Feb. 2, 1937. S. L. GOOKIN 2,069,241

EYELET INSERTING MACHINE

Filed June 17, 1935 2 Sheets-Sheet 1

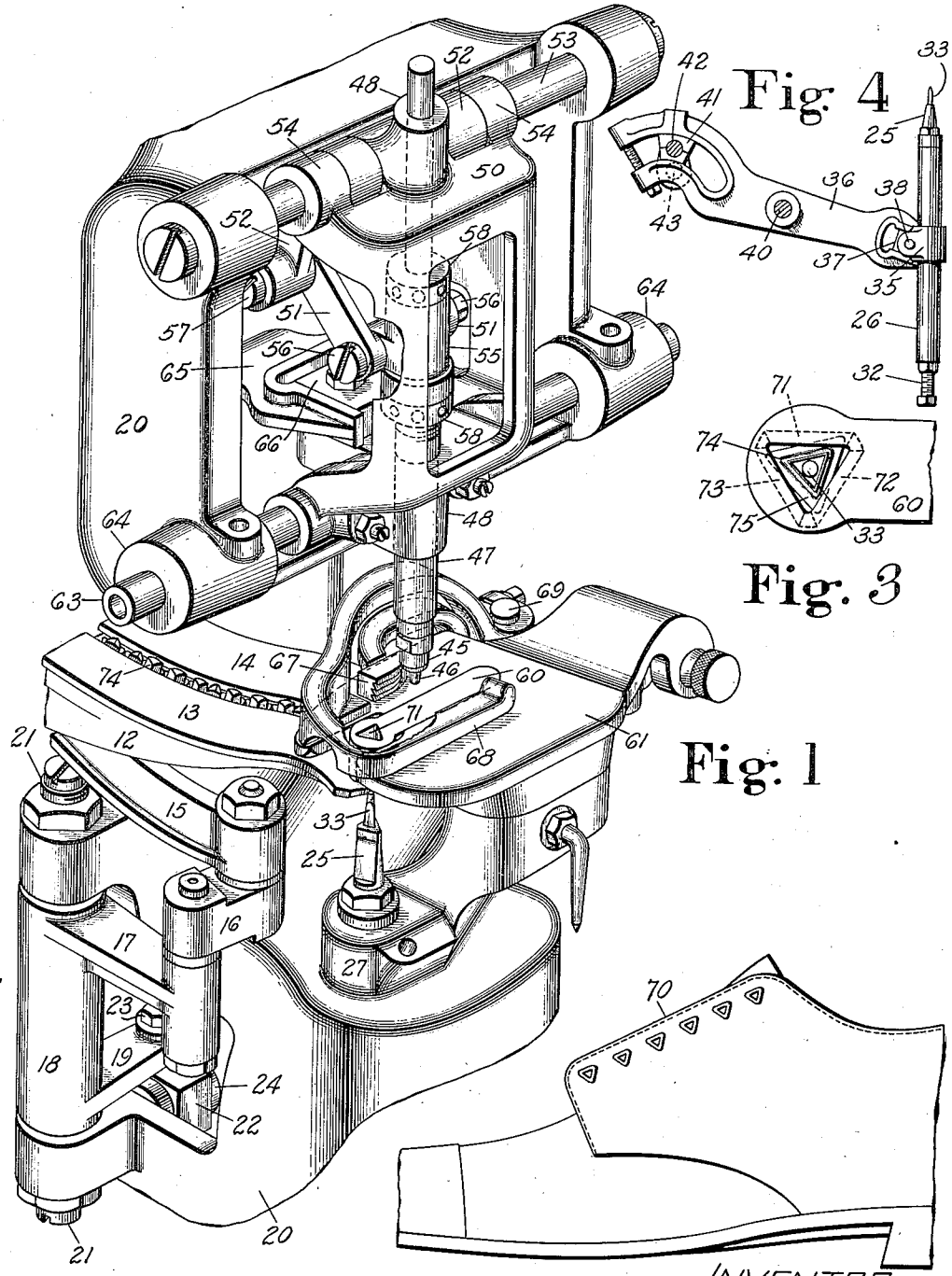


Fig. 1

Fig. 4

Fig. 3

Fig. 2

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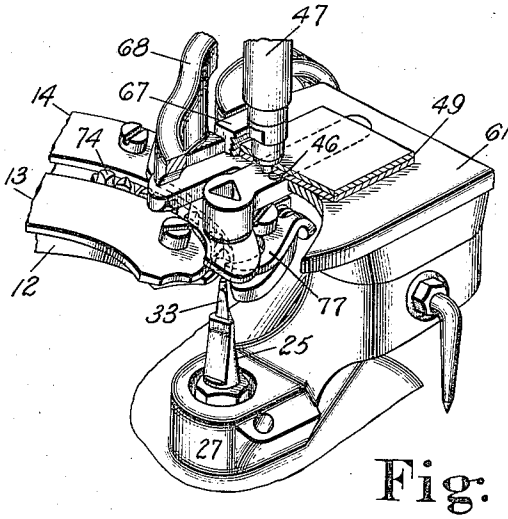


Fig. 5

