Sept. 21, 1965 W. GAUER 3,206,965

SHEET METAL EDGING APPARATUS

Filed June 19, 1963 4 Sheets-Sheet 1

FIG. 1

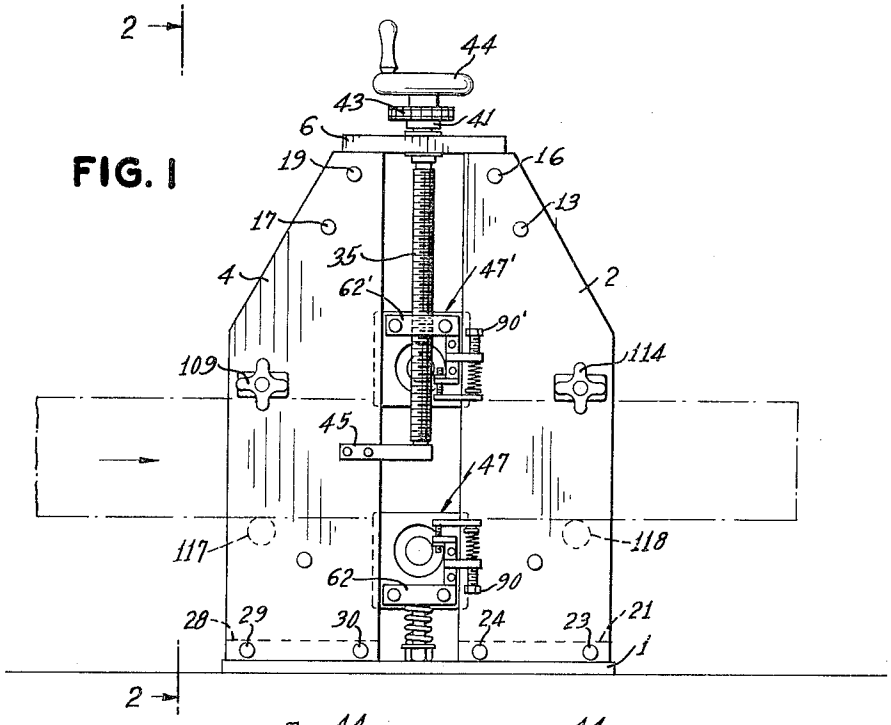


FIG. 2

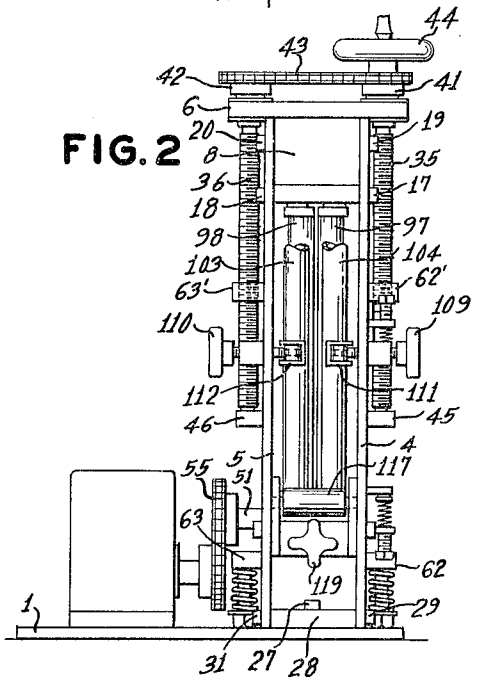
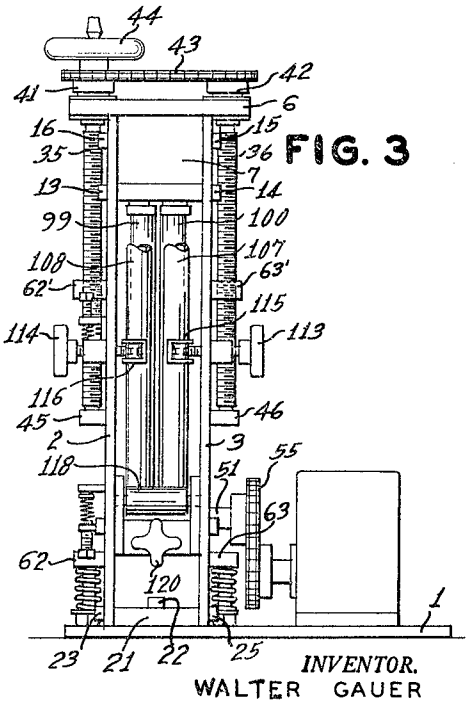


