

May 23, 1939.

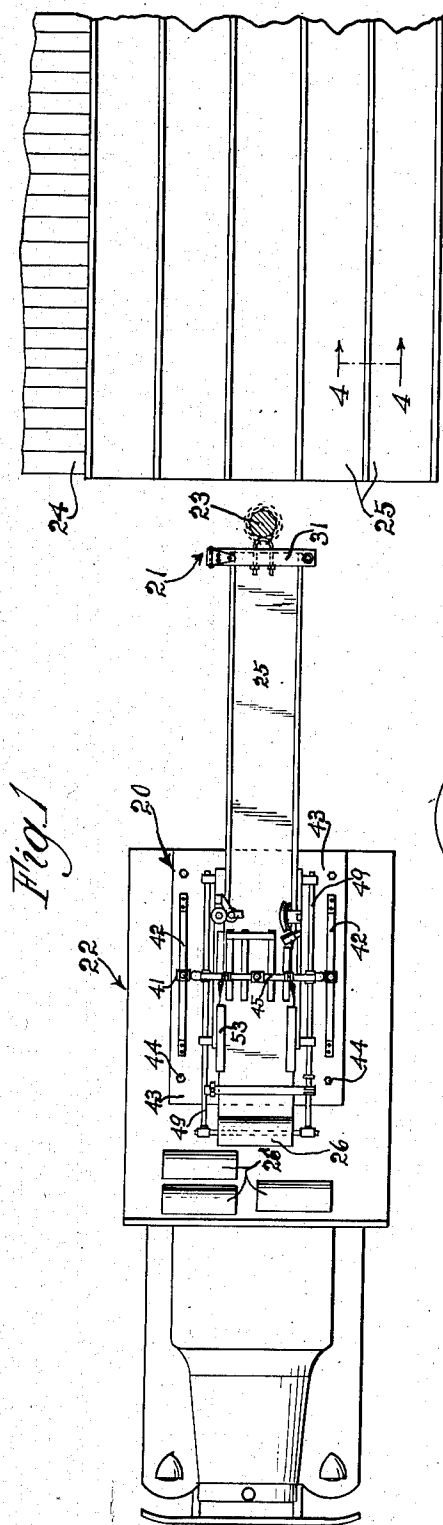
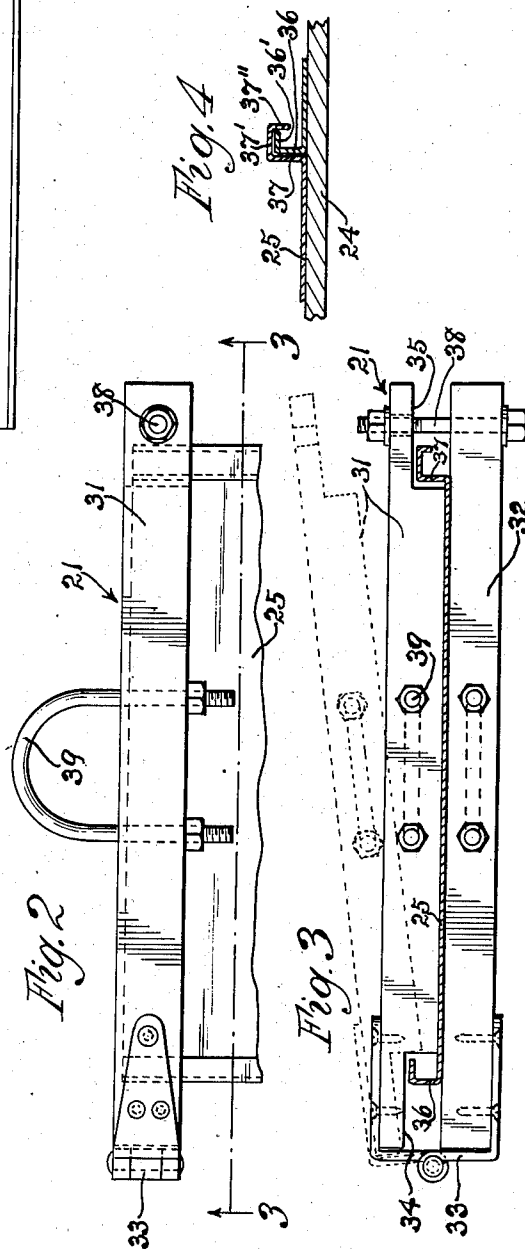
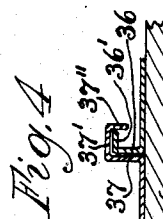
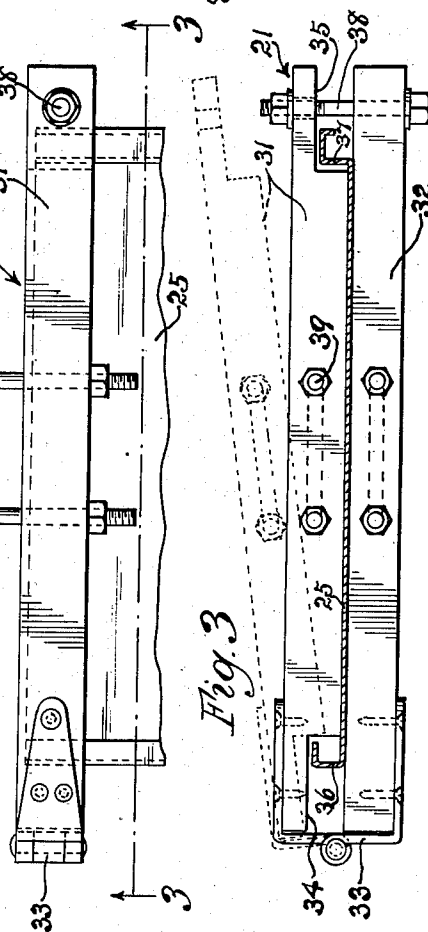
C. R. SCHLICHT

2,159,771

SHEET METAL FLANGING APPARATUS

Filed June 22, 1938

4 Sheets-Sheet 1



Inventor
 Carl R. Schlicht
 by J. Daniel Stuwe
 Attorney.

