W. C. STEWART.

FASTENER INSERTING MACHINE.

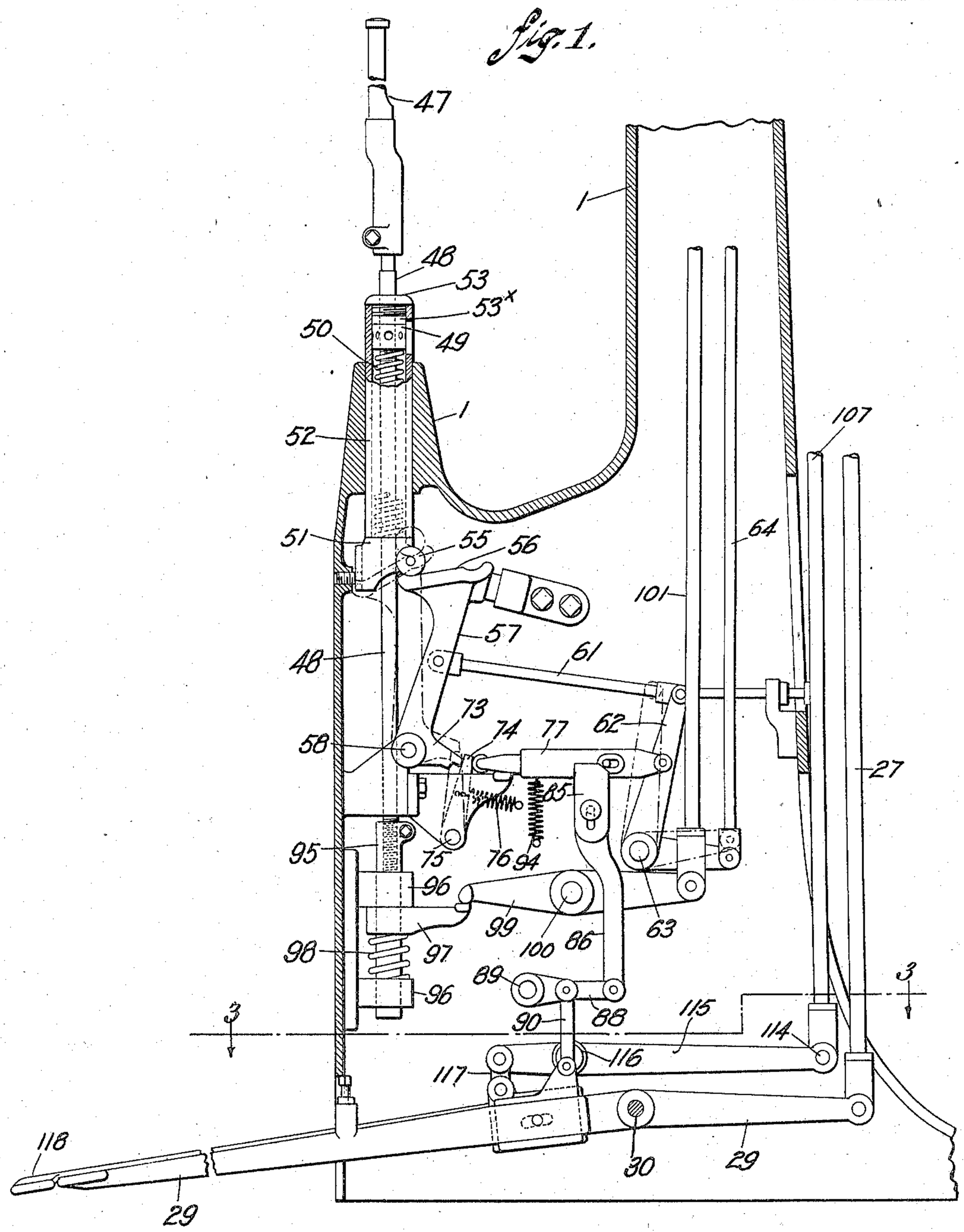
APPLICATION FILED DEC. 22, 1909.

958,040.

Patented May 17, 1910.

4 SHEETS—SHEET 1.

Fig. 1.



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4 SHEETS—SHEET 2.

Fig. 2.