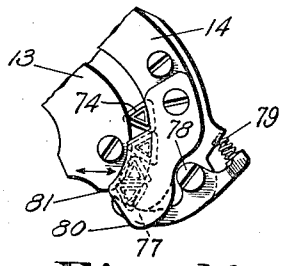


Fig. 10

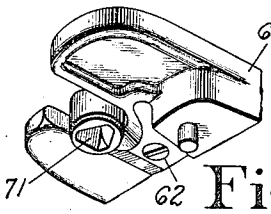


Fig. 8

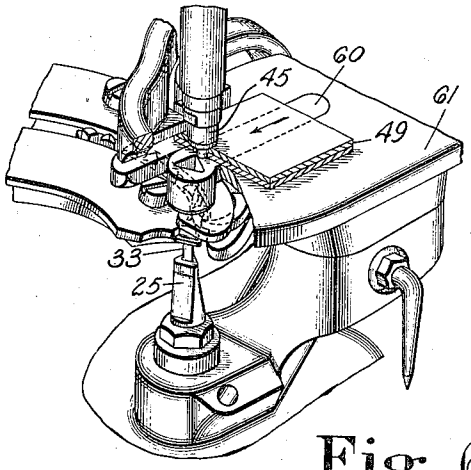


Fig. 6

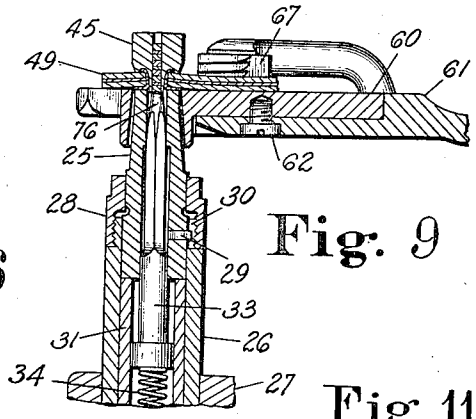


Fig. 9

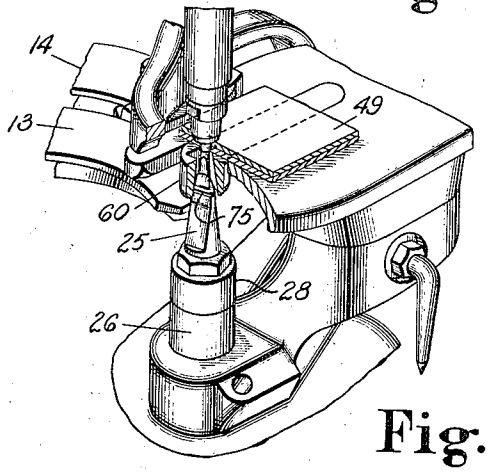
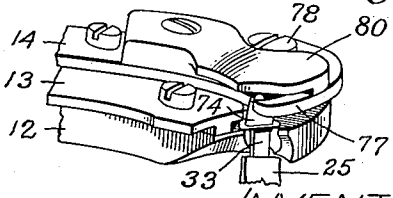