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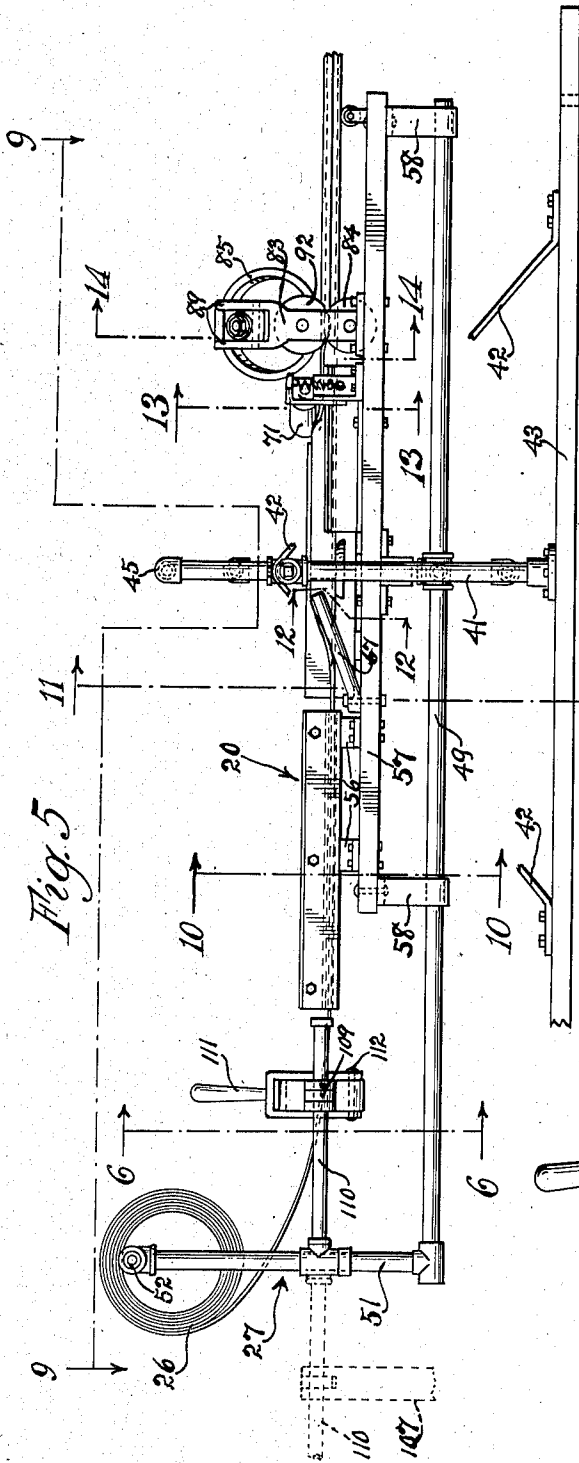
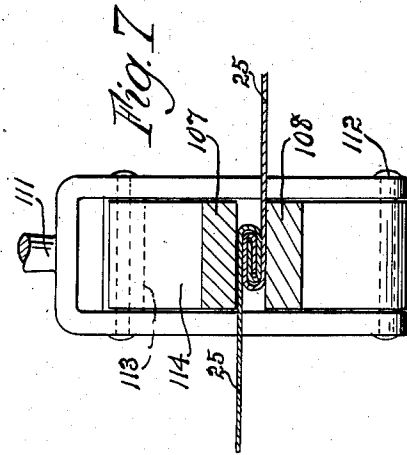
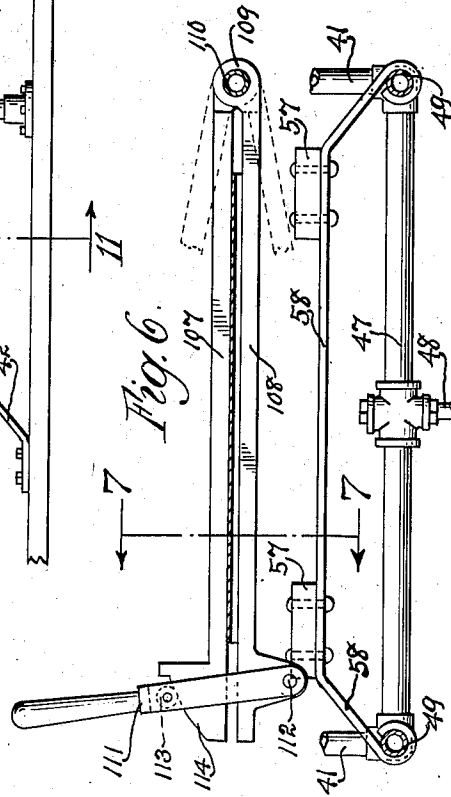
C. R. SCHLICHT

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SHEET METAL FLANGING APPARATUS

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4 Sheets-Sheet 2



Inventor
Carl R. Schlicht
by Daniel Stuewe
Attorney.

