A. R. SCHOENKY.

DRIVING AND STOPPING MECHANISM.

APPLICATION FILED OCT. 4, 1915.

1,242,247.

Patented Oct. 9, 1917.

2 SHEETS—SHEET 1.

Fig: 1.

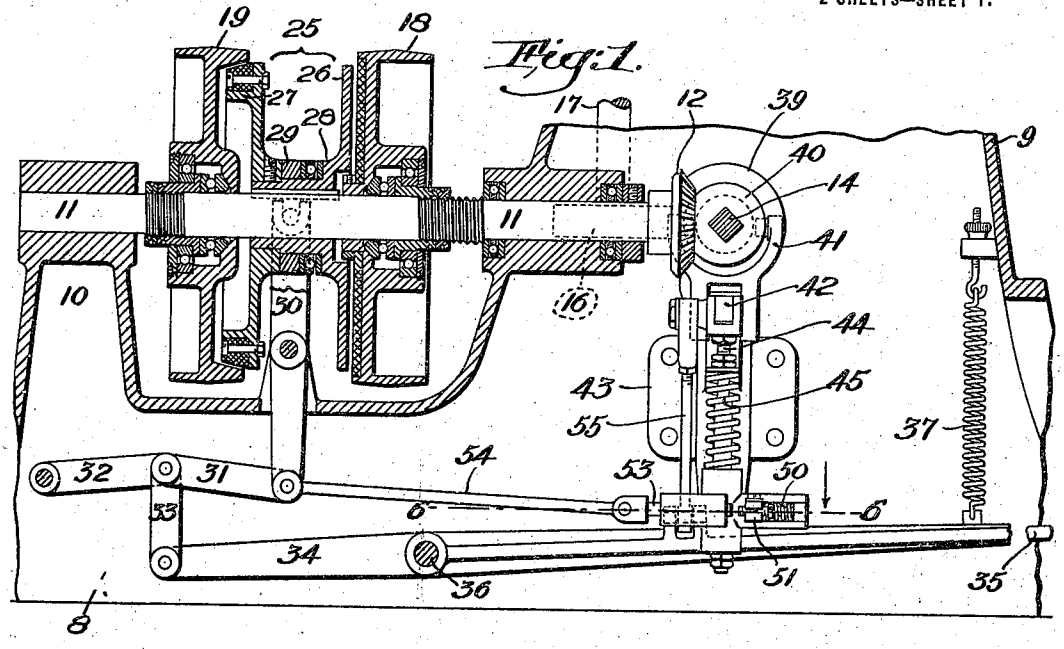
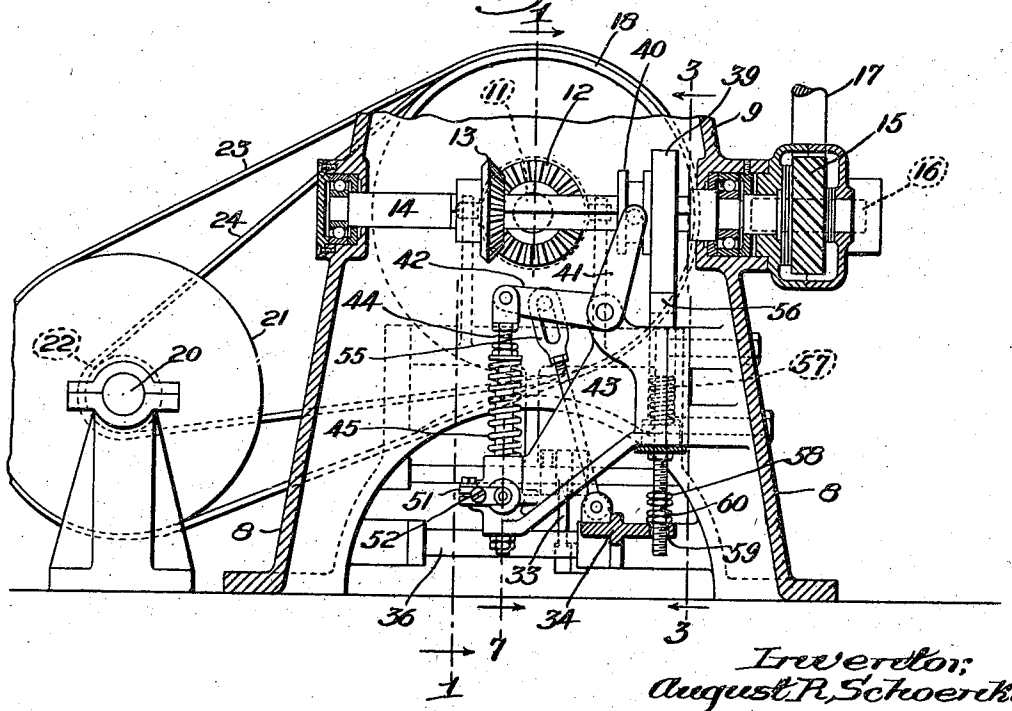


