March 23, 1943. H. E. DICKERMAN 2,314,574

DEVICE FOR MAKING REAR SIGHTS FOR FIREARMS

Filed July 29, 1940 3 Sheets-Sheet 1

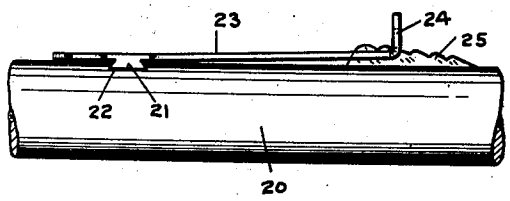


Fig. 1

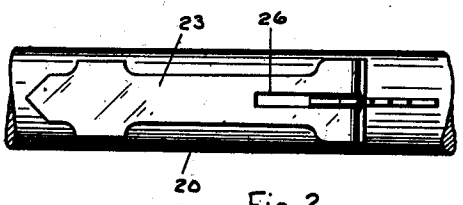


Fig. 2

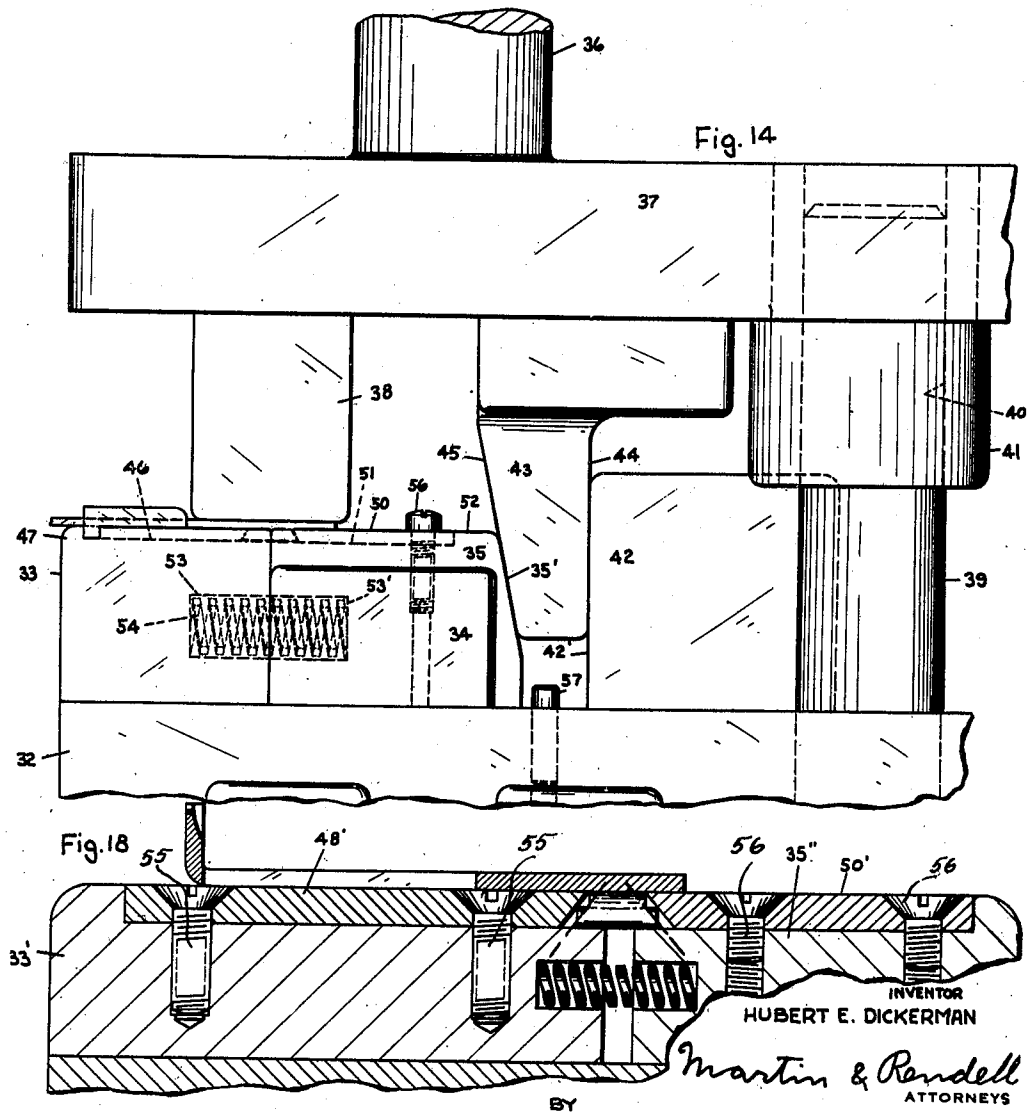


Fig. 14

Fig. 18

INVENTOR
HUBERT E. DICKERMAN

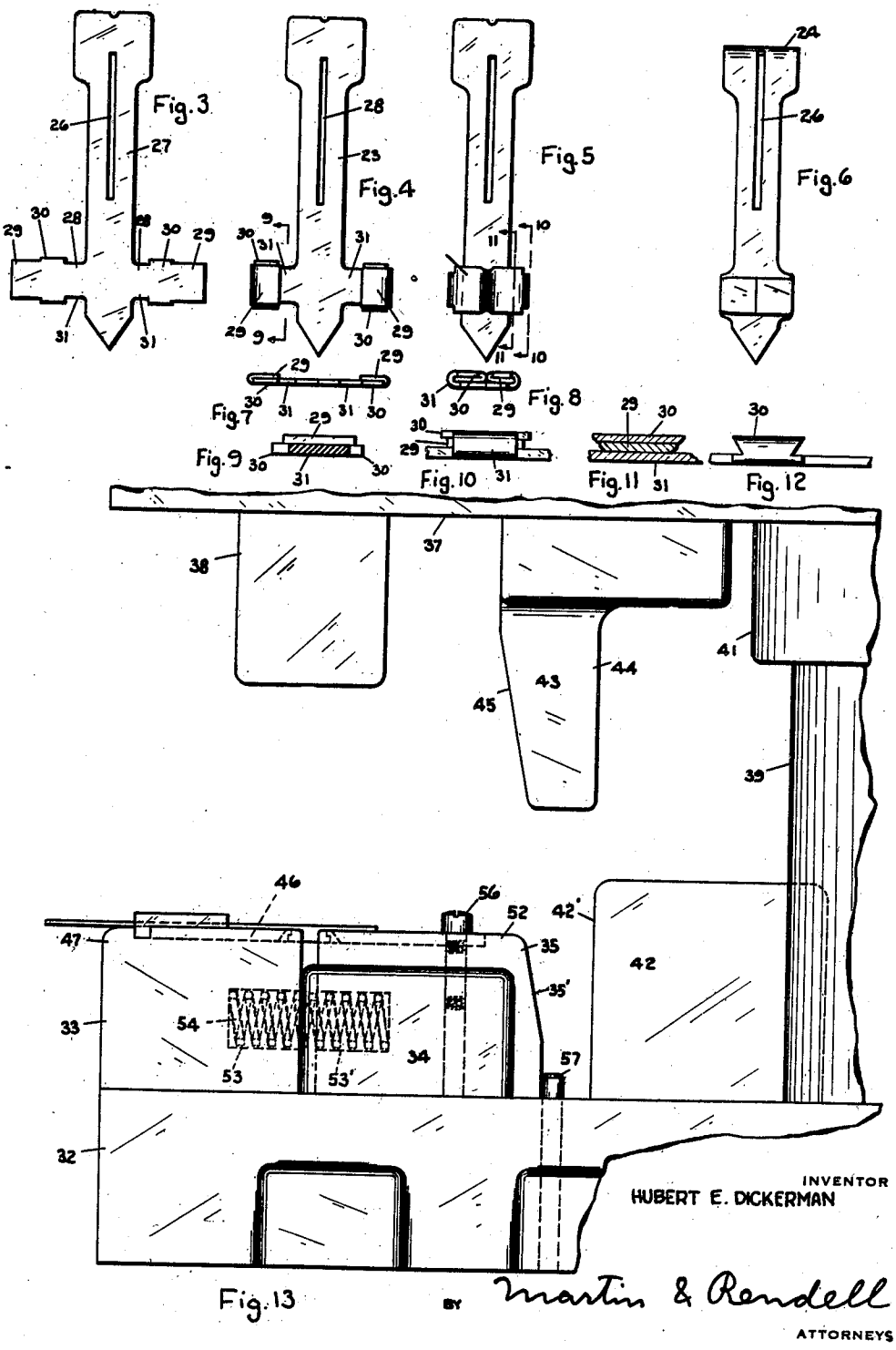
Martin & Rendell
ATTORNEYS

BY

March 23, 1943. H. E. DICKERMAN 2,314,574

DEVICE FOR MAKING REAR SIGHTS FOR FIREARMS

Filed July 29, 1940 3 Sheets-Sheet 2



March 23, 1943. H. E. DICKERMAN 2,314,574

DEVICE FOR MAKING REAR SIGHTS FOR FIREARMS

Filed July 29, 1940 3 Sheets-Sheet 3

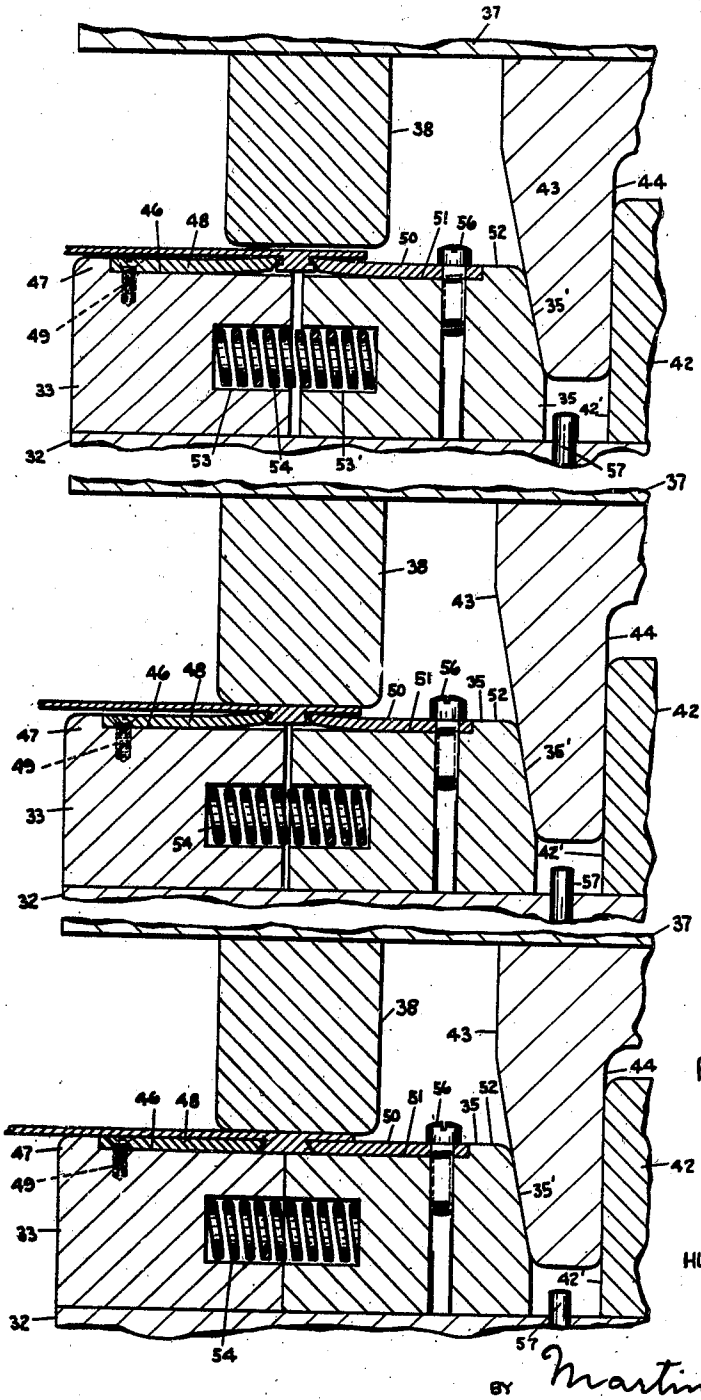


Fig. 15

Fig. 16

Fig. 17

INVENTOR
HUBERT E. DICKERMAN

BY Martin & Rendell
ATTORNEYS

Patented Mar. 23, 1943 2,314,574

UNITED STATES PATENT OFFICE

2,314,574

