Dec. 10, 1935. A. VALLE 2,023,652

BELT LACING MACHINE

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Fig. 1.

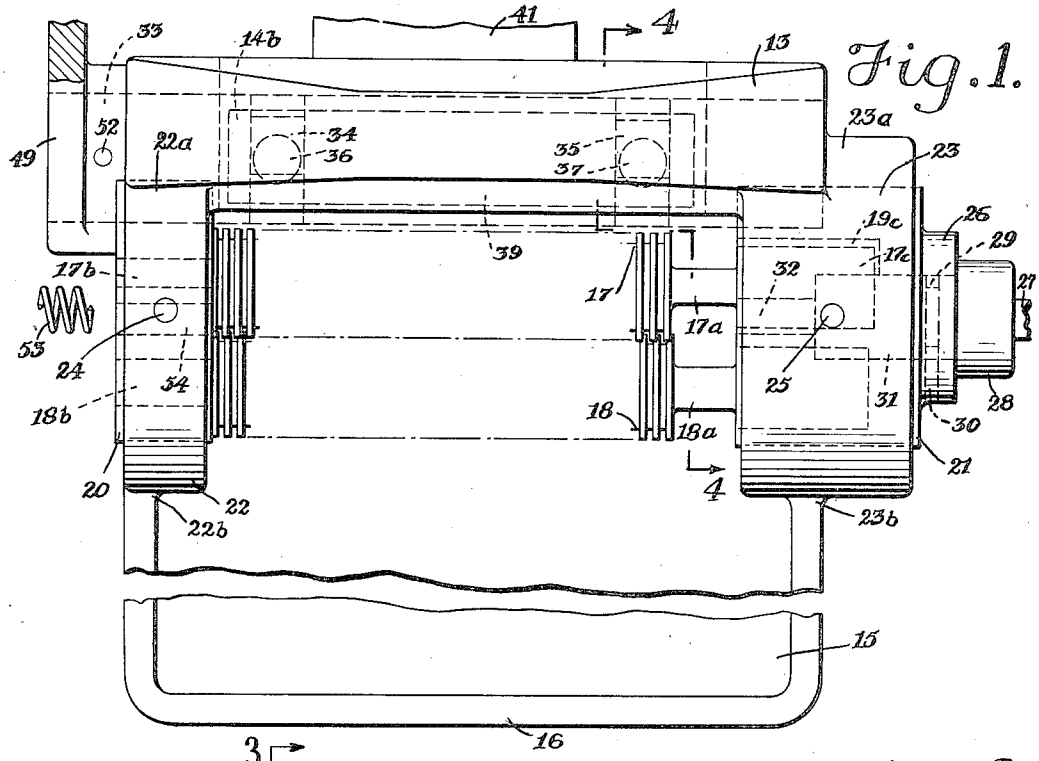
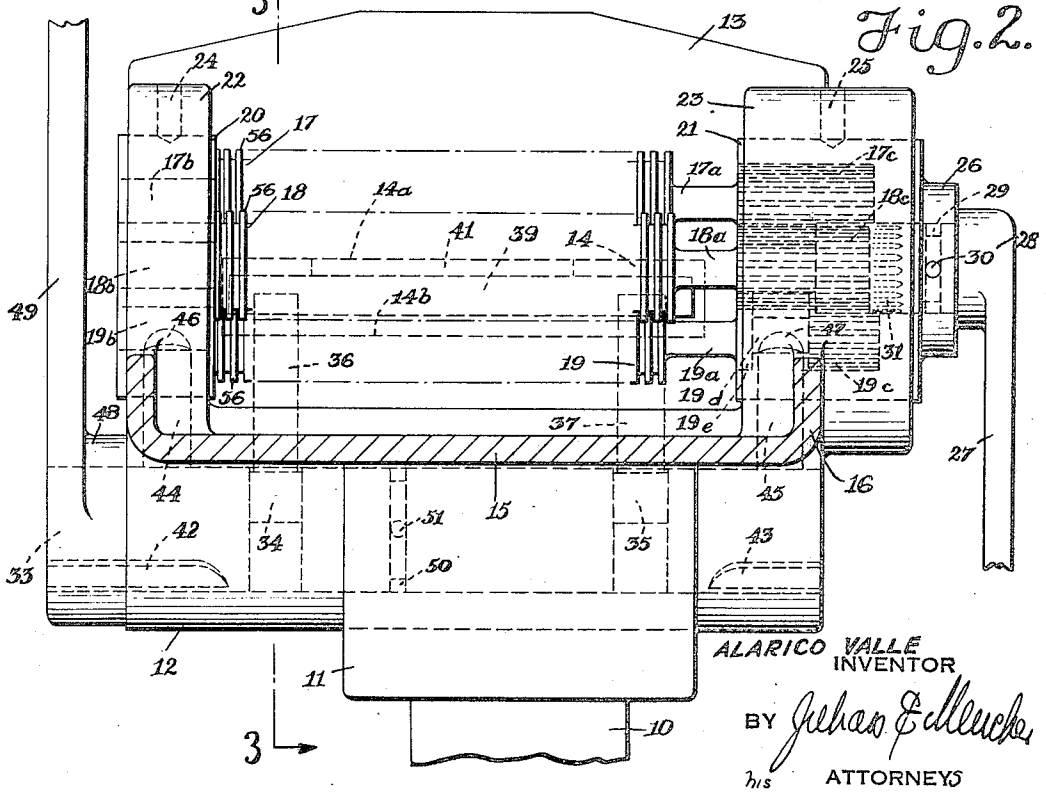


