

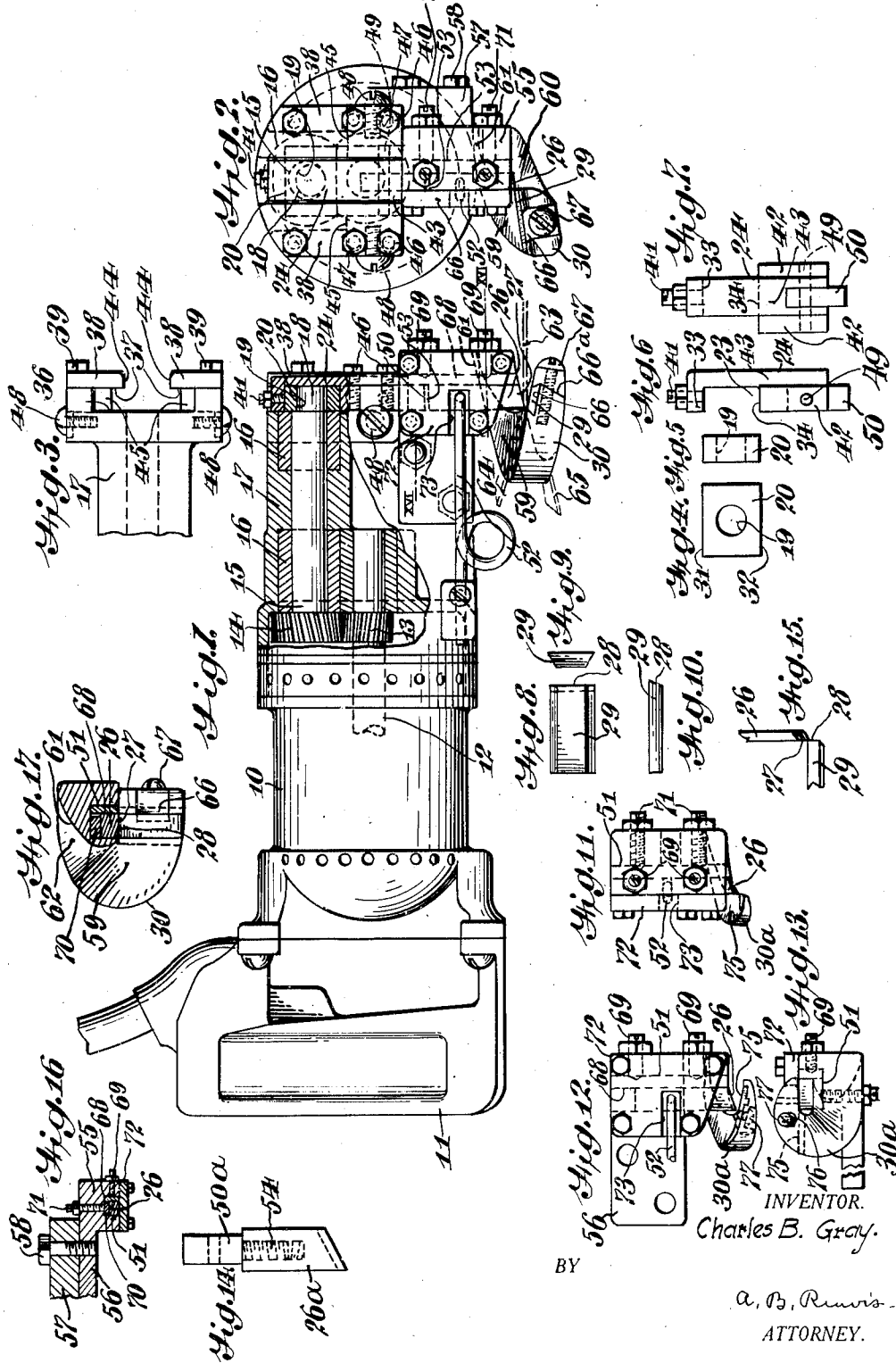
Aug. 15, 1933.

C. B. GRAY

1,922,846

MOTOR OPERATED SHEAR

Filed June 25, 1930



UNITED STATES PATENT OFFICE

1,922,846

MOTOR-OPERATED SHEAR

Charles B. Gray, Millbourne, Pa.

