United States Patent [19]

Duffy

[11] **3,740,846**

[45] **June 26, 1973**

[54] **SHEARS HAVING CLEARANCE ADJUSTING MEANS BETWEEN PIVOTAL COOPERATING MEMBERS**

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[21] Appl. No.: **218,129**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 74,087, Sept. 21, 1970, Pat. No. 3,678,580.

[52] **U.S. Cl.** **30/267,** 81/416

[51] **Int. Cl.** **B26b 13/28**

[58] **Field of Search** 30/266, 267, 270, 30/254; 81/416

[56] **References Cited**

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Attorney—Maxwell E. Sparrow and Mark H. Sparrow

[57] **ABSTRACT**

A tool, for example, shears, having clearance adjusting means between pivotal cooperating members or blades. An adjustable ride in the means is provided to facilitate adjustments of cutting blade clearance. The ride is concentrically circumposed around the pivot stud or bolt and interposed between the members or blades. Application is made to scroll shears or snips with an offset cutting edge with relation to the flank of the shear, in order to obtain clearance to scroll slightly to the right, while retaining full maneuverability to the left.

11 Claims, 10 Drawing Figures

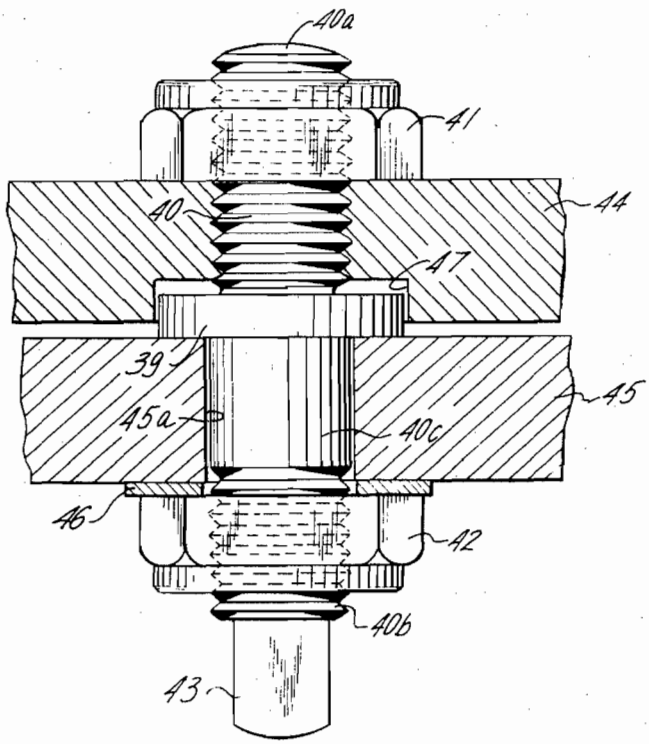


FIG. 1a

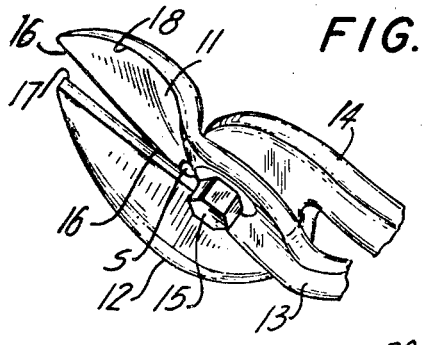


FIG. 1

FIG. 3

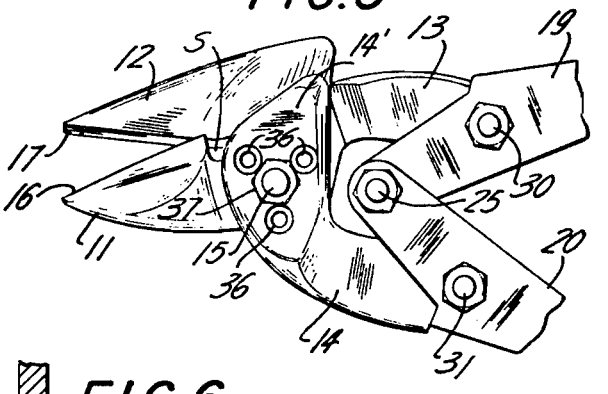


FIG. 2

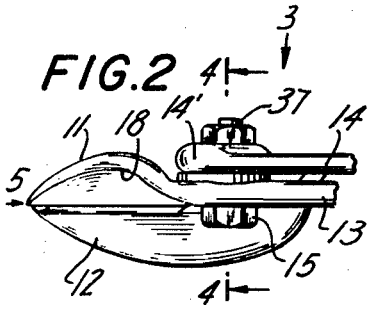


FIG. 6

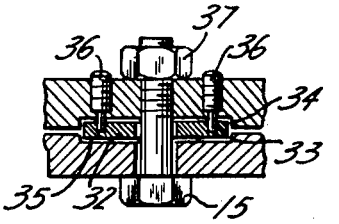


FIG. 4

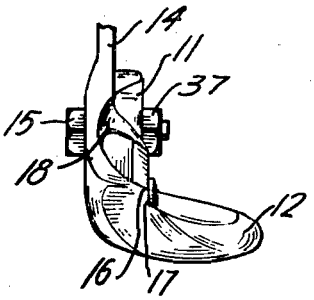


FIG. 5

FIG. 7

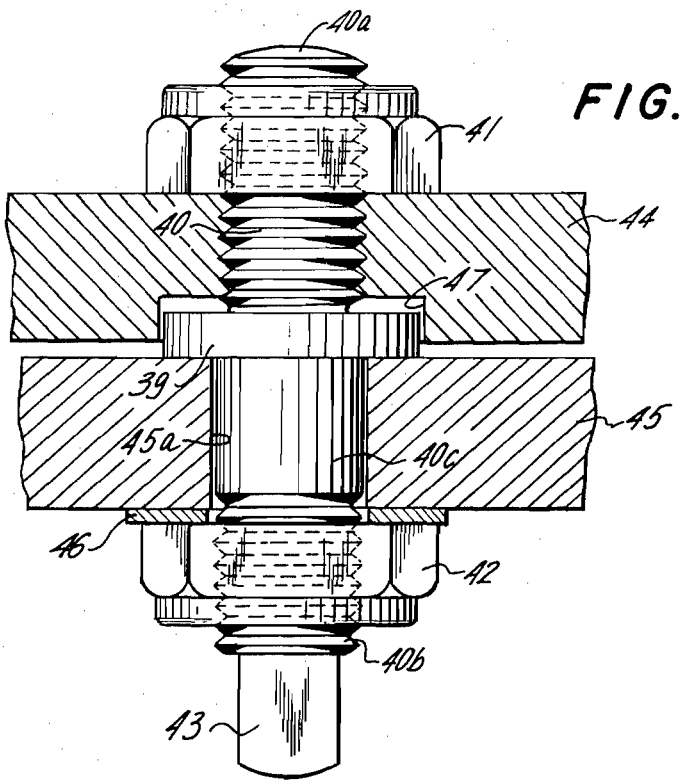
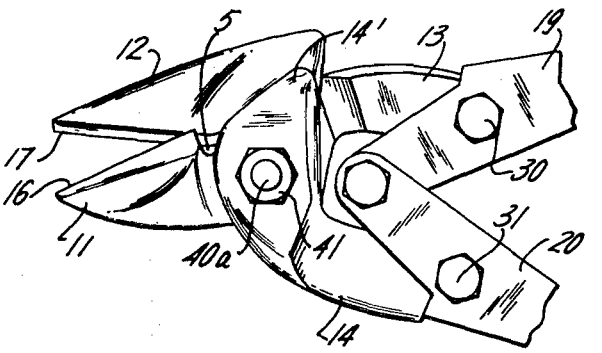

40a
41
44
40
47
39
45
45a
40c
46
42
40b
43

FIG. 8

FIG. 9


5
14'
13
19
12
17
16