FIG. 3



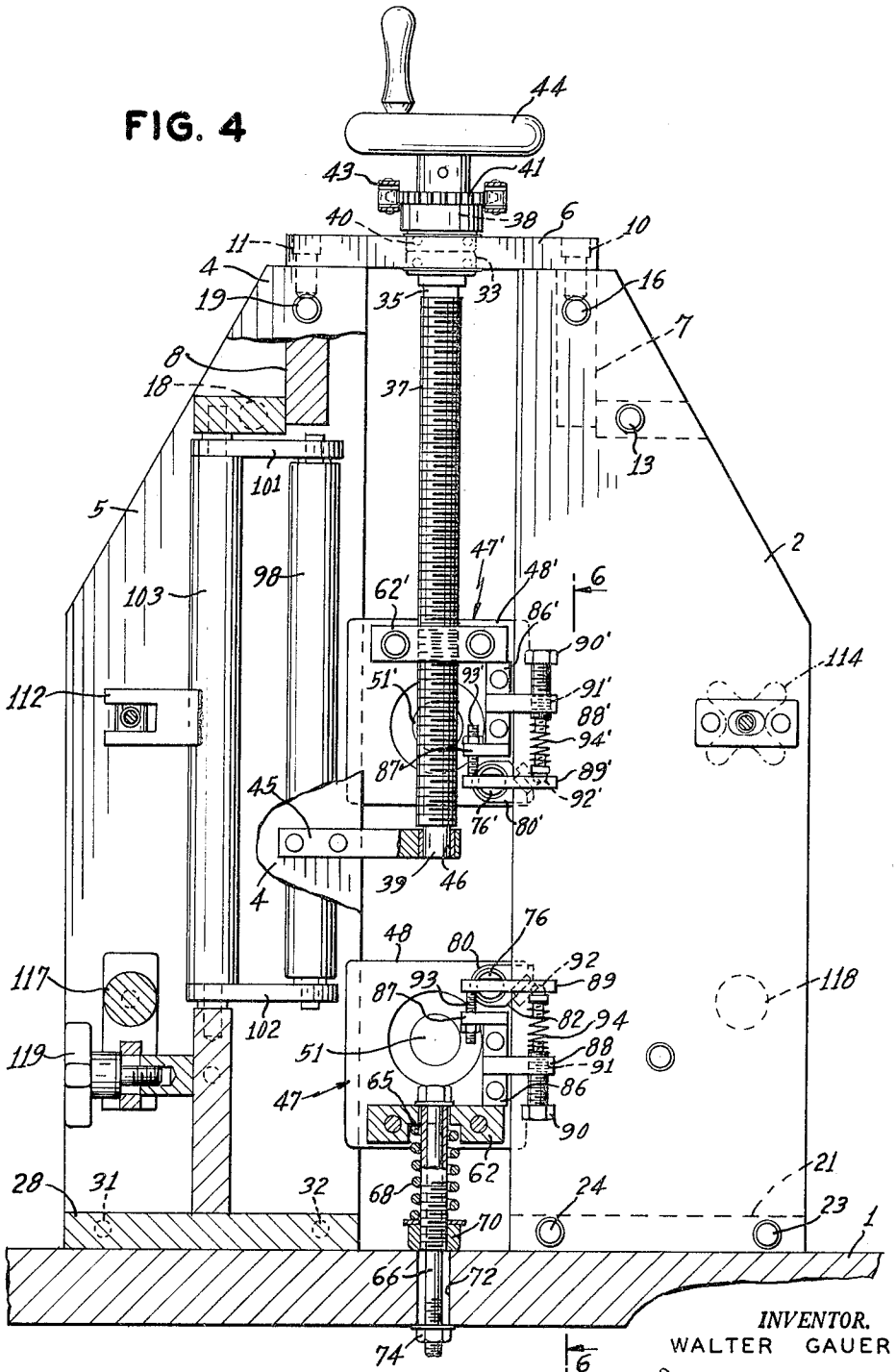
INVENTOR.
WALTER GAUER
BY John G. Gualtieri
Agent
ATTORNEY