DEVICE FOR MAKING REAR SIGHTS FOR FIREARMS

Hubert E. Dickerman, Springfield, Mass., assignor to Savage Arms Corporation, New York, N. Y., a corporation of Delaware

Application July 29, 1940, Serial No. 348,089

4 Claims. (Cl. 78—60)

My present invention relates to a machine for die-stamping or die-forming the undercut double-thickness dovetail tenon by which one end, as the forward end, of the shank of a sight for firearms is mounted in the undercut notch provided transversely of the barrel of the firearm.

The purpose of this invention is to provide a new and improved and efficient machine or device for die-forming or die-stamping the undercut double-thickness dovetail tenon on such a sight for firearms. Heretofore it has been common to make the resilient shank and the integral dovetail tenon from a cross-shaped blank of proper metal by bending the arms of the cross successively from their outer ends to produce the rough shape for the double-thickness tenon at the forward end of the shank of the sight, as shown for instance in the patent to La Riviere No. 847,953 issued March 19, 1907. But that patent contemplated the forming and finishing of the slanted faces of the undercut dovetail tenon would be done by milling operations and such milling operations have heretofore always been necessary to complete in practice such a gunsight, which was made from a cross-shaped blank by bending in successively the arms of the blank to form the thickened tenon. These milling operations are relatively difficult to perform and the work of performing these steps has heretofore represented a very considerable part of the cost of producing and finishing to the necessarily precise size and fit, this type of gunsight.

