Sept. 30, 1952 S. L. GOOKIN 2,612,282

EYELETING MACHINE

Filed Aug. 16, 1950 4 Sheets-Sheet 1

Fig.1.

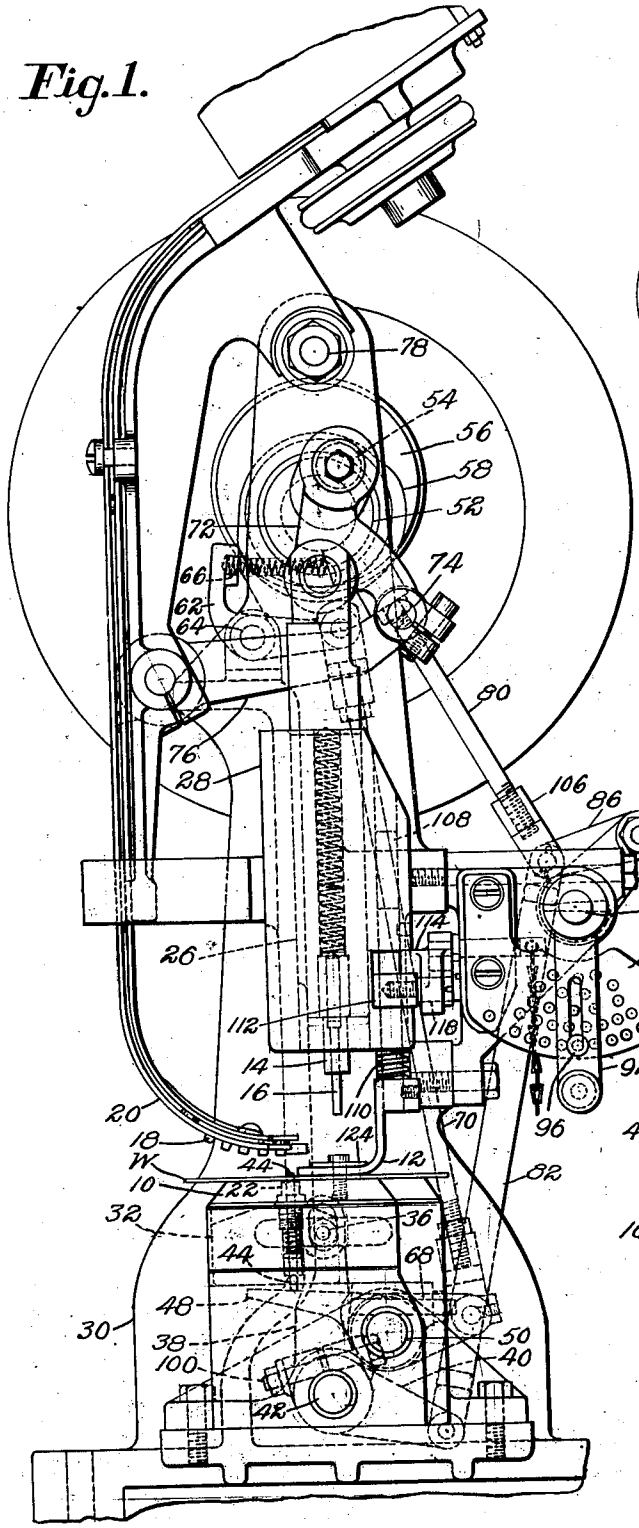
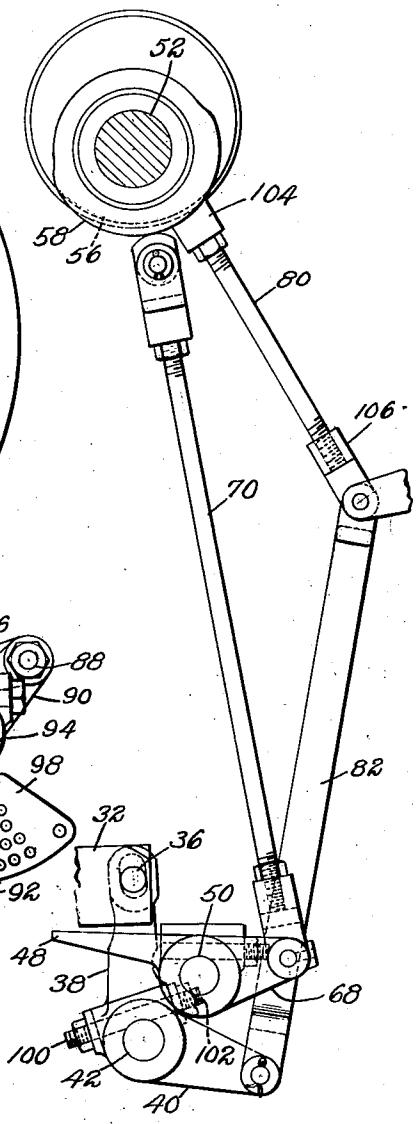


Fig.2.