May 23, 1939.

C. R. SCHLICHT

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SHEET METAL FLANGING APPARATUS

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4 Sheets-Sheet 3

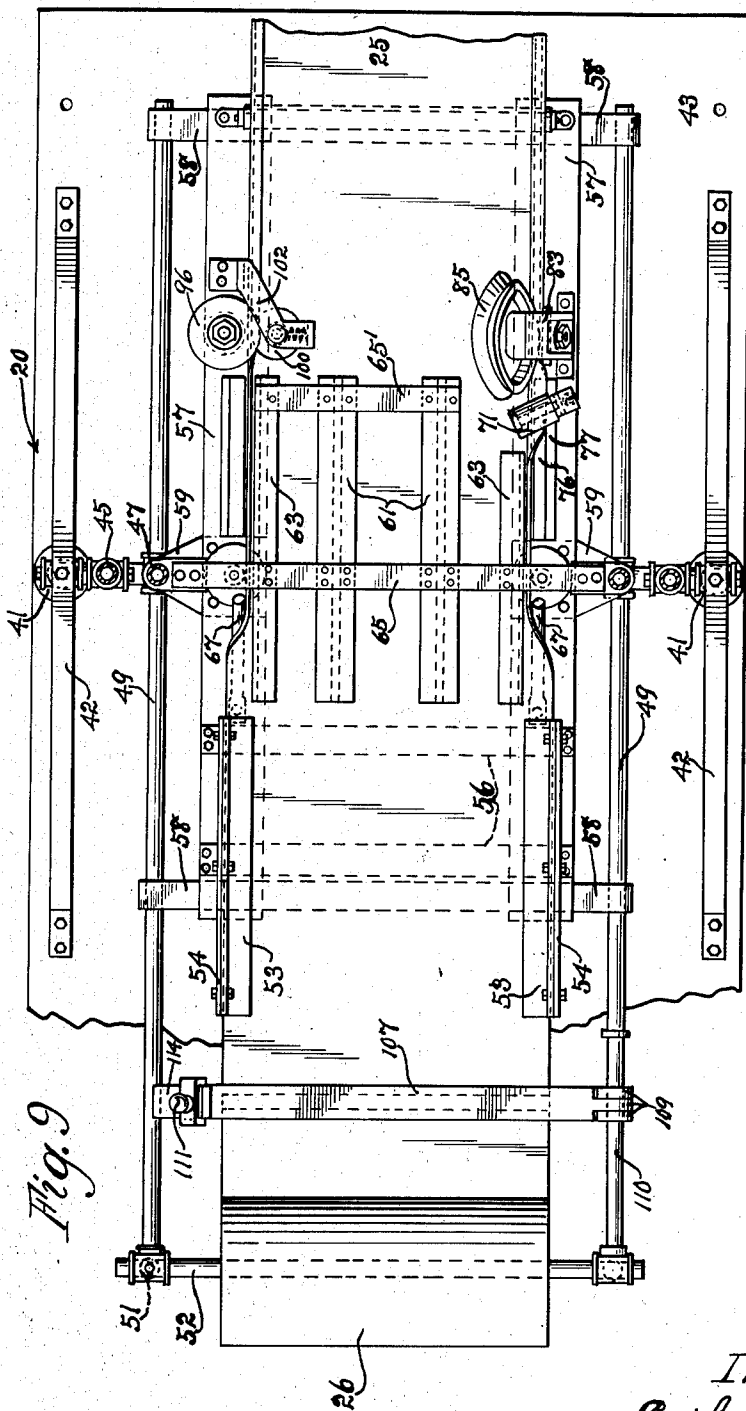


Fig. 9

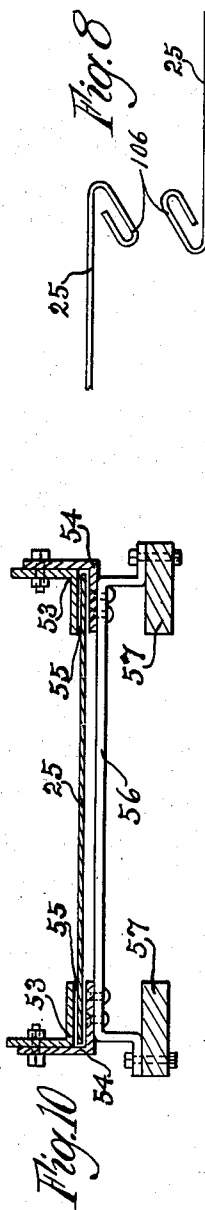


Fig. 10

Inventor
 Carl R. Schlicht
 by J. Daniel Stuwe
 Attorney.

May 23, 1939.

