R. L. HERMAN.

SHEARS.

APPLICATION FILED NOV. 20, 1917.

1,321,918.

Patented Nov. 18, 1919.

2 SHEETS—SHEET 1.

FIG. 1

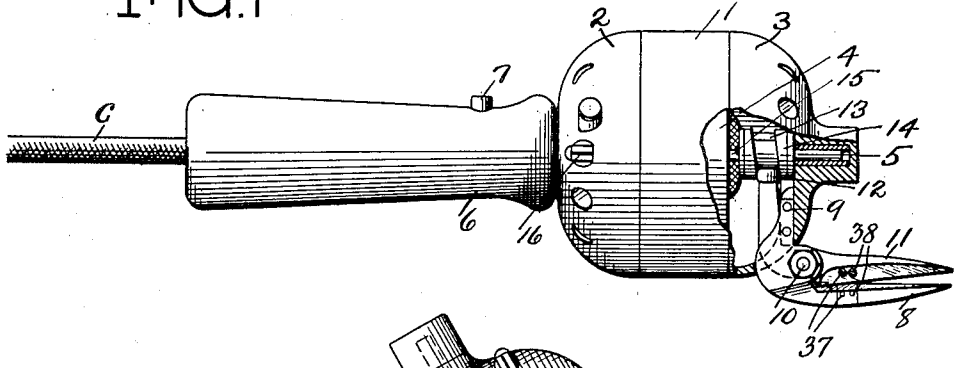


FIG. 2

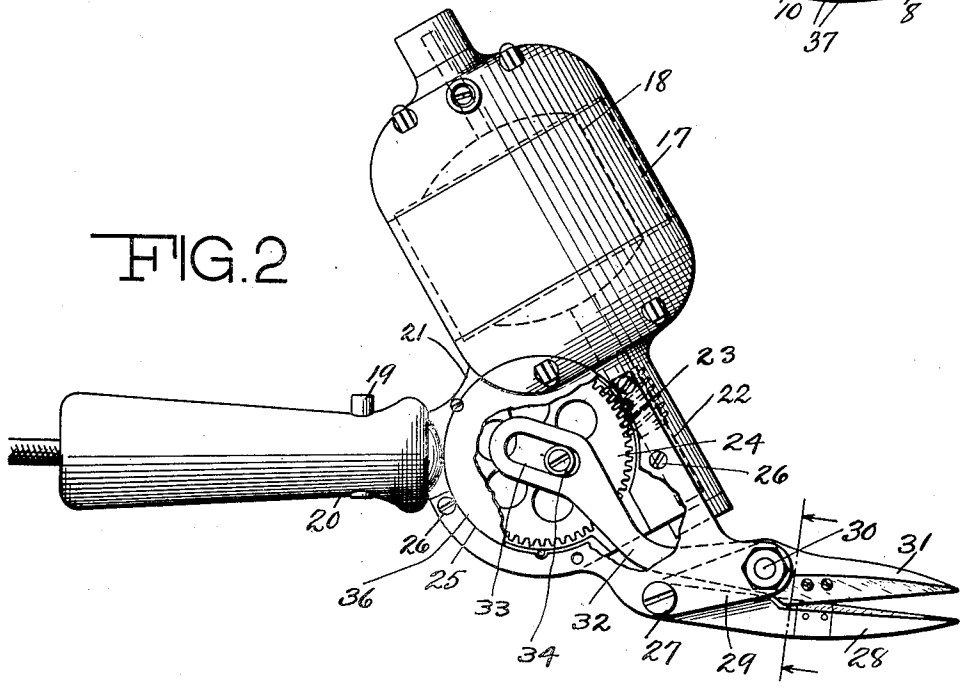
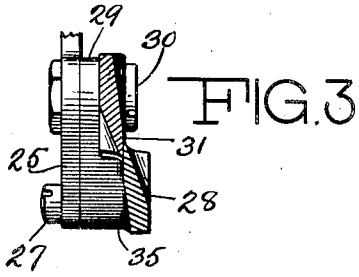


FIG. 3



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2 SHEETS—SHEET 2.