Fig. 2.



ALARICO VALLE INVENTOR

BY Julian & Mueller

his ATTORNEYS

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Fig. 3.

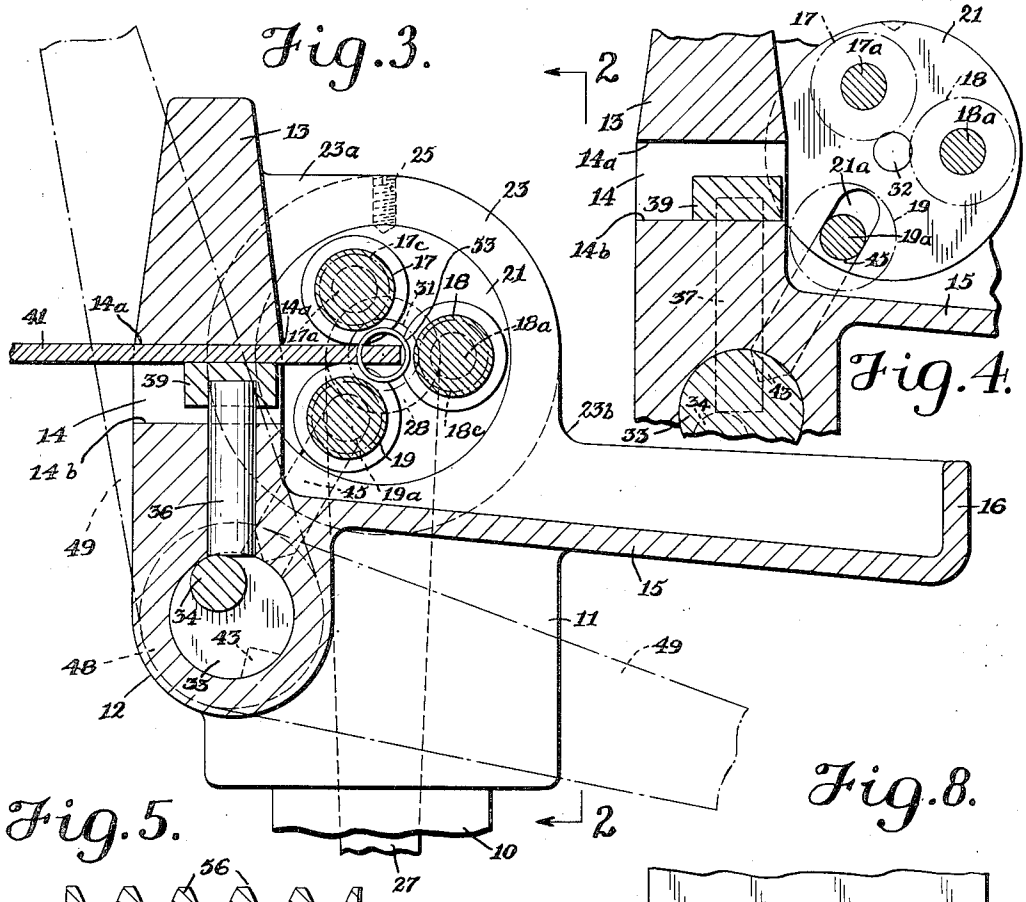


Fig. 4.

Fig. 5.

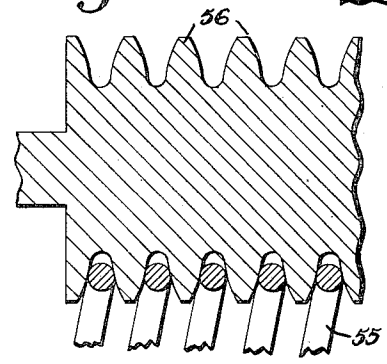


Fig. 8.

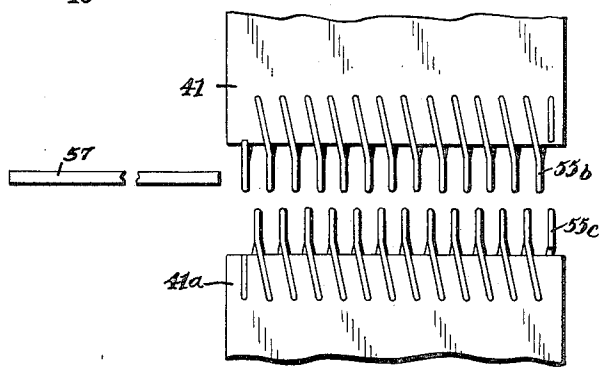


Fig. 6.

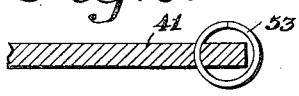


Fig. 7.

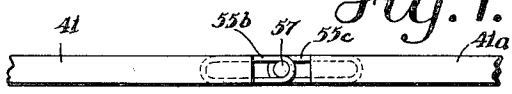


Fig. 9.



ALARICO VALLE INVENTOR

BY Julian Fellowes

his ATTORNEYS

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UNITED STATES PATENT OFFICE

2,023,652

BELT-LACING MACHINE

Alarico Valle, Yonkers, N. Y.

Application January 5, 1933, Serial No. 650,290

5 Claims. (Cl. 140—93)

This invention relates generally to belt lacing machines and more particularly to a belt lacing machine which stitches a continuous wire coil through the belt.

The primary object of the invention is to provide a machine whereby widths of belts are prepared for butt-jointing by stitching wire coils through the opposing widths to form projecting wire loops, and thereafter compressing these said projecting wire loops.

A further object of the invention is the provision of a machine which is composed of a minimum number of parts, a machine simple to manipulate, and manually operated.

An additional object of the invention is provision of a machine wherein the separate parts are easily assembled and replaceable.

This machine, by virtue of its principle of operation effects belt joints the parts of which do not overlap as in sewing, joints which do not weaken the belts to the same extent that other methods of connection do and joints wherein any short lengths of belting material may be brought together to form a continuous belt without appreciably impairing the flexibility of the said resultant belting.

A further advantage of the invention herein is the rapid making within a few minutes of neat, smooth and jarless connections which can easily be taken apart and replaced.