Inventor.

Sylvester L. Gookin

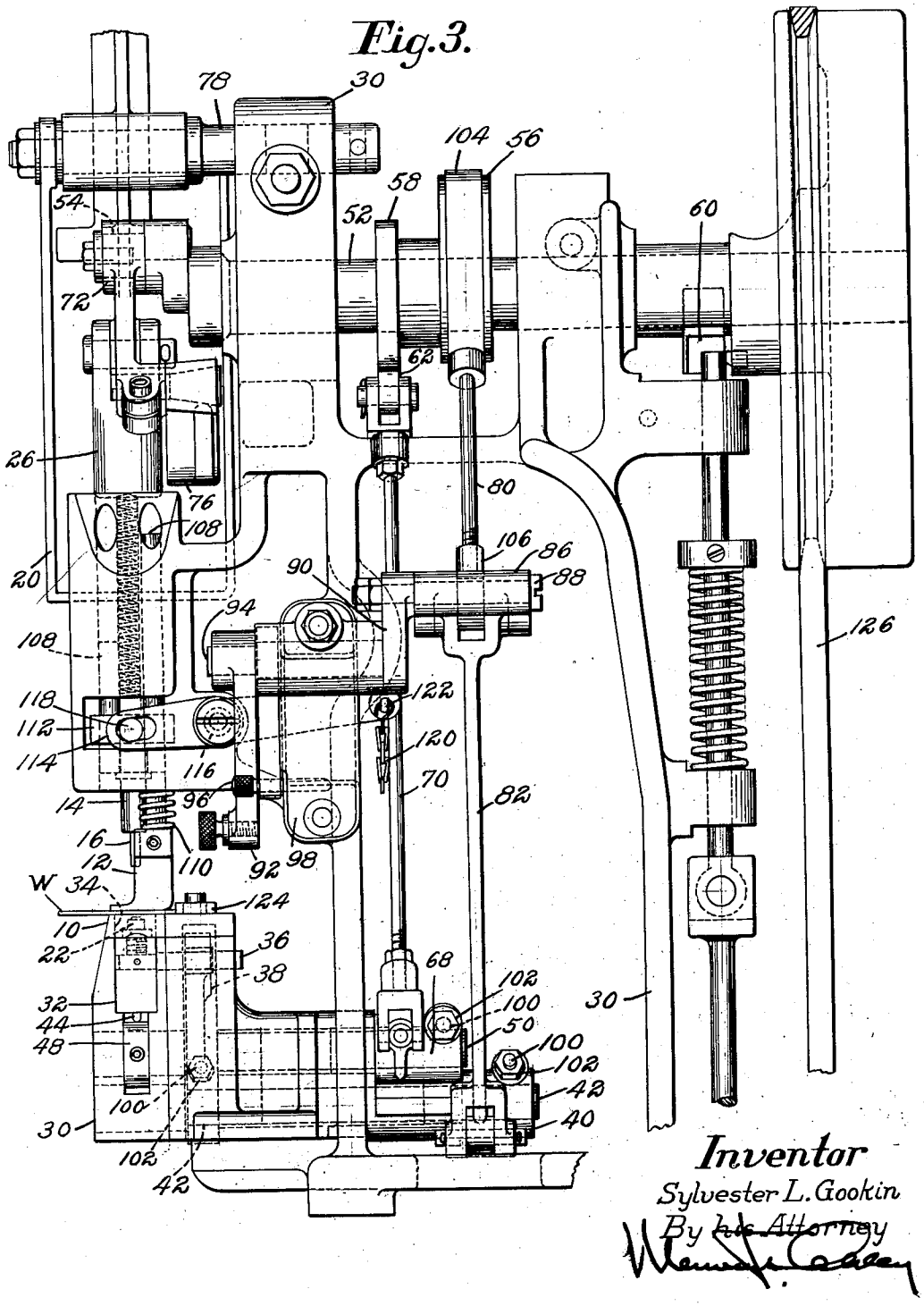
By his Attorney

Sept. 30, 1952 S. L. GOOKIN 2,612,282

EYELETING MACHINE

Filed Aug. 16, 1950 4 Sheets-Sheet 2

Fig. 3.



