June 1, 1943. A. H. MAYNARD 2,320,703

WIRE-STITCHING MACHINE

Filed June 16, 1941 3 Sheets-Sheet 1

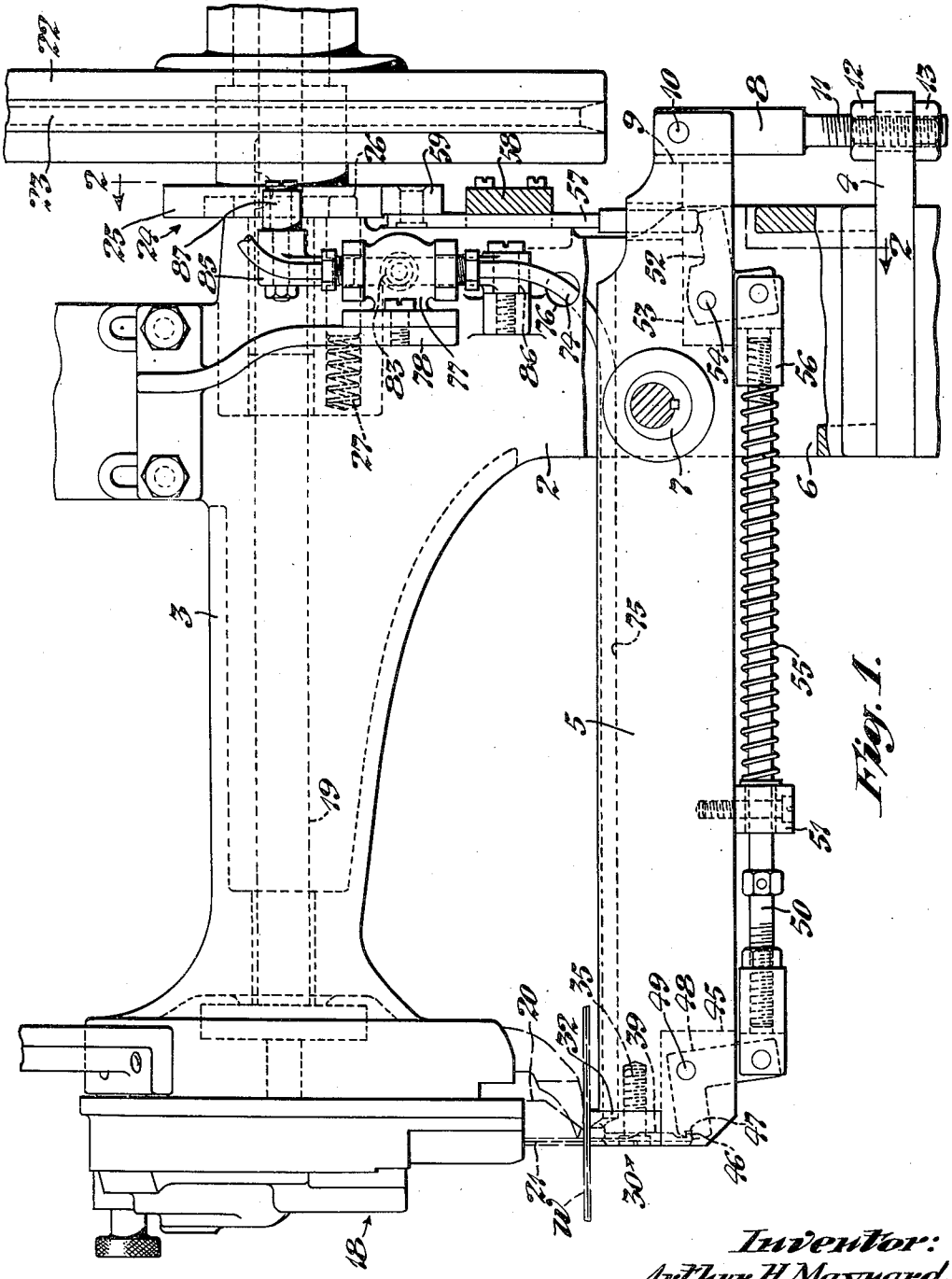


Fig. 1.