These objects and other incidental ends and advantages will appear hereinafter in the progress of this disclosure.

Accompanying this specification and forming part thereof are drawings showing a preferred form of the invention and on which drawings similar reference characters designate corresponding parts throughout these several views.

Figure 1 is a top plan view of the machine, the object of the invention herein, showing the main support thereof together with the other operative parts.

Figure 2 is a front elevational view of Figure 1.

Figure 3 is a sectional view along line 3—3 of Figure 2 and shows a belt portion in operative position with respect to the machine preliminary to either the perforation or stitching of an end thereof.

Figure 4 is a sectional view along the line 4—4 of Figure 1, showing the rollers in inoperative position.

Figure 5 is a fragmentary sectional view of any one of the longitudinal rollers comprising the machine showing the surface teeth and the engagement therewith of stitching material in the form of a wire coil.

Figure 6 is a fragmentary section showing an edge of any belting with the wire loop stitched therein.

Figure 7 is a sectional view showing opposing edges of belting having end projecting wire coil loops compressed and the said compressed loops being intermeshed together in hinge fashion and being pliably held in place by means of a non-metallic pin.

Figure 8 is a plan view showing two ends of a belting sought to be joined, the said ends having been stitched by wire coils, thereafter having been compressed and subsequently having the projecting loops straightened out for intermeshing purposes.

Figure 9 is a view in elevation showing a width of a wire coil used for stitching purposes.

In accordance with the invention and in accordance with the several views cylindrical and adjustable upright 10 has affixed to the upper portion thereof a seat member 11, said seat member 11 being preferably a casting and serving as the support for the frame work of the machine. The frame work comprises a rear longitudinal member having a lower portion 12 substantially semi-circular in section, the said lower portion extending upwardly to form a back plate 13.

14 represents a rectangular opening in the back plate 13 as is best shown in Figures 3 and 4 of the accompanying drawings, 14a being the upper face and 14b being the lower face of the said opening.

Lower portion 12 of the rear longitudinal member has extending forwardly from the front face thereof an apron plate 15 downwardly inclined throughout the length of the said longitudinal rear member, the apron plate 15 being provided with a front and side guide flanges 16.

Three longitudinal rollers having external teeth 56 in the form of transverse rings on the surface thereof, to form intermediate grooves and being in spaced and parallel relation and operatively co-acting with each other are rotatably mounted in end bearing plates, the said bearing plates being affixed in corresponding circular housings, the said housings being webbed preferably to the front face of back plate 13 and to the side guide flanges 16 as best shown in Figures 1 and 3 of the accompanying drawings.

17 designates the upper roller; 18 designates the outer roller and 19 designates the clamping roller. 17a represents the neck of upper roller 17 and is reduced therefrom in diameter only to be

enlarged again to form a spur gear wheel 17c at one end thereof. 18a similarly is the neck portion of outer roller 18 reduced in diameter and enlarged to form a spur gear wheel 18c at the end of said outer roller 18. 19a likewise designates the neck portion of the lower and clamping roller 19 and is first increased in diameter to form an enlarged shoulder 19e, then reduced thereafter to form a second neck portion 19d and finally enlarged to form a spur gear wheel 19c, all as best shown in Figure 2 of the accompanying drawings. Rollers 17, 18, and 19 at the ends opposite from the neck portions 17a, 18a, and 19a are provided with similar and reduced portions 17b, 18b, and 19b respectively serving to act as spindles for the rotation of rollers 17, 18, and 19.

20 represents a circular and left bearing plate for rollers 17, 18, and 19 and has two spaced cylindrical borings for spindles 17b and 18b, the third spindle 19b being provided with a slotted bearing guide in 20 cooperating with a shifting rod 44 hereinafter to be described to offer both rotational and linear movement for roller 19.