Inventor

Sylvester L. Gookin

By his Attorney

Wm. S. Cooper

Sept. 30, 1952 S. L. GOOKIN 2,612,282

EYELETING MACHINE

Filed Aug. 16, 1950 4 Sheets-Sheet 3

Fig. 4

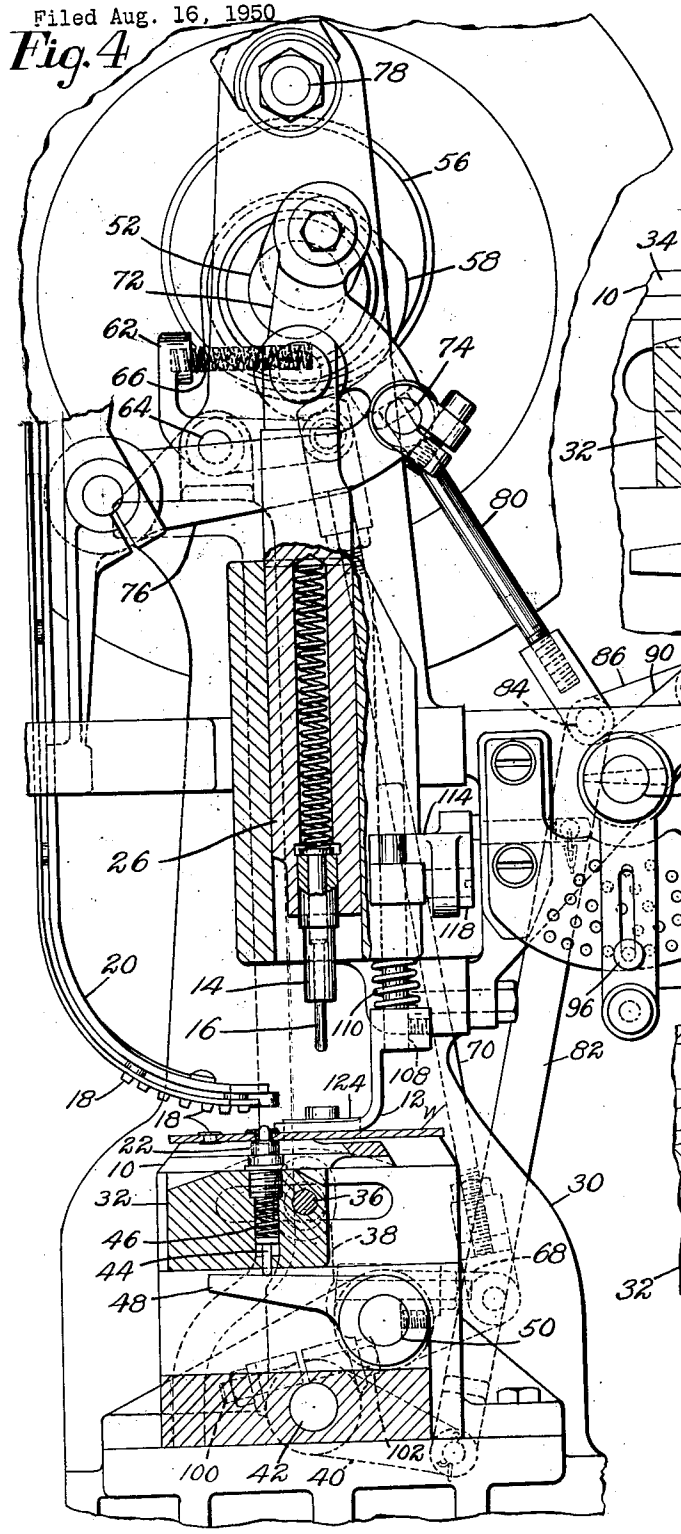


Fig. 6.

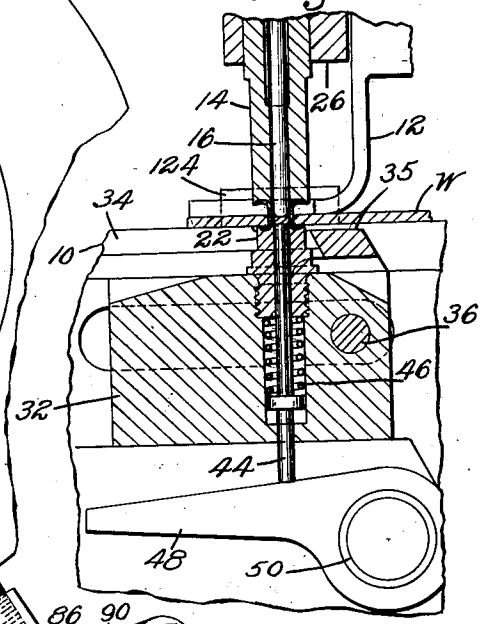
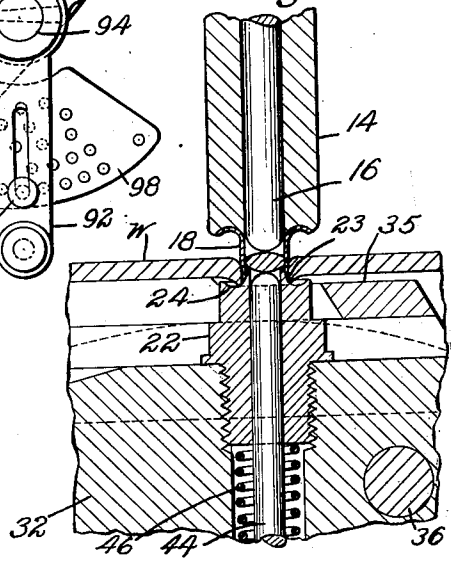


Fig. 9.