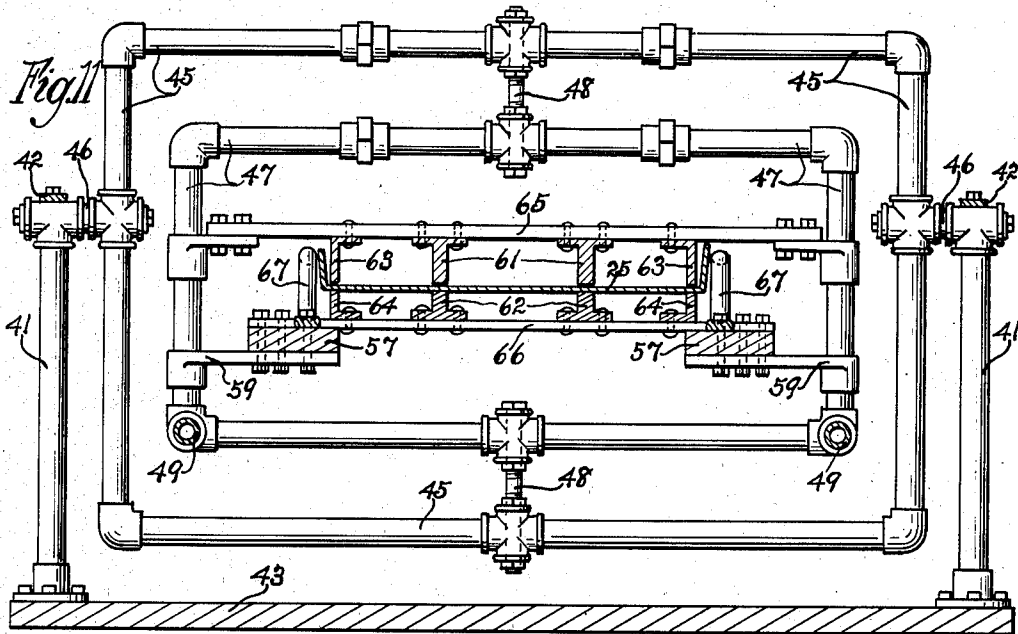
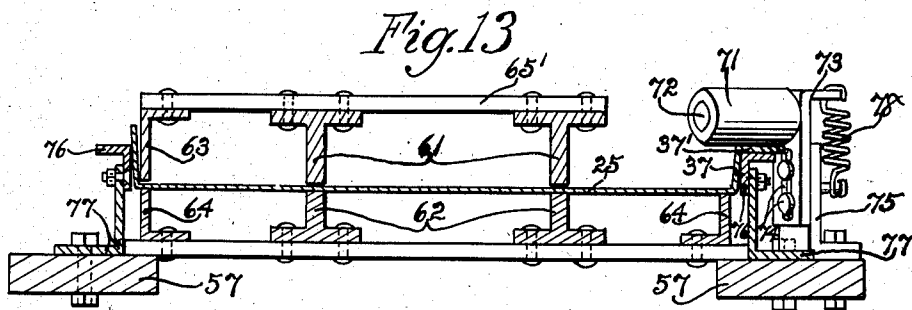
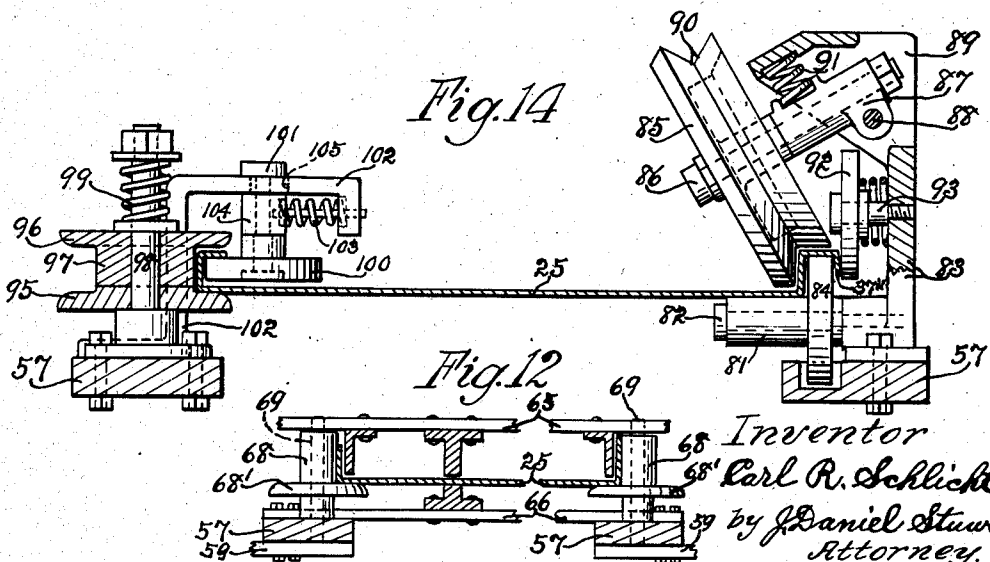
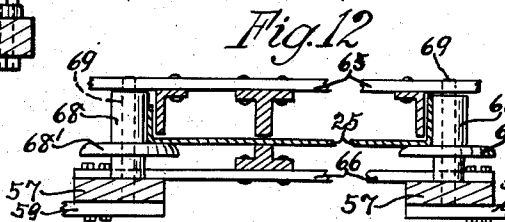
C. R. SCHLICHT

2,159,771

SHEET METAL FLANGING APPARATUS

Filed June 22, 1938

4 Sheets-Sheet 4



Inventor
'Carl R. Schlicht
by J. Daniel Stuwe
Attorney.

UNITED STATES PATENT OFFICE

2,159,771

SHEET METAL FLANGING APPARATUS

Carl R. Schlicht, La Crosse, Wis.

Application June 22, 1938, Serial No. 215,155

20 Claims. (Cl. 153—29)

This invention relates to a novel and improved sheet metal flanging apparatus.

