

Oct. 13, 1942.

L. G. MILLER

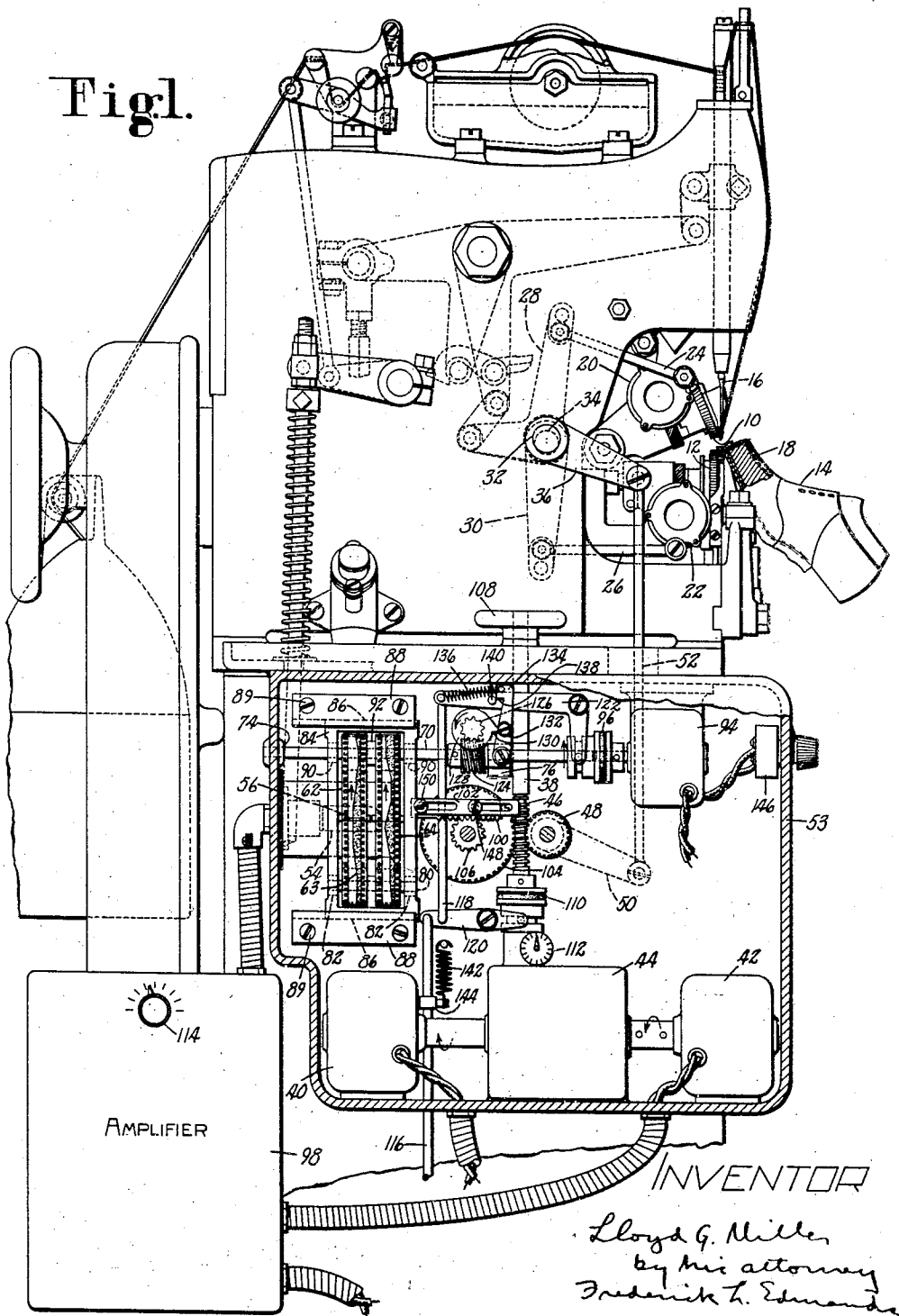
2,298,407

CONTROL MECHANISM

Filed May 14, 1941

2 Sheets-Sheet 1

Fig. 1.



Oct. 13, 1942.