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WIRE-STITCHING MACHINE

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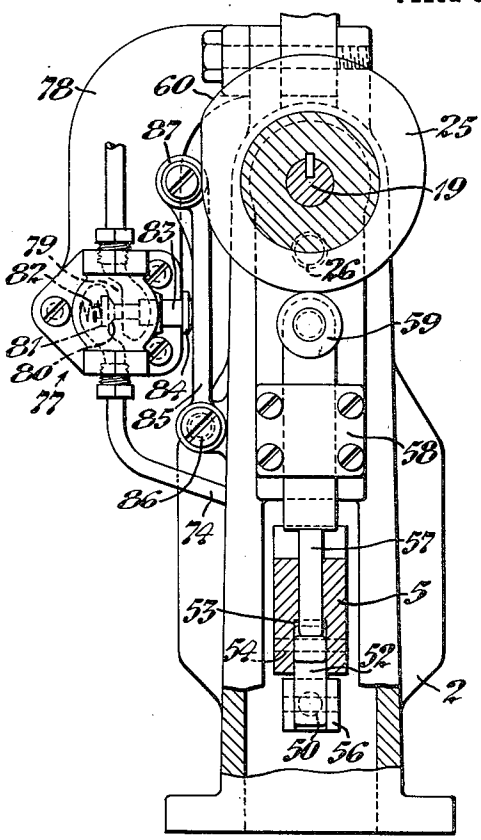


Fig. 2.

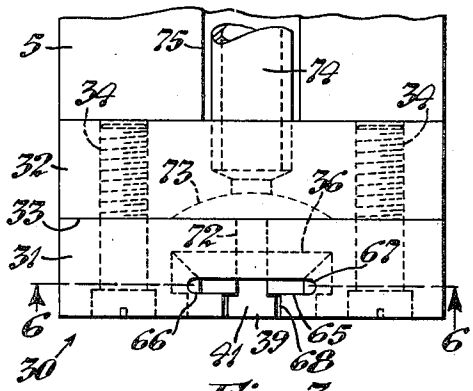


Fig. 3.

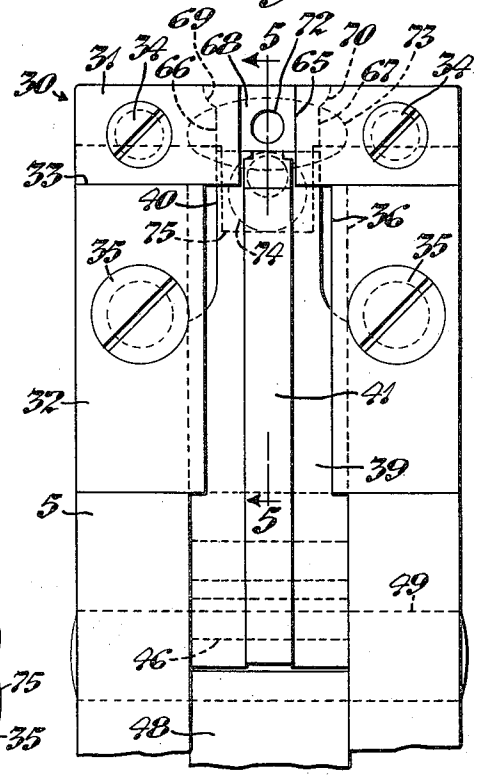


Fig. 4.

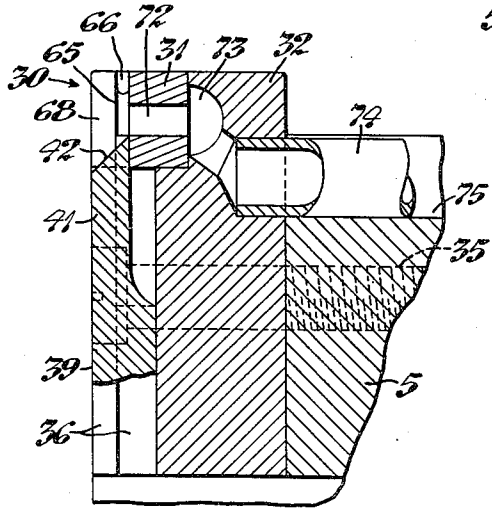


Fig. 5.

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WIRE-STITCHING MACHINE

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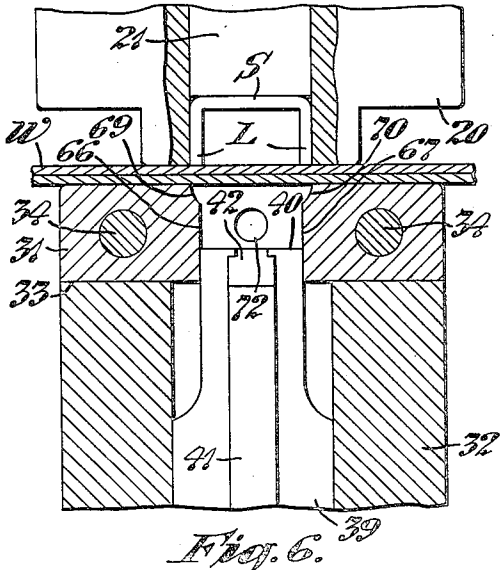


Fig. 6.