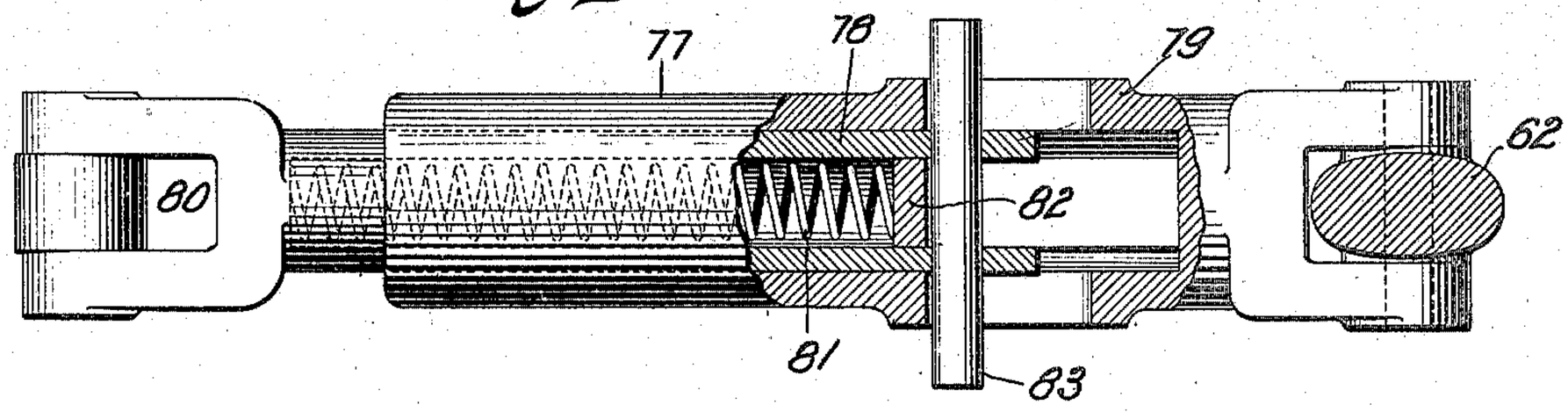
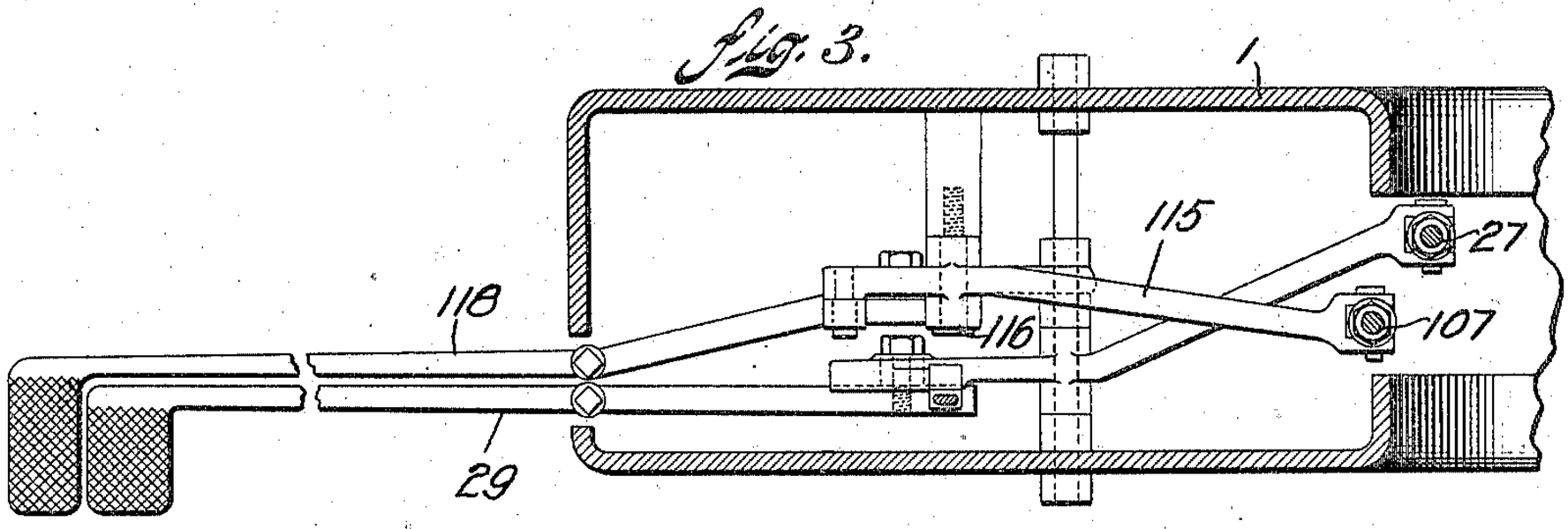


Fig. 3.