One of the main objects of this invention is to provide an apparatus for flanging sheet metal adapted for roofing purposes, whereby a continuous sheet of metal can be readily flanged directly at the building or place where the same is to be applied; in order that the sheet metal can be conveniently hauled in the original rolled form from the place of supply to the job where it is wanted, and the exact amount required on that job can there be flanged and applied; thus saving considerable trouble and inconvenience, formerly experienced in hauling the flanged and pre-cut sheets of metal in the flat and bulky shape from the flanging shop thru a great distance to the job where the sheets are wanted.

Another object of this invention is to provide a flanging apparatus whereby the sheet flanging means is mounted on a vehicle having a supporting body, such as a motor truck, or a trailer or the like, so that the vehicle can be used to transport the sheet metal in its original rolls from the supply place to the job; and said vehicle then also provides the traveling and drawing movement, and either serves to supply the motive power or may have means hitched thereto for supplying such power, for flanging the sheets by drawing them thru the flanging means, which can be run in a continuous web, then cut in correct lengths, and returned with said vehicle to the building to be applied.

Another object of this invention is to provide such a flanging apparatus wherein the flanging mechanism can be mounted on the truck so that it will automatically swing and tilt itself into the right position, and the pull on the sheet is straight even though the truck is not driven parallel with the pull; and whereby the flanged sheet can be tilted and run directly toward the ground, to be cut into desired lengths, and carried back by the truck on its return travel to the building.

Another object of this invention is to provide an edge flanging machine which is built up chiefly of standard inexpensive parts, so as to provide an economical construction.

Another object of this invention is to provide in such a flanging apparatus a flattening device for compressing the cross-seam which interconnects the ends of two rolls, and wherein the forming members are yieldably mounted, so that the cross-seam can be readily passed therethru and flanged, in order that the rolls can be connected at the ends and run in a continuous sheet thru the machine.

Another object is to provide in such an edge flanging apparatus an improved clamping device to be clamped onto the end of the preformed sheet, in drawing the sheet thru the edge flanging mechanism.

These and various other objects and advantages are attained with this invention, as will become apparent from the following description, taken in connection with the accompanying drawings in which this invention is illustrated in its preferred form; it being understood that various other arrangements and forms of construction may be resorted to for carrying out the objects and purposes of this invention.

In the drawings:

Fig. 1 is a plan view illustrating an embodiment of this invention in its preferred form, showing the flanging mechanism mounted on a motor truck and the clamping mechanism secured to a stationary post adjacent a building which is being covered.

Fig. 2 is a plan view of the clamping mechanism.

Fig. 3 is an elevational view thereof, taken along line 3—3 of Fig. 2, showing the flanged sheet metal in section.

Fig. 4 is an enlarged sectional view, taken on line 4—4 of Fig. 1, showing the flanges joined but before the seaming operation.

Fig. 5 is a side elevational view of the flanging mechanism.

Fig. 6 is an enlarged vertical sectional view, taken on line 6—6 of Fig. 5, illustrating the cross-seam flattening device.

Fig. 7 is an enlarged vertical sectional view, taken on line 7—7 of Fig. 6.

Fig. 8 shows the ends of the two rolls bent to be interconnected and thereafter flattened by said flattening device.

Fig. 9 is a plan view of the flanging mechanism, taken on line 9—9 of Fig. 5.

Figs. 10, 11, and 12, are enlarged cross sectional views taken on lines 10—10, 11—11, and 12—12 of Fig. 5, respectively.

Figs. 13 and 14 are further enlarged cross sectional views, taken on lines 13—13 and 14—14 of Fig. 5, respectively, illustrating the forming rollers.

With the formerly known flanging mechanism and apparatus the sheets of metal were customarily preformed in the shop and cut to the required length for use, and the sheet lengths were then transported thru a considerable distance to the building or structure where they were to be applied. The sheets with their upturned flanges

became bulky for their transport, and due to their flanges had to be laid straight and placed one upon the other, and were cut to the exact length required.

5 With this novel apparatus which forms the subject matter of the present invention I am enabled to haul the sheet metal in its original compact roll form directly to the job and there preform the sheet metal at the job, and cut the sheet
10 in the proper lengths to the exact amount required where they are directly applied to the building. This apparatus includes the flanging or preforming mechanism 20 and the clamping mechanism 21, along with a self-propelling vehicle 22, such as a motor truck, whereon either the flanging mechanism or the clamping mechanism may be mounted, while the other one of these two mechanisms is secured to a stationary object 23, such as a post, or other similar stationary object located near the building, on the
15 roof 24 of which the sheets of metal 25 are being applied. In Fig. 1 the flanging mechanism 20 is shown mounted on the truck 22, and the clamping mechanism 21 is secured to the post 23, and as the truck is driven the sheet unrolls from the roll 26 carried on a support 27 and passes thru the flanging apparatus to have its edges preformed to the desired shape, as indicated in Fig. 3. The truck is also utilized for bringing the other required rolls 26' of sheet metal to the building
20 24 to be applied.