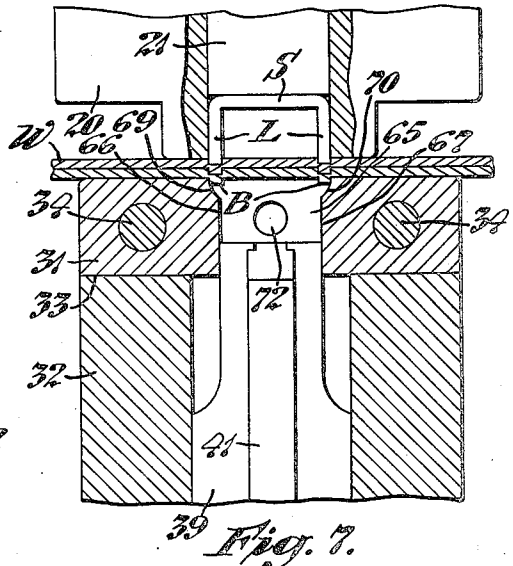


Fig. 7.

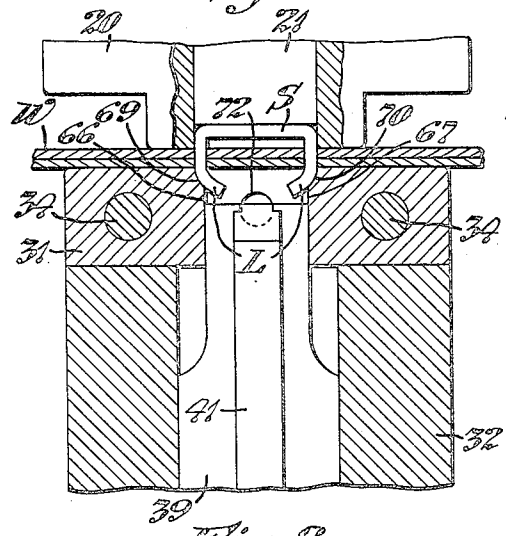


Fig. 8.

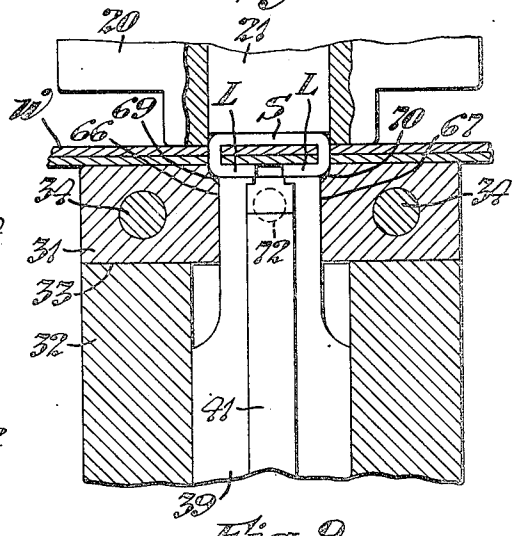


Fig. 9.

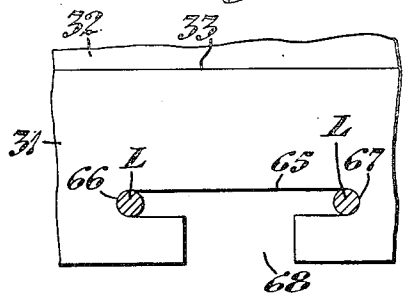


Fig. 10.

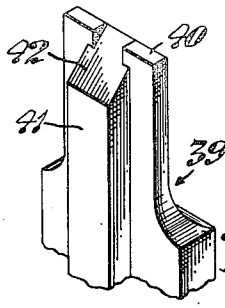


Fig. 11.

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Patented June 1, 1943 2,320,703

UNITED STATES PATENT OFFICE

2,320,703

WIRE-STITCHING MACHINE

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Application June 16, 1941, Serial No. 398,211

7 Claims. (Cl. 1—2)

The present invention relates to wire-stitching machines and more particularly to machines for stitching together sheets, bars and other structural forms of metal, such as iron, steel, copper, aluminum and alloys thereof or similar materials.

One of the objects of the present invention is to provide a method of stitching metal sheets or the like by driving metal fasteners therethrough without deforming or weakening the stitched material at points adjacent the fasteners.

Another object of the invention is to provide a method of stitching metals comprising the step of removing the burrs or punchings cut from the material by the driving of the fasteners therethrough whereby to permit proper clinching of the legs of the fasteners.

Another object is to provide a method of and means for removing the burrs punched from the work by directing an air stream at high velocity across the ends of the legs of the fastener as they are driven through the work.

Another object is to provide a method of and means for deforming the legs of the fasteners as they are being driven and simultaneously pressing the cross-bars and legs of the fasteners against the opposite sides of the work with equal and opposite forces to prevent deformation thereof.

Another object is to provide a wire-stitching machine in which the operation of the air-blast and clincher means is controlled by the operation of the wire-stitching means.