L. G. MILLER

2,298,407

CONTROL MECHANISM

Filed May 14, 1941

2 Sheets-Sheet 2

Fig. 2.

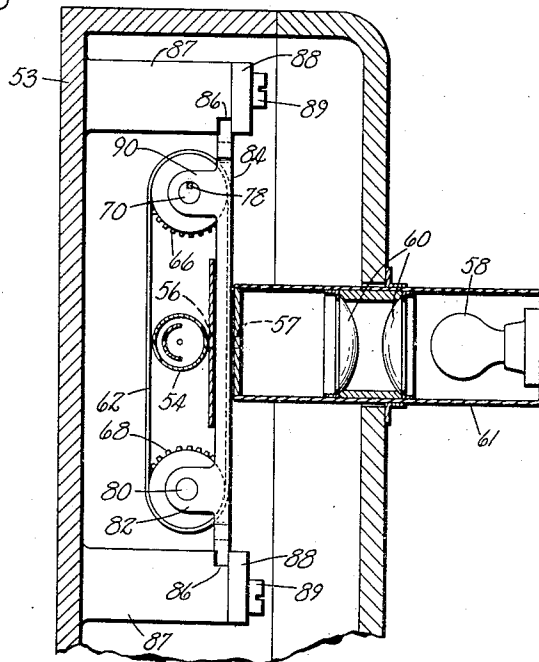
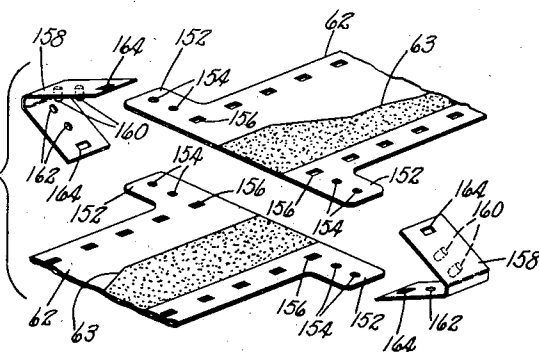


Fig. 3.



INVENTOR  
Lloyd G. Miller  
by his attorney  
Frederick L. Edwards

## UNITED STATES PATENT OFFICE

2,298,407

## CONTROL MECHANISM

Lloyd G. Miller, Beverly, Mass., assignor to United Shoe Machinery Corporation, Flemington, N. J., a corporation of New Jersey

Application May 14, 1941, Serial No. 393,374

17 Claims. (Cl. 12—6)

This invention relates to control mechanisms and more particularly to mechanisms for controlling machines for operating upon shoe parts.

In the use of machines for performing an operation progressively about the periphery of a shoe part of irregular contour, it is often desirable to vary the speed of operation of the work-engaging member in accordance with the shape of the part to be treated. The speed of the work-engaging member may bear a definite relationship to the radius of curvature of the portion of the shoe part at the operating point and may be controlled by a cam having a contour corresponding to the shape of the shoe part being operated upon. While the use of cams for controlling machines in this manner may be entirely satisfactory in many respects, it is well known that in the manufacture of shoes, changes in style often necessitate changes in the contour of the shoe and of its component parts. Thus, each new style of shoe operated upon may require a different cycle of speed adjustment of the work-engaging member. Each cycle of adjustment requires a separate cam and the expense of such cams may be excessive in factories where style changes are numerous. The use of cams for the adjustment of speed of an operating member for work of this type has the further disadvantage that the machine must be stopped and partially dismantled in order to change cams. Such a change in cams calls for mechanical skill on the part of the operator and also slows up production. On the other hand, automatic mechanism for changing cams is complicated and adds greatly to the cost of the machine.

In view of the above, it is an object of this invention to provide in a shoe machine means for continuously adjusting the speed of a work-engaging member according to a predetermined schedule which will overcome the disadvantages set forth above.

It is also an object of this invention to provide automatic control means for a shoe machine which may be used to produce any one of a plurality of different cycles of adjustment of the speed of a work-engaging member and means for selectively controlling the work-engaging member in accordance with any one of these cycles of adjustment.

