

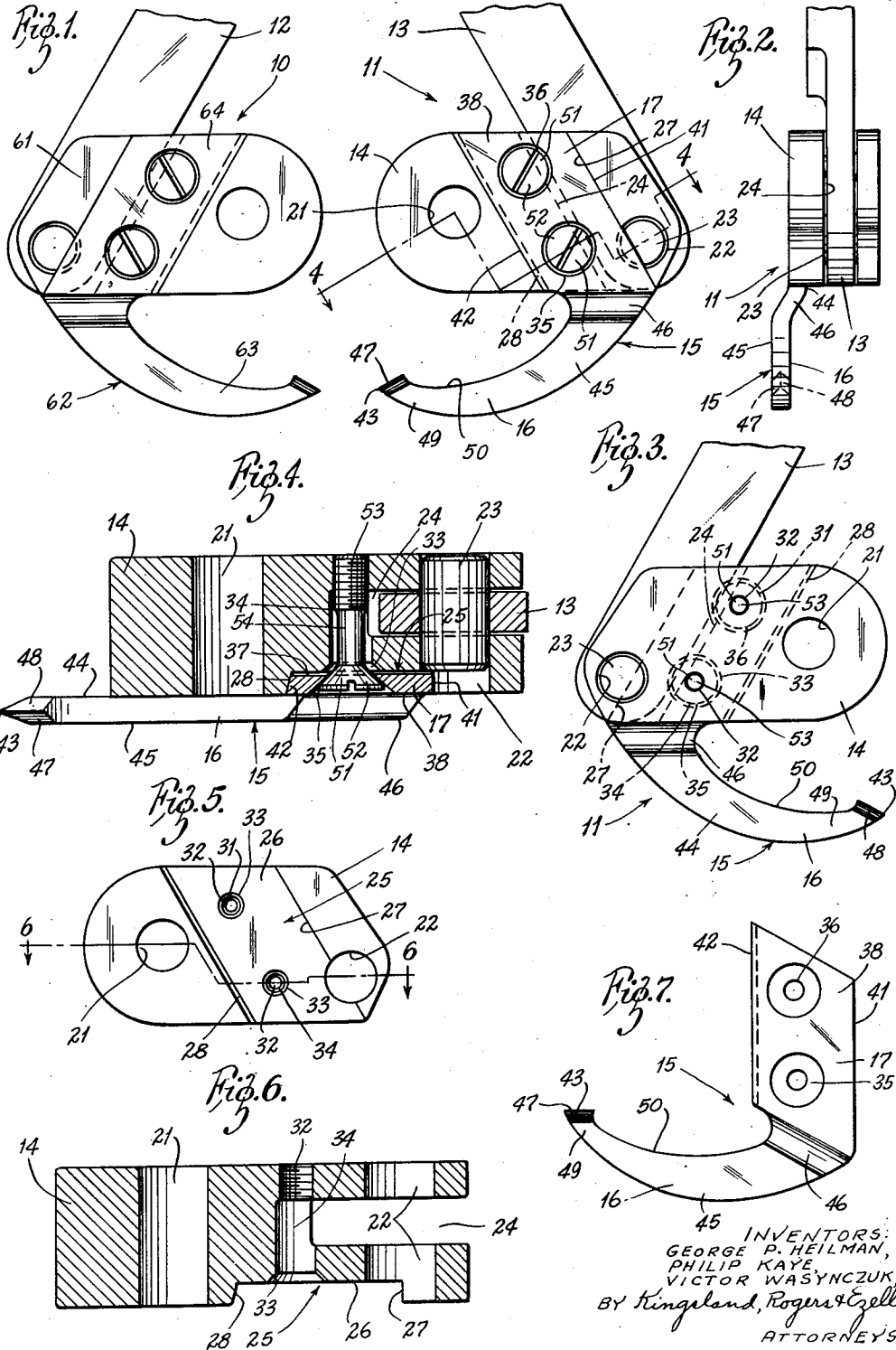
Dec. 17, 1957

G. P. HEILMAN ET AL

2,816,288

TWO-PIECE REMOVABLE ANVIL FOR STAPLING MACHINES

Filed Nov. 21, 1955



1

2,816,288

TWO-PIECE REMOVABLE ANVIL FOR STAPLING MACHINES

George P. Heilman, Herrin, Philip Kaye, Norridge, and Victor Wasynczuk, Chicago, Ill., assignors to International Staple and Machine Company, Herrin, Ill., a corporation of Pennsylvania

Application November 21, 1955, Serial No. 548,004

6 Claims. (Cl. 1—2)

This invention relates to improvements in anvils for stapling machines and, in particular, is concerned with a removable two-piece anvil assembly for retractable anvil stapling machines.