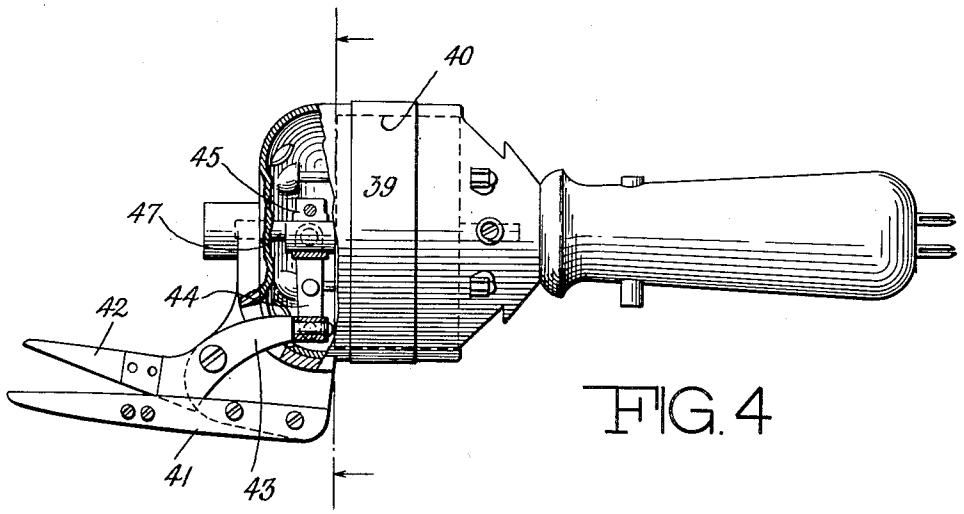


FIG. 4

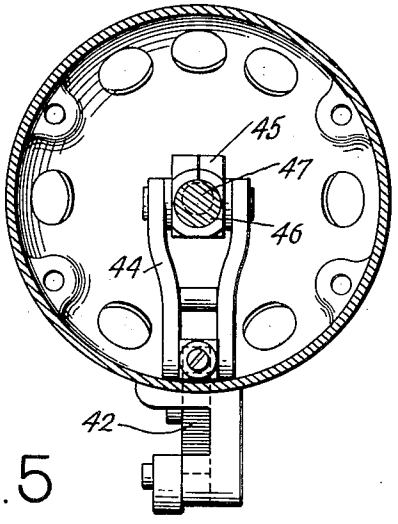


FIG. 5

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UNITED STATES PATENT OFFICE.

RAYMOND L. HERMAN, OF NEWARK, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE SPERRY GYROSCOPE COMPANY, OF BROOKLYN, NEW YORK, A CORPORATION OF NEW YORK.

SHEARS.

1,321,918. Specification of Letters Patent. Patented Nov. 18, 1919.

Application filed November 20, 1917. Serial No. 202,915.

To all whom it may concern:

Be it known that I, RAYMOND L. HERMAN, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Shears, of which the following is a specification.

This invention relates to an improvement in shears with special reference to the portable type, and comprises an apparatus wherein the shears, together with their operating mechanism are self-contained.

It is an object of this invention to provide shears of the type wherein one of the blades is fixed and in position to rest upon a supporting surface when the device is in operation, thus relieving the operator of the necessity of supporting the entire weight of the machine, while at the same time facilitating control of the apparatus.

Another object of the present invention is to provide shears of the type designated, wherein the forward ends of the blades are always spaced apart, to constitute a guide for directing the material being operated upon between the ends of the blades.

A still further object of the invention is to provide shears wherein buckling of the material being operated upon will not interfere with their proper functioning.

And a still further object of the invention is to provide shears which may be readily used on uneven surfaces and in making curved or other irregular cuts.

Other objects of the invention will appear more fully hereinafter and be pointed out in the appended claims.

In the accompanying drawings wherein are illustrated three embodiments of this invention—

Figure 1 is a side elevational view of one embodiment of the invention, with parts of the exterior of the apparatus cut away to show the interior working mechanism.

Fig. 2 is a part sectional side elevational view of another embodiment of the invention.

Fig. 3 is a sectional end view of the blades of the shears of Fig. 2.

Fig. 4 is a side elevational view of another embodiment of the invention; and

Fig. 5 is an elevation of the mechanism by which the shear blade is connected to the armature shaft in the embodiment shown in Fig. 4.

Throughout the drawings like characters of reference designate like parts.

Referring now to the drawings in detail, 1 designates a housing of aluminum or other light-weight metal or alloy, constructed in two parts, designated 2 and 3 respectively. A small electric motor 4 for operating the shears is carried within the housing and has its circuit controlled by means of a switch 7 within easy reach of the operator as he operates the shears, and preferably located in a handle 6 secured to the rear end of the housing 1, current being supplied from any suitable source by way of conductor C which, for convenience, may pass through the handle 6 of the shears, as illustrated. Secured to the forward end of the housing 1 by a set screw 9 is a shear blade 8, the lower part of which is below the bottom of the housing and is slightly curved to facilitate the shears passing over uneven surfaces. Pivoted to the blade 8 on a pivot 10 is a blade 11 in the form of a bell crank lever, one arm of which constitutes the blade proper, while the other extends rearwardly and upwardly and carries a friction roller 12 in engagement with a cam slot 13 cut in a cam 14 mounted on the armature shaft 5 of the motor.

