Oct. 2, 1945. E. C. NEAL 2,385,835

LEVER CONSTRUCTION

Filed Jan. 31, 1944 4 Sheets-Sheet 1

Fig. 1

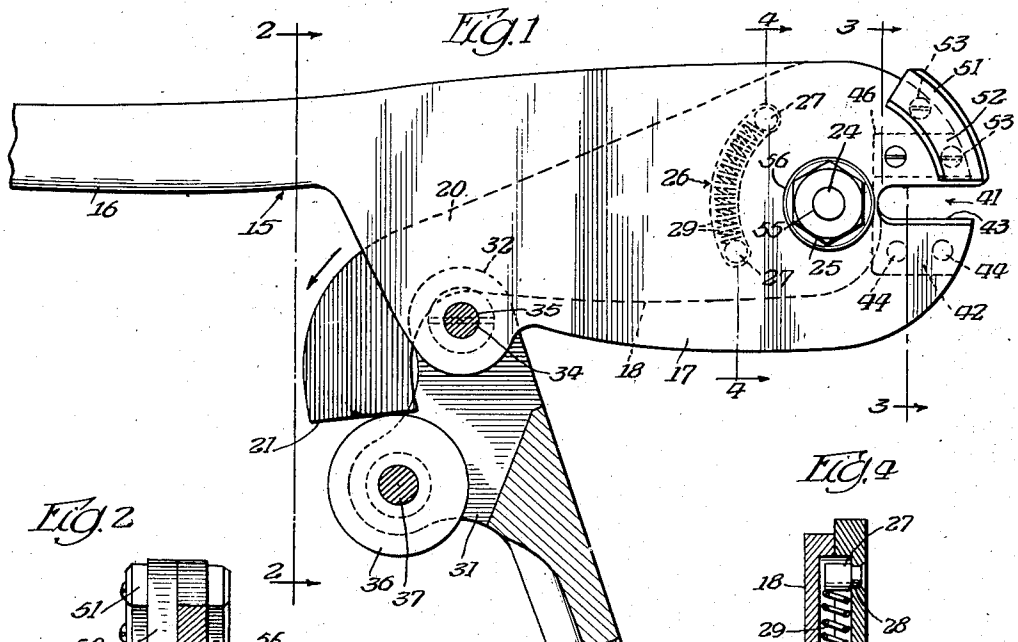


Fig. 4

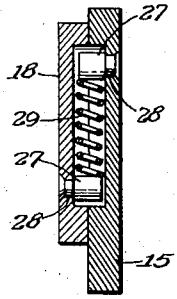


Fig. 2

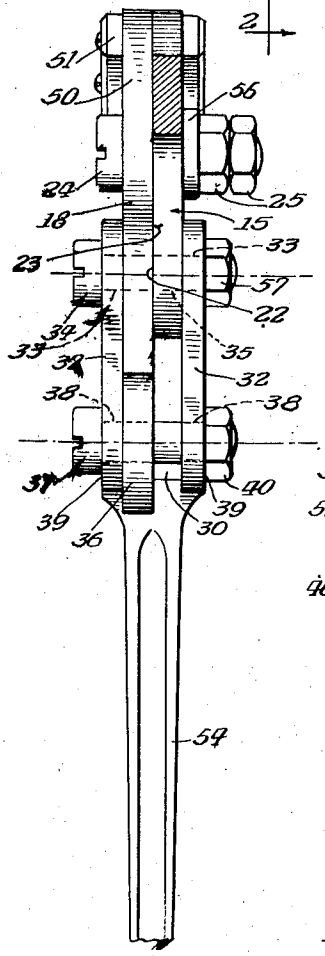
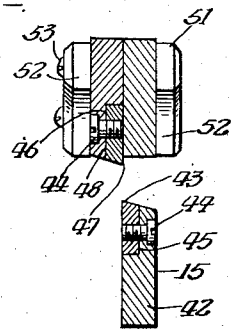
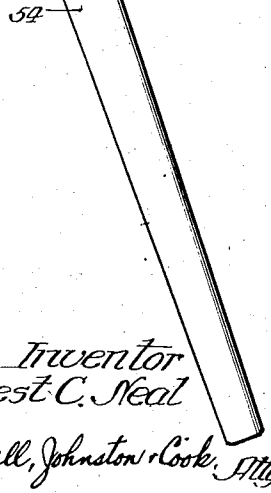


