

Sept. 20, 1932.

F. D. LINGWOOD

1,878,500

HAND OPERATED SHEARING TOOL

Filed Dec. 28, 1931

FIG. 1.

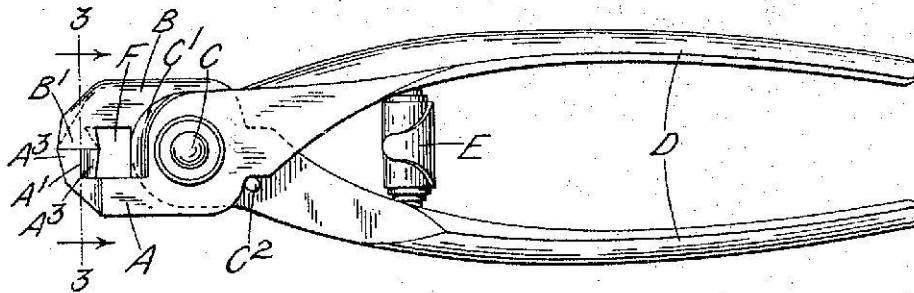


FIG. 2.

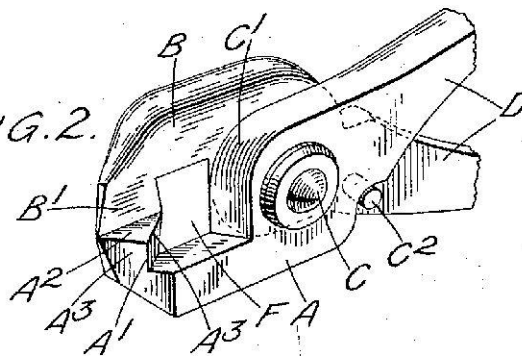


FIG. 3.

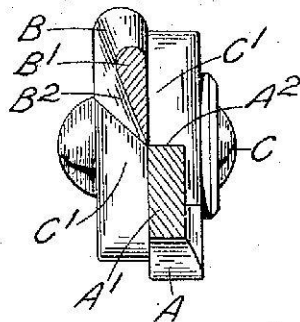


FIG. 4.

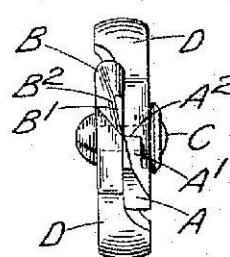
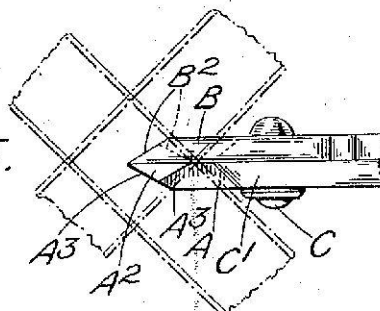


FIG. 5.