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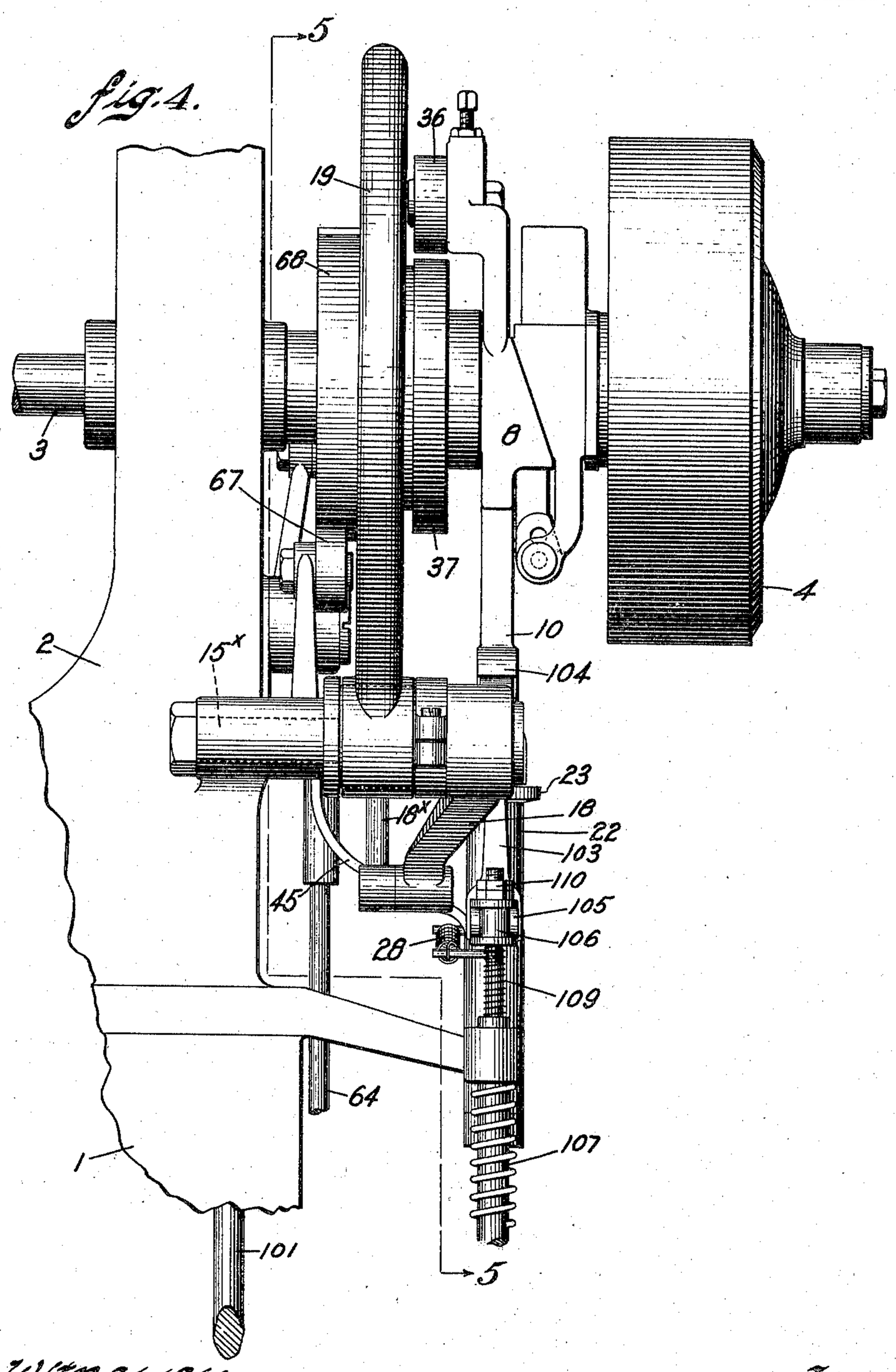
4 SHEETS—SHEET 3.

Fig. 4.