Application June 25, 1930. Serial No. 463,613

1 Claim. (Cl. 164—47)

My invention relates to a shear, more particularly of the portable motor-operated type, and it has for an object to provide apparatus of this character which is compact and rugged, whose mechanism is simple in principle and design, which has blades readily capable of adjustment, and which is capable of cutting suitable material, for example, sheet metal, in any desired direction.

In accordance with my invention, I provide a frame, to which may be connected a motor, the frame having a power shaft operated by the motor and imparting reciprocatory motion to a cutter or shear blade, the latter cooperating with a fixed blade or cutter carried by a guide and holder construction which not only guides the movable blade and holds the fixed blade in correct relative position but it is constructed and arranged to permit the passage over and under the deflector and fixed blade holding portion thereof of sheared material. The guide and holder construction is secured to the frame and the blade holding and deflecting portion thereof extends rearwardly, laterally, forwardly and downwardly so as to provide a fixed blade seat situated to properly locate the fixed blade relatively to the movable blade to permit of the entrance of material and the passage of sheared material thereby. Since the guide and holder construction has a movable blade guide portion formed as a relatively small neck where it joins the deflector and fixed blade carrier, the cutting region of the cooperating blades may be readily turned with respect to material in order to make cuts of very small radii. Hence, a further object of my invention is to provide a shear having these operating features and advantages.

A further object of my invention is to provide a shear having blades arranged substantially at right angles.

A further object of my invention is to provide a shear having a movable blade carried by a guide to the lower end of which is connected a spiral deflector and fixed blade carrier, sheared material passing over and under the spiral deflector.

These and other objects are effected by my invention as will be apparent from the following description and claim taken in connection with the accompanying drawing in which:

Fig. 1 is a view partly in side elevation and partly in section showing my improved shear;

Fig. 2 is an end elevation of the right hand end of Fig. 1;

Fig. 3 is a detail view of guide features;

Figs. 4 and 5 are detail views of the eccentric shoe or block;

Figs. 6 and 7 are detail views of the reciprocatory member;

Figs. 8, 9, and 10 are detail views of the fixed blade;

Figs. 11, 12, and 13 are detail views showing a modified form of guide and deflector construction;

Fig. 14 is a detail view showing a modified form of blade connection;

Fig. 15 is a diagrammatic view showing the right angular relationship of the fixed and movable blades;

Fig. 16 is a sectional view taken along the line XVI—XVI of Fig. 1; and

Fig. 17 is a sectional view showing the construction of the guide permitting of short radius turning.

Referring to the drawing now more in detail, I show a housing 10 containing a motor and the housing has a handle 11 connected thereto. The motor shaft 12 is connected by meshing speed reducing gears 13 and 14 to the power shaft 15 carried by bearings 16 on the supporting frame structure 17.

The power shaft 15 has an eccentric 18 fitting an opening 19 in the block or shoe 20, the latter fitting the transverse groove or guideway 23 provided in the reciprocatory member 24 guided to move in a direction at right angles to the guideway 23.

The reciprocatory member 24 is arranged to cause reciprocation of the movable blade 26 having a shearing edge 27 cooperating with the shearing edge 28 of the fixed blade 29, the blade 29 being preferably arranged at right angles to the movable blade 26.

The fixed blade 29 is carried by a support or deflector constructed and arranged to provide for the passage of one sheared portion of material thereabove and the other below and permitting of the tool being turned through a short radius in either direction.

Referring now more in detail to the means for converting rotary motion of the power shaft 15 into reciprocatory motion of the reciprocating member 24, the block or shoe 20 not only has its upper and lower surfaces 31 and 32, respectively, fitting between the abutments 33 and 34 on the member 24 but the block or shoe is restricted to movement normally of the axis of the power shaft 15 by the guide surface 36 provided on the frame and the guide surfaces 37 on the plates 38 secured to the frame by screws 39.

Preferably the lower abutment surface 32 of the block or shoe 20 is guided by the lower abutment surface 34 on the reciprocatory member 24, the upper abutment surface 33 of the latter being on an adjusting screw 41 in order that the surfaces 32 and 34 may slide relatively without play or looseness.