It is the main purpose of this invention to provide a device adapted to perform the necessary and proper steps for forming, by die-forming or die-stamping steps, this type of dovetail tenon; and a further main purpose of this invention is to provide a machine or device that is especially adapted to perform die-forming or die-stamping steps resulting in the making of such undercut double thickness dovetail-shaped tenons for gunsights of this type. In other words this invention contemplates the elimination of the heretofore necessary steps of milling to make the slanting sides of the dovetail tenons on these sights and further to reduce very decidedly the cost of manufacturing such sights by providing means for entirely completing the making of the slanted dovetail tenons by die-stamping or die-forming.

A further purpose is to provide a machine or device of the type above mentioned which is especially adapted to and which is especially effective in having its parts so formed, combined, coordinated and operated as to perform the steps of finishing the roughly bent and double-layered tenons into finished and accurately slanted undercut faces by die-stamping or die-forming steps.

Fig. 1 is a side elevation of a rear gunshight where the forward end of the shank of the gunsight is held to the gun barrel by an undercut dovetail tenon of the type to which this invention relates.

Fig. 2 is a top or plan view of the gunsight and of the adjacent portion of the barrel shown in Fig. 1.

Fig. 3 is a plan view of the cross-shaped blank of proper metal from which the shank and its integral tenon of the sight shown in Fig. 1 is to be made.

Figs. 4, 5 and 6 are bottom views after successive bending operations performed on the cross arms and rear end of the blank.

Fig. 7 is an end or edge view of the near or front end of the blank shown in Fig. 4.

Fig. 8 is a similar view of the blank as shown in Fig. 5.

Fig. 9 is a sectional view on an enlarged scale on line 9—9 of Fig. 4.

Fig. 10 is an edge view on a similarly enlarged scale of the partly made tenon as seen on line 10—10 of Fig. 5.

Fig. 11 is a sectional view on a similarly enlarged scale taken as on line 11—11 of Fig. 5 after the final finishing steps of forming the slanting faces of the dovtail tenon have been partly performed.

Fig. 12 is a similar sectional view after the steps of die-forming the slanting sides of the dovetail tenon have been completed.

Fig. 13 is a side view of the essential parts of a die-forming machine embodying the machine portion of this invention, the dies and adjacent movable parts of the machine being shown in separated positions, with the stepped form of the tenon shown in place in dotted lines.

Fig. 14 is a side view of the machine shown in Fig. 13 but with the dies and adjacent portions of the machine shown in the position they occupy when the step of making the slanting sides upon the dovetail tenon has been entirely completed.

Fig. 15 is a longitudinal sectional view through the shank and here downwardly projecting tenon of a gunsight together with a vertical sectional view through the parts of the machine adjacent to the sight, the parts being shown in

the position they occupy when the tenon-engaging dies have contacted the tenon and moved the sight slightly upward, but before the overhanging pressure member of the machine has come into contact with the upper side of the sight.

Fig. 16 is a view similar to Fig. 15 but after the overhanging pressure member has engaged the top of the sight.

Fig. 17 is a view similar to Figs. 15 and 16 but after the tenon-engaging die members and the overhanging pressure member of the die-forming machine have completed their movements and the slanting sides of the tenon are completely formed.

Fig. 18 is a sectional view similar to Figs. 15 and 16 but of a hypothetical device following the general principles of die-forming but found to be impracticable and unworkable when applied to forming an undercut tenon under an overhanging body.

Referring to the drawings in a more particular description it will be seen that in Fig. 1 there is shown a portion of a gun barrel 20 in the upper part of which is provided a transversely extending undercut mortise 21 for receiving the dovetail-shaped tenon 22 projecting downwardly from the forward end of the shank 23 of the gunsight. The gunsight here shown is of the well-known and conventional form where a resilient shank 23 has its forward end securely attached to the gun barrel by a dovetail-shaped tenon as appears in Fig. 1, and with the rear end of the sight shank having an upturned sight piece 24 in the upper edge of which ordinarily there is provided a sight notch, the rear end of said sight being normally easily adjustable up or down by means of a stepped wedge piece 25 located in a longitudinal slot 26 in the rear portion of the sight shank. The whole sight is arranged so that the rear end thereof is pressed down strongly towards the barrel and so holds the stepped wedge 25 in place in the slot 26 and beneath the lower solid portion of the sight piece 24, but allowing lengthwise adjustment of said stepped wedge.