Fig. 3





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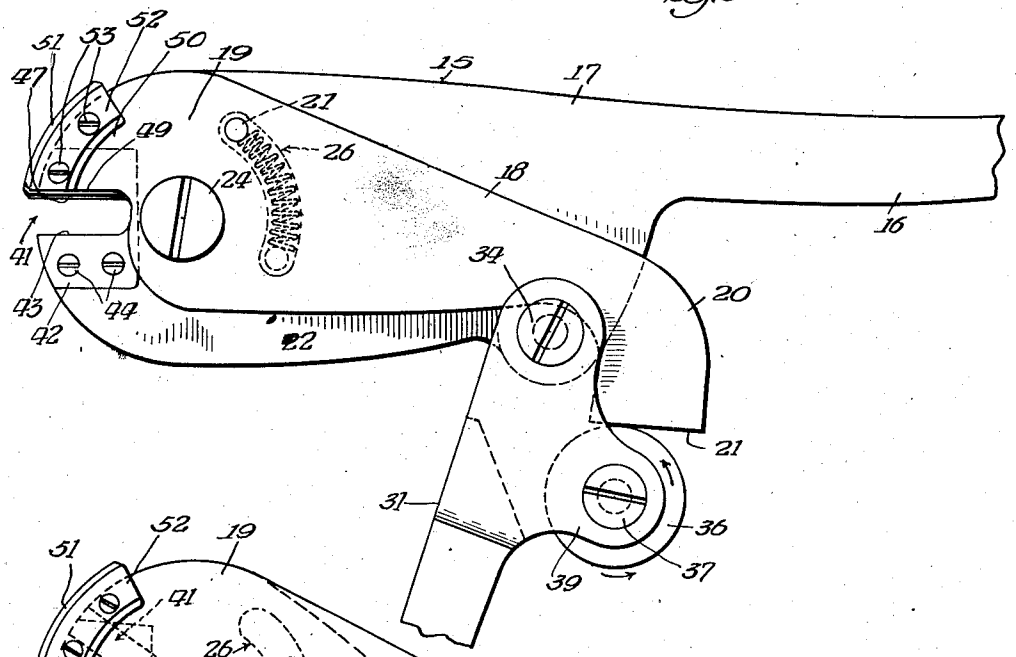
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Oct. 2, 1945. E. C. NEAL 2,385,835

LEVER CONSTRUCTION

Filed Jan. 31, 1944 4 Sheets-Sheet 2

Fig. 5



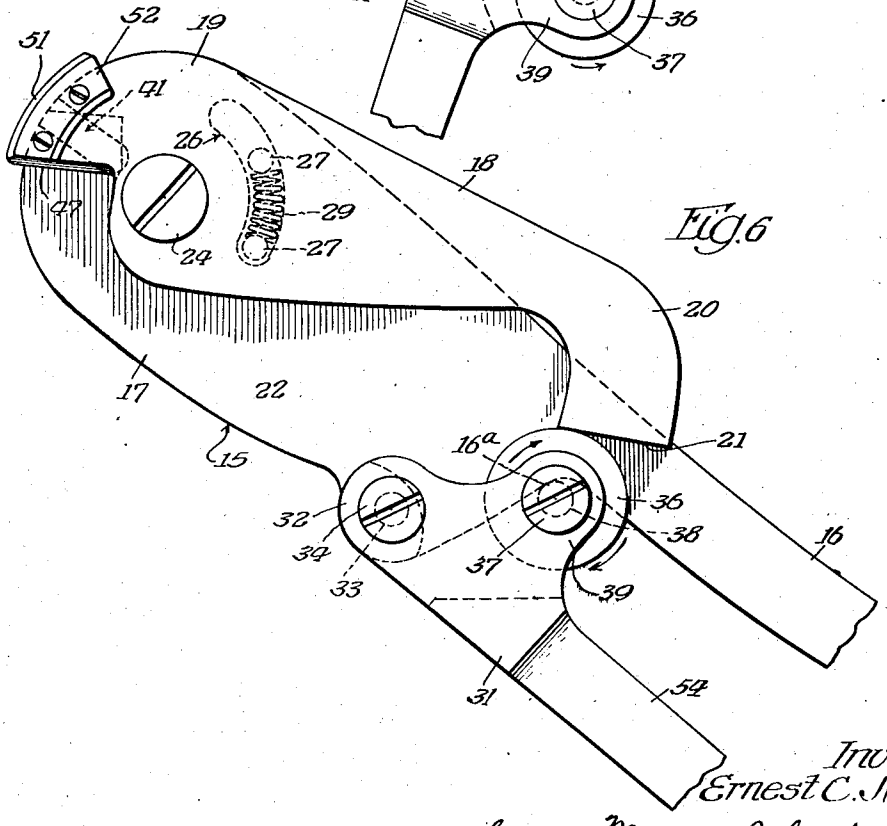


Fig. 6

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Oct. 2, 1945. E. C. NEAL 2,385,835

