

C. F. DUDLEY.
MACHINE FOR SETTING FASTENERS.
APPLICATION FILED NOV. 19, 1910.

1,049,463.

Patented Jan. 7, 1913.

3 SHEETS—SHEET 1.

Fig. 9.

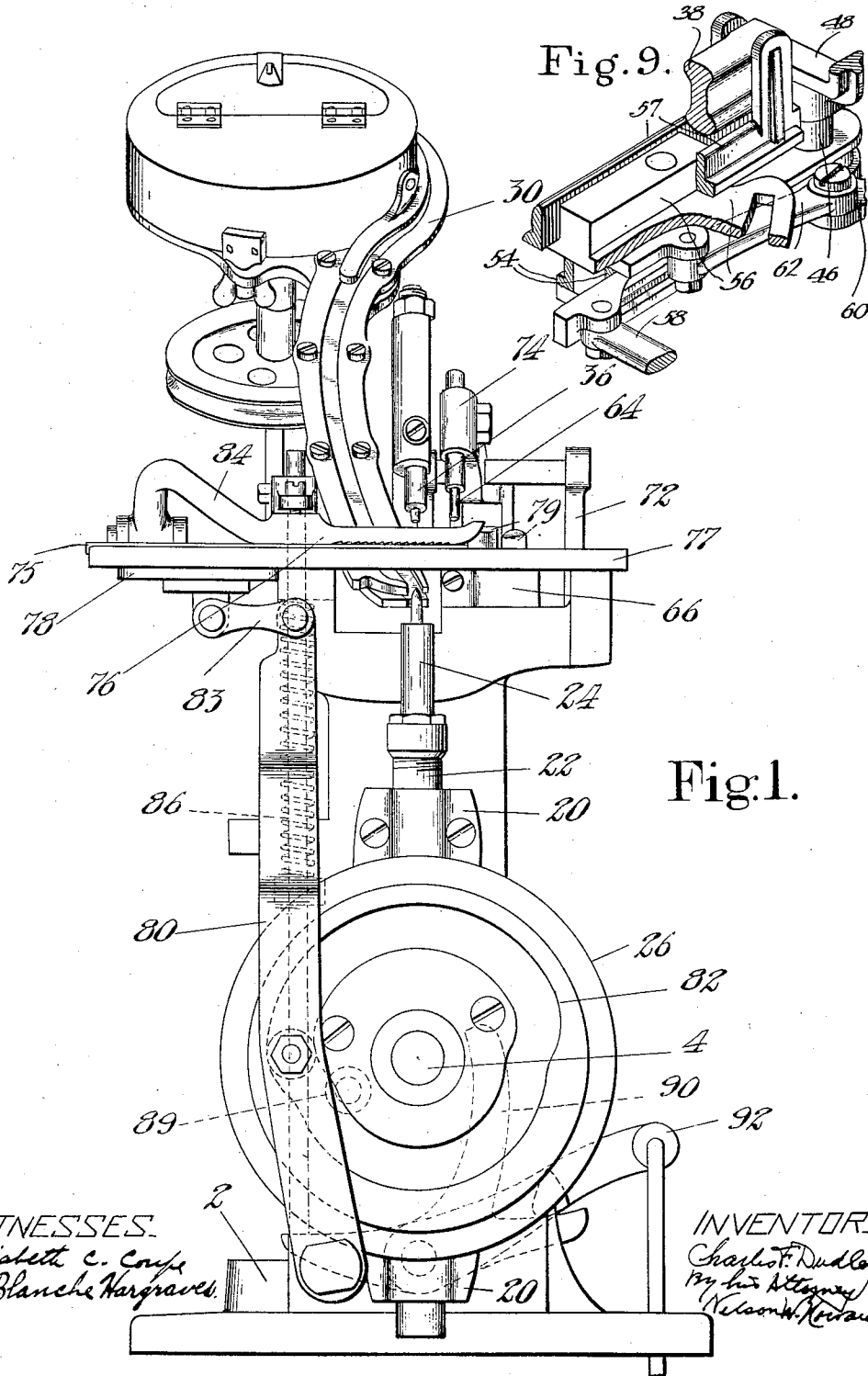


Fig. 1.

WITNESSES.

Elizabeth C. Coups
Blanche Hargrave.

INVENTOR.

Charles F. Dudley
By his Attorney
Nelson W. Howard

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3 SHEETS—SHEET 2.