Fig: 2.



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2 SHEETS—SHEET 2.

Fig: 5.

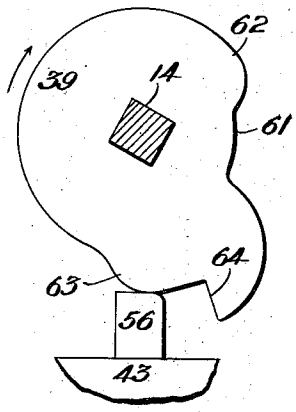


Fig: 3.

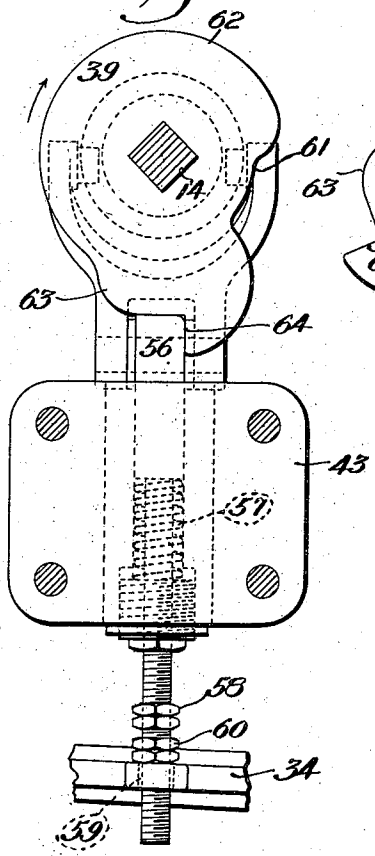


Fig: 4.

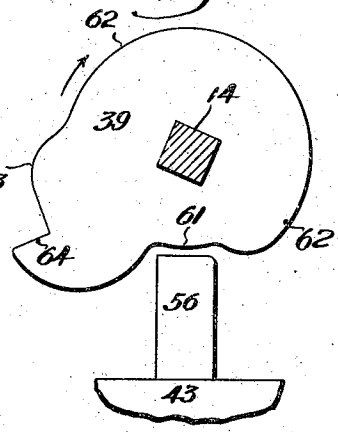


Fig: 8.

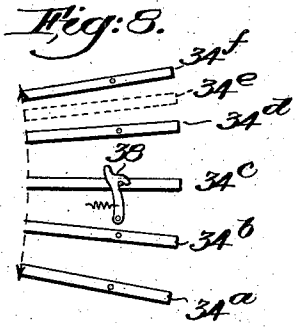


Fig: 6.

