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UK CL (Edition X) **B4B**
INT CL **A01G, B26B**
Other: **EPODOC; WPI**

(54) Abstract Title: **Shears including adjusting slot and drive arms having eccentric pivot bores**

(57) The shears include a main blade 40, a secondary blade 50, and two juxtaposed drive arms 60. The main blade 40 includes an anvil 44, a diametrically opposed handle 41, and aligned main 42 and eccentric 43 pivot holes. The secondary blade 50 includes a co-operating cutter 54, a secondary pivot hole 51 connected to the main pivot hole 42 and an elongated adjusting slot 52. Each juxtaposed drive arm 60 has a bent portion 65 including an eccentric pivot bore 63 connected to the eccentric pivot hole 43 and a linking pivot bore 62 connected to the elongated adjusting slot 52, and a handle 61.

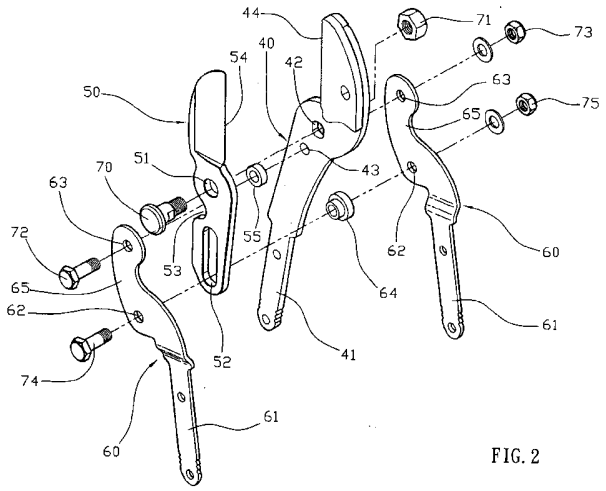

FIG. 2

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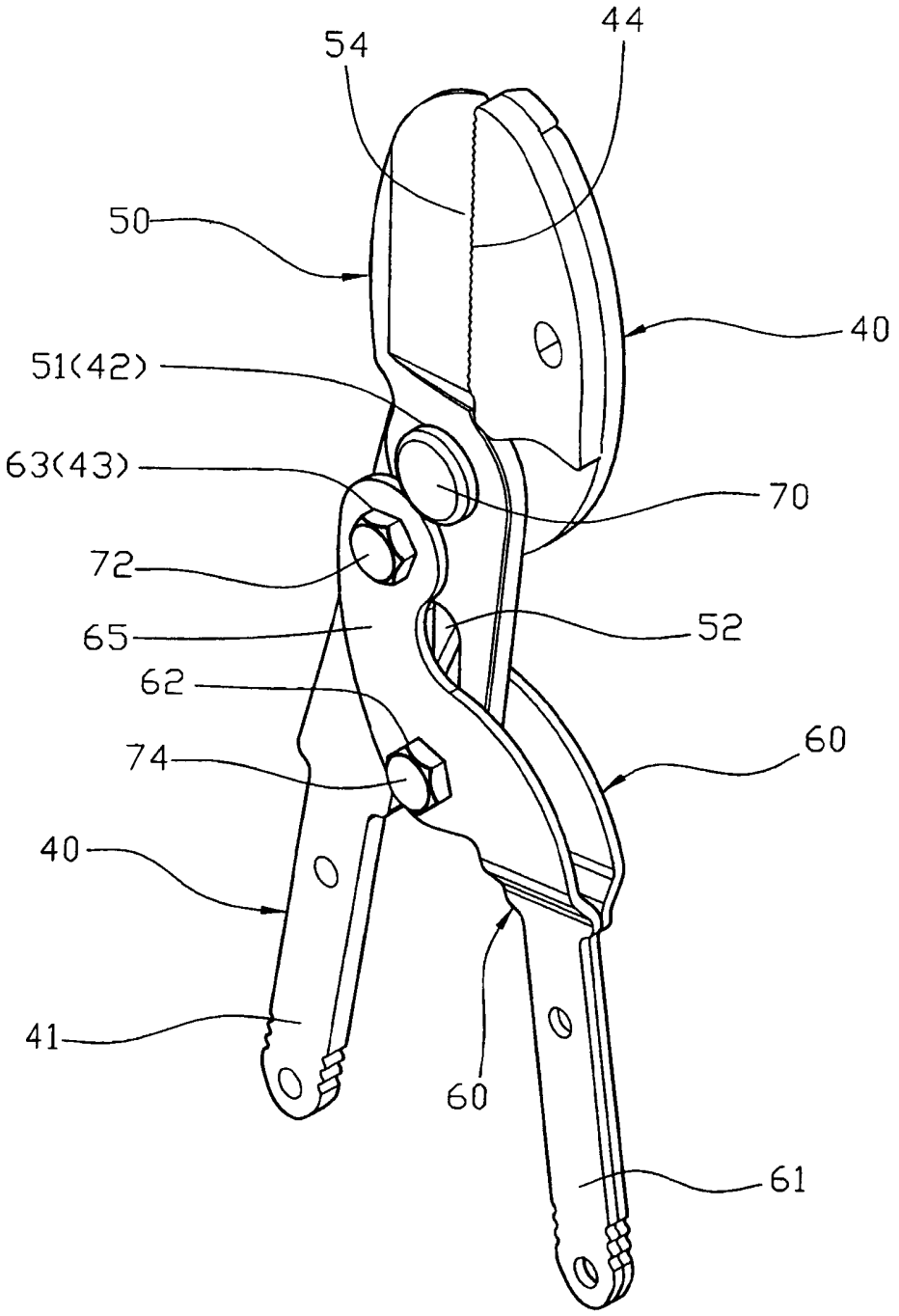

FIG. 1

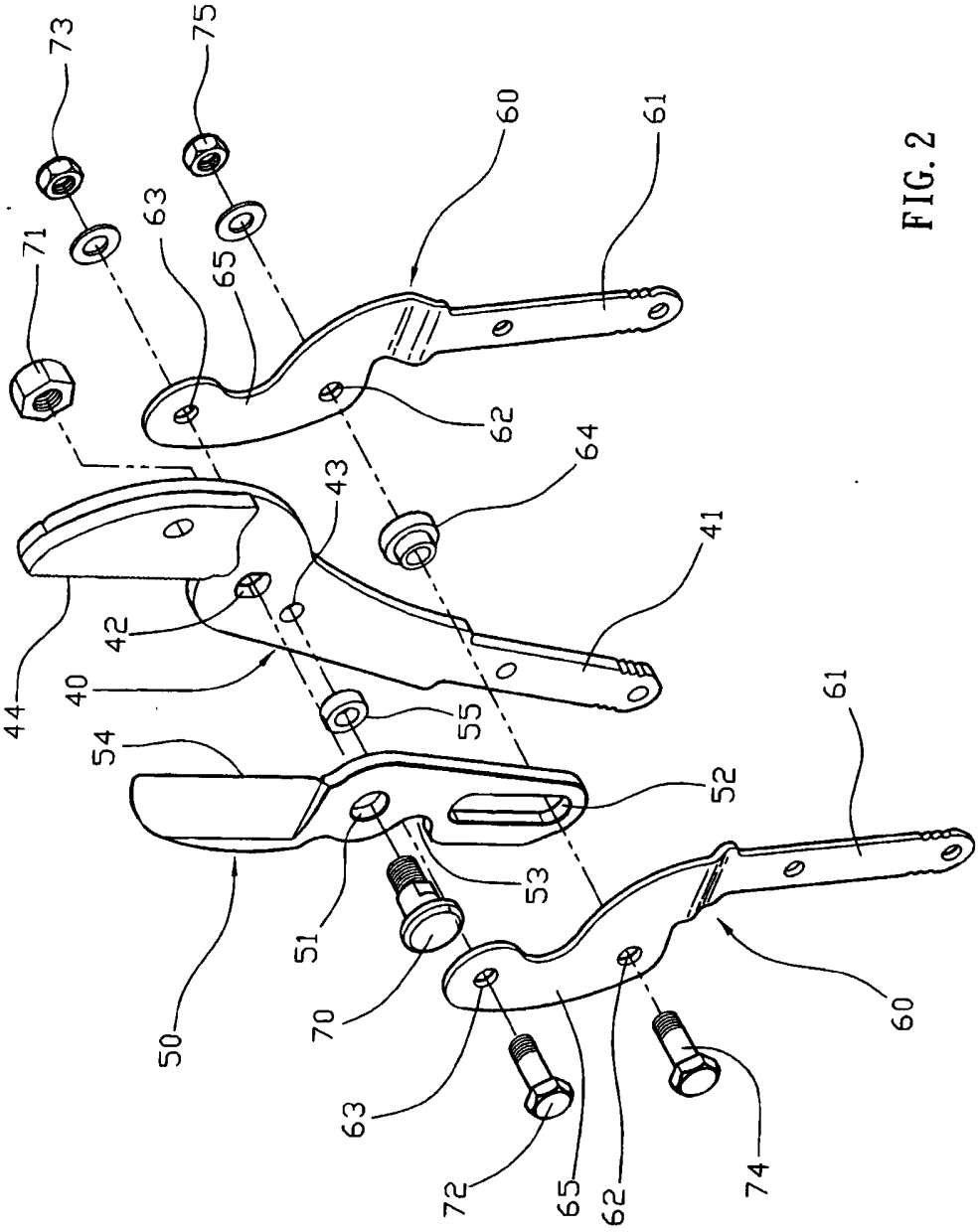
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FIG. 2