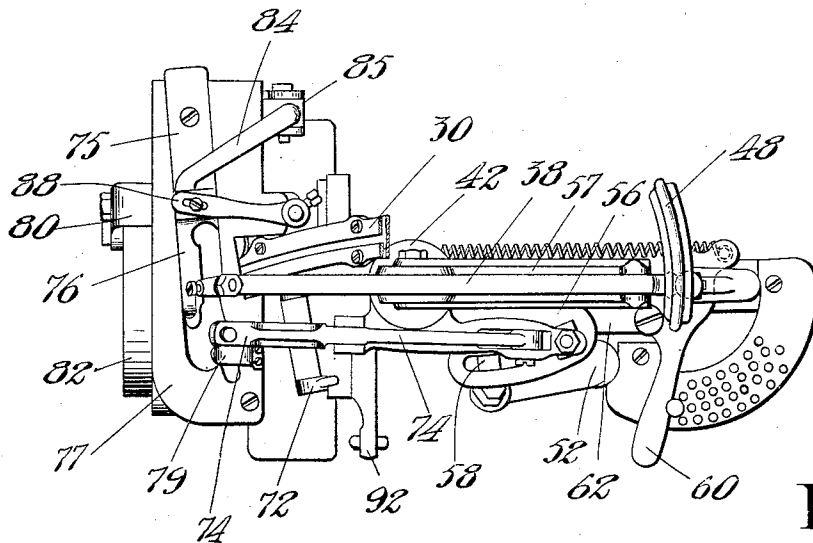


Fig. 3.

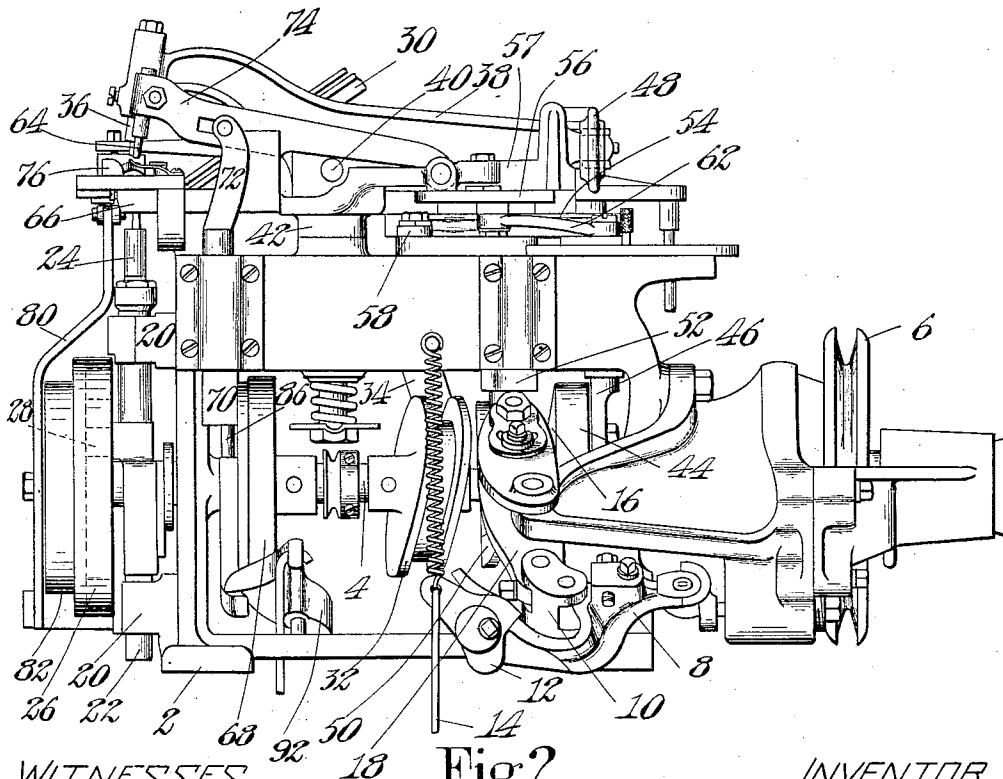


Fig. 2.

WITNESSES:

Elizabeth C. Coyle
O. Blanche Hargraves.

INVENTOR.
Charles F. Dudley
By his Attorney,
Nelson W. Howard

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3 SHEETS—SHEET 3.