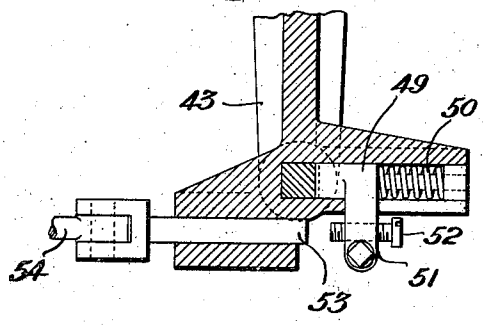
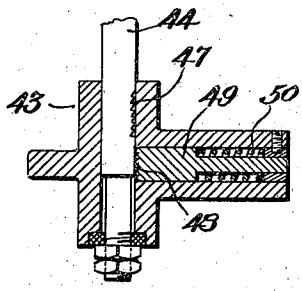


Fig: 7.



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UNITED STATES PATENT OFFICE.

AUGUST R. SCHOENKY, OF SOMERVILLE, MASSACHUSETTS, ASSIGNOR TO THE REECE SHOE MACHINERY COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MAINE.

DRIVING AND STOPPING MECHANISM.

1,242,247. Specification of Letters Patent. Patented Oct. 9, 1917.

Application filed October 4, 1915. Serial No. 53,883.

To all whom it may concern:

Be it known that I, AUGUST R. SCHOENKY, a citizen of the United States, residing at Somerville, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Driving and Stopping Mechanisms, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to driving and stopping mechanisms, and more particularly to a mechanism adapted to be incorporated in power driven machines, in which high or destructive momentum is present by reason of the great weight or speed of the rotating parts.

The main object of the present invention is to effectively provide for the stoppage of the rotating shafts of such a machine so as to give a predetermined final angular position of the shaft, and yet without undue or destructive shock, and to effect this accurate and easy stoppage in a predetermined manner and quickly in point of time.

It is a further object hereof to bring about such an advantageous stoppage of the machine in an automatic manner, that is to say, without any special attention or skill on the part of the operator. Further and detailed objects and advantages of the present invention will be elucidated in the hereinafter following description, or will be apparent to those skilled in the art.

To the attainment of the above referred to objects and advantages, the present invention consists in the novel mechanisms, devices, arrangements, details and other features herein shown or described.

I will first describe one form of driving and stopping mechanism embodying the present invention, and will then point out the novel features in the claims.

In the accompanying drawings, Figure 1 is a left elevation partly in section on the plane 1—1 of Fig. 2 of a portion of a machine containing a driving and stopping mechanism embodying the present invention.

Fig. 2 is a front elevation of the mechanism shown in Fig. 1, with the machine frame or case shown in section to better disclose the interior.

Fig. 3 is a right elevation of certain parts of the mechanism, taken partly in section on the plane 3—3 of Fig. 2.

Figs. 4 and 5 are views similar to Fig. 3, showing the parts in different stages of operation.

Fig. 6 is a detail section taken on the plane 6—6 of Fig. 1.

Fig. 7 is a detail section taken on the plane 7—7 of Fig. 2.

Fig. 8 is a diagram of the pedal control action.

All the figures, except Figs. 4, 5, and 8, show the parts in their position after the machine has been stopped.

The present invention for stopping the machine operates on the principle of applying to the fast rotating shaft after the full speed drive has been thrown out, a slow speed driving means, which acts first to retard the shaft to the designated slow speed, and then drive at such slow speed substantially to the final stopping position, whereupon, the momentum having been very very largely eliminated, the slow speed drive is thrown out, and a final stoppage effected, preferably by impact. This operation is in part automatically controlled by the machine itself, for example, by cam action from the shaft which is to be stopped. A control lever operated at a suitable time in the progress of the seam being stitched, serves to throw out the high speed and at once apply the low speed power. When the operator is to determine the time or place of stopping the stitching the control lever may be a hand lever or pedal. The shaft cam or control insures at least a certain minimum period of low speed power application and then throws off all power and at once causes final stoppage in a definite shaft position.

