Jan. 14, 1941. C. P. CHAMBERLIN 2,228,506

METAL WORKING DEVICE

Original Filed Nov. 11, 1937 4 Sheets-Sheet 1

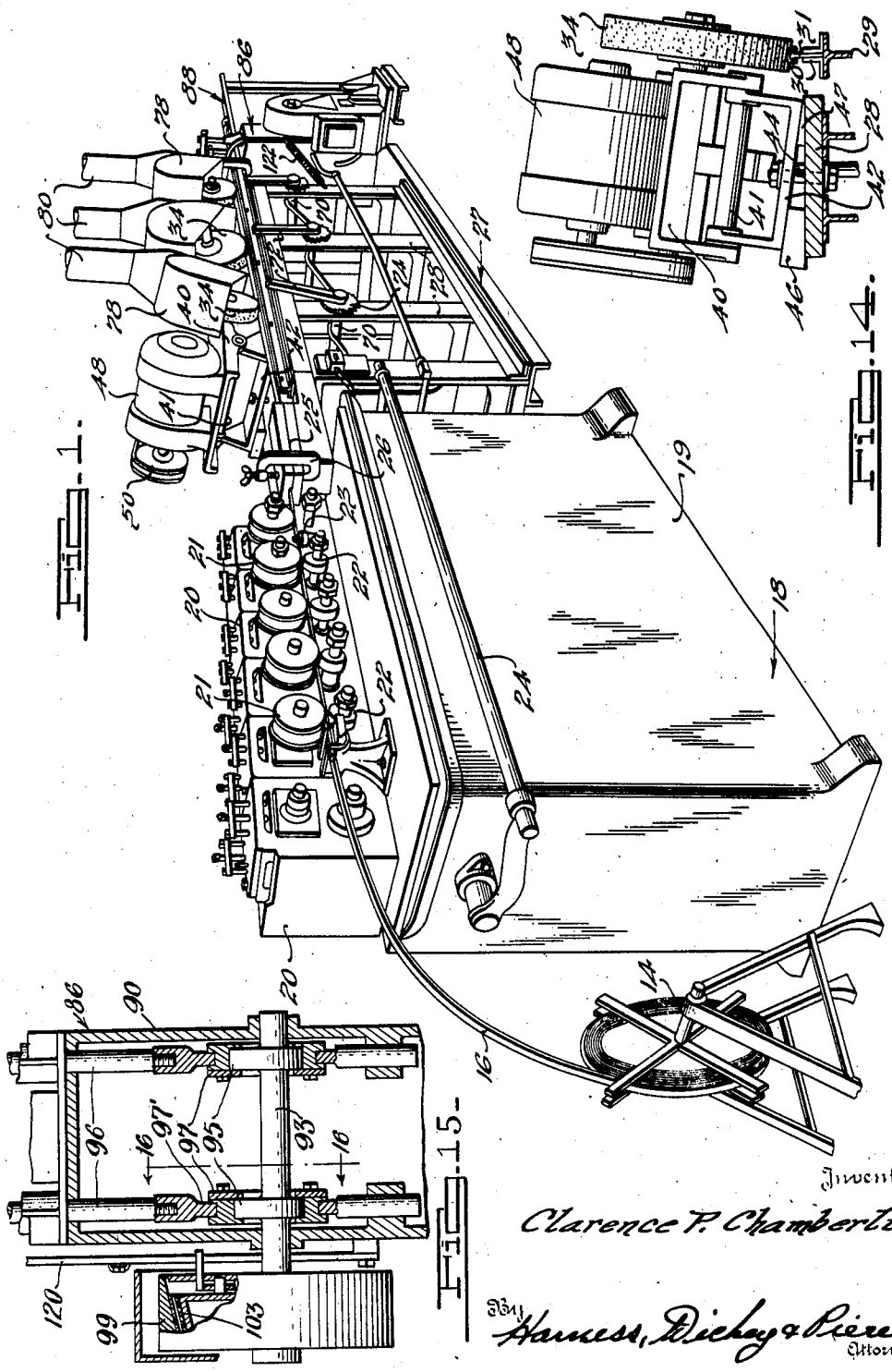


Fig. 1.

Fig. 14.

Fig. 15.