Sept. 21, 1965 W. GAUER 3,206,965

SHEET METAL EDGING APPARATUS

Filed June 19, 1963 4 Sheets-Sheet 2

FIG. 4



INVENTOR.
WALTER GAUER
John G. Gogalick
Agent
ATTORNEY

Sept. 21, 1965 W. GAUER 3,206,965

SHEET METAL EDGING APPARATUS

Filed June 19, 1963 4 Sheets-Sheet 3

FIG. 5

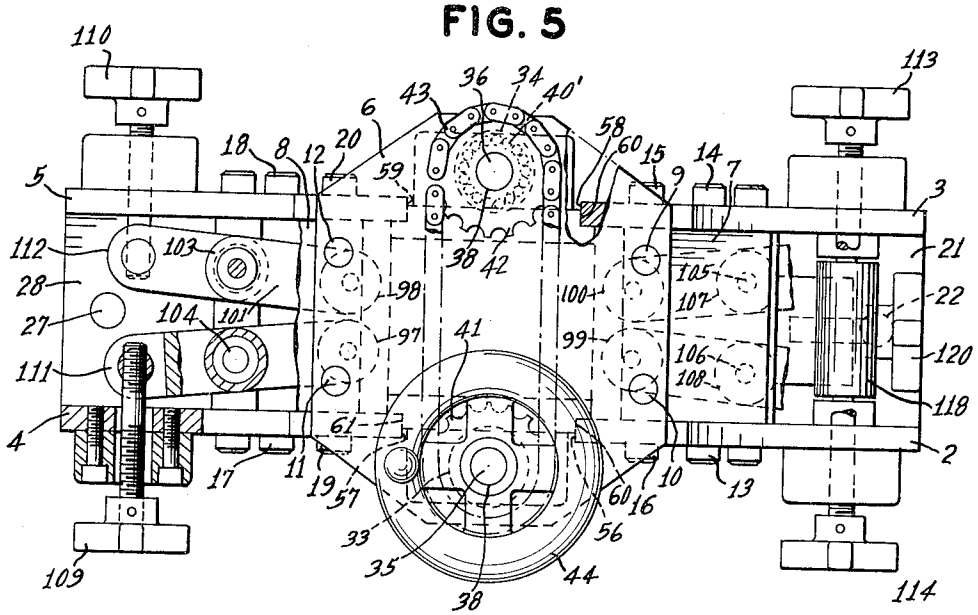


FIG. 8

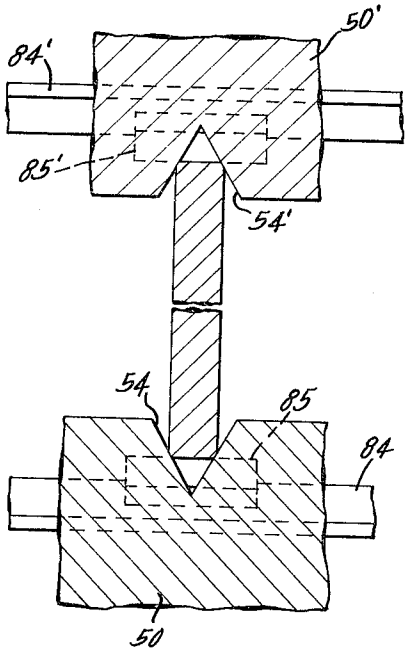
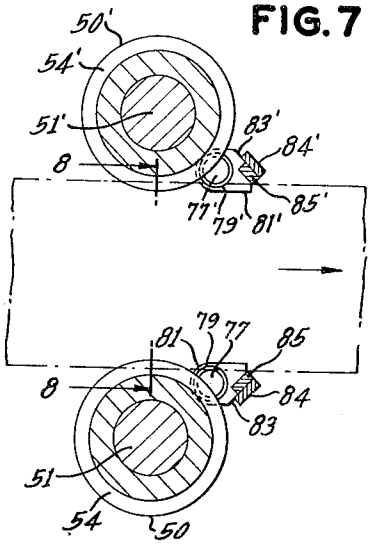