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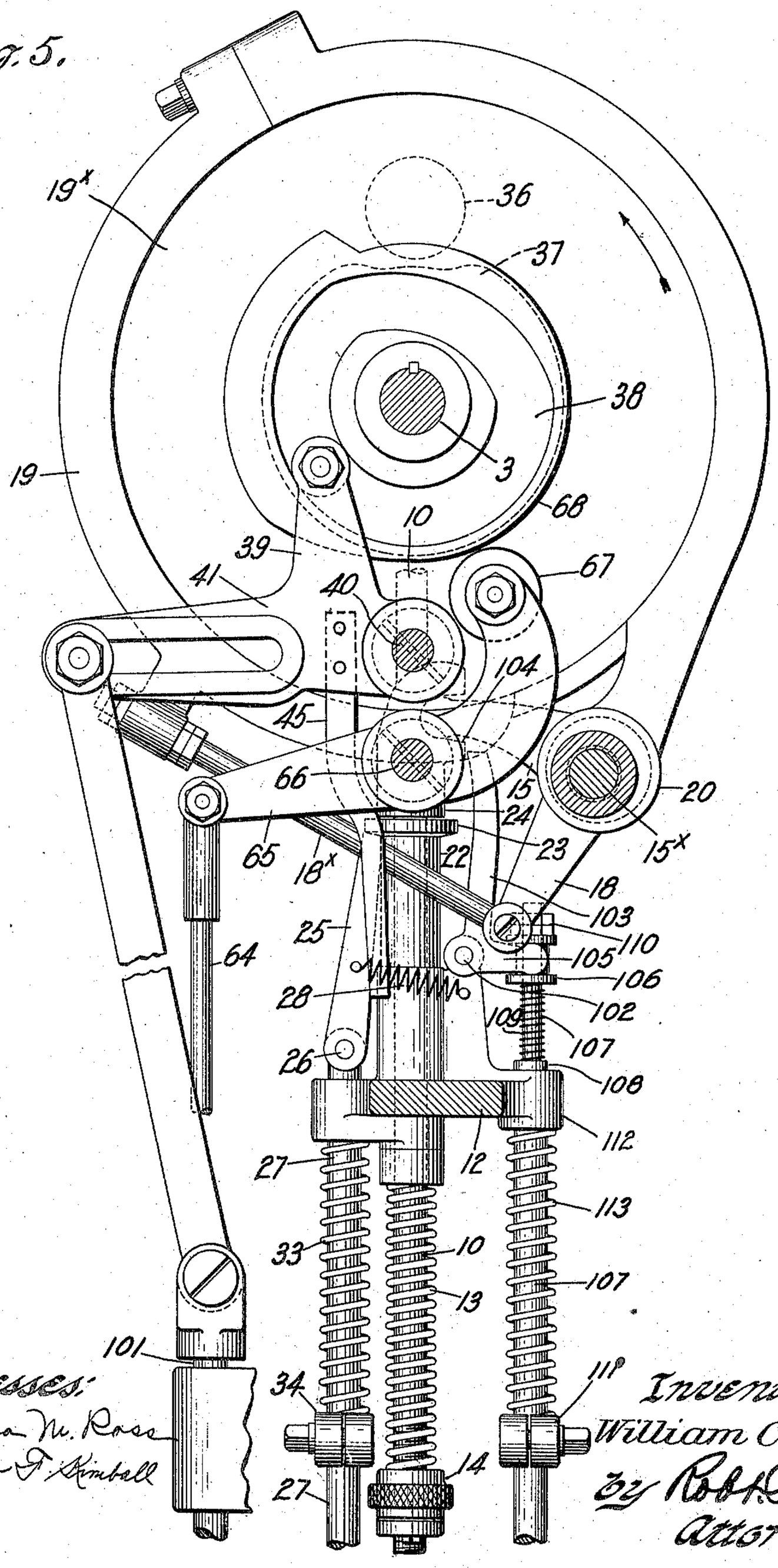
4 SHEETS—SHEET 4.

Fig. 5.



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UNITED STATES PATENT OFFICE.

WILLIAM C. STEWART, OF LYNN, MASSACHUSETTS, ASSIGNOR TO THOMAS G. PLANT, OF BOSTON, MASSACHUSETTS.

FASTENER-INSERTING MACHINE.

958,040. Specification of Letters Patent. Patented May 17, 1910.

Application filed December 22, 1909. Serial No. 534,409.

To all whom it may concern:

Be it known that I, WILLIAM C. STEWART, a subject of the King of Great Britain, residing at Lynn, in the county of Essex and State of Massachusetts, have invented an Improvement in Fastener-Inserting Machines, of which the following description, in connection with the accompanying drawings, is a specification, like numerals on the drawings representing like parts.

The invention to be herein described relates to machines for inserting fasteners, and more particularly to machines for inserting fasteners in leather during the manufacture of boots and shoes.

The aims and purposes of the present invention are to provide a machine of the above general character which will be simple in construction and operation, and wherein either one or more fasteners may be driven with equal surety that the fasteners may be properly forced into the work.

The present invention is a development of that set forth and claimed in a prior application, renewal Ser. No. 529,308, filed November 30, 1909, to which reference may be had.

In the drawings:—Figure 1 is a vertical longitudinal section and partial elevation of the lower portion of a machine illustrating one embodiment of the present invention; Fig. 2 is an enlarged detached detail of the pusher to be described; Fig. 3 is a horizontal section on the line 3—3 of Fig. 1; Fig. 4 is a side view showing a part of the machine head, the driving pulley and clutching device with their associated parts; and Fig. 5 is a section on the line 5—5 of Fig. 4.

As fully described in the application hereinbefore mentioned, the column 1 sustains at its upper end the machine head 2 of any desired character for inserting fasteners and fitted as usual with any suitable work plate. For the present purposes it is sufficient to note that the machine is of a character to insert one nail or fastener at each rotation of the main shaft, the period of operation of the machine determining the number of fasteners that may be driven and it being necessary to stop the machine to arrest the insertion of the fasteners.

As indicated in Figs. 4 and 5, the machine head 2 is provided with the main shaft 3 having at its outer end portion a suitable friction clutch 4, controlled by the vertically movable wedge 8 on a slide rod 10, as pointed out in the application mentioned. The wedge rod 10, Fig. 5, passes through the bracket or lug 12 extending from the machine column, and below the lug 12 said rod is surrounded by a spring 13, seated at its lower end against a nut 14 upon the lower end of said rod and tending normally to depress the wedge rod and the wedge, and thus stop the machine. Just below the wedge 8, the wedge rod 10 is provided with a lateral recess, Fig. 5, which receives the end of a brake controlling arm 15, mounted on a stud 15* and from the hub of which projects the arm 18 connected by the rod 18* to the brake band 19, Fig. 5, surrounding the brake wheel 19*, the other end of said brake band being connected to the eccentric portion 20 movable by the arm 15, the construction being such that when the arm 15 is raised by the slide rod 10 it will loosen the brake band and when it is depressed by said rod it will tighten the brake band upon the wheel 19* and assist in stopping the machine.