Gunsights of this description are commonly made by forming, by proper machinery and tools, cross-shaped blanks 27 having near one end, commonly the forward end of the sight, oppositely extending arms 28. The extremities of these arms, constituting about the outer one-third part of the length of each arm, are bent over flat against the next inwardly or intermediate portions approximately as plainly shown in Fig. 4 and the edge view thereof Fig. 7. Fig. 4 is a view of the bottom of the shank of the gunsight so that the overturned extremities 29 are here shown on top viz. in front of the adjacent inner intermediate portions 30. The intermediate portions 30, for a purpose hereinafter mentioned, are formed slightly wider than the outer extremities 29 and so the opposite ends of each intermediate portion 30 appear beyond the bent-over extremities 29. In the next step the already folded together parts 29 and 30 are turned over bodily towards each other and against the under side of the shank 23. The inner portion 31 of each arm is appreciably narrower than the intermediate portion 30 and even than the outer extremities 29, and this portion 31 provides the material extending from the body of the shank 23 out around the outer extremity portions 29 to connect to the outer edge of the intermediate portions 30 as plainly appears in the edge view Fig. 8. Bearing in mind that the intermediate portion 30 is now most remote from the shank and that the outer extremity portions 29 are between the parts 31 and the shank 23, it will be seen that as viewed in the edge view of the parts forming the tenon, as seen in Fig. 10, the tenon in this upside down view begins to assume the general shape of a dovetail tenon in that the part 31 farthest from the shank is longer, or wider as seen in Fig. 10, than is the layer composed of the intermediate parts 29.

As already intimated herein, the transforming of these step-shaped tenons into real slanting-faced dovetail tenons of the shape shown in Fig. 1 and in detail on a larger scale in Fig. 12, has heretofore been made by milling operations rather than by bending or even die-forming or die-stamping operations. Also it may be stated that the milling of these small pieces of which Figs. 3 to 6 are substantially full-sized views, and Figs. 9 to 12 are views double the size of the actual part have involved great practical difficulties and particularly have required considerable hand work or hand placing of the work in a milling machine, so that in effect the milling operation to complete the rough stepped form of a tenon to a nicely sloping faced dovetail tenon has made a very considerable portion of the total cost of manufacturing this form of firearm sight.

Figs. 13 to 17 illustrate in somewhat diagrammatical form a die-forming machine or device which I have had made, that is particularly adapted to die-form the tenon of the sight shown in Figs. 5, 8 and 10 to the shape shown in enlarged sectional view in Fig. 12.

By referring to these views it will be seen that the machine comprises a bedplate 32, having thereon at its left hand end as shown in the drawings, a fixed platform member 33 and to the right thereof two spaced strong guide members 34 and therebetween a movable platform member 35 (only the near guide member 34 appearing in the side views shown of said machine). Down-hanging, as from a suitable down-hanging plunger properly moved by power but not shown, is a strong vertical member 36 carrying the upper platform 37, from which depends the pressure die member 38 in suitable alignment with the meeting parts of the fixed platform member 33 and the movable platform member 35 as appears in Figs. 13 and 14. Upstanding from the other or right hand portion of the platform 32 as seen in the drawings there are provided two spaced guide pillars 39, the upper ends of which are slidingly received in correspondingly sized and shaped sockets 40 provided in the overhanging portion of the upper platform 37 and preferably in an aligned downwardly extending ring-shaped portion 41 extending down from the lower side of said platform 37. These guide pillars and their sockets insure the proper alignment of the upper and lower parts of the machine. Solidly secured to the platform 32 to the right of the movable platform member 35 there is provided an upstanding abutment 42, preferably having its left hand side a vertical smooth face. The right hand end of the movable platform member 35 is formed at an angle slanted to the left, as it extends upward, to form a smooth slanting contact face 35'.

Rigidly secured to the movable upper platform member 37 and depending therefrom is a wedge-shaped member 43, as seen in side elevation Figs.

13 and 14, or as seen in transverse sectional view Figs. 15 to 17, having its vertical and right hand contact face **44** in alignment with the vertical left hand face **42'** of the strong abutment **42**, so that as the whole upper unit of the machine descends the vertical right hand face **44** of the wedge **43** will slide in close alignment and in contact with the cooperating vertical left-hand face **42'** of the abutment **42**.

