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2,493,415

METHOD FOR FORMING SHEET METAL GUTTERS

Filed July 18, 1947

2 Sheets-Sheet 1

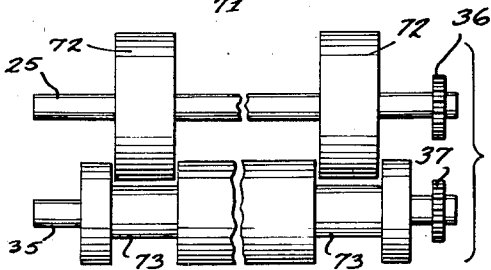
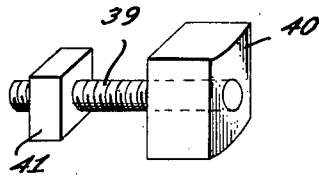
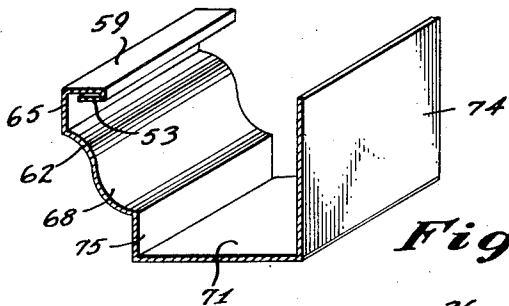
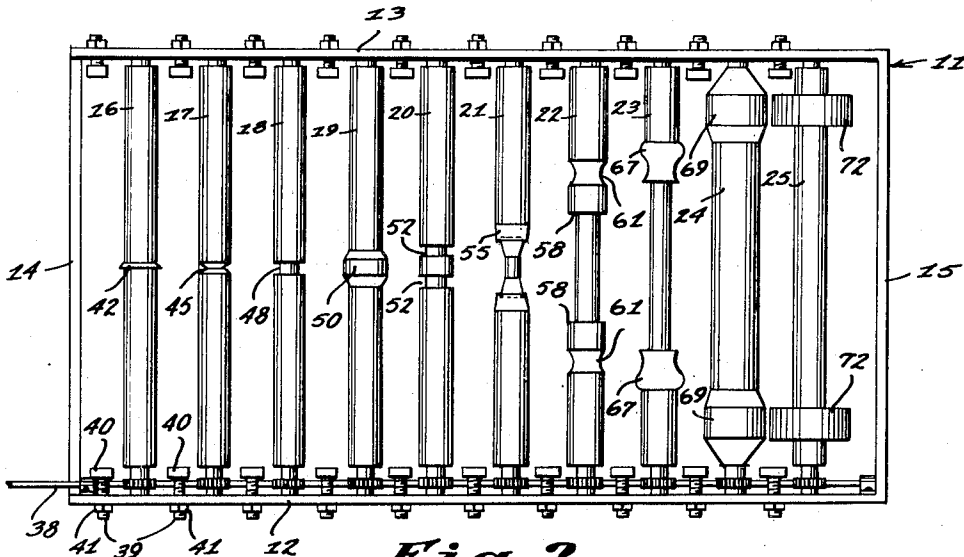
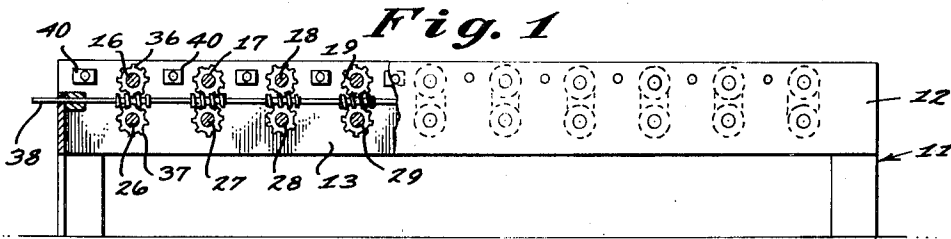