Fig. 7

Fig. 11



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Patented Feb. 2, 1937 2,069,241

UNITED STATES PATENT OFFICE

2,069,241

EYELET-INSERTING MACHINE

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Application June 17, 1935, Serial No. 26,951

11 Claims. (Cl. 218—15)

This invention relates to fastener-inserting machines, and is herein illustrated as embodied in an eyeleting machine of the type disclosed in United States Letters Patent No. 1,228,768, granted June 5, 1917, on application of P. R. Glass. It is not to be understood, however, that the invention is limited to eyeleting machines of that type since the principles of the invention are applicable to machines of other types for inserting eyelets.

One type of eyelet now in vogue for use in shoe-uppers has a triangular barrel and a triangular head or flange intended to lie on and ornament the outer surface of a shoe-upper, and one of the problems involved in inserting such an eyelet is to arrange one of the straight edges of its flange in parallelism with the adjacent edge of the shoe-upper. Precision in this respect is essential to a neat and artistic appearance of a shoe provided with rows of eyelets having straight edges, whether the flanges of the eyelets be triangular, square or oblong.

In machines heretofore used for such work the only provision for controlling the eyelets with regard to turning movement about their axes has been the spring-pressed spindle that projects from the eyelet-inserting tool to pick an eyelet from a raceway and maintain it on the tool until it has been inserted. Although such spindles are usually shaped to conform to the shapes of the eyelet barrels, the spindles themselves must be capable of sliding relatively to the tools that carry them, and since the spindles are not rigidly related to the tools they are usually capable of some slight lateral play and turning movement. Moreover, the eyelets do not, as a rule, fit the spindles so closely as to prevent all relative side play or turning movement. These conditions have heretofore so militated against precision in setting straight-edged eyelets that many shoe manufacturers who would otherwise have used such eyelets in large quantities have avoided them.

In consideration of the conditions above pointed out, an object of the present invention is to provide improved means for controlling and registering, in a fastener-inserting machine, fasteners having uniformly shaped heads and for insuring that their heads, if non-circular, will be turned with precision to a certain position at the instant when their insertion begins.

Accordingly, to deal with the problem above mentioned, one feature of the present invention provides, in a machine of the type in which one of two cooperative eyelet-setting tools has eyelet-inserting movement, a work-supporting member having a surface arranged to be rubbed by the perimeter of an eyelet being carried to the work by the inserting tool, the surface above specified being formed in accordance with a straight edge of the perimeter to turn the eyelet in whichever direction may be necessary to arrange the straight edge of the perimeter in a certain line.

Obviously, if the perimeter of an eyelet is polygonal and symmetrical it may be that any one of its straight edges will be the one to be alined by the operating surface of the work-supporting member, for example, any one of the three straight edges of an equi-lateral triangular flange or any one of the four straight edges of a square flange.

While a single operating surface may be sufficient, under favorable conditions, to procure the desired result, nevertheless, it is preferable to provide the alining member with one or more supplemental or complemental surfaces arranged to eliminate side play of the ingoing eyelet. Thus, to guard against side play and to insure the utmost degree of precision in the matter of alining a straight edge of an eyelet, the preferred construction of the alining member is obtained, as herein shown, by providing it with a hole that tapers toward the work, the smaller end of the hole being of the same shape and size as the flanges of the eyelets to be inserted therethrough.