It is another object of this invention to provide in a shoe machine means for producing a cycle of adjustments in the speed of a work-engaging member in accordance with the shape of a shoe part of any particular style and means for varying the time necessary to complete this

same cycle of adjustments so that the machine may be used to operate upon shoe parts of various sizes having the same shape.

In accordance with the above objects, a feature of the invention consists in the use of photoelectric control means to provide the desired adjustments in the speed of a work-engaging member and includes, in one aspect, a photoelectric cell, a light source therefor, a template the shape of which corresponds to the outline of a shoe part, means driving this template in a path intercepting the beam of light from the light source to the photoelectric cell to vary the amount of light reaching the photoelectric cell from the light source in accordance with the shape of the shoe part to which it corresponds, and means operated by the photoelectric cell in response to the variations in the amount of light reaching it for controlling the speed of the work-engaging member.

Another feature of the invention consists in the provision of a plurality of templates in combination with means for selectively driving any one of these templates in a path intercepting the beam of light from the light source to the photoelectric cell, whereby the speed or magnitude of motion of the work-engaging member may be controlled for operating upon shoes or shoe parts of different shapes.

According to other features of the invention, means are provided for varying the speed at which the template is driven past the photoelectric cell to vary the time necessary to complete the cycle of speed adjustment which it controls, as well as means for interrupting the drive of the template at the completion of one cycle of operation.

The invention is herein illustrated as applied to a machine for lasting stitchdown shoes, which machine is of the same general character as that disclosed in Letters Patent of the United States No. 1,864,510, granted June 21, 1932, upon an application filed in the name of B. T. Leveque, but it is to be understood that the invention is of general application and is not limited in its application to machines of the type shown in this patent.

The above and other important features of the invention will now be described in detail in the following specification and pointed out more particularly in the appended claims.

In the drawings,

Fig. 1 is a side elevation, partly in section, of one form of mechanism embodying the present invention, the mechanism being shown, for purposes of illustration, as applied to a thread last-

ing machine of the type shown in the above-mentioned Letters Patent;

Fig. 2 is a vertical section, taken at right angles to Fig. 1, through a portion of the control mechanism; and

Fig. 3 is an exploded view showing the ends of a film forming the template of the illustrated machine and indicating the method of joining the ends together to form a loop of film, as shown in Fig. 2.

The control mechanism of this invention is shown, for purposes of illustration, as applied to a machine which is intended for use in thread-lasting stitchdown shoes and provides means for tightly drawing an upper around a last and securing it in lasted position by means of stitches. As disclosed in the above-mentioned Letters Patent, this machine includes in its organization a pair of intermittently rotated rolls 10 and 12 constructed and arranged to feed a shoe 14 past stitching instrumentalities including a needle 16 and loop mechanism (not shown) to wipe the upper of the shoe tightly over a last 18. These rolls have been shown in the positions which they occupy when the machine is at rest. It will be understood that the upper roll 10 is lowered into contact with the work when the machine is set in operation. The rolls are driven by mechanism including Horton clutches 20 and 22, links 24 and 26, and bell cranks 28 and 30. These bell cranks are mounted on a shaft 32 and are oscillated about this shaft by mechanism fully disclosed and described in the above-mentioned Letters Patent. For the purpose of drawing the upper of the shoe 14 around the last to dispose of its fullness with a smooth uniformity, as described in the above-mentioned patent, the upper roll 10 is arranged to be driven at a higher speed than the lower roll 12. Accordingly, the lower roll 12 acts to feed the shoe as a whole past the needle 16 while the upper roll 10, by reason of its higher speed and position, tends to gather the material of the upper slightly into each stitch made by the needle. Provision is made for adjusting the speed of rotation of the upper feed roll 10 relative to the lower roll 12. For this purpose, the bell crank 28 is mounted on an eccentric portion 34 of the shaft 32 to which is connected a handle 36 for rotating the shaft to alter the position of the eccentric 34. It will be understood that this effects a change in the throw of the bell crank lever 28 and thus changes the speed of the upper feed roll 10.