To control the wedge 8, its depending rod 10 above the lug 12, Fig. 5, is surrounded by a sleeve 22 provided with a flange 23. A little above this sleeve 22 is the collar 24 fast upon the rod 10, the construction being such that upon lifting the sleeve 22, the collar 24, and perforce the slide rod 10 and wedge 8 will be lifted to engage the wedge members, as pointed out in the application hereinbefore mentioned. Standing normally beneath the flange 23 of the said sleeve is the upper end of a lift pawl 25, fulcrumed at 26 to the upper end of a treadle rod 27, Fig. 4, and is controlled as to one position by a spring 28, as clearly indicated in Fig. 5. This treadle rod is connected at its lower end, see Fig. 1, to the rear end of a foot treadle 29, fulcrumed at 30 and is surrounded by a spring 33 bearing at one end against a stationary portion of the machine frame and at its other end against a collar 34 adjustably secured to said treadle rod 27, said spring serving to depress the treadle rod and elevate the foot end of the treadle after the latter has been released by the foot.

The slide rod 10 is provided at its upper end with a roller stud 36, Fig. 4, shown also in dotted lines in Fig. 5, which overlies a cam 37 on the main shaft. The shape of

this cam is such that when once the wedge has been lifted to start the machine, initial rotation of the main shaft will turn said cam beneath the roller which is to hold said roller and wedge in their elevated positions until the shaft has substantially completed one rotation, whereupon the lower portion of the cam reaches a position beneath said roller and allows the spring 13 to depress the slide rod and wedge to thereby disengage the clutch members, substantially as pointed out in the application hereinbefore mentioned. When, therefore, the operator depresses the treadle 29 and lifts the starting pawl 25 to start the machine, if a single fastener only is to be driven, he may instantly release his treadle and permit the pawl to drop, the lifting wedge being locked in its elevated position by its cam 37 to complete the rotation of the shaft and the driving of the fastener, after which said wedge is dropped by its own spring 13 and the machine is arrested by the brake described.

Mounted on the main shaft 3 is a cam provided with a groove 38 in which travels a roller stud on a short arm 39 of a lever 41 mounted on a shaft 40 carried by the machine head. Depending from the lever 41 is the depending or trip arm 45, the lower portion of which extends back of the lifting pawl 25, the construction being such that, on the first rotation of the main shaft, and following the engagement of the roller stud 36 with its cam 37 which maintains the clutch members in engagement for a complete rotation of the main shaft, the lever 41 is rocked by the cam 38 and the arm 45 disengages the pawl 25 from the shoulder 23 carried by the slide rod 10, so that the wedge may drop at the completion of the first rotation of the shaft, regardless of how long the treadle may remain depressed. This is of advantage in what is known as single nail work where it is required to drive fasteners one at a time in different positions, the work being fed between the driving of successive fasteners, because regardless of any inattention on the part of the operator, the machine will drive one fastener completely and then come to rest, the work support maintaining the work in nailing position until the completion of the driving operation, as will hereinafter more fully appear.

The work support is shown, Fig. 1, as a horn 47 and is removably mounted upon the upper end of a supporting rod 48, mounted to slide vertically in a part of the machine column 1. The details of construction and the characteristic operation of the parts indicated in Fig. 1 are substantially the same as that in the application mentioned so that a brief description thereof will be sufficient at this time.

The supporting rod 48 is provided with a nut 49 supported upon a coiled spring 50 and seated at its lower end upon a head 51 at the lower end of a barrel 52 that surrounds said spring and its contained rod. This barrel at its upper end is closed by a screw plug 53 which serves also as a guide for the rod, and seated against the under side of this screw plug is a stop 53* fast on said rod and serving to limit the upward spring-pressed movement of the horn, relative to said barrel. Elevation of the barrel serves also through the spring 50 to elevate the rod 48 and the work supporting horn, thereby to raise the work against the work plate of the machine, as clearly pointed out in said prior application. When the work meets the work plate, further elevation of said barrel compresses the spring 50 which presses the work firmly against the work plate to receive the fastener. When the barrel is dropped, it first releases the spring 50 and then drops the horn. The horn and spring carrying barrel are normally in their lowermost positions to permit ample separation between the horn and work plate for the removal and insertion of the work, consequently after the work has been placed upon the horn, it is necessary to elevate the latter to position the work. This is accomplished by a positioning means which lifts the barrel 52 and through the contained spring lifts the horn and work.