Inventor:
Sylvester L. Gookin
By his Attorney

Sept. 30, 1952 S. L. GOOKIN 2,612,282

EYELETING MACHINE

Filed Aug. 16, 1950 4 Sheets-Sheet 4

Fig. 7.

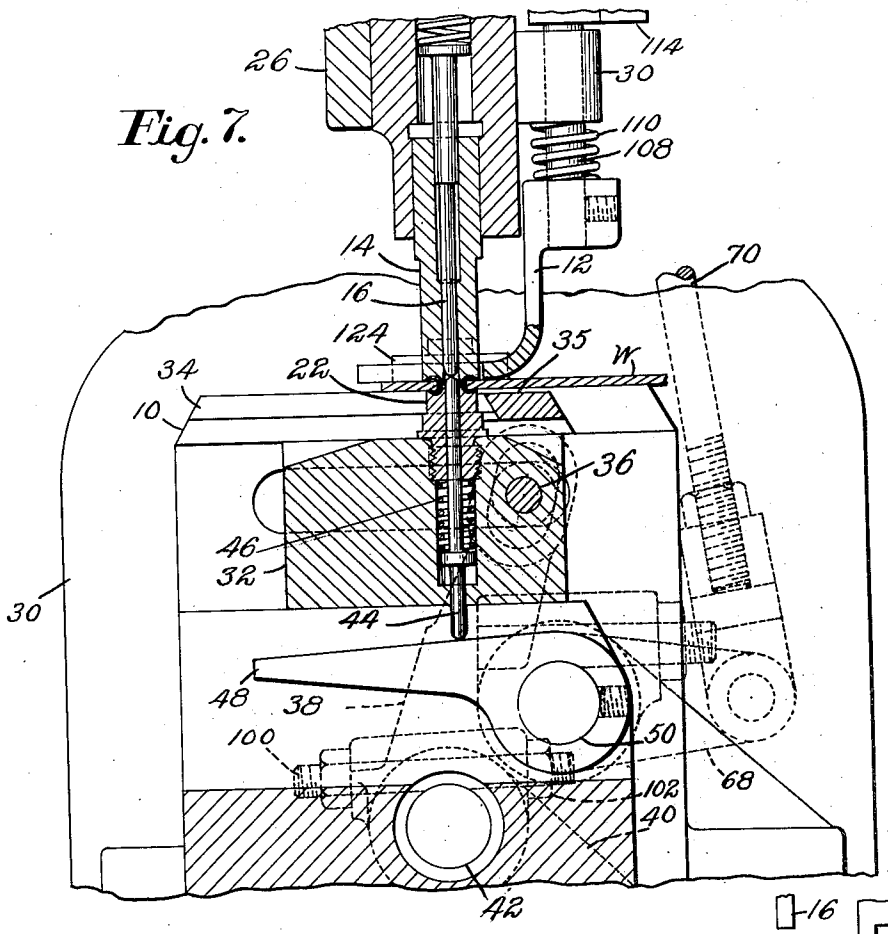


Fig. 5.

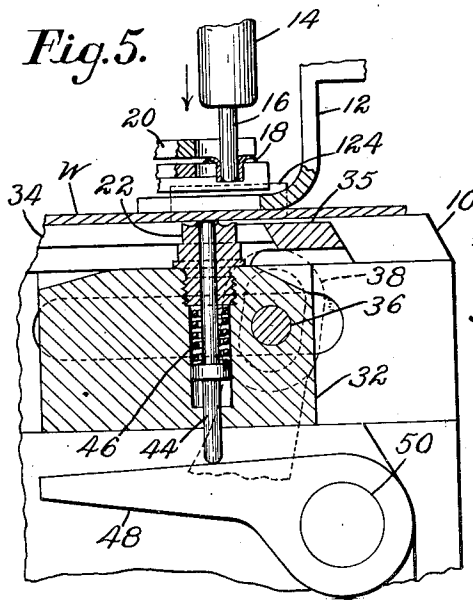
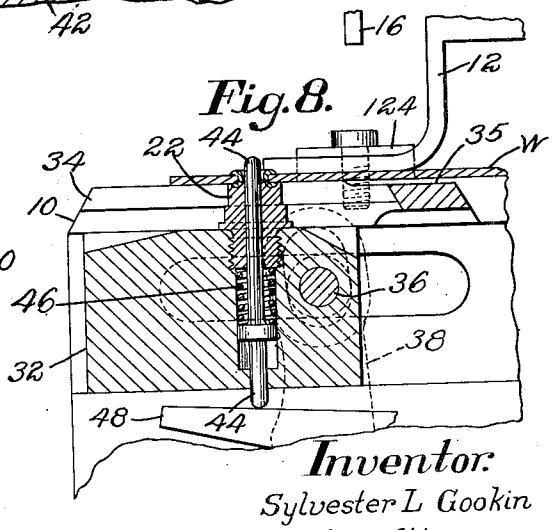


Fig. 8.



