

Sept. 12, 1944.

S. L. GOOKIN

2,357,889

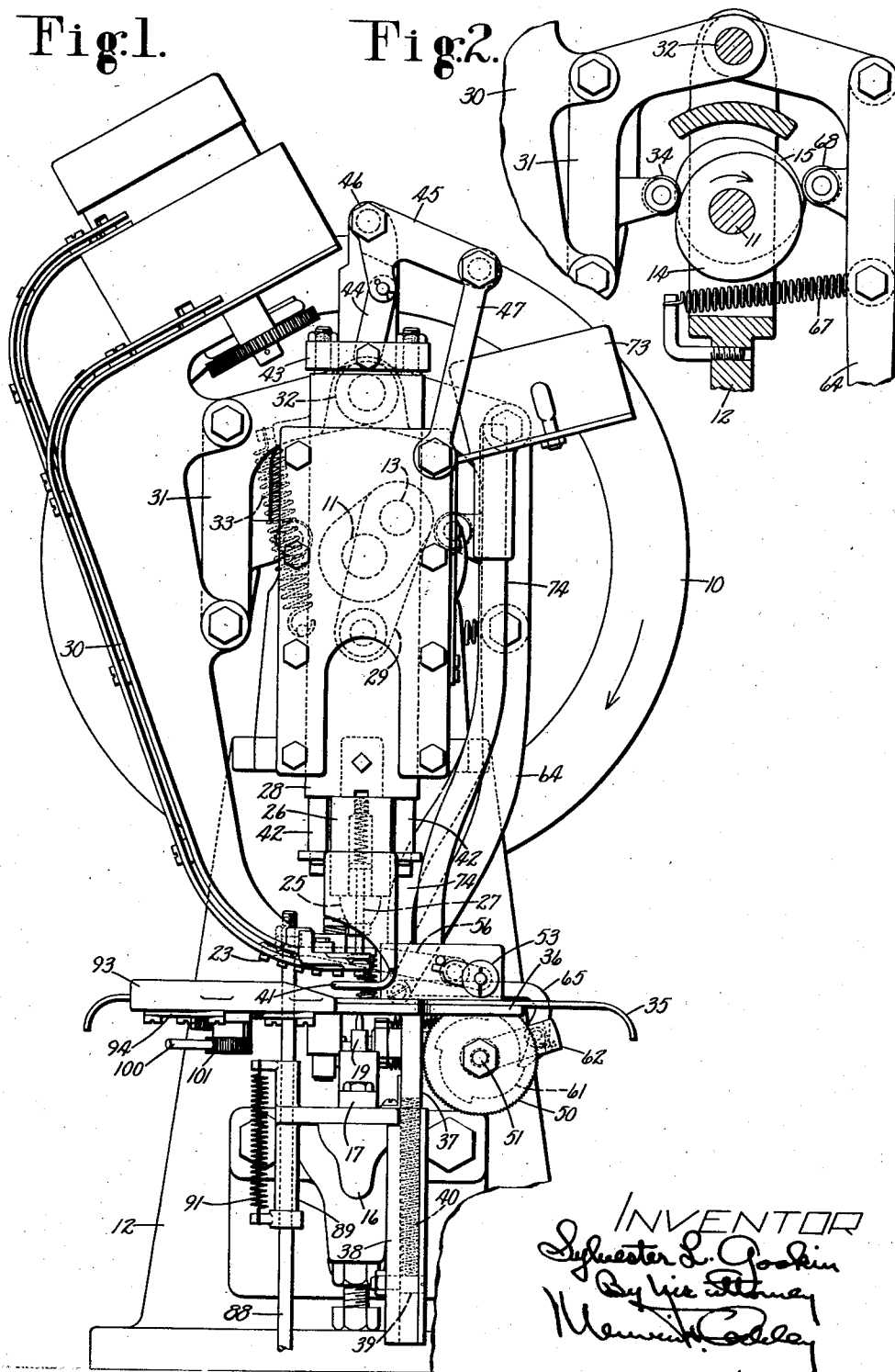
FASTENER-INSERTING MACHINE

Filed Jan. 8, 1943

2 Sheets-Sheet 1

Fig.1.