LEVER CONSTRUCTION

Filed Jan. 31, 1944 4 Sheets-Sheet 3

Fig. 7

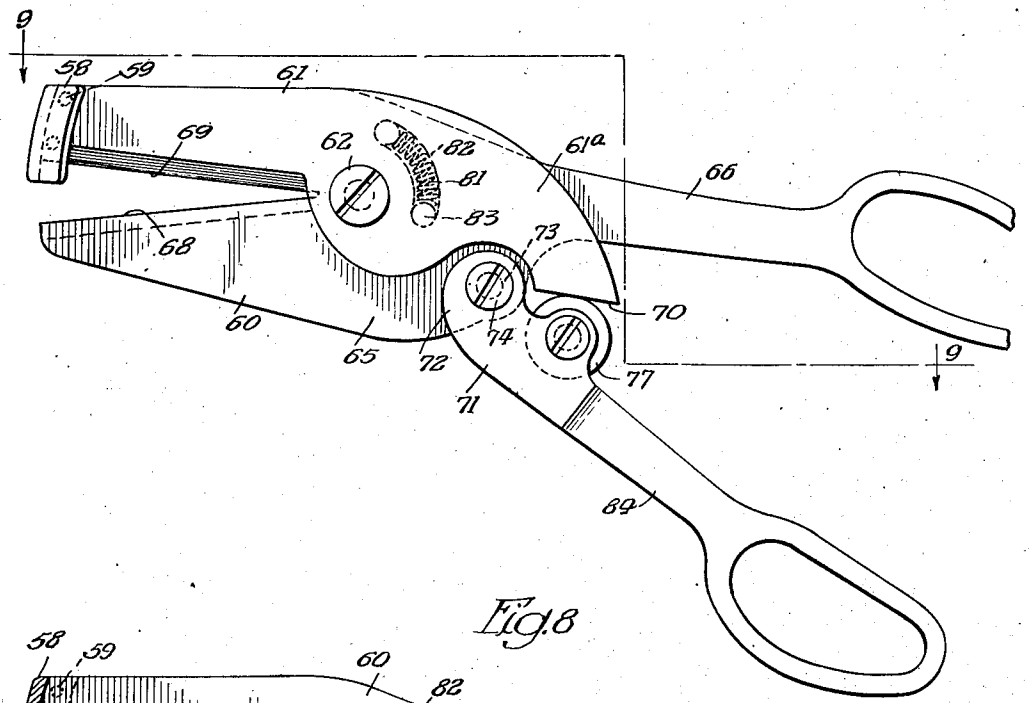


Fig. 8

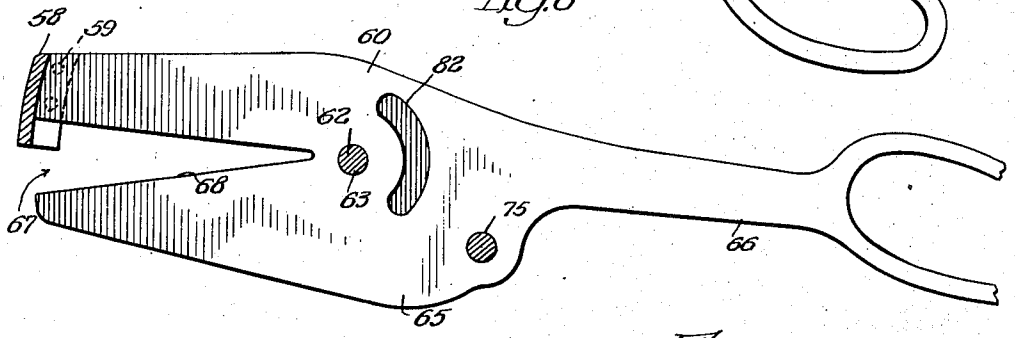


Fig. 9

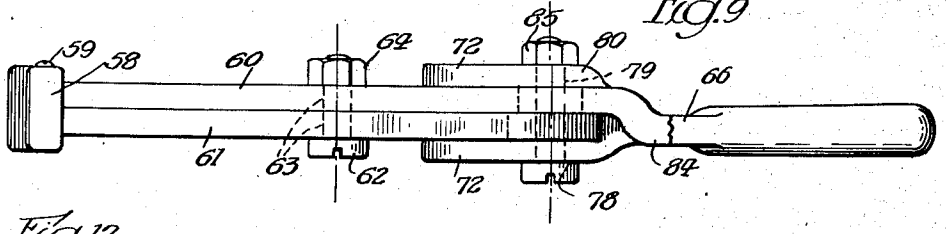
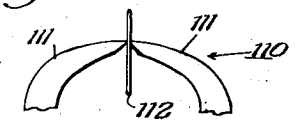


Fig. 12



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Oct. 2, 1945. E. C. NEAL 2,385,835