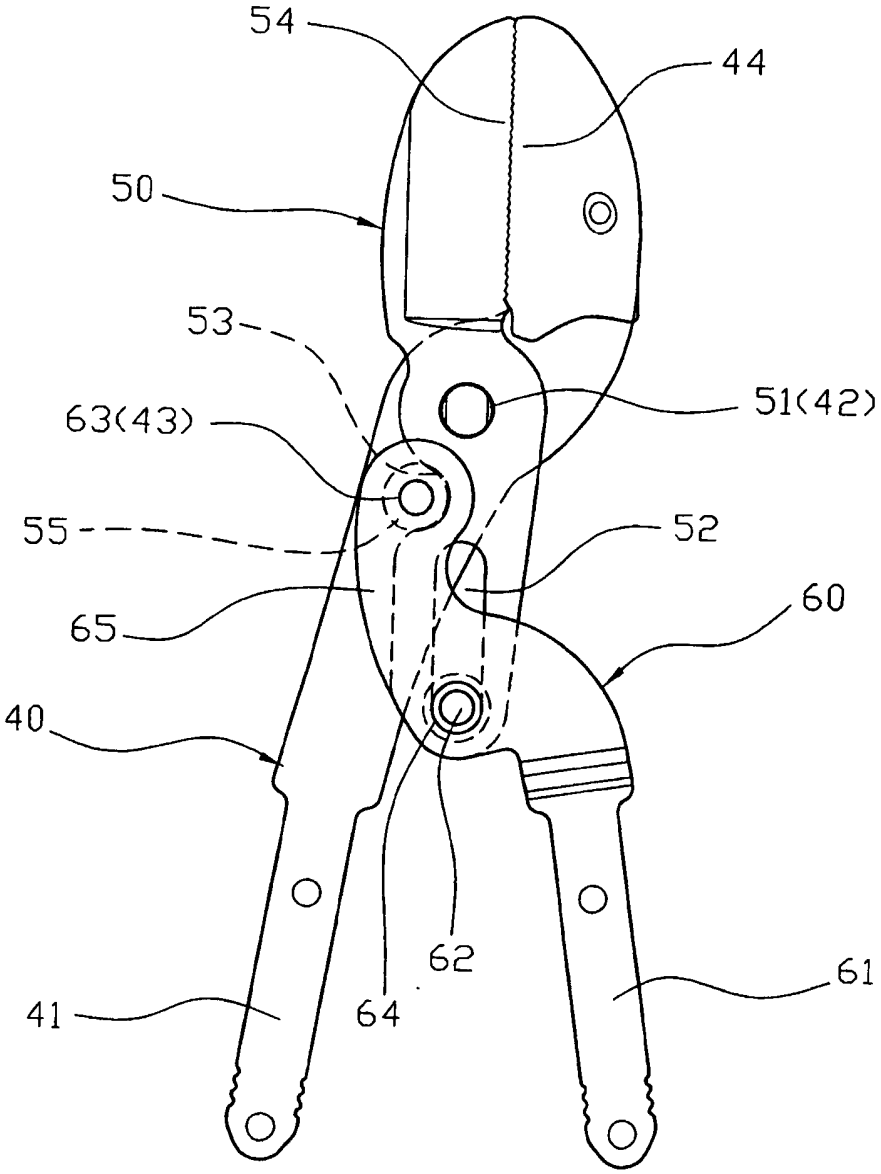

FIG. 3

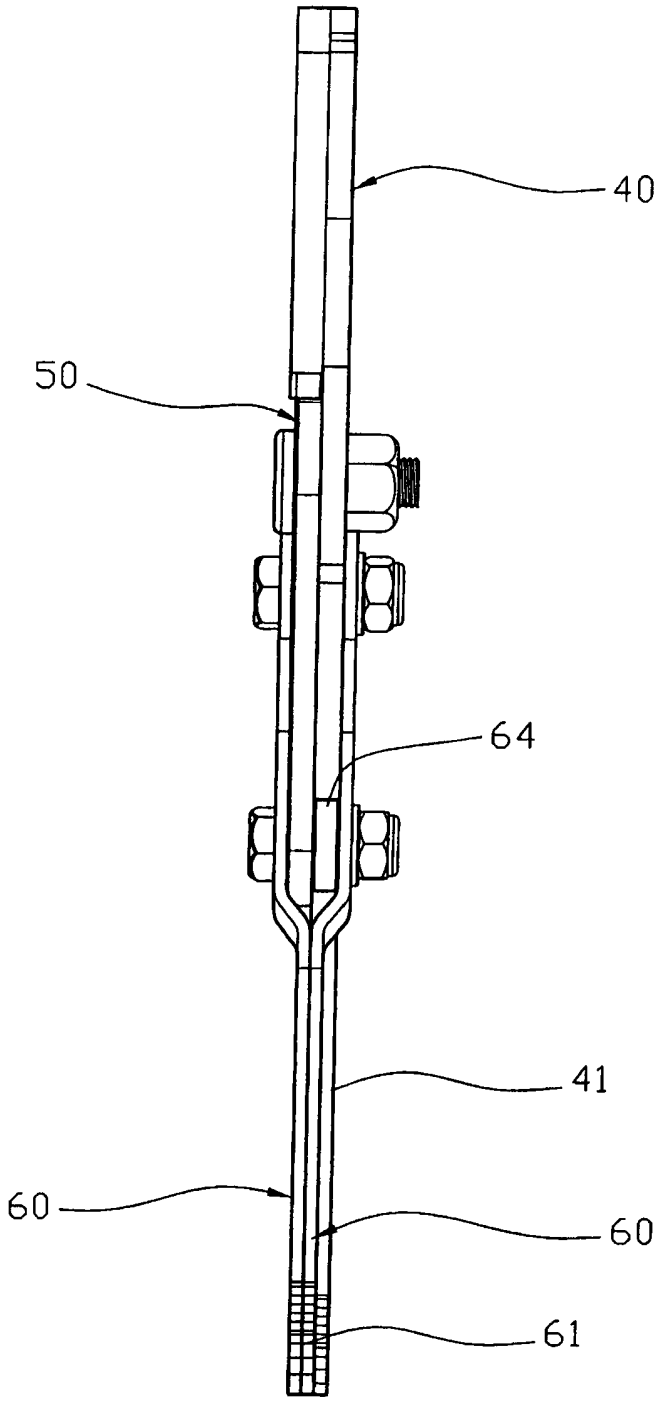

FIG. 4

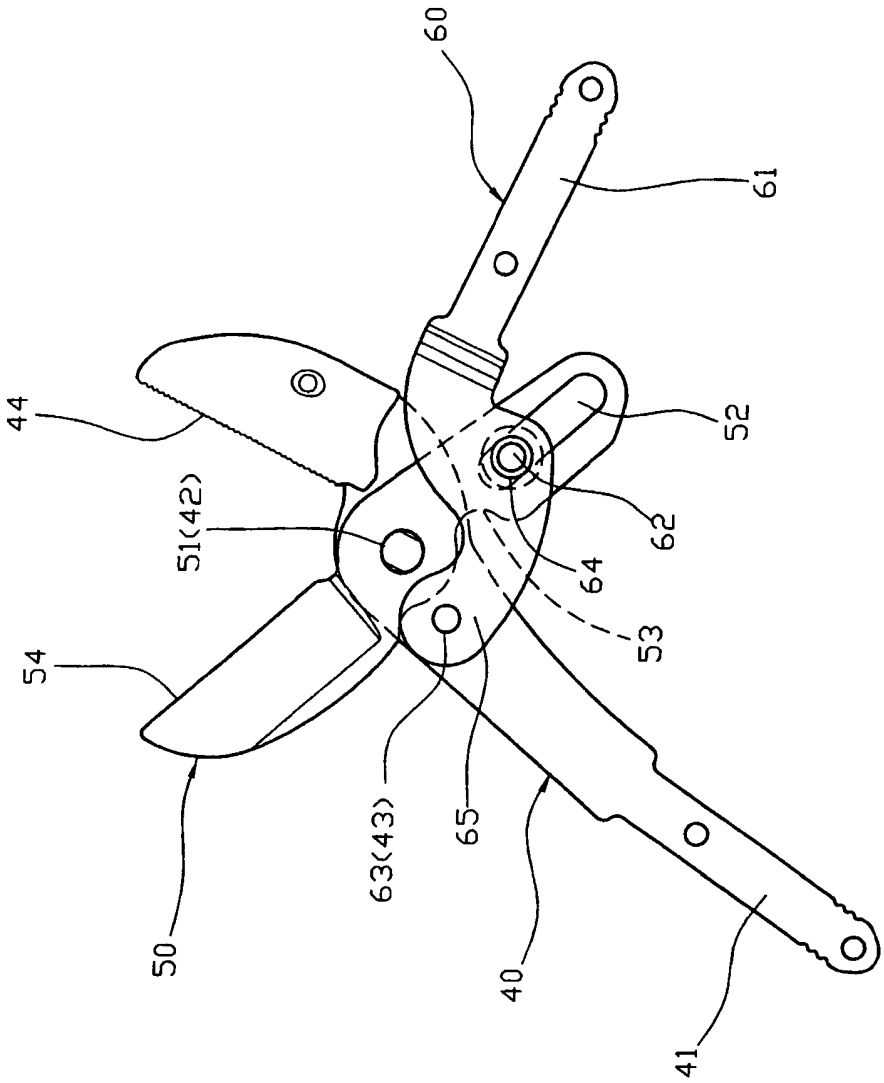

FIG. 5

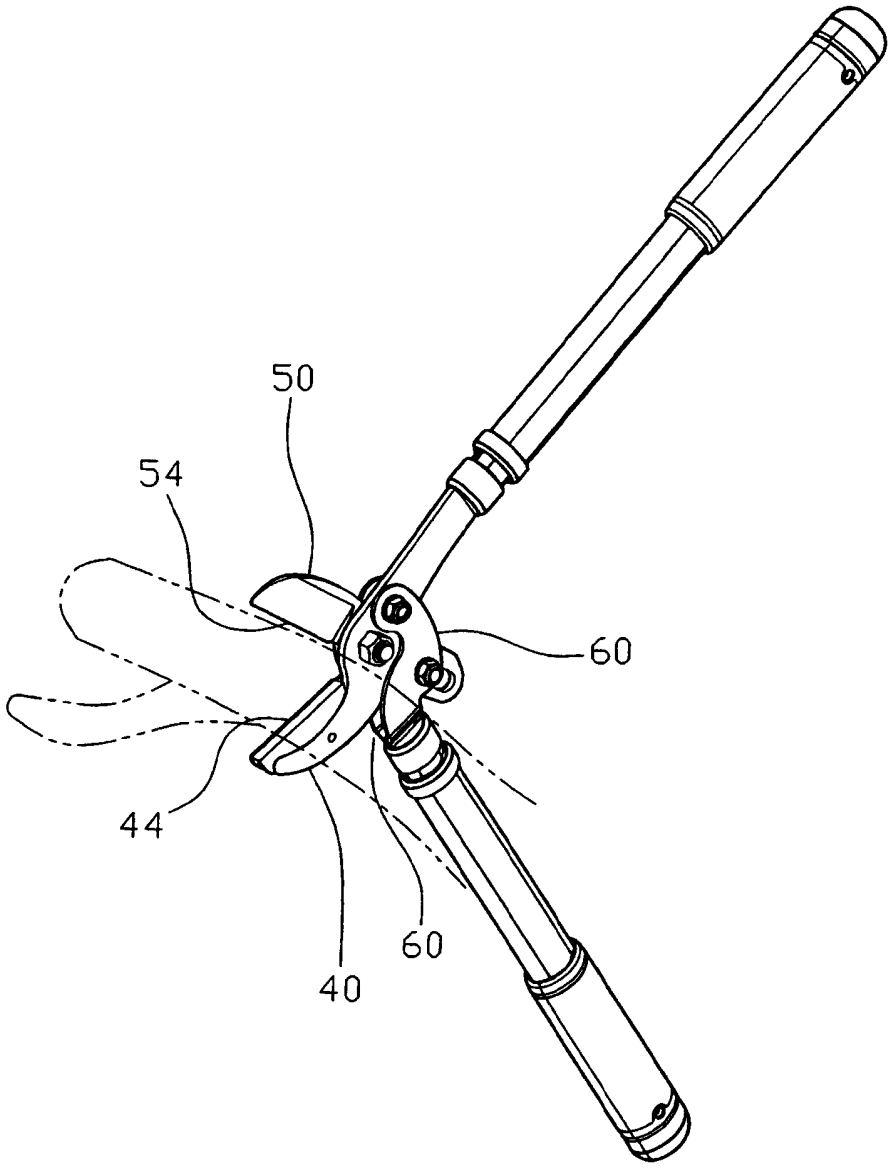

FIG. 6

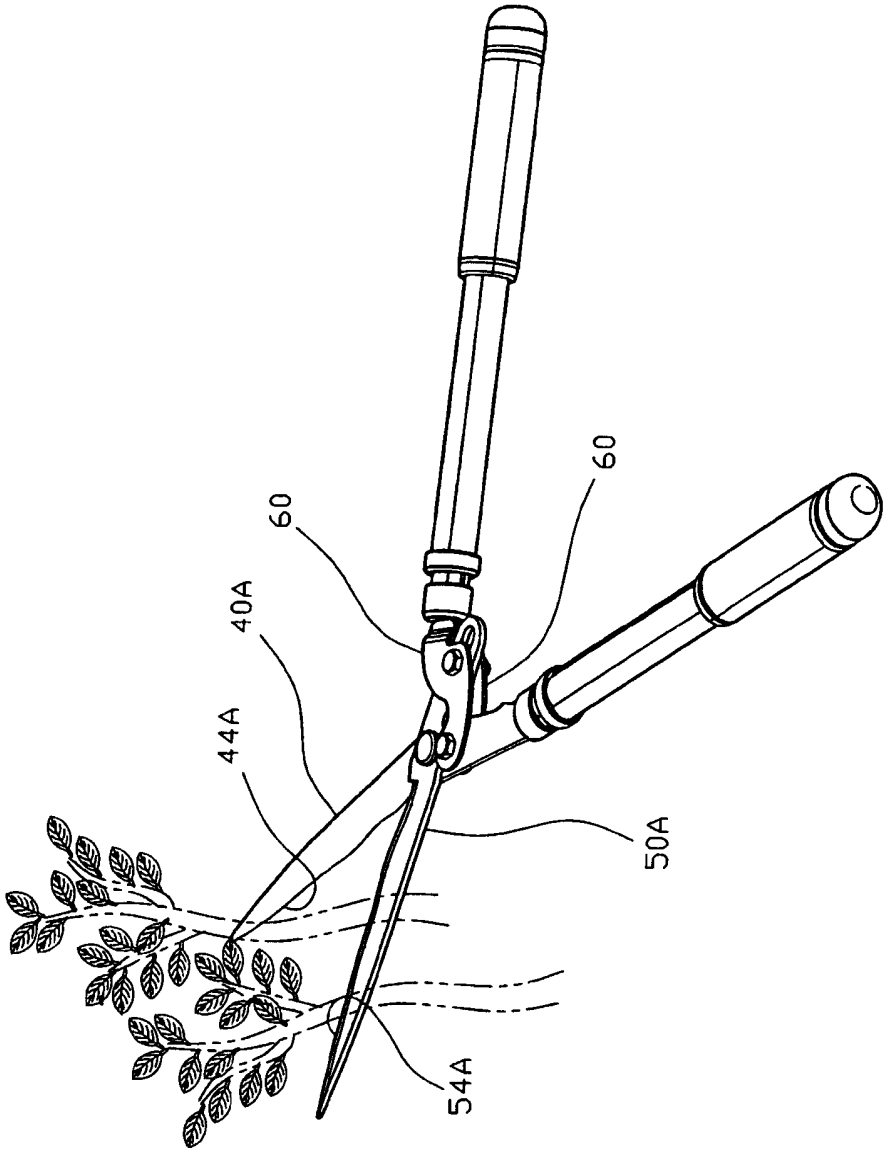

FIG. 7

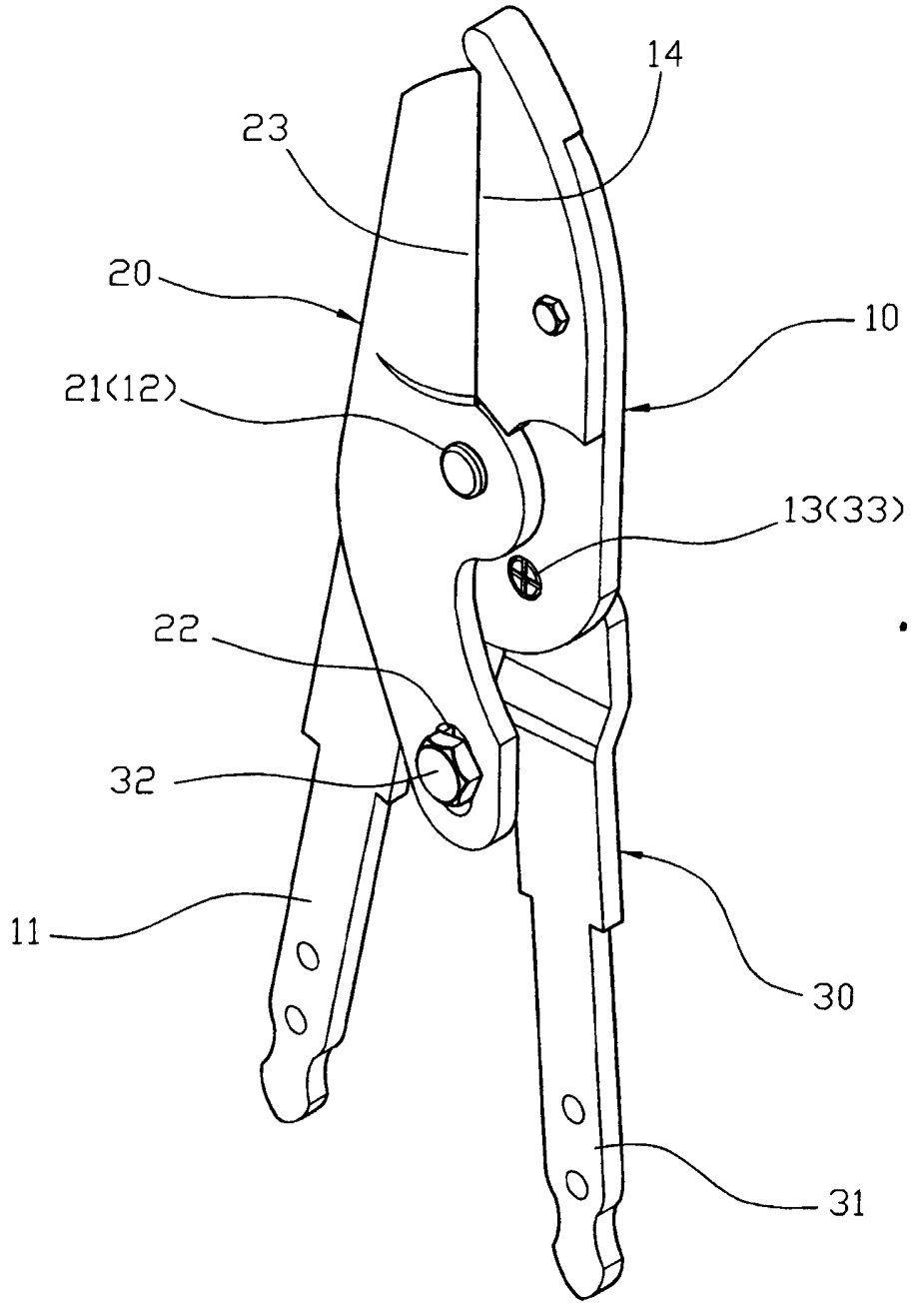

FIG. 8
PRIOR ART

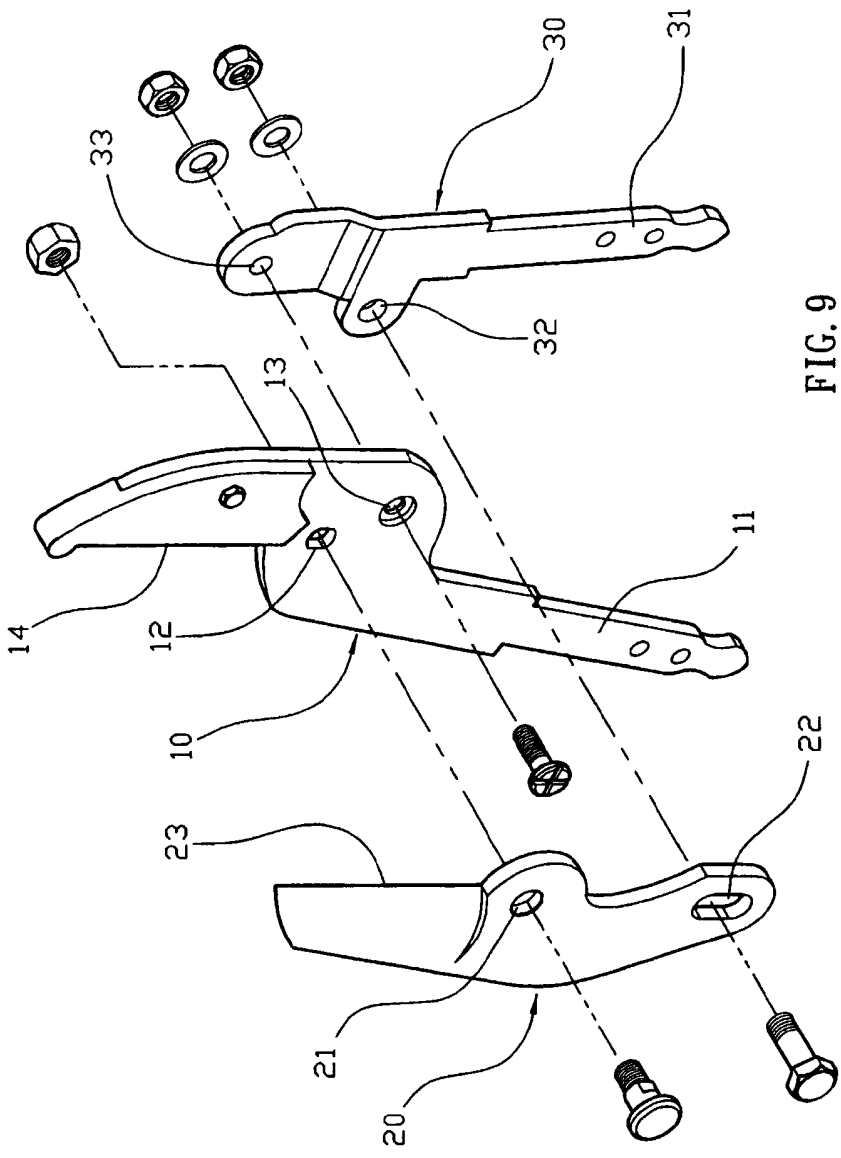

FIG. 9
PRIOR ART

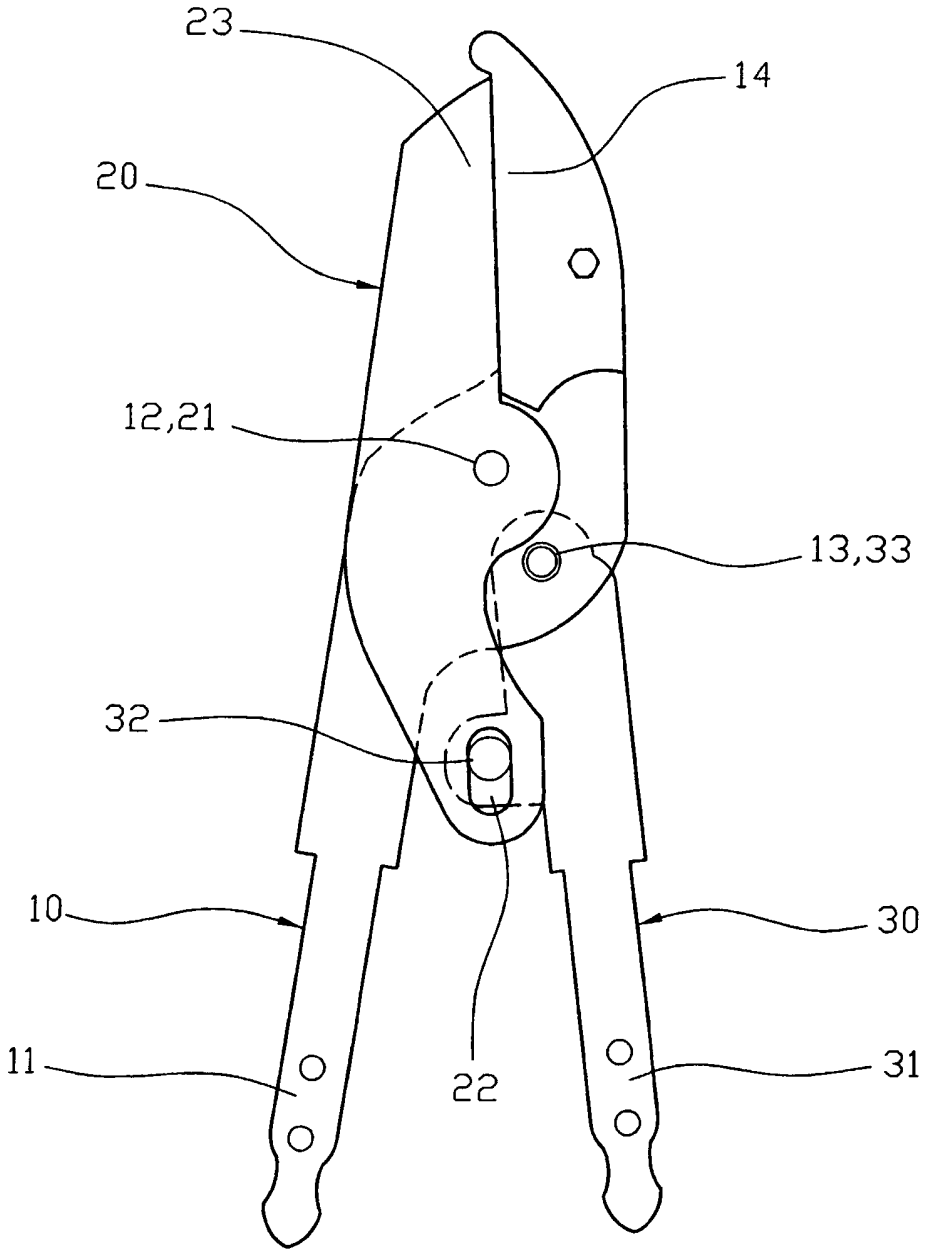

FIG. 10
PRIOR ART

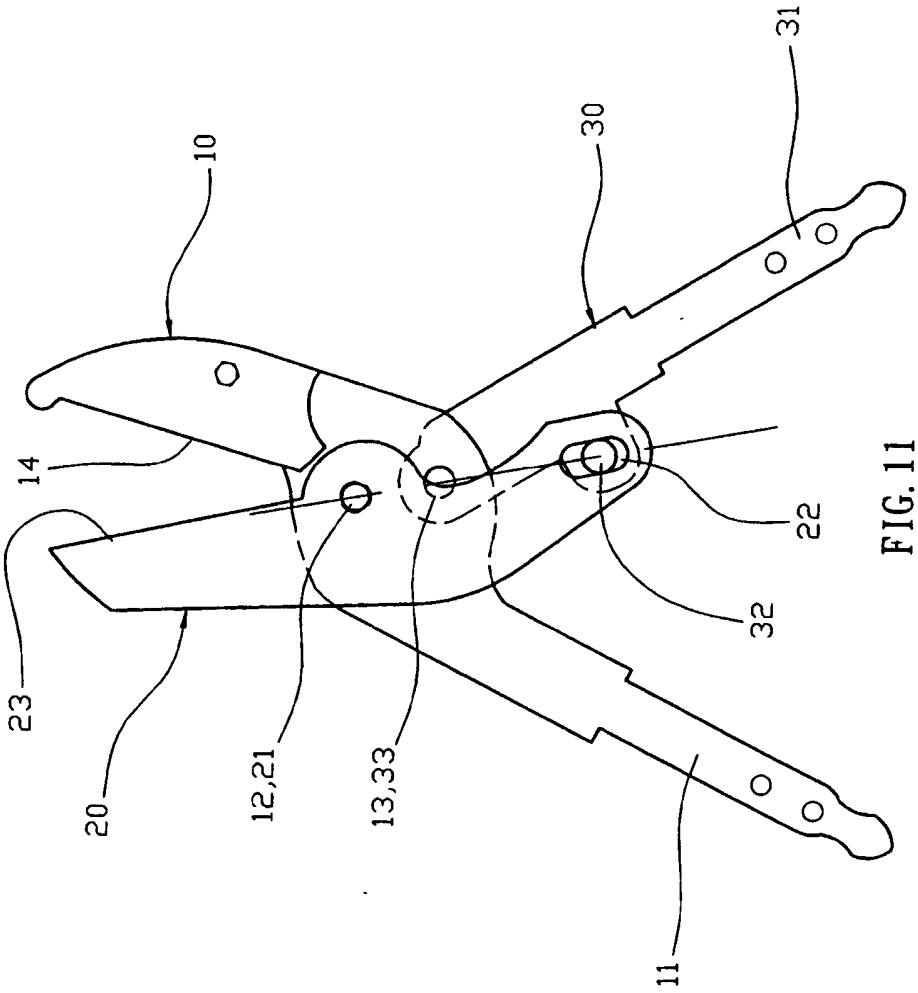

FIG. 11
PRIOR ART

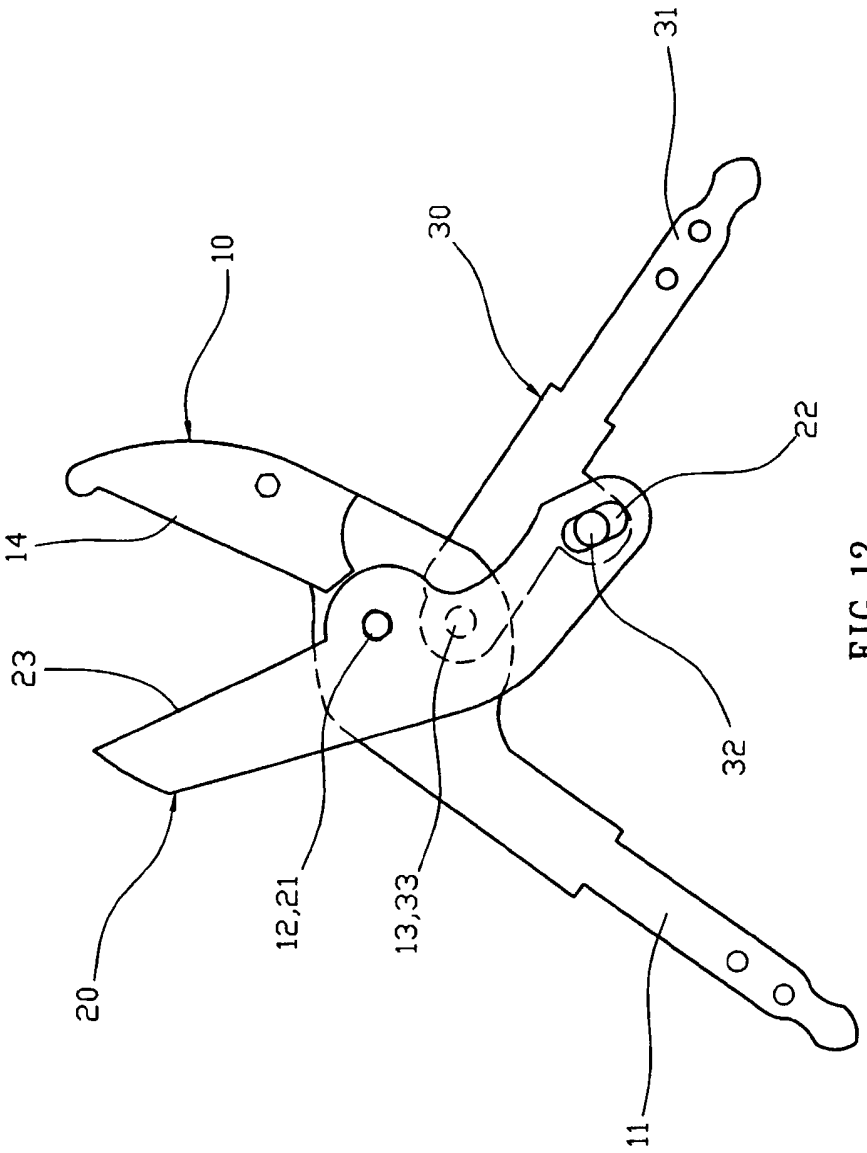

FIG. 12
PRIOR ART

ENERGY SAVING SHEARS

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a pair of shears and, more particularly, to a pair of energy saving gardening shears to shear or cut a plant.

2. Description of the Related Art

A pair of conventional gardening shears in accordance with the prior art shown in Figs. 8-12 comprises a main blade 10, a secondary blade 20, and a drive arm 30. The main blade 10 has an upper portion having a right position formed with an anvil 14, a mediate portion having a middle section formed with a main pivot hole 12 and an eccentric pivot hole 13 located beneath a right position of the main pivot hole 12, and a lower portion having a left position formed with a grip portion 11. The secondary blade 20 has an upper portion having a left position formed with a sharp edge 23, a mediate portion formed with a secondary pivot hole 21 pivotally connected with the main pivot hole 12 of the main blade 10, and a lower portion formed with an elongated adjusting slot 22. The drive arm 30 has a lower portion formed with a drive grip 31, a mediate portion having a left position formed with a linking pivot bore 32 pivotally and movably connected with the adjusting slot 22 of the secondary blade 20 and an upper portion formed with a pivot bore 33 pivotally connected with the eccentric pivot hole 13 of the main blade 10.