The clamping device 21 for clamping and holding the end of the sheet metal comprises a pair of beams 31 and 32 which are connected at one end by hinge means 33 so as to be swingable
25 apart, as indicated in Fig. 3, and the two ends of the pair of beams are provided with pockets or notches 34 and 35 to accommodate the edge flanges 36 and 37 of the sheets 25. A bolt 38 is extended thru the ends of the beams, opposite hinge 33, for forcing the beams tightly together upon the end of the sheet and hold it in position. A pair of U-bolts 39 are secured in the intermediate parts of the beams, and these are adapted to be fastened to a stationary object, or to the building, by the use of a chain or the like.
30

In the form of flanges provided with this flanging mechanism disclosed herein, the flange 36 has a main portion which extends vertically and has an edge portion 36' further bent horizontally
35 inwardly from the main portion; while the opposite flange 37 extends first vertically upwards and has an intermediate portion 37' extending therefrom horizontally outward, and the edge portion 37'' extends therefrom vertically downwards, adapted to overlap flange 36' and to be engaged around it in closing the seam.

In the preferred form of flanging apparatus, as illustrated in this application, the flanging machine or mechanism 20 is preferably mounted on the truck and moves therewith, while the clamping device 21 is secured to the stationary object to hold the end of a sheet stationary. The flanging mechanism is therefore arranged to be
40 mounted so as to have vertical tilting and horizontal swinging movement relative to the truck, so that the pull thru the sheet will be even and straight during the flanging operation, although the truck is not traveling in a straight line or parallel to the sheet. The construction comprises frame means, which preferably includes a pair of posts or standards 41, which are steadied by brace bars 42 thereon, both being mounted on the rear part of the truck or on a platform 43
45 detachably secured on the truck, as by means of

bolts 44. A rectangular frame 45 is mounted by pivot means 46 between said posts, adapted to be tilted up and down or swung in a vertical plane therein; and a smaller rectangular frame 47 is mounted within said frame 45, by vertical
5 pivot means 48, to swing sideways or in a horizontal plane therein.

These standards 41 and the members of frames 45 and 47 can be economically made by the use of tubular bars such as standard pipe lengths and joints, as indicated in the drawings. Said frame 47 carries a pair of tubular bars or main bars 49 at its lower corners which extend longitudinally for the length of the flanging machine, and upon their forward ends they carry the supporting means 27 bearing the roll 26 of sheet metal to be flanged. Said supporting means includes a pair of uprights 51 arising from bars 49 and having a cross bar 52 at the top whereon roll 26 is placed so as to unroll.
10 20

Referring to Figs. 9, 10, and 11, the means for forming the flanges 36 and 37 comprises two pair of spaced guide members mounted at the two edge portions of the sheet, each including an upper angle plate 53 attached to the upper part of a lower angle plate 54, providing a horizontal guideway 55 therebetween, adapted to guide and steady the edge portions of the traveling sheet. The angle plates 54 are secured on cross bars 56 mounted on supporting bars 57 which extend longitudinally of the flanging machine and are supported at their ends by a pair of yoke members 58 mounted on the main supporting bars 49, as best shown in Fig. 6, and said bars 57 are connected at their intermediate parts by bracket arms 59 to frame 47.
25 30 35

As best shown in Fig. 11, the primary flanging means comprises a plurality of guiding and steadying members, including spaced intermediate upper and lower T-bars 61 and 62 and outer upper and lower L-bars 63 and 64, between which the sheet travels, the upper bars being supported by cross-plate 65 mounted on frame 47, and the lower bars on a cross-plate 66 mounted on bars 57. A brace plate 65' is secured on the ends of the upper T-bars 61 and on one L-bar 63.
40 45

The L-bars are positioned a short distance from the edges of the sheet just sufficient to allow for the primary vertical bending of the flanges. A pair of arms or bars 67 are mounted adjacent the outward sides of L-bars 63 and 64 and extend at an incline or slant upwardly rearwardly from bars 57, thereby effecting the primary upward bending of the flanges 36 and 37 of the sheet against the outward sides of the upper L-bars 63.
50 55

As shown in Fig. 12, two rollers 68 are mounted by two shafts 69 on cross-plate 66 and include each a main upper cylindrical portion whereby the flange is turned vertically, and a lower supporting disc portion 68', whereon the edge part of the sheet is supported, thereby completing the first part of the flanging operation.

A roller 71 is mounted on a shaft 72 extending from a plate 73 which is mounted by slot and bolt means 74 on a bracket 75 secured on one bar 57. Said roller engages the outer portion of flange 37 to turn it horizontally upon the upper angle portion of an L-bar 76 supported by means 77 upon bar 57. Resilient means 78 is connected to bracket 75 and to member 73 to hold roller 71 firmly upon the horizontal flange portion, but member 78 permits yielding movement of the roller 71 to enable the sheet with its cross-seam to pass therethru. This provides the intermedi-
60 65 70 75

ate step of the flanging operation on this flange 37.