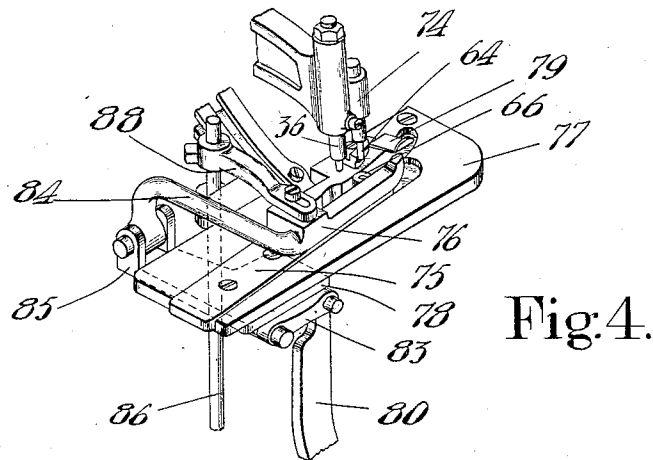


Fig. 4.

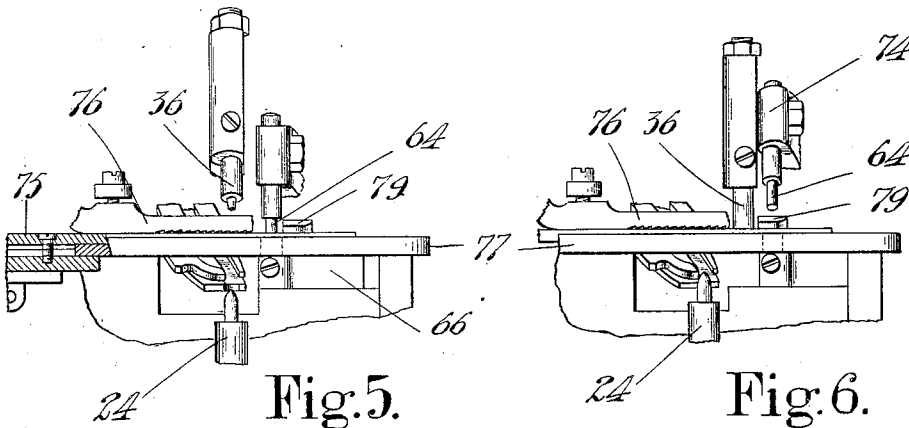


Fig. 5.

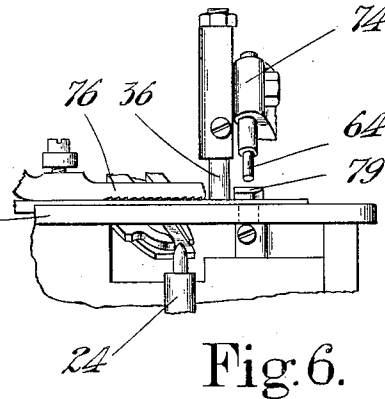


Fig. 6.

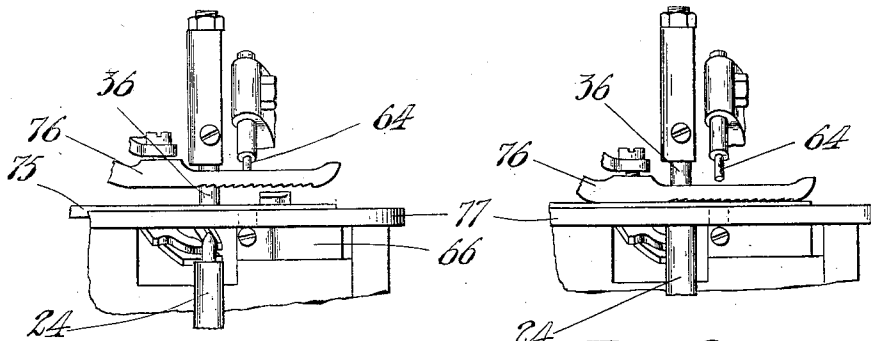


Fig. 7.

WITNESSES.

Elizabeth C. Cook
A. Blanche Hargraves

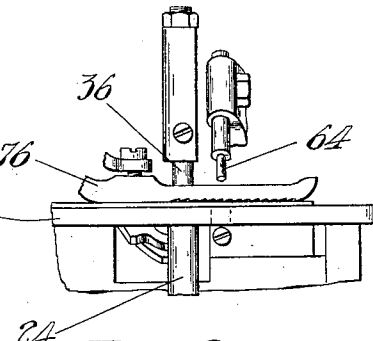


Fig. 8. INVENTOR.