In the illustrated mechanism, therefore, the performance of the described steps is apportioned. The control lever or pedal disengages the high speed power and engages the low speed power. The remainder of the action is purely automatic since the shaft, which is to be stopped, effects control through its cams to throw out the low speed power at a certain point in its rotation and to cause the subsequent final stoppage, preferably by impact, having previously set the stop dogs in effective position.

The low speed power, being thrown in by the control lever or the strong spring which actuates it, is not dependent upon the momentum of the rotating parts as in a case where the shaft itself causes the engagement of the low speed power.

The low speed is, therefore, always properly thrown in notwithstanding any deficiency in momentum or in premature stoppage. Indeed, if the shaft has been prematurely stopped in the wrong position the mechanism hereof is such as to re-start the shaft at slow speed and promptly stop it again in the desired angular position.

The function of the low speed drive or clutch is not only to carry the shaft to its final stopping position under conditions of negligible momentum, but to extract the destructive momentum by retarding the shaft from its high to its low speed, the clutch members first sliding so as to effect this braking or retarding action and then becoming accoupled. The period of sliding or retarding should be as long as possible to avoid abruptness of action and shock, but cannot be prolonged to such an extent that the clutch members will still be sliding when the clutch is finally thrown out, for in that case the shaft will not have been properly reduced to its desired low speed condition. The mechanism hereof gives full advantage of the low speed drive because the clutch is engaged at the same time and with the same motion that disengages the high speed clutch. The action of the low speed clutch, therefore, bridges over the entire period from the lifting of the pedal until practically the time of final stoppage. This obviously would not be the case with a construction wherein the shaft effected the engagement of the low speed clutch. With the present construction the average time of action of the clutch is prolonged and therefore a slight amount of slack in the clutch or a slight excess of slippage would be less likely to result in injury by the throwing out of power while the parts still possessed a destructive amount of momentum.

Referring first to some of the general parts, the machine is shown as having a hollow base casting 8, which incases parts of the mechanism. Upstanding from the base is a post 9, which may extend to a suitable height for the support of the stitching mechanism or other mechanism which is to be driven and stopped. The base also has an upstanding bracket 10, which supports a journal for a shaft 11, the post 9 supporting a journal at the other end of the shaft.

The shaft 11 may be considered one of the driven shafts of the machine, since it is permanently geared to the operating or stitching shaft and rotates and stops with the latter.

Thus, at the front end of the shaft 11 is provided a bevel gear 12, which meshes with a bevel gear 13 carried by a cross shaft 14, suitably journaled in the post 9. The cross shaft extends through the casing or wall of the post, and at its exterior end is provided with a helical gear 15, which is in mesh with a helical gear 16 carried on a shaft 17 that extends upwardly, and is suitably geared to the operating or stitching shaft of the machine.

In order to provide for the application of either high speed power or low speed power to the shaft 11, it is shown as provided with driving connections including a high speed pulley 18, turning loosely on the shaft and a slow speed pulley 19, also loose on the shaft. The ratio of the speed of the pulleys 18 and 19 may be in some suitable proportion, such as five to one, so that when the shaft speed is reduced from the high to the slow, its destructive momentum is practically eliminated. With a ratio five to one, the momentum reduction would be in the ratio of twenty-five to one. That is to say, ninety-six per cent. of the momentum would be absorbed in the process of retarding or braking down the shaft to the slow speed.

Both pulleys 18 and 19 may be actuated from a common power shaft 20, the latter having large and small pulleys 21 and 22 connected by belts 23 and 24 with the pulleys 18 and 19 respectively.

In order that the shaft 11 may be coupled to either one of the constantly rotating driving pulleys 18 or 19, a clutch device 25 is provided, this being a sort of double acting clutch enabling either pulley to be coupled to the shaft. The clutch, for example, may comprise a clutch part or disk 26 adapted to engage frictionally with a suitable corresponding portion of the driving pulley 18. Also a clutch part or cone 27 adapted to engage a suitable surface in the driving pulley 19. Also a sleeve portion 28 to which the clutch parts 26 and 27 are rigidly attached. The sleeve 28 is splined to the shaft 11, and only needs to be shifted axially, to cause one or the other of the clutch parts to take effect.

