J. F. DAVEY.

WORK SUPPORT.

APPLICATION FILED JAN. 2, 1909.

1,023,300.

Patented Apr. 16, 1912.

2 SHEETS—SHEET 1.

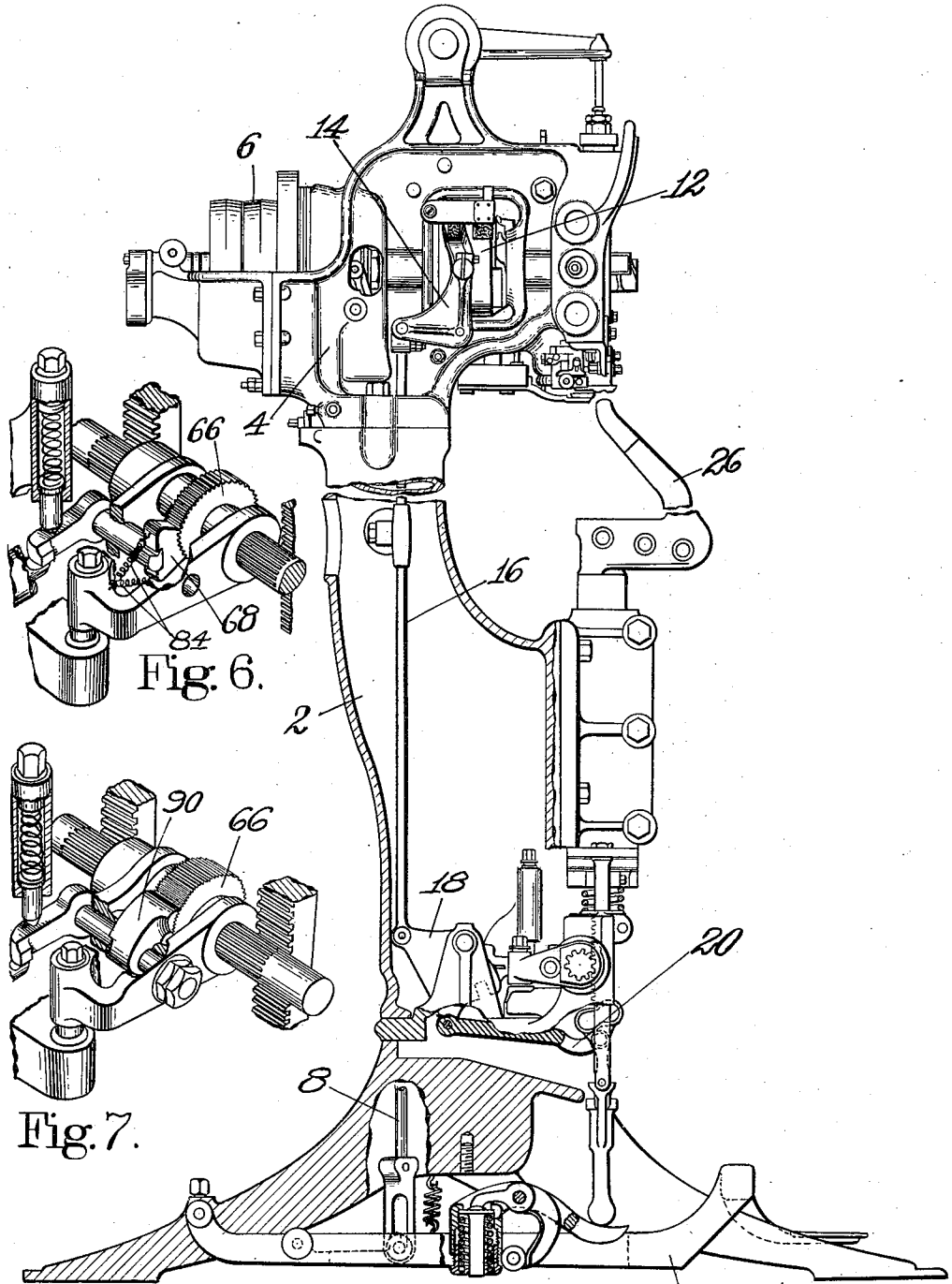

Fig. 6.

Fig. 7.

Fig. 1.