Fig.2.



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Fig.3.

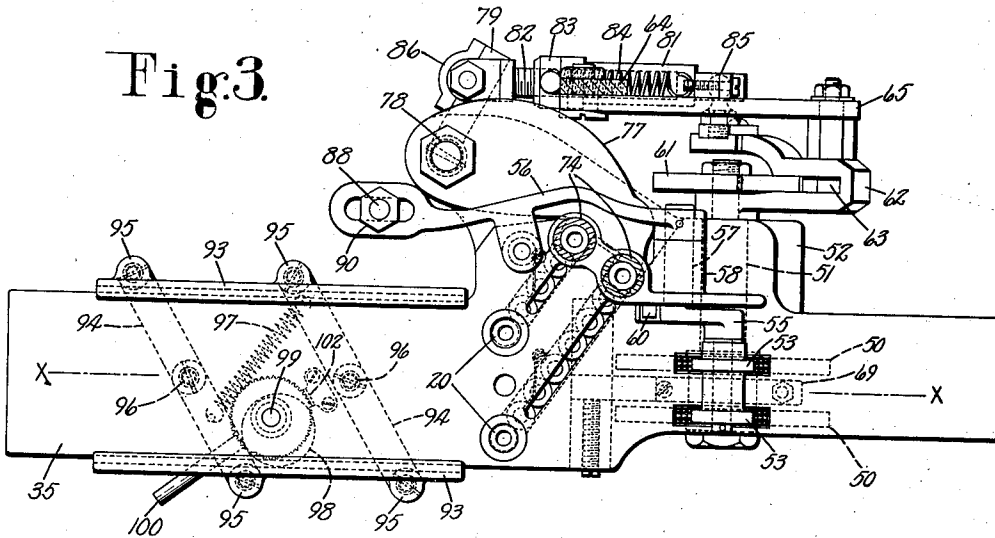


Fig. 4.

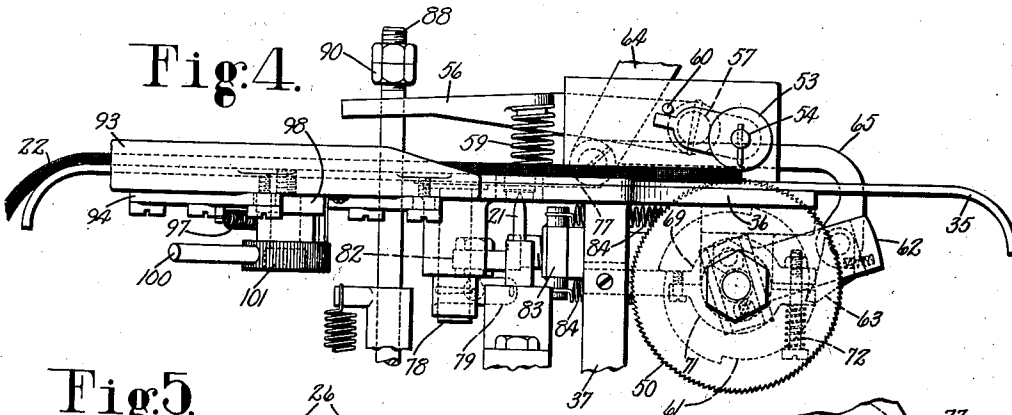


Fig.5.