Another object of the invention is to overcome a difficulty that arises not infrequently when an eyelet having a non-circular barrel is about to be picked from a raceway by an eyelet-inserting tool provided with a non-circular spindle. If, at the moment when the spindle encounters the eyelet, the latter is turned about its axis so that its cross-sectional shape does not register with that of the spindle, the endwise thrust of the spindle will be communicated to the eyelet. To insure entrance of the tip of the spindle into an eyelet, however the latter may be turned, it has been customary to form the tip of the spindle with a long conical taper, but since the tapered portion does not turn the eyelet, it may, and frequently does, become tightly wedged in the eyelet after its extremity has passed through and a short distance beyond the eyelet.

This condition is not only detrimental to the eyelet and to the usual eyelet-detent at the delivery end of the raceway, but also, if it persists, it is likely to defeat the purpose of the above-described means for alining a straight edge of the flange of the eyelet.

Therefore, to obviate the condition described, the invention also provides, in a machine of the type in which an eyelet-inserting tool is provided with a spring-pressed spindle for impaling an eyelet presented thereto by a supplying member, mechanism for operating the inserting tool, a stop arranged to interrupt the travel of the spindle through an impaled eyelet held by the supplying member, and mechanism by which the stop is retracted to release the spindle at a certain stage in the cycle of operations. In operation, the stop sustains the thrust of the spindle until the supplying member, it may be a raceway, has been retracted far enough to release the impaled eyelet, thus giving the eyelet sufficient time in which to turn and escape the wedging effect of the spindle.

Considered broadly, this aspect of the invention is not limited to any specific form or arrangement of the arresting element, but in the preferred embodiment illustrated herein it is an abutment carried by a raceway and arranged to engage and arrest the tip of the spindle as the latter emerges from an impaled eyelet in the raceway.

Referring to the drawings,

Fig. 1 is a perspective view of a portion of an eyeletting machine embodying this invention;

Fig. 2 is a side elevation of a portion of a shoe provided with a typical specimen of special eyeletting to which the present invention is related;

Fig. 3 is a plan view on a magnified scale of one form of means for turning an eyelet about its axis to correct the alinement of its straight edges;

Fig. 4 is an elevation of the eyelet-inserting tool and its operating mechanism;

Figs. 5, 6, and 7 are perspective views showing successive stages of operation of the eyelet-setting tools;

Fig. 8 is a bottom perspective view of the work-supporting means including the element for turning an ingoing eyelet;

Fig. 9 is a front sectional elevation including the work-supporting means and the eyelet-setting tools in the position of clenching an eyelet in a work-piece;

Fig. 10 is a top plan view including the delivering end of a raceway and an abutment for arresting the spindle of the eyelet-inserting tool; and

Fig. 11 is a left side elevation of the elements represented in Fig. 10 and includes also a portion of the eyelet-inserting tool in the act of impaling an eyelet. This view and Fig. 6 are virtually identical in regard to timing.

In a machine of the type illustrated in the accompanying drawings and in the above-mentioned Patent No. 1,228,768, the eyelets are supplied to a fastener-inserting tool by an inclined raceway comprising a base or frame 12 and two sheet-metal strips or guide-rails 13 and 14 spaced apart to form a channel through which the barrels 74 of eyelets project. In such an organization, the flanges 75 of the eyelets lie on the base 12 and the barrels project upwardly therefrom.

The delivery end of the raceway is movable laterally to and from the path of the eyelet-inserting tool 25. Fig. 1 includes a portion of the train of mechanism by which the raceway is operated in timed relation to the motions of the eyelet-inserting tool. An arm 15 formed on the base 12 receives operating motion from a link 16 that connects it with an arm 17 of a bell-crank lever 18 mounted in the main frame 20 of the machine by trunnions 21. A block 22 connected to the arm 19 of the bell-crank lever by a pivot member 23 is also pivotally connected to a forked link 24 that receives reciprocatory motion from an operating cam (not shown).