It will be understood that the parts are so shaped, arranged and coordinated that as the whole upper unit of the machine descends the said wedge **43** will enter the space between the abutment **42** and the movable platform member **35** and the left-hand sloping face **45** of the wedge **43** will come into camming engagement with the cooperating and similarly slanting and complemental face **35'** of the movable platform member **35**. Accordingly as the upper unit of the machine has descended a considerable distance and the wedge **43** has come into camming engagement with the movable platform member, and the parts come to the position shown in Fig. 14, the movable platform member **35** will have been moved in an obvious manner to the left with a relatively slow but very strong powerful movement, and this slow powerful movement to the left of said movable platform **35** will continue until the wedge member **43** comes to its lower position or until the said platform member **35** has been moved its prescribed length of travel.

In the top of the fixed platform member **33** is provided a wide, relatively shallow recess **46** terminating at its left-hand end short of the left-hand edge of the said platform member and thus leaving an upstanding abutment **47**, preferably of the material of said platform member, forming a backstop for the removable but relatively fixed die member **48**. The sides of the recess form side guides closely engaging said die member **48**. The right-hand or movable die member **50** is similarly mounted in the movable platform member **35** as by being placed in a similar shallow recess **51** at the back or right-hand end of which is a backstop **52** preferably formed of unremoved upstanding metal of the movable platform. I have called this right-hand die member **50** the movable die member because it is mounted to travel with the movable platform member **35**.

Fig. 18 is a sectional view corresponding to the lines shown in Figs. 15 and 16, if the machine already so far described were completed according to the usual rules of die-stamping engineering, but showing a form of machine which I have found to be absolutely impracticable and entirely useless in that it would break off the bevel points of the dies instead of putting a slant upon the irregular or stepped faces of the tenon, which should be transformed into uniform slanted faces of dovetail tenon shape.

The general principle of die-forming is that shapes can be produced if dies of the proper shape are provided to form, in the object to be worked on, the desired shape, and then an irresistible power given to these dies. In following this principle of die-forming the die machine heretofore described in detail would be completed to have the form shown in Fig. 18, in that the fixed die member **48'** is immovably secured to the fixed platform **33'** as by strong screws **55** coming down through suitable apertures in the die member into the fixed platform **33'** while the movable die member **50'** would likewise be firmly secured to the movable platform **35''** as by screws **56** or the equivalent projecting down through the movable die member **50'** into the movable platform **35''**. The parts are shown in this Fig. 18 at the positions they would occupy when the upper and acute-angled sharp edges of the beveled ended dies would engage the sides of the tenon that are to be shaped into slanting faces. The slanted dotted lines parallel to the beveled faces of the die members represent the desired slanted faces into which the dies are to transform the stepped faces of the tenon. I have found however that this Fig. 18 form of die-forming device is impracticable and actually breaks off the pointed ends of the bevel. In action the beveled faces of the dies, as they forceably engage the stepped faces of the tenon, operate as by camming or wedging action of the stepped faces against the slanting die faces to produce a tendency of the inner ends of the dies to move upwardly and incidentally carry therewith the tenon and its attached shank, and the continuation of this approaching movement of the dies produces such an upward cross-bending stress or cross-shearing stress on the beveled ends and particularly the pointed ends of the dies as to break off the extremities. The dies are of the proper form and shape to produce the slanted tenon faces on the tenon but the sharply pointed edges on the beveled ends of the dies do not have the inherent strength to withstand the transverse stress that this particular situation places upon the said dies.

The general rule of die-forming, that there must be provided a strong enough die to do the work and unlimited power behind it, fails to work in the case where the die is required to be the shape of a relatively sharp acute angle and the working effort places a transverse breaking stress upon the acute angles of the die. With the dies having their angles acute enough to make the desired relatively sharp slanted faces under a closely overhanging body, and with the material of the tenon and the slant of the dies operating to transform ordinary longitudinal compression stress into a very strong transverse stress, the working ends of the dies cannot stand the strain as they would if they were simply shaping up moldable putty or perhaps even weldable hot metal.

After repeated experiments and long study I arrived at the form of device shown in the drawings herein (except Fig. 18) and at the steps in the process herein disclosed.

Leaving now the unworkable structure shown for the purpose of illustration only in Fig. 18, and going back to the form of the machine shown in Figs. 13 to 17 and continuing the detailed description of said machine before it was interrupted in order to show the structure and action of the form shown in Fig. 18, it will be seen that my machine, embodying the machine end of my invention, provides means for allowing the inner cooperating ends of the die members **48** and **50** to move or swing slightly upwardly as the die members are in effect forced towards each other and against the stepped faces of the tenon. This result is brought about by having no positive fixed fastening means in a vertical direction between the inner portions of the dies and their respective platforms, and so allowing not only a slight springing action in the length of the die members but even affirmatively supplying a slight looseness in the means, as the screw **49**, which fastens the fixed die **48** to its fixed platform **33** and the screw **56** which secures the outer or

right-hand end of the movable die 50 to the movable platform 35.