FIG. 7



INVENTOR.
WALTER GAUER
BY John J. Hovalek
Agent

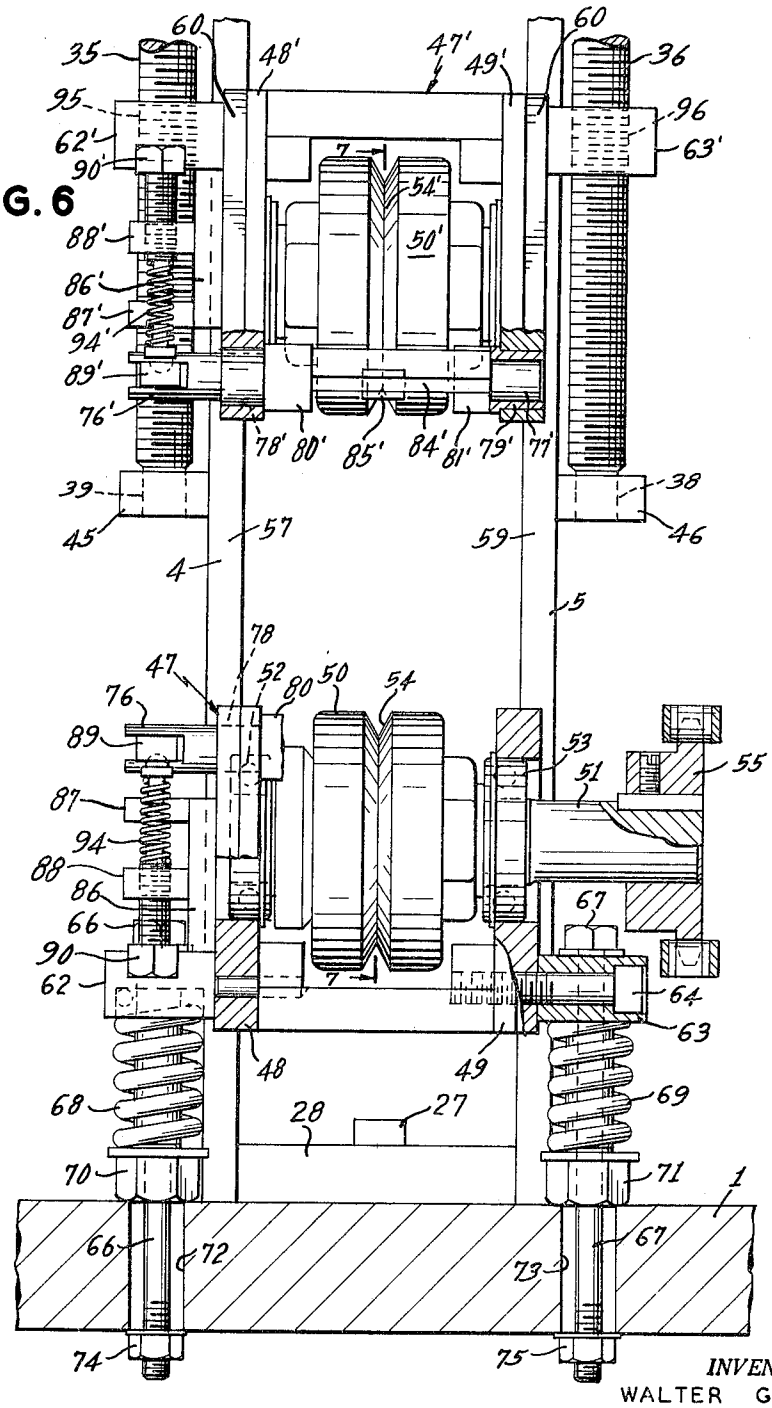
ATTORNEY

Sept. 21, 1965 W. GAUER 3,206,965

SHEET METAL EDGING APPARATUS

Filed June 19, 1963 4 Sheets-Sheet 4

FIG. 6



INVENTOR.
WALTER GAUER

BY John J. Kowalik
Agent

ATTORNEY

United States Patent Office 3,206,965 Patented Sept. 21, 1965

3,206,965

SHEET METAL EDGING APPARATUS

Walter Gauer, 48 S. 18th St., Kenilworth, N.J.

Filed June 19, 1963, Ser. No. 289,102
11 Claims. (Cl. 72—206)

This invention deals with a sheet metal edging apparatus and more particularly with an apparatus for edging sheet metal and metal strip within a wide range of sheet and strip width and thickness dimensions.