As shown in Fig. 10, when the anvil 14 of the main blade 10 abuts the sharp edge 23 of the secondary blade 20, the linking pivot bore 32 of the drive arm 30 is located at the uppermost position of the adjusting slot 22 of the secondary blade 20, and the secondary pivot hole 21 of the secondary blade 20 is closer to the pivot bore 33 of the drive arm 30. When the drive grip 31 of the drive arm 30 is movable outwardly relative to the grip portion 11 of the main blade 10, the drive arm 30 is pivoted about the main blade 10, and the linking pivot bore 32 of the drive arm 30 is movable downward along the adjusting slot 22 of the secondary blade 20. At this time, the secondary blade 20 is driven by the drive arm 30 to pivot outwardly relative to the main blade 10 to open the angle between the anvil 14 of the main blade 10 and the sharp edge 23 of the secondary blade 20.

As shown in Fig. 11, when the drive grip 31 of the drive arm 30 is movable outwardly relative to the grip portion 11 of the main blade 10 successively to the position where the secondary pivot hole 21 of the secondary blade 20, the pivot bore 33 of the drive arm 30 and the linking pivot bore 32 of the drive arm 30 are arranged in a line, the distance between the linking pivot bore 32 of the drive arm 30 and the secondary pivot hole 21 of the secondary blade 20 has the maximum value, so that the moment (or leverage action) applied by the drive arm 30 on the secondary blade 20 has the maximum value.