Similarly, 21 represents a circular and right bearing plate for rollers 17, 18, and 19 and is excavated from the inner face thereof to preferably a greater part of the width of the said 21 to form a separate bearing for spur gear wheel 17c, a separate bearing for spur gear wheel 18c, and a slotted bearing guide 21a cooperating with a shifting rod 45 hereinafter to be described to offer both rotational and linear movement for roller 19.

Housings 22 and 23 hereinbefore mentioned are connected to the frame work of the machine by means of webs 22a, 22b, 23a, 23b respectively, these webs joining the front face of back plate 13 near the side edges thereof and the side guide flanges 16 of apron plate 15. Set screws 24 and 25 situated on housings 22 and 23 function to set and maintain the opposite positions of left and right bearing plates 20 and 21 into which are mounted the parallel, longitudinal and spaced rollers 17, 18, and 19.

26 is a concentric boss on the outer face of right bearing plate 21, the said concentric boss and right bearing plate having a central bore extending approximately mid-way and inwardly of plate 21, the said bore continuing in a reduced diameter to the inner face of plate 21. A driving gear wheel intermeshing with spur gear wheels 17c, 18c, and 19c occupies the central bore above mentioned as a bearing, and a projecting concentric and reduced portion thereof or spindle occupying the bore of reduced diameter as an auxiliary bearing. The assembly of the driving gear wheel includes a crank lever, a shoulder 28 abutting the outer face of boss 26, a driving gear wheel 31, a concentric and projecting spindle 32, an annular groove 29 at the outer and non-toothed portion of wheel 31 at the boss area and a set screw 30 adapted to fit into groove 29 from boss 26 to prevent withdrawal of driving gear wheel 31 from its bearing in right bearing plate 21.

33 is a cylindrical and longitudinal shaft penetrating the rear longitudinal member of the frame work of the machine at the lower portion 12, and has two similar eccentric spindles 34 and 35 equidistant from the center of shaft 33, these said spindles supporting upright rods 36 and 37 which penetrate lower face 14b of rectangular opening 14. The said rods 36 and 37 are furnished with vertical borings as bearings, the said borings extending in the rear longitudinal member from lower face 14b of opening 14 to eccentric spindles 34 and 35. Rods 36 and 37 at their upper ends support a vise plate 39 having free play between upper and lower faces 14a and 14b of rectangular opening 14.

Between the upper face of vise plate 39 and upper face 14a of rectangular opening 14, the end of a belt 41, of any non-metallic material, such as leather, composition, felt and the like, is fed forwardly for purposes of preparing an edge thereof for butt-jointing purposes. As has hereinbefore been mentioned, roller 19 is a clamping roller, and in addition to rotational motion, the said roller 19 must have linear displacement along the guide slots therefor developed in the left and right bearing plates 20 and 21 respectively. To accomplish such linear displacement in roller 19, cylindrical shaft 33 simultaneously with its displacement of rods 36 and 37 by means of eccentric spindles 34 and 35 respectively is provided with cooperating means to effect linear displacement of roller 19.

42 and 43 represent longitudinal V notches along an element of cylindrical shaft 33, being positioned outside the eccentric spindles 34 and 35 and extending to the ends of cylindrical shaft 33. Rods 44 and 45 hereinafter to be designated as shifting rods for clamping roller 19 are wedge-shaped at their lower ends to articulate with V notches 42 and 43 respectively. The upper ends of shifting rods 44 and 45 are worked out in the form of semi-cylindrical surfaces 46 and 47 respectively, these said surfaces acting as the support bearings for clamping roller 19 at spindles 19b and 19c respectively. When shifting rods 44 and 45 are lowered, clamping roller 19 is lowered, and driving gear wheel 31 looses its mesh with spur gear wheel 19c which fact prevents the machine from operating as will hereinafter appear. The lowering of clamping roller 19 is simultaneously accompanied by a lowering of rods 36 and 37 by virtue of the special interrelation between eccentric spindles 34 and 35 and the V notches 42 and 43 respectively.