The apparatus of the invention comprises cooperating elements especially adapted not only to accommodate a wide range of metal sheet and strip dimensions in the edging operation, but to provide for the accurate and controlled edging of strip and sheet material composed of various metals and metal alloys including relatively soft as well as relatively hard metals with controlled edging accuracy.

When metal sheet or strip of desired dimensions is sheared from comparatively larger sheet metal stock, there is the attendant formation of burrs or ridges out of the plane of the strip or out of the plane of the narrow edge normal to the longitudinal dimension of the strip. These burrs or ridges are often extremely sharp and present a hazard in the handling of the sheared strip or sheet. Apart from the potential hazard the sheared edges lack straight-edged uniformity and are disadvantageous, for example, when edge-to-edge welding or close fit edge abutment is contemplated.

Various types of sheet or strip metal apparatus are known, but in general they lack the versatility of easily accommodating a wide range of sheet width dimensions, they lack operability to provide constant edge tolerances with a wide variety of metal compositions and they are otherwise unable to provide uniform edging of strips having slight variations in width.

It is an object of the invention to provide a sheet or strip metal edging apparatus adapted to accommodate a wide variety of strip or sheet metal widths during the edging operation.

It is another object of the invention to provide a sheet or strip metal edging apparatus adapted to accommodate a wide variety of metal compositions for the accurate and controlled edging of the work material.

It is a further object of the invention to provide an edging apparatus easily adjustable for operation with strip or sheet materials of different widths and compositions.

It is a still further object of the invention to provide an edging apparatus incorporating cooperative components to provide for controlled yieldable edging pressures.

Other objects and advantages of the invention will become apparent from the description hereinafter following and the drawings forming a part hereof in which:

FIGURE 1 illustrates an elevational front view of the apparatus according to the invention.

FIGURE 2 illustrates an elevational side view along lines 2—2 of FIGURE 1.

FIGURE 3 illustrates an elevational side view of the side opposite to that of FIGURE 2.

FIGURE 4 illustrates a partly cross-sectional and partly elevational enlarged front view of the apparatus.

FIGURE 5 illustrates a top view of FIGURE 4.

FIGURE 6 illustrates a fragmentary view along lines 6—6 of FIGURE 4.

FIGURES 1 through 3 are elevational views of the complete apparatus of the invention and FIGURES 4 through 6 are enlarged detail views shown partly in elevation, cross-section and fragmentation. Referring to the figures, the apparatus comprises of a base 1 having mounted thereon a first pair of laterally spaced upright

sides 2 and 3 and a second pair of laterally spaced upright sides 4 and 5. Preferably, the sides are in the form of flat plates. While the sides of each pair of sides are spaced laterally of each other, the pairs as such are also laterally spaced of each other at right angles from the spacing of the sides of each pair to provide vertical rail means along the edges thereof hereinafter more particularly described. A top plate 6 is mounted on the top of the sides and overlying the four individual sides as illustrated by FIGURE 5.

A pair of L-shaped spacers 7 and 8 are mounted between the top portions of both pairs of sides with the top ends of vertical legs thereof extending into alignment with the top surfaces of sides 2 and 3 and 4 and 5, respectively. The horizontal legs of the L-shaped spacers 7 and 8 extend in a direction opposite from each other. Top plate 6 is mounted on the top of the sides 2 and 3 by bolts 9 and 10 passing therethrough and into the top of the vertical leg of L-shaped spacer 7, and with bolts 11 and 12 identically mounted on the top of sides 4 and 5. Sides 2 and 3 are secured at a top portion thereof to the spacer 7 by bolts 13 and 14 passing therethrough into the horizontal leg of spacer 7 and bolts 15 and 16 passing therethrough into the vertical leg of spacer 7. Sides 4 and 5 are identically secured to spacer 8 by bolts 17, 18, 19 and 20. The sides 2 and 3 are mounted at the bottom portion thereof to base plate 1 by means of flat spacer 21 positioned therebetween and on the top surface of base 1. Bolt 22 secures the spacer 21 to base 1 and bolts 23, 24, 25 and 26 secure the bottom portion of plates 2 and 3 to the spacer 21. The sides 4 and 5 are, relative to sides 2 and 3, identically spaced and mounted at the bottom thereof to base plate 1 by bolt 27 securing spacer 28 to base 1 and bolts 29, 30, 31 and 32.