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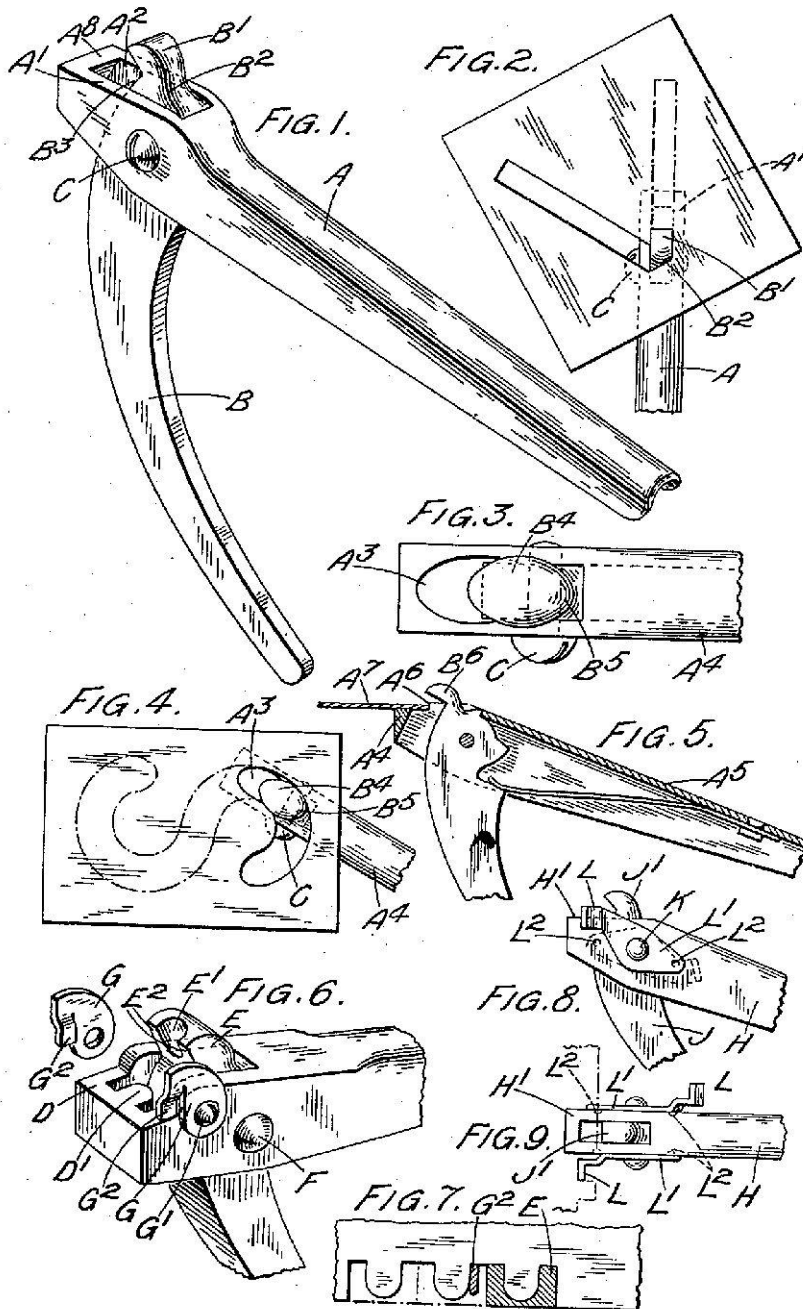
June 30, 1931.

F. D. LINGWOOD

1,812,350

PUNCHING OR CUTTING PLIERS

Filed Oct. 25, 1930



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Patented June 30, 1931

1,812,350

# UNITED STATES PATENT OFFICE

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## PUNCHING OR CUTTING PLIERS

Application filed October 25, 1930, Serial No. 491,253, and in Great Britain November 8, 1929.

This invention relates to punching or cutting pliers or gimpers for use in cutting sheet material and has for its object to provide a convenient form of hand tool by which sheet material can be cut without causing its distortion and without forming a burr.

A tool according to the invention comprises a slotted jaw forming a work-supporting table or anvil adapted to cooperate with a cutting jaw which at each cutting operation removes a portion of sheet material of an area which does not exceed that of the jaw itself, the pivot by which the cutting jaw is connected to the anvil jaw being disposed wholly below the level of the work supporting anvil.

The surface of the anvil is inclined relatively to the arm on which it is formed and not only does the forward end of the anvil project beyond the forward edge of the cutter, but its sides extend rearwards on each side of the cutting arm.

Further, the neck of the cutter preferably is of such reduced cross-section that after a slot has been cut, the cutter can be turned in the slot so as to execute the next cut in any desired direction. If rectangular portions of sheet material are to be removed at each cut, the cutting jaw is of rectangular shape or if desired the head or nose of the cutter may be of parabolic form thus enabling curved slots with substantially smooth edges to be cut of any radius greater than the smallest radius of the cutting jaw.

The work-supporting anvil may be provided with a stop to limit the extent to which the sheet material can be inserted between the jaws and fixed or removable fences or stops may be provided to determine the relative position of successive cuts.