LEVER CONSTRUCTION

Filed Jan. 31, 1944 4 Sheets-Sheet 4

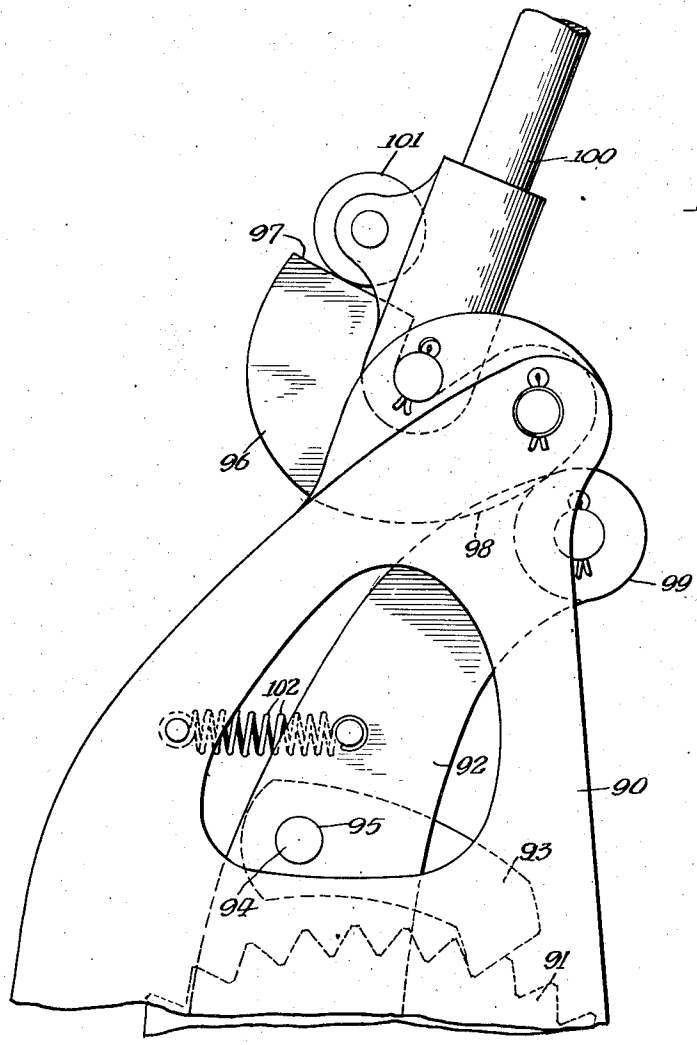


FIG. 10

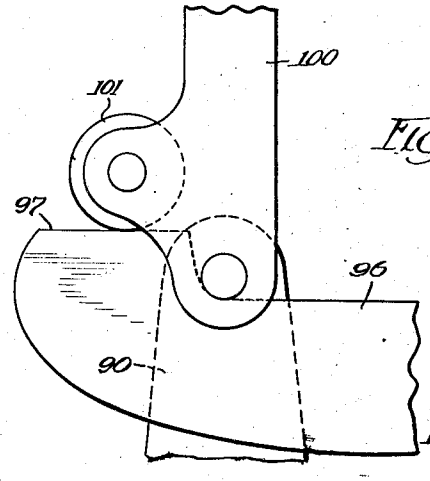


FIG. 11

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2,385,835

UNITED STATES PATENT OFFICE

2,385,835

LEVER CONSTRUCTION

Ernest C. Neal, Chicago, Ill., assignor of one-half to Elmer Brandell, Chicago, Ill.

Application January 31, 1944, Serial No. 520,400

10 Claims. (Cl. 30—250)

This invention relates in general to a lever, and more particularly to a compound lever providing for the movement of a lever about a fulcrum by the application of force to a portion of the lever through the medium of an auxiliary lever member and associated means having moving contact with a surface of the lever member.

An object of this invention is to provide compact, safe, simple and efficient means providing for relative movement of a lever about a fulcrum by the mechanical application of force to a portion of the lever through the medium of an auxiliary lever and cooperating means on the said portion of the lever and the auxiliary lever.

A further object of the invention is to provide a compound lever construction in which relative movement of a lever about a fulcrum is accomplished by the mechanical application of force to a portion of the lever through the medium of roller means having rolling contact with that portion of the lever, first in one direction and then in an opposite direction, in a predetermined ratio and with a minimum of frictional loss.

Another object of the invention is to provide a lever construction including a plurality of lever members arranged for relative pivotal movement wherein force is applied to one of the members through the medium of an auxiliary lever member pivotally mounted on one of the first mentioned members in adjustable angular spaced relation with the other of said members and having roller means arranged thereon for rolling engagement with an adjacent surface of the said other member so that upon the application of force to the said auxiliary lever member in a predetermined direction the roller means will have rolling contact with the said surface, first in one direction and then in an opposite direction, to cause predetermined relative movement of the said first mentioned members.

A further object of the invention is to provide a lever construction in which a holding member and a lever member are arranged for relative pivotal movement in parallel planes and including spring means interconnecting the members and arranged to operate normally to urge the lever member in a predetermined direction in relation to the holding member, an auxiliary member pivotally mounted on the holding member in adjustable angular spaced relation with the lever member, and roller means arranged on the auxiliary lever member for rolling engagement with an adjacent surface of the lever member, the arrangement being such that upon the application of force in converging directions to corresponding portions of the holding member and the auxiliary lever member, that force will be translated by rolling contact between the roller means and the lever member first in one direction and then in an opposite direction to the lever member to cause relative movement of the lever member and the holding member.

Other objects of the invention include the application of the stated principle of operation of the novel lever construction to specific devices including a rod or cable cutter, sheet metal shears, and a ratchet; the provision of novel means for maintaining parts of such devices in spaced relation; the provision of novel safety means in such devices; and the provision of novel cutting means, and means for mounting, demounting, and securing said cutting means in position on certain of such devices. It will be understood, of course, that the principle of the invention is not limited in its application to such devices but is applicable to numerous other devices. Additional objects, advantages and capabilities inherent in this invention will become readily apparent from the description thereof which follows.

This invention further resides in the combination, construction and arrangement of parts illustrated in the accompanying drawings, and while there is shown therein preferred embodiments of the invention, it is to be understood that the same are susceptible of modification and change without departing from the spirit of the invention.

The accompanying drawings illustrate a selected embodiment of the invention, and the views therein are as follows:

Fig. 1 is a fragmentary side view of a device embodying the invention, partially in section, with the parts in initial operating or "zero" position;

Fig. 2 is a sectional view along the line 2—2 of Fig. 1;

Fig. 3 is a sectional view along the line 3—3 of Fig. 1;

Fig. 4 is a sectional view along the line 4—4 of Fig. 1;

Fig. 5 is a fragmentary side view of the device shown in Fig. 1, partially in section looking in the opposite direction, with arrows indicating the direction of movement of the roller means in the beginning of the operation of the device;

Fig. 6 is a fragmentary side view of the device shown in Fig. 5, partially in section, showing the parts in position upon the conclusion of the operation of the device with arrows indicating the

direction of movement of the roller means immediately preceding;

Fig. 7 is a fragmentary side view of another form of device embodying the invention;

Fig. 8 is a detail view, partially in section, of a part of the device shown in Fig. 7;

Fig. 9 is a sectional view along the line 9—9 of Fig. 7;

Fig. 10 is a fragmentary side view, partially in section, of another form of device embodying the invention;

Fig. 11 is a detail view of parts of a device shown in Fig. 10, but in modified form; and

Fig. 12 is a fragmentary view of another form of device to which the invention may be applied.

