being conventional, and being interchangeable with other nail boxes in order to receive shoes of

different size and type, as for example men's shoes or ladies' shoes in either large or small sizes.

Power is supplied to the machine through a combined pulley and flywheel 18, driven by a belt 20 (Figs. 3 and 4). The pulley normally turns loosely on main shaft 22, but may be connected thereto by means of conventional clutch mechanism schematically indicated at 24. This clutch need not be, but preferably is, a single revolution clutch, that is, one which is automatically disengaged at the end of one revolution. Such clutches are well known, and the present clutch is therefore not shown and described in detail.

The forward end of main shaft 22 carries a suitable eccentric or crank 26, (Fig. 1), which operates the nail box 14. More specifically, the eccentric 26 bears against the transverse lower end 28 of an upright vertically reciprocable rod 30, the upper end of which bears against a plunger 32. Plunger 32 forms a part of the nail box assembly, and is in turn connected to the individual drive pins which drive the heel nails upwardly, it being understood that the nails are preliminarily placed in holes in the upper portion of nail box 14, one nail being placed over each drive pin.

In order to hold the heel tightly against the shoe during the upward drive of the nails, the machine is provided with a pressure plunger 34 which is mounted for vertical reciprocation over the nail box 14. This may be moved between the elevated position shown in Fig. 1, and the depressed position shown in Fig. 3. It is forced downwardly by means of a foot treadle 36. The treadle 36 is pivoted on a fulcrum 38, and its opposite end is connected by means of an upright link 40 to a lever 42 pivoted at 44. The opposite end of lever 42 is provided with an appropriate rounded part 46, which is received in a mating part of plunger 34. It will be evident from comparison of Figs. 1 and 3 that depression of the treadle forces the pressure plunger downwardly until the pressure plate 48 bears against the heel of the shoe.

When the pressure plunger has reached its downward limit of movement, the clutch 24 is engaged to turn the main shaft 22. For this purpose the fulcrum 38 of treadle 36 is yieldable, it being constructed in a manner best shown in Figs. 5 and 6, where it will be seen that fulcrum 38 is carried in a bearing 50, which is vertically slidable in bearing housing 52. The latter is vertically slotted at 54, thus affording vertical

movement of fulcrum 33. The bearing 50 is normally urged upwardly to the position shown in Figs. 5 and 6 by a relatively powerful compression spring 56, the tension of which may be adjusted by means of an adjusting screw 58.

One end of fulcrum pin 38 passes through a lever 60, which is located outside the bearing housing 52. Reverting now to Figs. 1 through 4, the forward end of lever 60 is pivoted on the machine frame at 62, while its rear end is connected to a generally vertical link 64. Link 64 is operatively connected to clutch tripping arm 66. It will be evident from comparison of Figs. 1, 3 and 4 that preliminary movement of the treadle lowers the pressure plunger, and it is only after the plunger is forced against the shoe heel with sufficient force to overcome the compression spring 56 in bearing housing 52, that the fulcrum 38 of the treadle is forced downwardly as shown in Fig. 4, thereby moving lever 60 and link 64 downwardly, and so tripping or engaging the clutch.

The movement of the treadle also functions to lock the pressure plunger in its depressed position, against the blow of the heel-nailing operation. In the present case, the plunger is locked by means of a split ring 70 which closely surrounds plunger 34. This split ring is best shown in Figs. 8 and 9. The ends 72 and 74 are connected by means of a screw 76, which may be turned in order to contract the split ring and thereby lock the plunger 34 against movement. In the present case the screw has right and left-hand threads. One threaded end 78 is threadedly received directly in the part 74 of the split ring. The other threaded end 80 is threadedly received in a disc 82, the hole 84 through part 72 of the split ring clearing the thread 80. Disc 82 may be rotated to adjust the mean dimension or the tightness of the split ring. This is clearly shown in Fig. 9, in which it will be seen that disc 82 has arcuate slots 86, and is locked in position by bolts 88 passing through slots 86. One or more compression springs 90 may be provided to normally urge the split ring to its expanded or plunger-releasing position.