30
31
20
11
40a
41
14

SHEARS HAVING CLEARANCE ADJUSTING MEANS BETWEEN PIVOTAL COOPERATING MEMBERS

This application is a continuation-in-part of application Ser. No. 74,087, filed filed Sept. 21, 1970, now U.S. Pat. No. 3,678,580.

BACKGROUND OF THE INVENTION

The present invention relates in general to tools having cooperating pivotal members, for example, shear-type cutting tools and particularly to such tools as are used for cutting metals, plastics and combinations in sheet form.

Scroll shears for cutting sheet metal or like sheet material are well known in the trade. They permit unlimited maneuverability in one direction, so that the operator may cut a square corner, a very small curve, or even cycloidal and involute shapes. However, these scroll shears have one serious disadvantage. If shears were made to make a scroll to the left (normal for use by a right-handed person) they would not scroll to the right; thus it was almost impossible to regain a given cutting line when the operator went even slightly off to the left. The reverse was true when the shears had been made for cutting to the right, so that it had been impossible to return to the cutting line when an error had been made by veering a bit too much to the right. Improvements have been made in the past by forging a throat in the flank of the shears, such as disclosed in U. S. Patent No. 3,143,799. Another disadvantage found in all existing scroll shears is that some metal has to be removed from the ride area when the blades are resharpened by grinding, in order to bring the blades back into a proper cutting relationship. This is a very difficult, and in many instances unsuccessful, operation.

