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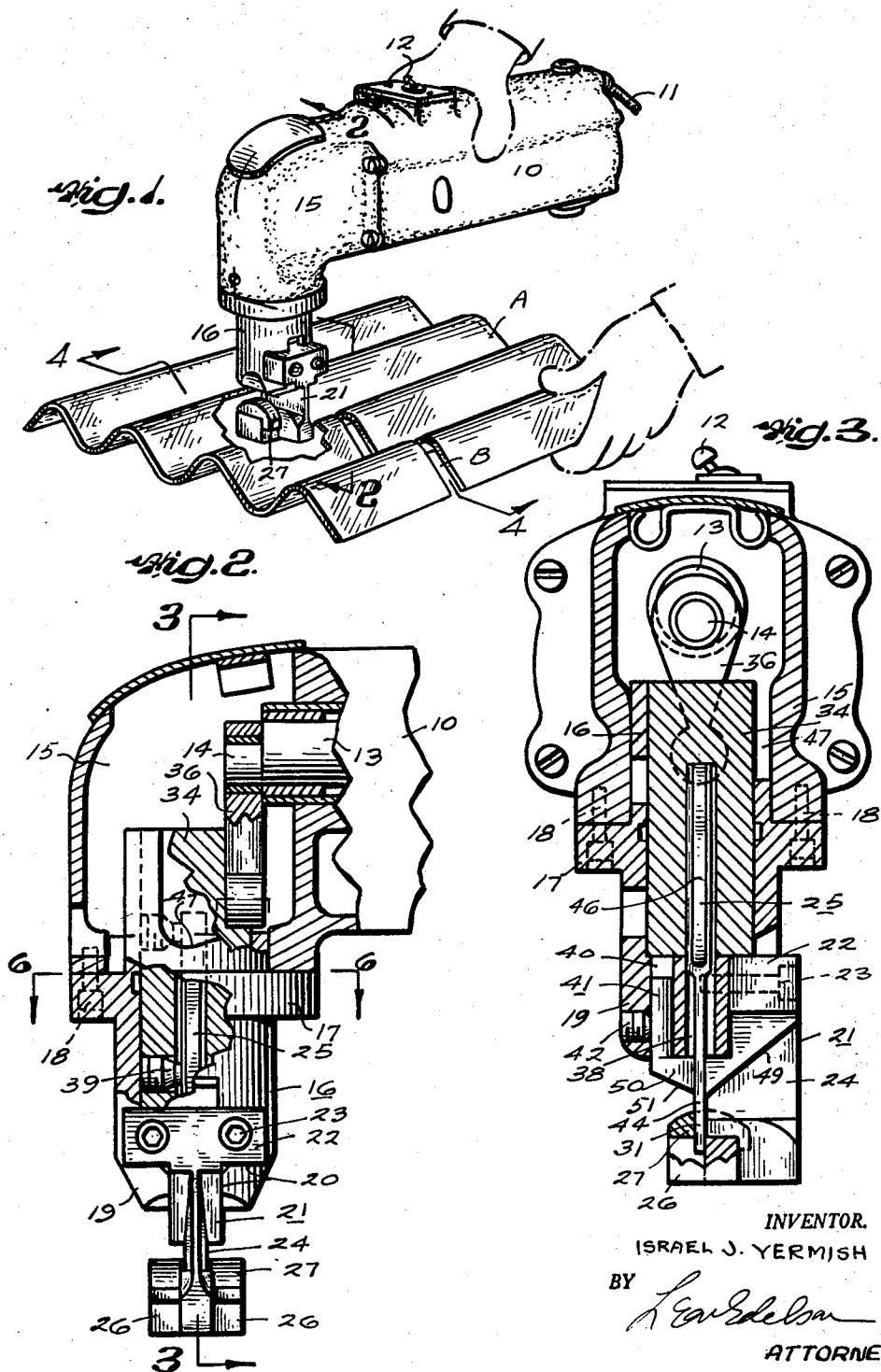
I. J. YERMISH

2,888,744

SHEET METAL NIBBLING TOOL (FOR CORRUGATED SHEET METAL)