The structure heretofore described constitutes the basic frame of the apparatus of the invention.

Referring to FIGURES 4 and 5, the top plate 6 is provided with portions thereof extending in opposite direction laterally outwardly beyond the outer surface of sides 2, 3, 4, and 5 and with a pair of apertures 33 and 34 laterally spaced of each other at a distance exceeding the spacing between the sides 2, 3, 4 and 5 and through the oppositely extending portions. A pair of parallel rods 35 and 36 each having externally threaded surfaces as at 37 and long and short thread-free end portions as at 38 and 39, respectively, rotatably vertically mounted in apertures 33 and 34 with the long end portions 38 having ball bearing means 40 and 40' intermediate the ends 38 of each rod and the inner walls defining apertures 33 and 34 in which the rods are mounted. The upper ends 38 extend upwardly through the aperture and are each provided with sprockets 41 and 42 positioned on top plate 6. A chain 43 engages both sprockets and by means of ball crank 44 mounted on end 38 of rod 35 both rods are simultaneously rotated. The lower thread-free ends 39 are each rotatably mounted in seat members 45 and 46 intermediate the top and bottom edges of the sides and thereby maintains its parallel relationship centrally of the spacing hereinabove referred to between the pairs of spaced sides. As illustrated in FIGURE 4, the ends 39 are journaled in bearing lined aperture 46 formed through an end portion of the seat members.

A first roll carriage generally designated as 47 is provided at a bottom of the apparatus. The roller carriage 47 has a pair of laterally spaced parallel side plates 48 and 49 with a driven roll 50 rotatably mounted therebetween. The roll 50 is mounted on a shaft 51 which is journaled in both side plates 48 and 49 with intermediate ball bearing means 52 and 53. The roll is provided with a centrally positioned peripheral V-shaped groove 54. A portion of shaft 51 extends laterally out-

wardly beyond sides 3 and 5 and is provided with a drive sprocket 55 on the extending end portion.

In accordance with the foregoing description, the pairs of sides referred to above are a first pair of sides 2 and 3 and a second pair of sides 4 and 5 and they are laterally spaced from each other. Particularly this lateral spacing is between the adjacent vertical parallel edges 56 and 57 of sides 2 and 4, respectively, and edges 58 and 59 of sides 3 and 5, respectively. These vertical edges constitute a rail means for the vertical movement of carriage 47 thereon. The carriage 47 is mounted in the rectangular central space defined by both the spacing between the pairs of sides and by the spacing between the individual sides of the first and second pair of sides. The vertical sides of both carriage plates 48 and 49 are provided with vertical and squared undercuts as at 60 and 61 of plate 48 and the carriage plates 48 and 49 are movable along the rail edges 56 and 57 in contact with the vertical undercuts. Each of the carriage plates 48 and 49 are provided with an outwardly extending horizontal block 62 and 63, respectively along the bottom of each plate. The blocks are secured to the plates, for example, by bolts 64. The underside of each block is provided with a recessed spring seat 65 as illustrated in FIGURE 4. The recesses are centrally apertured and a pair of partly threaded bolts 66 and 67 are passed downwardly through each block aperture with the threaded portions thereof clearing the thickness of the blocks. Compression springs 68 and 69 are mounted on the bolts 66 and 67, respectively, below the blocks 62 and 63. In lieu of the springs, other suitable elastic compression means may be employed, e.g. rubber or compressed gas means, so long as the compression members are capable of controlled yieldability. Spring retaining rings 70 and 71 are mounted on the bolts below the springs. The end portions of the bolts are passed through apertures 72 and 73 through base plate 1 and nuts 74 and 75 are applied to the bolt ends to yieldably secure the carriage 47 to the base plate at above-described location. Since the carriage 47 is yieldably mounted by virtue of elastic compressive means, it will be recognized that the advancement or retraction of bolts 74 and 75 will control the yieldability of carriage 47 and the attendant roll 50. In other words the roll 50, when the springs are under lower compression, is under resultant forces of compression such that edging of relatively soft metals can be advantageously accomplished. When the work pieces are of relatively hard metals, a simple advancement of the bolts 74 and 75 on their respective bolts will increase the resultant forces of compression for the desired edging. The term "resultant forces of compression" refers to the forces generated in opposition to the forces employed in compressing the springs. In contrast to controllable yieldability of elastic compression means, a tension spring or like tension means relies only upon its inherent ability to retract and cannot be as advantageously controlled as the compression spring.