The particular form of device herein disclosed for the purpose of illustrating the invention comprises an elongated lever member 15 having a handle or gripping portion 16 and a portion 17 of increased width, and a relatively shorter lever member 18 having a portion 19 of increased width and a curved neck 20 with an elongated bearing surface 21. The members 15 and 18 are arranged in juxtaposition, as shown in Fig. 2, and have corresponding, adjacent flat surfaces 22 and 23. The members 15 and 18 are interconnected by means of a screw 24 received in corresponding openings 55 in the members 15 and 18 and forming a common pivot having an axis normal to the surfaces 22 and 23 at a point disposed in spaced relation with their corresponding end portions. The screw 24 is secured in position by means of the nuts 25. A collar or washer 56 may also be provided on the screw 24 intermediate the nuts 25 and the adjacent surfaces of the lever member. The members 15 and 18 are freely pivotable in parallel relation about the axis of the screw 24.

The members 15 and 18 have corresponding generally arcuate cut-away portions 26 in the surfaces 22 and 23 and are provided with stops 27 arranged in opposite ends of those cut-away portions (in the position shown in Fig. 5) and in the form of pins having enlarged heads and received in openings 28, which are provided in the members in angular spaced relation with the axis of the screw 24. The cut-away portions 26 are arranged to receive a spring or tension member 29 which is positioned intermediate the stops 27 and acts normally to urge the neck portion 20 of the member 18 in the direction of the arrow in Fig. 1. A stop 30 is provided on the member 15 to engage a co-operating portion of the member 18 for limiting its movement in response to the action of the spring 29.

An auxiliary lever member 31 is pivotally mounted adjacent one end thereof on the member 15 and, for this purpose, is provided with spaced ears 32 at one end thereof and having coaxial openings 33 therein for receiving a screw 34 which is also received in a corresponding opening 35 in the member 15. The screw 34 forms a fulcrum connection for the lever member 31 on the member 15, said screw having an axis disposed in spaced relation with respect to the axis of the common pivot screw 24 and is adjustably secured in position by means of a nut 57 which bears upon an adjacent surface of one of the ears 32.

The auxiliary lever member 31 carries a roller 36 which is rotatably mounted on a screw 37 received in coaxial openings 38 in the spaced ears 39 provided on the member 31 for rotation in the plane of pivotal movement of the member 18. The screw 37 is adjustably secured in position by means of a nut 40, which bears upon an adjacent surface of one of the ears 39, and has an axis disposed in spaced relation with respect to the axis of the fulcrum connection screw 34. The member 31 is provided with a handle or gripping portion 54 corresponding with the portion 16 of the member 15.

The arrangement and configuration of the described parts is such that normally the periphery of the roller 36 will contact and ride upon the bearing surface 21 of the lever member 18 during the operative movement of the lever 54 at the commencement of a power stroke, the parts generally will be in the position indicated in Figs. 1, 2 and 5 of the drawings, and upon the application of force to the handle or gripping portion 54 of the member 31, the member 15 being maintained in position to cause that portion of the member 31 to move pivotally about the axis of the screw 37 in a direction toward the handle or gripping portion 16 of the member 15, the periphery of the roller 36 will have rolling contact with the surface 21 of the member 18, first in one direction, as indicated by the arrows in Fig. 5, and then in the opposite direction, as indicated by the arrows in Fig. 6, to cause pivotal movement of the member 18 about the axis of the screw 24 until the parts take the position shown in Fig. 6. It will be noted that the neck portion 20 of the member 18 extends on the side of the fulcrum pivot 34 remote from the common pivot 24, that is to say, the surface 21 is spaced from the common pivot 24 a distance greater than the spacement of the common and fulcrum pivots 24 and 34. During the initial portions of the power stroke, the roller 36 will roll along the surface 21 in a direction outwardly of the common pivot 24 until the lever 54 reaches a position in which the axes of the pivot pins 24, 34 and 37 are in alignment. During the latter portions of the power stroke, after the handle passes the aligned pivot pin position, the member 36 will roll on the surface 21 in a reverse direction inwardly toward the common pivot 24. The construction and arrangement of the leverage thus provides for maximum power multiplication during medial portions of the power stroke and provides a most effective power multiplying mechanism, especially well adapted for use in cutters, clippers, shears and the like. Upon withdrawal of the applied force, the spring 29, which is compressed as shown in Fig. 6, will act to return the parts to the position shown in Fig. 5.

The relative dimensions and arrangement of the parts of the lever construction thus described will, of course, depend on the particular purpose for which it is employed and the requisite delivery of power, and will be varied according to well known principles of mechanics to meet particular needs. As shown, provision is made for pivotal movement of the auxiliary lever member 31 through an angle of approximately 90 degrees, during which movement the roller 36 contacts the surface 21 to cause pivotal movement of the lever 18 through an angle of approximately 35 degrees. In this connection, the screw 37 serves as a stop which engages the portion 16a of the member 15 to limit movement of the member 31.