Charles F. Dudley
By his Attorney
Nelson W. Howard

UNITED STATES PATENT OFFICE.

CHARLES F. DUDLEY, OF CINCINNATI, OHIO, ASSIGNOR TO UNITED SHOE MACHINERY COMPANY, OF PATERSON, NEW JERSEY, A CORPORATION OF NEW JERSEY.

MACHINE FOR SETTING FASTENERS.

1,049,463.

Specification of Letters Patent.

Patented Jan. 7, 1913.

Application filed November 19, 1910. Serial No. 593,247.

To all whom it may concern:

Be it known that I, CHARLES F. DUDLEY, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain Improvements in Machines for Setting Fasteners, of which the following description, in connection with the accompanying drawings, is a specification, like reference characters on the drawings indicating like parts in the several figures.

This invention relates to machines for setting fasteners, such as eyelets, lacing hooks, studs, or the like, and more particularly to improved feeding or spacing mechanism for such machines.

An object of the invention is to provide novel feeding mechanism for an eyelet setting machine which shall have a wide range of adjustment so that eyelets of large diameter may be set with a very wide spacing. Heretofore it has been the practice to utilize the punch or one of the setting devices of such a machine to effect the feeding of the work by imparting a single transverse movement to the set or punch while in engagement with the work. This arrangement has been satisfactory up to a certain limit of spacing but beyond that limit mechanical difficulties have been encountered in the construction of the machine and the necessarily abrupt cam motions have been found objectionable. A further difficulty, encountered in those machines in which the feeding movement of the punch or set follows a circular path, is that, when adjusted for wide spacing, the punch or set departs so much from a straight line that it has a tendency to draw or force the work out of the proper relation with the gages. The difficulties above enumerated have also been encountered to some extent in those machines having a feeding device distinct from the punch and set.

With a view to avoiding these difficulties and improving the general operation of machines for setting fasteners, the present invention contemplates the provision of feeding means constructed and arranged to impart two feeding movements to the work between successive setting operations. With this arrangement a wide feeding movement of the work may be attained yet each transverse movement of the feeding device or

devices may be relatively short and easily effected.

In a preferred embodiment of my invention the two feeding movements of the work are effected by separate feeding devices, one of which may be the punch or a set to which a transverse movement is imparted while in engagement with the work and the other of which preferably comprises an auxiliary feeding device arranged for operation while the punch and setting devices are inoperative.

An important feature of the invention consists in timing the action of the auxiliary feeding device to occur immediately after the setting operation and just prior to the stopping of the machine. This arrangement permits the punch to act directly on the point of the work presented in alignment therewith before any lateral movement of the work takes place and thereby contributes to improve the accuracy of the operation of the machine.

For purposes of illustration the invention will be herein described and shown in the accompanying drawings, as embodied in an eyelet setting machine in which one of the sets is constructed and arranged for partially feeding the work, although the invention is not limited to this type of machine, nor to eyelet setting machines but is of general application.

In the drawings,—Figure 1 is a view in front elevation of a machine embodying this invention; Figs. 2 and 3 are side elevation and plan views, respectively, of the machine shown in Fig. 1; Fig. 4 is a view in perspective of the punching, setting and feeding devices, and Figs. 5 to 8 indicate the various steps in a complete cycle of the machine. Fig. 9 is a fragmentary view in perspective of part of the mechanism for actuating the upper set.

Referring to Figs. 1 and 2 of the drawings, 2 represents the supporting frame of the machine which is provided with horizontal bearings for the main shaft 4. The shaft 4 carries the various cams for actuating the different elements of the machine and is adapted to be driven from a grooved pulley 6 through any suitable clutch mechanism. Preferably the clutch may be arranged to engage, under the actuation of suitable springs, when the toggle formed by the links

8 and 10 is broken. This may be effected by turning the locking cam 12 through a treadle rod 14, shown in Fig. 2, while the clutch may be automatically disengaged and the machine stopped at the proper point in its cycle by a cam 16 on the main shaft acting through the cam lever 18 and the toggle above mentioned when the latter is allowed to straighten. The clutch mechanism, however, forms no part of the present invention and is not herein described in detail, being merely one form of starting and stopping mechanism suitable for use in this connection.