Retractable anvil stapling machines, such as that typified in Patent No. 2,469,054 assigned to applicants' assignee, International Staple and Machine Company, have conventionally used one-piece anvils. These anvils comprised as their major components an anvil blade, a hub and a shank connected to operating linkages in the stapling machine. Due to wear and attrition, the most common fault has been found to be in failure of the anvil blade. However, due to the integral construction, the entire anvil was required to be replaced, which necessitated that the machine be dismantled. This procedure had the obvious disadvantages of loss in labor time in making the repairs and the expense in substituting an entirely new anvil.

By means of this invention, there has been provided a pair of removable two-piece anvil assemblies which can be used in existing stapling machines without the necessity of redesign. The anvil assembly comprises, as its main components, an anvil base which can be connected to the operating linkages of the stapling machine and a removable anvil. The anvil assemblies have provisions whereby the anvil base can serve as a face past which the staple passes while the anvil blade is slightly offset therefrom to contact the legs of the staple and effect the staple clinching operation. Accordingly, the two anvil assemblies are characterized in their construction so that one serves as a right hand anvil and the other serves as a left hand anvil, making up a complete pair for the stapling machine.

The anvil blade is mounted to the anvil base in a wedging groove or recess, and securing is preferably effected by tension screws so that the anvil blade can be maintained in wedging relationship within the base without any possibility of disengagement. Conventional screws, however, may be utilized. This mounting is so effected that easy withdrawal of the blade can be brought about after the screws are removed by simply tapping the secured portion of the anvil in the direction of the axis of the groove.

Further, by means of the mounting construction for the anvil blade within the anvil base, a positive lock is provided without requiring the entire force to be maintained by the securing screws as the normal forces of operation tend to lock the anvil blade within the base, due to the special wedging action of the locking groove. Thus, a very secure anvil assembly has been provided, together with the extremely important feature of easy removability of the blade, where this is required, for maintenance which can be done by unskilled personnel.

Accordingly, it is a principal object of this invention to provide a removable anvil assembly comprising an anvil base and an anvil, wherein the securing of these two components can be provided by a locking device.

Another object of this invention is to provide an anvil assembly including an anvil base and an anvil, in which

2

the anvil base can function as a guide for a staple to direct it against the anvil.

Yet another object of this invention is to provide a removable anvil assembly comprising an anvil base and an anvil, in which the anvil can be secured to the base by a locking and wedging engagement.

Still another object of this invention is to provide a removable anvil assembly in which an anvil can be removably secured to an anvil base by an anchoring portion which is fitted into a groove in the anvil base in a relationship which provides a firm lock against removal in operation.

Still another object of this invention is to provide an anvil assembly including an anvil base having means for securing an anvil thereto, with a face of the anvil base being offset from the anvil blade to serve as guiding means for a staple.

Yet another object of this invention is to provide a removable anvil assembly having an anvil base in which an anvil blade may be removably secured thereto, and in which the securing engagement is effected by locking screws which are positioned under tension forces to the anvil base so as to hold the anvil securely within tapered sides of the base and in wedging relationship.

Still a further object of this invention is to provide a removable anvil assembly comprising an anvil base and an anvil, which can be removably secured thereto, and which is rugged in construction, easy to install and remove, and relatively inexpensive in cost.

Further objects of this invention will appear in the detailed description which follows and will be further apparent to those skilled in the art.

Reference will now be had to the accompanying drawings, which show, for the purpose of illustration, a preferred embodiment of this invention. It is to be understood that these drawings are for the purpose of example only and that the invention is not limited thereto.

In the drawings:

Figure 1 is a view in front elevation of a pair of anvil assemblies as they would appear in a retractable anvil stapling machine in their final staple clinching position;

Figure 2 is a view in side elevation of the anvil assemblies taken from the right side of Figure 1;

Figure 3 is a view in rear elevation of the right hand anvil assembly of Figure 1;

Figure 4 is a view in section taken on the line 4—4 of Figure 1 showing the right hand anvil assembly;

Figure 5 is a detailed view in front elevation showing the anvil base for the right hand assembly;

Figure 6 is a view in section taken on the line 6—6 of Figure 5; and

Figure 7 is a detailed view in front elevation showing the anvil for the right hand assembly.