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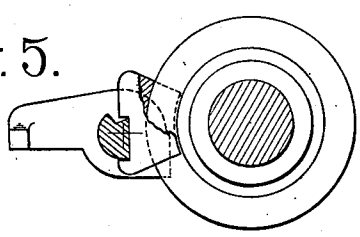
2 SHEETS—SHEET 2.

Fig. 5.



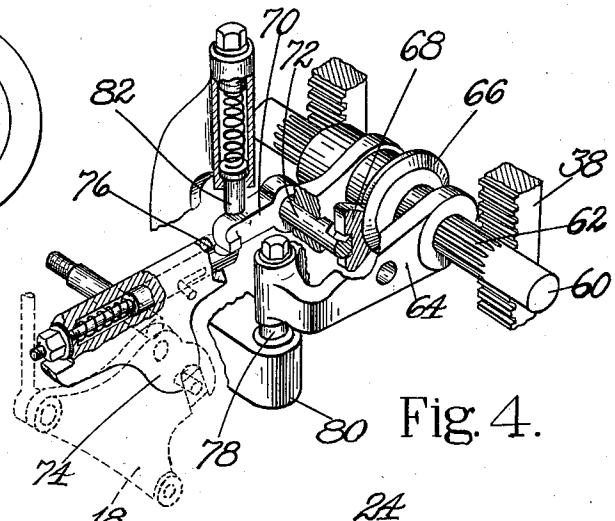


Fig. 4.

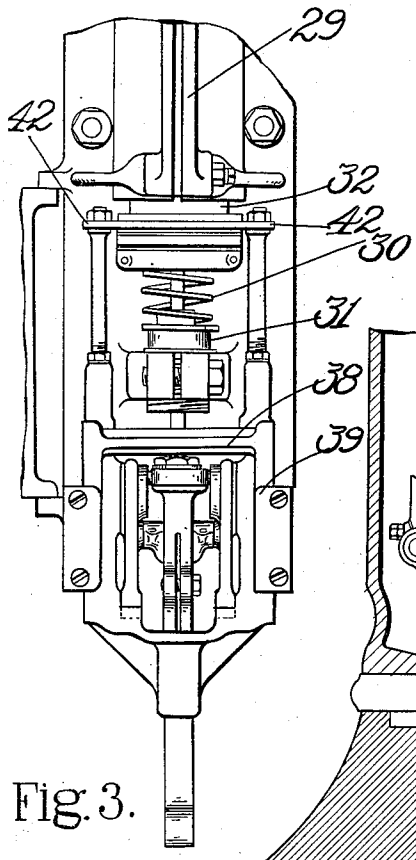


Fig. 3.

Fig. 2.

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UNITED STATES PATENT OFFICE.

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WORK-SUPPORT.

1,023,300. Specification of Letters Patent. Patented Apr. 16, 1912.

Application filed January 2, 1909. Serial No. 470,472.

To all whom it may concern:

Be it known that I, JOHN F. DAVEY, a citizen of the United States, residing at Beverly, in the county of Essex and State of Massachusetts, have invented certain Improvements in 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 machines for inserting fastenings, and particularly to mechanisms for operating the work supports in such machines.

As herein illustrated the invention is shown as embodied in a fastening inserting machine of the type disclosed in United States Letters Patent to J. F. Davey and S. W. Ladd, No. 581,066, granted April 20, 1897, for improvements in pegging machines, but it will be understood that many, if not all, of the features of this invention are applicable to fastening inserting machines of other types.

In the machine illustrated in the Letters Patent above referred to, it has been found desirable to "peg against a spring", as it is called; that is, to support the work for the pegging operation upon a work support which is pressed up under strong spring pressure to clamp the work against the work abutment. In this machine, as in many fastening machines of other types, a hole is formed in the work to receive the peg before it is driven, this hole being formed usually by an awl which afterward feeds the work over the work support to bring the awl hole into peg-receiving alinement with the peg driving mechanism.

In order that the awl may readily feed the work in a machine in which the work support clamps the work normally against the work abutment under the action of a strong spring, it is preferable that the work support be lowered to release the work during the feeding operation. The illustrated machine is constructed to operate at comparatively high speed and difficulty has been found in providing work support releasing mechanism which will insure a positive release of the work at the time it is fed, especially when, as in the illustrated embodiment of the invention, the work support clamps the work against a work abutment under the action of a strong spring.

