

G. A. AMBLER.
MECHANISM FOR CONTROLLING WORK SUPPORTS.
APPLICATION FILED AUG. 21, 1909.

996,043.

Patented June 27, 1911.

2 SHEETS—SHEET 1.

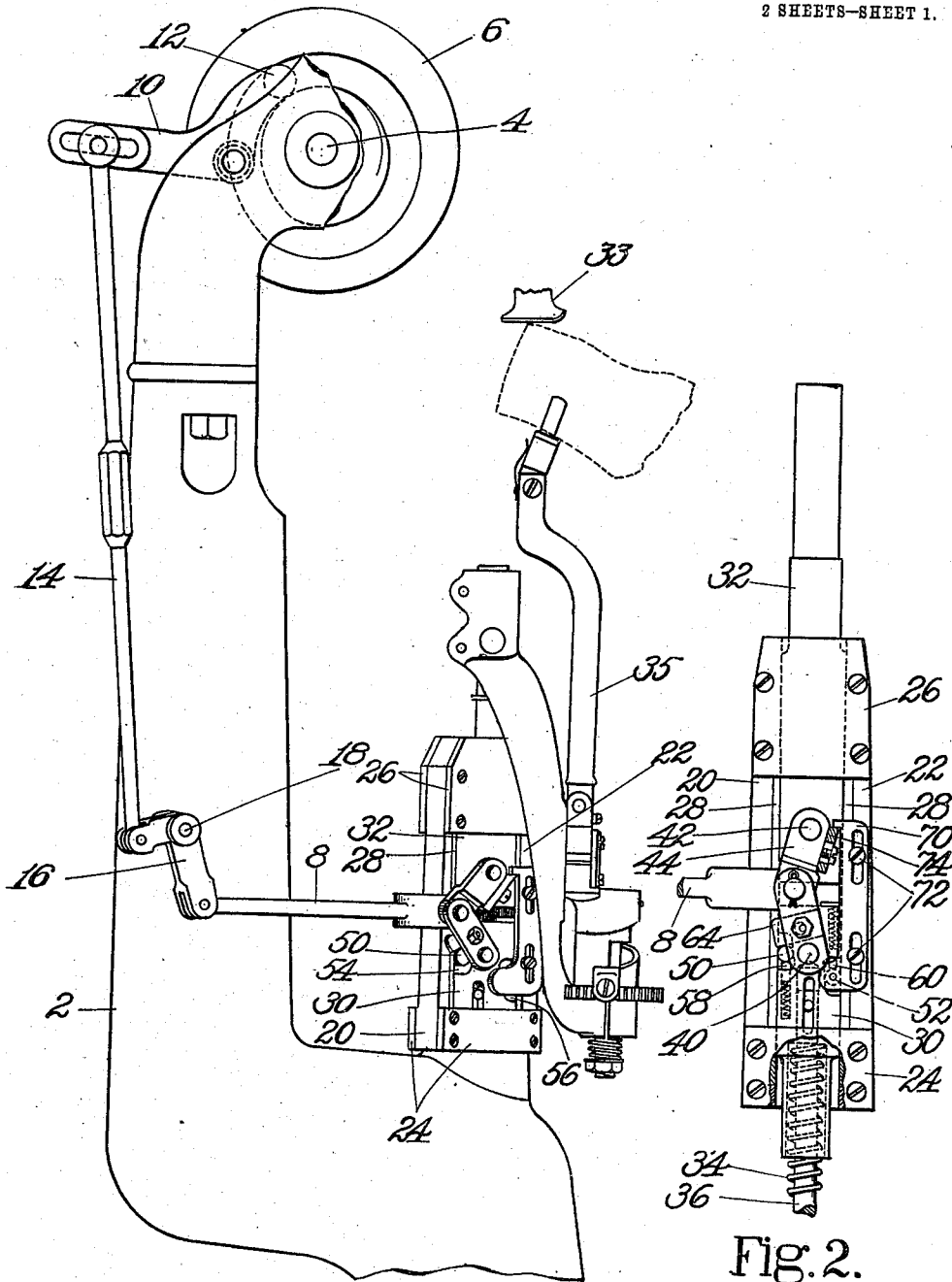


Fig. 2.

WITNESSES.

Fig. 1.