Inventor:
Sylvester L. Gookin
By his Attorney

Patented Sept. 30, 1952 2,612,282

UNITED STATES PATENT OFFICE

2,612,282

EYELETING MACHINE

Sylvester L. Gookin, Quincy, Mass., assignor to United Shoe Machinery Corporation, Flemington, N. J., a corporation of New Jersey

Application August 16, 1950, Serial No. 179,740

9 Claims. (Cl. 218—15)

1

This invention relates to eyeleting machines and is more particularly concerned with automatic power-operated machines provided with work feeding mechanism and capable of installing a series of eyelets one or more at a time.

The usual eyeleting machine is adapted to upset an eyelet in a hole in a pre-punched work piece or includes additional mechanism by which a hole is first produced in one locality, the hole then being shifted to align with the upsetting tools or the latter being shifted to align with the hole to complete an installation. In contrast therewith an eyeleting machine of the type here under consideration omits elements and motions hitherto deemed indispensable and advantageously employs means cooperative with eyelets of a type adapted specially to punch their own holes in a work piece. It will be understood, however, that while a particular machine designed for setting a particular fastener will be hereinafter specifically described, certain features of the invention are equally adapted for use in other types of machines and with other types of fasteners.

A primary object of this invention therefore is to provide an improved power machine for eyeleting an imperforate work piece, said machine to include simple and relatively inexpensive mechanism for installing what may be termed self-punching eyelets one at a time and means for feeding the work to space the eyelets one from another.

In accordance with this object a novel feature of the invention consists in a combination comprising an anvil having an eyelet punching-surface, and a pin centrally located therein and telescopically related thereto. The anvil serves first as a punch bed against which an eyelet may be forced to punch a hole in the work. Thereafter, the anvil performs the usual function of upsetting and clenching the ingoing eyelet and the pin located therein later ejects the pill from the throat of the eyelet. This feature does away with a separate punch and punch bed.

Another novel feature consists in a combination in which the aforesaid anvil and ejector pin are utilized to feed the work step by step while installing a series of eyelets in it. This combination includes one power actuated mechanism for moving the anvil to and fro sidewise, and another for moving the pin to and fro along its axis in timed coordination with the sidewise strokes of the anvil. These motions of the anvil and the individual motions of the pin are compounded to produce a four-way orbital motion of the pin which, after ejecting a pill from each eyelet at

2

the conclusion of the clenching operation, feeds the work one step by its engagement with the throat of the eyelet last clenched.

A machine of the type under consideration includes a raceway for supplying eyelets to a setting tool provided with a spindle, and performs its duties in the following order: the spindle impales an eyelet on the raceway; the raceway recedes; the setting tool drives the eyelet through the work and against the anvil; the pin in the anvil advances through the clenched eyelet as the setting tool recedes, thereby ejecting the pill from the eyelet; a presser foot braces the work against the thrust of the ejector pin; the anvil moves sidewise away from the setting locality while the ejector pin is in the throat of the clenched eyelet, thereby feeding the work; and the ejector pin is withdrawn from the eyelet as the feeding stroke is terminated, and is finally returned toward the setting position, being maintained below the level of the work table until the next eyelet has been clenched.

It will be understood that, though not so illustrated herein, the invention also comprehends the setting of more than one eyelet at a time. It will become apparent that a gang raceway could as well be substituted for the single raceway employed in the embodiment to be described, thereby providing means for delivering a series of eyelets one at a time in each of two or more rows, and cooperative anvils and setting tools would then be provided in a manner similar to that hereinafter described but adapted simultaneously to set the eyelets in each row.

The above and other features of the invention together with novel combinations and arrangements of parts will now be more fully described with reference to a preferred embodiment and the accompanying drawings thereof, in which:

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

Fig. 2 is a detached front elevation of certain elements shown in Fig. 1;

Fig. 3 is a side elevation of the machine, portions being omitted for the sake of clarity;

Fig. 4 is an enlarged front elevation of the machine, portions being broken away to indicate details of construction and showing the relative positions of elements at or near the end of a feed stroke;

Figs. 5, 6, 7 and 8 are further enlarged front elevations, partially in section, indicating relative positions of parts shown in Fig. 4 but at other and successive stages in the operating cycle of the machine, and

Fig. 9 is a still further enlarged vertical section taken along the axis of the spindle and showing the work immediately after being punched by an eyelet.

The drawings illustrate the invention as embodied in a machine comprising a fixed horizontal work-supporting table 10, a presser foot 12 cooperatively related thereto, an eyelet-setting tool 14 having a spring-pressed spindle 16 for impaling an eyelet 18 on a raceway 20, an anvil 22 having an annular surface 24 for upsetting and clenching an eyelet, a plunger 26 by which the tool 14 is carried above the table 10, a fixed bearing 28 by which the plunger and the tool 14 are guided endwise toward and from a setting locality in the plane of the table, a frame 30 of which the bearing 28 is a part, and other elements hereinafter described.