Shifting rods 44 and 45 are provided with upward and forwardly inclined bearings in the form of borings penetrating the frame work and housings of the machine, the borings being coextensive in direction with the side walls of the guide slots for roller 19.

48 is a collar for cylindrical shaft 33 and abuts the left end of member 12 of the frame work while 49 is a clamping lever affixed to collar 48. 50 is an annular groove in cylindrical shaft 33 with set screw 51 penetrating the same from member 12 to prevent withdrawal of the said shaft from its bearing in 12. 52 is a set screw affixing collar 48 to the cylindrical shaft 33.

In Figure 3 of the accompanying drawings clamping lever 49 in the lower position effectuates a tightening of vise plate 39 and at the same time raises roller 19 to its single and critical operative position. This simultaneous action is due to the fact that when lever 49 is lowered from its upright position the wedge-shaped ends of shifting rods 45 and 46 are immediately forced out of V notches 42 and 43, respectively thereby causing the said shifting rods to raise roller 19 in critical position and against the width of belt 41 to be operated upon. Thereafter eccentric spindles 34 and 35 operate to raise rods 36 and 37 during which period the lower edges of the shifting rods remain at the same radial distance with respect to shaft 33.

53 represents a helical perforator or cutter and is adapted to be passed through an orifice 54 in the left bearing plate 20 and led into the grooves of rollers 17, 18, and 19. The rollers 17, 18, and 19 at the grove portions thereof are so situated that the helical perforator touching the grooves of each roller is caused to travel in screw-like fashion to the opposite end of the machine where it falls out on the apron plate 15, the screw-like travel of the helical perforator being actuated by turning crank lever 27 toward the operator.

It therefore becomes manifest that when a belt of any non-metallic material to be butt-jointed such as 41 is fed forwardly through rectangular opening 14 until the forward edge thereof abuts the teeth 56 of front roller 18, and when clamping lever 49 is lowered from its unclamping and normal upright position to the lower position to wedge the rear portion of belt 41 between vise plate 39 and upper face 14a, and to shift roller 19 to critical clamping position for a substantially standard thickness of belting, the lacing machine is prepared for its operation. Thereafter helical perforator 53 is passed through orifice 54 by means of any pin until the perforator strikes the rollers. Hereupon the crank 27 is turned with the right hand slowly and forwardly to the operator, while at the same time the left hand of the operator pushes the helical perforator 53 with any pin lightly against the rollers, turning the said perforator in the direction of the turning of crank 27. The perforator 53 is then seized by the three rollers and by a continued turning of crank 27 the perforator continues to travel axially between the three rollers 17, 18 and 19 and during such travel perforates the tightly held belt 41 for its entire width near the forward edge thereof. The perforator 53 falls out by its own weight at the right at the neck of the three rollers 17, 18 and 19.

55 is a wire lacing coil of the same helical dimensions as perforator 53 and constitutes the lacing material for the butt-jointing of belts. A piece of such wire coil 55 as long as the width of the tightly held belt is cut off by means of a wire cutter; when cutting, care must be exercised not to cut the wire on a slant. If the lacing coil 55 is cut on a slant, then the front of the end must be directed outwardly so that it may enter the perforations in belt 41 screw-like fashion.

The cut-off piece of wire coil 55 is then introduced through orifice 54 and passed through to the rollers 17, 18, and 19. When crank 27 is turned wire lacing coil 55 screws itself through the pre-perforated holes in the firmly secured belt 41. When it is seen between the rolls that the wire coil has moved across the entire width of the belt and perhaps projects on either side of the same by a few turns, the turning of crank 27 is discontinued and the belt is released by the lifting of hand lever 49 to a vertical position. Hereupon wire coil 55 stitched into an edge of belt 41 and projecting therefrom in the form of rounded loops is clamped between upper face 14a and vise plate 39 and is pressed flat by the downward movement of clamping lever 49. During this operation the wire 55 must be thoroughly pressed into the material of the belt. When the wire coil 5 has already been stitched into the edge of belt 41 and compressed the ends projecting off the side edges of belt 41 are cut off with a wire cutter and the loose ends of the wire coil doubled back to prevent injury to the operator. If there is any slight twist in the wire loops projecting from edge of belt 41 the said loops represented by number 55b may be straightened out with a pair of pliers, the resultant lacing appearing as shown in Figure 9 of the accompanying drawings. The complementary belting 41a is similarly treated as 41 and offers projecting wire loops 55c.