In Figs. 1 to 6 inclusive, the invention is applied to a cutting device suitable for cutting rods, cables and the like. For this purpose, cutting means is provided on the members 15 and 18 in angular spaced relation with the axis of the screw 24. Such means may be formed integrally

with those members by providing cooperating cutting edges on suitable portions of the members. In such an arrangement there is a disadvantage of impaired usefulness of the device due to the cutting edges becoming dulled or broken from use, necessitating sharpening, and ultimately rendering the device useless. To obviate this difficulty, it is desirable to provide removable cutting means in such a device. As shown in Figs. 1, 3 and 5, the member 15 is provided adjacent one end with a cutaway portion 41 arranged in angular spaced relation with the axis of the screw 24 and of suitable configuration for receiving an article to be cut. A plate 42 having a cutting edge 43 is secured on the member 15, as by means of screws 44, and preferably inset in a recessed portion 45 of the member 15 with its cutting edge adjacent one edge of the cutaway portion 41, as shown in Figs. 1 and 5. The member 18 is provided with a corresponding cutting edge. For this purpose a plate 46 having a cutting edge 47 is secured on the member 18, as by means of screws 44, and preferably inset in a recessed portion 48 of that member with the cutting edge 47 arranged adjacent the edge 49 of an extended portion 50 of the member 18. By manipulation of the screw 24, relative pivotal movement of the members 15 and 18 and the corresponding cutting edges 43 and 47 may be adjusted to enable the desired cutting action upon operation of the lever mechanism which has been described.

The corresponding end portions of the members 15 and 18 adjacent the cutting means are preferably co-extensive and, as shown, have outer edges which are generally arcuate in relation to the axis of the screw 24. In order to maintain the adjacent surfaces 22 and 23 in generally predetermined spaced relation, a guard 51 is provided, as shown in Figs. 1, 2, 3, 5 and 6. This guard is similarly arcuate in one direction and has depending side portions 52 extending adjacent opposite surfaces of the members 15 and 18, as shown in Fig. 3. The guard is secured in position on the member 18 by means of screws 53 and is relatively movable in relation to the member 15 between the positions shown in Figs. 5 and 6. The guard 51 acts not only to limit angular displacement of the members 15 and 18 in the direction of the axis of the screw 24 but to protect the operator of the device from injury by flying fragments of articles severed by the cutting means.

In a modification of the invention shown in Figs. 7, 8 and 9, shearing members 60 and 61 are interconnected by means of a screw 62, which is received in corresponding openings 63 in the members and adjustably secured in position by means of a nut 64 thereon, for relative pivotal movement about the axis of the screw and in parallel planes. The member 60 has a portion 65 of increased width and a handle or gripping portion 66. The member 60 also is provided with an angular opening 67 for receiving an article to be cut and an adjacent shearing edge 68 disposed in angular spaced relation with the axis of the opening 63 therein and the screw 62. A guard 58, generally similar in arrangement to the guard 51, is provided on the member 60, being secured thereto by screws 59.

The member 61, which is relatively shorter than the member 60, has a corresponding shearing edge 69 arranged in co-operative shearing relation with the shearing edge 68 and in angular spaced relation with the axis of the opening 63 in the member 60 and the screw 62. The member 61 has a curved end portion 61a generally opposite its shearing edge and a rectilinear end surface 70 arranged in angular spaced relation with the said axis.

A lever arm 71, which has a handle or gripping portion 84 corresponding with the handle or gripping portion 66 of the member 60, is pivotally mounted adjacent its end remote from the portion 84 on the member 60 and for this purpose is provided with spaced ears 72 at one end thereof and having coaxial openings 73 therein for receiving a screw 74 which is also received in a corresponding opening 75 in the member 60. The screw 74 and the openings 73 and 75 have an axis disposed in angular spaced relation with the axis of the screw 62 and the openings 63 and is adjustably secured in position by means of a nut 76.

The arm 71 carries a roller 77 which is rotatably mounted for rotation in the plane of pivotal movement of the member 61 on a screw 78 received in coaxial openings 79 in the spaced ears 80 provided on the arm. The screw 78 is adjustably secured in position by means of a nut 85 which bears upon an adjacent surface of one of the ears 80. The common axis of the openings 79 and the screw 78 is disposed in angular spaced relation with the axis of the screw 74 and the openings 73 and 75.

Spring means 81 similar to that described in connection with the device shown in Figs. 1 to 6, inclusive, is provided in the device of Figs. 7, 8 and 9 and arranged to operate in like manner in the corresponding cut-away portions 82 in the members 60 and 61 in association with the stops 83, which correspond with the stops 27.

In other respects, the structure and arrangement of parts of the device generally are similar to that shown in Figs. 1 to 6, inclusive.

As in the case of the device shown in Figs. 1 to 6, inclusive, the parts of the device shown in Figs. 7, 8 and 9 are so arranged and conformed that normally the periphery of the roller 77 will contact the adjacent surface 70 of the member 61 and the parts will be in the position indicated in Fig. 7, and upon the application of force to the handle or gripping portion 84 of the member 71, the member 60 being maintained in position, to cause that portion of the member 71 to move pivotally about the axis of the screw 74 in a direction toward the handle or gripping portion 66 of the member 60, the periphery of the roller 77 will have rolling contact with the surface 70 of the member 61, first in one direction and then in an opposite direction, in the manner described in the case of the roller 36 and the surface 21, to cause pivotal movement of the member 61 about the axis of the screw 62 and resulting shearing movement of the shearing edge 69 in relation to the shearing edge 68.