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METAL WORKING DEVICE

Original Filed Nov. 11, 1937 4 Sheets-Sheet 2

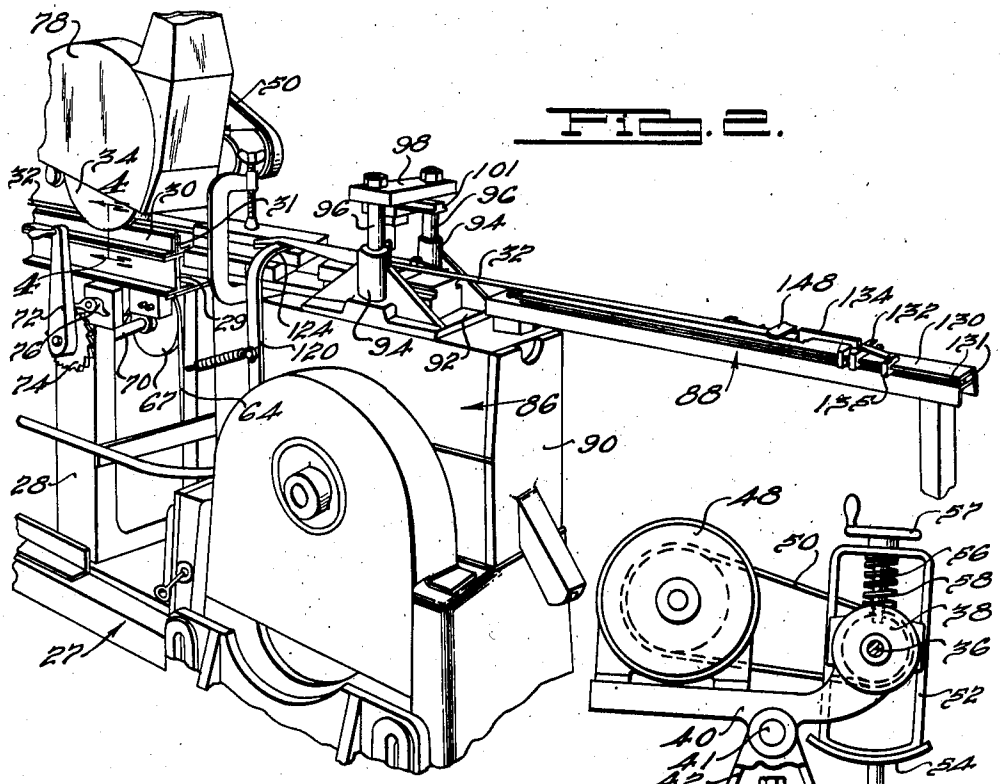


Fig. 2.

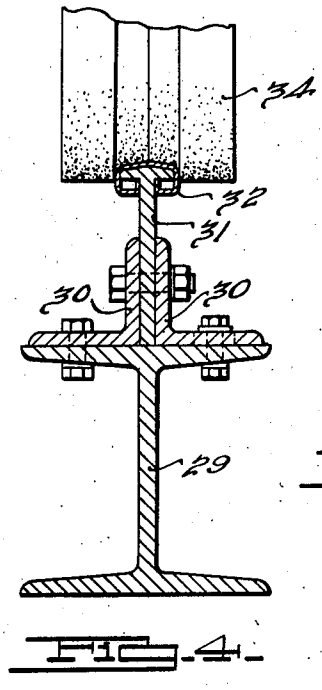


Fig. 4.

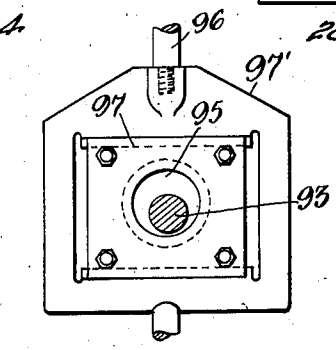


Fig. 1B.

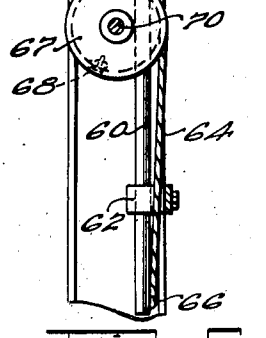


Fig. 5.