In order to slide the double clutch device 25 axially, a ring 29 is arranged loosely in a suitable groove in the sleeve 28, and the ring is engaged by the upper yoked end of a lever 30, which lever is centrally fulcrumed and is adapted to be swung between three positions, the central position being neutral and serving to disengage both clutch parts, while the extreme positions cause the engagement of one or the other clutch part to secure high or low speed in the shaft.

It will thus be seen that by moving the lever 30 at suitable times, the speed of the power application may be adjusted as required by the principles of this invention. The movements of the lever 30 may, for example, be effected partly at the will of the

operator through a starting lever, or pedal, or the like. The following connections may be employed to secure this end.

A short link 31 is shown connected to the extremity of the lever 30 and to the extremity of a swinging arm 32, the link and arm forming a toggle by which the lever may be swung. A link 33 extends from the joint of the toggle to the extremity of a control lever or pedal lever 34. The lever 34 is provided with a foot piece or pedal 35 at its front end, and this has different positions as indicated in Fig. 8.

The bottom pedal position 34^a corresponds with the high speed of the machine and the pedal is held down in that position during the normal running. In the lifting of the pedal from its bottom to its stop position the first result is the disengagement of the high speed clutch and this may occur at the pedal position indicated at 34^b. The pedal then passes through the position 34^c, middle position, in which both clutches are thrown out. It then passes through 34^d at which the low speed clutch commences to engage. At 34^e a certain stop mechanism guard is released. At 34^f the pedal is at the top of its swing and the low speed clutch is in full engagement.

The pedal lever is fulcrumed at 36, and is provided with a lifting spring 37, which is strong enough to put the slow speed power into effect. The operator by depressing the pedal at will to its lowest position, puts the high power into effect upon starting the machine. When he desires to stop for any reason, for example, at the completion of the stitching operation, he will release the pedal thus disengaging the high speed power and engaging the slow speed, and the remainder of the stopping action is automatically controlled or effected by the machine, without the attention or skill of the operator, or he may lift the pedal half way and swing hook 38 into position to hold it, upon which the shaft is left free to slow down and stop by natural causes.

The spring 37 lifts the pedal, when released, to its full height, thus throwing the slow speed clutch member 27 into engagement with the pulley 19. This action commences with a sliding engagement, the shaft 11 being easily brought down to the predetermined slow speed. As will be seen, the mechanism is so devised as to insure invariably a certain minimum extent of application of slow speed power. The mechanism thereupon throws all power off the shaft 11, and applies a suitable final stop to the shaft. The details may be, for example, as follows:

A control cam or stop cam 39 is shown slidable axially upon a squared portion of the cross shaft 14. This enables the cam to be shifted to the left where it will be inoperative, or return to its right hand position seen in Fig. 2, where it becomes effective, being directly above its follower 56.

For shifting the stop cam 39, it may be provided with a grooved collar 40, engaged by pins at the extremities of an upright yoked arm 41, which forms one part of a bell crank lever, the other arm 42 of the lever extending horizontally to the left. The bell crank 41, 42 is fulcrumed on a fixed bracket 43, secured to the frame of the machine.

Beneath the extremity of the arm 42 and pivoted thereto is a plunger 44 fitted at its lower end to slide within a portion of the bracket 43. A spring 45, which also bears on the bracket, tends to lift the plunger, and thereby force the stop cam toward its effective position, and an adjustable limiting device consisting of a pair of lock nuts near the threaded lower end of the plunger 44, serve to limit the upward movement of the plunger, and therefore determine the right hand position of the cam.