The result of these provisions for looseness at the inner cooperating ends of these dies 48 and 50 is that as the pointed ends of the dies come into close and intimate contact with the stepped or irregular faces of the tenon, the tendency of the beveled faces of the dies to be moved upward is accommodated rather than thwarted by sheer force, and the inner ends of said die members swing up slightly as shown (perhaps in somewhat exaggerated form) in Fig. 15, carrying therewith of course the tenon and its integral shank to a slightly raised position. About this time the downward movement of the upper pressure-exerting member 38 comes into engagement with the upper and top face of the sight shank directly over said tenon, and then the continued downward movement of this pressure member 38 forces the said engaged portion of the sight, including the forward end of its shank and its integral tenon, and also the two oppositely disposed inner ends of the die members, downwardly from the position shown in Fig. 16, gradually but strongly to the position shown in Fig. 17. By this time the bevel-ended die members have been pushed back into a straight line with what may be said to be the completion of a toggle-joint action, so that by the final compression or die-forming, the stepped faces of the tenon are now transformed into the two desired slanting faces of a dovetail-shaped tenon.

Allowing the inner ends of the dies to move slightly upwardly as shown in Fig. 15, I believe relieves the die members from the breaking cross stress that was incident to the structures shown in Fig. 18, and then the force from the overhead pressure member 38 brings about the desired ultimate forming pressure by the beveled ends of the dies upon the to-be-formed faces of the tenon without a breaking cross stress being placed upon the die members. It may be that this ultimate straightening out of the up-raised dies, after the manner of a straightening out of a toggle-joint, results in the ultimate crucial forming force being placed upon the dies in the form of a longitudinal compression which the dies are well able to stand.

Certain it is that long practical use of this machine in the production of slanted faces upon tenons under a closely overhanging body has shown that this machine can perform successfully a die-stamping process that for a long time seemed impossible of accomplishment by known methods or devices for die-forming.

The one complete die-forming step above described entirely completes and finishes the formation of the smoothly finished, accurately slanted, uniform-angled sides upon the tenon and at the completion of such step the overhead unit is moved upward, causing the overhead pressure member 38 to rise from the top of the sight shank and causing soon thereafter the wedge pressure member 43 to be withdrawn from between the buttress 42 and the right-hand slanted contact face 35' on the movable platform member 35. With the wedge member 43 thus removed, the strong helical spring 54 interposed between the movable platform 35 and the fixed platform 33 with its ends housed within oppositely placed sockets 53 and 53' formed in said fixed and movable platforms 33 and 35 respectively, operates in an obvious manner to move the movable platform to the right the proper distance until its movement is arrested by a stop pin 57 suitably located in the bedplate 32.

The explanation of my machine and its operation incidentally points out the steps of my process and particularly that in a hand operated device, such as would illustrate my process as distinct from a full power-operated machine, the inner portions of the bevel-ended die members would be properly allowed to swing or spring upwardly as the dies advanced towards the tenon part of the sight, enough to relieve the breaking transverse stress upon the sharply pointed or bevel-ended dies, that would otherwise, operating as by a camming or wedging action against the slanted ends of the dies, cause the stepped faces of the tenon to force the dies upward.

In such a hand-operated device as would illustrate my process there would of course be provided the overhanging downwardly moving pressure member which would move the sight body and its tenon downwardly and incidentally straighten out or substantially straighten out the dies members into a straight line, with the resulting great finishing pressure upon the former stepped faces of the tenon by the ultimate movement of the die members back into more or less of a straight line, after the manner of a toggle-joint action.

It will be understood that making the body of the gun sights out of cross-shaped blanks by successively turning back different portions of the outer ends of the arms, not only provides sufficient thickness, that is height, in the tenon out of the sheet or strip material that is desirable for the making of the shank of the sight, but also affords a desirable opportunity for making different portions of the arms of different widths, such as the portions 31, 29 and 30, which are successively wider, and so produces a stepped formation in the tenon portion, as shown in Fig. 10, which roughly approaches the desired dovetail shape of tenon as shown in Fig. 12.

With this approach to the desired shape of the tenon it will be seen that the material from which the ultimate slanted faces of the tenon are to be made does not have to be distorted so greatly as would be the case if the different levels of the tensons were all of the same width. The dies are thus relieved of a considerable part of the work that would have to be done if the tenon were not thus roughly shaped, by its stepped formation, towards the ultimate slanted formation.