Original Filed Oct. 5, 1956

3 Sheets-Sheet 1



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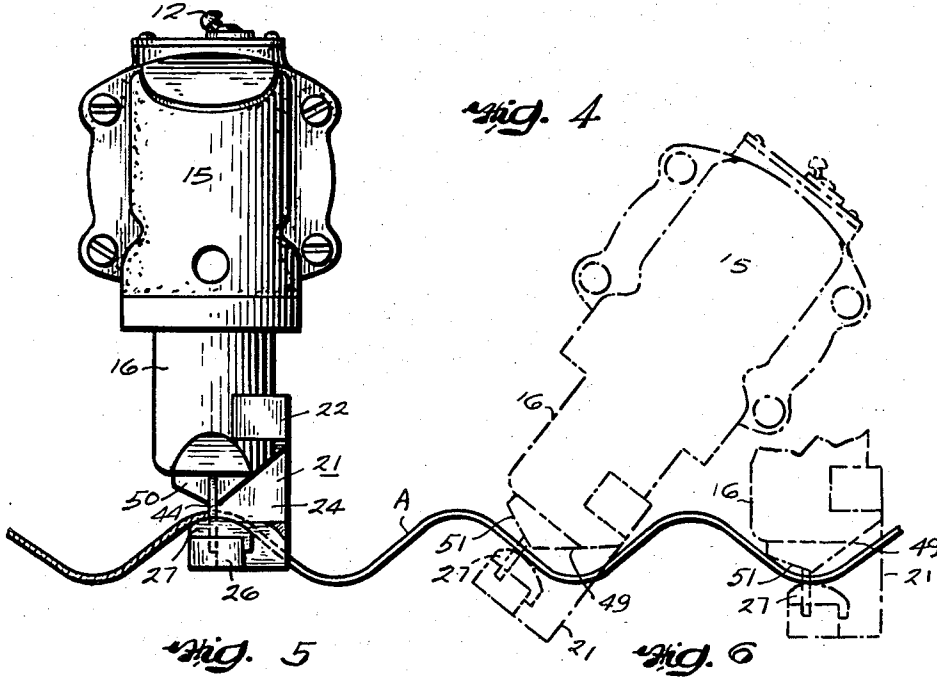
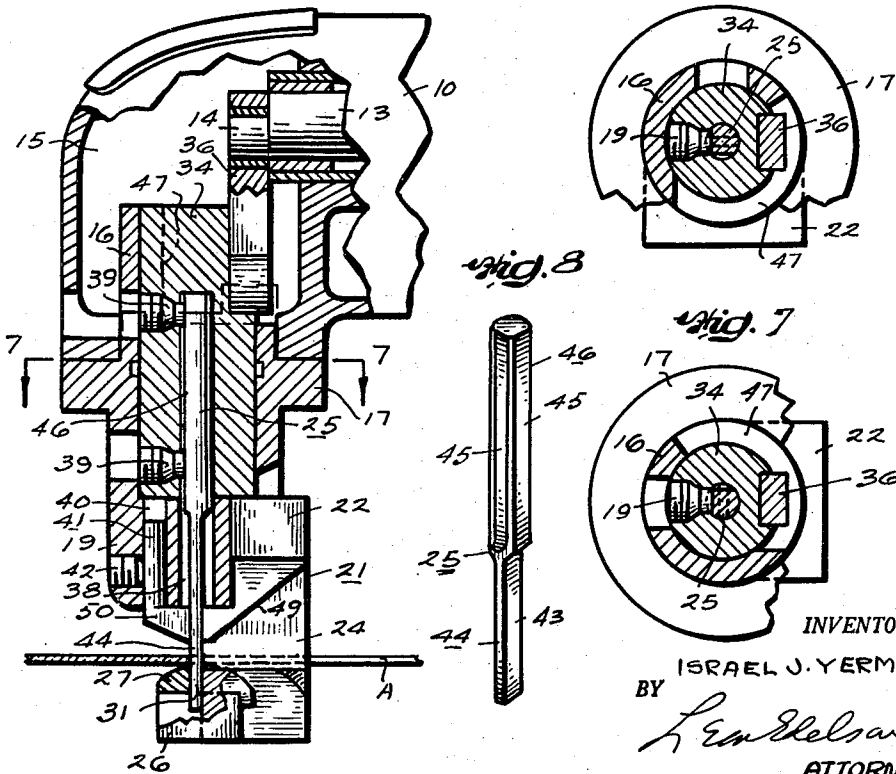
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3 Sheets-Sheet 2