The reciprocatory member 24 has lateral guide portions 42 overlapped by the plates 38, the tongue-like portion 43 of the member 24 being arranged between the edges 44 of the plates 38. Guide blocks 45 cooperate with the guide portions 43 to restrict the reciprocatory member 24 to rectilinear movement, the blocks being clamped by the plates 38 and the screws 46 passing through opening 47 in the blocks somewhat larger than the screws and the blocks being adjusted upward by the screws 48.

As shown in Figs. 1 and 2, the reciprocatory member or ram 24 has connected thereto, by a pin 49, a hammer 50 which depends into the guideway 51 for the movable blade 26, the blade being moved through its cutting stroke by the hammer or impact member and being retracted by a spring 52. Sharpening of the blade 26 results in shortening thereof and for this reason filler pieces 53 of suitable thickness are preferably inserted between the hammer or impact member 50 and the upper end of the blade 26 to keep the cutting edge 27 thereof properly positioned relatively to the cutting edge 28 of the fixed blade 29.

As shown in Fig. 14, the blade 26a may be connected to the hammer or impact member 50a by a threaded connection 54, in which case the spring 52 would be unnecessary. The threaded connection 54 assures of reciprocation of the blade 26a and for adjustment thereof.

Both the fixed blade 29 and the movable blade 26 are carried by a unitary or integral blade supporting and guiding structure 55 having a body portion 56 secured to the frame extension 57 by bolts or screws 58, the body portion having the guideway 51 for the movable blade and being connected or joined at its lower end to the deflector and fixed blade holder 30. The deflector and holder 30 has upper and lower surfaces 59 and 60 which deflect sheared edges above and below. Preferably the holder and deflector 30 is in the form of a spiral joined to the lower end of the body portion 56, this shape providing the aforesaid backward, outward, forward, and downward extension. With the deflector and fixed blade support 30 connected to the body portion 56 in this way, the body portion permits of short radius turns, the body portion restricting the sharpness of turning in one direction and offering no interference in the other direction. Interference by the body portion 56 to sharpness of turning in one direction may be reduced by relieving or recessing the body portion as shown at 61 to provide a neck of small cross-sectional area (Fig. 17) and a surface 62 which is a continuation of the upper surface 59. Referring to the blank 63 shown in dot and dash lines in Fig. 1, the upper sheared edge 64 passes over the upper surface 59 of the deflector 30 and the lower sheared edge 65 passes beneath the lower surface 60. If the tool is turned sharply to the left, the edge 64 contacts with the recess bottom, this limiting the smallness of radius of turning and cutting. There is no restriction in the other direction.

As the cutting edges of the blades diverge forwardly to provide entrance space for material, the

cutting region of the blades is disposed adjacent to the rear edges of the latter; and, as one end of the recess 61 is located quite close to the cutting region, it will be apparent that the recess is effective to reduce interference by the body member 56 with material when making a curved cut in one direction, there being no interference in the other direction.

The spiral element 30 is integral with the body member 56 and springs rearwardly from the lower end of the latter, this construction providing for the best location of the recess, maximum strength, and disposition of the inner edge of the spiral element close to the rear of the cutting region and close to the plane of the side surface of the body member having the movable blade guideway formed therein. Hence, the blades are supported by the body member and by the spiral element close to the cutting edges, with the result that any tendency to spreading due to shearing forces is effectively resisted. The spiral element converges from the outer edge to the inner edge, and this, taken with location of the inner edge closely adjacent to the rear of the cutting region, assures passage of cut portions of material over and under the spiral element with no interference.

The forward portion of the spiral element 30 is provided with a channel seat 66 opening through its upper surface, the fixed blade fitting the seat and having its upper surface flush with the upper surface of the forward portion, whereby the fixed blade does not interfere with the passage of material over the spiral element. The fixed blade is secured in place in the seat by means providing for longitudinal adjustment so that its cutting edge may be brought into proper relation with respect to the cutting edge of the movable blade.

A diverging entrance space for material is provided not only by the arrangement of cutting edges as heretofore described but also by the structure of the spiral element 30 and the body member 56. To this end, the upper surface of the forward portion of the spiral element diverges forwardly with respect to the under surface of the body member and the portion of the spiral element adjacent thereto.

Drag or resistance to relative movement of the shear and material being cut is minimized by limiting contact of the material with the spiral element. The upper surface of the forward portion of the spiral element is inclined outwardly and downwardly at one side of the cutting region and the under surface of the body member and the spiral element at the other side of the cutting region is inclined upwardly and outwardly, with the result that said surfaces contact with cut portions of material leaving the cutting region only to the extent necessary for the required deflection to obtain proper operation.