The anvil 22 is affixed to a horizontally movable block 32 by which it is carried sidewise to and from the setting locality, the block being installed in a groove in the frame 30 and having a bearing therein by which the anvil is maintained at a constant level. The upper portion of the anvil occupies a slot 34 (Fig. 3) in the table 10 and is located at a level where it will support a small area of a work-piece W overlying the table. For a purpose hereinafter explained the level of the table 10 is slightly lower in the locality 35 (Figs. 7 and 9) beneath the eyelet setting tool 14. To provide for moving the anvil sidewise to and fro a pin 36 is affixed to the block 32, and it extends through a slot in an arm 38. This arm and an arm 40 (Fig. 2) are both affixed to a rockshaft 42 journaled in the frame 30 and they are operated by a regulatable linkage, hereinafter described, by which feeding steps of variable length may be imparted to the work.

A pin 44 (Fig. 9) is located centrally in the anvil 22 and is telescopically related thereto. The upper portion of the pin is smaller than the throat of an eyelet 18 and is nested in the anvil while an eyelet is penetrating the work and thereafter until the tool 14 has risen slightly from the clenched eyelet. The pin 44 is normally depressed by a compression spring 46 contained in the block 32, but is automatically lifted after each eyelet has been clenched and is thereby utilized to eject the pill cut from a work-piece W by the barrel of the eyelet. The lower end of the pin 44 projects below the block 32 and rides on a flat face of an arm 48 affixed to a rockshaft 50. This shaft is oscillated in timed coordination with the sidewise movements of the anvil 22 with the result that the pin 44 projects through the throat of a clenched eyelet while the anvil travels from right to left, but is withdrawn from the eyelet and work-piece W before the backstroke of the anvil begins.

The up-and-down (endwise) movements of the pin 44 are derived from a rotary power-driven assemblage that includes a main drive shaft 52, a crank-pin 54 for operating the tool 14, an eccentric 56 for moving the anvil 22 to and fro sidewise, and a cam 58 for oscillating the rockshaft 50. The shaft 52 is journaled in bearings in the frame 30 and is provided with a treadle operated clutch 60 (Fig. 3) preferably of a type that will enable the machine to run as many cycles as may be desired, without interruption, and will stop the shaft 52 at the same point at the end of each run. A clutch of the type disclosed in U. S. Letters Patent 2,274,140, granted February 24, 1942, on my application could, with slight alteration, be made to remain in operation as long as the treadle-rod is depressed.

The cam 58 engages a follower on the end of an angular arm 62 (Figs. 1 and 4) mounted on a fulcrum pin 64 and said follower is biased against the cam by a spring 66. The motion of the follower is communicated to the rockshaft 50 by an arm 68 and a rod 70 connecting the latter and the follower. The rockshaft 50 and the two arms 48 and 68 are all rigidly related.

The plunger 26 and the crank-pin 54 are operatively connected by a pitman 72 that also operates the raceway 20. For the latter purpose the pitman is provided with a pivot pin 74 with which the raceway is connected by a link 76. The raceway 20 is thereby oscillated about a fixed pivot pin 78 by which it is supported, and the lower end of the raceway is shifted to and from the path of the spindle 16.

The eccentric 56 and the arm 40 are connected by a linkage that includes adjustable means for regulating the length of the strokes imparted to the anvil. The power-actuated elements of this linkage are an eccentric rod 80 (Figs. 3 and 4), a link 82 connecting the latter and the arm 40, a pivot pin 84 (Fig. 4) forming a joint of the members 80 and 82 and a forked member 86. This forked member is constrained to swing about a pivot member 88 by which it is supported, and its effect is to guide the pin 84 in an arcuate path. As long as this path remains constant the amplitude of the work feeding movement of the anvil 22 will be constant, but when the path is changed by shifting the pivot member 88 to another location the amplitude of that feeding movement will be changed. For this purpose the pivot member 88 is carried by a regulator made up of two rigidly related arms 90 and 92 (Figs. 1, 3 and 4) and a rockshaft 94 connecting them. The rockshaft 94 is journaled in the frame 30 and the regulator may be fastened at various positions of adjustment by inserting an anchoring pin 96 through a slot in the arm 92 and into any one of a plurality of holes in a fixed anchoring plate 98.

This linkage is so organized that the right-hand limit of travel of the anvil, as well as the left-hand limit, may be shifted by changing the angular relation of the two arms 38 and 40. For this purpose each of these arms is bored to receive a frictional binder which consists of a draw bolt 100 (Fig. 3) having a screw-thread for engagement with a nut 102. When the parts are assembled the draw bolt may be drawn tightly against the rockshaft 42 by setting up the nut 102.