INVENTOR.
BY ISRAEL J. YERMISH
Levin
ATTORNEY

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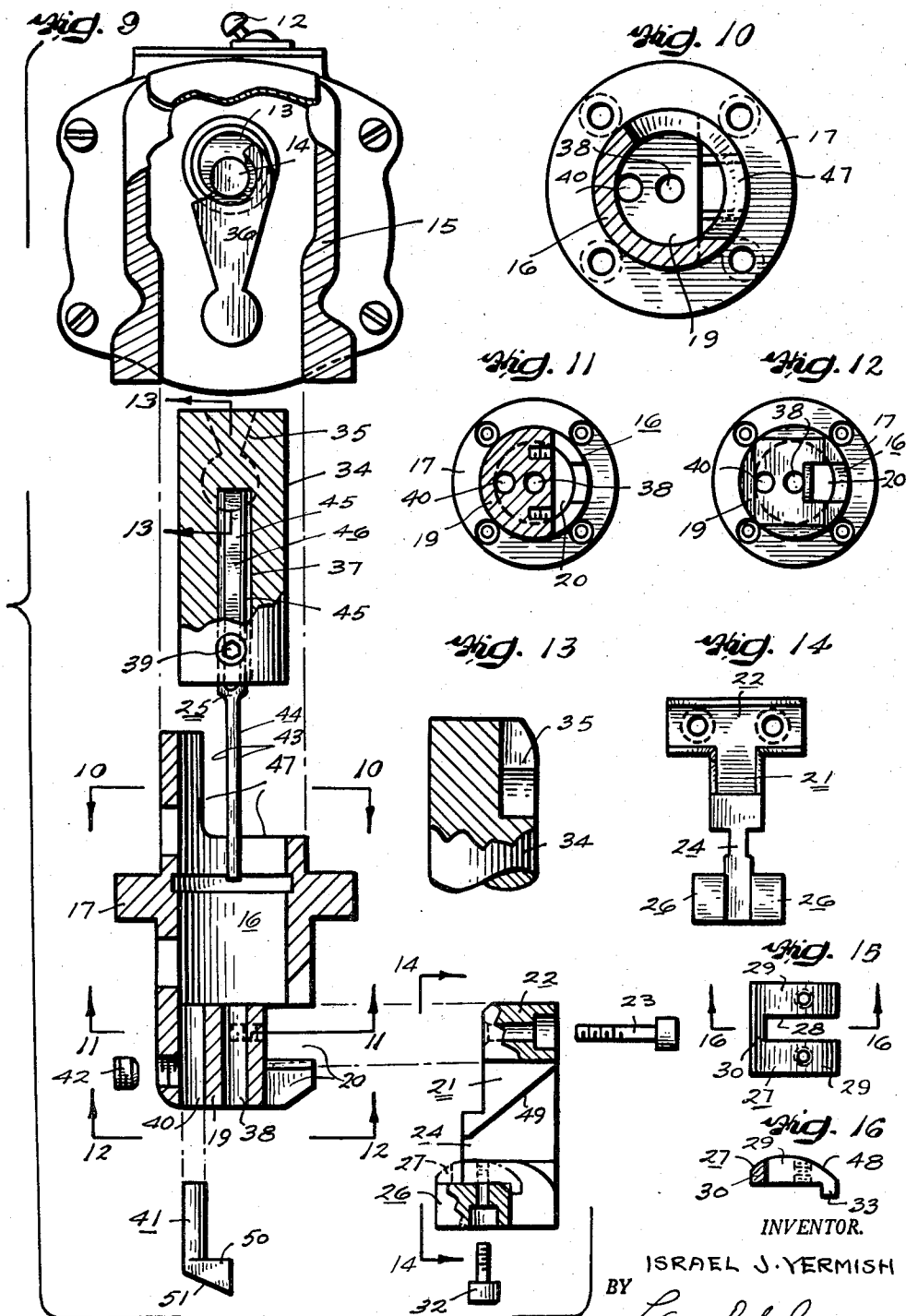
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SHEET METAL NIBBLING TOOL (FOR CORRUGATED SHEET METAL)

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3 Sheets-Sheet 3



INVENTOR.