The eyelet-inserting tool 25 is affixed to the upper end of a vertical plunger 26 arranged to slide, but prevented from turning, in bearings in the frame 20, the upper bearing 27 appearing in the drawings. As shown in Fig. 9, the tool 25 is confined in a bore in the plunger 26 by a flanged collar 28 and is provided with a key in the form of a pin 29, the purpose of which is to maintain the tool 25 in a certain angular position. The pin 29 projects from the shank of the tool 25 into a slot or keyway 30 formed in the plunger 26. The vertical extent of this slot is sufficient to provide for vertical adjustment of the tool 25 by a supporting sleeve 31 which may be adjusted to the desired level by a screw 32 in the lower end of the plunger.

The tool 25 is centrally bored for the reception of a spring-stressed spindle 33 arranged to slide therein. A compression spring 34 exerts its force upwardly against the lower end of the spindle to maintain the upper portion of the spindle normally well above the upper end of the tool 25, as shown in the several views except Fig. 9, in the latter of which the spindle is depressed.

Fig. 4 illustrates a mechanism for operating the plunger 26 with a continuous stroke from its lowest position to its highest position for the purpose of taking an eyelet from the raceway and inserting the eyelet into a work-piece and thereby clenching the eyelet during the final stage of such movement. For this purpose, a collar 35 is tightly clamped to the plunger to afford an operating connection with a lever 36 through the medium of a block 37 pivotally mounted on a screw-stud 38 that serves also to set up the clamping pressure of the collar 35 against the plunger. The lever 36 is arranged to rock on a fulcrum pin 40 supported in the main frame 20. Its forward end is forked to straddle the pivoted block 37 and its rear end is forked to straddle a two-part block 41 carried in a circular path by the crank element 42 of a crank-shaft 43.

The eyelet-inserting tool 25 cooperates with a clenching tool 45 of well-known construction to insert and clench the eyelets. The clenching tool is provided with an upsetting and clenching surface, and in an organization of the type herein illustrated it is also provided with a central pilot or projection 46 that operates first to punch an eyelet-receiving hole in the work 49 (see Fig. 5) and thereafter feeds the work (see Fig. 6) to shift the punched hole into register with the inserting tool 25 (see Fig. 7). The tool 45 is affixed to the lower end of a plunger 47 arranged to slide in vertical bearings 48 formed in a horizontally movable carriage 50, as more fully illustrated in the aforesaid Patent No. 1,228,768. The plunger 47 is reciprocated vertically by a train of mechanism that includes two pairs of toggle members 51 and 52, the latter being pivotally mounted on a fixed horizontal guide-rod 53, the ends of which are secured in portions of the frame 20. This rod 53 also extends through bosses 54 formed on the carriage 50 to guide the latter. The toggle members 51 are connected with a collar 55 by pivot-studs 56, and are also connected respectively with the members 52 by pivot-studs 57 that form the knees of the toggle.

The collar 55 is arranged on the plunger 47

and is operatively connected thereto by well-known adjusting collars 58 that provide for adjusting the plunger vertically as may be necessary to cause the pilot 46 to cooperate with a work-supporting member 60, which is preferably a hardened steel punch-block mortised into a work-supporting plate 61 and affixed thereto by a screw 62 (see Figs. 8 and 9). The work-supporting plate 61 is mounted on a portion of the frame 20 and affixed thereto by a screw (not shown).

Referring to Fig. 1, a guide-rod 63 cooperates with the rod 53 to guide the horizontal motions of the carriage 50, but unlike the rod 53 the rod 63 is affixed to the carriage and its extremities are arranged to slide in bearings 64 formed on the frame 20. Fig. 1 also includes a portion of the train of operating mechanism by which the carriage 50 is reciprocated to feed the work 49 along the supporting members 60 and 61. This operating mechanism includes a lever 65, the forward end of which is forked to straddle a block 66 mounted on the carriage and connected thereto by a pivot member. The train of operating mechanism that includes the lever 65 receives its operating motion from a cam (not shown) carried by the crank-shaft 43. The effect of this mechanism is to feed the work step by step from right to left as indicated by the arrow in Fig. 6.