After both ends of the belt are provided with wire loops as hereinabove mentioned the two ends of the belt are brought together and intermeshed by means of these loops 55b and 55c and the joint is then completed by means of a strip of gut fiber 57, or other similar material the length of the width of the joint.

It is important to set forth the fact that the machine described hereinabove is adapted for specific thicknesses of belting, the helical perforator 53 being of a size which cooperates with a specific spacial arrangement of the three grooved rollers 17, 18, and 19. Moreover, each machine is adapted for a particular width of belt to be laced. It is significant that the width of the machine may be altered and the helical dimensions of perforator 53 enlarged or decreased with accompanying rearrangement of rollers 17, 18 and 19 in order to accommodate the lacing of belting of different widths and thicknesses.

Driving gear wheel 31 instead of being manually operated can be electrically driven.

I wish it distinctly understood that minor changes, consolidations and rearrangements of parts of this machine which embody the same mode of operation may all be resorted to without departing from the spirit of the invention and without departing from the scope of the appended claims.

1. In a machine for belt lacing of the character described, a stationary frame, two grooved rollers in spaced and parallel relation mounted therein, a third single roller shiftably mounted in said stationary frame, an actuating spindle revolubly mounted within the said stationary frame, the said actuating spindle having reduced eccentric portions and cut out portions on the surface thereof, clamping means supported by the said reduced eccentric portions and shifting means supported by the said actuating spindle in conjunction with the cut out portions whereby upon rotation of the said actuating spindle, the third roller is shifted to operative position and the clamping means are shifted to operative position in consecutive order.

2. In a machine for belt lacing of the character described, a stationary frame, a plurality of grooved rollers in spaced and parallel relation mounted therein, a third similar roller shiftably mounted in said stationary frame, an actuating spindle revolubly mounted within the said stationary frame, the said actuating spindle having reduced eccentric portions and cut out portions on the surface thereof, clamping means supported by the said reduced eccentric portions and shifting means supported by the said actuating spindle in conjunction with the cut out portions whereby upon rotation of the said actuating spindle, the third roller is shifted to operative position and the clamping means are shifted to operative position in consecutive order.

3. In a machine for belt lacing utilizing a stationary frame, a clamping roller shiftably mounted in said stationary frame, an actuating spindle revolubly mounted within the said stationary frame, the said actuating spindle having reduced eccentric portions and cut out portions on the surface thereof, clamping means supported by the said reduced eccentric portions and shift-

ing means supported by the said actuating spindle in conjunction with the cut out portions whereby upon rotation of the said actuating spindle, the clamping roller is shifted to operative position and the clamping means are shifted to operative position in consecutive order.

4. In a machine for belt lacing utilizing a stationary frame, a clamping roller shiftably mounted in said frame, an actuating spindle revolubly mounted within the said stationary frame, the said actuating spindle having cut out portions on the surface thereof, shifting means supported by the said actuating spindle in conjunction with the said cut out portions whereby upon rotation of the said actuating spindle, the said clamping roller is shifted to operative position.

5. In a machine for belt lacing utilizing a stationary frame, a clamping member mounted within said stationary frame, an actuating spindle revolubly mounted within the said stationary frame, the said actuating spindle having reduced eccentric portions supporting the said clamping member whereby upon rotation of the said actuating spindle, the clamping member is shifted to operative position.

ALARICO VALLE.