A solution of these problems has been found in this invention.

SUMMARY

The invention consists in such novel features, construction arrangements, combinations of parts and improvements as may be shown and described in connection with the devices therein disclosed by way of examples only and illustrating scroll shears as preferred embodiments.

The novel way to overcome the difficulties and disadvantages of the past art is to provide an offset cutting edge, relative to the flank of the shears, in order to obtain clearance to scroll slightly to the right while retaining full maneuverability to the left. Resharpening of worn edges further requires a re-setting of the blades in the direction of increasing the spacing of the ride. The invention provides new and very simple adjusting means for the ride compensation.

Objects and advantages of the invention will be set forth in part hereafter and in part will be obvious herefrom or may be learned by practicing the invention, the same being realized and attained by means of the instrumentalities and combinations pointed out in the appended claims.

It is an object of the invention to provide scroll shears with an offset cutting edge in relation to the flank of the shears in order to obtain clearance to scroll slightly to the right while retaining full maneuverability to the left.

A further object of the invention is to provide an adjustable ride in tools having cooperable pivotal members or blades, for example, in scroll shears, for permitting adjustments of cutting blade clearance.

Another object of the invention is to provide cutting blade clearance adjustment means which are easily and conveniently operated.

BRIEF DESCRIPTION OF THE DRAWINGS

In the following description and in the claims, parts will be identified by specific names for convenience, but such names are intended to be as generic in their application to similar parts as the art will permit. Like reference characters denote like parts in the several figures of the drawings, in which

FIG. 1 shows a side elevation of the scroll shears in an open position;

FIG. 1*a* is a perspective view of the front portion of the shears, with its bottom up;

FIG. 2 is a top view of the scroll shears, partly broken away, shown in FIG. 1, taken in the direction of the screw 2;

FIG. 3 is a bottom view of the scroll shears, partly broken away, shown in FIG. 1, taken in the direction of the arrow 3 in FIG. 2, partly broken away;

FIG. 4 is a cross-section of the scroll shears shown in FIG. 1, taken along the line 4—4 in FIG. 2, partly broken away;

FIG. 5 is a view of the scroll shears, taken in the direction of the arrow 5 in FIG. 2, partly broken away ;

FIG. 6 is a cross-section of the upper blade of the scroll shears, taken along the line 6 in FIG. 1, partly broken off;

FIG. 7 iS a cross-section of the lower blade of the scroll shears, taken along the line 7—7 in FIG. 1, partly broken off;

FIG. 8 is a cross-section of an adjustable ride in modified form with respect to FIG. 4; and

FIG. 9 is a bottom view of scroll shears, partly broken away, with the adjustable ride or blade adjusting mechanism of FIG. 8 applied thereto.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now in more detail to the drawings illustrating preferred embodiments by which the invention may be realized, there is in FIG. 1 a side elevation of the scroll shears 10 with an upper cutting blade 11 and a lower cutting blade 12. Blades 11 and 12 have shanks 13 and 14, respectively, and are pivotally mounted on a pivotal bolt 15 (FIG. 4). Blades 11 and 12 have cutting edges 16 and 17, respectively. Lower blade 12 is offset forwardly of flank portion 14' of shank 14 and extends to the front of upper blade 11. Where blade 12 connects at its rear with flank portion 14' it slopes downwardly as seen at 14''. The cutting edge 17 of blade 12 extends inwardly of the juncture line of blade 12 and flank portion 14'. In other words, the cutting edge 17 of blade 12 is not in alignment with said juncture line, but is offset in relation thereto. Considering the left hand scroll shears shown in FIG. 1, shank 14, from which flank 14' extends downwardly, is pivoted behind shank 13 and protrudes angularly below pivot 15 to the left extending then forwardly to provide blade 12 with its cutting edge 17. Upper blade 11 is curved away from cutting edge 16 (shown at 18 in FIGS. 2 and 5) in order to provide sufficient maneuverability to the right while retaining capacity for full operational movement to the left. The cutting edge 16 of blade 11 is so

disposed on the pivoted shank 13 that the cutting edge 16 meets the cutting edge 17 of blade 12 in a straight cutting line (FIG. 2). A relief between the lower edge 13' of shank 13 and the starting edge 16' constitutes a cutout forming an open space S providing a clearance at the rear ends of the two cutting edges 16 and 17. Shanks 13, 14 are attached to the handles 19 and 20, respectively, which have hand grips 21 and 22, respectively, covered with suitable plastic. Handles 19, 20 are extended beyond their point of attachment to shanks 13, 14 in the direction toward pivot stud 15, and their forward ends 23, 24 are pivotally joined by a bolt 25. A spring 26 is wound around bolt 25, and the free ends 27, 28 of spring 26 are disposed to abut against the inside of shanks 13, 14 in order to urge shears 10 to open, thus providing a return stroke during cutting operations. A latch 29 is swingably attached to the screw 30 fastening shank 13 to handle 19, whereas the screw 31 fastening shank 14 to handle 20 serves as a catch for latch 29.