This machine may also be used in the manufacture of welt shoes to last the upper and attach welting in a single operation. When the machine is used for this purpose, it is necessary to hold the shoe at an angle, as indicated in Fig. 1. It is evident that when the shoe is so held, the lengths of the feed paths of the upper and lower rolls between any two points will differ in proportion to the radii of curvature of the feed paths between the points. When a shoe is held at such an angle, this difference amounts to the combined thickness of the welt, upper and midsole. This difference may have a considerable effect on the path lengths at the toe and heel of the shoe where it is relatively large as compared with the radii of curvature but will have only a slight effect at the straighter parts of the periphery of the shoe where it is relatively small in respect to the radii of curvature. In order to compensate for the difference in the lengths of feed paths, means are provided, in accordance with this invention, for continuously adjusting

the speed of the upper roll 10 as the radius of curvature of the work being operated on varies.

The automatic adjusting means comprises a drive shaft 38 which is driven by a constant speed motor 40 and a variable speed motor 42 through a differential gear mechanism 44. Normally, the motors 40 and 42 rotate in opposite directions and at the same speed, and the differential gear mechanism is so constructed and arranged that no motion is imparted to the shaft 38. Should the speed of one of the motors exceed that of the other, the shaft 38 will be set in motion, the direction and speed of rotation depending upon the relative speeds of the two motors. Thus, it will be understood that any variation in the speed of the variable speed motor 42 will produce a corresponding motion of the shaft 38. A worm 46 is cut on the shaft 38 and engages a gear 48 to which is attached an operating arm 50. This arm is connected to the handle 36 by means of a rod 52 so that rotation of the drive shaft 38 will operate through the rod 52 to shift the handle 36 which changes the speed of rotation of the upper feed roll 10.

For controlling the speed of the variable speed motor 42, and thus that of the upper feed roll 10, a photoelectric balance system is provided. Basically, this system comprises a photoelectric cell and a light source therefor, a template, an amplifier and the variable speed motor arranged to be controlled by the photoelectric cell through the amplifier. These elements are so arranged that the normal current through the photoelectric cell is constant at a given value. The template is arranged to be driven in a path intercepting the beam of light from the light source to the photoelectric cell and any change produced by this template in the amount of light reaching the photoelectric cell from the light source causes a variation away from the balance value in the current flowing through the cell. This variation is amplified and controls the variable speed motor which is arranged so to move the template relative to the photoelectric cell that the current therethrough again approaches the given balance value. The motion produced by the motor in performing this function is utilized to perform any desired additional operation. Such a photoelectric cell balance system requires only a small slit opening in front of the photoelectric cell and is consequently quite accurate. The above-mentioned device will now be described as applied to the machine illustrated herein, all of its elements being contained in a control box 53 which is fastened to the frame of the machine.

As shown in Fig. 2, a photoelectric cell 54 is positioned behind slits 56 and 57, formed in suitable diaphragms upon which light from a light source 58 is focused by the lenses 59. The diaphragm containing the slit 57, the light source 58, and the lenses 59 are mounted in a tube 61 extending through the cover of the control box 53 so that they may be removed for inspection or replacement. The template is herein illustrated as an endless strip or loop of motion picture film and has a darkened surface of varying width, as shown at 63 in Figs. 1 and 3, to form an outline which corresponds in shape to a desired cycle of speed adjustment of the upper feed roll 10, the outline being photographically registered on the surface of the film or produced thereon in any other suitable manner. As shown in Fig. 1, two such template films 62 and 64 have been provided in the present embodiment

of the invention. These films are supported on pairs of sprocket rolls 66 and 68 (Fig. 2), the upper pair 66 of which is splined on a shaft 70 carried in bearings 74 and 76 mounted on the control box 53. Keys 78 (Fig. 2) are formed on the sprocket rolls 66 and engage a slot which is cut lengthwise of the shaft 70. These parts are so constructed that the sprocket rolls may move lengthwise of the shaft but may not revolve relative thereto. The lower sprocket rolls 68 are mounted on a shaft 80 journaled in ears 82 provided at the lower end of a slide 84 which is mounted for movement in slideways 86 formed by supports 87 and cover plates 88, these parts being secured together by screws 89. A pair of ears 90 at the upper end of the slide 84 confine the movement of the upper sprocket rolls 66 lengthwise of the shaft 70 and a washer 92 (Fig. 1) positioned between the sprocket rolls 66 on the shaft 70 maintains the sprocket rolls at the proper separation. It will be understood that movement of the slide 84 in the slideways 86 causes movement of the template films 62 and 64 relative to the photoelectric cell 54 as a unit in a direction parallel to the shaft 70. The template films 62 and 64 are moved past the photoelectric cell in a direction indicated by the arrows in Fig. 1 by means of a variable speed motor 94 which is arranged to drive the shaft 70 through a friction clutch 96. As indicated in Fig. 1, the slide 84 has been so positioned relative to the photoelectric cell that the template film 62 is located in front of the slit 56, the other template film being ineffective at this time to control the light passing to the photoelectric cell.

