United States Patent

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[31] **17,962/68**

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[54] **PLIER-TYPE CUTTING TOOLS**
2 Claims, 1 Drawing Fig.

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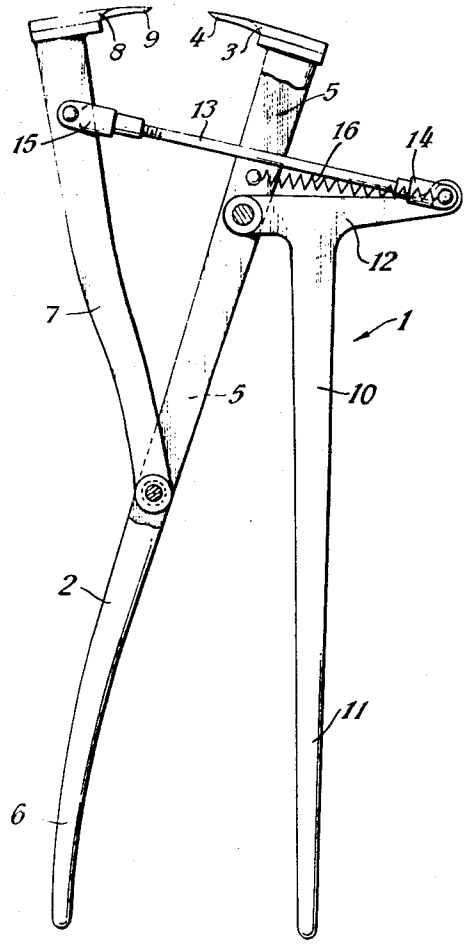
ABSTRACT: A plier-type cutting or gripping tool having first and second arms-carrying operating heads can be operated one-handed by gripping an operating arm and the first arm and pressing the same together; the mechanical advantage of the tool increasing as the operating heads approach one another.



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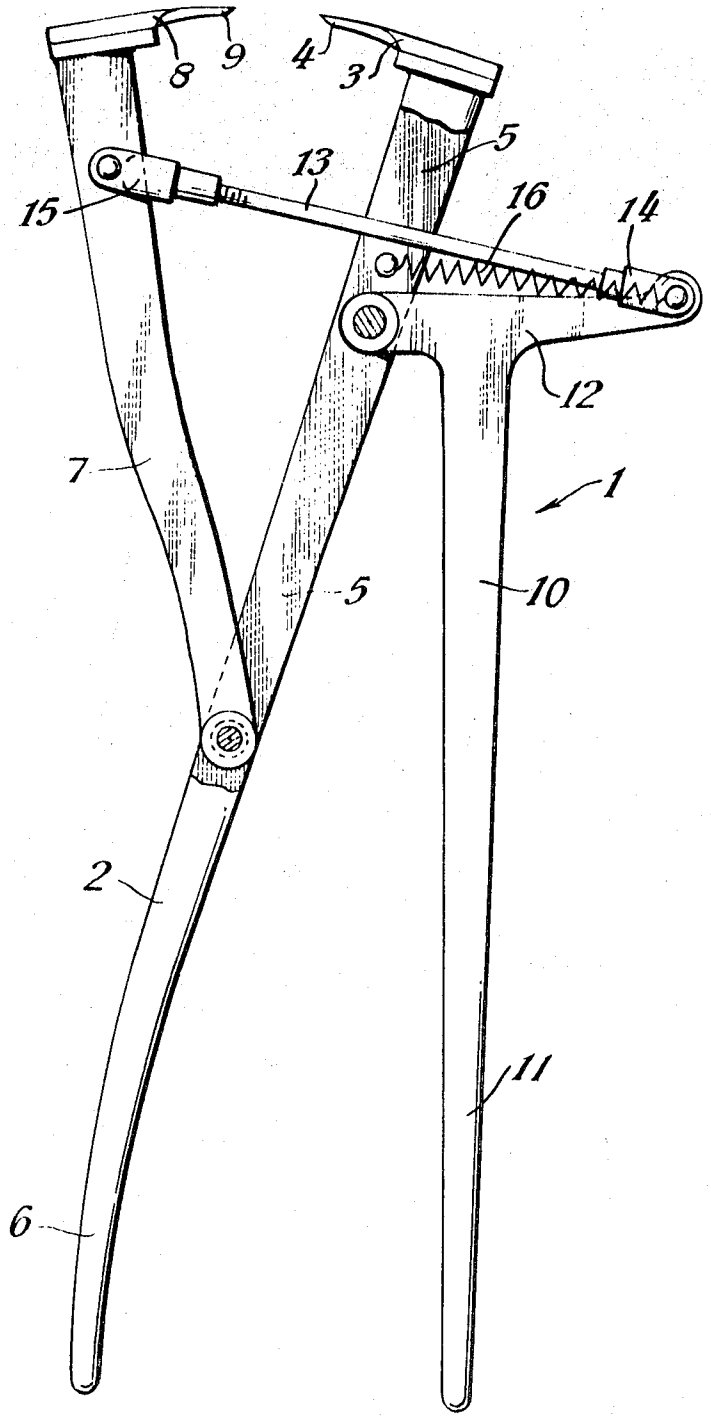