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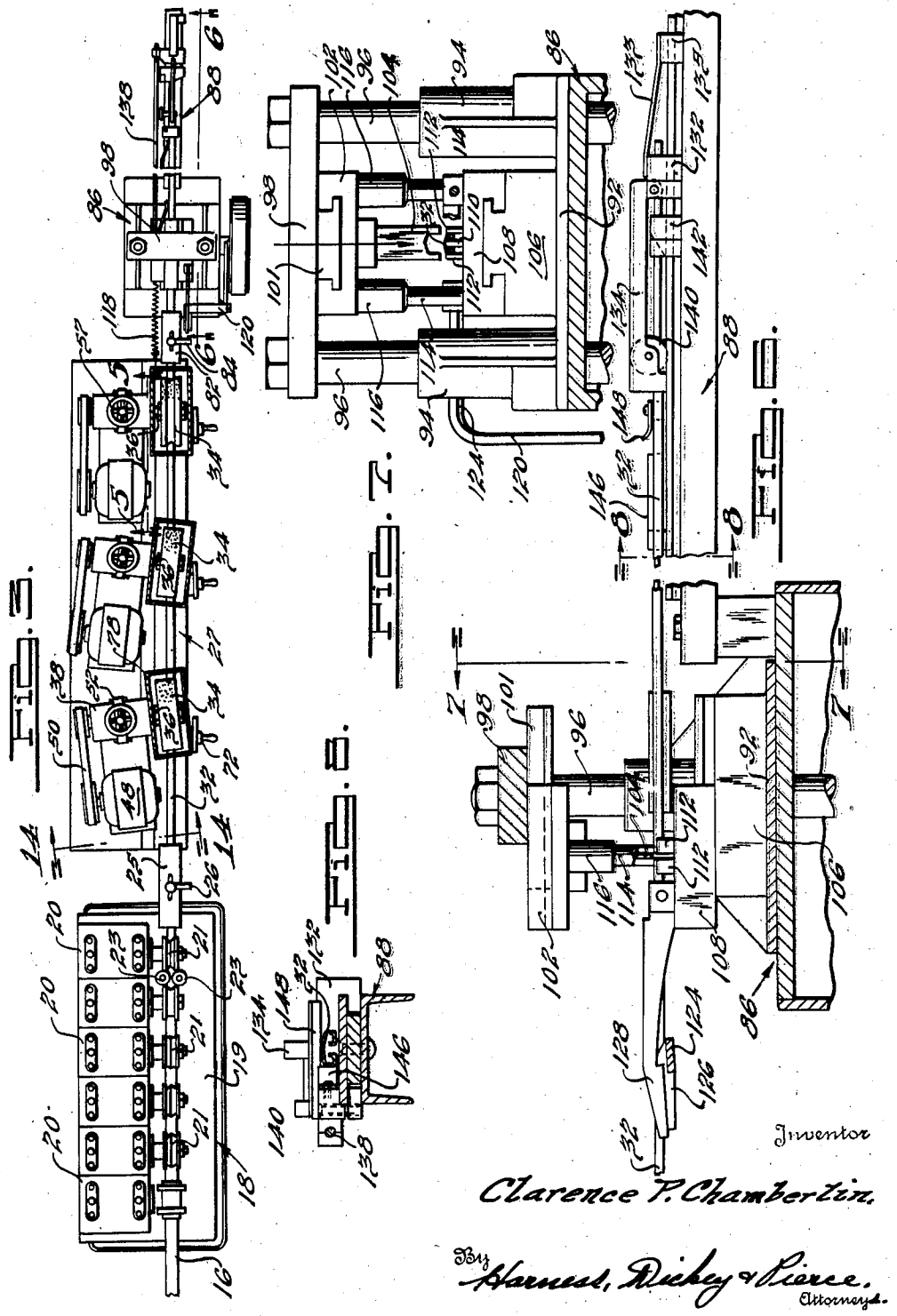
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METAL WORKING DEVICE