When the plunger is moved down, and the stop cam to the left as hereinbelow described, the parts are adapted to be temporarily locked in this condition by means of locking teeth 47 formed on one side of the plunger 44, adapted to engage corresponding teeth 48 on a locking bolt 49, which is normally pressed by a spring 50 toward the plunger 44. This device is purely auxiliary and serves merely as a guard to additionally insure that the stop dogs will not assume impacting position one rotation too early or before the slow speed clutch has had its intended effect. The bolt 49 is intended to be withdrawn while the slow clutch is being engaged, for example, at the point 34^e on the diagram Fig. 8. This releases the plunger 44 and permits the spring to lift it. For these purposes the locking bolt 49 is shown, see Fig. 6, as provided with a lateral extension 51 supporting an adjustable contact or screw 52 adapted to be struck and moved forwardly to retract the locking bolt, by a bunter or pin 53. The described parts 44, 49 and 59 are all slidable in the bracket 43. For actuating the bunter 53, it is shown connected by a link 54 with the clutch lever 30. By this arrangement when the clutch lever has been thrown so as to apply slow speed power to the shaft 11, it actuates the bunter 53 to retract the locking bolt 49 and permit the plunger 44 to rise under the influence of its spring. The spring would thereupon tend to move the stop cam 39 into effective position, but this action is controlled or delayed in a manner that will hereinafter appear.

Directly below the effective position of the cam 39, is the pin or follower 56 slidably mounted in the bracket 43. A spring 57 tends to lift the stop cam follower or pin 56, and the pin is provided with an adjust-

able stop 58 consisting of lock nuts on its threaded lower end for limiting the upward movement of the pin.

As will be seen, the stop cam pin serves not only as a follower actuated by the cam for controlling the throw-out of power, but also serves as an impact pin or dog for securing the final stoppage in predetermined position.

The stop cam pin may, for convenience, effect the throw-out of power by coöperation with the pedal lever 34, and for this purpose the lower end of the pin is shown as extending through a hole formed at 59 in the lever, the pin having an adjustable contact 60 consisting of a pair of lock nuts mounted on the threaded lower end of the pin, and adapted at the proper time to force the pedal lever downward to its middle or neutral position 34^c for throwing off all power.

The stop cam 39 is shown to be in the form of a plate or disk, and its contour is shown in Figs. 3 to 5. The cam is constructed with a deep recess or depression 61, which is followed by a guard or concentric portion 62, this in turn, being followed by a rising portion 63, and lastly a final stop shoulder 64.

It will be understood that in the normal running of the machine, the stop cam pin 56 will stand to the right of the cam in Fig. 2, so that the cam is ineffective, and the cam pin will also stand in its highest position as indicated in Fig. 4. This condition continues as long as the operator holds the pedal at its lowest position. On releasing the pedal, it springs to its highest position, thus throwing out the high speed power and throwing in the slow speed power. The throwing in of the slow speed power is accompanied by the release of the plunger 44, so that the spring 45 thereafter tends to move the cam 39 into effective position. This it is unable to do, however, until the depression 61 of the cam comes over the pin 56. This will be understood from Figs. 3 and 4. The cam portions 62, 63 and 64 at the right hand face of the cam serve as a guard, preventing the cam moving into effective position. When the recess 61 has come above the follower pin as seen in Fig. 4, the cam 39 moves over the pin. From this point until the final stoppage, more than three-fourths of a revolution of the shaft must take place. Thereby is insured a substantial length of time for the slow speed clutch to take effect in performing its functions of first retarding the shaft to slow speed, and thereafter driving it at the slow speed.

After the cam and pin have assumed the position seen in Fig. 4, the continued rotation of the cam first merely slightly depresses the pin, which is thereafter in sliding contact with the cam portion 62 until the rise or shoulder 63 comes into play to force the pin downwardly to the position shown in Fig. 5. This downward thrust of the cam pin acts through contact 60 to depress the pedal lever 34 to its middle position 34^c, thus removing all power from the shaft 11. This condition of affairs is followed immediately by the impact of the stop shoulder 64 of the cam against the pin 56, as seen in Fig. 3. The shock is slight and not destructive, since ninety-six per cent. of the momentum has been eliminated. Excessive friction would serve for the final stoppage at the low speed to the same purpose as the impact.