In Figs. 10 and 11, there is illustrated an application of the invention to a ratchet device. Such a device may include a support 90 on which a ratchet wheel 91 is rotatably mounted. A generally upstanding lever member 92 is mounted adjacent its lower end on the support 90 for relative pivotal movement in a vertical plane. The member 92 carries a pawl 93 which is pivotally mounted adjacent one end thereof on a pin 94 received in an opening 95 provided in the member 92, its opposite end being arranged for engagement with the ratchet wheel so as to cause rotation of the wheel upon pivotal movement of the member 92 in a given direction.

A generally curved lever member 96 is mounted adjacent one end thereof on the support 90 for relative pivotal movement in a plane parallel to the plane of pivotal movement of the member 92 and is provided with an opposite rectilinear end portion 97 disposed in angular spaced relation with the pivotal axis of the member. The member 96 is arranged so that the curved surface 98 thereof will engage the periphery of a roller 99 mounted on the member 92 adjacent its uppermost end for rotation about an axis disposed in parallel, angular spaced relation with the pivotal axis of the pawl 93.

An auxiliary lever member 100 is mounted adjacent one end thereof on the support 90 for pivotal movement about an axis disposed in parallel, angular spaced relation with the pivotal axis of the member 96. The member 100 carries a roller 101 mounted for rotation about an axis disposed in parallel angular spaced relation with the pivotal axis of the member 100 and arranged to have rolling contact with the surface of the end portion 97 of the member 96.

A spring or tension member 102 is anchored at its opposite ends to the support 90 and the member 92 so as normally to urge the free end of the member 92 in a predetermined direction, as shown in Fig. 10, to the left viewing of the drawings, and thus to maintain the parts in the position shown therein.

The arrangement and conformation of the parts is such that upon the application of force to the member 100 in a given direction, to the left viewing Fig. 10, the roller 101 will have rolling contact with the surface 97, first to the left and then to the right, causing the member 96 to move pivotally in an anti-clockwise direction and the surface 98 to press and ride upon the roller 99, thereby producing pivotal movement of the member 92 about its axis against the action of the spring 102 and resultant movement of the ratchet wheel 91 in a clockwise direction through the operation of the pawl 93.

Fig. 12 illustrates an additional kind of device to which the invention may be applied, namely, snips 110 in which opposed cutting members 111 are brought together generally in one plane to cut a wire or small rod 112.

Changes may be made in the form, construction and arrangement of the parts without departing from the spirit of the invention, and the right is hereby reserved to make all such changes as fairly fall within the scope of the following claims.

The invention is hereby claimed as follows:

1. A device of the character described comprising a pair of members pivotally connected for relatively turning movement about a common pivot, a power lever having an end connected on one of said members for relative turning movement thereon about a fulcrum connection spaced from said common pivot, the other of said members having an elongated bearing surface extending adjacent said fulcrum connection and on the side thereof remote from said common pivot, and a bearing member on said power lever and spaced from said fulcrum connection in position to bear upon said bearing surface whereby to provide power multiplying means for relatively turning said members in the performance of a power stroke, said bearing surface being movable, during a power stroke, from a position engaging said bearing member on one side of the plane including the axis of said fulcrum connection and the axis of said common pivot, to a position engaging said bearing member on the other side of said plane.

2. A device of the character described comprising a pair of members pivotally connected for relatively turning movement about a common pivot, a power lever having an end connected on one of said members for relative turning movement thereon about a fulcrum connection spaced from said common pivot, the other of said members having a cam comprising an elongated surface extending adjacent said fulcrum connection and on the side thereof remote from said common pivot, a cam driving roller on said power lever and spaced from said fulcrum connection in position to bear upon said cam to relatively turn said members in the performance of a power stroke, said cam being movable by said driving roller, during a power stroke, from a position engaging said roller with its axis on one side of the plane including the axis of said fulcrum connection and the axis of said common pivot, to a position engaging said roller with its axis on the other side of said plane.

3. A device of the character described comprising a pair of members pivotally connected for relative turning movement about a common pivot and having cooperating portions forming cutting jaws, a power lever having an end connected on one of said members for relatively turning movement thereon about a fulcrum connection spaced from said common pivot, the other of said members having an elongated bearing surface extending adjacent said fulcrum connection and on the side thereof remote from said common pivot, and a bearing member on said power lever and spaced from said fulcrum connection in position to bear upon said bearing surface whereby to provide power multiplying means for relatively turning said members in the performance of a power stroke, said bearing surface being movable, during a power stroke, from a position engaging said bearing member on one side of the plane including the axis of said fulcrum connection and the axis of said common pivot, to a position engaging said bearing member on the other side of said plane, said cutting jaws being in fully open position when said bearing member is spaced from said plane on one side thereof and completely closed when the bearing member reaches a position on the other side of said plane.

4. A device of the character described comprising a pair of members pivotally connected for relative turning movement about a common pivot and having cooperating portions forming cutting jaws, a power lever having an end connected on one of said members for relatively turning movement thereon about a fulcrum connection spaced from said common pivot, the other of said members having an elongated bearing surface extending adjacent said fulcrum connection and on the side thereof remote from said common pivot, and a bearing member on said power lever and spaced from said fulcrum connection in position to bear upon said bearing surface whereby to provide power multiplying means for relatively turning said members in the performance of a power stroke, said bearing surface being movable, during a power stroke, from a position engaging said bearing member on one side of the plane including the axis of said fulcrum connection and the axis of said common pivot, to a position engaging said bearing member on the other side of said plane, cutting jaws being in fully open position when said bearing member is spaced from said plane on one side thereof, said

jaws being completely closed when the bearing member reaches a position on the other side of said plane and spaced further therefrom than when in jaw-open position, said bearing member passing through said plane in constant engagement with the bearing surface, during the jaw closing stroke.