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PLIER-TYPE CUTTING TOOLS

The present invention relates to plier-type tools having a pair of operating heads which are movable relative to one another so as to grip or cut an article disposed between said heads. In particular, the invention relates to a cutting tool for veterinary use which can be operated one-handedly.

According to the present invention, there is provided a gripping or cutting tool comprising a first arm carrying an operating head; a second arm carrying a second operating head and pivotally connected to the first arm; lever means pivotally connected to both of said arms for moving the second arm relative to the first arm between an inoperative position and an operative position so as to grip or cut an article disposed between the operating heads, said lever means comprising an operating arm which moves in the same sense as the second arm with increasing angular velocity ratio between said operating and second arms as the second arm is moved from its inoperative to its operative position, the arrangement being such that the tool can be operated by one hand of an operator by gripping the first arm and the operating arm and pressing the same together by increasing the operator's grip thereby causing the lever means to move the second arm between said inoperative and operative positions.

By the term "in the same sense" as used above and elsewhere in this specification, we means that, if one of said arms is moved clockwise (or anticlockwise), the other of said arms is moved clockwise (or anticlockwise respectively).

The lever means preferably comprises a lever pivotally attached to the first arm between the second arm and the first operating head, and a connecting rod pivotally attached to the second arm between the first arm and the second operating head and pivotally attached to the lever at a point spaced from the first arm. The operating arm may extend laterally from the lever between the first arm and the connecting rod and preferably is disposed on the opposite side of the first arm to the second operating head.

Spring means may be provided to bias the second arm into its inoperative position and thereby facilitate easy return of the second arm from its operative to its inoperative position. Suitably, said spring means may comprise a helical tension spring operating between the first arm and the lever means.

The operating heads may be detachably mounted on the first and second arms so as to facilitate the replacement of said heads. The operating heads may be jaws formed so as to abut of substantially abut to provide pincer or crimping action. However, the tool has been primarily designed as a cutting tool intended for the removal of overgrowth from the feet of farm animals, for example horses and cattle, and accordingly the operating heads of such a cutting tool have cutting edges which abut to provide cutting action. The operating heads of such a cutting tool may have chisellike jaws extending normally from the end of the relevant arm towards the other arm. These chisellike jaws may be arcuate forming an arc of a circle centered on the point of attachment of the second arm to the first arm.

The following is a description by way of example only and with reference to the accompanying FIGURE of a veterinary cutting tool according to the present invention.

The FIGURE is a side view of a veterinary cutting tool generally indicated at 1 and comprising a first elongate arm 2 having an arcuate jaw 3 extending forwardly from its upper end. THis jaw 3 extends substantially normally to the first arm and terminates at its forward end in a chisellike-cutting edge 4. The arm 2 has an elongate slot 5 extending longitudinally therethrough from the rearward to the forward face and the arm terminates below said slot 5 in a handle portion 6 shaped to facilitate gripping of the tool by an operator.

A second elongate arm 7 is pivotally mounted for rotational movement in a forward-rearward direction at its lower end in the slot 5 at a point towards the lower end of this slot. The arm 7 has an arcuate jaw 8 extending rearwardly from its upper end, which jaw extends substantially normally to said arm and terminates at its rearward end in a chisellike-cutting edge 9, which cutting edge has convergent sides in the manner of a carpenter's mortise chisel. The arrangement of the jaws 3 and 8 is such that said jaws both constitute arcs of a circle having its center at the point of attachment of the arm 7 to the arm 2.