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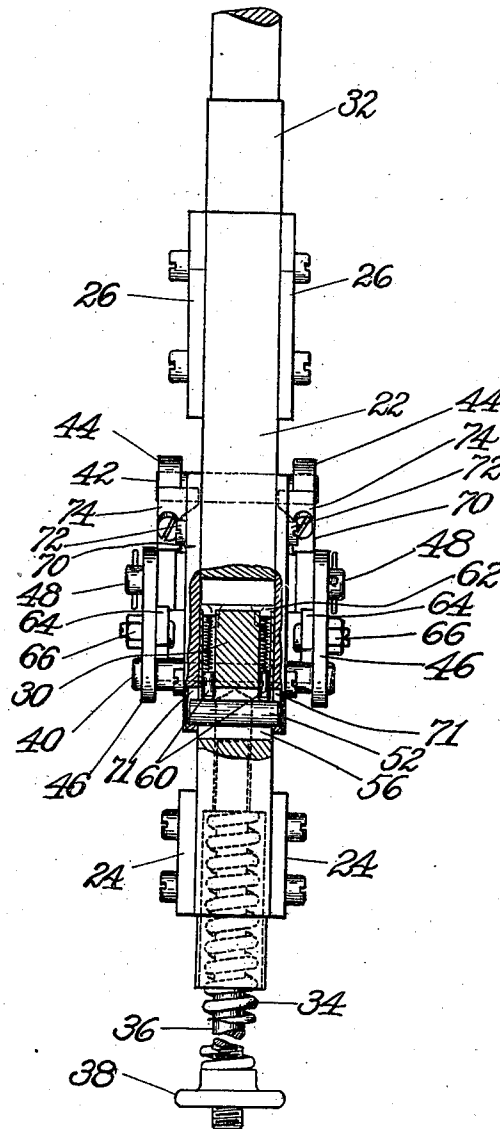


Fig. 3.

WITNESSES.

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MECHANISM FOR CONTROLLING WORK-SUPPORTS.

996,043.

Specification of Letters Patent. Patented June 27, 1911.

Application filed August 21, 1909. Serial No. 513,944.

To all whom it may concern:

Be it known that I, GEORGE A. AMBLER, a citizen of the United States, residing at Winchester, in the county of Middlesex and Commonwealth of Massachusetts, have invented certain Improvements in Mechanisms for Controlling Work-Supports, of which the following description, in connection with the accompanying drawings, is a specification, like reference characters on the drawings indicating like parts in the several figures.

This invention relates to mechanisms for controlling work supports, such, for example, as those used in the manufacture of boots and shoes, and has special utility in machines for inserting fastenings.

In mechanisms for operating work supports of the type commonly employed in fastening inserting machines the work support is automatically operated first to clamp the work against the work abutment during the fastening inserting operation, and then to release the same to allow it to be fed over the work support into proper position for receiving the next fastening. This type of mechanism usually comprises also a spring which acts normally to hold the work clamped against the work abutment and coöperates with thickness compensating clutches to compensate for variations in the thickness of the stock. In certain forms of mechanisms of this character, the work support is held in its work clamping position during the fastening inserting operation by a strong spring, and in this type therefor the machine drives the fastening against the pressure of said spring. In other forms the fastening is driven against the inertia of heavy moving parts. According to the present invention, however, the fastening is driven against a rigid support; and an important object of the present invention, therefore, is the provision of a mechanism of the character described in which the work sustaining member is clamped rigidly to a fixed support, preferably the frame of the machine, while the fastening is being driven.

The invention further aims to provide a mechanism for controlling work supports in which both the work clamping and work releasing movements shall be positively ef-

fect; in which the extent of each of said movements may be minutely adjusted; and which shall be capable of operating at high speeds. The particular manner in which these results are effected will be clear from the detailed description of a preferred embodiment of the invention which forms a later portion of this specification.

Briefly stated, said embodiment comprises a stationary slideway, a work supporting post mounted in said slideway, a sliding block also mounted in the slideway and yieldingly urged toward the work support, a toggle mechanism connecting the block and post, oppositely operating clutches interposed between the block and slideway, and adjustable devices operated by the toggle mechanism for controlling the operation of the clutches.

The invention also includes other features of construction and operation and certain arrangements of parts, all as hereinafter described, the novel features being pointed out in the appended claims.