Various constructional forms according to the invention are illustrated in the accompanying drawings, in which

Figure 1 is a perspective view of one construction,

Figure 2 is a view showing how the construction shown in Figure 1 can be used,

Figure 3 is an enlarged plan view of the operative portion of an alternative construction,

Figure 4 is a view showing how the alter-

native construction shown in Figure 3 can be used to cut out curved slots,

Figure 5 is a sectional side elevation of a modification applicable to either of the constructions shown in Figures 1 to 4,

Figure 6 is a perspective view of a modified construction having movable side spacing fences or stops with one of these stops shown detached from the tool,

Figure 7 illustrates the manner in which the tool shown in Figure 6 can be employed to form a series of equally spaced tongues along the edge of a piece of sheet material,

Figure 8 is a side elevation of a further modified construction having movable side spacing fences, and

Figure 9 is a plan of the construction shown in Figure 8.

In the construction illustrated in Figures 1 and 2 the tool is adapted to remove a small rectangle of sheet metal at each cut and comprises two arms A, B, pivotally connected together at C. The arm A, which is of channel section, carries a jaw slotted at A<sup>2</sup> and forming a work-supporting anvil having side portions A<sup>1</sup> connected by an end portion A<sup>3</sup> which closes the end of the slot A<sup>2</sup>, the pivot C being disposed wholly below the level of the actual work-supporting anvil. The surface of the anvil is inclined to the main portion of the arm A as shown so that when a cut is being made at some distance from the edge of a piece of sheet metal the arm A will lie wholly below the sheet metal so that the worker's hand can grasp this arm without deflecting the sheet metal or other work. The end of the arm B is formed as a projecting cutting head B<sup>1</sup> which cooperates with the sides and end of the slot A<sup>2</sup> in the work-supporting anvil to cut out a small rectangle of sheet metal. The cutting head B<sup>1</sup> is connected to the arm by a narrow neck B<sup>2</sup> of such dimensions that it can be rotated in a slot cut by the cutting head so that the next cut can be made in any desired direction as indicated in Figure 2. Thus the back of the neck B<sup>2</sup> is cut away or rounded as shown so that the largest cross-sectional dimension of this neck is smaller than the width of the slot cut by the cutting head. The depth of the cutting

head  $B^1$  measured in a plane at right angles to that in which the cutting edges lie is, further, less than the width of the cut so that this head can readily be inserted into a slot already cut.

The depth of the cut, i. e. the distance between the free end of the cutting head  $B^1$  and the edge of the work, is limited by the surface  $B^3$  so that the overhanging portion of the cutter  $B^1$  coincides with the dimensions of the piece of sheet metal of maximum size which can be removed by a single cut.

In the alternative construction illustrated in Figures 3 and 4 the general arrangement is similar to that illustrated in Figure 1 except that the cutting head or nose  $B^2$  is formed with the cutting edges parabolic as shown, these edges cooperating with a similar parabolic slot  $A^3$  in the anvil jaw  $A^4$ . Alternatively, the cutting head or nose  $B^2$  and the slot  $A^3$  may be of some other convenient curved form. With this construction also the back of the neck connecting the cutting head to the arm is rounded as shown at  $B^5$  so that the largest cross-sectional dimension of this neck is smaller than the width of the slot cut. With this construction of cutting head it will be seen that curves of any radius larger than the minimum radius of the cutting edge can be executed as indicated in Figure 4, these curves being smooth and not requiring filing out.

In the modification illustrated in Figure 5 which may be applied to the construction of Figures 1 and 2 or that shown in Figures 3 and 4, the anvil  $A^4$  on the anvil arm  $A^5$  is provided with a step  $A^6$  which limits the extent to which the sheet material  $A^7$  can be inserted between the jaws and hence the depth of the cut which can be made at one cutting operation by the cutting head  $B^2$ .

In an alternative construction illustrated in Figure 6 the tool comprises a jaw D constituting a work-supporting anvil and having a slot therein through which passes a cutting jaw E pivoted to the anvil jaw at F, the cutting jaw E and the work-supporting anvil D with which the cutting edges cooperate being so formed respectively with a slot  $E^1$  and a projection  $D^1$  that at each cutting operation they will remove a substantially U-shaped piece of sheet material so as to leave a tongue of the dimensions of the projection  $D^1$ .