As shown in Fig. 12, when the drive grip 31 of the drive arm 30 is movable outwardly relative to the grip portion 11 of the main blade 10 successively, the linking pivot bore 32 of the drive arm 30 is movable upward along the adjusting slot 22 of the secondary blade 20 so that the moment (or leverage action) applied by the drive arm 30 on the secondary blade 20 is decreased gradually. At this time, the secondary blade 20 is driven by the drive arm 30 to pivot toward the main blade 10 to decrease the angle between the anvil 14 of the main blade 10 and the sharp edge 23 of the secondary blade 20.

However, the angle between the anvil 14 of the main blade 10 and the sharp edge 23 of the secondary blade 20 cannot opened to the maximum value, so that the shears cannot be used to shear a plant having a larger thickness. In addition, after the secondary pivot hole 21 of the secondary blade 20, the pivot bore 33 of the drive arm 30 and the linking pivot bore 32 of the drive arm 30 are arranged in a line, the distance between the linking pivot bore 32 of the drive arm 30 and the secondary pivot hole 21 of the secondary blade 20 has the maximum value, so that the moment applied by the drive arm 30 on the secondary blade 20 is limited.

BRIEF SUMMARY OF THE INVENTION

The primary objective of the present invention is to provide a pair of energy saving shears, wherein the linking pivot bores of the drive arms are movable along the adjusting slot of the secondary blade from the lowermost position to the uppermost position of the adjusting slot of the secondary blade

to open the angle between the main working end of the main blade and the secondary working end of the secondary blade to the maximum value.