To insure a quick return of the work support to its work clamping position after the work feeding operation, it is desirable that this return be effected through the action of the spring upon the work support and, therefore, the work support is preferably lowered against the action of its spring by mechanism which releases it at the proper time to permit its being restored to work clamping position at the end of the work feeding operation.

An object of the present invention is to provide in a machine which runs at comparatively high speed, a work support lowering or releasing mechanism which will insure a positive lowering of the work support against its spring to release the work at the proper time during the work feeding operation.

Another object of the invention is to provide means which not only will insure the positive release of the work at the proper time in the cycle of operations of the machine, but which will operate in such timed relation to the other parts that it will permit the work support to be restored again to its work clamping position in time to permit the hereinbeforementioned "pegging against the spring."

One of the difficulties met with heretofore in providing a work support releasing mechanism which operates to depress the work support against the action of its spring is to provide means for clutching the work support, or some part connected therewith, which acts positively enough to insure the depression of the work support against its spring at comparatively high speeds of operation and which can at the same time be unclutched quickly enough to permit the work support to be returned into clamping position as the work feeding operation ceases.

A further object of the present invention, therefore, is to provide work support releasing or depressing mechanism which combines the above-mentioned positive clutching feature with the above-mentioned sensitive unclutching feature.

A particular object of the present invention is to provide work support releasing or depressing mechanism which may readily be operated from other parts of the machine and which may therefore be conveniently embodied in machines already in com-

mercial use, particularly in machines of the type disclosed in the above-mentioned Letters Patent.

Other objects of the invention are the provision of novel means for applying strong spring pressure to the work support as it is moved from work receiving position into operative work supporting position, said means being preferably under the control of the operator and so arranged that, when the treadle or other manually operated means is released, the strong spring pressure is automatically removed from the work support and the work support is free to fall of its own weight into its work receiving position, the shock of this fall being preferably taken up by a cushioning spring; the provision of means for cushioning the unclutching movement of the work support depressing mechanism; the provision of means for preventing a depression of the work support beyond a predetermined amount but insuring a uniform release of the work without regard to its thickness, and the provision of means for multiplying the movements of the part of the commercial machine hereinbefore referred to from which the work support depressing mechanism is operated.

With the foregoing and other objects in view, the invention is herein shown as embodied in a construction comprising a clutch by which a normally operating lever may be clutched to a shaft geared to the work support and automatically unclutched therefrom after a predetermined depressing movement has been imparted to said work support, the clutch in the preferred embodiment of the invention being constituted by coöperating members one of which is rigidly attached to the work support operating shaft and the other of which is carried by a lever loosely pivoted upon said shaft.

In one embodiment of the invention the clutch member carried by the work support operating shaft comprises a friction disk having a V-shaped periphery and the clutch member carried by the lever pivoted upon said shaft comprises a shoe shaped to fit upon said periphery. The lever which is pivoted upon said shaft is arranged to turn normally about said shaft without imparting motion thereto, when it is not locked to the shaft by the action of the brake shoe upon the friction disk, and means is provided, therefore, which serves to lock the shaft and lever together for movement together to effect the work support depressing operation, the said means preferably including a member through which the work support depressing movement of the lever is imparted to said lever. Preferably the means for imparting the work support depressing movement to said lever is arranged to release the lever after it has imparted a predetermined amount of movement thereto, whereby the lever is free to return to its initial position under the action of gravity, this movement being accelerated somewhat in the preferred construction by the action of the work clamping spring upon the work support and through it upon the work support operating shaft, and by the action of an unclutching spring upon the means through which the brake shoe is applied to the clutching disk. The brake shoe will be moved out of clutching relation to the friction disk as the lever is returned to its initial position and thus the lever will not retard the upward movement of the work support in case a thinner portion of the work has been fed over it, but the work support will be free to move quickly into work clamping position under the action of its spring.

When the machine is to be used with very heavy work on which the clamping action of a very strong spring is desired, it is preferable to substitute for the friction clutch members, in the embodiment just described, interlocking clutch members, and another illustrated embodiment of the invention is a construction in which such interlocking clutch members are provided.

The spring hereinbefore referred to, through which the work clamping action of the work support is effected, is preferably so mounted that its tension may be varied, and an important feature of the present invention is the provision of novel means for supporting the just-mentioned spring together with novel means for effecting a tension adjustment of said spring.