Pivoted at  $G^1$  to each side of the anvil jaw is a movable side fence or stop G only one of which is intended to be moved into its operative position at a time as shown in Figure 6, the other being rocked about its pivot so as to be in an inoperative position. In Figure 6 one of the stops G is shown as removed from the anvil for the sake of clearness. The operative end  $G^2$  of each of these stops when in its operative position rests on the anvil D and is so disposed that if after

a cutting operation the edge of the tongue which has thus been formed is placed against the stop, the adjacent cutting edge of the cutting jaw will just overlap the edge of the slot already cut whereby on the next cutting operation, in addition to forming a second tongue, the tool will complete the formation of the space between the two tongues as clearly shown in Figure 7. Further the width of each of the two portions  $E^2$  of the cutter which forms a side of the U is slightly greater than half the width of the tongue which is formed at each cut so that when used as above described to cut out two or more tongues with a gap between them this gap will be equal to or slightly greater than the width of each tongue.

The purpose of this is to enable a series of evenly spaced tongues to be formed on the edge of a piece of sheet material with spaces between them such that tongues similarly formed on a second piece of sheet material can be brought into engagement with these spaces and the tongues on both pieces of sheet material then bent over so as to join the two pieces of sheet material together for example at right angles or at some other angle relatively to one another.

It will be seen that by employing one or other of the movable side fences or stops G a series of tongues can be formed in succession along the edge of a piece of sheet material, the first tongue being formed at either end of the series.

In the modified construction shown in Figures 8 and 9 the tool comprises a work-supporting arm H having a part  $H^1$  acting as a work-supporting anvil, and a cutting arm J pivoted thereto at K and having a cutting head  $J^1$  which, in the construction shown, is adapted to remove a rectangular piece of sheet material. Other forms of cutting head may, however, be employed. Rotatably mounted on the pivot K on each side of the work-supporting anvil  $H^1$  are two side fences or spacing stops L each provided with an extending lug  $L^1$  having a projection  $L^2$  formed on its inner face and adapted to cooperate with small recesses in the side of the anvil arm H so as to hold the spacing stop L either in its operative position as shown in full lines in Figure 8 or in its inoperative position as shown in dotted lines in Figure 8. In Figure 9 one of the spacing stops is shown in its operative position and the other in its inoperative position.

In operation, after the tool shown in Figures 8 and 9 has been used to cut one slot, it is placed in position for cutting the next slot with one of the spacing stops L in the slot already cut so that a series of evenly spaced slots can be cut in the edge of a piece of sheet material as indicated in Figure 9. Thus the head of each stop L is conveniently of substantially the same or slightly less width than



the slot cut, as indicated. If desired, however, the laterally projecting part of the head may be omitted.

What I claim as my invention and desire to secure by Letters Patent is:—

1. A tool for cutting sheet material including in combination two arms, a slotted jaw carried by one arm forming a work-supporting anvil, a cutting jaw in the form of a head carried by the other arm and adapted to pass through the slot, a neck portion connecting the head to its arm and having its cross-sectional dimensions reduced so that the cutter can be turned in a slot already cut and the cut continued in any other desired direction, and a pivot connecting the arms disposed wholly below the work-supporting surface of the anvil.

2. A tool for cutting sheet material including in combination two arms, a slotted jaw carried by one of the arms and forming a work-supporting anvil, a cutting jaw in the form of a head carried by the other arm and adapted to pass through the slot, a neck portion connecting the head to its arm and having its cross-sectional dimensions reduced so that the cutter can be turned in a slot already cut and the cut continued in any other desired direction, and a pivot connecting the two arms disposed wholly below the level of the work-supporting anvil, the work-supporting surface of said anvil being inclined relatively to the arm which carries it and extending rearwardly on either side of the cutting jaw.

3. A tool for cutting sheet material including in combination two arms, a jaw carried by one arm forming a work-supporting anvil and having a curved slot therein, a cutting jaw in the form of a head carried by the other arm and curved to correspond to the slot in the anvil and adapted to cooperate therewith, a neck portion connecting the head of the cutting jaw to its arm and having its cross-sectional dimensions reduced so that the cutter can be turned in a slot already cut to form a cut of any radius greater than the least radius of the cutter, and a pivot connecting the arms disposed wholly below the level of the work-supporting surface of the anvil.