Referring to Fig. 1, the barrel head 51 is provided with a roller 55 which rests upon the cam face 56 of the lifting lever 57 fulcrumed at 58. The lifting lever 57 is swung from right to left, Fig. 1, to lift the barrel and thereby the horn by a connecting rod 61 jointed thereto and also to the arm of a bell crank lever 62 fulcrumed at 63. The horizontal arm of this bell crank lever is connected to the lower end of a lift rod 64, which extends upward, Fig. 5, and is jointed at its upper end to the free arm of a lever 65 fulcrumed at 66 and provided with a roller 67 which runs in contact with a cam 68 on the main shaft, the construction being such that initial rotation of the main shaft operates through said cam 68 and rod 64, bell crank 62 and connecting rod 61 to push the lifting lever 57 forward and cause it to lift the horn to press the work against the work plate or into work fastening position, all of which may be substantially as indicated in said prior application. To retain the lifting lever 57 in its forward position with the horn elevated, said lever is provided with a toe 73 which stands normally in front of a prop 74 fulcrumed at 75 in the column. A spring 76 tends to draw said prop away from said toe but it may be pressed forward thereunder to hold the lever in horn lifting position by a pusher 77 connected with the upright arm of the bell crank lever 62 and pushed forward by said

lever as the latter moves to push forward the lifting lever. The prop pusher 77 is shown separately in Fig. 2 and comprises the two telescoping members 78 and 79, the former carrying the roller 80 to act upon the prop 74 and the member 79 being connected to the bell crank lever 62. The telescopic member 78 is socketed to receive a spring 81 seated at its inner end against a block 82 which straddles a pin 83 substantially as set forth in the application hereinbefore mentioned. The protruding ends of the pin 83 overlie the upper cam shaped end 85 of a tripping member 86 which may be of the construction indicated in said prior application, said member 86 being jointed to the free end of a lever 88 fulcrumed at 89 to the column. Between its ends said lever 88 is connected by a depending link 90 with the treadle 29. The pusher 77 is normally under the influence of a spring 94, but, as pointed out in said application, it is free to be lifted. When the foot treadle 29 is depressed to start the machine the releasing device 86 is similarly depressed and the moment the machine starts, rotation of the main shaft operates through the cam 68, Fig. 5, to lift the rod 64 and throw the bell crank lever 62 forward, Fig. 1, thereby to swing the lifting member 57 to lift the horn and at the same time, through the pusher 77, push the prop 74 into position under the toe 73, thereby to lock the said lifting member 57 in position sustaining the elevated horn, the operation in these respects being substantially as indicated in said prior application. So long as the treadle 29 remains depressed the lifting member will be held in horn sustaining position with the prop 74 under the toe 73, so that in single nail work the first rotation of the main shaft causes the starting pawl 25 on the rod 27 to be tripped and at the end of the first rotation the cam 37 permits the rod 10 to drop and stop the machine. The operator, however, retaining the treadle depressed, retains or may retain the horn in elevated position until after the machine has come to rest to make certain that the fastener is completely driven. Thereupon he may release the treadle and permit it to rise under the action of its spring 33, Fig. 5, thereby operating the releasing device 86 to cause the latter to engage the pin 83 and lift the forward end of the pusher 77, which frees the prop 74 and permits the lifting member 57 to move to the right, Fig. 1, and the horn to descend, all substantially as pointed out in said application to which reference may be had. Thus it will be seen that in single nail work the operator may maintain his foot upon the treadle and retain the horn in elevated position even though the machine itself comes to rest, the depression of the horn depending upon means under control of the operator and not upon means controlled from the stopping mechanism or the driving shaft. In actual practice upon single nail work the operator will ordinarily depress the foot treadle to start the machine and will, in order to gain speed, immediately release said treadle, without waiting for the machine to complete its first cycle or rotation of the main shaft, upon the completion of which the machine will stop by reason of the wedge block 8 dropping under the action of the spring 13. The actual release and depression of the horn is, however, delayed somewhat by reason of the fact that after the pusher 77 has been raised to release the prop 74, it takes an appreciable period for the prop to be drawn from under the toe of the lifter 57; also for the latter to be withdrawn from beneath the work supporting horn and for the horn to drop, this delay being sufficient to insure the complete driving of the fastener before the horn drops.

A large proportion of boots and shoes require the insertion of fasteners or nails in series, as for example in a series extending completely around the heel or in a series of sufficient length to extend around a portion thereof where the greatest wear comes in use. In either case when once the treadle has been depressed to start the machine it has been necessary that the operator retain said treadle depressed for a sufficient time to cause the machine to drive the required series of fasteners in rapid succession. During this time the horn must remain in elevated position, except that it must be periodically depressed slightly to permit the feed during the driving of successive nails. In machines of this type an awl is generally utilized as a feeding device, it being given a transverse movement while in the work to feed the latter, whereupon it is withdrawn and the fastener driven in the awl hole. The periodical depression of the horn for feeding takes place ordinarily about the time of insertion of the awl, to permit the latter to feed the work without resistance, after which the horn is again lifted substantially simultaneously with the withdrawal of the awl to permit the insertion of the nail. This periodical depression of the horn for feeding must take place automatically to keep pace with the speed of the machine, and this is accomplished in the present instance, Fig. 1, by providing the horn supporting rod 48 with a depending extension or grip bar 95, preferably squared in cross section and arranged to slide in bearings 96. Between these bearings there is a grip arm 97 between which and the lower bearing 96 is the spring 98. Depression of the grip arm is effected by means of the lever 99 pivoted at 100 and having its rear end connected by a rod 101 with a slotted arm of the lever 41,

Fig. 5, which is operated by the cam 38 on the main shaft, all substantially as set forth in detail in the application referred to.