What I claim as new and desire to patent is:

1. In a die-forming device for transforming oppositely located stepped faces on a tenon projecting downwardly from an overhanging body into slanted faces of dovetail-tenon form, the combination of a support, two aligned spaced platforms mounted immediately thereabove to have relative horizontal movement towards and from each other, means for imparting such relative movement to said platforms, two bevel-ended dies oppositely located one on each of said platforms, with their beveled ends towards each other and with their acute edges upward away from said platforms, each of said dies having its remote end articulated to its respective platform and so held longitudinally therewith but allowing the inner ends of the dies to be swung upwardly away from said platforms, and a moving pressure member movable downwardly toward the inner ends of said dies, the parts of said device being so operatively connected that said platform-moving means first starts relative

movement of the die-carrying platforms and carries the dies into intimate contact with the tenon and the inner ends of the dies swing upwardly and to the surface of said overhanging body adjacent said tenon and then said means for pressing downwardly the inner ends of the dies comes into action and the platform-moving means continues to operate concurrently therewith, whereby the dies are forced down into a straight line with a toggle-like final pressure on the tenon with compression stress and the avoidance of excessive cross-bending stress on the die points.

2. In a die-forming device for transforming oppositely located stepped faces on a tenon projecting from an overhanging body into slanted faces of dovetail-tenon form, the combination of a support, two aligned spaced platforms mounted thereon to have relative lengthwise movement towards and from each other, means for imparting such relative movement to said platforms, two bevel-ended dies in operative alignment and oppositely located one on each of said platforms with their beveled ends toward each other and with their acute edges away from said platform, each of said dies having its remote end articulated to its respective platform and held longitudinally therewith but allowing the inner ends of the dies to be swung away from said platforms, and a pressure member spaced opposite the inner ends of said dies and movable theretowards, the parts of said device being so operatively connected that said platform-moving means starts relative movement of the die-carrying platforms and carries the dies into intimate contact with the tenon and the inner ends of the dies swing towards and to the surface of said overhanging body adjacent said tenon and then said means for pressing the inner ends of the dies towards said platform comes into action and the platform-moving means continues to operate concurrently therewith, whereby the dies are forced back into a straight line with a toggle-like final pressure on the tenon with compression stress and the avoidance of excessive cross-bending stress on the die points.

3. In a die-forming device for transforming oppositely located stepped faces on a tenon projecting downwardly from an overhanging body into slanted faces of dovetail-tenon form, the combination of two aligned spaced platforms mounted to have relative horizontal movement towards and from each other, means for imparting such relative movement to said platforms, two bevel-ended dies oppositely located one on each of said platforms, with their beveled ends towards each other and with their acute edges upward away from said platforms, each of said dies having its remote end articulated to its respective platform and held longitudinally therewith but allowing the inner ends of the dies to be swung away from said platforms, and a moving pressure member movable downwardly toward the inner ends of said dies, the parts of said device being so operatively connected that said platform-moving means first starts relative movement of the die-carrying platforms and carries the dies into intimate contact with the tenon and the inner ends of the dies swing upwardly and to the surface of said overhanging body adjacent said tenon and then said means for pressing downwardly the inner ends of the dies comes into action and the platform-moving means continues to operate concurrently therewith, whereby the dies are forced down into a straight line with a toggle-like final pressure on the tenon with compression stress and the avoidance of excessive cross-bending stress on the die points.

4. In a die-forming device for transforming oppositely located stepped faces on a tenon projecting from an overhanging body into slanted faces of dovetail-tenon form, the combination of two aligned spaced platforms mounted to have relative movement lengthwise thereof towards and from each other, means for imparting such relative movement to said platforms, two bevel-ended dies in operative alignment and oppositely located one on each of said platforms with their beveled ends towards each other and with their acute edges away from said platform, each of said dies having its remote end articulated to its respective platform and held longitudinally therewith but allowing the inner ends of the dies to be swung away from said platforms, and a pressure member spaced opposite the inner ends of said dies and movable theretowards, the parts of said device being so operatively connected that said platform-moving means starts relative movement of the die-carrying platforms and carries the dies into intimate contact with the tenon and the inner ends of the dies swing towards and to the surface of said overhanging body adjacent said tenon and then said means for pressing the inner ends of the dies towards said platform comes into action and the platform-moving means continues to operate concurrently therewith, whereby the dies are forced back into a straight line with a toggle-like final pressure on the tenon with compression stress and the avoidance of excessive cross-bending stress on the die points.

HUBERT E. DICKERMAN.