4. A tool for cutting sheet material including in combination two arms, a jaw carried by one of the arms forming a work-supporting anvil having a curved slot therein, a cutting jaw in the form of a head carried by the other arm and curved to correspond to the slot in the anvil so as to be capable of passing through the slot, a neck portion connecting the head to its arm and having its cross-sectional dimensions reduced so that the cutter can be turned in a slot already cut, and a pivot connecting the two arms disposed wholly below the work-supporting surface of the anvil, said surface being in-

clined relatively to the arm which carries it and extending rearwardly on either side of the cutting jaw.

5. A tool for cutting sheet material including in combination two arms, a slotted jaw carried by one of the arms forming a work-supporting anvil, the slotted jaw comprising similar side portions connected at their outer ends by a transverse part which closes the outer end of the slot, a cutting jaw carried by the other arm and adapted to cooperate with both the said side portions and also the said transverse end portion of the slotted jaw in the cutting of the material, and a pivot connecting the arms disposed wholly below the level of the work-supporting anvil.

6. A tool for cutting sheet material including in combination two arms, a slotted jaw carried by one arm forming a work-supporting anvil, the slotted jaw comprising similar side portions connected at their outer ends by a transverse part which closes the outer end of the slot, a cutting jaw carried by the other arm and adapted to cooperate with both the said side portions and also the said transverse end portion of the slotted jaw in the cutting of the material, and a pivot connecting the arms disposed wholly below the level of the work-supporting anvil, the work-supporting surface of said anvil lying in a plane which is raised above the arm which carries it and extending rearwardly to said arm on either side of the cutting jaw so as to support the work around the cutting jaw above the level of the pivot and the hands of an operator.

7. A tool for cutting sheet material including in combination two arms, a slotted jaw carried by one of the arms forming a work-supporting anvil, the slotted jaw comprising similar side portions connected at their outer ends by a transverse part which closes the outer end of the slot, a cutting jaw carried by the other arm and adapted to cooperate with both the said side portions and also the said transverse end portion of the slotted jaw in the cutting of the material, a pivot connecting the arms disposed wholly below the level of the work-supporting anvil, and a movable fence adapted when moved into its operative position to determine the position in which the next slot is cut.

In testimony whereof I have signed my name to this specification.

FREDERICK DONALD LINGWOOD.

Sept. 20, 1932.

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1,878,500

HAND OPERATED SHEARING TOOL

Filed Dec. 28, 1931

FIG. 1.

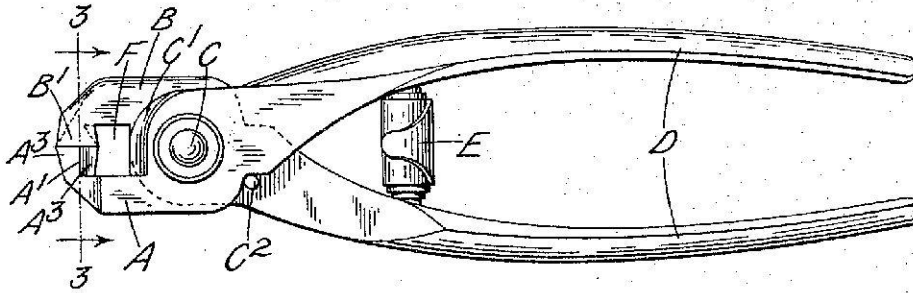


FIG. 2.

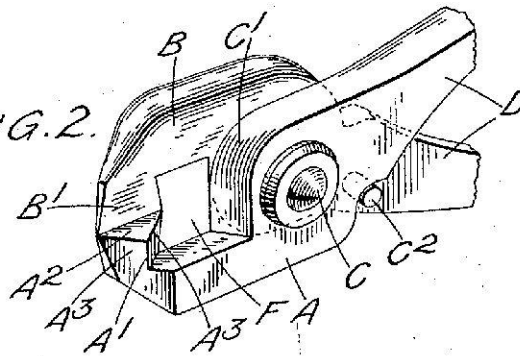


FIG. 3.