A pair of complete anvil assemblies is designated at 10 and 11 in Figure 1 as they would be positioned near the end of a stapling operation in a retractable anvil stapling machine. For the purpose of description and clarity only, the anvil assembly 10 will be designated the left hand assembly, while the anvil assembly 11 will be designated the right hand assembly. Actually, in the stapling machine, the reference point may be to the rear, which would require that the designations be reversed.

The anvil assemblies are shown as being partially connected through links 12 and 13, in a conventional manner, to the operating components of a stapling machine. As will be apparent, the two anvil assemblies are mirror images of one another, and a detailed description will be given only for the right hand anvil assembly 11. The main components of the anvil assembly 11 comprise the anvil base 14 and an anvil generally indicated at 15

3

which is composed of an anvil blade 16 and an anchor arm 17.

The anvil base 14 is best shown in Figures 4, 5 and 6. This base may be conveniently machined to shape out of bar stock or any other standard construction material which has strength and wear resistance to withstand the attritional forces of the moving parts of the operating mechanism. The base is provided with openings 21 and 22 for connection to pins in the operating linkage of the stapling machine. In Figure 4, a pin 23 is shown connecting the link 13 to the base, and this feature of connection should be readily understood. To accommodate the link 13, a slot 24 is cut into the end of the base and the opening 22 extends therethrough, as shown in Figures 4 and 6. This provides for a secure connection of the link to the base, so that the assembly can resist impact forces in the stapling operation.

The locking provision on the base is best shown in Figures 5 and 6, where it is seen that a transverse groove or recess 25 is cut transversely across the face of the base. This groove has a flat bottom surface 26, a perpendicular wall 27 at one side, and a tapering or slanting wall 28 at the other side. A hole 31 extends from the groove 25 to the opposite side of the base and is threaded at the end 32 and beveled at the opposite end 33. A second hole 34 is similarly constructed.

The anvil 15 is best shown in Figures 4 and 7. There it will be seen that the anchor arm 17 has the configuration of a parallelogram to mate within the groove 25 of the base. It is provided with two beveled openings 35 and 36 to receive screws which pass therethrough and are connected into the two threaded openings 31 and 34 in the base. Both of the opposite faces 37 and 38 of the anchor arm are flat and are bounded by sides which mate in the groove 25. These sides are a perpendicular side 41 which bears against the perpendicular side 27 of the groove, and a tapering side 42 which bears against the tapering side wall 28 of the groove.

The anvil blade 16 is of a generally curved configuration and has a sharp pointed end 43. Both of its opposite faces are flat and are positioned so that the blade is offset from the top face 38 of the anchor arm. As shown in Figure 4, the bottom face 44 of the anvil blade is coextensive with the top face 38 of the anchor arm, while the top face 45 of the anvil blade is above it. This offset relation is effected by the bend 46 between the anchor arm and the anvil blade, as shown in Figures 2 and 7.

The pointed end 43 of the anvil blade has two converging faces 47 and 48 which enable the anvil blade to pierce the material to be stapled. In addition, the pointed end 43 comprises a reduced width portion 49 which separates the main anvil blade 16 from the pointed end. By referring to Figure 7, it will be seen that the top surface 50 of the anvil blade has an arc-like configuration of a fairly large radius extending between the reduced portion 49 and the bend 46. From the reduced portion 49 to the pointed end 43 there is a reversal of the arc and a sharper bend corresponding to a short radius, which greatly enhances the clinching ability of the anvil through this hook-like feature.

In connecting the anvil blade to the anvil base, conventional machine screws may be used. However, the screws 51 of the type disclosed in Figure 4 are shown, as they can be used to some advantage in the locking of the pieces. This screw has a conventional tapered head 52 and an opposite threaded portion 53. Between the head 52 and the end 53 is a shank 54 of a reduced diameter, which may be in the order of 90% of the diameter of the threaded end 53. This reduced diameter shank permits the screw to be threaded into the threaded opening 32 of the base and tightened so that the screw is under tension. Thus, due to the tension of the shank, the screw acts like a spring and locks itself into place. This same result is obtained by the use of machine screws because

4

of the structure of the anvil anchor arm and the base, but to a slightly lesser degree.

The left-hand anvil assembly 10 is similar to the right-hand assembly 11 and is composed of an anvil base 61 and an anvil 62, which is comprised of an anvil blade 63 and an anchor arm 64. The construction details are identical, with the exception that the elements of the assembly 10 are arranged in mirror image, as shown in Figure 1, to the anvil assembly 11.

Use

The anvil assemblies are easily assembled through the special locking mechanism of this invention. Thus, the right-hand assembly 11 is connected by merely inserting the anchor arm 17 into the groove 25 in mating relation. In this condition, the perpendicular side walls of the anchor arm and the groove will mate, as will the opposite tapered walls of each of these elements. This easy assembly is foolproof because of the characterized side walls, and there can be no misassembly by a reversal of the parts.