Screw 76 is turned by means of an arm 92. Referring now to Figs. 1, 2 and 7, the arm 92 is connected to a link 94, the lower end of which is connected at 96 to a lever 98 carrying a cam follower 100. Lever 98 is pivoted to the frame of the machine at 102. The lever is normally urged downward by means of a relatively powerful pull spring 104, the upper end of which is connected to lever 98, and the lower end of which is fixedly connected to the machine frame. The cam follower 100 cooperates with a cam 106 on main shaft 22. The cam has a sharp rise which is located at the top when the machine is in its normal rest position. At this time, the split ring 70 is expanded and the plunger is free for downward movement by means of the treadle. However, after the treadle has been depressed so far that the treadle fulcrum is also depressed, the machine is started, but at the very first part of the rotation of main shaft 22, and before the heel nails are appreciably moved, the cam follower 100 moves downwardly from the solid line position 100' shown in Fig. 7, to the broken line position 100''. This causes a downward movement of arm 92 (Fig. 1) connected to the screw 76, and so tightens the split ring.

For effective operation the split ring must, of course, be held against any possibility of axial movement. For this purpose it is housed within

a cap 110 bolted to the top of frame 12. This cap is shown in inverted position in Fig. 8, and the bolts pass through holes 112. The upper part of frame 12 is dimensioned to slidably receive the plunger 34, as is best shown in Fig. 1, and therefore provides a table or surface on which the split ring 70 rests, and which prevents downward movement of the split ring. What is more important, however, the cap 110 is also dimensioned to slidably receive plunger 34, and provides a shoulder 114, which prevents upward movement of the split ring. The axial dimension of the space thus provided in cap 110 is preferably only a few thousandths of an inch greater than the axial dimension of the split ring, thus holding the same effectively against vertical movement and consequent knocking.

It will be understood that one advantage of using the power driven cam 106 for control of the locking mechanism, is that the main pull spring 104 which locks the split ring is initially tensioned under power drive, without necessitating additional treadle pressure. The cam tensions spring 104 during the return stroke of the nailing mechanism, so that there is no reduction in the power available for the nailing operation itself.

Because of substantial differences in heel height, as for example between a man's low-heeled shoe and a lady's high-heeled shoe, the position of the pressure plate 48 is preferably adjustable relative to the pressure plunger 34. The mechanism for this purpose is best shown in Figs. 9 through 13. The pressure plate 48 is non-rotatably carried at the lower end of a screw 116, the upper end of which is received within hollow plunger 34. The screw is preferably splined or is provided with a keyway 118. Plunger 34 includes a key 120, best shown in Fig. 11, said key preferably forming part of a ring 122 which is inserted upwardly into the lower end of the plunger, as is best shown in Fig. 9, and is there locked against rotation by means of one or more screws 124.

Screw 116 is matingly received in an internally threaded sleeve 126. This sleeve is rotatable in plunger 34, but is held against axial movement. In the present case, this is accomplished by means of an open ring 128, which is received in an annular groove on the outside of sleeve 126, said ring 128 being secured to the lower end of plunger 34 by means of screws 130. The shape of the open ring 128 is best illustrated in Fig. 12. It will be understood that the ring is open merely for ease in applying it around the sleeve 126, and that if desired a second piece may be included to complete the circumference, or two semi-circular pieces may be used, making up a complete circle.

The height of the pressure plate 48 is adjusted by rotating the sleeve 126. This raises or lowers the screw without permitting rotation of the same. To facilitate rotation of sleeve 126, an enlargement or ring 132 is secured to the lower end of the sleeve, as by means of screws 134. Detent means may be provided to hold the ring 32 in properly adjusted position. In the present case the upper edge of the ring is provided with a series of indentations 136 (see Fig. 13), which indentations cooperate with a spring-pressed ball 138 (see Fig. 9). The spring and ball are housed within a detent housing 140, secured to the lower end of the plunger 34 above ring 132. The latter may, of course, be knurled or otherwise appropriately treated to facilitate turning the same.

The angle of pressure plate 48 may also be

adjusted, this being done by means of a knob 142, turning a screw 144 moving a rod 146, bearing against a sloping surface or wedge 148. Plate 48 is pivoted at 150 on arms 152. The plate is normally urged in opposite direction by means of spring-pressed plunger 154 bearing against an upward extension 156 formed integrally with plate 48.