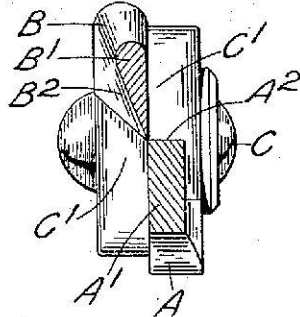


FIG. 4.

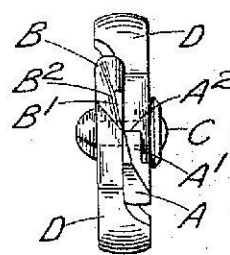
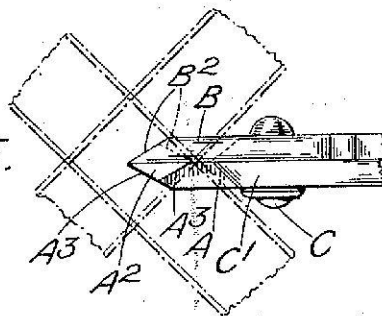


FIG. 5.

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Patented Sept. 20, 1932

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## HAND-OPERATED SHEARING TOOL

Application filed December 28, 1931, Serial No. 583,550, and in Great Britain June 2, 1931.

This invention relates to hand-operated shearing tools and has for its object to provide an improved shearing tool which will be capable of severing miniature girders and like members formed, for example, of laminated sheet or strip metal.

A hand-operated shearing tool according to the present invention, more particularly for severing miniature girders formed of laminated sheet or strip metal, comprises two pivoted jaws the cooperating shearing portions of which are formed at the outer ends of the jaws while parts of the jaws between the shearing portions and the pivot connecting the jaws are cut away to provide a gap between the jaws which will accommodate the flange of a girder, the shearing portion of one jaw of the tool being formed with a flat face of appreciable area acting as an anvil to support the part of the girder to be sheared and one edge of the anvil face co-acting in the shearing operation with a part of the other jaw which is formed as a knife edge. Preferably the front of the anvil part which cooperates with the said knife edge is formed flat with a straight cutting edge, while the back of the anvil part is so formed either curved or bevelled as to provide clearance which will permit of cutting through girder or like members at a substantial angle to the length of such members without the anvil part fouling the girder flanges or other parts which may lie in planes at right angles to that of the part actually being sheared at any moment.

The invention may be carried into practice in various ways but one construction of tool according to this invention is illustrated by way of example in the accompanying drawing, in which

Figure 1 is a side elevation of the complete tool,

Figure 2 is a perspective view of the jaws of the tool shown in Figure 1,

Figure 3 is a section on the line 3—3 of Figure 1,

Figure 4 is an end view of the tool shown in Figure 1, and

Figure 5 is a plan of the jaws of the tool shown in Figure 1 indicating how the tool can be used to sever a girder diagonally.

In the construction illustrated the tool comprises an anvil jaw A and a cutting jaw B pivoted together at C and provided with handles D between which lies a spring E tending to separate these handles. As shown the ends of the jaws A and B remote from the pivot constitute the actual shearing portions, the jaws being cut away as shown at F between their end portions and the pivot so as to provide a space or gap in which can lie the flange of a girder while its web is being severed.

The end part A<sup>1</sup> of the anvil jaw A is formed as shown with a flat upper surface A<sup>2</sup> constituting an anvil on which can rest the web of a girder to be severed, while the end B<sup>1</sup> of the cutting jaw B is formed as a knife edge which co-acts during the shearing operation with the front edge of the anvil. The back of the anvil part A<sup>1</sup> of the jaw A, i. e. the part remote from the cutting edge, is cut away or oppositely bevelled off as shown at A<sup>3</sup> so that the part A<sup>1</sup> is of triangular cross-section in planes parallel to the anvil face A<sup>2</sup> as shown in Figure 2. Similarly the back of the part B<sup>1</sup> of the jaw B is oppositely be-

In a convenient arrangement the back of the anvil part is cut away or oppositely bevelled off so as to give to this part an approximately triangular cross-section in planes parallel to the anvil face on which the metal to be sheared rests.