As the template film 62 is driven past the slit 56 by the motor 94, it produces variations in the amount of light reaching the photoelectric cell 54 from the light source 56 and thus varies the amount of current flowing through the photoelectric cell. The variation in the current from the balance value is amplified by an amplifier 98 and this variation in current is utilized to control the speed of the variable speed motor 42. The variation in speed of this motor produces motion of the shaft 38, as has been described above. For the purpose of moving the template film relative to the photoelectric cell 54 in a direction parallel to the shaft 70 in order to return the current flowing through the photoelectric cell to the balance value, a rack 100 secured to an extension 102 of the slide 84 is driven from the worm 48 on the shaft 38 through gears 104 and 106. Thus, the variation in the speed of the motor 42 operates not only to actuate the arm 50 but also to return the template film 62 to a position such that the current flowing through the photoelectric cell again approaches its balance value.

When the machine is set up for use with any particular template, it is necessary to adjust the position of the slide 84 relative to the photoelectric cell 54 so that the amount of light allowed to fall on the photoelectric cell at the beginning of the cycle represented by the template will correspond to the desired balance current. For the purpose of making this adjustment, a hand wheel 108 is provided at the upper end of the shaft 38 and a clutch 110 is provided between the shaft and the differential gear mechanism 44. When the clutch 110 is disengaged, the shaft 38 may be revolved by hand until the desired adjustment in the position of the slide 84 has been obtained. The machine is further adjusted by balancing the speeds of the

motors 40 and 42 so that the output of the differential gear mechanism as shown by an indicator 112, is substantially zero. This adjustment is effected by means of a control rheostat 114 associated with the amplifier 98.

The machine having thus been adjusted for operation using a particular template the outline of which corresponds to the desired cycle of speed adjustment for a given last style, the mechanism is set in operation by engaging clutches 96 and 110 by means of a treadle (not shown) which operates through treadle rods 116 and 118, lever 120, and bell crank lever 122, simultaneously, to engage the clutches. This sets the control mechanism in operation and from this point on, the adjustment of the speed of the feed roll is entirely automatic.

It is desirable to stop the motion of the template film, and hence the adjustment of the speed of the upper feed roll, at the termination of one complete cycle of operation. Such a cycle will normally correspond to the length of the loop of template film 62, and the following mechanism is provided for maintaining the clutches 96 and 110 in engagement until the entire loop of film has been driven past the slits 56 and then disengaging them. A worm 124 is provided on the shaft 70 and engages a worm gear 126 which drives a cam 128. The gear ratio is such that the cam 128 will make one revolution during the time that the complete loop of film is being driven past the slits 56 and 57. When the treadle is depressed, the clutches 96 and 110 are engaged and the cam 128 is set in motion. When the cam 128 has progressed a slight distance, a shoulder 130 on its periphery allows a pin 132 on a latch 134 which is pivoted to the bearing block 76 to move to the left (Fig. 1) under the action of a spring 136. When this occurs, a projection 138 on the latch 134 engages a pin 140 on the bell crank lever 122 and thereafter holds the treadle down until the cam has made a complete revolution and moves the latch 134 back to the position shown in Fig. 1. This allows a spring 142 which is secured at one end to the control box 53 and at the other to a collar 144 on the treadle rod 118 to operate and disengage the clutches 96 and 110 at the conclusion of precisely one cycle of operation.