Another objective of the present invention is to provide a pair of energy saving shears, wherein when the linking pivot bores of the drive arms are movable along the adjusting slot of the secondary blade from the uppermost position to the lowermost position of the adjusting slot of the secondary blade, the distance between the linking pivot bores of the drive arms and the secondary pivot hole of the secondary blade is increased gradually, and the moment applied by the drive arms on the secondary blade is increased gradually, so that the clamping force between the main working end of the main blade and the secondary working end of the secondary blade is also increased gradually so as to shear the plant in an energy saving manner.

A further objective of the present invention is to provide a pair of energy saving shears, wherein the main pivot hole of the main blade or the secondary pivot hole of the secondary blade, the eccentric pivot hole of the main blade or the eccentric pivot bore of each of the drive arms, and the linking pivot bore of each of the drive arms form a triangular force application state, thereby facilitating the user operating the energy saving shears.

Further benefits and advantages of the present invention will become apparent after a careful reading of the detailed description with appropriate reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S)

Fig. 1 is a perspective view of a pair of energy saving shears in accordance with the preferred embodiment of the present invention.

Fig. 2 is an exploded perspective view of the energy saving shears as shown in Fig. 1.

Fig. 3 is a front view of the energy saving shears as shown in Fig. 1.

Fig. 4 is a side view of the energy saving shears as shown in Fig. 1.

Fig. 5 is a schematic operational view of the energy saving shears as shown in Fig. 3.

Fig. 6 is a schematic operational view of the energy saving shears as shown in Fig. 1.

Fig. 7 is a perspective view of a pair of energy saving shears in accordance with another preferred embodiment of the present invention.

Fig. 8 is a perspective view of a pair of conventional shears in accordance with the prior art.

Fig. 9 is an exploded perspective view of the conventional shears as shown in Fig. 8.

Fig. 10 is a front view of the conventional shears as shown in Fig. 8.

Fig. 11 is a schematic operational view of the conventional shears as shown in Fig. 10.

Fig. 12 is a schematic operational view of the conventional shears as shown in Fig. 11.

DETAILED DESCRIPTION OF THE INVENTION

Referring to the drawings and initially to Figs. 1-4, a pair of energy saving shears in accordance with the preferred embodiment of the present invention comprises a main blade 40, a secondary blade 50, and two juxtaposed drive arms 60.

The main blade 40 has an upper portion having a right position formed with a main working end 44, a mediate portion having a middle section formed with a main pivot hole 42 and an eccentric pivot hole 43 located beneath the main pivot hole 42, and a lower portion having a left position formed with a grip portion 41. The eccentric pivot hole 43 of the main blade 40 beneath the main pivot hole 42 is located at a left position of the main pivot hole 42. The main working end 44 of the main blade 40 is preferably an anvil or a sharp edge.