5. A device of the character described comprising a pair of members pivotally connected for relatively turning movement about a common pivot, a power lever having an end connected on one of said members for relative turning movement thereon about a fulcrum connection spaced from said common pivot, the other of said members having an elongated bearing surface extending adjacent said fulcrum connection and on the side thereof remote from said common pivot, and a bearing member comprising a roller on the power lever and spaced from said fulcrum connection in position to make rolling contact with said bearing surface, said bearing surface being movable by said roller during a power stroke, from a position engaged by said roller with its axis on one side of the plane including the axis of said fulcrum connection and the axis of said common pivot, to a position engaged by said roller with its axis on the other side of said plane, said roller being adapted to travel said bearing surface in a direction away from said common pivot when the axis of said roller is moving toward said plane on either side thereof, and vice-versa.

6. A device of the character described comprising a pair of members pivotally connected for relatively turning movement about a common pivot, a power lever having an end connected on one of said members for relative turning movement thereon about a fulcrum connection spaced from said common pivot, the other of said members having an elongated bearing surface extending adjacent said fulcrum connection and on the side thereof remote from said common pivot, a bearing member on said power lever and spaced from said fulcrum connection in position to bear upon said bearing surface whereby to provide power multiplying means for relatively turning said members in the performance of a power stroke, said bearing surface being movable, during a power stroke, from a position engaging said bearing member on one side of the plane including the axis of said fulcrum connection and the axis of said common pivot, to a position engaging said bearing member on the other side of said plane, and spring means yieldingly urging said pair of members about said common pivot in a direction counter to the direction of said power stroke.

7. A device of the character described comprising a pair of plate-like elements supported in overlapping relationship and connected for relatively turning movement about a common pivot, a power lever having an end connected on one of said elements for relative turning movement thereon about a fulcrum connection spaced from said common pivot, the other of said elements having an elongated bearing surface extending adjacent said fulcrum connection and on the side thereof remote from said common pivot, a bearing member on said power lever and spaced from said fulcrum connection in position to bear upon said bearing surface whereby to provide power multiplying means for relatively turning said elements in the performance of a power stroke, said elements being formed each with an arcuate slot curved about the axis of said common pivot as a center, said slots being in registration to form a cavity, and a coil spring in said cavity and operatively connected with one of said elements at one end of the cavity and with the other of said elements at the other end of said cavity, said spring serving to yieldingly urge said elements in a direction counter to the direction of said power stroke, said bearing surface being movable during a power stroke, from a position engaging said bearing member on one side of the plane including the axis of said fulcrum connection and the axis of said common pivot, to a position engaging said bearing member on the other side of said plane.

8. A device of the character described comprising a pair of lever members forming jaws and pivotally connected for relative turning movement about a common pivot to open and close said jaws, one of said members having an extension forming a handle, a power lever forming a handle and having an end pivotally connected on said one member for relative turning movement thereon about a power pivot spaced from said common pivot, the other of said lever members having a cam surface spaced from said common pivot a distance substantially greater than the spacement of said common and power pivots, a cam follower on said power lever and spaced from said power pivot in position to bear upon said cam surface to relatively turn said lever members to perform a jaw closing stroke against resistance, said lever members and power lever being movable, during the performance of a jaw closing stroke, from a position in which the cam surface engages said cam follower on one side of the plane including the axes of said power and common pivots, to a position in which said cam surface engages said cam follower on the other side of said plane.

9. A device of the character described comprising a pair of lever members forming jaws and pivotally connected for relative turning movement about a common pivot to open and close said jaws, a power lever having an end pivotally connected on one of said members for relative turning movement thereon about a power pivot spaced from said common pivot, the other of said lever members having a cam surface spaced from said common pivot a distance substantially greater than the spacement of said common and said power pivots, a roller on the power lever and spaced from said power pivot in position to make rolling contact with said cam surface, and to bear thereon whereby to relatively turn said lever members to perform a jaw closing stroke against resistance, said lever members and power lever being movable, during a jaw closing stroke, from a position in which the cam surface engages said roller with its axis on one side of the plane including the axis of said power and said common pivots, to a position in which said cam surface engages said roller with its axis on the other side of said plane, said roller rolling on said surface in a direction toward said common pivot as the axis of said roller is moved in a direction away from said plane, and vice-versa.

10. A device of the character described comprising a pair of members pivotally connected for relative turning movement about a common pivot, a power lever having an end connected to one of said members for relative turning movement thereon about a fulcrum connection spaced from said common pivot, the other of said members having an elongated bearing surface extending adjacent said fulcrum connection and on the side

thereof remote from said common pivot, a bearing member on the power lever and spaced from said fulcrum connection in position to engage said bearing surface and, during the performance of a power stroke of said power lever, initially to ride along said bearing surface in a direction outwardly of the common pivot and finally to ride thereon in the reverse direction, whereby to provide power multiplying means for relatively turning said members and giving maximum power multiplying effect during intermediate portions of the power stroke of the power lever.

ERNEST C. NEAL.