In order to adapt the control mechanism for use with shoes of varying sizes but of the same style, it is necessary to vary the speed at which the template is driven past the photoelectric cell so that the cycle of adjustment will be completed at the time when the entire periphery of the shoe has passed the operating point. To this end, a speed control 146 is provided for the variable speed motor 94. This control may be calibrated directly in last sizes and adjusted by the operator in accordance with the sizes of the shoes being operated upon. A single template film may thus be used to control the speed of the upper feed roll 10 for use on shoes of all sizes of the particular last to which it corresponds.

Since it may be desired to operate upon shoes of more than one last style, a second template film 64 is provided, as shown in Fig. 1. If it is desired to use this template film instead of the template film 62, the screws 148 and 150 are loosened after which the slide 84 may be moved relative to the rack 100 until the film 64 occupies the position which has been occupied by the film 62. The machine is balanced, in the manner already described, with the template film 64 in front of the slit 56 and is then ready for operation upon shoes of the style which corresponds to

that particular template film. Although, as illustrated, only two template films have been provided, it will be understood that more than two template films could be carried on a suitable slide arranged to take the place of the slide 84.

To facilitate substitution of other template films for those in the machine, the films may be formed with separable ends as illustrated in Fig. 3, each end of the template film being provided with a pair of laterally extending projections 152. Registering holes 154 are so positioned in these extensions that when the ends of the films are brought together in overlapping relation with these holes in register, the ends of the template outline 63 as well as the sprocket holes 156 will be in perfect alinement. The ends of the film 62 are secured together in overlapping relation by means of a pair of U-shaped metal clips 158 which are designed to clamp the projections 152 on the ends of the film together. Spurs 160 on one arm of each U-clip are arranged to pass through the registering holes 154 in the projections 152 and engage holes 162 in the other arm of the U-clip, to fasten the ends of the film together. The arms of the U-clips 158 are long enough to extend over the sprocket holes 156 at the ends of the template film and serve to reinforce the film at the junction. Holes 164 are provided in the arms of the U-clips to permit the teeth of the sprocket wheels 66 and 68 to pass through the sprocket holes 156, these holes being so positioned as to be in alinement with the sprocket holes 156 when the clips are assembled upon the film. When it is desired to change template films, the arms of the clips 158 are forced apart and the clips are removed after which the films may be removed from the slide. The new template films are then threaded over the sprocket wheels 66 and 68, the registering holes 154 in their ends are brought together in overlapping relation, and new pairs of U-clips are applied to secure the ends of the films together. Assembled templates comprising loops of film and pairs of clips are shown assembled on slide 84 in Fig. 1.

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

1. In a machine for operating upon the periphery of a shoe part, a first work-engaging member, means for driving said first work-engaging member at a constant speed, a second work-engaging member, means for variably driving said second work-engaging member in accordance with a predetermined schedule, a photoelectric cell, a light source therefor, means for causing variations in the amount of light reaching said photoelectric cell from said light source according to said predetermined schedule, and means operated by the photoelectric cell in response to said variations for controlling said last-mentioned driving means.

2. In a machine for operating upon the periphery of a shoe part, a first work-engaging member, means for driving said first work-engaging member at a constant speed, a second work-engaging member, means for variably driving said second work-engaging member in accordance with a predetermined schedule, a photoelectric cell, a light source therefor, a template, means for driving said template in a path intercepting the beam of light from said light source to said photoelectric cell to cause variations in the amount of light reaching said photoelectric cell from said light source according to said predetermined schedule, and means operated by the photoelectric cell in response to said variations

for controlling said second-mentioned driving means.

3. In a machine for operating upon the periphery of a shoe part, a first work-engaging member, means for driving said first work-engaging member at a constant speed, a second work-engaging member, means for driving said second work-engaging member at speeds which vary according to a predetermined schedule, a photoelectric cell, a light source therefor, a template the shape of which corresponds to said predetermined schedule, means for driving said template in a path intercepting the beam of light from said light source to said photoelectric cell to cause variations in the amount of light reaching said photoelectric cell according to the predetermined schedule, and means operated by the photoelectric cell in response to said variations for controlling said second-mentioned driving means.