In order to restore the parts to the position in which the cam 39 is at the left and inoperative, and the plunger 44 is locked in lowered position, I have provided a slotted link 55 extending from the pedal 34 to the bell crank lever arm 42, such that on depressing the pedal for restarting the machine the bell crank and the other parts are reset.

Mechanism for driving and stopping one of the shafts of a high speed power operated machine has, therefore, been described, which includes in combination with a high speed drive means, a slow speed drive means, and a final stop, a control part represented by the pedal lever 35 which is shiftable at suitable times but at indeterminate positions of the shaft, being shifted for example at will, and connections whereby the control part when it is shifted may both disengage the high and engage the slow speed, together with automatic connections operative after the slow speed engagement whereby the shaft itself may cause the disengagement of the slow speed and apply the final stop to stop the shaft in a predetermined angular position. These automatic connections are shown as including in effect three shaft members combined in the single disk 39. Thus the shaft cam 63 is adapted to shift the control lever so as to disengage the slow speed. The shaft dog 64 serves for stopping the shaft in its predetermined position after the slow speed is disengaged. The face of the disk 39 constitutes a shaft guard for restraining the action of the shaft cam and dog until after a minimum extent of slow speed. By these elements when the lever is shifted from high speed to low speed position the shaft members, cam, dog and guard, are released to the action of their spring 45, but the guard restrains their movement into effective position until the non-rotating part 56 drops into the notch 61 of the guard, after which nearly a full rotation takes place before the shaft cam 63 throws the lever to neutral position, thus disengaging the slow speed followed by impact of the shaft dog 64 with the member 56. The slow speed is, therefore, invariably engaged for a mini-

mum period of say three quarters revolution and may be engaged for as long as one and three quarters revolutions.

If the present invention be used on a stitching machine, such as used for stitching outsoles of shoes running normally at say 500 revolutions per minute, and it is desired to jockey the pedal during its stitching operations so as to permit slippage and cause the machine to run in the neighborhood of half the full speed for special purposes, this can be done on the present machine without danger of accidentally stopping the machine. Thus, the operator may manipulate the pedal between the positions 34[a] and 34[b] so as to reduce the efficiency of the high speed drive without, in fact, coming near to the higher position of the pedal in which the stop mechanism is apt to be applied.

It will thus be seen that I have described a driving and stopping mechanism embodying the principles of this invention, and attaining its objects and advantages. Since many matters of arrangement, design, detail and other features may be modified without departing from the novel principles involved, it is not intended to restrict the invention to such features, except so far as set forth in the appended claims.

What is claimed is:

1. A driving and stopping mechanism for a shaft of a high-speed, power-operated machine including in combination, high speed drive means, slow speed drive means, a final stop, a control part shiftable at suitable times at indeterminate positions of the shaft, connections whereby the control part when shifted may disengage the high and in the same action engage the slow speed drive means, and connections operative thereafter whereby the shaft may automatically disengage the slow speed drive means and apply the stop to stop the shaft in a predetermined angular position.

2. A driving and stopping mechanism for a shaft of a high-speed power-operated machine, including in combination, high speed drive means, slow speed drive means, a control part shiftable at suitable times at indeterminate positions of the shaft, connections whereby the control part when shifted may disengage the high and engage the slow speed drive means, a shaft member adapted to shift said control part to disengage the slow speed drive means, means for restraining the action of said member until after the slow speed drive means has been engaged, a stop device for stopping the shaft in a predetermined position after slow speed drive means is disengaged, and a guard device for restraining the action of said member and stop device until after a minimum extent of slow speed drive engagement.