As best shown in Fig. 14, the final flanging means includes two sets of rollers, one at each side of the sheet. One of the sets includes a supporting roller 81 mounted on a shaft 82 supported on a bracket 83 supported on beam 57, said roller supporting the edge part of the sheet thereon, and including a disc portion 84 engaging the outer side of flange 37 and having the horizontal portion 37' resting thereon. A roller 85 is mounted by a shaft 86 on a supporting sleeve 87 which is carried by a pivot member 88 in the upper forked part 89 of bracket 83 and it has a peripheral groove 90 adapted to engage the upper inward edge of flange 37 to hold it in position on disc 84. Means 91 is provided between bracket portion 89 and the supporting sleeve 87, to enable yielding of roller 85 for passage of a cross-seam. A roller 92 is mounted by shaft 93 on bracket 83 for turning down the edge portion 37' of the flange vertically at the outer side of the disc 84 of the roller 81. The other set of finishing rollers comprise a split roller including a lower supporting flange portion 95 and an upper flange portion 96 seated thereon by its hub portion 97, the same providing a peripheral groove therebetween and being mounted by a shaft 98 upon bar 57, a spring 99 being preferably provided upon the shaft 98 to enable upper part 96 with hub 97 to yield and move upward from the lower part 95 for letting the cross-seam pass therethru. A roller 100 is mounted on a shaft 101 supported on a bracket 102 mounted on bar 57; while a spring 103 is provided between the bracket 102 and a collar 104 on shaft 101, adapted to let shaft 101 yield in a slot 105 provided in bracket 102, thereby enabling the roller 100 to yield and accommodate the passing of the cross-seam thru this set of rollers. The upper flange portion 36' is thus formed between roller 100 and the upper roller part 96 to complete the flange 36.

As best shown in Figs. 6, 7, and 8, means is also provided for flattening the cross-seam whereby the adjoining ends 106 of two rolls 25 are connected, and this means preferably includes a pair of levers or beams 107 and 108 which are hingedly connected at one end, preferably by providing eye portions 109 thereon which engage slidably upon rod 110 which is swingably supported on one of the uprights 51 which support the roll of sheet metal. The opposite ends of said beams 107 and 108 have a lever 111 pivotally connected on one of them, as by a pivot pin 112, said lever having a roller 113 thereon which engages upon a cam or wedge portion 114 provided on the other beam 107, so that swinging of the lever 111 will enable forcing beam 107 down onto beam 108 and flatten the cross-seam therebetween. The beams can be separated and the supporting shaft 110 can be swung on the upright 51 so as to bring the shaft and the beams from the full line position shown in Fig. 5 to the dotted line position indicated, in order to place the flattening device out of the way. The beams can likewise be moved forwardly and backwardly on bar 110, so as to place the beams in the exact position where the bent ends 106 of two rolls have been interconnected and are located when the truck is stopped therefor.

I claim:

1. In the art of flanging the edges of elongated metal sheets for the covering of building and the like, a flanging device for flanging the sheet as it

passes thru the device from a supply of sheet metal, and a device adapted to be secured to the flanged end of the sheet which extends from the flanging device, one of said devices being moved away from the other to effect a drawing of the metal sheet material thru the flanging device for flanging its edges.

2. The subject matter set forth in claim 1, wherein said apparatus includes a carriage carrying said flanging device thereon and also carrying other means adjacent thereto for supporting a supply of sheet metal as it is drawn thru the flanging device, and either said carriage or else the device with the sheet-end is retained stationary while the other is being moved away therefrom in the flanging operation.

3. A sheet metal edge flanging apparatus comprising means to be secured to the end of a sheet of metal whereby to retain said end stationary, and movable means including means for flanging the edges of metal sheets and also means for supporting a supply of sheet metal adjacent said flanging means to pass therethru, whereby the moving of said flanging means and said supporting means away from said stationary sheet-end will effect the drawing of the sheet thru the flanging means and the flanging of the sheet thereby.

4. A sheet metal flanging apparatus comprising means to be secured to the free end of a roll of sheet metal and adapted to fasten said end to a stationary object, movable carrier means having means mounted thereon for flanging the edges of the metal sheet, and means on said carrier means for supporting a roll of sheet metal adjacent the flanging means to be drawn therethru, whereby the moving of said carrier means and roll away from said stationary end, will cause the unrolling of the roll and the drawing of the sheet thru the flanging means and the flanging of the edges of said sheet thereby.

5. A sheet metal flanging apparatus comprising a flanging device for flanging the opposite edges of sheet metal and provided with means for flattening a cross-seam produced by the interconnected bent ends of two rolls, a device to be secured to the flanged end of a sheet, means for mounting one of said devices on a vehicle, and means for securing the other of the said devices to a stationary object, whereby the sheet metal can be hauled in rolls to the job, and flanged by drawing it thru the flanging device and the cross-seams of joined sheet ends can be flattened to facilitate flanging in a continuous strip all the sheet metal that is required on the job.

6. A sheet metal flanging apparatus comprising a device for flanging the edges of sheet metal and being provided with means for flattening a cross-seam of interconnected sheet ends, a clamping device for clamping one end of the flanged sheet, a movable support having one of said devices adjustably mounted thereon and being adapted to carry a roll of sheet metal to be flanged on the job, and means for securing the other of said devices to a stationary object, whereby the sheet metal is flanged by drawing it thru the flanging device and can be hauled in rolls to the job, and the cross-seams of joined sheet ends can be flattened, to facilitate flanging at the job the entire amount of sheet metal required on that job.

7. A sheet metal flanging apparatus comprising a flanging device for flanging the edges of sheet metal for roofing purposes, a device to be secured to the flanged end of the sheet, for securing said end to a stationary object, and supporting means for mounting the flanging device

on a vehicle so that it can turn and tilt thereon, whereby the traveling of the supporting means with the vehicle can be utilized to flange the sheet metal and locate it on the ground, and the flanging device will automatically move into the right position on said supporting means.

8. A sheet metal flanging apparatus comprising a flanging device for flanging the opposite edges of sheet metal for roofing purposes, frame means for supporting said flanging device and whereby it is mountable on a vehicle to tilt and to swing thereon, a securing device for engaging the end of the preformed sheet metal and for securing it to a stationary object, whereby the moving of the vehicle with said frame means is utilized to flange the sheet metal and the flanging device will automatically adjust itself on the frame means to produce a straight pull on the sheet of metal, and the rolls of sheet metal can be hauled to the job where the exact amount required can be flanged for use.