In the forward part of the frame 2 are formed vertical journals 20 in which the spindle 22 of the lower set 24 is mounted for reciprocation. The spindle 22 is reciprocated by a cam track cut in the face of the disk 26 acting through a cam roller 28 on the spindle. During the ascent of the lower set 24 an eyelet is delivered thereto by the raceway 30 in the usual manner, the raceway being thereupon retracted to an inoperative position by a cam 32 acting through the lever 34 and other connecting mechanism not shown.

A work table 77 is rigidly mounted upon the frame 2 at the forward end of the machine and is apertured to permit the passage of the lower set as it ascends to effect the setting operation. The setting operation occurs when the lower set is flush with the surface of the table. Suitable gages 79 are provided to assist in properly locating the work when it is presented to the machine.

The upper set, or upsetting die 36, is carried in the forward end of a lever 38 mounted upon a horizontal journal pin 40 which extends between ears projecting from a swinging head 42. The upsetting die 36 is actuated in a vertical plane by a cam track cut in the disk 44 on the main shaft acting through a connecting rod 46 having a yoke 48 into which projects the rear end of the lever 38. The upsetting die is swung about the axis of the head 42, to effect a partial feeding of the work, by a cam 50 acting through a vertical rock shaft 52 and suitable connecting mechanism.

Preferably the connecting mechanism between the rock shaft 52 and the lever 38 may be utilized to control the extent of the lateral movement of the upsetting die. To this end, a guideway 54 is pivotally mounted for horizontal movement about the rod 46 and link 58 serves to transmit the movement of the upper end of the rock shaft 52 to this guideway. A connecting member 56 engages and slides in the guideway 54 and also in a second guideway 57 projecting rearwardly from the head 42 in which the lever 38 is mounted. It will be seen that the guideways 54 and 57 are arranged one above the other and extend in opposite di-

rections from their respective axes, while the connecting member 56 serves to transmit the oscillation of the lower guideway 54 to the upper guideway 57. A regulating lever 60 is connected with the sliding member 56 by a link 62 whereby the point of connection between the guideway 54 and its actuating mechanism may be shifted to different distances from the axis of the head 42 and the extent of the lateral feeding movement of the lever 38 and the die 36 thereby regulated.

Prior to the setting operation it is desirable to punch the work for the reception of the eyelets. This may be effected in various ways, but preferably by employing a separate punch arranged to operate in the proper timed relation with the upsetting die. To this end, a punch 64 and cooperating die 66 are mounted for lateral swinging with the head 42 and the punch is given a vertical punching movement by a cam 68 operating through a reciprocatory rod 70 carrying a yoke 72, the upper cross bar of which engages and actuates the punch lever 74 while permitting unimpeded lateral movement. The punch and die levers are mounted to turn about the axis of the head 42 and are moved by the connecting member 56 which projects on one side and is slotted to receive a stud projecting downwardly from the rear end of the die lever. This construction insures an adjustment in the lateral movement of the punch corresponding to the adjustment in the lateral movement of the set carrying lever 38 when the position of the regulating lever 60 is changed.

In order to obtain a greater feeding movement than it is convenient to derive from the lateral movement of the set or punch alone and also to improve the general operation of the machine by rendering the cam motions less abrupt, the present invention contemplates an auxiliary feeding device arranged to impart a feeding movement to the work, in addition to that imparted by the punch or set as the case may be. In the machine herein described one of the sets is utilized for feeding the work and an auxiliary clamp feeding device supplements the feeding movement of the set, being arranged to operate between the setting of successive eyelets, preferably just after each setting operation.

The auxiliary feeding device comprises separable clamping jaws 75 and 76 arranged to engage the work in front of the path of the upsetting die 36 and move in a straight line path carrying the work with them. The jaws are mounted upon a carrying member 78 guided for transverse reciprocation below the work table 77 under the actuation of the cam lever 80 pivoted at its lower end to the frame and oscillated by

the cam 82. The lever 80 is connected with a stud projecting from the lower side of the carrier 78 by a removable link 83. The work table is provided with ways for the lower jaw 75 of the feeding device and the carrying member 78 is maintained in engagement with the lower side of the work table and guided in its movement by being connected with the jaw 75 through a slot in the bottom of the guideway, as shown in Fig. 5.