Another object is to provide a machine of the type indicated which is of simple and compact construction and adapted to efficiently perform its intended function.

Further objects of the invention are set forth in the following specification which describes the method and a preferred form of the machine for carrying out the steps of the method, by way of example, as illustrated by the accompanying drawings. In the drawings:

Fig. 1 is a side elevational view of a portion of a wire-stitching machine incorporating the novel features of the present invention;

Fig. 2 is a transverse sectional view taken on line 2—2 of Fig. 1 showing the cam on the drive shaft of the wire-stitching means for operating the air-control valve and the clincher slide;

Fig. 3 is an enlarged plan view of the anvil for supporting the work showing the form of the slot therein;

Fig. 4 is an enlarged front elevational view of the anvil showing the opening at the front of the slot in the anvil and the form of the clincher slide;

Fig. 5 is a longitudinal sectional view taken on line 5—5 of Fig. 4 showing the nozzle for directing an air-stream across the slot in the anvil;

Fig. 6 is a transverse sectional view taken on line 6—6 of Fig. 3 showing the relationship of the parts at the beginning of a fastener-driving operation;

Fig. 7 is a view similar to Fig. 6 showing the burrs sheared from the work while the latter is supported at points adjacent the legs of the staple;

Fig. 8 is a view similar to Fig. 6 showing the legs of the fastener deflected inwardly toward each other at the underside of the work as they are driven therethrough;

Fig. 9 is a view similar to Fig. 6 showing the driver and clincher slide as simultaneously pressing the cross-bar and legs of the fastener against the work at opposite sides thereof;

Fig. 10 is a further enlarged detailed plan view of the slot in the anvil showing the contour and dimensions at the end thereof as substantially the same as the contour and dimensions of the legs of the fastener; and

Fig. 11 is a perspective view of the upper end of the clincher slide.

It has heretofore been the common practice to join metal parts such as used in the construction of airplanes, to which the present invention is particularly directed, by means of rivets. Such airplane parts are usually constructed of Duralumin which has the characteristic of being materially weakened by scratches, cuts, abrasions, and the like on its outer surface or skin. Consequently, when the material is punched with relatively large holes to receive rivets and the rivets are driven and headed over, the material is liable to be weakened and to tear along the row of rivets. It has been discovered that Duralumin airplane parts may be stitched together by driving U-shaped fasteners through the elements and that when so stitched the section of metal is as resistant to shear as when riveted because of the greater land between the fastener legs and less deformation and injury to the surface of the material, the tendency to shear being in the metal rather than in the rivets or fastener legs.

When standard types of stitching machines are used to stitch metals particularly Duralumin, tearing and deformation of the metal occurs as the ends of the legs of the fastener are driven therethrough. As a result of the driving of the fastener legs through the work the material is

drawn down in a neck around the holes through which the legs of the fastener extend. The deformation of the metal by the penetration of the legs of the fastener therethrough also causes fissures and minute crevices at the sides of the holes. As a result the material is considerably weakened at points adjacent the holes and the fissures form a series of breaks in the material which promote further tearing of the material when subjected to stress. Furthermore, the burrs punched from the work by the fastener legs are apt to remain on the ends of the legs or to become positioned between the bent legs and the work which prevents proper clinching of the legs on the under side thereof. In some types of metal stitching such tearing and deformation of the material around the holes through which the fastener legs extend is not objectionable, but for work where the parts are subjected to flexing and stress, such as airplane parts, deformation and weakening of the structure cannot be tolerated.

The improved method of the present invention comprises the step of forming a slot in the anvil on which the work is supported disposed in alinement with the plane of movement of the metal fastener to be driven, with the ends of the slot of substantially the same contour and dimensions as the cross-sectional contour and dimensions of the legs of the fasteners. The work is forced against the anvil under considerable pressure and during this operation the legs of a U-shaped metallic fastener driven through the metal. The ends of the legs of the fastener and the ends of the slot in the anvil, being of substantially the same contour and dimensions, will act in the manner of a punch-and-die for cleanly cutting a burr or burrs from the metal without deforming or weakening the work around the hole from which the burr is punched.

As the legs of the fastener penetrate the metal they force the burrs into the slot beneath the work and simultaneously an air-blast of high velocity is directed across the ends of the legs of the fasteners to expel the burrs outwardly through an opening at the front of the slot. As the legs of the fastener penetrate through the work they are preferably deflected inwardly toward each other. At the end of the driving operation while the driver is still in engagement with the cross-bar of the fastener its legs are clinched by bending them upwardly toward the work with a force equal and opposite to the driving force, whereby to prevent deformation of the material being stitched. As a result of the present improved method, materials such as Duralumin may be stitched by driving metal fasteners therethrough without deforming or weakening the metal around the holes through which the legs of the fasteners extend.