4. In a machine for operating upon the periphery of a shoe part, a first work-engaging member, means for driving said first work-engaging member at a constant speed, a second work-engaging member, means for driving said second work-engaging member at varying speeds, a photoelectric cell, a light source therefor, a template comprising a loop of film with an outline corresponding to a desired schedule of operations photographically registered thereon, means for driving said template in a path intercepting the beam of light from said light source to said photoelectric cell to cause variations in the amount of light reaching said photoelectric cell from said light source according to said schedule, and means operated by the photoelectric cell in response to said variations for controlling said second-mentioned driving means.

5. In a machine for operating upon the periphery of a shoe part, a work-engaging member, means for variably driving said work-engaging member, a photoelectric cell, a light source therefor, means for causing variations in the amount of light reaching said photoelectric cell from said light source according to a predetermined cycle of operations, means for varying the time required for one complete cycle of operation, and means operated by the photoelectric cell in response to said variations for controlling said driving means.

6. In a machine for operating upon the periphery of a shoe part, a work-engaging member, means for driving said work-engaging member at varying speeds, a photoelectric cell, a light source therefor, a template comprising an endless band of film with an outline corresponding to a predetermined cycle of operation of said work-engaging member photographically registered thereon, a variable speed motor for driving said template in a path intercepting the beam of light from said light source to said photoelectric cell to cause variations in the amount of light reaching said photoelectric cell from said light source according to said cycle, means for adjusting the speed of said motor to vary the time required to complete said cycle, and means operated by the photoelectric cell in response to said variations for adjusting the speed of said first-mentioned driving means.

7. In a machine for operating upon the periphery of a shoe part, a work-engaging member, means for variably driving said work-engaging member, a photoelectric cell, a light source therefor, a plurality of template films each of which bears an outline corresponding to a predetermined cycle of operations, means for selectively driving

any one of said films in a path intercepting the beam of light from said light source to said photoelectric cell to cause variations in the amount of light reaching said photoelectric cell according to the corresponding outline on the film, and means operated by the photoelectric cell in response to said variations for controlling said first-mentioned driving means.

8. In a machine for operating upon the periphery of a shoe part, a work-engaging member, means for variably driving said work-engaging member, a photoelectric cell, a light source therefor, a template, means for driving said template in a path intercepting the beam of light from said light source to said photoelectric cell to cause variations in the amount of light reaching said photoelectric cell from said light source according to a predetermined schedule, and means operated by said photoelectric cell in response to said variations for relatively shifting said template and said photoelectric cell to maintain the amount of light reaching said photoelectric cell at a substantially constant value.

9. In a machine for operating upon the periphery of a shoe part, a work-engaging member, means for driving said work-engaging member at varying speeds, a photoelectric cell, a light source therefor, means for causing variations in the amount of light reaching said photoelectric cell from said light source according to a predetermined schedule, a constant speed motor, a variable speed motor controlled by said photoelectric cell in response to said variations, a drive shaft, means connecting said motors to said drive shaft so that the speed and direction of rotation of said shaft depend upon the difference in the speeds of said motors, and means operated by said drive shaft for varying the speed of said driving means.

10. In a machine for operating upon the periphery of a shoe part, a work-engaging member, means for driving said work-engaging member at varying speeds, a photoelectric cell, a light source therefor, means for causing variations in the amount of light reaching said photoelectric cell from said light source according to a predetermined schedule, a constant speed motor, a variable speed motor controlled by said photoelectric cell in response to said variations, a drive shaft, means connecting said motors to said drive shaft so that the speed and direction of rotation of said shaft depend upon the difference in the speeds of said motors, means driven by said shaft for adjusting the speed of the driving means for said work-engaging member, and means also driven by said shaft for adjusting the amount of light reaching said photoelectric cell so that it is maintained at a substantially constant value.

11. In a machine for operating upon the periphery of a shoe part, a work-engaging member, means for variably driving said work-engaging member, a photoelectric cell, a light source therefor, a template, means for driving said template in a path intercepting the beam of light from said light source to said photoelectric cell to cause variations in the amount of light reaching said photoelectric cell from said light source according to a predetermined schedule, means operated by the photoelectric cell in response to said variations for controlling said driving means, and means for interrupting the drive of said template after a predetermined time.