According to the invention blade adjusting means are provided to facilitate adjustment of cutting blade clearance as described in the following examples.

A ride between blades 11, 12 is provided (FIG. 4) consisting of a washer 32 which is located in recesses 33,34 of blades 11, 12, respectively. Washer 32 preferably consists of hardened steel and is preferably coated with a layer 35 of a material having a low coefficient of friction such as "Teflon S". Three pointed set screws, commonly called half dog point set screws 36 are equally spaced around stud or bolt 15 and are directly threaded in lower blade 12 (FIGS. 3 and 4). Set screws 36 abut with their dog points against washer 32. It is easily and conveniently possible to adjust the clearance between blades 11, 12 by means of set screws 36. This facility of adjustment of blades 11, 12 after regrinding the cutting edges 16, 17 thereof has the further advantage of quick adjustment for cutting very thin material. When cutting an average sheet metal of 0.020 inch to 0.036 inch thickness, a clearance of approximately 0.008 inch between cutting edges 16 and 17 should be kept. However, when cutting very thin materials of 0.002 to 0.012 inch thickness, the clearance between cutting edges 16 and 17 must be reduced to zero, because otherwise the thin metal is pulled between the blades and is squeezed, chewed or is otherwise improperly cut. Conversely, when cutting very heavy materials of 0.040 inch to 0.062 inch, a spacing or clearance of approximately 0.012 inch between the cutting edges has been found desirable.

FIG. 8 discloses in cross-section a modification of the adjustable ride or blade adjusting means. Its application to scroll shears is shown in FIG. 9. Ride member 39 is an integral part of threaded pivotal bolt 40. Adjustment is made by loosening jam nut 41 and lock nut 42, screwing the threaded fulcrum or pivotal stud or bolt 40 in or out by means of the wrench flats 43 extending from bolt 40 until the desired jaw spacing is obtained, then retightening jam nut 41 down hard, and turning lock nut 42 down until smooth operation is achieved. This means of adjustment is in contrast with that shown in FIG. 3 wherein adjustment is obtained by loosening the nut of pivotal stud or bolt 15, then screwing in or out on the three set screws 36 until desired jaw spacing is obtained, then retightening the nut until smooth operation is achieved.

In FIG. 8 the two cutting blades are indicated by the reference numerals 44, 45. Blade 44 has a recess 47 which accommodates the ride member or washer 39, the latter being an integral part of bolt 40. Bolt 40 threadedly engages blade 44, and jam nut 41 extends through bore 45a of blade 45 and washer 46 and threadedly engages lock nut 42. Ride 39 and washer 46 preferably consist of hardened steel and is preferably coated with a layer of a material having a low coefficient of friction, such as "Teflon S".

By the use of the novel ride compensating adjustments, according to the present invention, settings suitable for the work to be done can be easily and quickly obtained, as well as resetting after sharpening of the blades.

More specifically, referring to FIG. 8, the reference numerals 44 and 45 may refer to any cooperating pivotal members or blades of a tool in which clearance adjusting means is required. The cooperating members 44 and 45 are rotatably disposed on pivotal stud or bolt 40. Stud or bolt 40 comprises a non-threaded intermediate portion 40*c* including ride member 39 at one end thereof, a first threaded portion 40*a* extending from ride member 39 and a second threaded portion 40*b* extending from the other end of the intermediate portion 40*c*. Cooperating member or blade 44 has a threaded bore threadedly engaging the threaded portion 40*a* of stud 40 and has a recess 47 accommodating at least a portion of ride member 39 for axial adjustment therein. The other cooperating member or blade 45 has a bore accommodating intermediate portion 40*c* of stud 40 for rotation therein. Threaded member 41 which is preferably a jam nut threadedly engages threaded portion 40*a* of stud 39 adjacent blade or member 44. Threaded member 42, which is preferably a lock nut, threadedly engages portion 40*b* of stud 39. A washer 46, preferably made of hardened steel and preferably coated with a layer of material having a low coefficient of friction, such as "Teflon S", is preferably interposed between nut 42 and blade 45. Ride member 39 is axially adjustable to provide a desired space position between blades 44, 45 when the jam nut 41 and lock nut 42, respectively, are loosened on stud 39 and the latter rotated and the ride member 39 fixed in this position when nut members 41, 42 are tightened on stud 39 with relation to blades 44, 45. Stud 39 has an extension 43, preferably provided with wrench flats or other suitable means for rotating stud 39 to make the required adjustment. Although FIG. 8 shows the recess for ride 39 in cooperating member 44, it is understood that recess 47 may be wholly within either one of the cooperating members 44 or 45 or partially within each of both members 44 and 45.