Original Filed Nov. 11, 1937 4 Sheets-Sheet 3



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METAL WORKING DEVICE

Original Filed Nov. 11, 1937 4 Sheets-Sheet 4

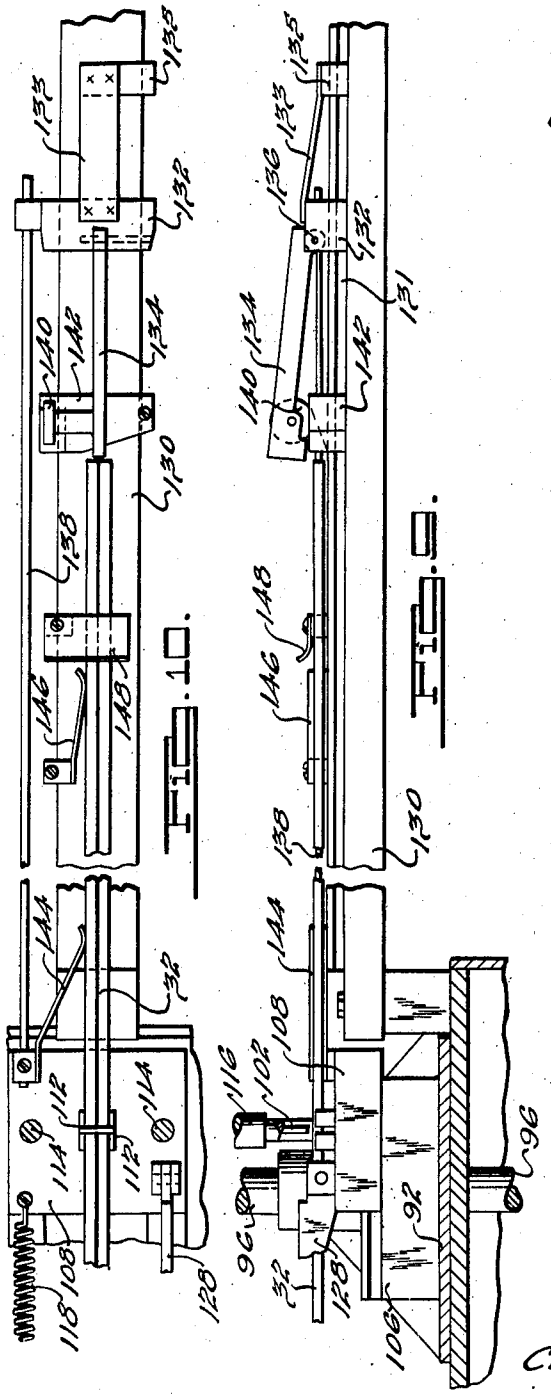


Fig. 10.

Fig. 9.

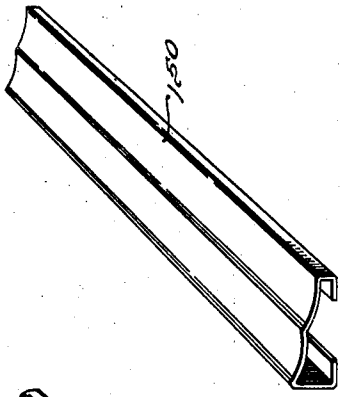


Fig. 13.

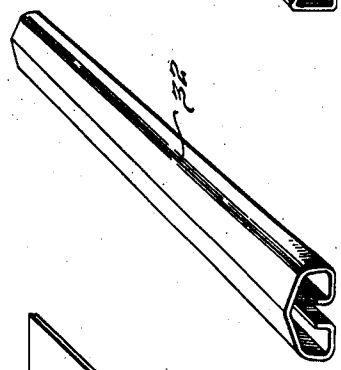


Fig. 12.

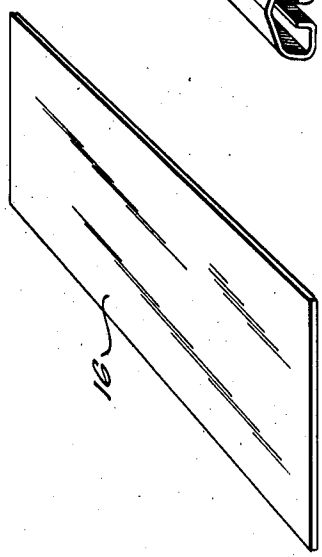


Fig. 11.

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Patented Jan. 14, 1941 2,228,506

UNITED STATES PATENT OFFICE

2,228,506

METALWORKING DEVICE

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Original application November 11, 1937, Serial No. 174,085. Divided and this application April 13, 1939, Serial No. 267,654

3 Claims. (Cl. 164—49)

This invention relates to apparatus for forming and working metal articles and is a division of the copending application of Clarence P. Chamberlin, Serial No. 174,085, filed November 11, 1937.