3. A driving and stopping mechanism for a shaft of a high-speed power-operated machine, including in combination, high and slow speed drive means, a shiftable control device, connections whereby the control device when shifted may shift the drive from high to slow speed, a shaft cam adapted to shift said control device to disengage slow speed drive means, connections controlled by said control device for restraining the action of said cam until the slow speed drive means has been engaged, a stop device for stopping the shaft in a predetermined position after slow speed drive means has been disengaged, and a device for restraining the action of said cam and stop device until after a minimum extent of slow speed drive engagement; whereby when the control device is shifted to slow speed adjustment the following shaft-controlled actions automatically take place, the shaft cam is released, slow speed drive engagement continues for a minimum extent, the shaft cam disengages power, and the stop device causes final stoppage in a definite shaft position.

4. A driving and stopping mechanism for a shaft of a high-speed, power-operated machine including in combination, high and slow speed drive means, a control lever therefor having high speed, slow speed and neutral positions, a cam rotating with the shaft for shifting said lever from slow speed to neutral position, a stop device comprising rotating and non-rotating stop members for causing final stoppage in predetermined shaft position, connections controlled by the lever for restraining said cam and stop device until after the slow speed drive means is engaged, and a device controlled by the shaft for thereafter restraining said cam and stop device to insure a minimum extent of slow speed drive engagement before the final throw out and stoppage.

5. A driving and stopping mechanism for a shaft of a high-speed power-operated machine, including in combination, high and slow speed drive means, means for at will throwing the slow drive into effect at an indeterminate shaft position, and automatic means set into action by the throwing of the slow speed drive means into effect for first insuring a minimum extent of slow speed drive engagement, then throwing out the slow speed drive means and applying a stop at a predetermined shaft position.

6. A driving and stopping mechanism for a shaft of a high-speed, power-operated machine including in combination, high and slow speed drive means, a control lever therefor shiftable at will and having high speed, slow speed and neutral positions, a shifting device controlled by the shaft for automatically shifting said lever from slow speed to neutral position, a stop device for causing final stoppage in predetermined shaft position, means for restraining said shifting device and stop device until after

the slow speed drive means is engaged, and a guard device controlled by the shaft for thereafter restraining said shifting device and stop device to insure a minimum extent of slow speed drive engagement before the final throw out and stoppage.

7. In combination with a shaft adapted to be rotated at high speed, means actuated externally of the shaft, and operative at an indeterminate shaft position for throwing it into a condition of slow speed drive with small momentum, and means controlled by the shaft for automatically throwing off power and applying a stop.

8. A shaft stopping mechanism including in combination a slow speed drive adapted to be put into action between the normal running of the shaft and its final stoppage, means operable independently of the shaft position for engaging the slow drive at an indeterminate shaft position, and means controlled by the shaft itself for subsequently disengaging the slow drive at a predetermined shaft position.

9. A shaft stopping mechanism including in combination a slow speed drive adapted to be put into action between the normal running of the shaft and its final stoppage, means operable independently of the shaft position for engaging the slow drive at an indeterminate shaft position, means for maintaining such engagement for a minimum period, and means controlled by the shaft itself for subsequently disengaging the slow drive at a predetermined shaft position.

10. A shaft stopping mechanism including in combination a slow speed drive adapted to be put into action between the normal running of the shaft and its final stoppage to progressively retard and slowly drive the shaft, means operable independently of the shaft position for engaging the slow drive at an indeterminate shaft position, means for maintaining such engagement for a minimum period, and means controlled by the shaft itself for subsequently disengaging the slow drive at a predetermined shaft position.

11. A shaft stopping mechanism including in combination a slow speed drive adapted to be put into action between the normal running of the shaft and its final stoppage, means operable independently of the shaft position for engaging the slow drive at an indeterminate shaft position, means for maintaining such engagement for a minimum period, means controlled by the shaft itself for subsequently disengaging the slow drive at a predetermined shaft position, and a stop device for automatically finally stopping the shaft in a definite position after the period of slow drive engagement.

In testimony whereof, I have affixed my signature hereto.

AUGUST R. SCHOENKY.

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