ISRAEL J. YERMISH

BY

Lea Edelson
ATTORNEY

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SHEET METAL NIBBLING TOOL (FOR CORRUGATED SHEET METAL)

Israel J. Yermish, Philadelphia, Pa., assignor to Fenway Machine Company, Inc., Philadelphia, Pa., a corporation of Pennsylvania

Continuation of application Serial No. 614,177, October 5, 1956. This application November 18, 1957, Serial No. 697,271

13 Claims. (Cl. 30—228)

The invention relates generally to metal cutting tools and more particularly to an improved construction of portable, hand held sheet metal cutting tools of the nibbler type, this application being a continuation of co-pending application Serial No. 614,177 now abandoned, filed October 5, 1956.

A principal object of the present invention is to provide such a tool which can be selectively arranged for movement in cutting direction with its main body extending parallel to the work and normal to the line of the cut or optionally parallel to said line.

Another principal object of the present invention is to provide such a tool which may be moved in cutting direction with its main body extending parallel to the work and normal to the line of the cut, and which may be rocked simultaneously back and forth about the longitudinal axis of said main body when said line extends across corrugations formed in the work.

Other objects and advantages of the present invention will appear more fully hereinafter, it being understood that the invention consists substantially in the construction, combination, location and relative arrangement of parts, all as described in the accompanying drawings and as finally pointed out in the appended claims.

In the accompanying drawings:

Figure 1 is a perspective view of a tool constructed in accordance with and embodying the principles of the present invention, which tool is shown in the process of cutting a corrugated sheet of material;

Figure 2 is a view looking at one side of the fore end part of the tool, a portion being in elevation and a portion in vertical section;

Figure 3 is section on line 3—3 of Figure 2;

Figure 4 is front view of the tool, various positions thereof being shown in broken lines;

Figure 5 is similar to Figure 2, but shows a different arrangement of the tool;

Figure 6 is a section on line 6—6 of Figure 2;

Figure 7 is a section on line 7—7 of Figure 5;

Figure 8 is a perspective view of the punch, shown detached from the rest of the tool;

Figure 9 is an exploded view of the fore end part of the tool, portions being broken away and sectioned for the sake of clarity;

Figures 10 and 11 are sections respectively on lines 10—10 and 11—11 of Figure 9;

Figure 12 is a view on line 12—12 of Figure 9;

Figure 13 is a section on line 13—13 of Figure 9;

Figure 14 is a view on line 14—14 of Figure 9;

Figure 15 is a plan view of the die member, shown alone; and

Figure 16 is a section on line 16—16 of Figure 15.

Referring to the drawings, the nibbler tool constructed in accordance with and embodying the principles of the present invention includes a housing that has an elongated main body 10 in which is encased an electric motor (not shown). The latter is supplied with power through the medium of a cable 11, and this power is controlled

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through finger pressure applied to a switch control lever 12. Suitably journaled in the housing main body 10 is a shaft 13 that is operatively connected to and driven by the electric motor aforesaid and which has an eccentric fore end portion 14 extending freely into a head section 15 of the housing.

Carried by the housing head section 15 is a vertically extending guide member 16 that is round and tubular throughout the major portion of its length, terminating in a more or less solid lower end or nose portion. Intermediate the opposite ends of the guide member 16 is a circumferentially extending flange 17 by means of which the guide member is bolted, as by bolts 18, to the housing head section 15 with the upper end portion thereof extending freely well up into the head section 15. On one side of the nose of the guide member, designated by the numeral 19, is a T-shaped recess 20 that snugly receives the correspondingly shaped head of a die support member designated generally by the numeral 21, which head, designated by the numeral 22 is detachably secured to the nose 19, as by bolts 23.

The die support member 21 is provided with a punch backing part 24 that extends downwardly in vertical continuation of the head 22 aforesaid and horizontally rearwardly from the back of a punch 25, to be described hereinafter. Integral with the lower end portion of the punch backing part 24 is a die mounting part that is in the form of a pair of arms 26—26 which extend laterally outwardly on opposite sides of the punch backing part 24 and forwardly therefrom.