It is readily understood that the invention is not limited to shears or snips to provide cutting clearance, but is applicable to other tools where an adjustable ride may be used to provide clearance between cooperating pivotal members.

While the invention has been described and illustrated with respect to certain preferred examples which give satisfactory results, it will be understood by those skilled in the art after understanding the principle of the invention that various other changes and modifications may be made without departing from the spirit of the invention.

What is claimed is:

1. A tool having two cooperating pivotal members and clearance adjusting means for said members; comprising a pivotal stud, said cooperating members being rotatably disposed on said stud, and two threaded members; said stud comprising a non-threaded intermediate portion including a ride member at one end thereof, a first threaded portion extending from said ride member and a second threaded portion extending from the other end of said intermediate portion; one of said cooperating members having a threaded bore threadedly engaging said first threaded portion of said stud, at least one of said cooperating members having a recess accommodating at least a portion of said ride member for axial adjustment therein, the other of said cooperating members having a bore accommodating said intermediate portion of said stud for rotation therein; one of said threaded members threadedly engaging said threaded portion of said stud adjacent said one of said cooperating members, the other of said threaded members threadedly engaging second threaded portion of said stud adjacent said second cooperating member, said ride member being axially adjustable to provide a desired spaced position between said cooperating members when said threaded members are loosened on said stud and the latter rotated and being fixed in said position when said threaded members are tightened on said stud with relation to said cooperating members.

2. A tool according to claim 1, wherein one of said threaded portions of said stud has an extension adapted for engagement by a tool for rotating said stud.

3. A tool according to claim 1, wherein one of said two threaded members comprises a jam nut and the other thereof comprises a lock nut.

4. A tool according to claim 3, wherein one of said threaded portions of said stud has an extension adapted for engagement by a tool for rotating said stud.

5. A tool according to claim 3, and a washer interposed between said lock nut and said second threaded portion of said stud, said washer having an artifriction coating thereon.

6. A tool adjusting mechanism according to claim 1, wherein said cooperating members comprise cutting blades rotatably disposed on said stud.

7. A tool accordind to claim 6, wherein said blades have cutting edges forming a cutting line, said cutting line being offset relative to said blades.

8. A tool according to claim 7, said ride member being disposed between said blades to provide cutting clearance between said cutting edges, and said ride member is a circumposed enlargement of said stud.

9. In shears having an upper cutting blade and a lower cutting blade and a pivotal stud, said blades having cutting edges and being rotatably disposed on said stud, at least one of said blades having a recess, a ride member between said blades concentrically circumposing said stud and being an integral part of said stud, said ride member at least partially extending within said recess and being disposed to provide cutting clearance between said cutting edges; said stud comprising a non-threaded intermediate portion below said ride member and rotatably located within a bore in said lower blade, a threaded portion extending below said non-threaded portion and said lower blade and a threaded portion above said ride member engaging a threaded bore in said upper blade and extending above the latter; a first threaded member engaging the threaded portion extending below said lower blade; a second threaded member engaging the threaded portion of said stud extending above said upper blade.

10. In shears according to claim 9, wherein said stud has means for engagement by a tool for rotating said stud.

11. A tool having two cooperating pivotal members and clearance adjusting means for said members; comprising a pivotal stud, said cooperating members being rotatably disposed on said stud, and two threaded members; said stud comprising a non-threaded intermediate portion including a ride member at one end thereof, a first threaded portion extending from said ride member and a second threaded portion extending from the other end of said intermediate portion; one of said cooperating members having a threaded bore threadedly engaging said first threaded portion of said stud and at least one of said cooperating members accommodating at least a portion of said ride member for axial adjustment therein, the other of said cooperating members having a bore accommodating said intermediate portion of said stud for rotation therein; one of said threaded members threadedly engaging said threaded portion of said stud adjacent said one of said cooperating members, the other of said threaded members threadedly engaging said second threaded portion of said stud adjacent said second cooperating member, and means for axially adjusting said ride member.

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