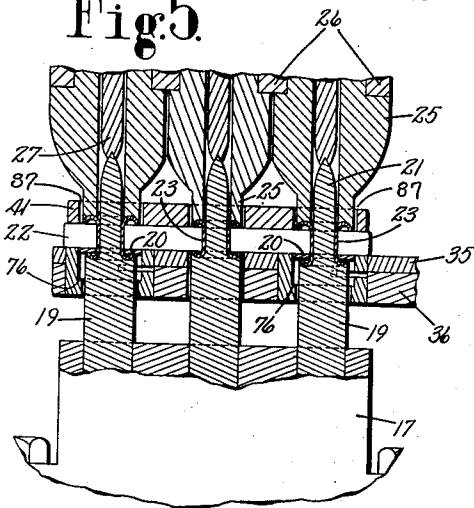
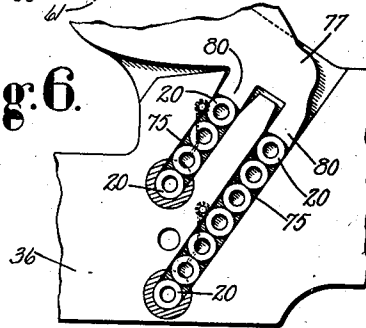


Fig. 6.



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FASTENER-INSERTING MACHINE

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Application January 8, 1943, Serial No. 471,668

14 Claims. (Cl. 218—0.5)

The purpose of the present invention is to provide improvements in machines for inserting fasteners and supplying them with washers. The improvements herein set forth are embodied in a machine equipped to insert three eyelets at once and to supply only two of them with washers as required for military belts made of thick webbing. A similar machine for the same purpose, but without these improvements, is shown and described in my copending application Serial No. 442,423, filed May 11, 1942, in the United States Patent Office.

One of the improvements provided by the present invention consists in a novel combination comprising washer-feeding means and work-feeding means so organized and coupled as to derive their operating motions from a common actuator by which washers are moved successively into alignment with eyelet-setting tools in synchronism with feeding steps imparted to the work.

Another improvement, predicated upon the one first specified, consists in resilient means by which operating strokes are normally communicated to the washer-feeding member in synchronism with operating strokes positively imparted to the work-feeding member but with provision for absorbing the motion of the common actuator without damaging the combined mechanisms in the event of clogging of washers. In this respect, continued operation of the work-feeding means, notwithstanding such clogging, is assured to avoid more serious damage which would occur if eyelets already inserted were to remain at the setting locality during a subsequent cycle of the eyelet-inserting mechanism.

Still another improvement is embodied in work-guiding means designed to maintain the median line of a belt in the median line of its pathway despite variations of its width.

Referring to the drawings,

Fig. 1 is a front elevation of a machine embodying the invention;

Fig. 2 is a vertical section of two cam motions, one for the eyelet raceway and the other for feeding washers and the work;

Fig. 3 is a top plan view including the work-supporting table, the washer-feeding means and the work-feeding means;

Fig. 4 is a front elevation of the assemblage shown in Fig. 3 with the addition of a work piece in the starting position;

Fig. 5 is a vertical section of the eyelet-setting tools in the act of completing a setting opera-

tion, the direction of the view being from right to left; and

Fig. 6 is a top plan view including a portion of the lower plate of the work table and a portion of the washer feeder.

With the exception of the work-feeding means, the work-guiding means and the washer-feeding means the general organization of the machine herein shown is the same as that shown in my former application identified above, but it is to be noted that the crank for operating the eyelet-setting plunger (Fig. 1) moves about 36° beyond top center to its stopping position. The reason for this choice of a stopping position is to complete the final work-feeding motion in every run of the machine, and that result is obtained by a corresponding angular setting of the crank shaft with respect to the driven member of a clutch, the details of which are not shown.

The pulley 10, to be rotated by a belt, is loosely mounted on the crank shaft 11 and its hub constitutes the driving member of the clutch. The shaft 11, journaled in a frame 12, carries a crank 13, a raceway cam 14 and a cam 15, in addition to the driven member of the clutch. The motion derived from the cam 15 feeds the work and operates a washer-feeding member (Figs. 3 and 6).

A horn 16, rigidly secured to the frame 12, supports a tool block 17 in which three anvils or setting tools are fixed in a row (Fig. 5), the middle anvil 18 being adjusted heightwise to upset an eyelet without a washer, and the two outer anvils 19 being adjusted slightly lower to upset eyelets against washers 20. Each anvil is provided with a pointed central projection 21 for piercing the work 22 and thereafter guiding the barrel of an eyelet 23 through the work. Although Fig. 5 represents the elements in section the customary cross-hatching is omitted from the work piece to avoid obscuring the eyelets and washers and to leave blank spaces for reference numerals.