Carried by the die support member 21 is a die member 27 that is recessed, as at 28, to provide a pair of laterally spaced arms 29—29 which are connected together by a fore end portion 30. This die member is mounted with the arms 29—29 thereof respectively overlying the arms 26—26 aforesaid, and with the arm connecting portion 30 bridging the gap between the latter and disposed in spaced relation to the punch backing part 24, in consequence of which the die member 27 and the punch backing part 24 conjointly form a vertically extending open channel 31 therebetween. The die member 27 is removably secured to the die mounting part, as by bolts designated 32, and the arms 29—29 thereof are provided with depending elements 33—33 each of which hooks over the rear end portion of the associated die mounting arm 26.

Slidably fitted into the guide member 16 is a ram 34 one side of which is suitably recessed, as at 35, for operatively receiving the rounded lower end portion of a link 36. The upper end portion of the latter is connected to the eccentric fore end portion 14 of the drive shaft 13. The ram 34 is bored to provide a central channel 37, and the nose 19 of the guide member 16 is bored to provide a channel 38, these channels 37 and 38 being longitudinally aligned with one another and with the channel 31 formed conjointly by the die member 27 and the punch backing part 24. The punch 25 is slidably fitted into the channel 37 and secured therein by a pair of set screws 39—39. The nose 19 of the guide member is also bored, as at 40, for mounting a stripper member 41 that is secured in place by a set screw 42.

Referring particularly to Figure 8, the punch 25 is a round bar section the lower end portion of which is flattened on diametrically opposite sides, as at 43—43, to form a comparatively thin blade 44, and the upper end portion of which is flattened on two sides disposed at 90 degrees to one another, as at 45—45, to form a comparatively heavy shank 46. Now referring to Figures 5 and 7, it will be observed that the punch 25 may be turned about its longitudinal axis and positioned with the blade 44 thereof normal to the plane aforesaid, with the set screws 39—39 engaging the other flat surface 45 of the shank 46. Of course, repositioning the punch 25

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in the manner just indicated, necessitates a corresponding change in the position of the die support member 21, die member 27 and stripper member 41, which change is effected by suitably reorienting the guide member 16, from which the members 21, 27 and 41 aforesaid depend.

The link 36 is of a thickness greater than the depth of the recess 35 into which it is fitted, in consequence of which the back of the link 36 is positioned outwardly beyond the outer surface of the ram, thereby forming an obstruction to turning of the guide member 16 about the ram 34 for reorientation thereof. To avoid this obstruction a wall area is cut out of the guide member, which wall area, designated by the numeral 47, extends from the top of the guide member 16 downwardly to a point just below the link 36 and circumferentially through an arc of approximately 180 degrees.

The top or work supporting surface of the die member 27 is of convex shape, being curved, as at 48, in the direction of its length and being flat in the direction of its width.

The punch backing part 24 is of an overall thickness which does not exceed the width of the punch blade 44. In horizontal section, just above the die member 27, the punch backing part 24 is of wedge shape, the base of the wedge being proximate the punch blade 44 and the apex of the wedge being remote from the punch. This wedge shaped portion of the punch backing part 24 increases in vertical extent from the proximity of the punch blade 44 outwardly therefrom, whereby to form a pair of inclined shoulders, designated by the numeral 49, respectively disposed on opposite sides of the punch backing part.

The stripper member 41 is provided with a foot 50 that extends laterally from a vertically adjustable shank and engages the punch blade 44, the under surface of the foot being inclined, as at 51.

Referring particularly to Figures 1 and 4, to cut across the corrugations of a corrugated sheet of material, designated A, the tool is held parallel to the work with the main body thereof extending normal to the line of the desired cut, and a marginal area of the sheet at the point of entry of the tool is supported on the die member 27, adjacent the punch blade 44. Rotary motion of the drive shaft 13 is translated into reciprocating motion of the link 36, ram 34 and punch 25. As the latter nibbles through the material, the cut, designated B, is formed and the tool enters the work with the punch backing part 24 of the die support member trailing the punch blade 44 and passing freely between the severed sections of the material. The tool is moved in the position aforesaid but simultaneously is rocked by the operator about the longitudinal axis of its main body in order to keep the punch 25 as nearly as possible normal to the area of the work immediately underlying the punch. Referring particularly to Figure 4, in each position of the tool illustrated, the area of the work immediately underlying the punch 25 is firmly seated upon the die member 27. When the tool is cutting along the side of a corrugation, the inclined shoulders 49—49 formed respectively as opposite sides of the punch backing part 24 clear the opposed corrugation side, and when the tool is cutting between two corrugations, these shoulders 49—49 clear one of the corrugation sides and the inclined under surface 51 of the stripper foot 50 clears the other corrugation side.