In the illustrated construction, the spring which operates through the work support to clamp the work during the fastening inserting operation is carried in a cage supported upon, or formed integral with, one end of a lever, pivoted preferably in the base of the machine, the spring-supporting cage containing a plunger bearing upon one end of the spring by which the spring may be compressed. The other end of the cage-carrying lever bears against the under side of a rod connected to the work support and through which the work support may be raised into work clamping position.

Means is provided by which the cage-carrying lever may be turned about its fulcrum to raise the work support into work clamping position, the said means operating upon the plunger in the spring cage and thereby effecting through the spring in said cage a yielding work clamping action of the work support.

In the construction herein shown, the means for turning the cage-carrying lever about its fulcrum to effect a work clamping action of the work support comprises a second lever turning about the same center as the cage-carrying lever, having one arm ex-

tending into engagement with the upper end of the plunger in the spring-carrying cage and having its other arm shaped to form a cam by which rotary motion may be imparted to said lever through a cam roll mounted upon a treadle arranged to be depressed by the foot of the operator. Preferably the treadle through which the work support raising movement of the cage-carrying lever is effected is connected to means by which the fastening inserting mechanism may be set in operation as the work support comes into work clamping position. As herein shown, the means connected to the treadle for setting the fastening inserting mechanism in operation comprises a clutch actuating rod having a lost motion connection with said treadle, whereby the treadle operates first to bring strong spring pressure to bear on the work support and upon the work before the fastening inserting mechanism is actuated to insert fastenings, and an important feature of the present invention is the provision of means whereby, through a single treadle, strong spring pressure may be brought to bear upon the work to effect a clamping thereof, and, after the work has been clamped, the fastening inserting mechanism may be set in operation to insert fastenings.

In the accompanying drawings,—Figure 1 is a side elevation partly in section of the machine disclosed in the above-identified Letters Patent, having this invention applied thereto; Fig. 2 is a sectional view on a larger scale of the base of the machine shown in Fig 1; Fig. 3 is a detail front elevation of the mechanism shown in Fig. 2; Fig. 4 is a perspective view of one form of clutch embodied in the work support depressing mechanism of this invention; Fig. 5 is a detail section of the clutch shown in Fig. 4; Fig. 6 is a perspective view of a modified form of the clutch shown in Figs. 4 and 5. Fig. 7 is a perspective view of still another modification of the clutch shown in Fig. 4.

In the machine of the above identified Letters Patent a suitable base or standard 2 supports a head 4 in which is carried the mechanism for forming and driving pegs together with the actuating cam for the peg cutting device which cuts the ends of the pegs projecting through the sole of the shoe. The main shaft of the machine is arranged to be clutched to a driving pulley 6 by any suitable clutch mechanism actuated through a clutch actuating rod 8 connected to a treadle 10 in the base of the machine. The cam 12, hereinbefore referred to, which actuates the peg cutting device in the work support, is connected to said peg cutting device through suitable connections comprising an angle lever 14, a rod 16, a second angle lever 18, a bifurcated link 20, actuators 22, and cutter actuating rod 24, these connections being preferably substantially the same as those described in the co-pending application, Ser. No. 222,022, of Louis A. Casgrain, for improvements in machines for inserting fastenings.

The angle lever 18 is oscillated at every rotation of the main shaft of the machine and the oscillation of this lever is utilized in the present construction to operate the work support depressing mechanism. The work support in the present construction comprises a horn 26 which contains the peg cutting device. The horn 26 is supported to rotate freely and to be movable longitudinally in a split bearing sleeve 29. A spring 30 bearing at its lower end on a vertically adjustable foot piece 31 carried by the machine frame engages at its upper end a shoulder, not shown, inside the horn shank 32 and partially counterbalances the horn and its connected parts.

The foot piece 31 is preferably so adjusted as to cause the horn to be balanced in depressed position so that the operator is not required to depress the horn manually in order to remove the work. At its lower end the horn shank 32 is threaded to be engaged by an adjustable collar 33 which has a flange 34 at its upper end and is externally threaded at its lower end to receive a split lock ring 35. A ring 36 surrounding the collar 33 is provided at its inner periphery with a channel to receive the flange 34. A cushioning device, such as a felt washer *w*, is located between the ring 36 and the stationary sleeve 29. As shown, an anti-friction device 37 is interposed between the rings 35 and 36.