One of the primary objects of the present invention is to provide an improved apparatus for automatically measuring the formed strip into desired lengths and severing the strip into such lengths.

A further object of the present invention is to provide an improved measuring and severing mechanism in which a continuous strip of formed metal is automatically measured into desired lengths and in which the cutting means moves in unison with the measuring means and automatically actuates an operating mechanism in order to accurately sever the strip into such lengths.

A further object of the present invention is to provide a simplified structure for removing the severed, finished, strips from the machine.

Other objects of the present invention will become apparent from the following specification, the drawings relating thereto, and from the claims hereinafter set forth.

In the drawings, in which like numerals are used to designate like parts in the several views throughout:

Figure 1 is a perspective view of an apparatus embodying features of the present invention;

Fig. 2 is a fragmentary perspective view of the discharge end of the apparatus illustrated in Fig. 1;

Fig. 3 is a top plan view of the structure illustrated in Fig. 1;

Fig. 4 is a cross-sectional view taken substantially along the line 4—4 of Fig. 2;

Fig. 5 is a fragmentary front elevational view showing parts in cross-section taken substantially along the line 5—5 of Fig. 3;

Fig. 6 is a broken fragmentary front elevational view with parts in cross-section taken substantially along the line 6—6 of Fig. 3;

Fig. 7 is a cross-sectional view with parts in elevation taken substantially along the line 7—7 of Fig. 6;

Fig. 8 is a cross-sectional view taken substantially along the line 8—8 of Fig. 6;

Fig. 9 is a view similar to Fig. 6 with the parts in a different operating position;

Fig. 10 is a top plan view of the structure illustrated in Fig. 9;

Fig. 11 is a perspective view of the strip stock before rolling;

Fig. 12 is a perspective view of the finished article;

Fig. 13 is a perspective view of a modified form of molding;

Fig. 14 is an elevational view taken substantially along the line 14—14 of Fig. 3;

Fig. 15 is a vertical cross-sectional view through a portion of the operating mechanism; and,

Fig. 16 is an elevational view taken substantially along the line 16—16 of Fig. 15.

In general, according to the present invention, a substantially flat continuous strip of metal is passed through a forming or shaping machine in which the metal strip is shaped to the desired cross-sectional configuration. The forming machine is of conventional construction and forms no part of the present invention per se and is part of the present invention only in the combination illustrated and claimed. The buffing or polishing machine is arranged in line with the forming machine so that as the strip of metal leaves the forming machine, it is passed directly onto a support on the finishing machine which guides and supports the formed strip in its passage through the finishing machine. The forming rollers on the shaping machine are rotated in such a direction that the forming rollers serve as a driving means for passing the formed strip along the support on the finishing machine. The support is of a complementary sectional shape to the shape of the formed strip so that the strip is properly supported and the buffing or polishing is thereby facilitated. The buffing or polishing wheels are universally mounted on the finishing machine so that they may be suitably positioned for proper engagement with the surfaces of the formed strip for properly finishing all surfaces thereof. After leaving the finishing machine, the strip is passed onto a measuring and cut-off mechanism. The measuring mechanism measures the continuous strip into desired lengths and automatically actuates the severing mechanism for severing the strip into articles of desired length. Spring means engage the strip adjacent the measuring mechanism and beyond the cut-off mechanism so that after the strip is measured, the springs function to automatically discharge the severed article from the machine.

Referring to the drawings, a supporting reel 14 is provided upon which a roll of metal strip stock 16 is rotatably supported for feeding a forming or shaping machine generally indicated at 18. The shaping machine 18 is of conventional construction, and includes a base 19 which supports a plurality of gear reduction driving

mechanisms 20. Each of the driving mechanisms 20 has upper and lower drive shafts extending therefrom upon which are mounted an upper forming roller 21 and a lower forming roller 22. Vertical forming rollers 23 are also provided for shaping the sides of the strip. The shaping rollers are of suitable configuration so as to give the substantially flat strip 16 the desired shape, and are aligned so as to provide a substantially straight forming pass through which the strip 16 passes. The rollers 21 and 22 are rotated in such a direction that the strip 16 is pulled from the reel 14 and fed toward the discharge end of the shaping machine 18. An operating bar 24 is provided for operating the forming machine and may be suitably connected to a prime mover housed within the base 19 which is connected to the gear reduction mechanisms 20 in a suitable way.