Fig. 1 also includes an edge-gage 67 for guiding the work, and a presser-foot 68 that cooperates with the work-supporting plate 61 to clamp the work, except during the work-feeding periods when the presser-foot automatically raised by a vertically movable rod 69 on which it is mounted.

Although the drawings illustrate the invention in a form designed to deal with eyelets having triangular barrels 74 and triangular flanges 75, it is to be understood that it is not limited to eyelets of this configuration. The upper end of the eyelet-receiving tool 25 is shaped according to the perimeter of the flange of an eyelet of a selected shape, and since a triangular shape is the one now under consideration the upper end of the tool 25 is triangular, but its lateral dimensions are slightly less than those of the flange to avoid interference between the tool and the member 60 which, as hereinafter described, is provided with surfaces arranged to be rubbed by the straight edges of the flange. Moreover, a portion of the spindle 33 is shaped to a triangular section and this portion is arranged to slide in a triangular bearing broached in the upper portion of the tool 25. The triangular portion of the spindle projects initially to occupy the barrel of an eyelet, but since some tolerance or clearance between the eyelet and the spindle is necessary, likewise between the spindle and the tool 25, precision in regard to registering the eyelet cannot be obtained from the spindle.

Referring to Fig. 3 which represents a triangular eyelet and the member 60 on a magnified scale, a triangular tapered hole extends through the member 60 from top to bottom to provide a pasageway through which an eyelet may be carried by the inserting tool 25. The lower end of this hole is larger than the flange of an eyelet to insure entrance of the flange even though the eyelet may be initially turned about its axis to a position out of register with the hole, as represented in Fig. 3. This representation of a non-registering relation is typical of a condition that has heretofore militated against precision in locating straight-edged eyelets in a work-piece such as a shoe-upper.

Fig. 2 illustrates a portion of a shoe into which triangular eyelets have been inserted in the desired relation to the edge 70 of one of the quarters, the essential consideration concerning this relation being that the straight edge of each eyelet that lies nearest the edge 70 shall be exactly parallel therewith so that all the corresponding edges of the series of eyelets will be in alinement with each other.

To insure this result the upper end of the hole in the member 60 is no larger than necessary to enable the eyelets to pass through it. The wall of the hole comprises three converging surfaces 71, 72, and 73 each arranged to be rubbed by a straight edge of the perimeter of the flange of the eyelet. One of these surfaces, for example the surface 71, is parallel with the lines of work-feeding movement and likewise parallel with the edge-gage. As an eyelet passes through the hole in the member 60, any one or more of the converging surfaces 71, 72, and 73 may operate with a camming effect to turn the eyelet in whichever direction may be necessary to rectify its position before it is clenched. The inaccuracy of position pictured in Fig. 3 requires turning movement in a clockwise direction to rectify the position of the eyelet, but under some conditions it might be that turning movement in the opposite direction would be required. However that may be, the converging surfaces that form the hole through which the eyelet must pass will produce the desired turning movement. Although only one of these surfaces may be necessary to effect the turning movement, it is preferable to provide one such surface for each straight edge of the perimeter of the flange of an eyelet to relieve the spindle 33 from lateral stress and to insure a centralizing effect upon the eyelet solely by the cooperation of all the converging surfaces.

To avoid obstruction of the eyelets in the raceway the channel between the guide-strips 13 and 14 provides clearance that enables the barrels of the eyelets to turn freely therein.