Although the steps of the present improved method may be carried out by other suitable apparatus, a preferred form of machine is herein illustrated for that purpose. Referring to Fig. 1, the machine comprises a frame having a pedestal 2 with a horizontally extending arm 3 at its upper end. The pedestal 2 consists of upper and lower sections bolted together with a rearwardly projecting plate 4 therebetween. Below the arm 3 is an anvil-supporting arm 5 which extends through a slot 6 in the upper section of the pedestal and is supported on an eccentric stud 7 extending across the slot. The rearward end of the anvil-supporting arm 5 is connected to the rearwardly extending end of the stationary plate 4 by means of a bolt 8. The upper end of the bolt 8 is fastened in a slot 9 at the rearward end of the arm 5 by means of a pin 10 which extends across the slot and through the bolt. The bolt 8 has a screw-threaded shank 11 which projects through the rearward portion of the stationary plate 4 and is clamped thereto by nuts 12 and 13. By releasing the nuts 12 and 13 on the threaded shank 11 of the bolt 8 and rotating the eccentric stud 7 the anvil-supporting arm 5 may be adjusted longitudinally to aline the anvil with the staple-driver, after which it is secured rigidly by tightening the nuts against the opposite faces of the arm 4.

A wire-stitching head 18 is mounted at the end of the horizontally extending arm 3 of the frame for operation by a drive shaft 19 extending through the arm. The wire-stitching head 18 may be of any suitable construction and, as herein illustrated, is of the type shown and described in United States Letters Patent to H. G. Allen, No. 1,760,031, issued May 27, 1930. In the operation of this type of wire-stitching head the first half-operation of the drive shaft 19 causes a length of wire to be severed from the supply, bent into a U-shaped staple S and the staple driven into the work; and during the second half-revolution of the drive shaft 19 the parts of the stitching mechanism are returned to initial position and another length of wire fed thereto. The severed length of wire is bent into a U-shaped staple S by means of a bender bar 20 which, during its operative stroke, is reciprocated into engagement with the upper face of the work to apply pressure thereon while the staple is being driven by a driver 21 which reciprocates in a slot in the bender bar.

A fly-wheel 22 is mounted for rotation on the end of the drive shaft 19 projecting rearwardly from the arm 3 and is adapted to be continuously driven by a belt 23 from a suitable prime mover, not herein shown. A clutch 24 is provided adjacent the fly-wheel 22 for connecting the latter to the drive shaft 19. The clutch 24 as herein shown is generally similar to that illustrated and described in United States Letters Patent to A. H. Maynard, No. 1,495,342, issued May 27, 1924, and comprises a housing member 25 adapted to rotate with the drive shaft 19. The actuation of the clutch 24 is controlled by a pin 26 to automatically couple the fly-wheel 22 to the drive shaft 19 when the pin is retracted against the action of a spring 27. When the pin 26 is released and projected into the clutch by the spring 27 the fly-wheel is uncoupled from the drive shaft 19 at the end of a cycle of operations of the wire-stitching head 18. It will be understood that the pin 26 may be operated by any suitable means, such as a foot-treadle, a work-operated gauge, or the like and preferably the manually controlled means is so constructed and arranged as to release the control-pin 26 from the clutch after each stitch to provide for applying a single stitch at each operation of the manually controlled means.

A work-supporting anvil 30 mounted on the forward end of the arm 5 comprises a pair of blocks 31 and 32, shown in detail in Figs. 3 and 5. The block 31 is seated in a recess 33 in the upper forward side of the block 32 and is secured thereto by means of bolts 34. The block 32, in turn, is fastened to the forward end of the arm 5 by means of bolts 35, see Fig. 5. The forward face of the block 32 has a T-shaped slot 36 formed therein, see Figs. 3 and 4, to provide a guideway

for slidably mounting a clincher plate or slide 39. As illustrated most clearly in Fig. 11, the clincher slide 39 has a forwardly projecting rib 41 extending throughout its length. The upper end 40 of the clincher slide 39 is of reduced width and has an angular face or bevel 42 at the center of its upper edge which extends from the rearward face of the slide to the forward face of the rib 41 for a purpose as will appear later.

The clincher slide 39 is reciprocated in timed relation to the operation of the wire-stitching mechanism 18 to cause its upper end to clinch the legs of the driven staple S while the crossbar of the staple is held by the driver 21 at the end of its stroke, see Fig. 9. The lower end of the clincher plate 39 has a rearwardly projecting lug 46, see Fig. 1, which extends into a correspondingly shaped recess 47 at the end of one arm of a bell-crank-lever 48. The bell-crank 48 is positioned in a rectangular slot 45 in the anvil-supporting arm 5 and pivotally mounted on a pin 49 extending across the slot. The opposite arm of the bell-crank 48 is connected to one end of an adjustable link 50 slidably mounted in a guide 51 depending from the bottom of the arm 5. A spring 55 acting between the guide 51 and the end of a clevis 56 on the link 50 normally holds the latter in its rearward or retracted position. The clevis 56 at the end of the link 50 is connected to one arm of a bell-crank 52 positioned in a slot 53 at the rearward end of the arm 5 and pivotally mounted on a pin 54 extending across the slot.