The radius of the forked member 86 and that of the arm 90 are equal, and the length of the eccentric rod 80 may be regulated to arrest the pin 84 at various points in its arc of travel, including one point in which the pin 84 will be coaxial with the rockshaft 94 of the adjustable regulator. One end of the eccentric rod 80 is threaded and screwed into an eccentric strap 104, and the other end, also threaded, is screwed into a fitting 106 in which the pin 84 has a bearing. By screwing the rod 80 in or out of the strap 104 or rotating the fitting 106 both limits of the arc of travel of the pin 84 may be shifted with respect to the fixed location of the axis of the rockshaft 94.

The adjustability of the described connections provides for obtaining coaxial relation of the pin 84 and the rockshaft 94 at the instant when the anvil 22 is aligned with the tool 14. The length of the eccentric rod should normally be adjusted

to carry the pin 84 to the level of the axis of the rockshaft 94 when the setting tool 14 is at its lowest point, and the angular relation of the arms 38 and 40 should be adjusted to carry the anvil to its position of true alignment with the setting tool 14. When special conditions exist other adjustment may be found necessary as, for example, to compensate for vibration, lost motion, tolerance or wear in parts, or to allow for whip or overthrow. The path of the feed finger 44 will change for each of the different feed spacings but in general the adjustment will be found satisfactory when the tool 14 and the anvil 22 cooperate in a manner such that eyelet setting may commence a little ahead of their alignment and finish when they are substantially in line.

The presser foot 12 is affixed to one of a pair of parallel rods 108 that have individual bearings bored in the frame 30. A compression spring 110 surrounding one of these rods maintains pressure of the presser foot against the work-supporting table 10 except when the foot is raised. For the latter purpose a block 112 is affixed to the rods 108, a recess is formed in the frame 30 to provide clearance for the block, a lever 114 is mounted on a fulcrum stud 116 (Fig. 3) set into the frame, and a pin 118 is set into the block to be engaged by the lever. If a treadle is provided it may be connected to the rear end of the lever 114 by a chain or cable 120 only a portion of which is shown in Fig. 3, the lever having a pin 122 for that purpose. As indicated in Figs. 5, 6 and 7 the presser foot is forked and arranged to straddle the setting tool 14 when the latter is fully depressed. The pressure exerted by the spring 110 is constant but not so great as to require retracting the presser foot during work-feeding stages, since the work-engaging surfaces of the work-table and the foot are smooth, and the work will slide when drawn by the pin 30. As further aid in feeding the work W along a line a straight-edged back gauge 124 may be secured to the work table 10. Operating power is preferably supplied from any suitable source via a pulley and a belt 126 (Fig. 3).

When the elements occupy their initial positions (Figs. 1 and 4) the crank-pin 54 is at or near top center, the anvil 22 is at or near the left-hand limit of its range, and the pin 44 is about to be, or in other cases has just been, fully depressed. In consequence of tripping the clutch 60, the plunger 26 descends, the spindle 16 impales an eyelet 18 on the raceway 20, the raceway recedes, and the anvil 22 moves to the right. If a workpiece W lies between the presser foot 12 and the work-table 10, the anvil 22 and the pin 44 will travel under it without touching it until the ingoing eyelet 18 strikes the work in the locality 35 of the table 10 and depresses a small area of work into contact with a sharp circular edge 23 (Fig. 9) of the anvil. This sharp edge forms the inner boundary of the clenching surface 24 and the outer boundary of the central bore in which the pin 44 slides.

The depressed locality 35 of the work table assures that the work will not be permanently bunched or impressed with the periphery of the setting tool 14 or anvil 22, and also aids the anvil and pin 44 in subsequently avoiding any return drag on the under surface of the work.

Eyelets for this type of machine are preferably unscored, and the surface 24 of the anvil is designed to clench them without splitting them into prongs. This technique is known as roll-clenching. Now, since the eyelets must cut their way through a work-piece, their clenching ends should be initially acute and sharp, and the work-piece should be of some material that will not cause the eyelets to be blunted, crushed or collapsed. Leather belts and cardboard products are examples in this category.

If, as may prove desirable in some instances, the anvil and the sharp end of an eyelet are concentric when they first encounter each other the actual clenching of the eyelet will tolerate a slight overtravel of the anvil to the right, that is, beyond true coaxial relation with the tool 12. The extent of such overtravel can be regulated by adjusting the length of the eccentric rod 80 or the angular relation of the arms 38 and 40. The useful effect of such overtravel is that it will provide a time interval during which the tool 14 may rise and the anvil may move slightly from right to left before leaving the setting locality. To all intents and purposes this time interval constitutes a dwell of the anvil at the setting locality and a postponement of its departure therefrom. Consequently, the lifting of the pin 44 to eject the pill from the clenched eyelet may be postponed until the tool 14 is raised slightly from the eyelet. The work will then be braced by the presserfoot 12 against the thrust of the pin.