In the accompanying drawings, Figure 1 is a side elevation of portions of a fastening inserting machine showing the work support controlling mechanism of the present invention applied thereto. Fig. 2 is a side elevation partly in section of said mechanism. Fig. 3 is a front elevation of said mechanism, certain parts being broken away to more clearly show the construction.

The machine, partly illustrated in Fig. 1, forms the subject matter of the co-pending application, Serial No. 393,477, filed September 18, 1907, assigned to the assignee of the present invention, and is here shown merely for the purpose of illustrating one operative application of this invention. For a detailed description of the construction and operation of the fastening inserting machine, reference should be made to the above named application. For the purposes of the present invention it is sufficient to state that the frame 2, which supports the entire operating mechanism of the machine, carries at its upper end a main shaft 4 on which is rigidly mounted a cam 6 constructed to operate the rod 8, and consequently the work support, in timed relation to the successive steps of the fastening inserting process. This operation is effected through interme-

diating mechanism consisting of a lever 10 pivoted on the frame of the machine and oscillated by a roll 12 operating the groove of the cam 6, an extensible rod 14 adjustably connected to said lever 10, and a bell crank lever 16 pivoted on a stud 18 projecting from the frame 2 and having the rods 14 and 8 connected to its respective arms. The mechanism by which the operating rod 8 is reciprocated may be varied to suit the design and operation of the machine to which the invention is applied.

The machine frame 2 has mounted thereon a rigid framework consisting of upright members 20 and 22, lower plates 24 securing said members to the frame, and upper plates 26 holding the upright members in spaced relation to each other. The frame work constitutes a slideway for a clutch block 30 and a reciprocating post 32, and the upright members are each provided on adjacent faces with removable shoes 28 that receive the wear caused by the movements of said block and post. Any suitable form of work support may be secured to the post 32 to present the work in operative relation to the fastening inserting mechanism, the work abutment of which mechanism is indicated at 33. The work support, here shown mounted on the post 32, is fully disclosed in the United States Patent 919,424, April 27, 1909. A helical spring 34 surrounding a rod 36 engages the lower end of the block 30 and tends to hold the same in an elevated position in the slideway. The rod has a pin and slot connection at its upper end with the clutch block and is threaded at its lower end to support a hand nut 38 against which the spring abuts and by which its tension may be varied.

The block 30 and post 32 each carry pivot pins 40 and 42 respectively which support upper and lower pairs of toggle links 44 and 46, said links being connected by pivot pins 48 to the forked end of the operating rod 8. Two rolls 50 and 52 are carried by the clutch block 30 in recesses 54 and 56 formed respectively in the opposite sides of the block that engage the shoes 28; and the recesses are each formed with an inclined wall, the recess 54 having at its lower end a depth greater than the diameter of the roll, but at its upper end a depth less than the diameter of said roll. The recess 56 is oppositely arranged, being deeper at its upper end than at its lower end. The term "roll" as herein used is intended to include rolling members of spherical, cylindrical or other form suited to the purposes of this invention. The roll 50 is pressed upwardly toward the shallow end of the recess 54 by a pair of spring pressed plungers 58 located in recesses in the block 30; and a pair of like plungers 60 operate on the roll 52 to urge the same

downwardly. The ends of the recesses in which the plungers 60 are received are covered by a plate 62.

It will be clear from the foregoing that the roll 50 tends to bind between the surface of the shoe 28 and the inclined wall of the recess 54 and thus prevent downward movement of the block 30; while the roll 52 acts similarly to prevent upward movement of said block. These devices thus constitute oppositely operating clutches acting at certain times to lock the block 30 rigidly to the frame of the machine. It is necessary for the purposes of this invention that the operation of these clutches shall be independently controlled; and to this end each link 46 carries a plate 64 adjustably secured thereto by bolts 66; and said plates are arranged to engage the roll 50 and exert a cam action thereon during certain portions of the movement of said links, the period of said action being predetermined by the adjustment of the plates on the links. It will be clear from the drawings that the cam plates 64 operate to move the roll 50 in a direction opposite to that in which it is urged by the spring pressed plungers 58; and said plates tend to force the roll into the deeper end of the recess where it can exert no binding or clutching action. The operation of the roll 52 is similarly controlled by two slides 70 mounted, one on each side of the upright member 22, and guided thereon by screws 72 secured in said member and projecting through slots formed in the slides. Movement in one direction is imparted to the slide 70 by two catch plates 74 adjustably mounted, one on each of the upper links 44, each plate being arranged to engage under a lip that projects from the upper end of each of the slides. The slides 70 each have recesses 71 formed in their lower ends in which opposite ends of the roll 52 are located. When, therefore, the slide is moved upwardly by the catch plates the roll is carried out of the shallow end of the recess and its clutching action is interrupted. As soon as the slides 70 are released by the catch plates 74 the spring pressed plungers 60 immediately act to force both the roll and the slides downwardly.