The horn slide or actuating yoke 38 reciprocates in guides 39 formed on the machine frame. The slide is bolted at its upper end to diametrically opposed ears 42 on the ring 36 and at its lower end terminates in a rod 43 which passes freely through the treadle 10. By this construction the horn is forced to partake of the longitudinal movement of its actuating yoke or slide, but is freely rotatable relatively thereto. The specific connections described between the horn 26 and the horn slide 38 form no part of the present invention, the illustrated connections being substantially the same as those shown in the co-pending application, Serial No. 222,022 above referred to.

Bolted to the under side of the machine frame is a bracket 45. Pivoted upon this bracket is a lever 46 carrying at one end a spring containing cage 47 comprising a cylindrical body portion and a cap 48 screwed into one end of the body portion. A spring 49 bears at one end against said cap and at its other end against the head 50 of a plunger 51 slidable through an opening in the cap 48. The tension of the spring 49 may be varied

by screwing the cap 48 in or out with respect to the body portion of the cage. The body portion of the cage 47 is open at its end remote from the cap and is inwardly flanged at this end to limit the outward movement of the plunger 51. The other end of the lever 46 extends beneath the rod 43 in which the lower end of the horn slide terminates and lifts the slide and horn when it is moved upwardly about its pivot. A second lever 52 mounted to turn concentrically with the lever 46 has one end extending into engagement with the upper end of the plunger 51 and its other end shaped to form a cam 53 by which it may be turned about its pivot to cause its plunger engaging end to press upon the plunger, this movement about the pivot being effected by the engagement of a cam roll 54 upon the treadle lever 10 with the said cam 53. When the treadle lever 10 is depressed the cam roll 54 will travel down the cam 53 and cause the lever 52 to turn about its pivot, the first movement of the lever 52 about its pivot acting through the plunger 51 and strong spring 49 to turn the lever 46 also about its pivot and bring its forward end into engagement with the rod 43 provided it is not already in engagement therewith. Continued depression of the treadle lever 10 will cause the horn to be raised through the connections just described until it clamps the work against the usual work abutment surrounding the peg driving opening and further movement of the treadle will then serve to compress the spring 49 somewhat and cause the work to be clamped under the yielding pressure of the said spring.

Preferably the same movement of the treadle which serves to bring the work support into work clamping relation to the work operates through suitable connections to actuate the clutch by which the fastening inserting mechanism is clutched to the constantly driven pulley hereinbefore mentioned. The illustrated connections comprise the clutch actuating rod 8 above mentioned and a roller 56 traveling in a slot 58 in a block attached to the lower end of the rod 8. When the treadle lever 10 is in its inoperative position the roller 56 is in the upper end of the slot 58. The first part of the downward movement of the treadle lever therefore has no effect upon the clutch actuating rod 8. After the treadle lever has moved far enough in its downward movement to raise the work support into work clamping relation to the work, the further movement of the treadle lever by which it brings the yielding pressure of the spring 49 to bear upon the work in its clamped position serves to pull down the clutch actuating rod 8 and to start the mechanism for inserting fastenings.

It will be seen from the foregoing description that the work is normally clamped against the work abutment during the fastening inserting operation under the action of the spring 49 which is preferably strong enough to absorb the impact incident to the peg driving operation. In other words, the pegging in this machine is preferably done "against a spring." As hereinbefore mentioned, an awl is provided which forms a peg receiving opening in the work in advance of the peg driving operation, and this awl is utilized in the illustrated construction to feed the work into position to bring the peg receiving opening beneath the peg driving mechanism.

In order that the work feeding operation of the awl may not be impeded, mechanism is provided which operates to depress the work support against the action of the spring 49 after each fastening inserting operation and during each work feeding operation. The illustrated mechanism comprises a shaft 60 mounted in bearings in the machine frame, said shaft having formed upon it two pinions 62 which engage teeth formed upon the two sides of the yoke 38. Loosely mounted upon the shaft 60 is a forked lever 64 and rigid with the shaft 60 and lying between the fork members of said lever 64 is a clutch disk 66 which, in the embodiment of the invention illustrated in Fig. 4, is a friction disk.