Three eyelet-setting tools 25 are affixed to a tool block 26 and each is provided with a spring-pressed spindle 27 for picking an eyelet from a raceway. The block 26 is carried by a vertically movable plunger 28 guided by the frame 12 and operated by the crank 13 to which it is connected by a link 29.

Eyelets are presented to the spindles 27 by a three-track raceway 30 affixed to a carrier 31. The latter is connected to the frame 12 by a rod 32 which serves as a fulcrum. The delivery end of the raceway is pulled into alignment with the

spindles by a tension spring 33 and is retracted by the cam 14 which engages a roll 34 mounted on the carrier 31. The eyelets at the delivery ends of the tracks are controlled as usual by spring-pressed detents.

The machine is provided with a work table which normally supports the work piece 22 slightly above the points 21 but yields downwardly when the work piece is depressed. The table comprises an upper plate 35 and a lower plate 36 affixed one to the other in face-to-face contact. The two-ply construction is merely to facilitate the work of making the table. A shank 37 formed on or welded to the plate 36 projects downwardly therefrom and is arranged to slide up and down in a guiding bracket 38 affixed to the horn 16. Compression springs normally raise the shank against a stop 39. One of these springs 40 is shown in Fig. 1.

A presser foot 41 is provided to force the work piece down on the points 21 in advance of the ingoing eyelets. It is formed on a hollow member carried by a pair of parallel rods 42 that slide in bearings formed in the plunger 28. The upper ends of the rods are connected by a head-piece 43 to which vertical strokes are imparted by a link 44 and a bell crank 45. The fulcrum 46 of the bell crank is carried by the plunger and one arm is connected to the frame 12 by a link 47. By means of these connections the presser foot derives up and down motions from the plunger 28, but its strokes are shorter than those of the plunger and its down strokes are terminated earlier than those of the plunger. Moreover, the presser foot is provided with three holes (Fig. 5) through which the setting tools may pass.

When the crank 13 is within the range of an arc extending about 40° each side of top center of its path of travel the work table remains at its highest level determined by the stop 39, and while the crank is traversing this arc the corresponding movement of the presser foot leaves the work piece free to be fed along the table. One of the features of the present invention is embodied in automatic work-feeding mechanism arranged to impart feeding steps during the intervals above specified.

A pair of toothed feed rolls 50 connected by a hub are affixed to a shaft 51 journaled in a bearing 52 (Fig. 3). The bearing is carried by the work table in which holes are provided to enable the teeth of the feed rolls to engage the lower surface of a work piece. A pair of presser rolls 53 are arranged to engage the upper surface of the work piece and press the latter against the feed rolls. The presser rolls are freely rotatable on a stem 54 carried by a rocker arm 55. Another arm 56 is rigidly connected to the arm 55 by a rock shaft 57 and the latter is journaled in a bearing 58 carried by the table. A compression spring 59 engaging the arm 56 normally maintains pressure of the rolls 53 against the work, but when no work is present the arm 55 will engage a stop 60 to prevent contact of the rolls 53 with the teeth of the feed rolls.

The rolls feed the work from left to right and are located at the leaving side of the eyelet-setting locality. Moreover, the nip of the rolls is spaced from that locality by a distance equal to the prescribed distance from the leading end of a military belt to the first row of eyelets to be inserted therein. Accordingly, the rolls 53 first serve to locate the leading end of a belt at the desired position for the first operating cycle.

The mechanism for driving the feed rolls comprises a ratchet wheel 61 affixed to the shaft 51, a pawl carrier 62 loosely mounted on the shaft, a driving pawl 63 mounted on the carrier, an operating arm 64, a link 65 connecting the arm and the carrier, a cam 15 carried by the shaft 11 (Fig. 2) and a spring 67 by which a roll 68 on the arm 64 is maintained against the cam. The rod 32 is the fulcrum on which the arm swings. The operating strokes of the pawl are derived from the cam and are positive. They occur only while the work table is stationary and at its highest level. Each operating stroke is long enough to feed the work the required distance, and the teeth of the ratchet wheel are spaced accordingly.