To convert the tool for cutting while held in the conventional manner, parallel to the work and with the main body thereof extending parallel to the line of the cut, first the guide member 16 is detached from the housing head section 15 by removing the bolts 18 and separating the guide member 16 and die support member 21, die member 27 and stripper member 41 as a unit from the ram 34. Then the ram 34 is detached from the link 36, and the ram 34 and punch 25 are removed from the

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housing head section 15 as a unit. Next the set screws 39—39 are loosened, and the punch is given a quarter turn, whereupon the set screws 39—39 are retightened, and the ram 34 and punch 25 are reattached as a unit to the link 36. Finally the guide member 16 and die support member 21, die member 27 and stripper member 41 are reattached to the housing head section 15 as a unit in a correspondingly reoriented position.

The tool of the present invention can be utilized for cutting along a straight line or a curved line on either flat or corrugated sheet material irrespective of which of the illustrated arrangements is utilized. However, the arrangement of Figures 1 through 4 is particularly advantageous because the main body of the tool is conveniently rocked about its longitudinal axis when cutting across the corrugations of a corrugated sheet of material, instead of being tilted fore and aft, which tilting movement would materially limit the usefulness of the tool.

It will be understood, of course, that the present invention as hereinbefore described and as shown in the accompanying drawings is susceptible of various changes and modifications which may be made from time to time without departing from the general principles or real spirit of the invention, and accordingly it is intended to claim the same broadly, as well as specifically, as indicated by the appended claims.

What is claimed as new and useful is:

1. A motor-driven sheet metal cutting tool comprising an elongated motor housing adapted to be held by the operator over and parallel to a horizontally extending sheet to be cut, a vertically extending guide member provided in the fore end of said housing, a reciprocable ram fitted in said guide member, means intervening said motor drive and ram for reciprocating the latter, a die support member including a die mounting part underlying and in spaced relation to said guide member, and a punch backing part extending vertically between said die mounting part and guide member, a die member mounted upon said die mounting part and conjointly forming with said punch backing part a channel longitudinally aligned with a channel formed in said ram, and a punch fixedly secured in said ram channel and reciprocable in the other of said channels, said die member being provided with an upper work supporting surface that is flat in a direction normal, and curved in a direction parallel, to the line of the cut to be made, the areas of said surface disposed respectively fore and aft of said punch being adapted to drop vertically away from the work, increasingly from the immediate proximity of the punch outwardly in opposite directions, and being smoothly merged in the immediate proximity of the punch.

2. A motor-driven sheet metal cutting tool as defined in claim 1 wherein a portion of the punch backing part is of a vertical extent that increases from the punch outwardly from the latter and is wedge shaped in horizontal section.

3. A motor-driven sheet metal cutting tool as defined in claim 1 wherein the guide member carries a vertically extending stripper member having a lateral extension that slidably supportingly engages the punch, said stripper member is vertically adjustable relative to said guide member, and the under surface of said extension is sloped upwardly in cutting direction from the immediate proximity of the punch.

4. A motor-driven sheet metal cutting tool as defined in claim 1 wherein a portion of the punch backing part of a vertical extent that increases from the punch outwardly from the latter is wedge shaped in horizontal section to thereby form a shoulder that slopes upwardly from the punch in a direction opposite to cutting direction, and the guide member carries a positionally adjustable vertically extending stripper member the under

surface of which is sloped upwardly from the punch in cutting direction.

5. In a sheet metal punch, an elongated member made of bar stock uniformly round in transverse section including a shank portion at one end and a blade portion at the opposite end, said shank portion being uniform in transverse section and provided with a pair of longitudinally extending sides flat and normal to one another, and a longitudinally extending side rounded through a distance at least half-way about said shank, and said blade portion being uniform in transverse section and provided with a pair of longitudinally extending oppositely facing sides flat and parallel to one another, and a pair of longitudinally extending oppositely facing rounded sides, the surface of each rounded side aforesaid being an area of the outer surface of the round bar member of which the punch is made.