A T-shaped lever 10 having an elongate shaft portion 11 and a crosspiece portion 12 is pivotally mounted for rotatable movement in a forward-rearward direction at the forward end of the crosspiece 12 in the slot 5 at a point spaced upwardly from the point of attachment of arm 7, the arrangement being such that the shaft portion 11 extends downwardly when the lever 10 extends rearwardly of arm 2.

An elongate connecting rod 13 is formed at its first end with a yoke 14 which fits about the rearward end of the crosspiece 12 and to which this crosspiece 12 is pivotally connected for relative rotational movement in a forward-rearward direction. The connecting rod 13 extends forwardly through the slot 5 and is externally threaded at its forward end. This forward end is received in a correspondingly internally threaded bore in a rearward portion of a yoke member 15, which yoke member 15 accommodates the arm 7 between its forward limbs and is pivotally connected to said arm 7 for rotational movement in the forward-rearward direction. The provision of the threaded cooperating portions of the connecting rod 13 and of the yoke member 15 enables the effective length of the connecting rod 13 to be varied slightly to allow for resharpening of the cutting edges 4 and 9. The relative arrangement of the lever 11 and connecting rod 13 is such that, when cutting edges 4 and 9 abut, the connecting rod 13 is substantially parallel to the crosspiece 12.

The second arm 7 is biased into a position where cutting edges 4 and 9 are spaced apart by means of a helical tension spring 16 acting between the arm 2 at a point above the pivotal mounting of the lever 10 and said lever 10 at the rearward end of the crosspiece 12.

In operation, the handle portion 6 and the shaft portion 11 are held in a hand of an operator of the tool. Tightening of the grip by the operator causes the said handle portion 6 and shaft portion 11 to move together thus causing rotation of the lever 10 about the pivotal mounting thereof, which movement in turn causes the connecting rod 13 to draw arm 7 about is pivotal mounting. The arrangement of the lever 10 and the connecting rod 13 is such that, as the shaft portion 11 is drawn nearer the handle portion 6, the ratio of angular movement of said shaft portion to angular movement of the second arm increases. This permits rapid initial approach of the cutting edges 4 and 9 and increased leverage as the cutting edges approach one another. This is desirable since the structure of the horn in the feet of horses etc. is such that its hardness increases markedly towards the outer surface of the horn. The mechanical advantage provided by the tool therefore matches the resistance offered by the horn at all points during the travel of the jaws.

Movement of the shaft 11 towards the handle portion 6 will continue until the cutting edges 4, 9 abut, which position corresponds to the position achieved when overgrowth of an ungulate, which overgrowth has been located between said jaws, has been severed. Release of his grip by the operator permits the spring 16 to move the lever 10 such that the shaft 11 moves away from the first arm and the jaws of the tool correspondingly open.

I claim:

1. A hand tool having a pair of arms hinged together at a pivot, each of said arms carrying one of a pair of tool heads, one of said arms having a rigid extension beyond said pivot forming the first of a pair of handles; a pair of lever arms pivoted together at an acute angle and each pivoted to a respective one of said pair of arms, one of said lever arms being adjustable in length, the other of said lever arms having the second of said pair of handles rigidly attached thereto; whereby gripping together of said pair of handles closes said tool heads together and closes the angle between said lever arms thereby providing increasing mechanical advantage as the tool heads close.

2. A hand tool for single-handed operation, having a pair of tool heads which are closed together by gripping a pair of handles and opened by releasing said handles, comprising

a first arm carrying a first of said tool heads and having a handle portion constituting one of said pair of handles;

a second arm carrying the second of said tool heads and pivotally attached to the first arm between the handle portion thereof and the first tool head;

a lever pivotally attached to the first arm between the pivotal connection to the second arm and the first operating head, said lever being disposed on the side of the first arm opposite to the second arm;

a connecting rod pivotally attached to the second arm between the pivotal connection of the first arm and the second tool head and pivotally attached at an acute angle to the lever at a point spaced from the first arm so that rotation of the said lever and rod to close the angle therebetween closes said tool heads together;

a bias spring mounted between the first arm and the said point of connection of the said lever and rod acting to open the angle between the said lever and rod; and

an operating arm extending from the lever between the pivotal connections of the first arm and of the connecting rod to constitute the second of said pair of handles.

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