The lever 64 is arranged to be clutched to the shaft 60 to turn therewith by means of a clutch shoe 68 which engages the clutch disk 66 upon said shaft. Means is provided for moving the clutch shoe 68 into clutching engagement with the clutch disk 66 and the illustrated means comprises a crank arm 70 having a stem 72 mounted to turn in one of the fork members of the lever 64, said stem having a cut-away portion lying within a rectangular recess formed in the back of the shoe 68. As shown in Fig. 5 the face of the cut-away portion of the stem 72 which bears normally against the back side of the shoe 68 in the rectangular recess in said shoe lies upon the forward side of the axis of said stem so that rotation of the stem about its axis tends to force the shoe 68 into clutching engagement with the disk 66. Preferably the means for moving the clutch shoe 68 into clutching engagement with the clutch disk 66 is arranged to be operated through the means by which work support depressing movement is imparted to the lever 64, and in the illustrated construction the said work support depressing movement is imparted to the lever 64 through the clutch actuating crank arm 70.

As hereinbefore suggested, the movement of the angle lever 18 is utilized in operating the work support depressing mechanism, but this movement in machines in commercial use is not sufficient to impart the desired movement to the said depressing

mechanism, and means is therefore preferably provided for multiplying the movements of the lever 18. The illustrated means comprises a second angle lever 74 pivoted in the machine frame and connected by a pin and slot connection to the angle lever 18. Mounted in the upper part of the angle lever 74 is a spring-pressed sliding bolt 76 having a flattened portion at its forward end arranged to engage normally the under side of the crank arm 70. As the angle lever 74 is rocked by its connections with the angle lever 18, it operates to lift the rear end of the crank arm 70 by the engagement of the forward end of the bolt 76 with its under side, the first part of the upward movement of the rear end of the arm 70 with the bolt 76 serving to turn the stem 72 and to bring the clutch shoe 68 into clutching engagement with the clutch disk 66. This movement of the clutch shoe into clutching engagement with the disk 66 locks the shaft 60 and lever 64 together and also prevents further turning of the stem 72. Continued upward movement of the bolt 76 will thus serve to lift the rear end of the lever 64 and to turn the shaft 60 which through its connections with the yoke 38 effects a depression of the work support against the action of the spring 49. The forward end of the bolt 76 does not project far under the crank arm 70 and therefore when the angle lever 74 has turned through a certain angle of rotation the bolt 76 slips out from beneath the arm 70 and the lever 64 is thus permitted to return to its initial position. The return movement of the lever 64 is cushioned by a spring buffer 78 which strikes a projection 80 upon the frame. A spring-pressed plunger 82 bearing normally upon the upper side of the arm 70 has a double function. When the lever 64 returns to its initial position, after being raised through the connections hereinbefore described to effect a depression of the work support, the plunger 82 bearing upon the upper side of the crank arm 70 serves to rock the stem 72 about its axis and thus to release the clutch shoe 68 from the clutch disk 66. When the angle lever 74 rocks in a direction to lift the lever 64 through the connections hereinbefore described, the plunger 82 which bears upon the upper side of the crank arm 70 at a point between the axis of the stem 72 and the point of engagement of the bolt 76 with said arm serves to retard the upward movement of the lever 64 somewhat, forming a fulcrum about which arm 70 turns as a lever of the first class, thereby turning the stem 72 sufficiently to effect a movement of the clutch shoe 68 into clutching engagement with the clutch disk 66. This is an important novel feature of the invention.

In the embodiment of the invention shown in Fig. 6, which is intended for use with very heavy work when the spring 49 is adjusted to exert a very strong spring pressure upon the work support, the clutch disk 66 and the clutch shoe 68 are provided with interlocking teeth whereby a more positive clutching action is obtained. In this construction, a mere oscillation of the stem 72 into its unclutching position will not usually serve to bring the clutch shoe 68 out of clutching relation to the clutch disk 66 and springs 84 are therefore provided, one upon each side of the stem 72, which are connected at one end to the clutch shoe 68 and at the other end to the machine frame, for withdrawing the clutch shoe when the stem 72 is moved into its unclutching position.

In Fig. 7 is illustrated still another embodiment of the invention by which a positive clutching action is obtained, and, in this embodiment, the clutch disk 66 is formed with teeth as in the construction shown in Fig. 6, and for the shoe 68 is substituted a pawl 90 rigidly attached to the stem 72.

A detailed description of the operation of the embodiments of the invention illustrated in Figs. 6 and 7 is believed to be unnecessary in addition to the description of the embodiment shown in Figs. 1 to 5 inclusive.