It is believed that the construction and operation of my improved heel-nailing machine, as well as the advantages thereof, will be apparent from the foregoing detailed description. It will also be apparent that while I have shown and described my invention in a preferred form, changes and modifications may be made in the structure disclosed, without departing from the spirit of the invention as sought to be defined in the following claims.

I claim:

1. A pressure plunger locking mechanism for a heel-nailing machine, said mechanism comprising a cylindrical plunger a mating split ring closely surrounding said plunger, means to prevent axial movement of the ring, and mechanical control means for contracting said ring to lock the plunger, or for expanding said ring to release the plunger.

2. A pressure plunger locking mechanism for a heel-nailing machine, said mechanism comprising a split ring closely surrounding said plunger, means to prevent axial movement of the ring, and mechanical control means for contracting said ring to lock the plunger, or for expanding said ring to release the plunger, said means comprising a screw extending across the split portion of the ring, and means to rotate said screw in one direction or the other in order to contract or expand the split ring.

3. A pressure plunger locking mechanism for a heel-nailing machine, said mechanism comprising a split ring closely surrounding said plunger, means to prevent axial movement of the ring, and mechanical control means for contracting said ring to lock the plunger, or for expanding said ring to release the plunger, said means comprising a screw extending across the split portion of the ring, and means to rotate said screw in one direction or the other in order to contract or expand the split ring, said screw having a right hand thread received in one side of the split ring and a left hand thread received in the other side of the split ring.

4. A pressure plunger locking mechanism for a heel-nailing machine, said mechanism comprising a split ring closely surrounding said plunger, means to prevent axial movement of the ring, and mechanical control means for contracting said ring to lock the plunger, or for expanding said ring to release the plunger, said means comprising a screw extending across the split portion of the ring, linkage to turn said screw a fraction of a turn in one direction or the other in order to contract or expand the split ring, and means for adjusting the mean dimension of the split ring.

5. A pressure plunger locking mechanism for a heel-nailing machine, said mechanism comprising a split ring closely surrounding said plunger, means to prevent axial movement of the ring, and mechanical control means for contracting said ring to lock the plunger, or for expanding said ring to release the plunger, said means comprising a screw extending across the split portion of the ring and provided with right-hand and left-hand threads, means to rotate said screw in one

direction or the other in order to contract or expand the split ring, and means for adjusting the tightness of the split ring when contracted, said means including an internally threaded disc secured to one side of the split ring for receiving the thread at one end of the screw, and locking means passing through arcuate slots on said disc for adjustably fixing the rotative position of the disc.

6. A heel-nailing machine comprising a nail box, a main shaft, a driving pulley, a clutch between said driving pulley and main shaft, eccentric means on said main shaft for operating the nail box, a pressure plunger vertically reciprocable over the nail box, a treadle arranged to depress said plunger and to thereafter engage said clutch, and means to lock the plunger in depressed position, said means comprising a split ring closely surrounding said plunger, means to prevent axial movement of the ring, mechanical control means for contracting said ring to lock the plunger, and means set into motion by depression of the treadle for operating said control means to lock the plunger prior to driving of nails into the heel.

7. A heel-nailing machine comprising a nail box, a main shaft, a driving pulley, a clutch between said driving pulley and main shaft, eccentric means on said main shaft for operating the nail box, a pressure plunger vertically reciprocable over the nail box, a treadle arranged to depress said plunger and to thereafter engage said clutch, and means to lock the plunger in depressed position, said means comprising a split ring closely surrounding said plunger, means to prevent axial movement of the ring, mechanical control means including a screw extending across the split portion of the ring for contracting said ring to lock the plunger, and means set into motion by depression of the treadle for turning said screw to lock the plunger prior to driving of nails into the heel.

8. A heel-nailing machine comprising a nail box, a main shaft, a driving pulley, a clutch between said driving pulley and main shaft, eccentric means on said main shaft for operating the nail box, a pressure plunger vertically reciprocable over the nail box, a treadle arranged to depress said plunger and to thereafter engage said clutch, and means to lock the plunger in depressed position, said means comprising a split ring closely surrounding said plunger, means to prevent axial movement of the ring, mechanical control means for contracting said ring to lock the plunger, a cam on the main shaft, and a cam follower connected to said mechanical control means, said cam being so shaped that immediately upon the beginning of rotation of the main shaft and prior to driving of nails into the heel the split ring is locked.