To prevent the machine from stopping at the completion of the first turn of the main shaft, as is the case with single nailing, and to adapt the machine for continuous or series nailing the following simple device is herein provided as one form of the present invention. Pivotally mounted at 102, Fig. 5, is an angle lever, one arm 103 of which extends upward into proximity to a lug 104 secured to or connected with the slide rod 10, as indicated by dotted lines in Fig. 5. The other arm 105 of said lever, Fig. 5, extends outward and its bifurcated portion receives the collar 106 mounted on the upper portion of a rod 107. Disposed between the collar 106 and the shoulder 108 of the rod 107 is a spring 109, the construction being such that upon upward movement of the rod 107, which rod is preferably made smaller in diameter at its upper portion to accommodate the collar and spring 109, the spring 109 will lift the collar 106 and if the arm 103 is free to move, will move said arm about its fulcrum 102, similarly, if the rod 107 be depressed, the collar 106 will be lowered in a manner to cause the arm 103 to move outwardly or clockwise about its fulcrum 102, a suitable stop 110 being provided at the upper portion of the rod 107 to limit the upward movement of the collar 106. The rod 107 extends downward, Fig. 5, through the bracket or projection 112 and has secured thereto an adjustable collar 111, between which and the bearing 112 is interposed a spring 113 which acts normally to depress the rod 107 and through the means hereinbefore described maintain the arm 103 in the position indicated in Fig. 5. The rod 107 is connected at 114, Fig. 1, to the treadle lever 115 fulcrumed at 116 and having its end opposite the connection 114 with the rod 107 joined by a link 117 to a treadle 118 pivoted at 119, the construction being such that upon depression of the treadle 118 the treadle lever 115 will be moved to raise the rod 107 and, through the intervening connections described, move the arm 103 into position to engage beneath the lug 104 on the slide rod 10 provided said slide rod is, at the time being, in raised position with the clutch members engaged.

From the construction described it will be noted that upon depression of the treadle 29 the rod 27 will lift the pawl 25 and perforce the slide rod 10 to cause the clutch members to be engaged and the machine to start, and if a single nail is to be driven, the machine will come to rest at the end of the first rotation in a manner already described. If, however, it is desired to drive nails continuously for any desired period, the operator puts his foot simultaneously on both treadles 29 and 118 with the result that the slide rod 10 is lifted by the lifting pawl 25, and the arm 103 of the angle lever, which for identification may be designated the series lever, is moved by its spring 109 so as to engage beneath the projection 104 of the slide rod, so that when the lifting pawl 25 is thrown outward or disengaged from the shoulder 23, Fig. 4, during the first rotation of the driving shaft, the arm 103 of the series lever will maintain the slide rod raised and perforce the clutch members in operative engagement. When the series of nails of a desired number has been driven, the operator slides his foot from the treadle 118 but still maintains the treadle 29 depressed with the result that the arm 103 of the series lever is thrown from under the toe or projection 104 and the slide rod 10 is allowed to drop with consequent disengagement of the clutch members on completion of the current rotation of the main shaft. Owing to the fact, however, that the treadle 29 remains depressed, the horn remains elevated to insure complete driving of the last nail of the series and does not drop until the operator desires this movement and initiates it by removing his foot from the treadle 29. It will thus be noted that upon starting the machine into operation, whether for single or series nail driving, the horn is raised by power from the main shaft, but at the conclusion of the nailing operation, whether for single or series driving, the horn will remain in raised position until such time as the operator by foot or manual control of the treadle 29 may cause it to descend, thus insuring at all times the complete driving of all the nails and particularly of the last nail of a series.

What is claimed is:

1. In a machine of the character described, the combination of a work supporting horn, power operated means for raising the horn, machine starting and stopping mechanism, a treadle for actuating said mechanism to cause the machine to start and then to be disconnected from said mechanism, a series lever having an arm for maintaining the said mechanism in machine operating position for any desired number of machine cycles after said treadle has been disconnected from said mechanism, a second treadle for moving the series lever into and out of operative position, and means under control of the first named treadle and independent of the stopping mechanism for effecting the final depression of the work supporting horn at the will of the operator independent of the operative or inoperative condition of the machine.

2. In a machine for inserting fasteners singly and in series, the combination of a driving shaft, a work supporting horn, means actuated from the driving shaft to raise the horn to position the work for the

insertion of fasteners, starting and stopping mechanism for said shaft, a treadle for actuating said mechanism to start the machine, means for then disengaging said treadle from said mechanism, a series lever having an arm 103 for continuing the machine in operation, a second treadle connected to said series lever for operating the same. and means independent of the stopping mechanism and under control of the first named treadle when disconnected from the starting mechanism to effect the final depression of the horn at the will of the operator.