12. In a machine for operating upon the periphery of a shoe part, a work-engaging mem-

ber, means for variably driving said work-engaging member, a photoelectric cell, a light source therefor, a template, means for driving said template in a path intercepting the beam of light from said light source to said photoelectric cell to cause variations in the amount of light reaching said photoelectric cell from said light source according to a predetermined cycle of operation, means operated by the photoelectric cell in response to said variations for controlling said driving means, and a one-revolution clutch associated with said template driving means for stopping the movement of said template past said photoelectric cell at the completion of one cycle.

13. In a machine for operating upon the periphery of a shoe part, a work-engaging member, means for driving said work-engaging member at varying speeds, a photoelectric cell, a light source therefor, a template, means for driving said template in a path intercepting the beam of light from said light source to said photoelectric cell to cause variations in the amount of light reaching said photoelectric cell from said light source according to a predetermined schedule, means operated by the photoelectric cell in response to said variations for adjusting the speed of said driving means, a one-revolution clutch associated with said template for interrupting the movement of said template past said photoelectric cell at the completion of one cycle, and means operated by said photoelectric cell in response to said variations for shifting said template in a direction tending to maintain the amount of light reaching said photoelectric cell at a substantially constant value throughout the cycle.

14. In a machine for operating upon the periphery of a shoe part, a work-engaging member, means for driving said work-engaging member at varying speeds, a photoelectric cell, a light source therefor, a template, means for driving said template in a path intercepting the beam of light from said light source to said photoelectric cell to cause variations in the amount of light reaching said photoelectric cell according to a predetermined schedule, a constant speed motor, a variable speed motor controlled by said photoelectric cell in response to said variations, a drive shaft, means connecting said drive shaft to said motors so that the speed and direction of the rotation of said shaft depend upon differences in the speeds of said motors, means operated by said drive shaft for varying the speed of said first-mentioned driving means, and means driven by said shaft for relatively shifting said template and said photoelectric cell to maintain the amount of light reaching said photoelectric cell at a substantially constant value.

15. A machine for lasting stitchdown shoes, having in combination, a pair of feed rolls, means for rotating one of said feed rolls at variable speeds, means for rotating the other of said feed rolls at a constant speed, and means for adjusting the speed of rotation of said first feed roll, said means comprising a photoelectric cell, a light source therefor, a template having an outline which corresponds to the bottom outline of a particular last, means for driving said template in a path intercepting the beam of light from said light source to said photoelectric cell to cause variations in the amount of light reaching the photoelectric cell in accordance with the shape of the particular last, and means operated by the photoelectric cell in response to said varia-

tions for controlling the speed of rotation of said first feed roll.

16. A machine for lasting stitchdown shoes, having in combination, a feed roll, means for rotating said feed roll at variable speeds and means for adjusting the speed of rotation of the feed roll, said means comprising a photoelectric cell, a light source therefor, a plurality of template films each having an outline corresponding to the bottom outline of a particular last photographically registered thereon, means for selectively driving any one of said template films in a path intercepting the beam of light from said light source to said photoelectric cell to cause variations in the amount of light reaching the photoelectric cell in accordance with the shape of the particular last chosen as determined by the outline on the corresponding template film, and means operated by the photoelectric cell in response to said variations for controlling the speed of rotation of said feed roll.

17. A machine for lasting stitchdown shoes,

having in combination, a feed roll, means for rotating said feed roll at variable speeds, means for adjusting the speed of rotation of the feed roll, said means comprising a photoelectric cell, a light source therefor, a template having an outline which corresponds to the bottom outline of a particular last, means for driving said template in a path intercepting the beam of light from said light source to said photoelectric cell to cause variations in the amount of light reaching the photoelectric cell in a cycle determined by the shape of the particular last, means operated by the photoelectric cell in response to said variations for controlling the speed of rotation of said feed roll in said cycle, and means for adjusting the machine for work on lasts of the same style but of different sizes, said means comprising a variable speed motor driving said template and means for adjusting the speed of said motor to vary the time required to complete said cycle.

LLOYD G. MILLER.