After the formed or shaped strip 32 leaves the forming machine 18, it is passed through a pair of elongated blocks 25 which are held together by a clamp 26. The blocks 25 have complementary grooves formed within the facing sides thereof in which the grooves have configurations of the shaped strip. The blocks serve as guides and also serve to iron out minor wrinkles which the formed strip may have.

The formed strip 32 is then passed through a finishing machine generally indicated at 27. The machine 27 includes a base 28 which supports a longitudinally extending I-beam 29. Spaced angle irons 30 are disposed on the top surface of the beam 29 and removably mount therebetween an elongated strip support 31. The support 31 has a sectional shape complementary to that of the formed strip 32, as shown in Fig. 4, so that the strip 32 is securely and properly positioned as it passes through the finishing machine. The support 31 is aligned with the path through the forming machine 18 and the forming rolls 21 and 22 serve to drive or feed the form strip 32 along the support 31.

Finishing or buffing wheels 34 of conventional, suitable construction are disposed above the support 31 and are spaced therealong to engage and finish the outer surface of the formed strip 32. The wheels 34 are mounted upon drive shafts 36 (Fig. 5) for rotation therewith; and the shafts 36 are journaled within bearing supports 38. The support 38 is fixed to one end of a pivoted support 40 which is pivotally mounted by a pivot 41 to an upstanding U-shaped bracket member 42.

The bracket 42 is adjustably fixed to the base 28 by an adjustable nut and bolt means 44; and wedges 46 and 47 are interposed between the base 28 and the bracket 42 for tiltably and adjustably mounting the bracket 42 and the wheel 34 relative to the base and to the work. The bracket 42 may also be rotated about the bolt 44 for rotatably adjusting the bracket 42 together with the wheel 34 relative to the support and to the work.

The supports 40 also have mounted thereon, on the side of the pivot 41 opposite to that of the wheel 34, a driving motor 48 which is suitably connected through a belt and pulley mechanism 50 to a pulley fixed to the shaft 36 for driving the wheel 34. The driving mechanism is so constructed and arranged that the wheels 34 are driven in the same direction as the direction of movement of the work strip 32 past the wheel so that the wheels 34 assist to some extent in passing the strip 32 through the finishing machine.

In order to adjustably mount the wheels 34 relative to the strip 32 in a vertical direction, the bearing support 38 is slidably mounted within a frame member 52 which has a curved plate member 54 fixed thereto at the bottom of the frame 52. An adjusting screw 56 is received through a threaded opening in a hand wheel 57 and is fixed to the bearing support 38 and received through an opening in the frame 52 so that by turning the hand wheel 57, the bearing support 38 may be slidably adjusted within the frame 52 for obtaining accurate adjustment. A spring 58 is mounted between the support 38 and the upper edge of the frame 52 in surrounding relation to the screw 56 for constantly urging the bearing support 38 downwardly.

For obtaining rough vertical adjustments of the wheel 34 and the shaft 36 about its pivot 41, an upstanding rod member 60 is slidably mounted within a bracket 62 and extends upwardly through suitable openings in the base 28 and engages the under surface of the curved member 54. A cable or rope 64 is suitably connected at 66 to the lower end of the rod member 60 and extends around a pulley 67 to which the cable 64 is attached at 68. The pulley 67 is secured to a shaft 70 for rotation therewith, and the shaft 70 is suitably supported on upstanding members of the base 28. The shaft 70 extends forwardly of the base, and has fixed thereto at its forward end a crank arm 72 for rotating the shaft 70, and therefore rotating the pulley 67. A ratchet wheel 74 is fixed to the shaft 70 and has associated therewith a stop pawl 76 which is fixed to the base 28 for holding the shaft 70 in its adjusted position. It is evident that by suitably turning the crank arm 72 the pulley 67 is thereby rotated, thus raising or lowering the rod member 67 which in turn raises or lowers the shaft 36 pivoting the shaft 36 about its pivot 41. The wheel 34 may thus be adjusted vertically relative to the work support 31.

By the various adjustments above described which are provided for each of the wheels 34, it is evident that the wheels 34 may be adjusted to any suitable position so that the buffing or polishing surfaces of the wheels may be positioned to engage any of the surfaces of the strip 32. The adjustments above described have particular utility when a support having a shape complementary to that of the workpiece is provided in that the workpiece is properly supported in all directions and the wheel may be adjusted to apply the polishing or buffing force against the strip 32 in any direction while the strip 32 will be properly supported and cannot be displaced during the finishing operation.