The secondary blade 50 has an upper portion having a left position formed with a secondary working end 54, a mediate portion formed with a secondary pivot hole 51 pivotally connected and co-axial with the main pivot hole 42 of the main blade 40 by a screw 70 and a nut 71, and a lower portion formed with an elongated adjusting slot 52. The secondary blade 50 has a periphery formed with a substantially arc-shaped limit groove 53 located between the secondary pivot hole 51 and the adjusting slot 52. The secondary working end 54 of the secondary blade 50 is preferably an anvil or a sharp edge.

The drive arms 60 are juxtaposed on two opposites sides of the main blade 40 and enclosed around two opposites sides of the secondary blade 50. Each of the drive arms 60 has a substantially Z-shaped profile and has a lower portion formed with a drive grip 61 and an upper portion having a left position formed with a bent portion 65 which has an upper section formed with an eccentric pivot bore 63 pivotally connected and co-axial with the eccentric pivot hole 43 of the main blade 40 by a screw 72 and a nut 73, and a lower section formed with a linking pivot bore 62 pivotally and movably connected with the adjusting slot 52 of the secondary blade 50 by a screw 74 and a nut 75. The screw 74 is slidable in the adjusting slot 52 of the secondary blade 50. The bent portion 65 of each of the drive arms 60 protrudes outwardly toward two sides thereof.

The lower portion of the secondary blade 50 is located at a right portion of the eccentric pivot hole 43 of the main blade 40 and the eccentric pivot bore 63 of each of the drive arms 60 as shown in Figs. 1 and 3. The screw 72 is received in and limited by the limit groove 53 of the secondary blade 50. An annular bushing 55 is mounted on the screw 72 and located between the screw 72 and the limit groove 53 of the secondary blade 50 to reduce the friction between the screw 72 and the limit groove 53 of the secondary blade 50. A stepped annular bushing 64 is mounted on the screw 74 and located between the screw 74 and the adjusting slot 52 of the secondary blade 50 to

reduce the friction between the screw 74 and the adjusting slot 52 of the secondary blade 50.

As shown in Fig. 3, when the main working end 44 of the main blade 40 abuts the secondary working end 54 of the secondary blade 50, the linking pivot bores 62 of the drive arms 60 are located at the lowermost position of the adjusting slot 52 of the secondary blade 50, and the screw 72 is received in and limited by the limit groove 53 of the secondary blade 50.

When the drive grips 61 of the drive arms 60 are movable outwardly relative to the grip portion 41 of the main blade 40, the drive arms 60 are pivoted about the main blade 40, and the linking pivot bores 62 of the drive arms 60 are movable upwardly along the adjusting slot 52 of the secondary blade 50 to approach the main pivot hole 42 of the main blade 40 and the secondary pivot hole 51 of the secondary blade 50 until the linking pivot bores 62 of the drive arms 60 are located at the uppermost position of the adjusting slot 52 of the secondary blade 50 as shown in Fig. 5. At this time, the secondary blade 50 is driven by the drive arms 60 to pivot outwardly relative to the main blade 40 to open the angle between the main working end 44 of the main blade 40 and the secondary working end 54 of the secondary blade 50 to the maximum value.

In operation, referring to Figs. 1-6, when the main working end 44 of the main blade 40 and the secondary working end 54 of the secondary blade 50 clamp a plant, such as a larger branch as shown in Fig. 6, the drive grips 61 of

the drive arms 60 are movable toward the grip portion 41 of the main blade 40, so that the secondary blade 50 is driven by the drive arms 60 to pivot toward the main blade 40, and the main working end 44 of the main blade 40 is movable toward the secondary working end 54 of the secondary blade 50 to shear the plant.

As shown in Fig. 5, when the linking pivot bores 62 of the drive arms 60 are located at the uppermost position of the adjusting slot 52 of the secondary blade 50, the distance between the linking pivot bores 62 of the drive arms 60 and the secondary pivot hole 51 of the secondary blade 50 has the minimum value, so that the moment (or leverage action) applied by the drive arms 60 on the secondary blade 50 has the minimum value.

As shown in Fig. 3, when the linking pivot bores 62 of the drive arms 60 are located at the lowermost position of the adjusting slot 52 of the secondary blade 50, the distance between the linking pivot bores 62 of the drive arms 60 and the secondary pivot hole 51 of the secondary blade 50 has the maximum value, so that the moment (or leverage action) applied by the drive arms 60 on the secondary blade 50 has the maximum value.

Thus, when the linking pivot bores 62 of the drive arms 60 are movable from the position as shown in Fig. 5 to the position as shown in Fig. 3, the distance between the linking pivot bores 62 of the drive arms 60 and the secondary pivot hole 51 of the secondary blade 50 is increased gradually, and the moment applied by the drive arms 60 on the secondary blade 50 is

increased gradually, so that the clamping force between the main working end 44 of the main blade 40 and the secondary working end 54 of the secondary blade 50 is also increased gradually so as to shear the plant in an energy saving manner.

As shown in Figs. 1-6, the main working end 44 of the main blade 40 is an anvil, and the secondary working end 54 of the secondary blade 50 is a sharp edge.

As shown in Fig. 7, each of the main working end 44A of the main blade 40A and the secondary working end 54A of the secondary blade 50A is a sharp edge.

Accordingly, the linking pivot bores 62 of the drive arms 60 are movable along the adjusting slot 52 of the secondary blade 50 from the lowermost position to the uppermost position of the adjusting slot 52 of the secondary blade 50 to open the angle between the main working end 44 of the main blade 40 and the secondary working end 54 of the secondary blade 50 to the maximum value. In addition, when the linking pivot bores 62 of the drive arms 60 are movable along the adjusting slot 52 of the secondary blade 50 from the uppermost position to the lowermost position of the adjusting slot 52 of the secondary blade 50, the distance between the linking pivot bores 62 of the drive arms 60 and the secondary pivot hole 51 of the secondary blade 50 is increased gradually, and the moment applied by the drive arms 60 on the secondary blade 50 is increased gradually, so that the clamping force between

the main working end 44 of the main blade 40 and the secondary working end 54 of the secondary blade 50 is also increased gradually so as to shear the plant in an energy saving manner. Further, the main pivot hole 42 of the main blade 40 or the secondary pivot hole 51 of the secondary blade 50, the eccentric pivot hole 43 of the main blade 40 or the eccentric pivot bore 63 of each of the drive arms 60, and the linking pivot bore 62 of each of the drive arms 60 form a triangular force application state, thereby facilitating the user operating the energy saving shears.

Although the invention has been explained in relation to its preferred embodiment(s) as mentioned above, it is to be understood that many other possible modifications and variations can be made without departing from the scope of the present invention. It is, therefore, contemplated that the appended claim or claims will cover such modifications and variations that fall within the true scope of the invention.

CLAIMS

1. A pair of energy saving shears, comprising a main blade, a secondary blade, and two juxtaposed drive arms, wherein:

the main blade has an upper portion having a right position formed with a main working end, a mediate portion having a middle section formed with a main pivot hole and an eccentric pivot hole located beneath the main pivot hole, and a lower portion having a left position formed with a grip portion;

the secondary blade has an upper portion having a left position formed with a secondary working end, a mediate portion formed with a secondary pivot hole pivotally connected with the main pivot hole of the main blade, and a lower portion formed with an elongated adjusting slot;

each of the drive arms has a lower portion formed with a drive grip and an upper portion having a left position formed with a bent portion which has an upper section formed with an eccentric pivot bore pivotally connected with the eccentric pivot hole of the main blade, and a lower section formed with a linking pivot bore pivotally and movably connected with the adjusting slot of the secondary blade.

2. The energy saving shears in accordance with claim 1, wherein the secondary blade has a periphery formed with a limit groove located between the secondary pivot hole and the adjusting slot.

3. The energy saving shears in accordance with claim 1, wherein the drive arms are juxtaposed on two opposites sides of the main blade and enclosed around two opposites sides of the secondary blade.

4. The energy saving shears in accordance with claim 1, wherein each of the drive arms has a substantially Z-shaped profile.

5. The energy saving shears in accordance with claim 2, wherein the eccentric pivot bore of each of the drive arms is pivotally connected with the eccentric pivot hole of the main blade by a screw and a nut.

6. The energy saving shears in accordance with claim 5, further comprising an annular bushing mounted on the screw and located between the screw and the limit groove of the secondary blade to reduce the friction between the screw and the limit groove of the secondary blade.