To prevent over-travel and reverse turning of the feed rolls a friction brake is arranged to engage the hub by which these rolls are connected. As shown in dotted lines in Fig. 4, one brake shoe 69 is provided with an anchoring stem 70 and the latter is inserted into a hole in the member 37 and fastened by a set-screw. Another brake shoe 71 is loosely connected to the first and the braking force is applied by a compression spring 72.

The washers 20 are supplied by a hopper 73 affixed to the frame 12 (Fig. 1). They gravitate through a pair of tubes 74 the upper ends of which have telescopic engagement with the hopper and the lower ends of which are flush with the lower surface of the upper plate 35 of the work table. To provide for this flush relation holes are formed in the plate 35 to receive the tubes, and the latter are secured to the table by the bearing member 58 in which sockets are formed to receive them.

As the lowest washer in each column drops from its tube 74 it enters one of two straight grooves milled in the upper surface of the lower plate 36 to provide tracks 75 for guiding the washers edgewise. The depth of these grooves is only slightly greater than the thickness of a washer to afford clearance. The grooves guide the washers to the pointed projections 21 of the two anvils 19 at a level slightly above the points. As the washers move into alignment with the anvils they enter tubular socket members (Fig. 5) pressed tightly into holes in the table and provided with internal shoulders 76 by which the washers are temporarily supported. The smallest internal diameter of these socket members is greater than the diameter of the anvils to provide clearance.

As shown in Fig. 6, washers are accumulated in edge-to-edge relation in each of the guiding grooves in consequence of advancing them with steps equal to their diameter. Both trains of washers are fed by a member 77 consisting of a blade of sheet steel of about the same thickness as the washers. The feeder 77 is carried by a rock shaft 78 to which an operating arm 79 is affixed, and the rock shaft is journaled in a bearing carried by the work table. To-and-fro motions imparted to the arm 79 cause two tongues 80 of the feeder to sweep across the lower ends of the washer tubes 74. The tongues support the stacks of washers in the tubes while advancing the trains of washers lodged in the guiding grooves above described. When the feeder is fully retracted its tongues clear the stacked washers, whereupon two of them drop into the guiding grooves.

The washer-feeder derives its to-and-fro motions from the pawl carrier 62 to which the arm

79 is connected by yieldable means designed to avoid damaging the machine in the event of clogging the tracks 75. The yieldable connections comprise (Fig. 3) a tubular socket member 81, a stem 82 telescopically related thereto but having a screw thread engaged only by an internally threaded collar 83, tension springs 84 connecting the collar and the socket member, a ball-and-socket connection 85 by which the pawl carrier and the member 81 are connected, and a ball-and-socket connection 86 by which the arm 79 and the stem 82 are connected. The springs 84 enable the socket member 81 to be pulled away from the collar 83 by the operating strokes of the pawl carrier whenever the normal operation of the feeder 77 is prevented by an obstruction.

When the washer feeder is operating normally, that is, when it is not obstructed, its feeding strokes coincide with the work-feeding strokes of the pawl 63. On the other hand, normal operation of the work-feeding means will continue despite obstruction of the washer feeder and avoid superposing eyelets on those already clenched in a work piece.

Once a belt 22 has been placed on the work table with its right hand end in the nip of the rolls 50 and 53, the operator has only to trip the clutch and keep it in operation through the desired number of cycles before releasing the clutch-treadle (not shown). The down stroke of the plunger 28 first carries the spindles 27 through eyelets in the raceway and depresses the presser foot 41. The raceway cam now retracts the raceway while the presser foot depresses the belt 22 and the work table. Washers previously lodged on the shoulders 76 (Fig. 5) descend with the work table and surround the pointed projections 21 while the belt is being forced down by the presser foot.