The bell-crank 52 is rocked in clockwise direction, as viewed in Fig. 1, to actuate the link 50 to the left against the action of the spring 55 by means of a push-rod 57 slidably mounted in a guide 58 attached to the rearward side of the pedestal 2, see Figs. 1 and 2. The push-rod 57 has a roller 59 at its upper end which bears against the periphery of the clutch-housing 25 and the latter is provided with a cam-lobe 60. Thus, the clutch-housing 25 acts as a cam operative on the follower roller 59 to actuate the push-rod 57, bell-crank 52, link 50 and bell-crank 48 to slide the clincher plate 39 from the position illustrated in Fig. 6 to that illustrated in Fig. 9.

The block 31 of the work-supporting anvil 30 is provided with a T-shaped slot 65 similar to the slot 35 in the block 32 but of contracted dimensions, see Figs. 3 and 10. In accordance with the present invention the ends 66 and 67 of the slot 65 are of the same contour and dimensions as the cross-sectional contour of the legs L of the staple S, see Fig. 10, and the width of the slot is of the same dimensions as the thickness of the staple legs. The T-shaped slot 65 also provides an opening 68 at the front of the block 31. With this form of construction the ends of the staple legs L and the ends 66 and 67 of the slot 65 act as a punch-and-die for cleanly cutting burrs B from the work W, see Fig. 7, without deformation of the work around the holes from which the burrs are punched. As illustrated in Figs. 6 to 9, the semicircular ends of the slot 65 are beveled or gradually curved in a vertical direction as indicated at 69 and 70 to deflect the ends of the legs of the staple S inwardly toward each other as the fastener is driven through the work. Furthermore, the width of the slot 65 below the vertically curved end portions 66 and 67 is such as to receive the reduced end 40 of the clincher slide 39 to adapt it to reciprocate therein. The cam-lobe 60 on the clutch-housing 25 is so positioned with respect to the follower roller 59 as to operate the clincher slide 39 during the latter part of the movement of the driver 21 whereby to engage the legs L of the staple S and press them against the under side of the work with a force equal and opposite to the force of the driver 21 to clinch the legs of the staple without deformation of the work.

It has been found in practice that when the machine is used to stitch relatively thin stock the ends of the legs L of the staple S will penetrate the work vertically, but with thicker stock the staple legs tend to penetrate the work in a direction slightly inclined inwardly toward each other to punch burrs of cylindroid form in which case the beveled or curved portions 69 and 70 of the slot 65 are positioned slightly inwardly with relation to the outer edges of the staple legs. However, whether thin work or thick work is being stitched the ends of the staple legs will act to cleanly shear the burrs B from the work W without deformation of the metal around the holes from which the burrs are punched.

Another feature of the present invention is the provision of means for removing the burrs B from the slot 65 after they have been punched from the work W. The means for expelling the burrs B may take other forms but, as herein illustrated, an air-blast is employed for blowing the burrs outwardly through the opening 68. For this purpose the block 31 is provided with a hole 72 extending rearwardly from the slot 65, the holes constituting a nozzle for converting fluid under pressure, such as air, to a stream at relatively high velocity. The hole 72 opens at its rearward end into a chamber 73, shown in dotted lines in Figs. 3 and 4, formed in the forward face of the block 32, see also Fig. 5. The chamber 73 is connected to one side of a control valve 77, see Figs. 1 and 2, by means of a tube or conduit 74 extending rearwardly through a groove 75 in the upper face of the arm 5. The conduit 74 then extends laterally through an opening 76 in the pedestal 2 to the control valve 77 and continues from the opposite side of the control valve to a source of fluid under pressure of any suitable type, not herein shown.