The final securing operation and locking of the parts is effected by inserting the screws 51 into the two openings 35 and 36 of the anchor arm and the openings 31 and 34 of the anvil base and screwing them in. When the two screws are tightened down, they will wedge the anchor arm firmly into the groove 25 of the anvil base, because of the action of the tapered wall 42 of the anchor arm against the tapered wall 28 of the groove which acts as a wedging lock. As this tightening down is effected, the straight side wall of the anchor arm is moved tightly against the straight side wall of the anvil base as mentioned for this wedging action, and even if the screws were subsequently removed the anvil would not become disengaged of its own accord.

In the locking of the anvil to the anvil base, a further locking and tightening is effected due to the special configuration of the screws 51. Thus, as these screws are tightened down, the relatively thin diameter of the shank portion 54 is put under tension, and the screw begins to act like a spring and locks itself into place.

Disassembly of the anvil 15 from the anvil base 14 is effected by removing the screws as the first operation, and then tapping the anchor arm in the direction of the axis of the groove to remove it therefrom. This can be conveniently done without the necessity of removing the anvil base from the operating linkage of the stapling machine.

The two anvil assemblies 10 and 11, as used in the conventional retractable stapling machine, are of improved advantage since a unitary and complete assemblage has been provided, with the additional feature of ready removability of the most easily worn out element, which is the anvil blade. In the assemblage of Figure 1, the anvil base serves as a guiding face for the staple which passes thereover and against the anvil blade 16. Since the anvil blade is offset from the base, it will be apparent that a convenient guide for the staple has been provided through the anvil assembly of this invention.

Further, a convenient clinching of the staple is provided through the configuration of the anvil blade 16 together with the reduced portion 49 and the hooked end 43. This provides for sure and positive clinching of the staple and, together with the staple guide means provided by the offsetting of the blade with respect to the anvil base, offers an important advance in the stapling art.

Various changes and modifications may be made in the anvil assembly as particularly shown in this invention, without departing from the spirit thereof. Such changes and modifications are intended to be within the teaching and principle of this invention as defined by the claims appended hereto.

What is claimed is:

1. An anvil assembly for use in retractable anvil stapling machines which comprises an anvil base, an anvil includ-

5

ing an anvil blade and an elongated anchor arm, and means for removably mounting said anchor arm on the anvil base in mating relation in an elongated locking recess provided in said base.

2. An anvil assembly for use in retractable anvil stapling machines which comprises an anvil base, an anvil including an integral anvil blade and an anchor arm, and means for removably mounting said anchor arm in the anvil base in wedging relation, said last-named means including a recess provided in the anvil base which has a tapering side wall at one side of the recess and a perpendicular side wall at the other side with said anchor arm being adapted to mate with said side walls, and tightening means for forcing said anchor arm into the recess and into wedging relation.

3. An anvil assembly for use in retractable anvil stapling machines which comprises an anvil base, an anvil including an integral anvil blade and an anchor arm, and means for removably mounting said anchor arm in the anvil base in wedging relation with said anchor arm being adapted to mate therewith, said last-named means including at least one screw, said screw being adapted to connect the anchor arm to the anvil base in wedging relation when it is tightened with said shank being put under tension, thereby to exert a locking force against loosening.

4. An anvil assembly for use in retractable anvil sta-

6

pling machines which comprises an anvil base having a flat face, an anvil having an anchor arm in the form of a plate and an anvil blade, said anchor arm being adapted to be removably mounted in a shallow recess provided in the base flush with the face thereof, and said anvil blade being at least partially located exteriorly of the base with respect to the face.

5. An anvil for use with an anvil base in a retractable anvil stapling machine, said anvil comprising an anchor arm and an anvil blade integrally connected to said anchor arm and offset therefrom, which arm is in the form of a plate and has a tapered side wall.

6. An anvil base for use with an anvil in a retractable anvil stapling machine, said anvil base having means for removably receiving said anvil in wedging relation, said means including a shallow open recess adapted to receive a portion of the anvil therein, said recess being provided with a tapered side wall.

References Cited in the file of this patent

UNITED STATES PATENTS

2,054,548	Matveyeff	Sept. 15, 1936
2,182,594	Matveyeff	Dec. 5, 1939
2,469,054	Schafroth	May 3, 1949
2,470,727	Schafroth	May 17, 1949
2,680,845	Schafroth	June 15, 1954