The back of the knife edge portion of the cutting jaw, i. e. the part lying remote from the front face of this jaw which cooperates with the front of the anvil, is conveniently also similarly formed curved or oppositely bevelled off so that this knife edge part, while it will permit girders or like members to be cut through at a substantial angle to the length of such members in the manner



elled off as shown at B<sup>2</sup> in Figure 5, while the part C<sup>1</sup> of each jaw forming the end of the recess adjacent the pivot C is bevelled or rounded as shown.

5 In cutting a miniature girder the part of the girder which is to be used is placed on the face A<sup>2</sup> of the anvil part A and, by reason of the area of the face A<sup>2</sup> of this jaw, this part of the girder during the shearing  
10 operation will tend not to be bent or distorted but will be cut off cleanly. Further, owing to the triangular cross-section of the part A<sup>1</sup> and the manner in which the jaw B is bevelled off at B<sup>2</sup> as well as the dimensions  
15 of the recess F and the bevelling of the part C<sup>1</sup>, a miniature girder can be inserted between the jaws and its web cut diagonally completely across and right up to its flanges either in a direction at right angles to the  
20 length of the girder or diagonally at any angle up to approximately 25° to the longitudinal axis of the girder without any part of the tool fouling the girder flanges. The manner in which this construction and arrangement of the parts makes it possible to sever diagonally the webs of miniature girders is indicated in Figure 5.

A stop C<sup>2</sup> is conveniently provided to limit the amount which the shearing portions A<sup>1</sup> and B<sup>1</sup> of the jaws can overlap when the shearing operation is completed, thus preventing distortion of the girder after cutting due to the cutting jaw B B<sup>1</sup> being forced to any considerable extent through the slot  
35 cut.

It is to be understood that the construction illustrated is given by way of example only and that constructional details may be modified without departing from this invention.  
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What I claim as my invention and desire to secure by Letters Patent is:—

1. A hand-operated shearing tool for severing miniature girders including in combination two jaws, a pivotal joint connecting one end of one jaw to one end of the other jaw, the jaws being oppositely recessed between the pivotal joint and their free ends to provide a gap which will accommodate a flange of a girder whose web is being severed, a knife edge on the outer end of one of the jaws forming a first shearing portion, a second shearing portion on the outer end of the other jaw having a plane face constituting an anvil for supporting the part of the girder to be sheared and having a straight edge with which the first shearing portion co-operates, the second shearing portion being tapered towards the gap formed by the recesses in the jaws so as to allow the girder flange to lie in this gap without fouling the shearing portions during shearing of the web at angles other than at right angles to the length of the girder.  
60

65 2. A hand-operated shearing tool for severing miniature girders, including in combination two jaws, a pivot connecting one end of one jaw to one end of the other jaw, the jaws being oppositely recessed between said pivot and their free ends to provide a gap which will accommodate a flange of a girder whose web is being severed, a knife edge on the free end of one of said jaws and forming a first shearing portion, a wedge-shaped anvil part at the free end of the other jaw constituting the other shearing portion and having a substantially triangular plane face for supporting the part of the girder to be sheared, one edge of the triangular face co-operating with the first shearing member to shear the girder web, while an apex of the wedge-like anvil part is directed towards the gap formed by the recesses in the jaws so that a girder flange can lie in this gap without fouling the shearing portions during the shearing of the web at angles inclined to the length of the girder.

3. A hand-operated shearing tool for severing miniature girders including in combination two jaws, a pivotal joint connecting one end of one jaw to one end of the other jaw, the jaws being oppositely recessed between the pivotal joint and their free ends to accommodate between them a flange of a girder whose web is being severed, upper and lower block-like shearing members respectively on the free ends of the jaws each having a vertical face lying substantially in the plane of shear, the upper face of the lower block lying at right angles to its vertical face and constituting an anvil for supporting the part of the girder to be sheared, while the lower face of the upper block is inclined at an angle to its vertical face to form therewith a knife edge, both blocks being tapered towards said pivot joint to allow said girder flange to be accommodated at a substantial angle to the axis of the tool.  
90