9. A heel-nailing machine comprising a nail box, a main shaft, a driving pulley, a clutch between said driving pulley and main shaft, eccentric means on said main shaft for operating the nail box, a pressure plunger vertically reciprocable over the nail box, a treadle arranged to depress said plunger and to thereafter engage said clutch, and means to lock the plunger in depressed position, said means comprising a split ring closely surrounding said plunger, means to prevent axial movement of the ring, and mechanical control means including a right and left hand screw extending across the split portion of the ring for contracting said ring to lock the plunger, an arm projecting from said screw,

a cam on said main shaft, and a cam follower connected to said arm, said cam being so shaped that immediately upon the beginning of rotation of the main shaft and prior to driving of nails into the heel the aforesaid split ring is locked.

10. A heel nailing machine comprising a main shaft, a driving pulley, a clutch between said driving pulley and main shaft, a nail box, eccentric means on said main shaft for operating the nail box, a pressure plunger vertically reciprocable over the nail box, a foot treadle lever pivoted between its ends, an upwardly extending link connected to the inner end of the treadle lever, said link being moved upwardly when the treadle is depressed, means connected to the upper end of said link for moving the pressure plunger downwardly when the link is moved upwardly, resiliently yieldable fulcrum means for said treadle lever, said fulcrum means comprising a stationary housing the upper end of which is vertically slotted to receive a fulcrum pin, said fulcrum pin passing through the vertically slotted housing and through the treadle lever, a compression spring disposed beneath said treadle lever, whereby said treadle fulcrum is normally urged upwardly, and linkage connected between the yieldable fulcrum and the clutch, whereby continued depression of the treadle lever after the pressure plunger can no longer move, results in engagement of the clutch and rotation of the main shaft.

11. A heel-nailing machine comprising a main shaft, a driving pulley, a clutch between said driving pulley and main shaft, a nail box, eccentric means on said main shaft for operating the nail box, a pressure plunger vertically reciprocable over the nail box, a treadle lever arranged to depress said plunger, a resiliently yieldable fulcrum for said treadle lever, means to lock the plunger in depressed position, including a split ring closely surrounding said plunger, means to prevent axial movement of the ring, mechanical control means for contracting said ring to lock the plunger, linkage connected between the yieldable fulcrum of the treadle lever and the clutch, whereby continued depression of the treadle lever after the pressure plunger can no longer move results in engagement of the clutch and rotation of the main shaft, and means set in motion by depression of the treadle to lock the pressure plunger prior to driving of nails into the heel.

12. A heel-nailing machine comprising a main shaft, a driving pulley, a clutch between said driving pulley and main shaft, a nail box, eccentric means on said main shaft for operating the nail box, a pressure plunger vertically reciprocable over the nail box, a treadle lever arranged to depress said plunger, a resiliently yieldable fulcrum for said treadle lever, means to lock the plunger in depressed position, including a split ring closely surrounding said plunger, means to prevent axial movement of the ring, mechanical control means including a screw extending across the split portion of the ring for contracting said ring to lock the plunger, linkage connected between the yieldable fulcrum of the treadle lever and the clutch, whereby continued depression of the treadle lever after the pressure plunger can no longer move results in engagement of the clutch and rotation of the main shaft, and means set in motion by depression of the treadle to turn the screw to lock the pressure plunger prior to driving of nails into the heel.

13. A heel-nailing machine comprising a main shaft, a driving pulley, a clutch between said

driving pulley and main shaft, a nail box, eccentric means on said main shaft for operating the nail box, a pressure plunger vertically reciprocable over the nail box, a treadle lever arranged to depress said plunger, a resiliently yieldable fulcrum for said treadle lever, means to lock the plunger in depressed position, including a split ring closely surrounding said plunger, means to prevent axial movement of the ring, mechanical control means for contracting said ring to lock the plunger, a cam on said main shaft, a cam follower connected to said control means, and linkage connected between the yieldable fulcrum of the treadle lever and the clutch, whereby continued depression of the treadle lever after the pressure plunger can no longer move results in engagement of the clutch and rotation of the main shaft, said cam being so shaped that immediately upon the beginning of rotation of the main shaft and prior to driving of nails into the heel, the aforesaid split ring is locked.