In addition to the mounted V-grooved roll 50 in carriage 47, short rotatable shafts 76 and 77 are mounted in the plates 48 and 49 in spaced axial alignment with each other, each being journaled in bearings 78 and 79. The shafts are each provided at their inner end portions with a cam-like head 80 and 81 having flat surfaces 82 and 83. The heads 80 and 81 are bridged by bar 84, mounted on the flat surfaces 82 and 83 and a burnishing block 85 is mounted intermediate the ends of the bar 84. The shafts 76 and 77 are located on the plates 48 and 49 and spaced from shaft 51 so that the burnishing block is positioned in alignment with and rearwardly of the groove 54 of roll 50. A vertical bar 86 is mounted along the side of plate 48 and is provided with a terminal ear 87 and a second ear 88, the ears being vertically spaced from each other on the bar 86 and extending outwardly of the bar in opposite directions relative to each other.

A lever 89 is mounted on shaft 76 and the ends thereof extend outwardly of the shaft in diametrically opposite directions relative to the shaft axis. One of the extending portions being shorter than the other. A threaded bolt 90 is threadedly mounted through threaded aperture 91 in ear 88 and the end of the bolt extends into engagement with bolt seat 92 in the end portion of lever 89. A lever stop member 93 in the form of a bolt is mounted through an aperture through terminal ear 87 and abuts the shorter lever extension. A compression spring 94 is mounted on bolt 90 intermediate the lever 89 and the ear 88.

A second roll carriage 47′ is mounted in the rectangular central space defined by both the spacing between the pairs of sides and the spacing between the individual sides of the first and second pair of sides. The second roll carriage 47′ is mounted directly above carriage 47 in vertical alignment and in slidable relationship with the rail edges hereinabove described with respect to carriage 47. Both carriages 47 and 47′ are substantially identical and identical components thereof are identified by primed reference numerals, except that shaft 51′ and blocks 62′ and 63′ are slightly modified relative to their counterparts in carriage 47. Shaft 51′ is shorter than shaft 51 and blocks 62′ and 63′ omit the spring seats 65 of blocks 62 and 63.

In mounting carriage 47′, the carriage is positioned in inverted relationship relative to carriage 47 with the axes of roll 50, shafts 76 and 77, and bolt 90 being, respectively, in vertical alignment with roll 50′, shafts 76′ and 77′ and bolt 90′.

Horizontal block 62′ and 63′ are provided with threaded bores 95 and 96 therethrough and the threaded rods 35 and 36 are threadedly engaged with the bores 95 and 96. It will be apparent that when bell crank 44 is operated that carriage 47′ will ride vertically upwardly and downwardly along rail edges 56 and 57.

A first pair of vertical guide rolls 97 and 98 are positioned forwardly of rolls 50 and 50′ and a second pair of vertical guide rolls 99 and 100 are positioned rearwardly of the said rolls. Guide rolls 97 and 98 are mounted between a pair of vertically spaced levers 101 and 102 at the adjacent end thereof. Fulcrums 103 and 104 in the form of vertical posts are interconnected between the said levers 101 and 102 for the forward guide rolls and fulcrums 105 and 106 are identically connected between identical levers 107 and 108 for rear guide rolls 99 and 100. Guide roll control means 109 and 110 are threadedly engaged with post lever arms 111 and 112, respectively, through sides 4 and 5. Identical guide control means 113 and 114 are identically engaged with lever arms 115 and 116.

Adjustable work piece rest rolls 117 and 118 are provided forwardly and rearwardly of roll 50 and are vertically adjustable by means of set members 119 and 120.

In operation, a work piece strip or sheet is passed through the apparatus between rolls 50 and 50′. Prior to the passage, the bell crank 44 is operated to pressurize the roll against the longitudinal edges of the work piece between the V-shaped grooves of rolls 50 and 50′ with an optimum pressure for the work piece material. When roll 50′ is so pressurized, it imparts a compression force through the workpiece to roll 50 which is depressed under compression forces of the springs 68 and 69. Roll 50′ sets the required compression forces and thereafter the springs 68 and 69 control the compression on the upper and lower edges of the strip.

The necessary compression forces are empirically established for the metal composition undergoing edging and thereafter automatically maintained by means of springs 68 and 69.