The operation of the mechanism is as follows: Assuming the work support to be in its lowest position and the operating rod 8 in its extreme left hand position; the clutch roll 50 is then held in its lower or inoperative position by the cam plates 64, while the roll 52 is in its clutching position and locks the block 30 against the upward thrust of the spring 34. As the rod 8 is now moved toward the right by the cam 6 and the intermediate connections, the toggle links gradually straighten and carry the post 32 upwardly. At the same time the catch plates

on the links 44 carry the slide 70 upwardly and ultimately interrupt the clutching action of the roll 52. The catch plates 74 and cam plates 64 are preferably so adjusted that the roll 52 is moved into its inoperative position while the roll 50 is still held in its inoperative position. During this interval, therefore, the clutch block 30 is free to move under the influence of the spring 34; and the spring operates during this period to press the work carried by the work support against the work abutment 33. The cam plates 64 do not allow the roll 50 to rise to its clutching position until the toggles are nearly straightened; but thereafter the block 30 is rigidly clamped against downward movement. The further straightening movement of the toggles, therefore, operates to positively compress and clamp the work between the work support and the work abutment. The fastening is driven while the work is so compressed and while the work support is rigidly clamped to the frame of the machine; the thrust of the driving mechanism being transmitted from the post 32 through the toggle links, clutch block and clutch roll 50 to the frame member 20. During the period in which the rolls are ineffective, the spring 34 positions the work against the work abutment, thus compensating for any variation in the thickness of the stock, and the subsequent clamping movement is therefore uniform in extent for all thicknesses of work. The extent of this clamping movement may be varied by adjusting the position of the cam plates 64 on the links 46. The cam 6 next operates to move the operating rod toward the left to release the work and the sequence of operations just described is reversed. The cam plates 64 first engage the roll 50 and force it out of its operative position leaving the clutch block again free to move in either direction. The roll 52 is carried down by the spring pressed plungers 60 as rapidly as the motion of the catch plates 74 will permit, and said roll becomes effective to lock the clutch block against upward movement just before the rod 8 has reached its extreme left hand position. Further movement of the rod 8 positively depresses the work support and permits the work to be fed freely over the same into position to receive the next fastening. The extent of the positively releasing movement may be varied by changing the position of the catch plates 74 on the links 44.

It will be clear that the range of motion of the block 30 is very limited. The only parts that must be moved to any considerable extent by the operating rod are the links, post and work sustaining member and these parts may be made very light in weight. This construction not only produces the advantage of requiring very little

power to operate the mechanism; but combined with the fact that the work clamping and work releasing movements are both positive, and that the work support is clamped rigidly to the frame of the machine, while the fastening is being driven, enable the device to be effectually operated at very high speeds.

The feature of having the work support rigidly locked to the frame of the machine during the fastening inserting operation is of special value in those machines which are adapted to drive either a single or a double row of slugs or fastenings. In machines of this type, if a work support employing a strong spring to effect the work clamping operation is used, it is found that a spring suitable for clamping the work when a single row of slugs is being driven does not operate satisfactorily when it is attempted to drive a double row of slugs because of the increased thrust upon the work support during this latter operation. Furthermore, if a spring heavy enough to support the work against the impact of double row insertion be employed, it puts an undesirable strain upon the driving shaft during the work releasing operation. The mechanism of the present invention, however, as above stated, locks the work support against movement relative to the frame of the machine and therefore sustains the work against the impact of the driving mechanism as effectually when two slugs are being simultaneously driven as when a single slug is being inserted.

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

1. In a machine of the class described, having a work abutment, the combination of a stationary support, a work sustaining member and means for imparting to said member a positive movement toward said abutment comprising a clutch constructed and arranged to engage said support.