The upper jaw 76 of the auxiliary feeding device has a rearwardly extending arm 84 which is pivoted between projecting ears on an arm 85 of the carrying member 78. The jaw 76 is raised from engagement with the work when the feeding device is moved toward the right and depressed to engage the work before the beginning of its feeding movement by the vertical movement of a rod 86 which is connected with the arm 84 of the jaw by a slotted arm 88. The rod 86 is elevated at the proper time and held in elevated position during the required interval by the action of a roller 89 (see Fig. 1) on a cam lever 90 which has a projection extending beneath the end of the rod 86. The roller 89 is mounted on the cam disk 68 and acts upon the lever 90 in opposition to a compression spring encircling the rod 86. The spring bears against a collar on the rod and serves to depress the rod and cause the jaw 76 to engage the work when the roller is carried out of contact with the lever 90. A treadle lever 92 is provided having a one-way connection with the lever 90 whereby the upper jaw 76 may be lifted by the operator to permit the insertion of the work. By suitably timing the operation of the jaw 76 this member may be made to perform the functions of a presser foot in addition to its other functions in feeding the work.

The cam 16 is timed to bring the machine to rest with the punch 64 in punching position, the auxiliary feeding jaws in their extreme left hand position and the jaw 76 in its lower or work engaging position, as shown in Figs. 1 and 4. In presenting the work in which the eyelets are to be set, the upper jaw 76 is elevated by depressing the lever 92, preferably from the heel of the treadle, and the work is positioned with the help of the gages 79, so that the point at which the first eyelet is to be set is in alignment with the punch 64. The machine is then set in motion and the following operations occur.

First, the punch 64 is depressed and a hole is formed at the proper point in the work, the punching passing downwardly through the die 66. This step in the cycle of the machine is indicated in Fig. 5 of the drawings and the subsequent steps are indicated in Figs. 6 to 8.

Second, the punch is withdrawn from the work, which is held stationary by the jaw 76, the upper set is moved to the right into alignment with the previously punched hole and then depressed to enter the hole. During this step the punch 64 has also been moved to the right, out of the path of the upper set, and the raceway has been advanced to carry an eyelet into alignment with the lower set 24.

Third, as represented in Fig. 7, the jaw 76 is lifted to disengage the work and both jaws are moved to the right, while, simultaneously, the upper set 23 is moved to the left feeding the work toward the left until the previously punched hole is in alignment with the lower set. During this step the lower set has engaged the lowermost eyelet in the raceway and the latter has been withdrawn leaving the eyelet in position on the set.

The fourth step in the cycle comprises the vertical relative movement of the sets 24 and 36 to clench the eyelet and the depression of the jaw 76 engaging the work between it and the lower jaw 75.

The last step in the cycle comprises the retraction of the two sets releasing the clenched eyelet and the lateral movement of the auxiliary feeding jaws to initial position. The latter operation, as will be obvious, imparts a feeding movement to the work immediately after the setting of an eyelet which movement is in addition to and augments the feeding movement of the set 36.

The extent of the movement imparted to the work by the auxiliary feeding device is uniform but, as already pointed out, the feeding movement of the set is variable and the spacing between successive eyelets may therefore be varied within limits by regulating the action of the set. Where a shorter spacing is desired than that resulting from the combined action of the auxiliary feeding device and the set, the auxiliary feeding device may be thrown out of operation by removing the pins of the connecting link 83 whereupon the jaw 76 will act merely as a presser foot and the work will be fed by the set alone. In the machine illustrated the feeding movement of the jaws 75, 76 is $1\frac{1}{8}$ inches, while the feeding movement of the set is variable between $\frac{1}{16}$ and $1\frac{1}{16}$ inches. The range of spacing of the machine, when both feeding devices are operative, is therefore from $1\frac{1}{16}$ to $2\frac{3}{16}$ inches.

It will be noted that the point on the work in which it is desired to set the first eyelet may be accurately located beneath the punch 64 and that the first step in the operation of the machine is the punching of the work at this point, before any feeding movement takes place. There is there-

fore no danger of the first hole being punched at other than the desired point in the work.