In some of the appended claims that part of the construction herein illustrated and described which comprises the spring-pressed bolt 76 is referred to as a latch. The term "latch" as used in these claims is understood to mean a part which yields to pass a coöperating stop when moving in one direction past said stop, whereby it may spring or drop into operative position behind said stop.

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, the combination with a work support, of operating mechanism therefor comprising a shaft intergeared at its ends with said support, a lever arranged to oscillate about said shaft between its ends, means for oscillating said lever, and means for clutching said lever to and unclutching it from said shaft.

2. A machine of the class described having, in combination, a work support and operating mechanism for said support comprising a shaft intergeared with said support, a lever mounted to turn concentrically with said shaft, means for operating said lever, and means operating upon a continuous movement in one direction to cause said lever to be clutched to and unclutched from said shaft.

3. In a machine of the class described, the combination with a work support, yieldingly pressed normally into clamping relation to

the work, of mechanism for intermittently depressing said work support comprising a shaft operatively connected at each of its ends with said support, a lever pivoted upon said shaft between the points of connection of said shaft with said work support and arranged to be clutched to said shaft, means for effecting the clutching of said lever to said shaft, and means for operating said lever including means for operating said clutching means.

4. In a machine of the class described, the combination with a work support, of operating mechanism therefor comprising a shaft intergeared with said support, a lever arranged to oscillate about said shaft, a clutch comprising a disk rigidly attached to said shaft and a shoe carried by said lever, means for pressing said shoe into clutching relation to said disk comprising a crank arm and a yielding fulcrum independent of said shoe about which said crank arm turns as a lever of the first class when operating said clutch.

5. A machine of the class described having, in combination, a work support yieldingly held normally in work clamping relation to the work, means for intermittently depressing said work support comprising a shaft intergeared therewith, means for intermittently oscillating said shaft comprising two levers, and means for oscillating one of said levers and a latch carried by said lever arranged to engage and carry the other lever with it during its movement in one direction, to move out of engagement with said lever at the end of the work support depressing movement of said lever and to yield to pass said lever upon its return movement.

6. A machine of the class described having, in combination, a work support, a spring acting normally to press said work support into clamping relation to the work, and means for intermittently depressing said work support against the action of said spring and then releasing it to permit said spring to restore it to work clamping position comprising a latch arranged to be released at the end of the work support depressing movement of said means and a clutch operated and released by said latch.

7. A machine of the class described having, in combination, a work support, a spring acting to press said work support normally into clamping relation to the work, means for intermittently depressing the work support against the action of its spring comprising a lever and connections between said lever and said support including a clutch, and means for moving said lever in the direction to effect a depression of said work support, said last-named means being arranged to release said lever after it has effected a predetermined movement thereof.

8. In a machine of the class described, a work support and means for bringing to bear upon the work support the work clamping pressure of a strong spring comprising a lever, a compressible spring confined upon one arm of said lever, the other arm of said lever being operatively associated with the work support, and means for compressing said spring comprising a second lever arranged to turn about the same center as the first mentioned lever.

9. In a machine of the class described a work support, means for bringing to bear upon the work support the work clamping pressure of a strong spring comprising a lever, a compressible spring confined upon one arm of said lever, the other arm of said lever being operatively associated with the work support, and means for compressing said spring comprising a second lever arranged to turn about the same center as the first mentioned lever, and means operating upon one arm of said last mentioned lever to cause the other arm to compress the spring.

10. A machine of the class described, having in combination, mechanism for operating upon the work, a work support, means for starting and stopping said mechanism comprising a treadle, means controlled by the treadle for bringing to bear upon the work support the work clamping pressure of a strong spring comprising two concentrically pivoted levers, a compressible spring confined upon one arm of one of said levers, the other arm of said lever being operatively associated with the work support, and means for causing one arm of the other lever to compress the spring comprising a cam roll upon the treadle arranged to engage a cam upon the other arm of said lever.

11. A machine of the class described having, in combination, a work support, a spring acting normally to press said work support into clamping relation to the work, automatically actuated means for intermittently depressing said work support against the action of said spring, constructed to be disconnected both from its actuating means and from said work support at the end of the depressing movement to permit said spring to raise the work support again into work clamping position, and means for cushioning the return movement of said aforementioned means.

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

JOHN F. DAVEY.

Witnesses:
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ARTHUR L. RUSSELL.