9. The subject matter set forth in claim 8, wherein the flanging device has a flattening device adjustably mounted thereon and extendible across the sheet for flattening the cross-seam provided by the interconnected bent ends of two rolls.

10. A sheet metal flanging apparatus comprising a machine for flanging the opposite edge portions of sheet metal, to make said portions interconnectable for roofing purposes, movable frame means whereon said machine is secured and is provided with means to enable tilting and swinging of the machine relative thereto, means to be secured to the free end of the sheet, and means on the frame means for supporting a roll of sheet metal to have its edges flanged by being drawn thru the machine, whereby the free end of a roll of sheet metal can be fastened to a stationary object and the frame means with the flanging machine driven away from the object for flanging the sheet metal out on that job.

11. In a sheet metal flanging apparatus, frame means provided with means thereon to support a roll of sheet metal in position for unrolling, guiding means on the frame means to guide and steady the sheets, slanting bars on the frame means positioned tilted at the edge parts of the plane of travel of the sheet for producing a primary bend on the edge portions, roller means to complete the primary vertical bending of the flanges, intermediate bending means to bend a part of one vertical flange horizontally, and final flanging rollers including rollers to further bend the outer part of the other vertical flange horizontally, adapting adjoining sheets to have their flanges interconnected and seamed for roofing purposes.

12. In a sheet metal flanging apparatus, a flanging machine comprising frame means whereby said machine is supported, spaced guide members thereon for guiding and steadying the sheet at both edges, slanting bars for primarily tilting the opposite edges, roller means at both edges to complete the primary flanging step and turn the edges vertically, intermediate bending means including roller means for turning the outer part of one vertical flange horizontally, and a double set of final flanging rollers, one set including cooperating rollers for turning the outer edge of said horizontal flange vertically, forming a channel portion, and the other set including cooperating rollers for turning the outer edge of the other vertical flange horizontally inwardly, thereby adapting the flanges of adjoining sheets to be interengaged and seamed in laying the same.

13. In a sheet metal flanging apparatus, a flanging machine comprising a frame whereby said machine is swingably and tiltably supported, means on the frame for supporting a roll of sheet metal to be flanged, spaced guide plates for guiding the sheet and steadying it at both edges, slanting bars beyond said guide plates for primarily turning the opposite edges of the sheet, means including a pair of rollers arranged to support the edge portions of the sheet and to direct the turned edges vertically, intermediate bending means including a roller for turning the outer part of one vertical flange horizontally outwardly, and a double set of final flanging rollers, one set including a supporting roller and a tilted roller with grooved periphery bearing against the inner edge of the flange, also a roller for turning the outer portion of the horizontal flange vertically, and the other set of rollers including a roller with a channeled periphery and a cooperating roller acting in said channel to bend the outer portion of the vertical flange horizontally inwardly, thereby adapting the flanged edges of adjoining sheets to be interconnected.

14. The subject matter set forth in claim 13, wherein several of the rollers are mounted to be automatically adjustable to accommodate sheet metal with cross-seams.

15. In a sheet metal flanging apparatus, a flanging machine comprising a supporting frame and means thereon for supporting a roll of sheet metal, means on the frame for flanging both side edges of the sheet, said means including resiliently mounted flange forming means to facilitate passage therethru of sheets having their adjoining ends connected by a cross-seam, and means on the frame adapted to extend across the sheet between said roll supporting means and said flanging means, operable for flattening said cross-seams.

16. In a sheet metal flanging apparatus, a flanging machine comprising a supporting frame, means on the frame including an upright for supporting a roll of sheet metal, means on the frame for flanging the edges of the sheet metal and including flange forming means automatically adjustable to facilitate passage therethru of sheet ends connected by a cross-seam, and seam flattening means including a rod mounted on said upright and a pair of cooperating bar members extending across the sheet and movable longitudinally on said rod to the cross-seam, adapted to clasp the cross-seam therebetween for compressing the same.

17. The subject matter set forth in claim 16, wherein said flattening means includes a pair of beams hinged together on the rod and having a lever for forcing said beams together on the cross-seam to compress the same, said beams being separable and swingable with said rod on the frame out of the way.

18. In an apparatus for flanging the edges of sheet metal, a device for clamping the end of the flanged sheet including a pair of cross-beams hingedly connected at one end, there being pockets provided between the two ends of the beams for receiving the edge flanges of the sheet, and means on the pair of beams for drawing them together to clamp the sheet therebetween.

19. In an apparatus for flanging the edges of sheet metal, a device for clamping one end of the sheet including a pair of cross-beams and hinge means connecting them at one end, there being cut-out portions to provide a pair of pockets at the two ends of the beams to accommo-

date the edge flanges of the sheet, means extending thru the beam ends opposite the hinge means for forcing them together on the sheet, and means centrally of the beams whereby to secure 5 them to a stationary object.

20. The subject matter set forth in claim 19, wherein the hinge means consists of an ordinary

hinge and said centrally connected means consists of a pair of U-bolts, one on each beam, and the means for drawing or forcing the beams together consists of a bolt, thereby providing an economical but strong and effective sheet clamp- 5 ing device.

CARL R. SCHLICHT.