4. A hand-operated shearing tool for severing miniature girders including in combination two jaws, a pivotal joint connecting one end of one jaw to one end of the other jaw, the jaws being oppositely recessed between the pivotal joint and their outer ends so as to provide a gap which will accommodate a flange of a girder whose web is being severed, cooperating shearing portions on the outer ends of the jaws one of which is formed with a flat face acting as an anvil for supporting the part of the girder to be sheared while the other is tapered to provide a knife-like shearing edge, and a stop for determining the maximum extent to which the cooperating shearing portions can overlap.  
110

5. A hand-operated shearing tool for severing miniature girders including in combination two jaws, a pivotal joint connecting one end of one jaw to one end of the other jaw, the jaws being oppositely recessed between said pivotal joint and their outer ends to provide a gap which will accommodate a flange of a girder whose web is being severed, cooperating shearing portions on the outer ends of the jaws one of which is formed with a flat face acting as an anvil for supporting the part of the girder to be sheared while the other is tapered to provide a knife-like shearing edge, and a stop for determining the maximum extent to which the cooperating shearing portions can overlap.  
115

6. A hand-operated shearing tool for severing miniature girders including in combination two jaws, a pivotal joint connecting one end of one jaw to one end of the other jaw, the jaws being oppositely recessed between said pivotal joint and their outer ends to provide a gap which will accommodate a flange of a girder whose web is being severed, cooperating shearing portions on the outer ends of the jaws one of which is formed with a flat face acting as an anvil for supporting the part of the girder to be sheared while the other is tapered to provide a knife-like shearing edge, and a stop for determining the maximum extent to which the cooperating shearing portions can overlap.  
120

7. A hand-operated shearing tool for severing miniature girders including in combination two jaws, a pivotal joint connecting one end of one jaw to one end of the other jaw, the jaws being oppositely recessed between said pivotal joint and their outer ends to provide a gap which will accommodate a flange of a girder whose web is being severed, cooperating shearing portions on the outer ends of the jaws one of which is formed with a flat face acting as an anvil for supporting the part of the girder to be sheared while the other is tapered to provide a knife-like shearing edge, and a stop for determining the maximum extent to which the cooperating shearing portions can overlap.  
125

8. A hand-operated shearing tool for severing miniature girders including in combination two jaws, a pivotal joint connecting one end of one jaw to one end of the other jaw, the jaws being oppositely recessed between said pivotal joint and their outer ends to provide a gap which will accommodate a flange of a girder whose web is being severed, cooperating shearing portions on the outer ends of the jaws one of which is formed with a flat face acting as an anvil for supporting the part of the girder to be sheared while the other is tapered to provide a knife-like shearing edge, and a stop for determining the maximum extent to which the cooperating shearing portions can overlap.  
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a gap which will accommodate a flange of the girder whose web is being severed, cooperating shearing portions on the outer ends of the jaws one of which is formed with a flat face acting as an anvil for supporting the end of the girder to be sheared, while the other is tapered to provide a knife-like shearing edge each shearing member being tapered both towards its end nearer to and towards its end remote from the gap formed by the recesses in the jaws so as to permit the tool to sever the web of a girder at a substantial angle to the length of such girder without the shearing portions fouling either of the flanges of the girder.

6. A hand-operated shearing tool for severing miniature girders including in combination two jaws, a pivotal joint connecting one end of one jaw to one end of the other jaw, the jaws being oppositely recessed between the pivotal joint and their outer ends to provide a gap which will accommodate a flange of a girder whose web is being severed, cooperating shearing portions on the outer ends of the jaws one of which is formed with a flat face acting as an anvil for supporting the part of the girder to be sheared, while the other is tapered to provide a knife-like shearing edge, each shearing portion being tapered both towards its end nearer to and towards its end remote from the gap formed by the recesses in the jaws so as to allow the tool to shear the web of the girder at a substantial angle to the length of such girder without the shearing portions fouling either of the girder flanges, and a stop for determining the extent to which the shearing portions can overlap.

In testimony whereof I have signed my name to this specification.

FREDERICK DONALD LINGWOOD.

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