2. In a machine of the class described, having a work abutment, the combination of a stationary support, a work sustaining member and means for imparting to said member a positive movement toward said work abutment, comprising a clutch constructed and arranged to engage said support at different distances from said work abutment.

3. In a machine of the class described, having a work abutment, the combination of a stationary support, a work sustaining member and means for imparting to said member a positive movement toward said abutment comprising a clutch constructed and arranged to engage said support and means whereby the extent of said movement may be varied.

4. In a machine of the class described, a stationary support, a work sustaining member and means for moving said member comprising a clutch constructed and arranged to engage said support and means whereby the time of operation of said clutch during the movement of said member may be varied.

5. In a machine of the class described, a stationary support, a work sustaining member and means for moving said member comprising a clutch constructed and arranged to engage said support and adjustable mechanism arranged to engage said clutch to control its operation.

6. In a machine of the class described, a work sustaining member and means for imparting to said member a positive work clamping movement comprising a movable clutch member and means operating at certain times to lock said clutch member against movement relative to the frame of the machine.

7. In a machine of the class described having a work abutment, the combination with a work sustaining member, of means for imparting to said member a positive movement toward said abutment comprising a toggle mechanism and a clutch operatively interposed between the toggle mechanism and the frame of the machine.

8. In a machine of the class described having a work abutment, the combination with a work sustaining member, of means for positively moving said member toward said abutment comprising a toggle and means operating at certain times to lock one member of the toggle against movement relative to the frame of the machine.

9. In a machine of the class described, a stationary support, a work sustaining member and means for moving said member comprising a roll clutch constructed and arranged to engage said support.

10. In a machine of the class described, a work sustaining member and means for operating said member comprising a toggle mechanism and a roll clutch operatively interposed between one member of the toggle mechanism and the frame of the machine.

11. In a machine of the class described, a stationary support, a work sustaining member and means for moving said member comprising oppositely operating clutches arranged to engage said support.

12. In a machine of the class described, a work support and means for positively moving said support comprising oppositely operating clutches arranged to engage the frame of the machine and means whereby the time in the operation of the machine at which such engagement takes place may be varied.

13. In a machine of the class described

having a work abutment, the combination of a rigid support, a work sustaining member and means for imparting to said member positive movements toward and from said abutment comprising oppositely operating clutches constructed and arranged to engage operatively said support and means whereby the extent of each of said movements may be predetermined.

14. In a machine of the class described, a work support and means for positively moving said support, comprising a toggle and oppositely operating clutches interposed between the toggle and the frame of the machine.

15. In a machine of the class described, a stationary support, a work sustaining member and means for positively moving said member comprising a toggle, oppositely operating clutches interposed between the toggle and said support and means for independently controlling the operation of each of said clutches.

16. In a machine of the class described having a work abutment, the combination with a work sustaining member, of means for positively operating said member to clamp the work against said abutment and to release the same, comprising a toggle, a movable support to which one member of the toggle is connected, and oppositely operating clutches acting successively to lock said support against movement.

17. In a machine of the class described, the combination with a work support, of means for positively moving said support into work clamping and work releasing positions comprising a toggle, oppositely operating clutches arranged to effect successively rigid connections between the toggle and the frame of the machine, and means for rendering each of the clutches inoperative during certain portions of the movement of the work support.

18. In a machine of the class described, the combination with a work support, of means for imparting to said support positive work clamping and work releasing movements, comprising a toggle mechanism, oppositely operating clutches acting successively to lock a member of the toggle mechanism against movement relatively to the frame of the machine, and means capable of adjustment for predetermining the period of operation of the clutches during each movement of the work support.

19. In a machine of the class described, a stationary slideway, a post arranged to support a work sustaining member, said post being movably mounted in said slideway, a movable block also mounted in said slideway, a spring tending to force said block toward said post, toggle members connecting said block and post, oppositely operating

roll clutches interposed between the block and slideway, means for operating the toggle members whereby said post is reciprocated, and adjustable devices carried by the toggle members for controlling the operation of the clutches.

In testimony whereof I have signed my

name to this specification in the presence of two subscribing witnesses.

GEORGE A. AMBLER.

Witnesses:

H. DORSEY SPENCER,
FREDERICK L. EDMONDS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."