Fig. 12

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2 Sheets-Sheet 2

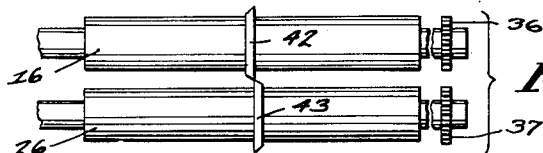


Fig. 3

Fig. 4

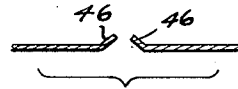


Fig. 13

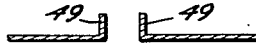


Fig. 14

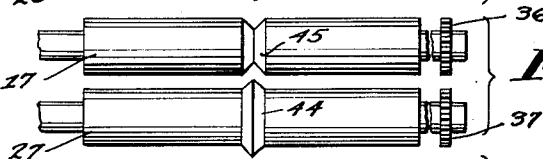


Fig. 5

Fig. 6

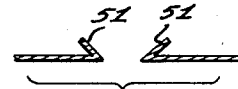


Fig. 15



Fig. 16

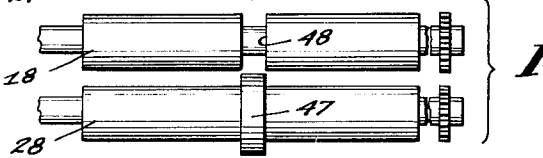


Fig. 7

Fig. 8

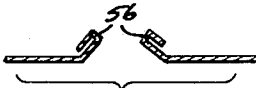


Fig. 17

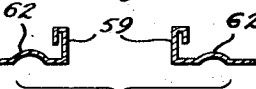


Fig. 18

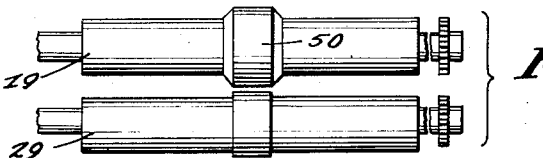


Fig. 9

Fig. 10



Fig. 19

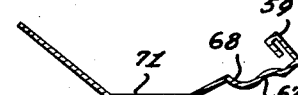


Fig. 20

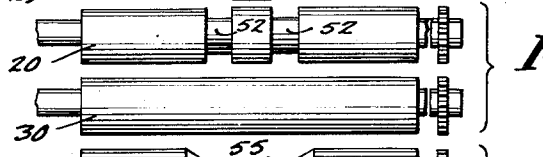


Fig. 11

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## METHOD FOR FORMING SHEET METAL GUTTERS

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Application July 18, 1947, Serial No. 761,876

3 Claims. (Cl. 153—54)

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This invention relates to the sheet metal forming art and more particularly to the art of forming sheet metal gutters.

A main object of the invention is to provide a novel and improved system of forming sheet metal gutters which is very simple, rapid and economical.

A further object of the invention is to provide an improved method of forming sheet metal gutters which utilizes the material in a very efficient manner, reduces the cost of manufacture of the gutters and provides uniformity of contour in the finished gutters.

Further objects and advantages of the invention will become apparent from the following description and claims, and from the accompanying drawings, wherein:

Figure 1 is a side elevational view, partly in cross-section of a machine for forming sheet metal gutters in accordance with the present invention.

Figure 2 is a top plan view of the machine of Figure 1.

Figures 3 to 12, inclusive, are detail views illustrating the successive pairs of sheet metal forming rolls employed in the machine of Figure 1.

Figures 13 to 21, inclusive, are cross-sectional detail views illustrating the respective configurations of the sheet metal stock as it is fed through the successive respective pairs of forming rolls illustrated in Figures 4 to 12.

Figure 22 is an enlarged detail view in perspective of a guide stop element employed in the machine of Figure 1.

Figure 23 is a fragmentary perspective view of a finished section of a sheet metal gutter formed in accordance with the present invention.

Referring to the drawings, 11 designates a table structure having parallel vertical side walls 12 and 13 supported on a suitable frame whose front end is shown at 14 and whose rear end is shown at 15. Journaled transversely in the side walls 12 and 13 in a common horizontal plane are the longitudinally spaced top forming rolls designated respectively at 16 to 25 and vertically aligned with the respective top rolls 16 to 25 are the respective bottom transverse rolls 26 to 35 also journaled in the side walls 12 and 13 in a common horizontal plane below the plane of the top rolls. Adjacent side wall 12 each top roll carries a gear 36 and carried on each bottom roll in vertical alignment with the gear 36 of the associated top roll is a similar gear 37. Journaled longitudinally in the frame 11 between the gears 36 and 37 is a worm shaft 38 meshing with said

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gears 36 and 37 to drive them simultaneously in reverse directions. Worm shaft 38 is driven by any suitable source of power.

Threadedly secured in the walls 12 and 13 in the horizontal plane between the respective sets of rolls are spaced stud members 39 on the inner ends of which are threaded stop nuts 40 which function as guides for a sheet of metal stock fed through the rolls. Threaded on the outer ends of the studs are nuts 41 for locking the studs to the respective side walls 12 and 13.

The initial set of rolls 16 and 26 carry cooperating central shearing blades 42, 43. When a sheet of metal stock is fed between rolls 16 and 26 at the front of the machine it is sheared longitudinally by the blades 42, 43.

Roll 27 carries a central symmetrical male bevel die 44 cooperating with an annular bevelled recess 45 formed in roll 17 to bend the sheared edges of the stock upwardly, as shown at 46, 46 in Figure 13.

Roll 28 carries a central shouldered male die 47 cooperating with an annular shouldered recess 48 in roll 18 to bend the stock edges to perpendicular positions with respect to the plane of the stock, as shown at 49, 49 in Figure 14.

Roll 19 carries a central bevelled male die 50 cooperating with roll 29 to bend the stock edges outwardly as shown at 51, 51 in Figure 15.

Roll 20 is formed with annular shouldered symmetrically spaced recesses 52, 52 cooperating with roll 30 to bend the stock edges parallel to the plane of the stock, as shown at 53, 53 in Figure 16.