Consequently, when the eyelets arrive at the delivery end of the raceway they may stand in any position with regard to turning movement about their individual axes, and more often than not the eyelet about to be impaled by the spindle 33 will be turned to some position other than one of true register with the spindle. Nevertheless, since the tip of the spindle is provided with a long conical tapering formation 76 (Fig. 9) the spindle seldom if ever fails to impale an eyelet, but, on the other hand, if the spindle is permitted to rise so far as to become wedged in a non-registering eyelet the latter may become so firmly fixed on the tapering portion 76 as to remain in a position not within the range of correction afforded by the member 60 (Fig. 3). Moreover, if the spindle were permitted to become tightly wedged in an eyelet in the raceway the full force of the spring 34 (Fig. 9) and the inertia of the spindle would be applied to the eyelet. This has frequently occurred in the past and has resulted in damaging the eyelet-detent 77 and in some cases has resulted in distorting the flange of the eyelet.

The detent 77 is mounted on the base 12 of the raceway and is connected thereto by a pivot stud 78. A compression spring 79 normally maintains the detent in a position (Figs. 10 and 11) to obstruct the outlet of the eyelet-channel sufficiently

to prevent the eyelets from running out by gravity, but when the delivery end of the raceway is retracted from the path of the inserting tool **25** after the spindle **33** has impaled an eyelet, the detent **77** yields to permit removal of the eyelet by the spindle. The eyelet-engaging extremity of the detent **77** lies normally against the end of the guide-strip **14**, and when the barrel of an eyelet is in contact with the detent the flange of that eyelet underlies the detent as shown in Fig. 11. Consequently, if some means were not provided to interrupt the upward movement of the spindle, the tapering portion **76** would, in many cases, thrust the eyelet upwardly and thus carry its flange against the detent with the damaging effects above mentioned.

To obviate the conditions above pointed out, the present invention provides an abutment **80** arranged to arrest the spindle as its tip emerges from the barrel of an eyelet impaled thereby (Fig. 11) but while there is still sufficient clearance between the eyelet and the tapering portion **76** to enable the eyelet to turn relatively to the spindle. Therefore, although the inserting tool **25** rises without interruption the travel of the spindle through an impaled eyelet will be arrested at a certain point, not by an eyelet but by the abutment **80** while the delivery end of the raceway is being retracted from the path of the tool **25**. While the spindle is thus arrested and while the impaled eyelet is still free to be turned relatively thereto the extremity **81** (Fig. 10) of the guide-strip **13** will rub against the barrel of the eyelet as shown in Fig. 6 and thereby turn the eyelet to a position in register with the triangular portion of the spindle, whereupon the eyelet will drop to its seat on the upper end of the tool **25**, aud the abutment **80**, moving laterally, will release the spindle.

Although the abutment **80** is shown as carried by the raceway its function does not affect that of the raceway, since it could interrupt the travel of the spindle if it were mounted otherwise than on the raceway. Nevertheless, since the motions of the raceway are suitable to shift the abutment to and from the path of the spindle the construction shown is preferred for the sake of simplicity. Accordingly, the abutment is affixed to the upper surface of the guide-strip **14** and its spindle-engaging portion is arranged to overlie the barrel of the eyelet involved in the problem. Under normal conditions the eyelets run under the abutment without touching it, but if the spindle **33** does happen to foul an eyelet the abutment will sustain the thrust of the spindle against the eyelet and thus save the detent **77** from being bent or broken.

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 of the type in which one of two cooperative eyelet-setting tools has eyelet-inserting movement; a work-supporting member having a surface arranged to be rubbed by the perimeter of an eyelet being carried to the work by said inserting tool, said surface being formed in accordance with a straight edge of said perimeter to turn the eyelet in whichever direction may be necessary to arrange said straight edge in a certain line.

2. An eyelet-inserting machine comprising a work-supporting member provided with a non-circular hole to fit the perimeter of an eyelet having a non-circular flange, an eyelet-inserting tool arranged to carry such an eyelet through said hole, and a clenching tool or anvil arranged to cooperate with said inserting tool, the wall of said hole being formed to turn the eyelet to a certain position as the eyelet goes through it.