7. The energy saving shears in accordance with claim 1, wherein the linking pivot bore of each of the drive arms is pivotally connected with the adjusting slot of the secondary blade by a screw and a nut.

8. The energy saving shears in accordance with claim 7, further comprising a stepped annular bushing mounted on the screw and located between the screw and the adjusting slot of the secondary blade to reduce the friction between the screw and the adjusting slot of the secondary blade.

9. The energy saving shears in accordance with claim 8, wherein the screw is slidable in the adjusting slot of the secondary blade.

10. The energy saving shears in accordance with claim 1, wherein the eccentric pivot hole of the main blade beneath the main pivot hole is located at a left position of the main pivot hole.

11. The energy saving shears in accordance with claim 1, wherein the bent portion of each of the drive arms protrudes outwardly toward two sides thereof.

12. The energy saving shears in accordance with claim 1, wherein the lower portion of the secondary blade is located at a right portion of the eccentric pivot hole of the main blade and the eccentric pivot bore of each of the drive arms.

13. The energy saving shears in accordance with claim 5, wherein the screw is received in and limited by the limit groove of the secondary blade when the main working end of the main blade abuts the secondary working end of the secondary blade, and the linking pivot bores of the drive arms are located at the lowermost position of the adjusting slot of the secondary blade.

14. The energy saving shears in accordance with claim 1, wherein when the drive grips of the drive arms are movable outwardly relative to the grip portion of the main blade, the drive arms are pivoted about the main blade, and the linking pivot bores of the drive arms are movable upwardly along the adjusting slot of the secondary blade to approach the main pivot hole of the main blade and the secondary pivot hole of the secondary blade to reach a

position where the linking pivot bores of the drive arms are located at the uppermost position of the adjusting slot of the secondary blade.

15. The energy saving shears in accordance with claim 1, wherein a distance between the linking pivot bores of the drive arms and the secondary pivot hole of the secondary blade has the minimum value when the linking pivot bores of the drive arms are located at the uppermost position of the adjusting slot of the secondary blade.

16. The energy saving shears in accordance with claim 15, wherein the distance between the linking pivot bores of the drive arms and the secondary pivot hole of the secondary blade has the maximum value when the linking pivot bores of the drive arms are located at the lowermost position of the adjusting slot of the secondary blade.

17. The energy saving shears in accordance with claim 16, wherein when the linking pivot bores of the drive arms are movable along the adjusting slot of the secondary blade from the uppermost position to the lowermost position of the adjusting slot of the secondary blade, the distance between the linking pivot bores of the drive arms and the secondary pivot hole of the secondary blade is increased gradually.

18. The energy saving shears in accordance with claim 1, wherein the secondary pivot hole of the secondary blade is co-axial with the main pivot hole of the main blade.

19. The energy saving shears in accordance with claim 1, wherein the eccentric pivot bore of each of the drive arms is co-axial with the eccentric pivot hole of the main blade.

20. The energy saving shears in accordance with claim 2, wherein the limit groove of the secondary blade is substantially arc-shaped.

21. A pair of energy saving shears substantially as hereinbefore described with reference to and as shown in Figures 1 to 7 of the accompanying drawings.

Amendments to the claims have been filed as follows

1. A pair of energy saving shears, comprising a main blade, a secondary blade, and two juxtaposed drive arms, wherein:

the main blade has a first end portion formed with a main working end, a mediate portion having a middle section formed with a main pivot hole and an eccentric pivot hole spaced from the main pivot hole, and a second end portion that acts as a grip portion;

the secondary blade has a first end portion formed with a secondary working end, a mediate portion formed with a secondary pivot hole pivotally connected with the main pivot hole of the main blade, and a second end portion formed with an elongated adjusting slot;

each of the drive arms has a first end portion formed with a drive grip, a second end portion formed with an eccentric pivot bore pivotally connected with the eccentric pivot hole of the main blade, and a middle section formed with a linking pivot bore pivotally and movably connected with the adjusting slot of the secondary blade.

2. The energy saving shears in accordance with claim 1, wherein the secondary blade has a periphery formed with a limit groove located between the secondary pivot hole and the adjusting slot.

3. The energy saving shears in accordance with claim 1, wherein the drive arms are juxtaposed on two opposites sides of the main blade and enclosed around two opposites sides of the secondary blade.

4. The energy saving shears in accordance with claim 1, wherein each of the drive arms has a substantially Z-shaped profile.

5. The energy saving shears in accordance with claim 2, wherein the eccentric pivot bore of each of the drive arms is pivotally connected with the eccentric pivot hole of the main blade by a screw and a nut.

6. The energy saving shears in accordance with claim 5, further comprising an annular bushing mounted on the screw and located between the screw and the limit groove of the secondary blade to reduce the friction between the screw and the limit groove of the secondary blade.

7. The energy saving shears in accordance with claim 1, wherein the linking pivot bore of each of the drive arms is pivotally connected with the adjusting slot of the secondary blade by a screw and a nut.

8. The energy saving shears in accordance with claim 7, further comprising a stepped annular bushing mounted on the screw and located between the screw and the adjusting slot of the secondary blade to reduce the friction between the screw and the adjusting slot of the secondary blade.

9. The energy saving shears in accordance with claim 8, wherein the screw is slidable in the adjusting slot of the secondary blade.

10. The energy saving shears in accordance with claim 1, wherein the eccentric pivot hole of the main blade beneath the main pivot hole is located at a left position of the main pivot hole.

11. The energy saving shears in accordance with claim 1, wherein the bent portion of each of the drive arms protrudes outwardly toward two sides thereof.

12. The energy saving shears in accordance with claim 1, wherein the second end portion of the secondary blade is offset from the eccentric pivot hole of the main blade and the eccentric pivot bore of each of the drive arms.

13. The energy saving shears in accordance with claim 5, wherein the screw is received in and limited by the limit groove of the secondary blade when the main working end of the main blade abuts the secondary working end of the secondary blade, and the linking pivot bores of the drive arms are located at an end of the adjusting slot of the secondary blade.

14. The energy saving shears in accordance with claim 1, wherein when the drive grips of the drive arms are movable outwardly relative to the grip portion of the main blade, the drive arms are pivoted about the main blade, and the linking pivot bores of the drive arms are movable along the adjusting slot of the secondary blade to approach the main pivot hole of the main blade and the secondary pivot hole of the secondary blade to reach a position where the linking pivot bores of the drive arms are located at an end of the adjusting slot of the secondary blade.

15. The energy saving shears in accordance with claim 1, wherein the distance between the linking pivot bores of the drive arms and the secondary pivot hole of the secondary blade has a minimum value when the linking pivot

bores of the drive arms are located at an end of the adjusting slot of the secondary blade.

16. The energy saving shears in accordance with claim 15, wherein the distance between the linking pivot bores of the drive arms and the secondary pivot hole of the secondary blade has a maximum value when the linking pivot bores of the drive arms are located at the other end of the adjusting slot of the secondary blade.

17. The energy saving shears in accordance with claim 16, wherein when the linking pivot bores of the drive arms are movable along the adjusting slot of the secondary blade from the said end to the other end of the adjusting slot of the secondary blade, the distance between the linking pivot bores of the drive arms and the secondary pivot hole of the secondary blade is increased gradually.

18. The energy saving shears in accordance with claim 1, wherein the secondary pivot hole of the secondary blade is co-axial with the main pivot hole of the main blade.

19. The energy saving shears in accordance with claim 1, wherein the eccentric pivot bore of each of the drive arms is co-axial with the eccentric pivot hole of the main blade.

20. The energy saving shears in accordance with claim 2, wherein the limit groove of the secondary blade is substantially arc-shaped.

21. A pair of energy saving shears substantially as hereinbefore described with reference to and as shown in Figures 1 to 7 of the accompanying drawings.

Application No: GB0625216.7 **Examiner:** Mr Robert Black

Claims searched: 1-21 **Date of search:** 23 January 2007

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
A	1	CA 2540960 A1 (MIL3) see especially the abstract, figures and page 23 lines 1-9
A	1	EP 0074578 A1 (WOLF) see especially WPI abstract 1983-E1535K, the EPODOC abstract and the figure

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category	P	Document published on or after the declared priority date but before the filing date of this invention
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^{X} :

B4B

Worldwide search of patent documents classified in the following areas of the IPC

A01G; B26B

The following online and other databases have been used in the preparation of this search report

EPODOC; WPI