3. In a machine for inserting fasteners singly and in series, the combination of a driving shaft, a work supporting horn, means including a clutch for actuating said shaft, means actuated from the driving shaft for raising the horn to position the work, a lift pawl for operatively connecting the clutch and shaft, a treadle for operating said lift pawl, means for tripping the lift pawl when the machine operates, a series lever pivoted at a fixed point on the machine frame for maintaining the clutch and shaft in operative relation after the lift pawl has been tripped, a second treadle, a connection between the second treadle and series lever including a spring, and means controlled by the first named treadle and operable independent of the operative or inoperative condition of the machine to lower the horn.

4. In a machine for inserting fasteners singly and in series, the combination of a driving shaft, a work supporting horn, means including a clutch for actuating said shaft, means actuated from the driving shaft for raising the horn to position the work, a lift pawl for operatively connecting the clutch and shaft, a treadle for operating said lift pawl, means for tripping the lift pawl when the machine operates, a series lever for continuing the machine in operation after the lift pawl has been tripped, a second treadle, a collar yieldingly connected thereto for operating the series lever, and means controlled by the first named lever to lower the horn independent of operative or inoperative condition of the machine.

5. In a machine for inserting fasteners singly and in series, the combination of a driving shaft, a work supporting horn, means including a clutch for actuating said shaft, means actuated from the driving shaft for raising the horn to position the work, a lift pawl for operatively connecting the clutch and shaft, a treadle for operating said lift pawl, means for tripping the lift pawl when the machine operates, a series lever having an arm 103 for holding the clutch in operative relation with the shaft after the lift pawl has been tripped and a second arm 105, a second treadle, a treadle rod connected thereto, and a yielding collar on said treadle rod and connected with the arm 105 of the series lever for yieldingly actuating said lever.

6. In a machine for inserting fasteners singly and in series, the combination of a driving shaft, a work supporting horn, means including a clutch for actuating said shaft, means actuated from the driving shaft for raising the horn to position the work, a lift pawl for operatively connecting the clutch and shaft, a treadle for operating said lift pawl, means for tripping the lift pawl when the machine operates, a series lever having an arm 103 for holding the clutch in operative relation with the shaft after the lift pawl has been tripped and a second arm 105, a second treadle, a treadle rod connected thereto, a yielding collar on said treadle rod and connected with the arm 105 of the series lever for yieldingly actuating said lever, and means controlled by the first named treadle for lowering the horn.

7. In a machine for inserting fasteners singly and in series, the combination of a driving shaft, a work supporting horn, means for raising the horn by the driving shaft to position the work, a clutch for connecting the driving shaft with a source of power, a treadle for operating the clutch, means for then disconnecting the treadle from the clutch, a series lever having an arm to hold the clutch in driving connection with the shaft after the said treadle has been disconnected therefrom, a second treadle, and yielding connections between the said second treadle and series lever for operating said lever and causing its arm to hold the clutch in operative relation with the shaft.

8. In a machine for inserting fasteners singly and in series, the combination of a driving shaft, a work supporting horn, means for raising the horn by the driving shaft to position the work, a clutch for connecting the driving shaft with a source of power, a treadle for operating the clutch, means for then disconnecting the treadle from the clutch, a series lever having an arm to hold the clutch in driving connection with the shaft after the said treadle has been disconnected therefrom, a second treadle, yielding connections between the said second treadle and series lever for operating said lever and causing its arm to hold the clutch in operative relation with the shaft, and means actuated by the operator for lowering the horn after the last nail has been driven.

9. In a machine for inserting fasteners singly and in series, the combination of a driving shaft, a work supporting horn, means for raising the horn by the driving shaft to position the work, a clutch for connecting the driving shaft with a source of power, a treadle for operating the clutch, means for then disconnecting the treadle

from the clutch, a series lever pivotally mounted on the machine frame and having an arm 103 to hold the clutch and shaft in driving connection after the treadle has been disconnected therefrom and a second arm 105, a collar 106 engaging the arm 105, a treadle rod on which said collar is yieldingly mounted, and a second treadle connected to said treadle rod.

10. In a machine for inserting fasteners singly and in series, the combination of a driving shaft, a work supporting horn, means for raising the horn by the driving shaft to position the work, a clutch for connecting the driving shaft with a source of power, a treadle for operating the clutch, means for then disconnecting the treadle from the clutch, a series lever pivotally mounted on the machine frame and having an arm 103 to hold the clutch and shaft in driving connection after the treadle has been disconnected therefrom, and a second arm 105, a collar 106 engaging the arm 105, a treadle rod on which said collar is yieldingly mounted, a second treadle connected to said treadle rod, and means under control of the first named treadle for permitting the operator to lower the horn and insure complete driving of the last nail.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

WILLIAM C. STEWART.

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ALFRED H. HUNDLEY.