The holder and deflector 30 is provided with a dovetail seat 66 for the blade 29, the latter being dovetailed in cross section. One side of the seat 66 is formed on the adjustable block 66a held in place by a screw 67. This structure permits of adjustment of the fixed blade 29 and of holding thereof in position of adjustment.

The guideway 51 is preferably provided with means for securing a snug sliding fit of the movable blade 26. To this end, an adjusting strip 68 is arranged in the guideway 51 at one side of the blade 26 and a strip 70 fits against the back of the blade. Screws 69 and 71 are carried by the body portion and serve to adjust the strips 68 and 70, respectively. The front face of the blade

26 bears against the cover plate 72 connected to the body portion 56 by the screws 72a and having a slot 73 for the spring 52.

In Figs. 11, 12, and 13, I show a lighter and shorter form of deflector and fixed blade holder 30a, the fixed blade 75 being segmental in shape. The blade 75 is connected to the holder and deflector 30a by a screw 77, the latter being disposed in the slot 76 provided in the deflector or holder and the slot permitting of adjustment of the blade.

From the foregoing it will be apparent that the deflector affords a rugged support for the fixed blade, that the latter is not wedged apart by the shearing action, and that the right angular relationship of the blades permits of adjustment thereof to get the correct relative positions of the shearing edges without the use of shims and the like. All reciprocating parts slide without looseness or play, this result being effected by the blocks 45 cooperating the member 24 and the strips 68 and 70 cooperating with the moving blade 26. While I show a built-up structure for guiding the member 24 and the blade 26 and for holding the blade 29, such structure being connected to the frame 17, if desired, an integral guide and holding structure may be provided and connected to the frame.

While I have shown my invention in two forms, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various other changes and modifications without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are imposed by the prior art or as are specifically set forth in the appended claim.

What I claim is:

In a motor-operated portable hand shear, a body member provided with a guideway opening through a side surface thereof, a spiral element integral with and springing rearwardly from the lower end of the body member and having the inside edge of its forward portion extending closely adjacent to the plane of said side surface, said spiral element, for at least the major portion of its length, tapering in cross section from the outer edge to the inner edge thereof and the upper surface of the forward portion being inclined downwardly and forwardly with respect to

the guideway and also being inclined downwardly and laterally from said side surface and the guideway, a channel seat provided at the upper side of said forward portion and extending transversely of the guideway, a fixed blade fitting the seat and having its upper surface flush with the upper surface of the spiral element, said fixed blade having a cutting edge at its inner end and at its upper surface, a reciprocatory blade fitting the guideway and having its lower end bevelled to provide a cutting edge at the surface thereof adjacent to the fixed blade, the fixed blade, due to the inclination of the upper surface of said forward portion, being inclined forwardly and downwardly with respect to the reciprocatory blade and the bevelled edge of the reciprocatory blade being inclined forwardly and upwardly with respect to the fixed blade to provide the cutting region of the blades adjacent to the rear side edges thereof, the bottom face of the body member and at least the portion of the spiral element adjacent thereto and the top face of said forward portion diverging forwardly from the rear-most portion of the inside edge of the spiral element disposed closely adjacent to said cutting region to define, with the forwardly divergent space between the blade cutting edges, an entrance space for material to be cut, said body member having a recess extending at least part way therearound and adjacent to the spiral element with one end of the recess disposed closely adjacent to the cutting region of the blades, whereby short radius cuts may be made in either direction, the upper surface of the spiral element at the fixed blade side of the cutting region being inclined outwardly and downwardly and the under surface of the spiral element and the body member at the other side of the cutting region being inclined outwardly and upwardly, whereby contact with a sheet being cut is reduced in order to minimize drag, means cooperating with the body member to retain the reciprocatory blade in the guideway, means cooperating with the end of the reciprocatory blade remote from the cutting end for reciprocating it, and means for retaining the fixed blade in place with respect to the seat and providing for adjustment thereof relatively to the reciprocatory blade.

CHARLES B. GRAY.

55

60

65

70

75

80

85

90

95

100

105

110

115

120

125

130

135

140

145

150