Dust collecting housings 78 are provided over each of the wheels 34 and have exhaust conduits 80 associated therewith so that the dust adjacent the wheels 34 may be effectively removed and discharged at a suitable remote location.

After the shaped and finished strip 32 leaves the finishing machine 27, it is passed through a pair of blocks 82 which are held together by a clamp 84 for guiding and also serving to iron out any minor wrinkles which the formed and finished strip may have, in the same manner as the blocks 25 previously described. The formed and finished strip 32 is then passed onto and through a severing mechanism 86 and a measuring mech-

anism 88 where the strip is measured into desired lengths and severed into these lengths.

The severing mechanism 86 is of conventional construction per se and includes a base portion 90 within which suitable operating mechanism is housed. Such operating mechanism is similar to a conventional punch press. A support member 92 is mounted on the base 90 and has a pair of upstanding guides 94 within which vertically movable rod members 96 are slidably received. The rod members 96 extend downwardly into the base 90 and are suitably connected to the operating mechanism which functions to vertically move the rod members 96 for effecting the severing operation. This connection is through a cam shaft 93 having integral cams 95 thereon which are embraced by transversely slidable cam followers 97. The cam followers are slidably embraced by plate members 97, which are connected to their respective rod members 96 so that when the cam shaft rotates the cutter is moved up and down. The shaft 93 is connected to a driven member 99 through a clutch 103. The member 99 is connected through a belt or gearing to a suitable source of power, such as a motor and is constantly driven. When the clutch is thrown in it will be evident that the cam shaft is rotated, thereby effecting the cutting. A cross member 98 is fixed to the members 96 adjacent the tops thereof; and a longitudinally extending supporting guide member 101 is fixed to the under surface of the cross member 98. The member 101 guides and supports a longitudinal movable carriage 102 to which a suitable downwardly extending severing or cutting element 104 is fixed. Another longitudinally extending supporting guide member 106 is fixed to the top of the support 92 and slidably supports a longitudinally movable carriage 108. The carriage 108 has mounted thereon a support 110 and guides 112 which support and guide the finished strip 32 as it passes through the severing mechanism.

The carriages 102 and 108 are connected for longitudinal movement together by substantially vertical tubular members 114 which are fixed to the carriage 108 and which are telescopically received within tubular members 116 fixed to the under surface of the carriage 102. The carriages 102 and 108 are normally urged toward the discharge end of the finishing machine 27 by means of a coil spring 118 which is connected to the carriage 108 and to the finishing machine 27.

An operating lever 120 is connected in the usual way to the operating mechanism of the severing means so that it strikes a member 121 when thrown in one direction to engage the clutch and rotate the cam shaft 93, and is normally urged to its inoperative position by means of a coil spring 122 which is connected to the lever 120 and to the finishing machine 27. The lever 120 is bent inwardly adjacent its upper end, as indicated at 124, and is provided with a notched member 126 which is adapted to be engaged by a complementary notched member 128. The notched member 128 is connected to the carriage 108 for movement therewith; and after the carriage 108 has moved a predetermined distance along with the finish strip 32, the lever 120 is moved to the right and actuates the operating mechanism, which in turn causes the cross member 98 with the cutting element 104 to move downwardly and sever the finished strip 32.

The measuring mechanism includes an elongated longitudinally extending support 130 having grooves 131 along its side edge. A longitudinally slidable block 132 is mounted on the support 130 and has complementary portions which are slidably engaged in the grooves 131 for guiding and positioning the block. A brace member 133 is fixed to a sliding block 135, which is slidably mounted on the support 130 in the same manner as the sliding block 132, and is fixed to the block 132 for steadying the block 132 as it moves along the support and preventing displacement of the block.

An elongated stop member 134 is pivotally mounted to the slide block 132 by means of a pivot 136 for movement with the block 132. The stop member 134 is adapted to lie in the line of travel of the finished strip 32; and as the finished strip 32 moves toward the right, it abuts against the stop 134, causing the stop 134 with the block 132 to be driven toward the right by the finished strip 32. An elongated rod member 138 is adjustably connected to the block 132 and to the carriage 108 so that the block member 132 and the carriage 108 move in unison. By suitably adjusting the distance between the block 132 and the carriage 108, the finished strip 32 may be severed into any desired lengths.