The blades 8 and 11 are made in sections secured together by set screws 37 and 38, so that when it is desired to sharpen the blades or replace them with new ones it is merely necessary to remove the screws, which eliminates the necessity of possibly removing the forward end 3 of the housing 1.

From the description thus far given, it is obvious that rotation of the armature shaft 5 of the motor will impart a rocking movement to the blade 11 about its pivot 10 through the medium of the cam 14 and one arm of the blade, to cause the shears to operate. It is to be noted at this time that the movement of the blade 11 about its pivot is such that the forward ends of the blades are always maintained spaced a short distance apart, constituting a guide to facilitate entry of the material to be cut between the blades.

The sections 2 and 3 of the housing 1 are secured together by bolts 15 held in place by nuts 16, so that the section 3 may be easily removed when it is desired to make repairs to the working parts of the apparatus.

Referring now to Figs. 2 and 3 which show another embodiment of the present invention, 17 designates a housing within which

is mounted a small electric motor 18, the circuit of which is adapted to be controlled by a switch 19 in a handle 20 secured to a depending portion 21 of the housing 17. The armature shaft 22 of the motor 18 carries a worm 23 meshing with a worm wheel 24 which is mounted for rotation within the portion 21 of the housing 17. A plate 25 secured to the housing and held in place by set screws 26 carries a blade 28 rigidly secured thereto by a screw 27, this blade constituting the lower and fixed blade of the shears. A pivot bolt 30 passes through an arm 29 formed on the blade 28 and carries the movable blade 31 of the shears, this blade having a rearwardly extending arm 32, the extreme end of which contains a slot 33 adapted to receive and coöperate with a pin 34 mounted eccentrically on the worm wheel 24 already referred to. The blade 31, as will be seen from Fig. 2, is in the shape of a bell crank lever, and rotation of the worm 23 on the armature shaft 22 of the motor, will, through the medium of the worm wheel 24, pin 34, slot 33 and arm 32, rock the blade 31 about its pivot to perform the cutting operation. The pin 34 is set so that its throw will never completely close the forward ends of the blades, but will always maintain them spaced a short distance apart to facilitate entry of the material to be cut between the blades. If desired, this pin may be adjustable so as to vary its thrown and thereby the cutting speed of the shears. The blade 28 is cut back at 35, as shown in Fig. 3, and the underside of the forward end of the plate 25 is undercut to allow plenty of clearance space for the material as it passes between the blades of the shears, so that the latter may be freely moved about during the cutting operation and may be freely passed over or around uneven surfaces without jamming of the blades of the shears. The blades 28 and 31 of this embodiment of the invention are made in sections similar to the disclosure of Fig. 1.

Immediately above the worm wheel 24 a cover plate 36 has been provided which, when removed, exposes the interior working parts of the shears.

Figs. 4 and 5 designate still another embodiment of this invention, which, as illustrated, comprises a housing 39 similar to the housing 1 of Fig. 1 within which is carried a motor 40 for supplying power to operate the shears. The shear blades in this embodiment designated 41 and 42, respectively, are made in sections similar to the disclosure of Fig. 1. The movable blade 42 has a rearwardly extending portion 43 connected by a universal joint to a link 44 pivotally secured to a split bushing 45 carried on an eccentric 46 formed on the armature shaft 47 of the motor 40. It will be seen that rotation of the armature shaft 47 will cause the blade 42 to be rocked about its pivot through the medium of the driving connection just described to cause the shears to perform their cutting operation.

It will be noted on inspection of Figs. 4 and 5, which show the preferred form of the invention, that not only is it true that the blades are constrained against complete closure but the connections between the motor and blade 42 are such that an extremely short cutting stroke is imparted to the latter. It will be noted also the rate of oscillation of the blade 42 is equal to the R. P. M. of the rapidly revolving motor shaft.

By virtue of this rapid oscillation of small amplitude, which may properly be termed a chattering oscillation or chatter, numerous important advantages are gained. First, it is found that tougher and heavier materials may be cut than is possible with the old long stroke shears. Secondly, as the cutting is in small increments, a cut along a curved path may be made rapidly and easily without danger of a miscut tangent to the curve. Thirdly, as the extent of opening of the blades is small the danger of injury to the operator is greatly minimized. Fourthly, the load on the motor is much more uniform than in the case of the long slow stroke devices.