3. An eyelet-inserting machine comprising a work-supporting member provided with a tapered non-circular hole the smaller end of which is shaped to fit the perimeter of an eyelet having a non-circular flange and is at the work-engaging surface of the member, an eyelet-inserting tool arranged to carry such an eyelet through said hole, and a clenching tool or anvil arranged to cooperate with said inserting tool.

4. An eyelet-inserting machine comprising an eyelet-inserting tool and a clenching tool or anvil arranged in cooperative relation, and a fixed member provided with a hole through which said inserting tool is movable to insert an eyelet into a work-piece, the wall of said hole being non-circular and tapered toward said clenching tool or anvil and its smaller end being shaped to fit the perimeter of an eyelet having a non-circular flange.

5. An eyelet-inserting machine comprising a hard member having a flat work-supporting surface and a hole intersecting said surface, work-feeding mechanism including a combined punching and clenching tool movable against said surface to punch a hole in the work and also movable laterally into register with said hole to feed the work, and a tool movable through said hole to insert an eyelet against said punching and clenching tool, the wall of said hole being non-circular and tapered toward the latter said tool and its smaller end being shaped to fit the perimeter of an eyelet having a non-circular flange.

6. An eyelet-inserting machine comprising an eyelet-inserting tool, a clenching tool having a work-punching portion, a hard member having a work-supporting surface and an intersecting surface arranged to be rubbed by the perimeter of an eyelet carried by said inserting tool, and mechanism by which said clenching tool is operated with punching movement against said work-supporting surface and with work-feeding movement into register with said inserting tool, said intersecting surface of the hard member being formed in accordance with a straight edge of said perimeter to turn the ingoing eyelet in whichever direction may be necessary to arrange said straight edge in a certain line.

7. An eyelet-inserting machine comprising an eyelet-inserting tool having a non-rotatable spindle of non-circular section, means arranged to operate said tool, means arranged to supply to said tool eyelets having non-circular flanges and barrels of said non-circular section, a clenching tool or anvil arranged to cooperate with said inserting tool, and means constructed and arranged to true the position of an eyelet on said spindle by engaging the perimeter of its flange while the barrel of said eyelet is entering the work.

8. An eyelet-inserting machine comprising a work-support, work-feeding mechanism, a gage arranged to guide an edge of the work, a raceway for supplying eyelets, cooperative eyelet-setting tools one of which is movable to take an eyelet from said raceway and insert it into the work, and means having a guiding face arranged to be engaged by the perimeter of an eyelet being carried by said inserting tool, said guiding face being formed in accordance with a straight edge of said perimeter to turn the eyelet in whichever direction will arrange said straight edge in

parallelism with the path of work-feeding movement.

9. In an eyelet-inserting machine of the type in which an eyelet-inserting tool is provided with a spring-pressed spindle for impaling an eyelet, mechanism for operating said tool, and means movable to and from the path of said tool for presenting an eyelet to said spindle; a movable stop arranged to interrupt the travel of said spindle through an eyelet held by said presenting means, and means by which said stop is operated to release the spindle in timed relation to the retractory movement of said presenting means.

10. In an eyelet-inserting machine of the type in which an eyelet-inserting tool is provided with a spring-pressed spindle for impaling an eyelet presented thereto by a supplying member; mechanism arranged to operate said tool with a continuous stroke to impale and insert an eyelet, an abutment arranged to engage and arrest the tip of said spindle as it emerges from an impaled eyelet held by said supplying member, and mechanism by which said supplying member and said abutment are retracted from the path of said tool.

11. In an eyelet-inserting machine of the type in which a raceway is movable to present eyelets to an eyelet-inserting tool provided with a spring-pressed spindle; an abutment carried by the raceway and arranged to engage and arrest the tip of said spindle as it emerges from an impaled eyelet at the delivery end of the raceway, said abutment being also arranged to release the spindle when the raceway is retracted from the path of said tool.

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