14. A heel-nailing machine comprising a main shaft, a driving pulley, a clutch between said driving pulley and main shaft, a nail box, eccentric means on said main shaft for operating the nail box, a pressure plunger vertically reciprocable over the nail box, a treadle lever arranged to depress said plunger, a resiliently yieldable fulcrum for said treadle lever, means to lock the plunger in depressed position including a split ring closely surrounding said plunger, means to prevent axial movement of the ring, mechanical control means including a right and left-hand screw extending across the split portion of the ring for contracting said ring to lock the plunger, an arm projecting from said screw, a cam on said main shaft, a cam follower connected to said arm, and linkage connected between the yieldable fulcrum of the treadle lever and the clutch, whereby continued depression of the treadle lever after the pressure plunger can no longer move results in engagement of the clutch and rotation of the main shaft, said cam being so shaped that immediately upon the beginning of rotation of the main shaft and prior to driving of nails into the heel, the aforesaid split ring is locked.

15. Adjusting mechanism for adjusting the position of a pressure plate relative to the plunger of a heel-nailing machine, said adjusting mechanism comprising a screw carrying the pressure plate, said screw having a keyway, the plunger having a key received in said keyway for preventing rotation of the screw and pressure plate, and a rotatable internally threaded sleeve in said plunger receiving said screw for adjusting the projection of the screw from the plunger, said sleeve and plunger having mating means to prevent axial movement of the sleeve.

16. Adjusting mechanism for adjusting the position of a pressure plate relative to the plunger of a heel-nailing machine, said adjusting mechanism comprising a screw carrying the pressure plate, said screw having a keyway, the plunger having a key received in said keyway for preventing rotation of the screw and pressure plate, a rotatable internally threaded sleeve in said plunger receiving said screw for adjusting the projection of the screw from the plunger, said sleeve and plunger having mating means to prevent axial movement of the sleeve, and an exposed ring secured to said sleeve to facilitate rotation thereof when adjusting the height of the pressure plate.

17. Adjusting mechanism for adjusting the position of a pressure plate relative to the plunger of a heel-nailing machine, said adjusting mechanism comprising a screw carrying the pressure plate, said screw having a keyway, the plunger 5 having a key received in said keyway for preventing rotation of the screw and pressure plate, a rotatable internally threaded sleeve in said plunger receiving said screw for adjusting the projection of the screw from the plunger, said 10 sleeve being grooved to receive a collar on the plunger to prevent axial movement of the sleeve, an exposed ring secured to said sleeve to facilitate rotation thereof when adjusting the height of the pressure plate, and spring detent means 15 on said plunger cooperating with said ring to retain the same in adjusted position.

18. A heel-nailing machine comprising a main shaft, a driving pulley, a clutch between said driving pulley and main shaft, a nail box, eccentric means on said main shaft for operating the nail box, a pressure plunger vertically reciprocable over the nail box, a foot treadle lever pivoted between its ends, an upwardly extending 20

link connected to the inner end of the treadle lever, said link being moved upwardly when the treadle is depressed, means connected to the upper end of said link for moving the pressure plunger downwardly when the link is moved upwardly, resiliently yieldable fulcrum means for said treadle lever, said fulcrum means comprising a stationary housing the upper end of which is vertically slotted to receive a fulcrum pin, a 10 plunger vertically reciprocable in said housing, said fulcrum pin passing through the vertically slotted housing and through the vertically movable plunger and through the treadle lever, a compression spring disposed beneath said plunger, and a plug threadedly received in the bottom of said housing for adjusting the tension of the compression spring, whereby said treadle fulcrum is normally urged upwardly, and linkage connected between the yieldable fulcrum and the clutch, whereby continued depression of the treadle lever after the pressure plunger can no longer move, results in engagement of the clutch and rotation of the main shaft.

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