Inspection of Fig. 4 will also reveal two additional features, which while not indispensable are advantageous. It will be noted that the cutting operation is performed comparatively close to the blade pivot so that a powerful cutting stroke is obtained. In the particular embodiment shown in Fig. 4 the intersection of the cutting edges of the blade is limited to a point spaced from the pivot of the blades a distance not greater than one-half the distance between said pivot and the tip of the fixed blade.

It should also be noted that the pivot of the blades is shown, in Fig. 4 as well as the other figures, located at a point to one side of the prolongation of the cutting edge of the fixed blade and on the same side of said cutting edge as the active end of the movable blade is located. By virtue of this structure, the material operated on is automatically drawn into the shears, *i. e.* the shears become to a certain extent self-feeding.

From the foregoing description it is apparent that this invention comprises portable shears which are light in weight and, therefore, readily operative, but which at the same time are powerful enough to perform the duties for which they are designed. It will be apparent also that by never closing the forward ends of the shear blades the operation of the shears is greatly facilitated, for not only does this feature act as a guide in operating shears, but enables the operator to readily insert the material to be cut

between the blades. It will be apparent also that the invention comprises an undercut blade, whereby cuts of any shape may be taken without any danger of the shears jamming due to buckling of the material being operated upon.

It is obvious that others skilled in this art may make various changes in the details of construction and arrangement of parts herein illustrated and described without departing from the spirit and scope of this invention.

What I claim as new and desire to secure by Letters Patent of the United States, is:—

1. A portable power shears comprising a handle, a motor, a shear blade, the handle, motor frame and said blade being rigidly connected, a second blade pivoted to said first blade at a point to one side of the prolongation of the cutting edge of the first mentioned blade and located on the same side of said cutting edge as the active end of the second blade is located, and means connecting the shaft of said motor and the second blade for oscillating the latter but constraining said blades against complete closure.

2. In combination, a pair of scissors constrained against complete closure and power means for imparting a rapid, small amplitude relative movement to the blades of said scissors independent of forward bodily movement thereof.

3. A portable cutting device comprising a pair of scissors constrained against complete closure, a supporting handle rigidly secured to one of the blades of the scissors and power means for imparting a rapid, small amplitude relative movement to the blades of said scissors.

4. A portable cutting device comprising a pair of scissors constrained against complete closure, a supporting handle rigidly secured to one of the blades of said scissors and means comprising a translating device carried by said handle for imparting a rapid, small amplitude relative movement to the blades of said scissors.

5. A portable cutting device comprising a pair of scissors constrained against complete closure and the blades of which are provided with straight adjacent edges, a supporting handle rigidly secured to one of said blades and power means for imparting a rapid, small amplitude relative movement to said blades.

6. A portable cutting tool comprising a pair of relatively movable cutting blades constrained against complete closure, a motor and means connecting said motor to at least one of said blades for imparting a chattering relative oscillation to said blades.

7. A cutting tool comprising a pair of relatively movable coöperating cutting blades constrained against complete closure, a handle, means fixedly securing one of said blades to said handle and means independent of bodily movement of said tool for imparting a rapid relative movement, confined to a small amplitude, to said blades.

8. A portable cutting device comprising in combination, a handle, a motor and a pair of scissor blades, the handle, motor casing, and one of said blades being rigidly connected, and connections between said motor and the other of said scissor blades for imparting a rapid, small amplitude oscillation to the last mentioned blade but preventing complete closure of the substantially straight adjacent portions of the edges of said blades.

9. A portable electric shears comprising in combination, a handle, a motor carried thereby, a pair of scissor blades, one of which is secured to the casing of said motor, and means connecting the shaft of said motor to the other of said blades for imparting a rapid small amplitude vibration to the last mentioned blade and for limiting the intersection of the cutting edges of said blades to a point spaced from the pivot of the blades a distance not greater than one-half the distance between said pivot and the tip of the fixed blade.

10. A portable sheet cutting shears comprising in combination, a handle, an electric motor carried thereby, a scissor blade fixedly secured to the frame of said motor and projecting below the latter to cause the material to clear the motor and handle, a second scissor blade pivoted to the first blade, and means connecting said second blade to the shaft of said motor for imparting a rapid, small amplitude vibration to said second blade and constraining said blades against complete closure.

RAYMOND L. HERMAN.