After the pin 44 has ejected the pill, the pin will be maintained in the throat of the eyelet by the arm 48 while the anvil continues its feeding stroke, but will be depressed to clear the eyelet 18 when the anvil reaches its left-hand limit of travel. The pin 44 thus executes an orbital motion two components of which are received from the power-actuated arm 48 and two others from the power-actuated anvil.

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

1. In an eyeleting machine of the type in which a power-operated tool cooperates with a clenching anvil to drive an eyelet through an imperforate area of a work-piece and clench it, a pin located centrally in the anvil and telescopically related thereto, power-operated means for ejecting the pill from the clenched eyelet by thrusting said pin through the latter, and means arranged to brace the work-piece against the thrust of said pin.

2. An eyeleting machine comprising an anvil having an eyelet-clenching surface, a power-operated tool arranged to drive an eyelet through an imperforate area of a work-piece and against the anvil to clench it, a pin located centrally in the anvil and telescopically related thereto, power-operated means for ejecting the pill from the flange end of the clenched eyelet by thrusting said pin through the latter, means arranged to brace the work-piece against the thrust of said pin, and power-operated means arranged to feed the work-piece by moving the anvil sidewise while said pin is in a clenched eyelet and while said tool is being retracted from the work.

3. An eyeleting machine comprising a power-operated tool arranged to drive an eyelet through an imperforate area of a work-piece, an anvil arranged to brace said area against the thrust of the ingoing eyelet, the anvil having a surface formed to clench the eyelet, a pin located centrally in the anvil and telescopically related thereto, means by which said pin is normally retracted into the anvil, power-operated means for ejecting the pill from the flange end of the

clenched eyelet by thrusting said pin through the eyelet, and power-operated means for moving said anvil sidewise in one direction while said pin is in the eyelet and in the opposite direction while said pin is retracted from the work.

4. An eyeleting machine comprising a fixed bearing, a power-operated plunger slidable in said bearing and provided with an eyelet-inserting tool, a work-feeding carriage, an anvil affixed thereto, power-operated means for reciprocating said carriage to shift the anvil sidewise to and from register with said tool, a pin centrally located in the anvil and telescopically related thereto, and power-operated means for reciprocating said pin endwise in timed relation to the sidewise movements of the anvil and thereby imparting two components of an orbital motion to said pin.

5. In an eyeleting machine of the type in which a setting tool provided with an eyelet spindle is reciprocated by power-driven means to transfer eyelets successively from a raceway to a setting locality, an anvil arranged to cooperate with said tool, a pin located centrally in the anvil and telescopically related thereto, power-operated means arranged to shift the anvil sidewise to and from the setting locality, and power-operated means arranged to project said pin toward said tool when the anvil is at the setting locality, and to retract the pin when the anvil is farthest distant from said locality.

6. An eyeleting machine comprising a generally flat work-supporting table having one portion of slightly lower level, a presser foot arranged to cooperate with said table, an anvil arranged to support a small area of a work-piece overlying the table, the anvil having an eyelet-clenching surface, a setting tool having an eyelet-spindle, said lower level portion of the table being in the locality proximate to said setting tool, means for moving the setting tool endwise to and from a setting locality adjacent to said lower level portion of the table, a fixed bearing by which the setting tool is guided, means for moving the anvil sidewise to and from said setting locality a pin located centrally in the anvil and telescopically related thereto, and means arranged to move said pin up and down in timed coordination with sidewise movements of the anvil.

7. In an eyeleting machine of the type in which a presser foot cooperates with a work-supporting table yieldingly to clamp a work-piece, an anvil having an eyelet-clenching surface below the general plane of the table, an eyelet-setting tool arranged to cooperate with the anvil, said tool having an eyelet-spindle adapted to impale an eyelet on a raceway, power-actuated means arranged to shift the anvil sidewise to and from cooperative relation with said tool, a pin located centrally in the anvil and telescopically related thereto, and power-actuated means for alternately projecting one end of said pin above said plane and retracting it below said plane in timed coordination with sidewise movements of the anvil.

8. An eyeleting machine comprising an eyelet-setting tool and an anvil cooperatively related, said tool having a spindle for impaling an eyelet and the anvil having a surface for clenching it, a rotary operating assemblage including an eccentric and a crank pin, means actuated by said eccentric for moving said anvil sidewise to and from a setting locality, means actuated by the crank pin for moving said tool endwise toward and from said locality, a pin located centrally in the anvil and telescopically related thereto, and means actuated by said rotary assemblage for projecting and retracting said pin in timed coordination with sidewise movements of the anvil to feed a work-piece by engagement with an eyelet installed therein.

9. A machine as set forth in claim 8 further characterized in that a generally flat work-supporting table is provided having a surface in the area beneath said eyelet-setting tool which is at a lower lever than the work-supporting table surface adjacent to the anvil when moved from the setting locality.

SYLVESTER L. GOOKIN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
936,431	Eaton	Oct. 12, 1909
1,205,277	Shaw	Nov. 21, 1916
1,459,738	McIntire	June 26, 1923