The stop member 134 has a roller 140 connected thereto, and as the stop member 134 with the block 132 approach the end of their travel simultaneously with actuation of the lever 120 for effecting the severance of the strip, the roller 140 strikes against and rides upon an inclined portion of a block 142 which is adjustably fixed to the support 130. The stop member 134 is thus moved upwardly out of engagement with the leading edge of the finished strip 32 and the severed strip is then free to be discharged from the severing and measuring mechanisms. During the travel of the member 134, the under surface thereof rests upon and slides over the block 142.

For discharging the severed strip from the mechanism, an elongated flat spring 144 is fixed to the carriage 108 and an elongated spring 146 is fixed to the support 130. The springs 144 and 146 engage one side of the finished strip 32 and are so constructed and arranged that they normally exert a force against that side of the strip. After the severing operation has taken place and after the stop 134 has been removed from engagement with the strip, the springs 144 and 146 are then permitted to function to throw the severed moldings from the machine to a position at which the moldings may be collected. Another spring member 148 is mounted on the support 130 and is adapted to engage the top surface of the finished strip 32 for assisting in properly positioning the strip 32 for the measuring and severing operation.

After the severing operation and after the molding has been discharged from the machine, the spring 118 functions to return the carriage 108 together with the block 132 and stop 134 toward the left to the initial positions of the members.

While in the structure above described a molding of a finished shape such as that indicated in Fig. 12 has been illustrated throughout, it will be appreciated that by changing the shape of the forming rollers and by changing the shape of the support 31 that moldings of other sectional shapes may be made. For example, moldings having a sectional shape such as that indicated at 150 in Fig. 13 may be fabricated by the use of suitable

shaping rollers and by the use of a support having a cross-sectional shape complementary to that of the molding 150.

Formal changes may be made in the specific embodiment of the invention described without departing from the spirit and substance of the invention, the scope of which is commensurate with the appended claims.

What is claimed is:

1. Apparatus of the class described comprising, in combination, a support, means for moving a continuous strip of molded metal along said support, a pivotally mounted abutment mounted for movement along said support in the path of said strip and engaged by said strip to move said abutment along said support, a member mounted on said support in the path of said abutment and engageable by said abutment to pivot said abutment and move it out of engagement with said strip, severing means mounted for movement along said support in overlying relation to said strip, said severing means being vertically movable to sever said strip, means adjustably connecting said abutment with said severing means so that the abutment and severing means move along said support in unison, means to operate said severing means to sever said strip, and means connected to said severing means for movement therewith and associated with said last named means to actuate said last named means upon a predetermined movement of said severing means along said support.

2. Apparatus of the class described comprising, in combination, a support, means for moving a continuous strip of molded metal along said support, a pivotally mounted abutment mounted for movement along said support in the path of said strip and engaged by said strip to move said abutment along said support, a member mounted on said support in the path of said abutment and engageable by said abutment to pivot said abutment and move it out of engagement with said strip, severing means mounted for movement along said support in overlying relation to said strip, said severing means being vertically movable to sever said strip, means adjustably connecting said abutment with said severing means so that the abutment and severing means move along said support in unison, means to operate said severing means to sever said strip, means connected to said severing means for movement therewith and associated with said last named means to actuate said last named means upon a predetermined movement of said severing means along said support, and means automatically discharging the severed strips from said support upon completion of the severing operation.

3. Apparatus of the class described comprising, in combination, a support, means for moving a continuous strip of molded metal along said support, a block member slidably mounted for movement along said support, an elongated member having one end thereof pivotally connected to said block member and having the other end thereof forming an abutment disposed in the path of said strip and engaged by said strip to move said block along said support, a member having an inclined surface mounted on said support in the path of said abutment and engageable by said abutment to pivot said elongated member and move it out of engagement with said strip, severing means mounted for movement along said support in overlying relation to said strip, said severing means being vertically movable to sever said strip, means adjustably connecting said block member with said severing means so that said block member, said elongated member, and said severing means move along said support in unison, means to operate said severing means to sever said strip, and means connected to said severing means for movement therewith and associated with said last named means to actuate said last named means upon a predetermined movement of said severing means along said support.

CLARENCE P. CHAMBERLIN.