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

1. A machine of the class described having, in combination, a setting device, a punch and actuating means therefor, means for feeding the work to bring a hole formed by said punch into alinement with said setting device, and means for imparting a further feeding movement to the work.
2. A machine of the class described having, in combination, cooperating setting devices, means for moving one of said devices to feed the work, and an auxiliary feeding device.
3. A machine of the class described having, in combination, a punching device, a setting device, means for moving one of said devices to engage and feed the work, and auxiliary work-feeding means.
4. A machine of the class described having, in combination, means for punching the work, a device operating thereafter to feed the work and set an eyelet therein, and auxiliary work-feeding means operating after the setting operation.
5. A machine of the class described having, in combination, means for punching the work, a device operating thereafter to feed the work and then set an eyelet therein, and means operating after the setting operation for feeding the work farther in the direction in which it was previously moved.
6. A machine of the class described having, in combination, setting devices, punching devices, actuating means for operating first a punching and then a setting device, and means arranged to feed the work into setting position and then farther in the same direction after the setting operation and prior to the next punching operation.
7. A machine of the class described, having, in combination, a reciprocating setting device, a punch, and means for feeding a predetermined point of the work into alinement with the punch and then into alinement with the setting device in separate steps.
8. A machine of the class described having, in combination, a reciprocating setting device, and means for advancing the work edgewise and feeding a predetermined point of the work, in separate steps, toward the setting position and then into setting position.
9. A machine of the class described having, in combination, a reciprocating setting device, and means for feeding the work from and into setting position in separate steps of definite extent, both occurring between consecutive setting operations.
10. A machine of the class described hav-

ing, in combination, a setting device, a punching device and actuating means therefor, means for feeding the work to bring a punched hole into alinement with said setting device, means for actuating the setting device, and separate means for feeding the clenched fastener out of alinement with said setting device.

11. A machine of the class described having, in combination, a setting device movable to feed the work and clench an eyelet therein, a punch arranged to operate on the work at one side of said setting device, and means for feeding the work prior to the operation of said punch.

12. A machine of the class described having, in combination, a punch, a setting device and mechanism for successively moving said punch and set into engagement with the work, means for feeding the work prior to the operation of the punch, and means for moving the setting device laterally to feed the work after the operation of the punch.

13. A machine of the class described having, in combination, punching and setting devices, one of which is arranged for lateral movement while in engagement with the work to feed the work, and means out of alinement with the path of said laterally moving device for engaging and feeding the work while said device is inoperative.

14. An eyelet setting machine having, in combination, two separate vibratory feeding devices, and means for moving one of them laterally to feed the work while the other is moving in the opposite direction.

15. An eyelet setting machine having, in combination, a movable work feeding device, feeding jaws, and means for moving the feeding jaws in one direction while the feeding device is moving in the other.

16. A machine of the class described having, in combination, a setting device, a plurality of feeding devices, and means for causing said feeding devices to operate successively upon one piece of work between two successive setting operations upon said piece of work.

17. A machine of the class described having, in combination, a setting device, separate feeding devices for moving the work by steps to setting position, and means for regulating the extent of the movement of one of said feeding devices.

18. A machine of the class described having, in combination, a punching device, a setting device, means for moving one of said devices while in engagement with the work to feed the work, means for regulating the extent of such feeding movement, and auxiliary work-feeding means.

19. An eyelet setting machine having, in combination, a work supporting table, means constructed and arranged to feed the

work into setting position prior to the setting operation and out of setting position after the setting operation, and means for regulating the extent of feeding movement occurring prior to the setting operation.

20. A machine of the class described having, in combination, a punch, setting devices, means for moving one of said setting devices laterally while in engagement with the work to feed the work, an auxiliary feeding device comprising work clamping jaws, and means for moving them laterally while in engagement with the work, both of said feeding operations being timed to occur between successive setting operations when the machine is operated continuously, whereby a wide space between successive fasteners is obtained.

21. A machine of the class described having, in combination, means for punching and feeding the work, means for presenting an eyelet to the punched hole and setting it therein, auxiliary feeding means arranged to act after the setting operation, and means

under the control of the operator for stopping the machine after the action of the auxiliary feeding means.

22. A machine of the class described having, in combination, a punch, setting devices, a presser foot arranged to hold the work stationary during the operation of the punch and setting devices, and means for moving said presser foot to feed the work at a predetermined point in the cycle of the machine.

23. A machine of the class described having, in combination, a reciprocatory setting die, a swinging feeding device, and a sliding feeding device, both feeding devices being arranged to operate upon the work between successive operations of the setting die.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES F. DUDLEY.

Witnesses:

OLIVER B. KAISER,
S. ROSS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."