The control valve 77 is attached to a bracket 78 bolted to the machine frame and comprises a housing having a septum 79 therein with a conical valve-seat 80. A valve-plug 81 is normally held in engagement with the valve-seat 80 by means of a spring 82, see Fig. 2. The plug 81 has a valve-stem 83 projecting through the wall of the valve-casing with a contact member 84 at its outer end. The valve-stem 83 is adapted to be slid against the action of the spring 82 to remove the plug 81 from its seat 80 by a lever 85 pivotally mounted at its lower end on a stud 86 projecting from the pedestal 2. The upper end of the lever 85 mounts a roller 87 which bears against the periphery of the clutch-housing 25 at a point 90° in advance of the follower roller 59 for the clincher plate actuating means. Thus, rotation of the drive shaft 19 and clutch-housing 25 fast thereon causes the cam-lobe 60 to engage the follower roller 87 on the lever 85 and rock the latter to slide the valve-stem 83 and move the valve-plug 81 away from the valve-seat 80. Upon actuation of the valve-stem 83 fluid under pressure, preferably air, is admitted to the chamber 73 through the conduit 74 and through the nozzle 72 to the T-shaped slot 65 in the block 31. The nozzle 72 converts the air under pressure to a stream at relatively high

velocity and directs it across the slot 65 to blow the burrs B outwardly through the opening 68, the beveled face 42 at the upper end of the clincher slide facilitating the escape of the burrs. A preferred embodiment of the invention having been described in detail, the mode of operation of the machine is explained as follows.

The anvil-supporting arm 5 is first adjusted by loosening the nuts 12 and 13 on the threaded shank 11 of the bolt 8 and rotating the eccentric stud 7, see Fig. 1, to so position the anvil 30 at the outer end of the arm as to aline the slot 65 in the block 31 with the staple-driver 21 and to cause the work W to be engaged by the bender bar 20 and forced tightly against the anvil during a stitching operation. The work W is placed in position on the anvil 30 and the stitching operation started by causing the pin 26 to be withdrawn from the clutch 24 to couple the fly-wheel 22 to the drive shaft 19 for the stitcher head 18. During the first half-revolution of the drive shaft 19 the bender bar 20 will operate to form a staple S, engage the upper face of the work W and firmly press the latter against the anvil 30, see Fig. 6; and thereafter it will operate to reciprocate the driver 21 to drive the staple through the work. Due to the conformity of the contour and dimensions of the ends of the slot 65 with the ends of the staple legs L the legs of the staple act as a punch and the slotted anvil 30 as a die to cleanly shear the burrs B from the work without deformation of the metal adjacent the holes through which the burrs are punched, see Fig. 7.

Prior to the penetration of the ends of the staple legs through the work the cam-lobe 60 on the clutch-housing 25 will engage the follower roller 87 at the upper end of the lever 85 and rock the latter in counterclockwise direction, as viewed in Fig. 2, to actuate the valve-stem 83 and supply air under pressure to the chamber 73 in the anvil 30. As the air escapes from the chamber 73 through the hole 72 in the block 31 it is converted to a high velocity stream directed across the slot 65. Thus, as the burrs B are cut from the work and forced into the slot 65 they are immediately blown forwardly through the opening 68 to remove them from the machine.

During the continued movement of the staple legs L, under the action of the driver 21, from the position illustrated in Fig. 7 to that illustrated in Fig. 8 they are deflected inwardly toward each other by the curved portions 69 and 70 of the slot 65. As the parts move from the position illustrated in Fig. 7 to that shown in Fig. 8 the cam-lobe 60 on the clutch-housing 25 will engage the follower roller 59 on the push-rod 57 to depress the latter which, acting through the bell-crank 52, link 50 and bell-crank 48, will move the clincher slide 39 upwardly. Upon movement of the clincher slide 39 from the position illustrated in Fig. 8 to that illustrated in Fig. 9 its upper end will engage the inwardly directed ends of the legs L of the staple S to clinch them against the under side of the work. The clinching of the staple legs L is accomplished while the driver 21 is in engagement with the cross-bar of the staple whereby the driver and clincher slide act with equal and opposite forces on opposite sides of the work W to tightly clinch the staple and prevent deformation of the work.

During the second half-revolution of the drive shaft 19 the bender bar 20 and driver 21 will be retracted and the clutch-housing 25 rotated to disengage the cam-lobe 60 from the follower rollers 87 and 59. Upon release of the follower roller 87 by the cam-lobe 60 the spring 82 will operate the valve-plug 81 to engage it with the seat 80 to arrest the flow of air to the anvil 30. Upon release of the follower roller 59 on the push-rod 57 the spring 55 acting between the guide 51 and the clevis 56 on the link 50 will slide the latter to the right, as viewed in Fig. 1, to rock the bell-crank 48 and depress the clincher slide 39 to its inoperative position illustrated in Figs. 6 and 7. The operation of the machine is initiated by withdrawing the pin 26 from the clutch 24 to connect the fly-wheel 22 with the drive shaft 19 and its operation is arrested by releasing the pin to cause the spring 27 to project it into the clutch 24 whereby to uncouple the fly-wheel 22 from the drive shaft 19. This control of the stitching operations may be accomplished manually through a lever or treadle connected to actuate the pin 26, but not herein shown.

It will be observed from the foregoing that the invention provides a novel method of and machine for stitching metals such as Duralumin without weakening or deforming the material adjacent the holes through which the legs of the fasteners project. It will also be observed that the present invention provides a novel method of and machine for removing the burrs punched from the material to permit proper clinching of the legs of the fastener against the under side of the work.