When the belt has been depressed to the roots of the projections 21 the down stroke of the presser foot is fully spent, but the down stroke of the plunger 28 continues. Now, the ingoing eyelets traverse the projections 21, pass through holes 87 in the presser foot, through the belt 22, and two of them enter the washers now lodged on the anvils 19. When the down stroke of the plunger 28 is completed the three eyelets are clenched and now the up stroke of the plunger begins.

The presser foot rises during the latter stages of the up stroke of the plunger, thereby permitting the work table to raise the belt above the points of the projections 21. When this stage is reached the work table is arrested, the presser foot releases the belt and the feeding stroke of the arm 64 begins. Now the feed rolls 50 advance the belt one step, the washer feeder 77 pushes two washers into alignment with the anvils 19, and the raceway 30 moves to its delivering position. The cycle may be repeated any number of times without interruption in one run of the machine according to how long the operator holds the clutch in operation. At the conclusion of the final cycle the parts will be left in the positions represented in Figs. 1 and 2.

To facilitate inserting and removing a belt, which would normally extend between the rolls 50 and 53 at the conclusion of a run, a treadle rod 88 is provided to lift the rolls 53. This rod extends through a stationary guide 89 (Fig. 1) and through a hole in the arm 56. A nut 90 carried by the rod actuates the arm 56 only when the rod is depressed in opposition to a spring 91.

A collar 92 affixed to the rod is normally upheld against the guide 89. In normal running of the machine the arm 56 will travel up and down without encountering the nut 90.

The work table is provided with work-guiding means designed to maintain the median line of a belt in register with the median line of the track provided by the work table. Belts of this type are woven and each has two selvages. They are intended to be all of one width, but the webbing of which they are made is woven by different manufacturers and some are narrower than others. The belt makers are consequently confronted with the problem of locating the eyelets and washers symmetrically between the selvages despite the differences in width above mentioned.

In Fig. 3 line X—X represents the median line of the path to be traversed by a belt. Two spaced work-guiding bars 93 are provided with straight confronting faces in parallel relation and equally distant from the line X—X. These faces are arranged to be engaged by the longitudinal edges of a belt. The bars are connected by a pair of parallel levers 94 and connecting pivots 95. Midway between the latter the levers are connected to the bottom of the work table by pivots 96 the centers of which are on the median line X—X. These levers constrain the bars 93 to move equally toward and from each other, but the bars are normally constrained toward each other by a light tension spring 97 attached to the levers. The power of the spring is not so great as to distort a belt or affect its feeding steps.

For the purpose of regulating the minimum distance between the bars 93 an adjustable stop 98 is attached to the bottom of the table to be engaged by one of the levers 94. The stop is mounted on a pivot 99 and provided with an adjusting handle 100 projecting from a hub on the periphery of which teeth 101 are formed to be engaged by a spring detent 102. When a belt is placed between the bars 93 the operator may quickly adjust the latter according to the width of the belt by moving the handle 100. So long as the space between the bars is no greater than the width of a belt the bars will maintain centralized tracking of the belt.

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 fastener-inserting machine of the type in which fasteners are supplied by automatic means to a power-operated fastener-inserting tool, the combination therewith of a work-supporting table having a washer-track, a member arranged to feed washers along said track and into alignment with said tool, a work-feeding member, and a power-actuated member by which said work-feeding member and said washer-feeding member are operated in synchronism.

2. A machine comprising the combination specified in claim 1 in which a resilient operating connection is interposed between the washer-feeding member and the power-actuated member.

3. In a fastener-inserting machine of the type in which fasteners are supplied by automatic means to a power-operated fastener-inserting tool, the combination therewith of a movable work-supporting table, power-operated means for moving the table up and down in timed relation to the strokes of said tool, a work-feeding member carried up and down by the table, and power-operated mechanism arranged to operate said work-feeding member.

4. An eyeletting machine comprising a power-operated plunger provided with an eyelet-inserting tool, a depressible work-table, work-feeding means carried by the latter, resilient means for normally raising the work-table, a power-operated presser foot arranged to depress and release the work, and power-operated means by which said work-feeding means is operated while the work is released by the presser-foot.