Roll 31 is formed with a bevelled symmetrical central male die 54, cooperating with bevelled annular shoulders 55, 55 formed on roll 21 to bend the flanged stock edges of Figure 16 to inclined positions shown at 56, 56 in Figure 17.

Roll 32 is formed with a shouldered central male die 57 cooperating with shoulders 58, 58 formed on roll 22 to bend the flanged stock edges to the perpendicular positions shown at 59, 59 to form edges in Figure 18. Roll 32 also is formed with symmetrical outwardly spaced arcuately curved annular male dies 60, 60 cooperating with annular recessed 61, 61 formed in roll 22 to produce the respective longitudinal corrugations 62, 62 in the stock blanks shown in Figure 18.

Roll 33 is formed with a symmetrically bevelled central male die 63 cooperating with shoulders 64, 64 formed on roll 23 to produce inclined bends in the stock blanks such as shown in Figure 19 at 65. Roll 33 also is formed with annular recesses 66, 66 cooperating with male arcuately curved annular die portions 67, 67 formed on roll

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23 to produce the reverse corrugations 68 in the stock blanks as shown in Figure 19.

Roll 24 is formed with symmetrically spaced large bevelled male dies 69, 69 cooperating with annularly recessed female die portions 70, 70 on roll 34 to produce the downward bends 71 in the stock blanks, as shown in Figure 20.

Roll 25 is formed with symmetrically spaced large shouldered annular male dies 72, 72 cooperating with annularly recessed female shouldered die portions 73, 73 formed on roll 35 to produce the perpendicular bends 74 and 75 in each of the stock blanks, as shown in Figure 21.

In operation, the sheet metal in flat strip form is fed between the shearing rolls 16 and 26 at the front end of the machine and progresses between the succeeding rolls as above described, being bent stage by stage, until two completely formed box-like gutters such as shown in fragmentary view in Figure 23 emerge from the rear end of the machine. The operation of the machine is completely automatic and it is only necessary to feed the flat strip material in a properly aligned manner into the front end of the machine between the initial rolls 16 and 26. The alignment may be positively established at the forward portion of the machine by setting the guide nuts 40 at said forward portion to engage the outside edges of the entering strip of stock.

While a specific embodiment of a system for forming sheet metal gutters has been disclosed in the foregoing description, it will be understood that various modifications in the method and means employed may occur to those skilled in the art. Therefore, it is intended that no limitations be placed on the invention except as defined by the scope of the appended claims.

What is claimed is:

1. A method of forming a sheet metal gutter which comprises shearing a strip of flat elongated sheet metal stock longitudinally substantially midway between the side edges thereof to subdivide the strip into two parts, simultaneously bending the portions of the two parts adjacent the sheared edges upwardly and backwardly to form an inturned flange parallel to and spaced from the remaining portion of each of said parts, simultaneously bending the portions of the two parts adjacent the inturned flanges perpendicular to the remaining portion of each of said parts to form in conjunction with each of the inturned flanges a ledge, simultaneously bending the portions of the two parts adjacent the ledges to form at least two corrugations, and simultaneously bending the portions of said parts adjacent to the corrugations to form with the ledges and corrugations two sections of box-like form.

2. The method of forming a sheet metal gutter which comprises shearing a strip of flat elongated sheet metal stock longitudinally substantially midway between the side edges thereof to subdivide the strip into two parts, simultaneously

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bending the portions of the two parts adjacent the sheared edges perpendicularly to the remaining portion of each of said parts, simultaneously bending the perpendicular portions of the two parts outwardly and backwardly to form an inturned flange parallel to and spaced from the remaining portion of each of said parts, simultaneously bending the portions of the two parts adjacent the inturned flanges perpendicular to the remaining portion of each of said parts to form in conjunction with each of the inturned flanges a ledge, simultaneously bending the portions of the two parts adjacent the ledges to form at least two corrugations, and simultaneously bending the portions of said parts adjacent to the corrugations to form with the ledges and corrugations two sections of box-like form.

3. The method of forming a sheet metal gutter which comprises shearing a strip of flat elongated sheet metal stock longitudinally substantially midway between the side edges thereof to subdivide the strip into two parts, simultaneously bending the portions of the two parts adjacent the sheared edges perpendicularly to the remaining portion of each of said parts, simultaneously bending the perpendicular portions of the two parts outwardly and backwardly to form an inturned flange parallel to and spaced from the remaining portion of each of said parts, simultaneously bending the portions of the two parts adjacent the inturned flanges perpendicular to the remaining portion of each of said parts to form in conjunction with each of the inturned flanges a ledge, simultaneously bending the portions of the two parts adjacent the ledges to form at least two corrugations, simultaneously bending the portions of said parts adjacent to the corrugations to form a bend perpendicular with respect to the ledge of each of said parts, simultaneously bending the portions of said parts adjacent the perpendicular bends to form a second bend perpendicular to each of the perpendicular bends of each of said parts, and simultaneously bending the remaining portions of said parts adjacent the second bends to form with the ledges, corrugations, first and second perpendicular bends, two sections of box-like form.

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