6. In a sheet metal punch as defined in claim 5 wherein diametrically opposite the rounded shank side and intervening the pair of flat shank sides is a fourth longitudinally extending rounded side that is an area of the outer surface of the rounded bar member of which the punch is made, and the blade portion is comparatively thin and flat and disposed in a plane normal to one of said flat shank sides.

7. In a motor-driven sheet metal cutting tool comprising a reciprocable ram, a punch reciprocable with said ram and having a flat blade extending from said ram in longitudinal continuation thereof, and a die member adapted for reciprocation of said blade therein and having a work supporting surface flat in the direction of the width of said blade and convex in the direction of the thickness of said blade, said die member and punch being positionable together relative to said ram optionally in a plurality of different positions spaced angularly about the longitudinal axis of said ram and said punch being detachably securable to said ram in any one of the different positions aforesaid.

8. In a motor-driven sheet metal cutting tool comprising a reciprocable ram, a punch reciprocable with said ram and having a flat blade extending from said ram in longitudinal continuation thereof, a die member having a work supporting surface flat in the direction of the width of said blade and convex in the direction of the thickness of said blade, a vertically extending positionally adjustable stripper member on one side of said blade having an undersurface sloped outwardly from said blade and toward said ram, a punch backing part on the opposite side of said blade, said blade being reciprocable between said stripper and die members on the one side and said punch backing part on the opposite side, said die and stripper members and punch and punch backing part being positionable together relative to said ram optionally in a plurality of different positions spaced angularly about the longitudinal axis of said ram, and said punch being detachably securable to said ram in any one of the different positions aforesaid.

9. In a sheet metal punch, an elongated member made of bar stock uniformly round in transverse section including a shank portion at one end and a blade portion at the opposite end, said shank portion being uniform in transverse section and provided with a pair of longitudinally extending sides flat and normal to one another, and a longitudinally extending side rounded through a distance at least half-way about said shank.

10. In a sheet metal punch as defined in claim 9 wherein diametrically opposite the rounded shank side and intervening the pair of flat shank sides is a fourth longitudinally extending rounded side that is an area of the outer surface of the rounded bar member of which the punch is made.

11. A motor-driven sheet metal cutting tool comprising a motor housing, a reciprocable punch, and work support means including a part carried by said housing and extending therefrom along the back of said punch, and a second part carried by said punch backing part and extending about and providing a guide for the working end of said punch, said punch backing part being provided with a wedge shaped portion extending axially of said punch and disposed with the broad base surface thereof against the back of said punch, said wedge shaped portion being of increasing length from the back of said punch outwardly from the latter, whereby to provide a pair of overhanging shoulders disposed respectively on opposite sides thereof and sloped axially of said punch from the back of the latter outwardly from the same and away from said second part of the work support means.

12. A motor-driven sheet metal cutting tool comprising a motor housing, a reciprocable punch, and work support means including a part carried by said housing and extending therefrom along the back of said punch, and a second part carried by said punch backing part and extending about and providing a guide for the working end of said punch, said punch backing part being provided with a portion of substantially uniform thickness undercut to provide a pair of shoulders respectively upon opposite sides thereof sloped axially of said punch to provide a flared work discharge passage underlying said shoulders.

13. A motor-driven sheet metal cutting tool comprising a motor housing, a reciprocable punch, and work support means including a part carried by said housing and extending therefrom along the back of said punch, and a second part carried by said punch backing part and extending about and providing a guide for the working end of said punch, said punch backing part being provided with a portion of substantially uniform thickness undercut to provide a pair of shoulders respectively upon opposite sides thereof sloped in a direction parallel to the cut to be made, and a stripper member selectively shiftable axially of said punch and having an undersurface sloped in a direction parallel to the cut to be made and away from said convex work supporting surface, said under surface of the stripper and said work support surface conjointly affording a flared entrance passage for the work, and said shoulders of the punch backing part and said work support surface conjointly affording a flared work discharge passage.

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