5. An eyeletting machine as specified in claim 4 comprising also washer-feeding means carried by the work-table, and means by which the washer-feeding means and the work-feeding means are coupled to be operated by one power-operated means common to both.

6. In a fastener-inserting machine of the type in which fasteners are supplied by automatic means to a power-operated fastener-inserting tool, the combination therewith of a movable work-supporting table having a washer-track, a member carried up and down by the table to feed washers along said track and into alignment with said tool, a work-feeding member carried up and down by said table, means by which said feeding members are coupled to be operated in synchronism, and a power-actuated member arranged to operate said feeding members.

7. In a fastener-inserting machine of the type in which fasteners are supplied by automatic means to a power-operated fastener-inserting tool, the combination therewith of a movable work-supporting table, power-operated means for moving the table up and down in timed relation to the strokes of said tool, a work-feeding roll carried up and down by the table, and power-operated means arranged to drive the feeding roll step by step.

8. In a fastener-inserting machine of the type in which fasteners are supplied by automatic means to a power-operated fastener-inserting tool, the combination therewith of a movable work-supporting table having a washer-track, power-operated means for moving the table up and down in timed relation to the strokes of said tool, a feed-roll carried up and down by the table, an operating member also carried up and down by the table for imparting feeding steps to said roll, means for reciprocating said member, and means operable by said operating member for feeding washers along said track and into alignment with said tool.

9. In a fastener-inserting machine of the type in which fasteners are supplied by automatic means to a power-operated fastener-inserting tool, the combination therewith of a movable work-supporting table, power-operated means by which said table is moved up and down in timed relation to the strokes of said tool and with an interval of dwell at its highest level, a work-feeding member carried up and down by the table, and power-operated mechanism by which said member is operated only during such interval of dwell.

10. An eyeletting machine of the type in which a strip of work is pressed down upon one or more

pointed punches by a power-operated presser before the eyelets are inserted and thereafter raised above the punches by a yieldable support as the presser rises, a stop for arresting the upward travel of the support before that of the presser is completed, means carried by the work-support for feeding the strip, and power-driven means arranged to operate the feeding means while the work-support is against said stop.

11. An eyeletting machine of the type in which a strip of work is pressed down upon one or more pointed punches by a power-operated presser before the eyelets are inserted and thereafter raised above the punches by a yieldable support as the presser rises, a stop for arresting the upward travel of the support before that of the presser is completed, a pair of rolls carried by the work-support to travel up and down therewith and arranged to grip the strip of work, and power-driven means arranged to impart a step of feeding movement to one of said rolls while the presser and the work-support are separated by said stop.

12. An eyeletting machine of the type in which a power-operated eyelet-inserting tool cooperates with an upsetting tool having a punch, the combination comprising a work-supporting table having a washer track and a hole to receive said upsetting tool, a washer-raceway, a reciprocatory member arranged to transfer washers successively from said raceway and along said track to said hole, means arranged to feed a work-piece step by step with respect to said tools, means connecting said reciprocatory member and said feeding means to synchronize their operative periods, and power means for operating said member and said feeding means.

13. In a fastener-inserting machine of the type in which setting tools are arranged to insert fasteners in the longitudinal margins of a belt fed lengthwise along a table, the combination therewith of a pair of separable work-guiding bars having straight confronting surfaces arranged to abut the longitudinal edges of the belt, parallel levers by which said bars are connected and by which said surfaces are maintained in parallelism, and resilient means by which said bars are constrained toward each other but permitted to yield to widthwise demands of the belt.

14. An eyeletting machine comprising a work-supporting table, a pair of separable bars mounted thereon and having straight confronting work-guiding surfaces arranged to abut the longitudinal edges of a work strip, yieldable means by which said bars are constrained to parallel and equal movement toward and from each other, strip-feeding means spaced from said bars lengthwise of a work-strip, power-operated means by which said feeding means is operated periodically to pull the work-strip from said bars, power-operated means arranged to insert eyelets into the work-strip between said feeding means and said bars, and eyelet-clenching means arranged to cooperate with said inserting means.

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