When comparatively hard metals are undergoing edging the guide rolls 97, 98, 99 and 100 are not absolutely necessary but when softer metals are used, the vertical guide rolls prevent the strip or sheet from buckling under

the edging pressures imparted by the rolls **50** and **50'**. However, when the strip or sheet material is passed through the rolls **50** and **50'** for edging by means of the V-shaped grooves, such edging does not in itself eliminate the complete deburring of the edges. To completely eliminate all burrs, the burnishing blocks **85** and **85'** positioned rearwardly of the rolls **50** and **50'** will simultaneously burnish the edges and completely eliminate all burrs in the single operation of passing the workpiece through the apparatus.

Various modifications of the invention are contemplated within the scope of the appended claims.

What is claimed is:

1. Apparatus for edging metal sheet and strip material comprising first and second substantially cylindrical rolls each having a circumferential co-axial V-shaped groove in the peripheral surface thereof, the grooves being in alignment with each other along a common plane normal to the axes of the rolls, a base, pressure yieldable compression means, the first roll being yieldably connected to the base through said pressure yieldable compression means connected intermediate the roll and the base and positioned for yieldability normal to the roll axis, selectively adjustable guide means mounted for translatory movement relative to the first roll and normal to the axis thereof, the second roll being mounted on said guide means, means for selectively adjusting said guide means relative to said first roll, and means for maintaining the adjusted position in opposition to the yieldable compression means.

2. Apparatus for edging metal sheet and strip material according to claim **1**, comprising adjustment means connected to said compression means for selectively adjusting the compression force of said compression means.

3. Apparatus for edging metal sheet and strip material comprising first and second carriages each containing rotatably mounted therein a substantially cylindrical roll, each roll having a circumferential co-axial V-shaped groove in the peripheral surface thereof, the grooves being in alignment with each other along a common plane normal to the axes of the rolls, a base, pressure yieldable compression means, the first carriage being yieldably connected to the base through said pressure yieldable compression means connected intermediate the first carriage and the base and positioned for yieldability normal to the roll axis, selectively adjustable guide means mounted for translatory movement relative to the first carriage and normal to the first carriage roll axis, the second carriage being mounted on said guide means, means for selectively translatorily adjusting the guide means relative to first carriage, and means for maintaining the adjusted position.

4. Apparatus according to claim **3**, comprising means for maintaining said adjusted position in opposition to the yieldable compression means.

5. Apparatus according to claim **3**, wherein the guide means is mounted on a threaded rod mounted normal to the roll axes.

6. Apparatus according to claim **5**, comprising means for rotating said rod thereby imparting translatory motion to said guide means along said rod.

7. Apparatus according to claim **3**, comprising burnishing means mounted on each carriage forwardly of the rolls and in contactable relationship with the edges of a work piece passing between said V-shaped grooves.

8. Apparatus according to claim **7**, comprising lever means interconnected with said burnishing means, and adjustable compression means connected to said lever, whereby controlled burnishing pressures are applied to the burnishing means.

9. Apparatus for edging metal sheet and strip material comprising first and second carriages each containing rotatably mounted therein a substantially cylindrical roll, each roll having a circumferential co-axial V-shaped groove in the peripheral surface thereof, the grooves being in alignment with each other along a common plane normal to the axes of the rolls, a base, pressure yieldable compression means, the first carriage being yieldably connected to the base through said pressure yieldable compression means connected intermediate the first carriage and the base and positioned for yieldability normal to the roll axis, selectively adjustable guide means mounted for translatory movement relative to the first carriage and normal to the first carriage roll axis, the second carriage being mounted on said guide means, means for selectively translatorily adjusting the guide means relative to first carriage, means for maintaining the adjusted position, and a pair of parallel laterally spaced guide rolls with the said plane therebetween and mounted forwardly of the V-shaped grooves.

10. Apparatus according to claim **3**, comprising motor means connected to one of the first and second carriage rolls for rotating said one roll.

11. Apparatus according to claim **9**, comprising means for varying the lateral spacing between said guide rolls.

References Cited by the Examiner

UNITED STATES PATENTS

1,837,494	12/31	Sessions	72—206 X
1,963,724	6/34	Taylor	80—40
2,353,289	7/44	Bennewitz	80—40

RICHARD H. EANES, *Primary Examiner.*