While a preferred method, and a suitable machine for carrying out the steps of the method, are herein described and illustrated, it will be understood that modifications may be made in the steps of the method and in the form of construction of the machine without departing from the spirit or scope of the invention. Therefore, without limiting myself in this respect, I claim:

1. In a wire-stitching machine, a stitching head for driving U-shaped fasteners through the work, a work-supporting anvil having an opening therein for receiving the legs of the fasteners, the fastener legs and anvil acting to punch burrs from the work to provide holes through which the legs of the fasteners are projected, means operated by the stitching head during the fastener-driving operation for directing an air stream at relatively high velocity across the ends of the legs of the fasteners to remove the burrs therefrom, and means for clinching the legs of the fasteners against the under side of the work.

2. In a wire-stitching machine, a stitching head for driving U-shaped fasteners through the work, a work-supporting anvil having an opening therein for receiving the fastener legs as they are driven through the work and a second opening extending laterally from the first-mentioned opening, the fastener legs and anvil acting to punch burrs from the work to provide holes through which the legs of the fasteners are projected, means operated by the stitching head during the fastener-driving operation for directing an air stream at relatively high velocity across the ends of the legs of the fasteners to remove the burrs therefrom and eject them through the lateral opening in the anvil, and means for clinching the legs of the fasteners against the under side of the work.

3. In a wire-stitching machine, a stitching head for driving U-shaped fasteners through the work, a work-supporting anvil having an opening therein for receiving the fastener legs as they are driven through the work and a second opening extending laterally from the first-mentioned

opening, the fastener legs and anvil acting to punch burrs from the work to provide holes through which the legs of the fasteners are projected, means for blowing an air stream at relatively high velocity across the ends of the legs of the fasteners to remove the burrs therefrom and eject them through the lateral opening in the anvil, means operated by the stitching head during each fastener-driving operation for controlling the air-blowing means to intermittently apply the air stream in timed relation to the operation of the wire-stitching head, and means for clinching the legs of the fasteners against the under side of the work.

4. In a wire-stitching machine, a stitching head having a reciprocating driver for driving U-shaped fasteners through the work, a work-supporting anvil having a slot therein with end portions of substantially the same cross-sectional contour and dimensions as the legs of the fasteners, the legs of the fasteners and ends of the slot acting as a punch-and-die for cutting burrs from the work to provide holes through which the legs of the fasteners are projected without deformation or tearing of the work at the edges of the holes, means operated by the stitching head during the fastener-driving operation for blowing an air stream at relatively high velocity across the ends of the legs of the fasteners to remove the burrs therefrom, and means for clinching the legs of the fasteners against the under side of the work.

5. In a wire-stitching machine, a stitching head having a reciprocating driver for driving U-shaped fasteners through the work, a work-supporting anvil having a slot therein with end portions of substantially the same contour and dimensions as the legs of the fasteners and an opening extending laterally from the slot, the legs of the fasteners and ends of the slot acting as a punch-and-die for cutting burrs from the work to provide holes through which the legs of the fasteners are projected without deformation or tearing of the work at the edges of the holes, means operated by the stitching head during the fastener-driving operation for blowing an air stream at relatively high velocity across the ends of the legs of the fasteners to remove the burrs therefrom and eject them through the lateral opening, and means for clinching the legs of the fasteners against the under side of the work.

6. In a wire-stitching machine, a stitching head for driving U-shaped fasterners through the work, a work-supporting anvil having an opening therein, the fastener legs and anvil acting to punch burrs from the work to provide holes through which the legs of the fastener are projected, a source of fluid under pressure, a nozzle adjacent the opening in the anvil and connected to the source of fluid, a valve for controlling the supply of fluid to the nozzle, means operated from the stitching head for opening the valve to direct a stream of air across the ends of the legs of the fasteners as they penetrate the work to remove the burrs therefrom, and means for clinching the legs of the fasteners against the under side of the work.

7. In a wire-stitching machine, a stitching head having a reciprocating driver for driving U-shaped fasteners through the work, a work-supporting anvil having a slot therein with end portions of substantially the same cross-sectional contour and dimensions as the legs of the fastener, the legs of the fasteners and ends of the slot acting as a punch-and-die for cutting burrs from the work to provide holes through which the legs of the fastener are projected without deformation or tearing of the work at the edges of the holes, means for directing an air stream at relatively high velocity across the ends of the legs of the fasteners to remove the burrs from the anvil, a valve for controlling the air stream, a cam driven by the stitching head for operating the valve, and a reciprocating clincher slide cooperating with the driver to simultaneously press the cross-bars and legs of the fasteners against the opposite sides of the work.

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